Report on medical & health work in the Sudan.

REPORT

ON

MEDICAL & HEALTH WORK

IN

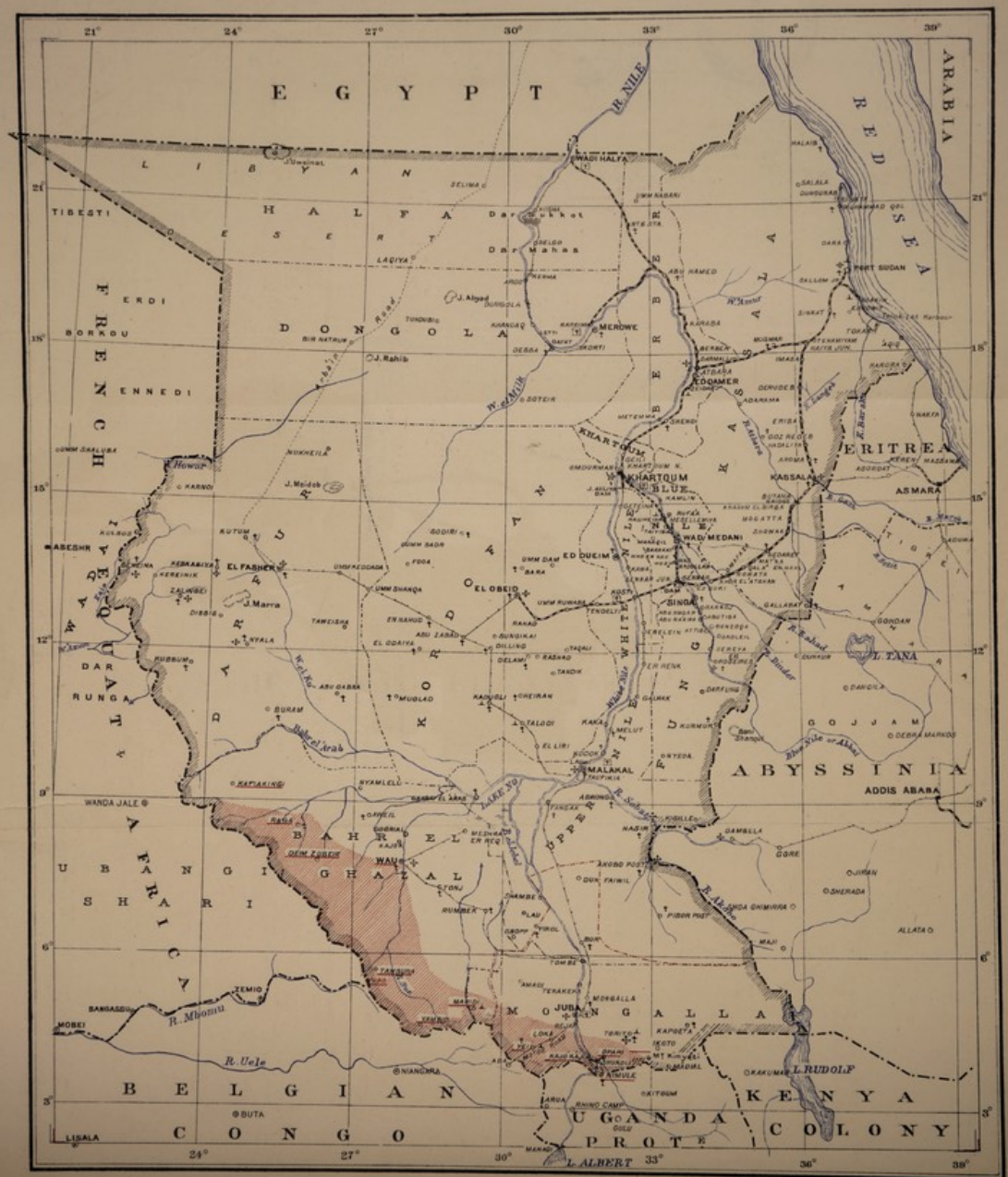
THE SUDAN

FOR THE YEAR

1932

McCorquodale & Co. (Sudan), Limited, Khartoum.

THE ANGLO EGYPTIAN SUDAN



REPORT

ON

MEDICAL & HEALTH WORK

IN

THE SUDAN

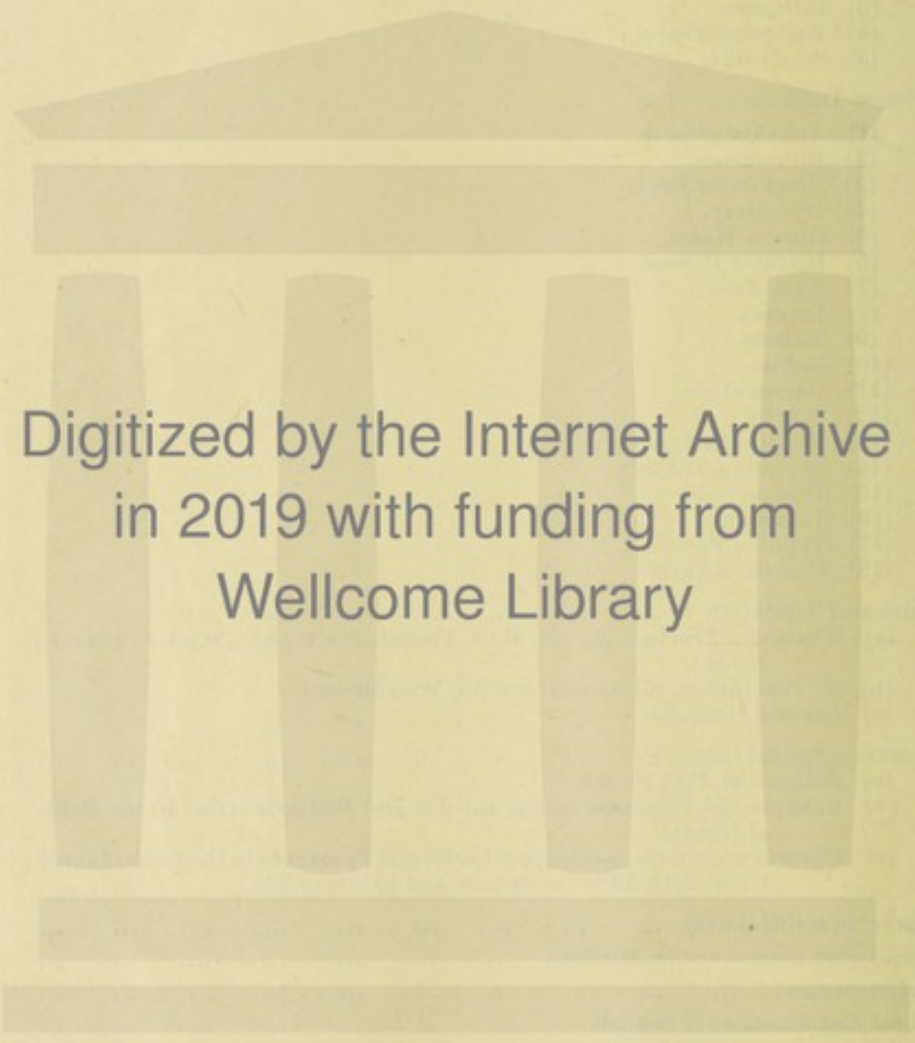
FOR THE YEAR

1932

McCorquodale & Co. (Sudan), Limited, Khartoum.

ANNUAL REPORT 1932.

SUDAN MEDICAL SERVICE.



GENERAL REMARKS.

GENERAL HEALTH OF THE SUDAN.

With the exception of a severe outbreak of Cerebro-Spinal Meningitis in the Nuba Mountains and a smaller one in the Blue Nile Province, in both cases in the early part of the year, the Sudan was remarkably free from serious epidemic outbreaks. Diphtheria continued to be endemic in Khartoum and Halfa Provinces and as usual scattered epidemic outbreaks occurred in Halfa Province as a result of infection from Egypt.

The rains were exceptionally heavy in the central Sudan and Malaria showed an increased incidence in this area during the latter part of the year. In the Upper Nile valley the high and long sustained flood gave rise to similar conditions

The durra crop was good throughout most parts of the Sudan and the heavy rains brought good grazing and provided in abundance the natural salads that form an important part in the diet of the less sophisticated natives. This plentiful supply of grain and milk and wild salad improved the general condition of the people and placed them in a favourable condition to resist disease.

HEALTH OF KHARTOUM AND OMDURMAN.

The health of these towns showed a general improvement on that of last year. No epidemic outbreak occurred and there was a decline in the incidence of Diphtheria, Bacillary Dysentery, and the Enteric Fevers. On the other hand there was a considerable increase in the new cases of Pulmonary Tuberculosis reported. This increase is attributable to the continued economic depression and to the malnutrition and overcrowding that has resulted. Overcrowding in certain parts of the city is on the increase, due to subletting a portion of a house to a separate family, or to taking in lodgers. The matter is receiving careful attention.

The sanitation and conservancy of Khartoum and Khartoum North continue to be satisfactory, but Omdurman and the villages immediately round Khartoum await the provision of an adequate conservancy system. The solution is likely to be found in the provision of deep pit latrines for every house. The matter is one of urgency, and as regards Omdurman some progress in this direction has already been made.

Considerable progress has been made during the year in extending and systematising the inspection of school children and ensuring effective treatment. Further progress is anticipated during the ensuing year.

HEALTH OF OFFICIALS.

The health of all classes of officials showed an improvement over that of 1931.

Nationality	No. of officials employed	Total		Average days sickness		Died	Invalided
		Placed on sick list	No. of days sick	For all officials	For those who were sick		
British	785	187	1616	2.05	8.64	5	5
Sudanese	2622	612	4590	1.75	7.5	5	5
Egyptians	778	73	652	0.84	8.9	1	2
Syrians	78	8	69	0.8	8.6	1	2

The average number of days lost per British official is 2.05 for 1932 as against 2.46 for 1931, and there was a loss by death of five officials against eight in 1931. The loss from invaliding remained the same.

The average number of days lost per Sudanese official shows an increase from 1.7 to 1.75 but this is more than compensated by a fall, in the loss by death from 13 to 5 and in the loss by invaliding from 7 to 5. Similarly the figures both for Syrian and Egyptian officials show an improvement over those of last year.

Assuming that British officials work for nine complete months in the year, which is actually an overestimate, the total number of days' sickness lost in 1932 is equivalent to the loss of the work of 5.9 officials and compares with previous years as follows :—

1929	1930	1931	1932
16.0	6.3	8.5	5.9

The great importance to the Government of this high standard of health, both administratively and financially, need not be emphasised, but it is important to remember that it is directly dependent on the existence of an adequate, highly trained, and efficient Medical Service and is only maintained by the most meticulous care of the official and his environment, on the railway, on steamers, and in his various stations from the time he enters the country until he leaves it.

The following table shows the number of days lost by officials in the various provinces :—

Province.	British.		Sudanese.		Egyptian.	
	1931	1932	1931	1932	1931	1932
Bahr-el-Ghazal	3.3	2.5	1.4	1.5	4.8	1.5
Berber	1.1	0.64	0.4	0.4	0 4	0.6
Blue Nile	1.4	2.06	1 0	2.1	2 2	1 2
Darfur	2.9	0.82	0.1	2.2	5.8	—
Dongola	1.8	0.42	2.0	2.2	0.7	—
Fung	1.7	6.0	1.3	1.2	2.3	0.17
Halfa	0.7	—	1.9	0.55	1.6	1.05
Kassala	0.8	0 8	2.9	1.3	0.7	0.2
Kordofan	1 7	3.0	0.9	1.6	1.0	0.3
Mongalla	1.7	3.1	6 3	2.5	3.9	1.0
Port Sudan and Suakin	1 8	0.7	1.7	0 4	0 9	1.1
Upper Nile	3.7	3.0	1.2	1.7	1 0	1.8
White Nile	1.0	0.4	2.3	1.2	2.0	0.8

It would be unwise to draw any conclusion as to the relative health of provinces from this table as the numbers concerned are small and as a single accident or prolonged illness may send up the sick rate for a province. But an average taken over a period of years might afford a useful guide on this point.

ENDEMIC DISEASES.

(1) Ankylostomiasis.

With the exception of Halfa and Dongola Provinces which are the two provinces most in contact with Egypt this disease is not endemic in the northern and central Sudan.

Evidence is accumulating to show that the disease is endemic in certain areas of the southern Sudan. This is particularly the case with regard to the Yei and Kajo-Kaji districts of Mongalla Province where certain elements of the population are heavily infected. (See p. 7).

(2) Bilharziasis.

The position with regard to Bilharzia infection of the Irrigated Area of the Gezira is somewhat less discouraging than last year, but six blocks still show evidence of mild endemic infection. It is most important to deal with the situation effectively so as to prevent the gradual increase and spread of the disease which would inevitably end in a heavy endemic infection comparable to that of the Nile Delta, but complicated in this case by seasonal Malaria. (See p. 8).

(3) Blackwater Fever.

There was a considerable increase in the incidence of this disease over that of the previous three years. This increase corresponds to a general increase of the Malaria rate throughout the central and southern Sudan, and to a higher relative incidence of the malignant type of the disease in certain provinces. (See p. 15).

(4) Leprosy.

Fuller information has been obtained as to the incidence and distribution of this disease in the Sudan, but accurate information is still lacking as regards certain districts. The available information seems to indicate a relationship between diet and the incidence of this disease.

A comparison between treated and untreated cases appears to indicate a rather more favourable progress in treated cases. (See p. 21).

(5) Sleeping Sickness.

No cases of this disease occurred in Mongalla Sleeping Sickness area—this is now the fifth year that this province has been free from indigenous cases of Sleeping Sickness.

In the Bahr-el-Ghazal Sleeping Sickness area the number of new cases discovered increased from 61 in 1931 to 63 in 1932. The circumstances which lead to a recrudescence of this disease have been rectified and it is hoped that a decrease of new cases will now take place.

A commencement has been made in the establishment of a network of dispensaries with a view to winning the confidence of the people in medical work and to obtaining early information as to the existence of disease. (See p. 30.)

(6) Tuberculosis.

The percentage rate of admissions for Pulmonary Tuberculosis in relation to total admissions for all diseases is slightly higher than that of last year, but lower than that of all previous years with the exception of 1928 when the rate was the same as in 1931. (See p. 36.)

(2) EPIDEMIC DISEASES.

(1) CEREBRO-SPINAL MENINGITIS.

During the year 532 cases of this disease with 384 deaths were reported. The incidence for the last six years is :—

	Cases.	Deaths.
1927	428	242
1928	335	274
1929	464	340
1930	865	665
1931	348	240
1932	532	384

Cerebro-spinal Meningitis occurred in epidemic form in the Nuba Mountains and in the Blue Nile Province. A few sporadic cases occurred in most of the other provinces.

Nuba Mountains.

In mid-January the disease appeared in epidemic form at Fungor and spread rapidly to the neighbouring hills. In view of the seriousness of the epidemic all huts were evacuated and the people were compelled to camp in the open. The epidemic then subsided. 354 cases were reported with 265 deaths but these figures are incomplete. The mortality rate was exceptionally high among children. A large number of the children showed signs and symptoms of lobular Pneumonia combined with doubtful head rigidity. This was also noted during the Khartoum epidemic in1931.

The villages and huts in the Nuba Mountains are more congested than any where else in the Sudan.

Blue Nile Province.

An epidemic of this disease occurred in Wad Medani and the surrounding villages. 106 cases occurred with 70 deaths. The epidemic commenced in March and terminated in June with the onset of the rains. Of the 106 cases 59 occurred among prisoners and 30 were day labourers. The early cases of the epidemic were of a fulminating septicaemic type frequently with no meningitis symptoms beyond headache. Meningococci were found in the blood culture of two such cases.

(2) DIPHTHERIA.

138 cases occurred during the year with twenty nine deaths. This compares with 183 in 1931 and 68 in 1930.

This disease continued to be endemic in Khartoum and Omdurman and in the northern villages of Halfa Province near to the Egyptian border.

The epidemic which broke out in the Halfa cataract country in January, 1931, was brought to a close in April, 1932.

Sporadic cases occurred in several provinces.

(3) INFLUENZA.

Influenza occurred widely during the winter months, but was mild in type. 685 cases were reported with only two deaths. The disease was epidemic in the Bahr-el-Ghazal, Berber, Kassala, Khartoum and Mongalla Provinces and in Port Sudan town.

(4) RELAPSING FEVER.

A small outbreak of this disease—18 cases—occurred in the Blue Nile Province among immigrant labourers. Sporadic cases were noted from several other provinces.

(5) SMALL POX.

Several thousand cases of this disease are said to have occurred among the Bul Nuers in their inaccessible marsh country. The disease was extremely mild in type and no deaths had occurred. In view of these facts it was decided to treat the disease as a useful measure of natural vaccination. The decision was justified by the absence of any fatal cases.

With this exception the incidence of Small-Pox was very low throughout the country. Forty-seven cases only were reported, with two deaths. One of these deaths occurred in quarantine at Wadi-Halfa in a case imported from Alexandria. The other 46 cases were distributed among five provinces.

(3) ENDEMIC DISEASES.

(1) ANKYLOSTOMIASIS.

NORTHERN AND CENTRAL SUDAN.

Ankylostomiasis is endemic in Halfa and Dongola Provinces. In Halfa district, the area nearest to Egypt, the school infection rate varies between 4 per cent. and 6.7 per cent. In Dongola Province the school infection rate is 0.67 per cent. In the rest of the northern and central Sudan Ankylostomiasis is non-existent as an endemic disease.

A careful watch for this disease has been kept in the Irrigated Area of the Gezira where it was thought that as a result of irrigation, soil conditions might be established which would favour the endemicity of thisn disease, but up to the present no evidence of endemicity in this area has been discovered.

SOUTHERN SUDAN.

Evidence is accumulating to show that this disease is endemic in considerable areas of the southern Sudan.

Bahr-el-Ghazal Province.

In Wau hospital 21 cases were treated for this disease. Thirteen of these cases were Dinkas from the eastern Bahr-el-Ghazal and eight were from the mixed tribes around Wau. In Tembura hospital 87 consecutive cases suffering from other diseases were examined for Ankylostoma infection and eggs were found in the stools of 52.8 per cent. of those examined. Similarly in 100 lepers examined, eggs' were found in the stools of 48 per cent.

Mongalla Province.

In Juba hospital out of 1,302 admissions, 74 were found to be infected with Ankylostoma, *i.e.*, a percentage rate of 5.67 per cent. These infections were chiefly among the Bari tribe.

The Yei and Kajo-Kaji districts are endemic areas and in particular the Fugilu tribe in the Yei district is known to be heavily infected.

(2) BILHARZIASIS.

Bilharzia is mildly endemic in most of the provinces of the northern and central Sudan but, excepting in the Irrigated Area, the infection is only seasonal

and the constitutional effects are not serious. The White Nile Province is a partial exception to this statement as in that province the infection (which is rectal in type) takes place during a considerable part of the year, and the constitutional effects, when left to run their course, result in marked debility.

Purely seasonal infections are not serious in themselves, whereas the ultimate effects of perennial infections on the population affected are very grave.

The preservation of the Irrigated Area of the Gezira with its thousands of miles of canals is a matter of paramount importance; it is perhaps the most important health problem that the Sudan has to face, because the prosperity and even the solvency of the Sudan is dependent on the health and efficiency of the inhabitants of this area.

Bilharzia is important to the Sudan in so far as it is a danger to the Irrigated Area of the Gezira. It is in the light of these considerations that the Bilharzia question is dealt with in the Sudan.

BLUE NILE PROVINCE (Irrigated Area).

The position in this area as regards endemic infection was reported on last year as being discouraging. This year the outlook is somewhat more hopeful. If the policy of providing proper latrine accommodation for this thickly populated area is energetically and steadily pursued, and the special measures now in force, maintained, it should be possible to eliminate endemic infection from these infected blocks in the course of a few years.

In 1930 a policy was foreshadowed of :—

(i) Establishing auger-bore latrines, close to the canals, at points near villages.

(ii) The gradual installation of auger-bore latrines in individual huts in villages.

This programme of work has been delayed owing to the stress of economic conditions and up to the present it has only been carried out on a limited and experimental scale, but in so far as carried out it has been useful as a guide to future effort and as an indication of the results likely to be obtained.

As a result of this experimental work it has been definitely established that, under Sudan conditions, and particularly in the Gezira, the deep pit latrine, dug to a sufficient depth and properly seated and covered, is the cheapest and most efficient type for public latrines and that under Gezira conditions the deep pit latrine, properly constructed, is generally speaking the most useful and economical latrine for private houses.

In view of the density of the population and the proximity of the canals the provision of a latrine for each separate hut must be considered an essential measure of prophylaxis, but it cannot be carried out generally until the villages, which are for the most part disordered agglomerations of huts closely huddled together, are properly laid out, allotting to each hut or house, a yard of its own. Up to the present it has not been found possible to take effective action in this matter.

A Bilharzia survey of the original 300,000 acres, the area previously surveyed and the only area found to harbour indigenous cases of this disease, was carried out at the end of the year. The results are as follows :—

Year.	Local Natives.						Sudan Immigrants.			Foreign Immigrants.		
	Adults.			Children.								
	No. examined	No. infted.	%	No. examined	No. infted	%	No. examined	No. infted	%	No. examined	No. infted	%
1929	9431	71	0.75	2341	37	1.6	6976	281	4.0	2691	312	11.6
1930	8783	6	0.07	3322	20	0.57	8246	60	0.72	5253	61	1.16
1931	11102	84	0.75	6895	51	0.73	4237	167	0.39	2925	231	7.8
1932	9618	51	0.53	1707	19	1.1	2265	91	4.0	2961	118	4.0

This shows :—

(i) A slight increase in the percentage of children infected.

(ii) that in spite of quarantine measures and local treatment there are still considerable numbers of immigrants infected with this disease and liable to infect the canals,

(iii) that the foreign immigrants still present a great danger to canal infection.

It is noteworthy that of the Sudanese immigrants, one third come from Darfur, whilst the percentage of infection is highest among natives of the Fung Province, who escape quarantine and where Bilharzia work has only recently been undertaken.

The following table shows the number of children locally infected in the various blocks concerned. Under 1932 the cases are classified under the affected villages of the block :—

Block.	1929	1930	1931	1932		
				Total	Infected villages.	Cases found
Barakat	3	—	7	—	—	—
Wad-Atyah ...	2	—	1	3	Rewina ...	2
,, ,, ...	—	—	—	—	Kilo 77 ...	1
Ghubshan	3	—	2	—	—	—
Derwish	—	1	2	4	Derwish ...	1
,, ...	—	—	—	—	Saad-el-Shafie ...	3
Tayiba	—	—	5	—	—	—
Nidiana	—	—	2	—	—	—
Wad-Hussein ...	—	—	2	—	—	—
Wad-el-Bur ...	—	—	1	—	—	—
Hamad-el-Nil ...	—	—	3	—	—	—
Hosh	4	—	2	—	—	—
Remitab	4	—	1	3	Wad-el-Amri ...	1
,, ...	—	—	—	—	Remitab ...	1
,, ...	—	—	—	—	Ala Kefak ...	1
Medina	2	1	1	1	Medina	1

Block	1929	1930	1931	1932		
				Total	Infected villages	Cases found
Abdel Galil	3	1	6	—	—	—
Saadalla	8	9	13	1	Shubra ...	1
Wad Sulfab ...	—	—	2	—	—	—
Tabat	—	—	1	—	—	—
Tebub	1	8	—	1	Um-Dueina ...	1
Abdel Rahman ...	2	—	—	2	Wad-el-Sayed ...	1
,, ,, ...	—	—	—	—	El-Goz	1
Seleimi	5	—	—	—	—	—
Radma	—	—	—	3	El-Shileikha ...	1
,, ...	—	—	—	—	Abu Higer ...	1
,, ...	—	—	—	—	El Tukol ...	1
Wad Naman... ...	—	—	—	1	Wad Naman ...	1
TOTAL	37	20	51	19		19

Locally infected children are considered to be the most useful indication of endemic infection. By this criterion nine blocks are still infected and the infection is distributed among 16 villages harbouring 19 infected children.

The measures adopted were the same as previous years, *i.e.*

(i) the quarantine and cure of all infected immigrant Westerners before they enter the Irrigated Area,

(ii) the detection and cure of all persons in the Irrigated Area infected with Bilharzia, whether local natives or immigrants,

(iii) propaganda,

(iv) regulations to prevent the contamination of the canals,

(v) snail destruction in infected canals.

In the case of three heavily-infected villages public latrines were installed between the villages and the canals with excellent results.

It is important to realise that this continued struggle to keep thousands of miles of canals free from infection is a tour de force and cannot be indefinitely maintained. A permanent natural solution must be arrived at. The inhabitants of this limited area of 1,111 square miles, number approximately 200,000 *i.e.* nearly 200 to the square mile, while the population density in Belgium with its big industrial towns and teeming villages is only 665 to the square mile, yet in the whole irrigated area there is practically no provision for native latrines. Dangerous contamination of soil and water is therefore inevitable.

The first step to this permanent solution is the provision of public latrines close to every village, between the villages and the neighbouring canals.

The second step is to provide a proper layout of every village ensuring to each house its own yard, and its own latrine. When this is achieved it will be

possible to look forward with reasonable hope to this area being permanently saved from becoming an endemic Bilharzia area with its grave attendant consequences, the loss of the health and the working capacity of the people.

NOTES ON THE HABITS OF SNAILS INFESTING GEZIRA CANAL SYSTEM.

An interesting report was received from Mr. Jane, one of the Sanitary Inspectors stationed in the Irrigated area, giving facts as to the life history and habits of the Bullinus snails infesting the canals of the Gezira. A very short summary of the results of these observations and experiments is given below :—

(1) Breeding takes place throughout the year, but not continuously in any one canal.

(2) The number of snails in canals increases from July to April, *i.e.* in the cooler weather, and decreases in May and June, *i.e.* the hot months.

(3) Snails can live on the slime that forms on objects remaining in water, and green vegetation is not a necessity.

(4) Snails are found mostly in the tails of the minor canals.

(5) Snails can float on the surface of the water at will, and are often carried in this way for considerable distances by the wind or current.

(6) Snails appear to be unable to burrow in soft mud, but they do insinuate themselves into small holes and crevices, thus getting as much as an inch below the surface.

(7) Snails under certain conditions can seal up the opening of their shells with a glutinous secretion.

(8) Snails cannot travel more than a few inches to reach water.

(9) When the level of a canal is lowered, many snails are dried out and killed but snails may survive in the sun for as long as three days.

(10) Snails can survive as long as 27 days in dry mud.

(11) Snails may live for 17 days without getting into crevices if they are sheltered from the sun.

(12) Within 48 hours of rain-water accumulating in a canal which previously had been without water for 31 days and quite dry for 21 days, snails made their appearance and also spawned.

(13) Ialine (Prince Regent) 1 in 50,000 was found to be the most effective molluscicide.

(14) Snails cannot be considered to be dead until they have had a period of four days in water to revive.

BILHARZIA QUARANTINE (White Nile Province).

Quarantine stations are established at Kosti and El-Dueim with a view to preventing infected western immigrants, entering the Gezira until they have been cured of the disease.

There was a further decrease in the number of western immigrants passing through these quarantine stations :—

The numbers for 1932 were as follows :—

	El-Dueim.	Kosti.	Total.
Number examined	1,451	6,868	8,319
Number infected	214	956	1,170
Number cured	107	796	903

BILHARZIA AMONG PILGRIMS.

The urine of 770 men, 501 women and 132 children, pilgrims admitted to the quarantine camp on their return from the Hedjaz, were examined for evidences of Bilharzia. Out of those 1,403 persons 55 or 3.9% were found to be infected with Bilharzia.

Only one of those infected, a man, was a Sudanese pilgrim, the remainder were West Africans.

The following table gives the figures for the last four years :—

Year	Infection Rate	
	Sudanese %	West Africans %
1929	18.0	82.0
1930	17.0	83.0
1931	10.0	90.0
1932	0.1	99.9

This would appear to indicate that the incidence of Bllharzia is diminishing among Sudanese pilgrims, while the incidence among West Africans is little altered, and this latter in spite of the quarantine stations on the White Nile.

BERBER PROVINCE.

The three Bilharzia-infected pump irrigation estates show a markedly diminished infection rate. This may be attributed to the energetic and systematic action taken by the local medical authorities.

When once Bilharzia has established itself in an irrigated area it is very hard to get rid of it, and it is possible that these pump irrigation farms will not

be finally freed from this disease until pit latrines are installed in all the villages affected.

Infected snails were this year for the first time found in some of the canals at Zeidab. In spite of the fact that the estates to the north and south of Zeidab have been heavily affected, this large estate has previously escaped infection. The infected canals have been carefully treated with molluscicide and it is hoped that they are now free from infection.

DONGOLA PROVINCE.

The position as regards Bilharzia infection does not seem to have altered appreciably since last year. The infection rate is slightly higher than it was in 1931, but an increasing number of cases come forward voluntarily for treatment and as these, who are 100%infected, are included in the cases examined a fictitious increase may be caused or possibly a diminution masked.

The following table shows the numbers examined, infected and treated over the last seven years :—

Year.	No. examined.	Infections.	Percentage.	No. treated.
1926	20,400	3,550	17.0	3,300
1927	11,376	1,829	16.0	1,199
1928	12,213	2,259	18.0	1,480
1929	17,925	2,187	12.0	1,607
1930	26,094	2,443	09.3	1,969
1931	37,405	1,765	4.6	1,182
1932	49,077	2,470	5.0	2,073

Reinfection of Treated Cases.

1,141 cases who had received a course of treatment at least one year previously were examined for evidence of recurrence or reinfection. Bilharzia ova were detected in 165 cases, i.e. 14.4%. It is believed that these are reinfections rather than recurrences.

Reinfection rates for last five years :—

1928	19.0
1929	31.0
1930	30.0
1931	6.1
1932	14.4

Sex Incidence.

Examinations of 4,302 females (including school girls) gave an infection rate of 0.85 while an examination of school boys gave a percentage of 11.5 The lower infection among girls is due to the fact that the girls are kept much more in the houses and do not bathe in pools and canals.

The age incidence is shewn in the following table under four groups :—

Group (a) under 5 years.
(b) 5-10 years.
(c) 10-15 years.
(d) 16 and upwards.

	(a)	(b)	(c)	(d)
No. examined	6,646	10,215	11,234	19,130
Infections	279	,722	,230	,420
Percentage	4.2%	7.0%	2.0%	2.0%

The age incidence for the last four years is as follows :—

Year.	(a)	(b)	(c)	(d)
1929	13.0	20.0	23.0	12.0
1930	6.4	18.0	17.0	8.0
1931	6.0	7.6	4.6	3.1
1932	4.2	7.0	2.0	2.0

Irrigated Areas.

There are four Government pumps in this Province. The infection rate for the population living in or near to these irrigated areas since 1927 is as follows :—

Year.	Nuri.	Gureir.	Mansurkoti	Ghaba.
1927	30.0	40.9	—	36.0
1928	32.0	47.0	—	23.0
1929	15.0	18.0	—	23.0
1930	14.4	26.0	9.0	12.0
1931	4.3	8.7	1.4	—
1932	8.1	7.5	0.29	6.9

These pumping stations represent limited although highly infected areas. Since 1926 organised measures have been taken to eliminate Bilharzia infection from these areas by :—

(i) Systematic destruction of the snail population.

(ii) Propaganda against bathing and against infecting the canals.

(iii) Systematic treatment of infected persons.

In spite of these seven years of careful anti-bilharzial measures the pumping schemes remain infected, and although the infection incidence has considerably diminished there is little doubt that were the prophylactic measures to be relaxed the infection rate would in a few years be as heavy as before.

This serves to emphasise the extreme difficulty of eliminating this disease from any irrigated area where it has firmly established itself. While success is so difficult in these small defined areas it would be almost impossible were the disease to become firmly established in a large irrigated area such as the Irrigated Area of the Gezira.

WHITE NILE PROVINCE.

With the exception of an endemic centre of urinary Bilharzia at Abu Duloh near Jebelein, due to infection from a Fula (rain water lake), the disease in this province is of the rectal type and infection takes place from the shallow water on the river banks or from inlets from the river. The school examinations show some diminished incidence. This improvement is attributed to the provision of a well water supply in certain villages so as to obviate the use of river water for drinking and washing purposes, and to a less extent also to the treatment of infected persons at dispensaries. There is an urgent need for a further increase in the number of village wells.

In the absence of a Medical Inspector throughout the year no further observations as to the time and method of infection and no systematic treatment of river inlets opposite villages have been carried out.

(3) BLACKWATER FEVER.

A total of 66 cases occurred in 1932 with 23 deaths. This is an increase on the previous three years and corresponds with a general increase of malarial prevalence in the central and southern Sudan.

The totals for the last four years are as follows :—

Year.	Cases.	Deaths.
1929	30	8
1930	20	6
1931	43	20
1932	66	23

Of the 66 cases occurring in 1932 the race incidence is as follows :—

	Cases.	Deaths.
British	6	—
Egyptian	6	2
Greek	5	1
Italian	7	—
Sudanese	38	19
Syrian	2	1
Abyssinian	1	—
West African	1	—
	66	23

PROVINCE.	STATION.	NATIONALITY.	RESULT.
Bahr-el-Ghazal	Wau	British	Recovered.
	,,	Italian (M)	,,
	,,	,, (F)	,,
	—	,, (F)	,,
	—	,, (F)	,,
	—	,, (M)	,,
	—	,, (M)	,,
	—	,, (M)	,,
	Wau	Egyptian	,,
	,,	,,	,,
	,,	Mahasi	Died
	,,	,,	,,
	Rumbek	Awabi	Recovered.
Berber	Atbara	Bedairi	,,
	,,	Rubatabi	,,
Blue Nile	Sennar	Egyptian	,,
	,,	Fellata	,,
	,,	Shaigi	,,
	,,	,,	Died
	Wad Medani	Bidairi	,,
	,,	Gaafari	,,
	,,	Mahasi	,,
Darfur	El Fasher	Sudanese	,,
	,,	,,	,,
	Nyala	,,	,,
	Um Keddada	,,	Recovered.
	Buram	,,	,,
Fung	Roseires	Greek	,,
Kassala	Gedaref	Shaigi	Died
	Kassala	Hadendawi	,,
	,,	Shaigi	,,
	,,	,,	,,
	,,	Suakini	,,
	,,	Dongolawi	Recovered.
	,,	British	,,
Khartoum	Khartoum	Sudanese	Died
Kordofan	Kadugli	Greek	Recovered.
	El-Obeid	Muwalled	,,
	,,	Australian	,,
	,,	,,	,,
	,,	Fadlawi	,,
	,,	Dongolawi	Died.
	,,	Gaali	,,
	Nahud	Syrian	Recovered.
	Dilling	Nubawi	Died.
	Talodi	Syrian	,,
Mongalla	Meridi	Latukawi	Recovered.
	,,	Dongolawi	,,
	Juba	British	,,
	,,	Mahasi	,,
	,,	Abyssinian	,,
	,,	Greek	Died.
	Torit	,,	Recovered.
Upper Nile	Pibor mouth	Egyptian	Died.
	Yirrol	Awadi	Recovered.
	,,	Dongolawi	,,
	,,	Mahasi	Died.
	Malakal	Egyptian	Died.
	,,	,,	Recovered.
	,,	Greek	,,
	,,	Berberi	,,
	,,	,,	,,
	Bor	British	,,
White Nile	Tendelti	Gaali	,,
	El-Dueim.	Muwallad	,,
	,,	Sudanese	,,

Thus out of a total of 66 cases, 39 cases with eight deaths occurred south of the 12th. parallel and 31 cases with fifteen deaths occurred north of the 12th. parallel.

The percentage of cases occurring south of the 12th. parallel for the last three years is as follows :—

1930-45% 1931-60% 1932-59%

Of the 28 non-Sudanese cases all but four occurred south of the 12th parallel.

Of the Sudanese cases only two were born south of the12th parallel and these were (1) a Latuka servant from Mongalla Province and (ii) a Nuba clerk from the Gebels south of Dilling.

Of the 36 cases among natives of the northern Sudan 13 contracted the disease south of the 12th parallel.

It is noticeable that seven cases of this disease occurred in a total of 78 fathers and sisters of the Italian Mission working in the Bahr-el-Ghazal Province.

(4) DYSENTERY.

A total of 1, 747 cases were admitted to hospitals of which 1,500 were Amoebic and 247 Bacillary.

The largest number of Bacillary cases were reported from Khartoum Province and the Irrigated Area of the Gezira, districts where there is a considerable European element. A localised epidemic of Amoebic Dysentery occurred in the Nuba Mountains of Kordofan Province. 74 cases, with 38 deaths were recorded, but are not included in the total figure given above as they were not admitted to hospital.

In Kassala Province the incidence of Dysentery is relatively very high among the Abyssinian immigrants and in the Blue Nile Province there is a relatively high incidence among the immigrants from the west.

There has been a decrease in the Dysentery incidence in the larger towns, Khartoum, Wad Medani and Port Sudan, attributable to the routine use of an adequate quantity of disinfectant in the bottom of the buckets. The native does not use sand or earth in his bucket and the use of disinfectant diminishes the transmission of infection by flies. In the smaller towns and villages and particularly in the thickly populated irrigated area a lowered incidence of this disease cannot be anticipated until adequate latrine accommodation is provided.

The following table shows the admissions to hospitals for each of these two diseases, given as percentage of the total admissions for all causes, for 1932 and the preceding six years :—

	1926	1927	1928	1929	1930	1931	1932
Amoebic Dysentery	2.47	3.29	3.40	3.02	2.68	3.28	2.51
Bacillary Dysentery	1.23	1.21	0.80	0.75	0.37	0.41	0.41
Total	3.70	4.50	4.20	3.77	3.05	3.69	2.92

(5) GUINEA WORM.

With the exception of Yaws and Tropical Ulcer this disease is the commonest cause of invalidism in the southern provinces. In the course of the year 998 cases were reported ; of these more than half were reported from Mongalla Province. In every case the disease was contracted south of the 12th parallel.

The disease is being dealt with wherever possible by :—

(i) treating all infected cases.

(ii) making a protecting rim around all wells as so to prevent contaminated water flowing back into the wells.

(iii) treating wells, and pools used for drinking with lime, so as to kill the cyclops.

There is evidence of improvement in certain localities.

(6) HYDATID DISEASE.

This disease only occurs in the Kapoeta district of Mongalla Province. Five cases were reported in 1932 ; of these three were males and two were females.

(7) KALA-AZAR.

GENERAL DISTRIBUTION.

Blue Nile Valley.

Kala-Azar may be said to be endemic in the Sudan along the Blue Nile and its branches as they emerge from Abyssinia into the Sudan. The incidence is smaller as the distance from the border increases, but occasional cases are found along the Blue Nile as far north as Wad Medani and Abu Usher.

Kapoeta.

In 1930 a heavily-infected endemic area was found to exist in the newly occupied Kapoeta district which lies near to the Abyssinian border where it joins the Sudan-Kenya boundary.

Melut.

In 1932 a small focus of this disease has been found to exist among the Dinkas at Melut. This focus is probably a secondary focus infected from an endemic area lying near to the Abyssinian border between Kurmuk and Gambeila. If this is found to be the case there will be evidence of an endemic area running along the whole Sudan-Abyssinian border on the Sudan side of the border. There is known to be a small focus of disease in Erythrean territory near to the Sudan-Erythrean border, but although many Abyssinians are treated for this disease in Sudan hospitals they are for the most part found to have been infected on the Sudan side of the border. Further investigations may point to the existence of endemic areas on the Abyssinian side, but on existing evidence there would seem to be some factor or factors that determines the endemicity of the disease on the river beds and khors as they emerge from Abyssinian territory into the Sudan along the whole border, but prevents the disease extending to the higher land on the Abyssinian side of the border.

Darfur.

Several cases diagnosed clinically, of which one case was confirmed microscopically, are reported from Darfur among natives who have never left that province. Further investigation may show that a definite endemic area exists in this province far removed from the Abyssinian border.

INCIDENCE OF THE DISEASE.

Kapoeta.

A total of 58 cases were treated for this disease in 1932 as against 48 cases in 1931 and 14 cases in 1930. The increased number of cases is attributable to the growing confidence of the people in this newly occupied area.

Of the 58 cases one case came from the Dodinga Hills and two cases from the Boya Hills, the remaining 55 cases were Taposans sit uated in an area of about 50 square miles between Kapoeta and Anachakuri khors.

Other endemic areas.

There is no evidence of an increase of this disease in the old endemic areas. The increased numbers coming forward for treatment in the Kapoeta district are due to the growing confidence in medical work in this newly occupied area.

Irrigated Area.

There is a danger that, if the population of the Gezira Irrigated Area owing to a relaxation of sanitary effort were to become seriously debilitated by the increase of Malaria and the introduction of Bilharzia, Kala-Azar might become seriously endemic in this part of the Blue Nile valley where at present only occasional cases occur. Except for this possibility there appears to be a prospect of a gradual diminution of the disease as the existing endemic centres are opened up to organised medical work.

Distribution.

The following list shows the number of cases occurring in the separate endemic areas, shewn as male, female and children under 15 :—

Area.	Station.	Adults.		Children.		Total.
		Male.	Female.	Male.	Female.	
Kassala ...	Kassala	6	—	—	—	16
	Gedaref	7	—	2	1	
Northern Fung ...	Singa	10	—	2	—	20
Southern Fung ...	Roseires	7	—	—	1	
Darfur	El-Fasher	1	—	—	—	1
Blue Nile	Rufaa	1	—	—	—	6
	Wad Medani	4	—	—	—	
	Abu Usher	1	—	—	—	
Upper Nile	Malakal	2	—	—	—	2
Mongalla	Kapoeta	10	3	30	15	58
Total	... ...	49	3	34	17	103

It is interesting to note that out of 103 cases reported, 83 were males and only 20 females. The incidence among women and children is less uncommon among the Kapoeta cases than elsewhere. This is probably due to the fact that in the Kapoeta area this disease is affecting the local population whereas in the Gedaref area the persons affected are in every case immigrants, and in the northern Fung Province and the Blue Nile Province, the majority of persons treated are immigrants. A similar observation was made last year and the facts suggest that the population in the Gedaref area and to a less extent in theFung area, are, to a considerable extent immune to infection or, if infected,contract the disease in a mild form, whereas in the Kapoeta area the local inhabitants are still susceptible to the disease.

(8) LEPROSY.

Fuller information has been obtained as to the incidence of Leprosy in the Sudan, but accurate information is still lacking with regard to several provinces and districts.

NORTHERN SUDAN.

Latitude	...	22° N. to 15° N.
Rainfall		Very low.
Inhabitants	...	Arab and Hamitic.
Leprosy	...	Incidence low.

Berber Province.

Latitude	...	22° to 16° N.
Population	...	175, 186—settled Riverain, and camel owning Nomad Arabs.
Leprosy	...	35 male and 7 female, all of whom sedentary.

Dongola Province.

Latitude	...	— 20° 17 to 17° 30′ N.
Population	...	— 187,34 —settled Riverain, and camel owning Nomad Arab.
Leprosy	...	— 43 males, 9 females, of whom 42 sedentary and one Nomad.

Halfa Province.

Latitude	...	— 22° to 20° 15′ N.
Population	...	— 60,900—sparse, isolated and Riverain.
Food ...	...	— Dates, grain, milk and a little meat.
Leprosy	...	— One male case.

Khartoum Province.

Latitude	...	— 17° 30′ to 16° 45′ N.
Population	...	— 278,594. Very mixed.
Leprosy	...	— 22 local cases reported during last five years.

Red Sea Littoral.

Latitude	...	— 23° to 18° N.
Population	...	— 23,788—camel owning Nomad and mixed town population.
Leprosy	...	— 11 male cases, of whom 5 Arabians (from Arabia) 2 West Africans, 1 Negroid from Darfur and 1 Nomad Arab.

CENTRAL SUDAN.

Latitude	...	— 15° N. to 12° N.
Rainfall	...	— 3-4 months rainy season.
Inhabitants	...	— Arab and Negroid.
Leprosy	...	— Incidence very low among Arabs, common among Hill dwelling Negroids.

Blue Nile Province.

Latitude	...	— 15° to 12° N.
Population	...	— 453,950—settled, Nomad, and immigrant
Leprosy	...	— 12 males, 4 females, of whom 3 foreigners 4 Negroid, 4 Nomad Arab and 5 sedentary Arabs. None of them were natives of the Province.

Darfur Province.

Latitude	...	— 17° 30 to 10° N.
Population		— 712,191-sedentary and camel owning Arabs in the north, sedentary Negroids and cattle owning Nomad Arabs in the south.
Leprosy	...	— No detailed figures available, but is very common among the Furs, a Negroid tribe owning few cattle common among the Masalit, also sedentary agriculturists, but owning more cattle. Almost unknown among the camel owning Nomad Arab of the north. Rare among cattle owning Nomdas of the south. Uncommon among settled Arabs.

Fung Province.

Latitude	...	— 14° 30′ to 10°30′ N.
Population	...	— 237,127-settled Arab and Negroid, and Nomad Arab.
Northern Fung		— 6 male, 1 female, of whom 5 Arab and 2 Negroid, all sedentary.
Southern Fung		— 43 cases reported, of whom 2 are Arab and 41 Hill dwelling Negroid, all sedentary. Information as regards the Negroid population very incomplete.

Kassala Province.

Latitude	...	— 18° to 30° N.
Population	...	— 364,481-Nomad Arab, and sedentary population which is largely Negroid.
Leprosy	...	— 20 men and 6 women, of whom 15 Negroid and 11 sedentary detribalised Arabs.

Kordofan Province.

Latitude	...	— 17° 30′ to 10°N.
Population	...	— 1,120,507-camel owning Nomad and sedentary Arab in the north, cattle owning Nomad and sedentary Hill dwelling Negroids in the south.
Leprosy	...	— 66 cases, of whom 56 sedentary Negroid, 8 sedentary Arab and 2 Nomad Arab. The figures for the Negroid population are very incomplete.

White Nile Province.

Latitude	...	— 15° to 12° N.
Population	...	— 431,913-mainly Nomad and semi-Nomad and a small definitely sedentary Riverain population.
Leprosy	...	— 2 male cases, of whom 1 a sedentary Arab and 1 a Negroid from Nuba Mountains.

SOUTHERN SUDAN.

Latitude	...	— 12°to 4°N.
Rainfall	...	— 6-9 months rainy season.
Inhabitants	...	— Cattle owning Negroids of the river plains and cattle less people in fly areas in the higher land away from the river valleys.

Bahr-el-Ghazal Province.

Latitude	...	— 10° to 5° 30′ N.
Population	...	— 675,111.

Northern, Eastern and Rumbek Districts in the valleys of Bahr-el-Ghazal and Bahr-el-Jebel rivers.

Population	...	— 354,392
Inhabitants	...	— Dinkas-cattle owning tribes.
Food ...	...	— Milk, meat and a little grain.
Leprosy	...	— 20 cases.

Western and Central Districts.

Population		— 88,553. Fly area, no cattle excepting a few in the extreme east of central district.
Food ...	...	— Grain, vegetables and vermin, more rarely game.
Leprosy	...	— 567 cases (figures very incomplete).

Southern Area.

Population	...	— 232,166
Inhabitants	...	— Zande. Fly country adjacent to Nile-Congo Divide. No cattle.
Food ...	...	— Grain, vegetables and vermin, more rarely game.
Leprosy	...	— 4,734 cases, or 2.39% of the population.

Mongalla Province.

Latitude	...	— 60° to 40° N.
Population	...	— 322,598.
Leprosy	...	— Is prevalent in the western and central districts. The incidence is particularly heavy in the Meridi and Moru districts, a heavy fly area with no cattle, and diminishes somewhat as the river is approached. The eastern district, stretching up to the Abyssinian highlands, a rich cattle country is reported to be free from the disease. A total of 1,643 cases is reported for the whole Province, but the numbers in many districts are incomplete.

Upper Nile Province.

Latitude	...	...	... — 12° to 6° N.
Population	...	...	... — 581,121-cattle owning Negroids.
Food ...	...	...	... — Milk, meat and a little grain.

Cases of Leprosy by Tribes:

	Population.
Shilluk	... 90,000—16 active, 24 burnt out.
Nuer	... 9,500—2 active.
Shish and Atwot Dinkas	... 30,000—10 active, 29 burnt out.
Twil Dinkas	... 11,643—1 case.
Northern Dinkas	... 20,000—2 cases.

In examining this statement of incidence it is interesting to note :—

(1) the almost complete freedom from Leprosy of the camel owning nomad.

There are two relevant facts about these people :—

(a) the isolation of their lives.

(b) the very large quantities of milk at their disposal more than they can drink. Their diet, and often for long periods their only diet, is milk.

(2) that there is a definite, but small incidence of the disease among the sedentary Arabs of the north where the grazing is confined to the river edge,

(3) this incidence is markedly diminished among the sedentary Arabs of the central Sudan where there is a definite rainy season and extensive grazing,

(4) that there is a very low incidence among the cattle owning nomad Arabs who have plenty of milk, but not in the same unlimited quantities as the camel owners,

(5) that there is a high, but not yet estimated incidence among the negroids of the centre. These people are hill dwellers (previously as a refuge from the Arabs and now from habitude). Their villages are cramped and overcrowded and the grazing for their cattle very limited. Grain is their staple food and milk only enters into their diet to a very limited extent,

(6) that as regards the southern Sudan; among the negroids of the river plains who are herdsmen and whose staple food is milk, the incidence of Leprosy is low while among the inhabitants of the fly country where cattle cannot survive the incidence of Leprosy is very heavy indeed. It is of interest to note that in the heavy fly areas where there are no cattle, excepting for the absence of milk and the scarcity of meat and salt the people are well fed and adequately lodged. There is an abundant supply of fresh vegetables and fruit; fish are caught in considerable numbers ; and the villages are well spaced out, each dwelling (of one or more huts) standing in its own plot of land.

Comparison between the Progress of Treated and Untreated Cases of Leprosy.

A total of 1,203 cases were kept under observation at Li Rangu and Meridi. Of these 929 were treated and 274 were untreated.

Similarly, 1,031 were kept under observation at Tembura. Of these 459 received treatment and 572 remained untreated.

A careful endeavour was made to obtain a comparison between the progress of similar treated and the untreated case. It was not considered justifiable to withhold treatment from the more advanced cases, and in consequence the comparison only deals with the early or milder cases.

The following tables show the results of these observations :—

Cases of Leprosy under treatment or supervision in Tembura, Li Rangu, and Meridi settlements.

Station.	Under treatment in Leper settlements.				Early cases in settlements not under treatment	No. of lepers listed in district outside settlements	Total lepers in district.
			Children.				
	Men.	Women.	Male.	Female.			
Tembura ...	151	174	100	114	—	1,094	1,633
Li Rangu ...	649	498	218	125	835	776	3,101
Meridi	84	38	11	15	265	487	900
Grand Total							5,634

Analysis of the progress of 1,170 treated lepers in the Li Rangu and Meridi settlements.

Progress.	C. 1.	C. 2.	C. 3.	N. 1.	N. 2.	C. 1. N. 1.	C. 1. N. 2.	C. 2. N. 1.	C. 2. N. 2.	C. 3. N. 1.	C. 3. N. 2.	Total.
Cured	36	1	—	21	1	1	—	—	1	—	—	61
Much improved	91	35	—	36	6	23	1	11	5	—	1	209
Improved ...	142	54	3	37	15	23	1	9	18	4	2	308
In statu quo. ...	108	102	1	36	27	29	11	23	20	8	16	381
Worse	20	30	9	14	18	23	10	30	27	14	16	211
Total ...	397	222	13	144	67	99	23	73	71	26	35	1,170

Analysis of the progress of 274 untreated lepers in the Li Rangu and Meridi settlements.

Progress.	C. 1.	C. 2.	C. 1.N.1.	N.1-2.	Total.
Cured	9	5	2	6	22
Much improved	15	11	—	1	27
Improved	17	4	2	2	25
In statu quo	103	35	14	22	174
Worse	17	4	1	4	26
Total	161	59	19	35	274

Comparative (percentage) analysis of the progress of 929 treated lepers and 274 untreated lepers in the Li Rangu and Meridi settlements,

Progress	C. 1.		C. 2.		C. 1—N.1		N. 1—2		% of all treated cases	% of all untreated cases
	Treated %	Untreated %	Treated %	Untreated %	Treated %	Untreated %	Treated %	Untreated %		
Cured	9.06	5.59	0.45	8.47	1.0	10.52	10.42	17.1	6.45	8.02
Much Improved	22 9	9.31	15.85	18.6	23.23	—	19.90	2.85	20.56	9.85
Improved ...	35.76	10.55	24 32	6.77	23.23	10.52	24.64	5.71	29.17	9.12
In statu quo ...	27.2	64.0	45.9	59.3	29.29	73.68	30.37	62.85	32.55	63.50
Worse	5 .03	10.55	13.5	6.77	23.23	5.26	15.16	11.42	11.30	9.48

The following tables show :—

(1) Progress of 459 cases of Leprosy under treatment in Tembura settlement and

(2) Comparison between (1) and 572 untreated cases outside the settlement:-

(1)

Progress.	Under Treatment in Settlement.			
	Cut.	Nerve.	Mixed.	Total.
Better	149	—	22	171
Stationary	145	5	74	224
Worse	10	1	53	64
Total	304	6	149	459

(2)

Progress.	Under treatment in settlement.		Untreated cases in district.	
	No.	%	No.	%
Better	171	37.2	55	9.6
Stationary	224	48.8	430	75.1
Worse	64	14.0	87	15.2

The comparison seems to indicate that there is a greater tendency to improvement among treated cases than among untreated cases. The comparison at Li Rangu was between treated and untreated cases living in the settlement. The comparison at Tembura was between treated cases in the settlement and untreated cases outside the settlement. Thus at Li Rangu the comparison was between cases living under nearly similar conditions while at Tembura the conditions of life of the treated cases were superior to those of the untreated cases. The Tembura figures are possibly as much an indication of the value of a regular food and salt supply as of drug treatment in early and mild cases of Leprosy.

(9) MALARIA.

In the northern Sudan, Malaria showed the usual incidence corresponding with the rise and fall of the river. There were no epidemic outbreaks calling for comment, but there was an increased incidence at Khartoum during November and December as an indirect result of the heavy Malaria incidence in the Gezira.

In the central Sudan there was an unusually high incidence of epidemic Malaria in the autumn months as a result of unusually heavy rains. This was particularly the case in the Gezira area.

In the southern Sudan the malarial incidence in the autumn was higher than usual, corresponding to an unusually high and sustained flood in the White Nile and its branches.

In the central Sudan the proportion of malignant to benign Malaria was reported to be higher than usual.

GEZIRA IRRIGATED AREA.

The rains in this area during August were the heaviest recorded for many years. Large areas were flooded and in some areas it was impossible to drain away the water for several months.

The system of drains and pumps which was initiated in the spring of 1929 and which has since been further developed has been useful in previous years in removing the flood water, but insufficient to deal with these exceptional rains. Provision has been made for improving and extending the drainage channels and for installing larger pumps.

As a result of these unusual conditions the autumn incidence of Malaria was nearly double that of last year, but vigorous action prevented epidemic conditions persisting into the winter.

Although the unused Dawarans and field channels were duly filled up, larger numbers of borrow-pits in the villages remained unfilled and these are the earliest and most important causes of epidemic Malaria.

On the advice of the Senior Medical Inspector an issue of Plasmochine Co. (consisting of .02 grammes Plasmochine) was issued to all (140) Syndicate British Inspectors ; one tabloid was taken every day during October and November. There were 23 admissions to hospital from among these Inspectors with an average stay of 5.66 days or a total of 131 days spent in hospital.

The following table gives the available information as to the incidence of the three types of Malaria throughout the Sudan.

The figures are for the most part collected in hospitals and give the incidence at the administrative centres where the type of Malaria is likely to be affected by the presence of a population alien to the province. A detailed survey of parts of the Upper Nile Province showed malignant Malaria to be a very rare infection among the Negroid population outside the towns, whereas the figures collected in Malakal show a considerable proportion of malignant infection. It is hoped to determine this point as regards Mongalla Province by a field survey carried out away from the administrative centres.

Province.	January	February	March	April	May	June	July	August	September	October	November	December	Total
BENIGN TERTIAN.													
Bahr-el-Ghazal	—	1	1	—	—	2	1	2	2	8	3	2	22
Berber	17	8	8	14	8	8	6	4	4	6	4	9	90
Blue Nile	8	5	3	2	2	5	18	9	25	111	83	65	336
Dongola	23	12	16	62	38	22	29	15	19	14	25	17	292
Kassala	12	6	8	4	3	—	21	63	166	119	24	11	437
Khartoum	3	1	—	—	4	1	1	1	4	21	3	5	44
Kordofan	1	2	1	—	—	1	1	1	10	10	8	—	35
Port Sudan	—	1	—	—	2	1	—	—	1	3	—	6	14
Upper Nile	27	32	17	32	9	8	11	6	14	13	5	1	175
White Nile	14	5	2	2	1	1	3	4	5	13	13	5	68
Mongalla	—	2	—	—	—	2	—	—	14	21	5	10	54
MALIGNANT TERTIAN.													
Bahr-el-Ghazal	—	—	2	—	—	1	—	2	2	5	3	1	16
Berber	6	7	15	12	9	1	—	2	1	7	2	5	67
Blue Nile	36	29	17	16	9	4	20	55	158	453	194	132	1123
Dongola	3	1	1	1	4	9	3	5	2	1	2	3	35
Kassala	—	—	—	1	—	—	—	10	27	15	2	3	58
Khartoum	9	5	3	515	—	—	1	4	8	26	15	39	115
Kordofan	—	—	2	—	—	—	3	2	13	22	11	3	56
Mongalla	3	7	3	—	—	1	7	3	24	45	25	24	142
Port Sudan	4	1	2	2	3	—	—	1	1	3	5	4	26
Upper Nile	24	15	12	12	11	14	10	18	77	78	74	33	378
White Nile	9	—	—	—	—	—	—	—	6	16	16	7	54
QUARTAN.													
Berber	—	1	1	—	—	—	—	—	—	—	1	2	5
Blue Nile	1	5	—	—	1	—	2	—	2	11	—	2	24
Kassala	—	—	—	—	—	—	—	—	—	1	—	1	2
Khartoum	—	—	—	—	1	—	—	—	—	—	—	—	1
Mongalla	—	—	—	—	—	—	—	—	—	2	—	—	2
Port Sudan	—	—	—	—	—	—	—	—	—	—	1	—	1
Upper Nile	—	1	2	1	—	—	—	—	—	—	1	2	7

(10) RABIES.

Eight cases of Human Rabies and sixteen cases of Animal Rabies occurred during the year.

Bahr-el-Ghazal, Dongola, the Fung, Halfa, Khartoum, Mongalla and Upper Nile Provinces remained uninfected.

226 persons received preventive inoculation against Rabies. Of these 15 were Europeans and 211 were natives of the Sudan. Of the European cases none contracted Rabies . Eight deaths occurred among natives of the Sudan.

The following information is available with regard to the fatal cases :—

One woman died 49 days after the bite, after having received 14 injections.

One man died 68 days after the bite, after having received 14 injections.

One woman reported 16 days after the bite, and died after having received 13 injections.

One woman and one man died two months after the bite, untreated.

One man died three months after the bite, untreated.

One woman died four months after the bite, untreated.

One man died, period unknown, untreated.

Distribution.

The following table shows the distribution of Human and Animal Rabies:—

PROVINCE.	Animals Rabies.	HUMAN RABIES.			
		Hydrophobia.		Preventive Inoculation for	
		Cases.	Deaths.	Dog bite.	Contact with rabid animal.
Berber	1 dog	—	—	—	—
Blue Nile ...	6 dogs	—	—	29	28
Darfur	—	—	—	33	—
Kassala	3 dogs	1	1	24	—
Kordofan ...	2 ,,	7	7	106	—
Port Sudan ...	1 donkey	—	—	—	—
	1 camel	—	—	—	—
White Nile ...	2 dogs	—	—	6	—
Totals	16 Animals	8	8	198	28

(11) ACUTE RHEUMATISM.

A total of 211 cases of this disease were reported with nine deaths. Cardiac complications were not uncommon. Cases were reported from every province in the Sudan.

The disease appears to occur equally in the intensely dry and hot climate of the northern Sudan and in the marshes of the Bahr-el-Ghazal. It affects all members of the community, townsmen and countrymen, foreigners and natives of the Sudan whether Arab or Negroid.

The disease is reported to be common among the Negroid Dinkas of the Bahr-el-Ghazal Province, but is apparently rare among the closely allied tribes of the Upper Nile Province.

(12) SCURVY.

A total of 61 cases occurred with four deaths. Of these 25 occurred among Nomads on the Red Sea littoral south of Tokar. These cases were due to a deficiency of milk resulting from insufficient grazing. Outbreaks of Scurvy are liable to occur in this district when the grazing is insufficient, notably a severe outbreak occurred in 1928 when over 400 cases came under observation.

The rest of the 61 cases were sporadic cases occurring in various provinces.

(13) SLEEPING SICKNESS.

BAHR-EL-GHAZAL PROVINCE.

The total of new infections in this area for 1932 is 63 as against 61 in 1931. There was a decrease of 12 new cases in the Tembura area where measures of Sleeping Sickness control have been enforced with increased stringency, but a new focus of disease has declared itself in the Gangura chiefdom of Yambio district.

The following list shows the cases discovered in these two districts since 1918 :—

Year.	Tembura.	Yambio.	Year.	Tembura.	Yambio.
1918	255	—	1926	79	—
1919	621	—	1927	49	3
1920	192	—	1928	26	2
1921	656	—	1929	18	—
1922	434	—	1930	37	1
1923	839	4	1931	61	—
1924	276	14	1932	49	14
1925	203	6			
Total	3,795	and 44.			

Tembura District.

Last Year 22 of the 61 cases occurred in the Bakindo chiefdom, where the people were settled along a frontier road on the water-shed dividing this district from the French Congo. It was found that the people were drinking from infected stream heads on the French side of the border. To discourage this practice high thorn barriers were built to render these springs difficult of access and in certain cases the people were moved back on to loop roads further from the border. As a result of these precautions the number of new cases in this chiefdom have dropped from 22 in 1931 to 5 in 1932 and no new cases have occurred in this district since June.

Twenty-four of the 49 cases reported in 1932 occurred among people living along 17 kilometres of a road running close to the river Yubu. When 17 cases had been reported the people were moved to a new site ; since then a further seven cases have occurred. It is probable that in this case the local fly were infected. It is interesting to note that concurrently with this outbreak there was a noticeable increase in the density of fly in the area affected.

Yambio District.

The 14 cases reported from this area all occurred in the Gangura chiefdom close to the border. This is the most crowded area of the district and is full of small fly-infested khors.

The outbreak is being dealt with by :—

(i) increasing the frequency of inspections.
(ii) more effective khor clearing.
(iii) moving the people away from the main focus of infections and from the more dangerous khors.
(iv) the more rigid enforcement of Sleeping Sickness regulations.

General Considerations.

The increase of Sleeping Sickness cases occurring in these districts appears to be due to the following causes :—

(1) Injudicious siting of roads and settlements as a result of over-confidence.
(2) The failure of chiefs to report transfugees from heavily infected areas across the border, and to prevent villagers from the Sudan visiting friends in infected villages across the border.

(3) The heavy claims made on the time and energy of Medical staff by the rapid expansion of leprosy work.

These difficulties are being dealt with as follows :—

(i) Settlements along dangerous roads have been and are being resited.
(ii) Administrative control is being made more effective.
(iii) The leper settlements have been reduced in size and numbers.

But although it may be possible by these measures to diminish the danger of infection being carried into the Sudan, the main problem presented by a heavily infected area just across the border, marching with our Palpalis infested areas for several hundred miles, remains to be solved on a more permanent basis.

To meet the difficulty of this situation more adequately, two things are necessary :—

(i) To obtain the confidence of the people in medical work and medical administration.
(ii) An effective system of medical intelligence.

To ensure these desiderata it is necessary to carry out here, in this limited, but thickly populated area, on an intensive scale what has been done with such excellent effect in other parts of the Sudan notably in the Gezira Irrigated area, and in Darfur in dealing with Relapsing Fever and Small-Pox, *i.e.*, the establishment throughout the area of a network of small dispensaries staffed by well-trained local natives, so that every person throughout the area will be within easy reach of medical assistance.

By this means it is hoped that here as elsewhere in the Sudan the confidence of the people in medical administration will be won and that at the same time the dispensary attendants will be in a position to send immediate information as to any cases of suspicious illness or as to native movements which are likely to give rise to the spread of infection.

A commencement has already been made in this direction. Six dispensary attendants have been trained at Li Rangu hospital and have been appointed to dispensaries opened at suitable places in the Yambio district. Other dispensary attendants are now in training at Source Yubu and Li Rangu, and it is hoped that this programme will be completed in the course of the next few years. In the meanwhile it will still be necessary to enforce control by strong administrative action on a patient, but uncomprehending people, and to maintain as at present a highly paid Medical Staff in numbers disproportionate to the population concerned.

MONGALLA PROVINCE.

No case of Sleeping Sickness was discovered in this area in the course of the year. The province has now been clear of indigenous infections for five years, in spite of the fact that it borders on the heavily-infected West Nile and Aringa districts of Uganda to the north, and with the heavily-infected Belgian Congo to the west. This result has been achieved by carefully executed Sleeping Sickness precautions and by effective administrative control.

The following list shows the cases of Sleeping Sickness occurring in Monga Province since 1918 :—

Year.	Yei.	Kajo-Kaji	Nimule
1918	32	42	2
1919	15	63	8
1920	32	54	2
1921	24	31	12
1922	7	68	35
1923	3	5	4
1924	—	82	9
1925	—	10	9
1926	—	3	—
1927	1	—	18
1928	1*	—	—
1929	—	—	—
1930	—	—	—
1931	—	—	—
1932	—	—	—
Total	115	358	99

*Contracted in Belgian Congo.

Resettlement of Acholi.

In the spring of this year a resettlement of the Acholi was agreed to, and they were allowed to move their villages down to approved sites in the foothills. These Acholi were originally plain dwellers, but they were moved up into the Acholi Hills to sites not less than 4,000 feet above sea level in 1926, so as to avoid further infection with Sleeping Sickness which was resulting from association with their heavily-infected relatives just across the Uganda border. Since that time the position as regards Sleeping Sickness in the Kitgum area of the Northern Province of Uganda has greatly improved and it is now considered safe to allow these plainsmen to move down from the hill sites which they have always hated and to which they have shewn no signs of becoming acclimatised.

Resiting of Western part of Libogo Village.

In the autumn of the year the part of Libogo village that extended West of the Uu river was moved back to the East of the river. This was to allow a wide interval between the natives of this village and the heavily-infected area in the Belgian Congo lying along the Aba river between Aba and the border.

(14) SYPHILIS AND YAWS.

As regards Yaws the incidence of this disease in the southern Sudan has been most strikingly reduced. Districts in which the incidence was very heavy are now almost clear of the disease, and these results can only be attributed to the widespread administration of Novarsenobenzol. Natives suffering from Yaws who will travel for long distances to receive injections of Novarsenobenzol, are seldom willing to remain for further treatment after the outward evidences of disease have disappeared, but this treatment, inadequate for the individual, has been a most potent factor in diminishing the incidence of the disease among the tribes. No one who has seen the population of a district crippled and disfigured, and seen it a few years later healthy and without obvious signs of disease, could advocate withholding the administration of this drug even though it is impossible to enforce complete treatment.

As regards the incidence of Syphilis in the northern and central Sudan, the question is one of greater difficulty, but there is a consensus of opinion in the provinces that the incidence of Syphilis has been declining among the Arab population of the north and centre as a result of widespread treatment with Novarsenobenzol, but that this does not apply to the Negroid population of the central Sudan who have been increasingly exposed to infection by the rapid improvement of communications and who have only been reached by medical work to a very limited extent. It is possible that the disease is increasing among these people. The establishment of dispensaries on a more adequate scale among the Negroid races of the central Sudan such as the Nubas of Kordofan and the Furs and Masalit in Darfur should do much to prevent the spread of Syphilis. The increase of motor transport throughout the Sudan, and in particular of the commercial and native owned car, has been a most important fact in the dissemination of venereal disease.

The Irrigated area of the Gezira is peculiarly exposed to venereal infection. The frequent motor services carrying natives between Khartoum and various parts of the Irrigated area ; the influx of merchants, pedlars, and servants from every part of the Sudan ; the presence of a large and frequently changing body of immigrant labour, are all factors greatly facilitating the dissemination of Syphilis. It is, therefore, interesting to note that there is some indication of decreased incidence of new cases in this area. The Gezira Irrigated area is particularly well served with dispensaries, there being one dispensary to every 15,000 acres and this favourable although limited result is largely attributable to this factor.

Every effort is being made throughout the Sudan to persuade the native to remain for further treatment after the outward manifestations of the disease have disappeared, but this is still a matter of great difficulty, and the native himself is often under the compulsion of circumstances which prevent him remaining for more complete treatment. In the meanwhile such evidence as is available supports the view that widespread, although partial, treatment whatever the ultimate results on the individual may be, has a marked effect in limiting the

transmission of the disease. It is important to remember that among natives of the Sudan the presence of a highly infective genital sore is no deterrent to sexual connection and that any interference with their liberty of action inevitably prevents them coming forward for treatment.

Later Manifestations of Syphilis.

The Senior Physician of Khartoum Hospital has analysed a series of 113 cases admitted to Khartoum Civil Hospital for Syphilis; primary and early secondary cases were excluded.

The results as tabulated by him are given below :—

	Untreated Cases.		Treated Cases.		
	No. of cases.	Average latent period.	No. of cases.	Latent period.	Average No. of injections of N. A. B.
Aortitis	23 (41%)	30 years	3 (5%)	6 years	3
Meningitis, Hemiplegia, etc. ...	5 (9%)	26 „	25 (45%)	5 „	3
Gumma, Periostitis etc.	21 (38%)	20 „	5(7%)	8 „	3
Adenitis, Orchitis	4 (7%)	16 „	—	—	—
Cutaneous Syphilide ...	5 (7%)	10 „	3(6%)	6 years	3
Late Secondary Chancre... ...	—	—	11 (20%)	2½ „	2
Optic Atrophy Retinitis ...	—	—	4 (7%)	6 months	3
Abortion	—	—	4 (7%)	3 years	2
TOTAL ...	58		55		

The latent period represents the probable period between infection and attendance at hospital.

The high percentage of affections of the Cerebro-Spinal System occurring in treated cases is noticeable. On the other hand cases of Syphilis affecting the Cerebro-Spinal System appear to be very rare in the provinces, and this marked discrepancy suggests the existence of a more European type of the disease in Khartoum.

The following are the only cases of Cerebro-Spinal Syphilis reported from the provinces :—

Darfur —14 cases Neuro Syphilis.
5 from Geneina (of which 1 a G.P.I.)
9 from other parts of Province—typical paraplegias all cured.

Omdurman— 2 cases spastic paraplegia—both died.

Mongalla — 2 cases paresis lower limbs—both cleared up under treatment.

(15) TUBERCULOSIS.

In the course of the year 702 cases were admitted to hospital for Tuberculosis. Of these 421 cases were Pulmonary and 281 were Non-Pulmonary.

Of the Pulmonary cases 62 were foreigners and eight were Sudanese who contracted the disease in Egypt.

The nationality of the foreigners affected with Pulmonary and Non-Pulmonary Tuberculosis is as follows :—

	Pulmonary.	Non-Pulmonary.
West Africans and French Sudan	16	8
Abyssinians	15	6
Somalis	8	1
Eritreans	7	—
Yemenese	5	4
Hedjazis	3	—
British	3	1
Syrians	2	—
Greeks	1	—
Egyptians	1	1
Indians	1	—
TOTAL	62	21

The following table shows the admissions for Pulmonary and Non-Pulmonary Tuberculosis since 1922 and the percentage rate of Tuberculosis cases to other admissions.

YEAR.	Pulmonary.		Non-Pulmonary.		Total.	
	Admissions.	Percentage.	Admissions.	Percentage.	Admissions.	Percentage.
1922 ...	140	.82	94	.56	234	1.38
1923 ...	123	.72	128	.74	251	1.46
1924 ...	159	.80	131	.66	290	1.46
1925 ...	135	.62	157	.84	292	1.46
1926 ...	175	.80	196	.91	371	1.71
1927 ...	226	.86	178	.69	404	1.55
1928 ...	260	.82	237	.75	497	1.57
1929 ...	302	.65	322	.70	624	1.35
1930 ...	480	.95	300	.61	780	1.56
1931 ...	390	.65	294	.49	684	1.14
1932 ...	421	.70	281	.47	702	1.17

This table dealing with cases from the whole Sudan has in recent years become increasingly inadequate as a guide to the incidence of Tuberculosis in the northern and central Sudan, owing to the growth of work at the southern hospitals where patients attend more for injuries, ulcers and obvious defects than for internal diseases. New tables have, therefore, been prepared showing the admissions and percentage rates separately for the north and centre, and for the south, covering the last three years and in future years these tables will replace the combined table.

	1930		1931		1932	
	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.
			NORTHERN SUDAN.			
Admissions for Tuberculosis	428	271	320	256	380	228
Total admissions	35,183		40,286		42,007	
%Tuberculosis to total admissions	1.21	0.77	0.79	0.63	0.90	0.54
	1.98		1.42		1.44	
			SOUTHERN SUDAN.			
Admissions for Tuberculosis	52	29	70	38	41	53
Total admissions ...	14,746		19,450		17,635	
%Tuberculosis to total admissions	0.35	0.19	0.36	0.19	0.23	0.30
	0.54		0.55		0.53	

Both tables show for the north and centre an incidence of Pulmonary Tuberculosis higher than that of 1931, both absolutely and relatively to total admissions, but lower than that of 1930. The relative increase is probably exaggerated by the fact that cases of Pulmonary Tuberculosis when recognised are always admitted while the total admissions have been restricted wherever possible so as to meet the necessity for economy.

The fall in the price of exported commodities have caused a reduction in the standard of living and in particular the standard of living of the wage earning class and it is not surprising that this should cause a temporary rise in the Tuberculosis rate.

In Khartoum and Omdurman where the new cases of Pulmonary Tuberculosis have risen from 83 in 1930 and 67 in 1931 to 92 in 1932 the Medical Officer of Health comments on the malnutrition and overcrowding existing among the poorer classes as a result of economic conditions.

A study of the occupation of persons affected throughout the northern and central Sudan gives the following result :—

Cultivators	Nomads	Soldiers Police	Day Labourers	Townsmen	women (unclassified)	Unknown or of no occupation	Total
87	8	12	66	94	41	72	380

A study of the percentage rates for Pulmonary Tuberculosis in the various provinces gives the following rates :—

Bahr-el-Ghazal	Berber	Blue Nile	Darfur	Dongola	Fung	Halfa	Kassalla	Khartoum	Kordofan	Mongalla	Port Sudan	Upper Nile	White Nile
.23	.83	.93	.39	1.5	1.15	2.7	.46	1.14	.65	.05	1.96	.45	.5

These percentages do not in every case represent the true incidence of this disease among the indigenous population of the provinces. Halfa heads the list with a percentage rate of 2.7 per cent. but of the total of 13 cases one was a Somali and of the remaining 12, eight had contracted the disease in Egypt and were sent at once to hospital on their return to the Sudan. In the Blue Nile Province 27.7 per cent. of the cases were foreigners, in Kassala Province 58 per cent. were foreigners and in Port Sudan 24.4 per cent. of cases were foreigners.

AGE INCIDENCE.

The age group incidence of cases and deaths was as follows :—

Under 1		1—10		10—20		20—30		30—40		40—50		50—60		Over 60		Not given	
C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
NORTHERN SUDAN.																	
1	1	4	—	46	11	155	38	88	22	47	18	20	4	15	7	4	—
SOUTHERN SUDAN.																	
—	—	—	—	4	1	12	2	11	1	5	1	—	—	1	—	8	1

INCIDENCE AMONG SCHOOL CHILDREN.

An examination of 13,458 children in schools in various parts of the Sudan showed two cases of Pulmonary Tuberculosis.

SUBSEQUENT PROGRESS AFTER NOTIFICATION.

At Omdurman a special effort has been made to keep in touch with all cases of Pulmonary Tuberculosis that have been admitted to Omdurman hospital and to the Church Missionary Society hospital during the last six years. The results are shewn in the following table :—

Year.	Cases notified.	Lost trace of.	Died.	Remaining.
1927	24	14	8	2
1928	22	12	7	3
1929	16	10	6	—
1930	33	9	22	2
1931	12	4	7	1
1932	24	5	9	10

Thus of 131 cases reported since January, 1925, 59 are known to have died and 54 have been lost sight of. Of the 18 remaining, nine are reported to be in good health.

NORTHERN SUDAN.

Mantoux Test (Khartoum Province).

In conjunction with the Medical Research Laboratories this test was carried out on all the boys in the Gordon College, in the Khartoum Kuttabs and the Eilafun Kuttab.

Tuberculin 1/10 c.c. of 1/1000 solution was used throughout.

I append the tabulated results :—

Gordon College.

TABLE I.

Age Periods	Strong Positive.	Positive.	Weak Positive.	Negative.	Percentage Positive.
1st Year 14-20	15	49	14	39	67 %
2nd Year 16-20	19	52	23	36	72 %
3rd Year 18-20	24	52	19	10	90 %
4th Year 19-22	22	43	12	25	75 %
TOTAL ...	80	196	68	110	76 %

A total of 454 boys were examined and 344 (76 per cent.) were found to give a positive reaction.

The following table shows the results classified according to the places of origin of the boys :—

TABLE II.

	Positive.	Negative		Positive.	Negative
Khartoum ...	56 (74.0%)	20	Wadi Halfa ...	19 (90.0%)	2
Omdurman ...	114 (77.5%)	33	Wad Medani...	32 (82.0%)	7
Atbara ...	14 (70.0%)	6	Rufaa ...	25 (66.0%)	13
Berber ...	36 (63.0%)	21	Port Sudan ...	7 (50.0%)	7
El Dueim ...	12 (80.0%)	3	El-Obeid ...	29 (80.0%)	7

The Berber and Rufaa boys showed the lowest percentage of positive and the Wadi Halfa boys the highest percentage, the former two places are perhaps the least exposed to outside infection and Wadi-Halfa the most exposed. Owing to the scanty numbers of boys from El-Dueim and Port Sudan Schools the results cannot be considered.

Khartoum Kuttab Schools.

242 boys in the three Kuttabs were examined and 97 (40 per cent.) were found to be positive, but there was found to be very little difference in the age groups.

		Number examined.	Number positive.
Group I.	7-10 years	94	38 (40%)
Group 2.	9-11 years	68	24 (35%)
Group 3.	10-13 years	80	35 (43%)

To compare the results with those of rural schools the boys at Eilafun Kuttab were examined. Eilafun is a village 20 miles from Khartoum and just outside the province boundary.

Eilafun School.

		Number examined.	Number positive.
Group 1.	7-10 years	28	10 (38%)
Group 2.	10-12 years	15	8 (53%)
Group 3.	12-14 years	17	4 (23%)

This rural school shows only a slightly lower positive rate than that of the Khartoum Urban schools, viz : 37 per cent. as compared with 40 per cent.

SOUTHERN SUDAN.

This area comprises three provinces, Upper Nile, Bhar-el-Ghazal and Mongalla.

The Upper Nile Province has been opened up to systematic medical work for some six years and the statistics of disease obtained from this province are comparable to those obtained from the central Sudan. The Bahr-el-Ghazal and Mongalla Provinces are, however, in a different position ; until quite recently little organised medical work had been carried out in these provinces, and the figures obtainable do not give a reliable indication as to the incidence of disease.

Upper Nile Province.

A careful survey of the Nilotic Negroid tribes of this province extending over a series of years was carried out and only 39 cases of Pulmonary Tuberculosis were found, *i.e.*, an infection rate of .2 per 1,000.

In 1931 twenty cases and in 1932 twenty-four cases of Pulmonary Tuberculosis were treated in Malakal hospital and of these latter cases three were from northern provinces. The Shilluk tribe and the northern Dinkas have been exposed to contact with the outside world for many years, but as yet they show no serious infection with this disease. The Nuers and the southern Dinkas on the other hand have been brought very little into contact with people outside their own tribes, and it remains to be seen if these tribesmen will be able to resist the infection resulting from this exposure. Isolated incidents have suggested that the Nuers show a tendency to contract the disease when exposed to infection. It is hoped by maintaining the tribal organisations in their integrity to limit the extent of this exposure to infection and thus afford more time for the gradual establishment of immunity.

The Mantoux test was carried out on 903 natives of the province from among (1) Shilluks, (2) Dinkas, (3) Nuers and (4) Detribalised elements.

Sex.	Shilluks.			Dinkas.			Nuers.			Detribalised Negroids.		
	No. Injected	No. Reacting	% Positive	No. Injected	No. Reacting	% Positive	No. Injected	No. Reacting	% Positive	No. Injected	No. Reacting	% Positive
Male	135	65	48.1	54	24	44.4	64	15	23.4	101	39	38.6
Female ...	95	24	25.2	28	5	17.85	40	15	37.5	9	3	33.3
Children ...	207	46	22.2	27	8	29.6	30	12	40.0	113	21	18.5

Mongalla Province.

Only three cases of Pulmonary Tuberculosis were admitted to hospital. The admissions to hospital in this province do not as yet form any criterion as to the incidence of disease.

Bahr-el-Ghazal Province.

Only 15 cases were admitted to hospital in this province, but here, as in Mongalla, admissions to hospitals and dispenasries are not an adequate indication of the incidence of disease.

An investigation into the incidence of Tuberculosis among the Dinkas of the eastern district of this province was carried out by El Bimbashi S. M. Burrows, who was specially detailed for this work. A short summary of this investigation is given below :—

During the years 1931-32 a total of 160 cases of Tuberculosis have been found amongst the Dinkas of the eastern district. Of these cases 101 were males and 59 females, the average age being 27.5. No cases were found in children under the age of about 12 years. 144 of these cases were Pulmonary and 16 Non Pulmonary.

The number of cases found in each area of the district were as follows :—

Tonj and Meshra	89
Gogrial area	35
Twij area	36

The total population of the district estimated at 171,000 in 1930 shows that a proportion of .93 per thousand are infected.

Over 80 per cent. of the Pulmonary cases showed signs of advanced disease, and the Tubercle Bacillus was readily found in the sputum, masses often being found in each field. The following table shows the extent of the disease in the lungs according to the physical signs :—

One lung massive infection	18.0%
Both lungs massive infection	12.8%
One apex infected	23.2%
Both apices infected	5.0%
One base ,, ...	33.3%
Both bases ,, ...	7.7%

The Non-Pulmonary cases were as follows :—

Bone and joint	7
Tuberculosis adenitis	5
,, peritonitis	3
,, epididymitis	1

Factors involved in the spread of Tuberculosis.

(i) Spitting.

This is perhaps one of the most important factors involved. Dinkas spit at all times and in all places. The virulence of the Tubercle Bacillus in dried sputum is well known. Also connected with this is the practice of passing chewed tobacco and the pipe freely from one to another.

(ii) Overcrowding.

Overcrowding takes place to some extent in the tukls, where many members of the same family sleep together and ventilation is non-existent except through the grass roofing. This factor does not apply to the same extent in the open-air life led during the dry seasons when trekking with the cattle. Here they live in shelters consisting of a roof and no walls.

(iii) Isolation.

Isolation is not carried out and tuberculous patients live in close and intimate contact with the remainder of the family.

The Tuberculin Reaction.

A total of 3,662 Intradermal Tuberculin Reactions were carried out amongst the Dinkas.

Of this number 915 or 24.98 per cent. gave a positive reaction.

The following table shows the results and sex :—

Sex.	Number Injected.	Number Reacting.	Percentage of Positive Reactions.
Men	1,398	451	32.2%
Women	987	262	26.5%
Children	1,277	202	15.8%
Total	3,662	915	24.98%

1,487 Intradermal Tuberculin Reactions were carried out by Dr. Theodore Belsky in the Rumbek District and the results were as follows :—

Sex.	Number Injected.	Number Reacting.	Percentage of Positive Reactions.
Men	634	287	45.2%
Women	492	152	30.8%
Children	361	62	17.1%
Total	1,487	501	33.6%

The above results suggest that Tuberculosis is more common amongst the Dinkas of the Rumbek District than those of the Eastern District.

The low percentage of reactors amongst children as compared with adults tends to show that infection occurs later in life, this is also borne out by the fact that no cases were found in children under the age of puberty. It is also of interest that only 10 per cent. of the cases found were Non-Pulmonary.

Rumbek District.

The Medical Inspector of Rumbek district notes :—

(i) Pulmonary Tuberculosis is common among the Rumbek Dinkas.
(ii) Most of the cases start in the base of the lung.
(iii) Laryngeal Tuberculosis is common in cases with quite recent lung symptoms.

Distribution and Incidence.

The distribution and extent of Tuberculosis infection in the south needs careful investigation. The information at present available indicates that it is much commoner among the cattle owning tribes of the river valley than among the natives of the fly country adjacent to the Nile Congo divide, but this may be due to the fact that these Riverain tribes have been more exposed to infection. One case only of Tuberculosis infection has been found among cattle; in a bull from the Bahr el Ghazal.

CONCLUSION.

In the northern and central Sudan the incidence of this disease has been carefully watched during the last ten years. Medical work has greatly developed during this period and each year a larger proportion of persons suffering from internal diseases attend the hospitals and consequently each year fuller information as to the incidence of such diseases is obtained. The evidence available is definitely against there having been any general spread or increased incidence of Tuberculosis.

The last 20 years has been a period of economic and agricultural development, wages have increased and the general standard of living especially as regards food and clothing has risen. On the other hand intercommunication between various sections of the population has very greatly increased during this period and certain areas of the Sudan have been flooded with immigrant labour. In this way few even of the most remote villages of the northern and central Sudan have escaped exposure to the risk of infection. It is both interesting and satisfactory that the natives under the existing conditions of life have shewn considerable resistance to this disease.

If this resistance to the spread of Tuberculosis is to be maintained it is important that the gradual improvement in the standard of living which has received a set back during the last two years should be resumed and in particular that the standard of native housing which in the central Sudan has lagged far behind the general standard of prosperity, should be improved.

The only sure defence against the spread of this disease in the Sudan is a progressive improvement in the nutrition, the general health, and the housing of the people, together with a reasoned comprehension of the mode of infection.

In the southern Sudan where large sections of the population have only recently been brought into contact with the outside world the position as regards Tuberculosis is one of great interest and some anxiety. Two of the three provinces concerned are only now being opened up to systematic medical work and in consequence our knowledge with regard to the incidence of disease in these areas is very deficient. The matter calls for extended investigation and great watchfulness.

(16) TUMOURS.

Admissions for new growths totalled 617. Of these 460 were benign and 157 were malignant.

The malignant growths were diagnosed as follows :—

Carcinoma	55
Sarcoma	48
Unclassified	54

The following table shows the admissions and percentage rates separately for the north and south for the last three years :—

	1930		1931		1932	
	Malignant	Non-Malignant	Malignant	Non-Malignant	Malignant	Non-Malignant
	NORTHERN SUDAN.					
Admissions for new growths	136	226	131	313	141	295
Total admissions ...	35,183		40,286		42,007	
% to total admissions	0.38	0.64	0.32	0.77	0.33	0.70
	SOUTHERN SUDAN.					
Admissions for new growths	36	40	15	98	16	165
Total admissions ...	14,746		19,450		17,635	
% to total admissions	0.24	0.27	0.07	0.50	0.09	0.93

Of the 136 cases of malignant tumours reported from hospitals of the northern and central Sudan, 21 were Negroids and eight were foreigners leaving 107 Sudan Arabs.

As regards the southern Sudan a smaller proportion of cases attend hospital for internal diseases than in the north and centre so that the lower percentage of malignant tumours in terms of total admissions in the southern provinces is not necessarily an indication of a lower incidence.

(17) TYPHOID FEVER.

A total of 85 cases of Typhoid and Paratyphoid fevers were reported in 1932. Of these 57 were Typhoid, six Paratyphoid " A " and 22 Paratyphoid " B."

The totals since 1927 are as follows :—

	Cases.
1927	52
1928	132
1929	86
1930	73
1931	100
1932	85

During the last few years Typhoid Fever has become endemic in the Upper Nile Province, but no cases are reported as yet from the Bahr-el-Ghazal and Mongalla Provinces or from Darfur.

The distribution by provinces was as follows :—

	Cases.		Cases.
Berber	8	Kassala	3
Blue Nile	9	Khartoum	33
Dongola	6	Kordofan	1
Fung	1	Port Sudan	13
Halfa	4	Upper Nile	7

(18) UNDULANT FEVER.

A total of 26 cases of this disease were reported in 1932 as against 25 in 1931 and 26 in 1930.

The distribution for the two years was as follows :—

Province.	1931	1932
Blue Nile	10	10
Fung	—	1
Kassala	11	8
Khartoum	2	2
Port Sudan	1	3
Upper Nile	—	1
White Nile	1	1
Total	25	26

(4) HEALTH AND SANITATION.

(a) KHARTOUM PROVINCE.

GENERAL.

In spite of continued economic depression and unemployment, there has been no evidence of any measurable physical effect upon the population of Khartoum Province nor, with one or two exceptions, has there been any increase in the incidence of disease.

No epidemic made its appearance during the year and there were no cases of Relapsing Fever or Smallpox.

Cerebrospinal Meningitis threatened to break out in February but quickly subsided after the occurrence of only three isolated cases.

Of the endemic diseases, there has been a decline in the incidence of diphtheria, bacillary dysentery and enteric fever.

A sharp rise in the notifications of primary malaria occurred in the autumn—factors contributing to this outbreak are examined in detail in the section dealing with this disease.

Sand fly fever attacked a number of British residents towards the end of the year. Sand flies did not seem to be more in evidence than in other years, and as has been noted before, the number of sand flies does not appear to be the determining factor in the prevalence of the disease.

It is perhaps of some significance that during this year of shortage, there has been an increase in the notification of tuberculosis and leprosy. It is well-recognised that the prevalence of these two chronic diseases is associated with condition of poverty and malnutrition and it is by no means unlikely that privations experienced by the poorer classes during the past year have already made their presence felt.

The sinking of auger bore latrines in Khartoum North and the Deims was continued during the year on experimental lines and a scheme was initiated for the conversion of bucket latrines to pit latrines in Omdurman.

Considerable progress has been made in the inspection and treatment of school children, and the beginning of a school medical service has been established.

Further efforts have been made to tighten up the control of the public food supply. To this end, legislation was introduced to prohibit the hawking of food and regulations drawn up to ensure the maintenance of a high standard of cleanliness on railway dining cars and steamers.

Overcrowding in certain parts of the city continues and calls for early and serious consideration. The conditions prevailing and the difficulties encountered in dealing with this problem are considered in detail below.

A large series of experiments were carried out early in the year in an endeavour to find an equally efficient but more economical larvicide and a series of observations were made at the Sunt Forest during the rainy season with a view to determining the nature of breeding sites favoured by different species of mosquito.

Economies and retrenchment of staff have necessitated considerable reorganisation and extra effort on the part of the remaining personnel. Judging by the results I think it can be fairly said that the efficiency of the Service has not suffered.

STAFF.

Retrenchments which took place during 1932 were as follows :—

1	British Mechanical Foreman.
34	Workshops Staff (Including Staff engaged on construction of new latrine buckets).
10	Mosquito men.
1	Native House-to-House Inspector.
1	Conservancy Headman.
12	Conservancy Cleaners.
1	Conservancy Driver.
1	Scavenging Headman.
4	Syces.
2	Light Railway Men.
1	Builder's labourer.
1	Murasla.
69	TOTAL.

POPULATION.

The population of the province is estimated at 278,594. This figure is only approximate and cannot be accepted as a basis for accurate statistics.

It is hoped that during the coming year a scheme will be evolved whereby a more accurate census can be obtained.

The following table shows the estimated population of each locality :—

	Men.	Women.	Children.	Total.
Khartoum	17,914	17,525	17,373	52,812
Khartoum North	7,815	9,663	14,252	31,730
Omdurman	29,684	40,518	35,279	105,481
Rural District	23,821	29,222	35,528	88,571
TOTAL	79,234	96,928	102,432	278,594

Of the above, the following are non-natives of the Sudan :—

	Khartoum	Khartoum North.	Omdurman	Rural Dist.	Total.
Indians.					
Men	12	5	22	1	40
Women ...	3	3	7	—	13
Children ...	8	7	16	—	31
Egyptians.					
Men	450	120	230	20	820
Women ...	450	75	392	15	932
Children ...	678	170	200	20	1,068
Europeans and Americans.					
Men	1,345	70	35	15	1,465
Women ...	674	40	41	5	760
Children ...	742	25	20	5	792
Other Non-Natives.					
Men	639	120	289	35	1,083
Women ...	412	45	85	2	544
Children ...	548	50	111	3	712
TOTAL ...	5,961	730	1,448	121	8,260

BIRTHS AND DEATHS.

5,006 births and 2,521 deaths were registered during the year showing an excess of births over deaths of 2,485.

Births show a decrease of 138 and deaths a decrease of 341 as compared with 1931.

The births and death rates, however, do not differ markedly from those of last year.

The following table shows the relationship of birth and death rates to the population of each locality per 1,000.

	Population.	Births.	Birth Rate.	Deaths.	Death Rate.
Khartoum	52,812	982	18.6	459	8.7
Khartoum North ...	31,730	538	16 9	250	7.8
Omdurman	105,481	1,619	15.3	931	8.8
Rural District	88,571	1,867	21.0	881	9.9
TOTAL ...	278,594	5,006	18.0	2,521	9.0

BIRTHS RECORDED BY MONTHS, LOCALITIES AND SEXES.

MONTH.	Khartoum		Khartoum North		Omdurman		Rural District		TOTAL		Still Births	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	42	48	20	21	75	70	62	66	199	205	11	7
February	40	35	19	25	52	59	98	68	209	187	4	6
March	44	26	30	21	66	67	75	60	215	174	4	10
April	37	22	20	26	60	65	54	45	171	158	6	5
May	47	30	25	18	66	55	66	67	204	170	9	6
June	39	37	21	22	73	55	85	83	218	197	5	7
July	44	59	16	20	79	54	53	59	192	192	7	5
August	47	43	12	14	80	77	86	87	225	221	9	7
September ...	38	40	32	30	81	65	119	110	270	245	7	3
October	49	41	27	20	64	67	86	78	226	206	14	6
November	46	42	19	33	67	72	97	100	229	247	6	6
December	56	30	29	18	71	79	78	85	234	212	10	5
TOTAL ...	529	453	270	268	834	785	959	908	2592	2414	92	73
	982		538		1,619		1,867		5,006		165	

	Births.		Total.	Still Births.	
	M.	F.		M.	F.
Khartoum	529	453	982	12	8
Khartoum North	270	268	538	12	4
Omdurman	834	785	1,619	39	34
Rural District	959	908	1,867	29	27
TOTAL	2,592	2,414	5,006	92	73
				165	

BIRTHS RECORDED BY NATIONALITIES, LOCALITIES AND SEXES

Nationality	Khartoum		Khartoum North		Omdurman		Rural District		Total		Still Births	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
British	5	3	—	—	—	—	—	—	5	3	—	—
Greek	13	10	1	—	—	1	—	—	14	11	3	—
Other Europeans	7	5	—	—	1	1	—	—	8	6	—	—
Egyptians & Syrians	58	57	12	20	30	23	—	—	100	100	4	1
Natives of the Sudan	444	374	257	248	801	754	959	908	2461	2284	85	72
All Others... ...	2	4	—	—	2	6	—	—	4	10	—	1
Total ...	529	453	270	268	834	785	959	908	2592	2414	92	73
	982		538		1,619		1,867		5,006		165	

DEATHS RECORDED BY MONTHS, LOCALITIES AND SEXES.

Month	Khartoum		Khartoum North		Omdurman		Rural District		Total	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	19	11	6	7	26	40	27	27	78	85
February	32	15	7	13	28	52	56	45	123	125
March	27	14	7	9	28	35	32	25	94	83
April	25	17	11	12	24	35	19	27	79	91
May	14	14	8	13	19	35	34	28	75	90
June	22	16	4	12	46	47	32	32	104	107
July	13	23	12	10	40	48	30	38	95	119
August	17	19	11	12	42	70	33	39	103	140
September	25	21	13	17	41	60	41	55	120	153
October	16	12	16	13	40	45	45	57	117	127
November	13	21	7	8	30	38	26	35	76	102
December	35	18	8	14	27	35	56	42	126	109
Total ...	258	201	110	140	391	540	431	450	1190	1331
	459		250		931		881		2,521	

DEATHS RECORDED BY NATIONALITIES, AGE PERIODS AND SEXES.

Khartoum, Khartoum North, Omdurman, and Rural District.

NATIONALITY.	Under 1 Year	1 to 5	5 to 10	10 to 20	20 to 40	40 to 60	over 60	Total	
								M.	F.
British	—	—	—	—	2	—	—	2	—
Greek	—	1	—	1	1	7	4	11	3
Other Europeans	—	—	1	—	2	2	1	4	2
Egyptians and Syrians	11	3	—	1	7	7	15	25	19
Natives of the Sudan	276	389	108	156	289	303	916	1,138	1,299
All Others	—	3	—	1	6	3	5	10	8
Total	287	396	109	159	307	322	941	1,190	1,331
								2,521	

57·3%

DEATHS RECORDED BY NATIONALITIES, LOCALITIES AND MONTHS IN CHILDREN UNDER FIVE YEARS.

Month	Khartoum			Khartoum North		Omdurman			Rural District	Total
	Greek	Egyptians and Syrians	Natives of the Sudan	Egyptians and Syrians	Natives of the Sudan	Egyptians and Syrians	Natives of the Sudan	All Other	Natives of the Sudan	
	0-1 : 1-5	0-1 : 1-5	0-1 : 1-5	0-1 : 1-5	0-1 : 1-5	0-1 : 1-5	0-1 : 1-5	0-1 : 1-5	0-1 : 1-5	
January ...	— —	— 1	4 5	—	1 5	—	6 4	1	7 8	42
February ...	— —	— —	3 2	—	1 1	—	9 6	—	11 12	45
March ...	— —	3 1	7 3	1	3 4	—	9 6	—	13 6	56
April ...	— —	1	4 4	—	2 5	—	7 8	—	7 4	42
May	— —	2	2 1	—	— 7	—	7 5	—	10 9	43
June ...	— —	—	6 2	—	2 6	—	18 15	—	9 12	70
July... ...	— —	—	6 1	—	1 8	—	10 13	—	7 9	55
August ...	— —	—	6 7	—	1 8	1	17 19	1	8 16	84
September ...	— —	1	7 13	—	5 12	1	12 24	1	5 24	105
October ...	— —	1	4 2	—	1 12	—	4 11	—	8 15	58
November ...	— —	—	— 7	—	1 5	—	8 6	—	5 6	38
December ...	1	1	4 8	—	1 6	—	3 5	—	4 12	45
Total ...	— 1	8 : 3	53 : 55	1 : —	19 : 79	2 : —	110 : 122	— : 3	94 : 133	683

	Under one year	From one to five years	Total
Khartoum	61	59	120
Khartoum North ...	20	79	99
Omdurman	112	125	237
Rural District	94	133	227
Total ...	287	396	683

The infant mortality for the whole province was 57.3 per 1,000 births and in each locality was as follows :—

	Per 1,000 births.
Khartoum	62.1
Khartoum North	35.3
Omdurman	69.0
Rural District	50.8

COMMUNICABLE DISEASES.

The number of cases of communicable diseases notified during 1932 has been reduced in the majority of instances. In particular, the incidence of intestinal diseases showed a marked improvement on that of the previous year.

The more important of these diseases are dealt with separately under their respective headings.

TABLE I.

SHOWING NUMBER OF CASES NOTIFIED.

Disease	Khartoum Local Cases	Khartoum North Local Cases	Omdurman Local Cases	Total of Local Cases	Rural Dist. Cases	Imported Cases	Relapsed Cases	Grand Total
Chicken Pox	57	76	29	162	26	4	—	192
Diphtheria	18	1	15	34	1	2	—	37
Bilharzia	1	5	28	34	8	32	3	77
Amoebic Dysentery	39	10	305	354	3	19	101	477
Bacillary Dysentery	12	12	13	37	—	7	30	74
Enteric Fever ...	5	3	16	24	1	8	—	33
Leprosy	1	—	7	8	2	10	—	20
Malaria	78	19	18	115	1883	50	1009	3057
Puerperal Fever ...	1	1	1	3	—	—	—	3
Phlebotomus Fever ..	14	26	—	40	—	—	—	40
Pulm. Tuberculosis...	13	9	26	48	7	40	—	95
Non-Pulmonary ..	8	3	12	23	2	11	—	36

COMMUNICABLE DISEASES.

TABLE II.

Showing cases notified by months.

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Chicken-pox	41	42	18	24	30	7	19	3	3	—	—	5	192
Diphtheria	1	5	3	1	2	1	—	—	8	7	4	5	37
Bilharzia	—	3	5	2	10	11	9	11	11	4	8	3	77
Dysentery Amoebic	1	18	22	23	19	120	53	61	52	40	47	21	477
Bacillary	6	3	5	4	8	—	3	9	18	6	5	7	74
Enteric Fever....	2	—	2	4	3	6	4	3	2	3	2	2	33
Leprosy	—	—	—	4	3	5	1	2	1	—	—	4	20
Malaria	155	249	170	149	167	99	183	144	313	490	586	352	3057
Phlebotomus Fever	—	—	—	—	—	—	23	16	1	—	—	—	40
Puerperal Fever	—	2	—	—	—	—	—	—	—	1	—	—	3
Tuberculosis Pulmonary	10	6	9	9	5	13	4	7	10	3	5	14	95
Non-Pulmonary	1	7	7	—	2	7	3	2	2	3	2	—	36

MALARIA.

The total number of cases of malaria notified during the year was 3,057 as compared with 2,263 in 1931.

Of these 3,057 cases, 1,009 were relapses, a figure nearly twice that of last year. 50 were imported—a decrease of 75 compared with that of 1931.

No distinction is possible between primary and relapse cases in the Rural District. These numbered 1,883 or 406 more than last year.

The remaining were primary cases occurring in the three towns—they account for 115 as against 110 last year. An analysis of these figures shows a decrease of 20 cases in Khartoum North, and increase of 5 in Omdurman and an increase of 20 in Khartoum City.

The monthly incidence of cases in Khartoum indicate a sharp rise in October to 31, a drop to 3 cases in November and another rise to 21 in December.

The cause of the October outbreak is not far to seek. In September the number of adult mosquitoes in Khartoum suddenly rose to an extent far above the normal for the time of the year. This adult infection was introduced by trains from the south and quickly became apparent in the South East part of the City and spread Northwards to the river front and British Barracks.

The arrangement existing for the flitting of carriages on passenger trains at Masid by railway staff was apparently insufficient to prevent mosquitoes reaching Khartoum. Therefore, as an additional precaution, trains were stopped at Soba where they were thoroughly inspected and flitted by a squad of mosquito men under the supervision of a British Inspector. The immediate effect on the number of mosquitoes found in Khartoum was dramatic and a corresponding fall in the number of cases of malaria followed.

This heavy invasion by trains was due to exceptional rains in the Gezira and Southern Districts and the outbreak emphasises the need for the strictest supervision and control of this potential channel of infection.

In future, it is proposed that the Sanitary Service should undertake this work as a routine measure and as soon as adult mosquitoes become prevalent in the Gezira.

By the end of the year, the number of mosquitoes arriving in Khartoum by trains had been reduced to a minimum and another explanation must be sought to account for the rise of malarial incidence in December.

The work on river pools during the falling Nile was very heavy and during the last two months phenomenal conditions prevailed. Ordinarily we find infected pools work out at about 10—15 per cent. of the pools, but without warning this figure jumped up to over 65 per cent. Culex were crowded out so that this abnormal figure represents almost entirely anopheline infections.

It was noted also that not only was the percentage of pools infected abnormally high, but the infections were extremely dense and larvae of various ages were commonly found in the same water, showing that the number of female adults on the wing was also exceptional. Instructions were at once given for the treatment of all pools whether infected or not and though these measures undoubtedly had a markedly beneficial result, yet still a large number of adults found their way to Khartoum and Khartoum North, particularly from the Blue Nile District and cases of malaria began to occur amongst the British Troops and a few in the civilian population.

Repeated check inspections were made to ensure that no local breed out had taken place but with persistently negative results—in this connection it is interesting to note that practically all the adult mosquitoes caught in Khartoum were females. It is reasonable to suppose that they had travelled some distance from the actual breeding place and had arrived in an infected state.

With these conditions prevailing and, I regret to say, still continuing even with added precautions and extra effort, a rise in the incidence of malaria is to be expected.

We are now working on the basis of an inner and outer circle round the three towns ; the former has an approximate radius of 15 miles and in this area all river pools, etc., are inspected and treated twice weekly ; while in the outer circle time and staff allows for one visit every ten days to a fortnight.

To enable us to cope with the extra work involved an additional lorry and a box car were provided and the Rural District Mosquito Squad was supplemented by extra men from the headquarters staff.

Frequently in the past it has been pointed out that there is a tendency for epidemics of Malaria to occur in definite cycle and at intervals of four to five years. It appears that these epidemics do not usually depend on local conditions but on a heavy rainfall or some atmospheric change operating at a distance. In either case the result is a sudden and heavy migration of adult mosquitoes to the towns, followed by severe infestation of river pools and the occurrence of a varying number of cases of malaria amongst the inhabitants.

I am satisfied that mosquito breeding within the area defined above can be kept under control, but an invasion of Khartoum by infected adults coming from a distance is a disquieting problem.

To cope with this added menace there appear to be only two methods of procedure : one to extend our area of biweekly inspections and treatment and the other to concentrate on the elimination of malarial carriers among the riverain population. Both these methods are expensive, and though this year we have suffered from abnormal conditions in the Gezira, similar circumstances will arise and will have to be dealt with on the lines suggested.

The following tables show the incidence of primary malaria by sexes, nationalities and age periods and also cases amongst British troops and types of parasites.

Sexes :—

Males	131
Females	34

Nationalities :—

British	89
Other Europeans	4
Egyptians and Syrians	3
Natives of the Sudan	68
Indian	1

Age Periods :—

1–5	5–10	10–20	20–30	30–40	40–50	50–60	Undefined.
17	2	24	85	18	6	1	12

Types of Parasites :—

	Civil.	British Troops.	Total.
Malignant Tertian	70	40	110
Benign Tertian	16	28	44
Malignant and Benign Tertian	—	1	1
Quartan	1	—	1
Undefined	3	6	9
TOTAL	90	75	165

Cases amongst British Troops :—

	Malignant Tertian	Benign Tertian	M.T. & B.T.	Undefined.	Total.
Khartoum	24	21	1	3	49
Khartoum North	9	6	—	2	17
Imported	7	1	—	1	9
TOTAL	40	28	1	6	75

Deaths.

5 deaths occurred amongst the abovementioned cases and 10 more deaths were said to be caused by malaria—2 of these occurred in Khartoum, 1 in Khartoum North, 3 in Omdurman and 4 in the Rural District.

ANTI MOSQUITO WORK.

The total cost of this part of the Service within the Province was £E. 1,964 *i.e.*, labour £E. 1569 and larvicides £E. 395.

The total number of infections found was 14,316 of which 3,180 were in Khartoum District, 2,086 in Khartoum North, 1,690 in Omdurman and 7,360 in the Rural District. Of the total infections 262 were in the pupal stage and 1,068 were eggs. The pupal infections, practically all of which were located in the Rural District, show an increase of 94 compared with 1931.

EXPERIMENTAL WORK.

Larvicides. During the early part of the year a series of experiments were carried out in an endeavour to find an equally efficient but more economical larvicide than the mixture of 1 part Ialine to 3 parts paraffin which was then in use.

Various oils and disinfectants were used, each being tested individually and in combination with others. The tests were carried out under laboratory conditions and in the field. In the latter, infected pools in the Rural District were experimented upon. From the results obtained it appeared that a mixture of 1 part Ialine to 6 parts Anti Malarial Mixture satisfied the requirements and it was therefore put in use.

From later observations, however, it was found that this mixture was not giving 100 per cent. efficiency, as on isolated occasions a few larvae have been found alive in pools exposed to the wind or in grass grown pools, a day after the mixture was applied. In view of these circumstances further tests will be carried out.

The oils and disinfectants employed in the experiments were :—" Ialine " Disinfectant, " White " Disinfectant, Paraffin Oil, Fuel Oil and Anti Malarial Mixture Oil.

Breeding Sites of Mosquitoes. In conjunction with the Forestry Department and Entomological Section a series of observations were carried out at the Sunt Forest during the rainy season with a view to determining the breeding sites favoured by different species of mosquitoes.

The conditions prevailing at the Forest were extremely varied and breeding sites ranged from clear sun-lit to heavily tree shaded grass grown pools.

The number of varieties of mosquitoes bred out were disappointingly few and consequently the experiment was robbed of a great deal of its value.

Over 70 per cent. of specimens determined proved to be A. gambiae and they were found breeding in every kind of situation.

The other species identified were A. pharoensis and A. rufipes. Their breeding sites did not differ markedly from those of gambiae.

A. pharoensis was obtained once in 1931 from cleared areas in the Sunt Forest and also from the Gezira.

A. rufipes has not been recorded previously from Khartoum but has been bred from escapes in the Gezira and also from swamps and slowly flowing shallow streams in the Nuba Hills.

It is hoped to continue this work on a larger scale during the coming rainy season.

CHICKEN POX.

The outbreak of chicken pox which assumed epidemic proportion in Khartoum North towards the end of 1931 continued into the new year. 40 cases occurred in January followed by another 28 in February. The Central Prison was again the principal focus of infection and it was not until practically the whole of the population has been attacked that the epidemic came to an end.

With the termination of this outbreak cases began to occur in Khartoum City and an average of 12 notifications were received during the months February to May. As elsewhere chicken pox is a disease of the winter months and with the approach of the warm weather this epidemic died out.

DIPHTHERIA.

37 clinical cases of diphtheria were notified from the three towns as against 55 last year. 35 of these were locally contracted and 2 were imported from Egypt. Positive contacts of these cases numbered 22 and in addition 7 carriers were discovered as a result of routine swabbing.

Males were affected twice as often as females and the largest number of cases, including the only death, occurred in the age group 1-5 years.

In conjunction with Dr. Horgan an investigation was carried out to determine the carrier rate in school children. Four schools, 2 boys' and 2 girls', were selected in the three towns, and 1200 children examined. Nose and throat swabs were taken in each case and examined morphologically. The positive findings were subjected to a virulence test.

The following results were obtained :—

School.	C. hofmannii.			C. diphtheria.	
	Tonsils only.	Nose only.	Tonsils & Nose.	Tonsils.	Nose.
Coptic Girls School, Khtm. (116)	3.4%	28.4%	6%	2.6% (.86% virulent)	0
Coptic Boys School, Khtm. (272)	3.3%	18.7%	2.5%	1.4% (Non-Virulent)	0
Khartoum North Girls School (300)	2%	21%	24.6%	.6% (.3% virulent)	0
Omdurman Boys School (512)	5.4%	15.8%	19.5%	1.7% (.19% virulent)	0
Total (1200)	3.6%	19%	15.7%	1.5% (.25% virulent)	0

Records for the past five years show the following cases of diphtheria in these schools :—

Coptic Girls School	1929	1 case.
Coptic Boys School	1931	4 cases.
Khartoum North Girls School	1929	1 case.
	1931	16 cases.
Omdurman Boys School	1928	1 case.
	1930	1 case.

It will be noted that the school with the fewest and most remote cases has the highest carrier rate whereas that which has been recently and most heavily infected has the lowest.

This is readily explained by the fact that with the occurrence of clinical cases of diphtheria the whole school is swabbed and positive contacts isolated and treated until negative.

Taking the above as representative of the school population, it will be seen that the carrier rate for virulent and non-virulent bacilli is 1.5 per cent. and that for virulent bacilli alone is .25 per cent.

In Europe the corresponding figures for the population at large are quoted as 4 and .6 per cent.

In the above table there appears a curious distribution of Hoffmann's bacillus in the nose and throat together. In the two Coptic Schools this combination is very rare while in the other two it provides the maximum figures (3.6 per cent. as against 21 per cent.).

This observation is obviously of no significance but is one which is difficult to explain.

TYPHOID FEVER.

(43)

Of the 33 cases notified during 1932, 8 were imported and 16 occurred in Omdurman. Cases were sporadic and incidence fairly evenly distributed throughout the year.

There were three deaths in Omdurman—a fatality rate for all cases of 9%.

Sexes :—

Males	22
Females	11

Nationalities :—

British	7
Egyptians and Syrians	2
Natives of the Sudan	24

Age Periods :—

1–5	2
5–10	8
10–20	11
20–30	6
30–40	3
40–50	1
Undefined	2

Type of Organism :—

Para A	3
Para B	7
Typhosus	23

British Troops Cases :—

Khartoum North	1 para
Imported	1 typhosus
TOTAL	2

DYSENTERIES.

There were 551 cases of dysentery notified from the three towns during the year. By comparison with last year's figure of 287 the increase would at first appear alarming, but an analysis of the cases shows the main cause of the increase to be one of more efficient notification. Hitherto it has not been the practice to report cases of amoebic dysentery found at outpatients—but from the public health point of view these are obviously as important as those admitted to hospital. From June onwards these figures were included in returns. As a result, notifications in Omdurman jumped from 12 to 113 in one month and total for the year amounted to 305 cases as against 66 in 1931. Included in the returns for the three towns there are 131 relapse cases and 3 cases who contracted the disease in the Rural District but who came into hospital for treatment.

In Khartoum and Khartoum North there was a definite improvement both as regards amoebic and bacillary dysentery. 39 cases of amoebic dysentery and 12 cases of bacillary dysentery were reported in Khartoum in 1932 as compared with 53 and 22 in the previous year. Similarly in Khartoum North the incidence of amœbic dysentery has been lowered by 12 and that of bacillary dysentery by 10.

Bacillary Dysentery.

Sexes :—

Males	63
Females	11

Nationalities :—

British	17
Other Europeans	1
Egyptains and Syrians	3
Natives of the Sudan	52
All others	1

Age Periods :—

1–10	7
10–20	11
20–30	32
30–40	13
40–50	7
50–60	0
Over 60	1
Undefined	3

Types of Organism :—

	Total	Civil.	British Troops.	Central Prison.
Flexner	27	17	7	3 (2 relapses)
Shiga	20	13	1	6 (2 relapses)
Schmitz	18	10	3	5 (2 relapses)
Undefined	9	9	—	—
TOTAL	74	49	11	14 (6 relapses)

British Troops Cases :—

	Flexner.	Shiga.	Schmitz.
Khartoum	4	1	1
Khartoum North	2	—	2
Relapse	1	—	—
TOTAL	7	1	3

Deaths :—

	Males.	Females.
Khartoum	1	—
Omdurman	2	—
	3	—

Amoebic Dysentery.

Sexes :—

Males	355
Females	122

Nationalities :—

British	2
Other Europeans	1
Egyptians and Syrians	4
Natives of the Sudan	470

Age Periods :—

0.1 ...	1
1.10...	40
10 20...	100
20.30...	132
30 40...	45
40.50...	26
50.60...	8
Over 60	11
Undefined	114

British Troops Cases :—1 relapse.

Deaths :—

	Males.	Females.
Omdurman ...	2	—

In addition to the above-mentioned deaths, which occurred amongst the cases notified, five more deaths were presumed to have been due to dysentery : 4 occurred in Omdurman and 1 in Khartoum North.

TUBERCULOSIS.

The number of cases of pulmonary tuberculosis contracted in Khartoum Province shows an increase of 25 as compared with last year. Those contracted outside the province show an increase of 3 as compared with last year.

Non-pulmonary tuberculosis has been made notifiable from 1.1.1932. 36 cases were reported.

The case incidence in the three towns was :—

Khartoum ...	.25 per 1,000.
Khartoum North ...	.28 per 1,000.
Omdurman ...	.25 per 1,000.

Local and Imported Cases—by Sex.

(1) Local Cases :—

	Pulmonary.	Non-pulmonary.
Males	46	13
Females	9	12
TOTAL	55	25

(2) Imported Cases :—

	Pulmonary.	Non-pulmonary.
Males	34	8
Females	6	3
TOTAL	40	11

Locally Contracted Cases—Probable Source of Infection :—

Where Infected.	Pulmonary.	Non-pulmonary.
Khartoum	13	8
Khartoum North	9	3
Omdurman	26	12
Rural District	7	2
	55	25

Imported Cases—Probable Source of Infection.

Where Infected.	Pulmonary.	Non-Pulmonary.
Blue Nile Province	11	5
Berber Province	5	1
White Nile Province	3	1
Kassala Province	3	0
Fung Province	2	1
Port Sudan	2	1
Dongola Province	2	0
Halfa Province	1	1
Kordofan Province	1	1
Abyssinia	1	0
Egypt	1	0
Syria	1	0
Hedjaz	1	0
England	1	0
Unknown	5	0
Total	40	11

Nationalities :—

	Pulmonary.	Non-pulmonary.
British	2	0
Sudanese	86	33
Abyssinians	3	0
Yemanese	2	1
Syrian	1	0
Jew	0	1
Copt	0	1
Native of French Equatorial Africa ...	1	0
Total	95	36

Age Periods :—

	0–5	5–10	10–15	15–20	20–30	30–40
Pulmonary	0	1	4	14	40	18
Non-pulmonary	3	5	1	3	8	7

	40–50	50–60	Over 60	Unknown
Pulmonary	12	4	1	1
Non-pulmonary	5	3	1	0

The disposal of cases notified during the year was as follows :—

	Khartoum		Khartoum North		Omdurman		Rural District		Imported		TOTAL	
	P.	N.P.	P.	N.P.	P.	N.P.	P.	N.P.	P.	N.P.	P.	N.P.
Died	3	2	5	1	12	2	3	0	15	1	38	6
Left Province ...	4	0	1	0	3	0	1	0	16	5	25	5
Still in Hospital ...	2	0	1	0	2	1	0	0	4	0	9	1
Still in province ...	4	6	2	2	8	9	3	2	1	3	18	22
Untraced	0	0	0	0	1	0	0	0	4	2	5	2
TOTAL	13	8	9	3	26	12	7	2	40	11	95	36

Occupation :—

	Pulmonary.	Non-pulmonary.
Cultivators	7	2
Other outdoor workers	24	11
Cooks and servants	9	0
Dusty traders	11	1
Sedentary workers	12	3
Occupation especially exposed to infection (tumergis)	2	0
Under 15 years old	5	9
No occupation	10	1
Unknown	15	9
TOTAL	95	36

The following table shows the result of a follow-up of 354 cases of pulmonary tuberculosis notified between 1927 and 1931 :—

Year of Notification.	No. of Cases.	Died	Condition in December, 1932.			
			Left District.	Alive in District.	Untraced	Total.
1927 : Local	50	25	8	6	11	
Imported ...	15	2	7	0	6	65
1928 : Local	41	27	4	2	8	
Imported ...	25	6	9	0	10	66
1929 : Local	45	17	17	3	8	
Imported ...	29	10	14	0	5	74
1930 : Local	43	24	11	6	2	
Imported ...	39	16	18	0	5	82
1931 : Local	30	19	4	5	2	
Imported	37	13	20	0	4	67

LEPROSY.

Twenty cases of leprosy were notified in this province as compared with 7 last year. 10 of these were imported and the increase of locally contracted cases is 7.

The following table shows the disposal of the 45 cases notified during the last 5 years :—

YEAR.	No. of Cases.	Local.	Imported.	Died	Returned. Home.	Under Treatment.	Lost Sight of.
1928 ...	9	5	4	3	1	2	3
1929 ...	5	4	1	1	0	1	3
1930 ...	8	2	6	0	2	3	3
1931 ...	3	1	2	1	1	1	0
1932 ...	20	10	10	0	1	16	3
TOTAL ...	45	22	23	5	5	23	12

SMALL POX AND VACCINATION.

No cases of small pox occurred in the province during the year.
The vaccinations done in the province during the year were as follows :—

	Successful.	Failed.	Unknown.	Total.
Khartoum Hospital	496	93	56	645
British Military Hospital ...	246	11	—	257
River Hospital	—	30	—	30
Omdurman Hospital	1,941	61	107	2,109
Khartoum North Dispensary ...	878	27	44	949
Geili Dispensary	426	92	29	547
Khileila Dispensary	185	—	15	200
Gebel Aulia Dispensary	70	12	4	86
Rural District	—	—	4,488	4,488
TOTAL	4,242	326	4,743	9,311

DISPENSARIES.

The dispensaries at Geili and Khileila continue to function usefully as regards the villages in their immediate neighbourhood, and the average daily attendances have been well maintained. I consider, however, that their sphere of activity is too local and much more work is required in the outlying villages

and along the banks of the river. Arrangements have now been made for the Dispensary Hakims to carry out malarial and bilharzia surveys in both districts, and it is intended to co-ordinate this clinical work with that of the Sanitary Service working in the Rural District.

The dispensary at Gebel Aulia has remained open during the year. Only a skeleton staff of the Irrigation Service has been resident in the colony and the total number of attendances was 1,312.

New dispensaries were opened at Gordon's Tree Dockyard and at the Gebel Aulia Railhead. The outpatient attendances numbered 861 and 1,372 respectively.

SCHOOLS AND SCHOOL CHILDREN.

The medical inspection of schools has now been taken over by the Medical Officer of Health and considerable progress has been made during the year.

In the past, inspections have been irregular and intermittent and treatment has often been inadequate.

Our immediate object is to carry out the regular medical inspection of all pupils in schools coming directly under the Education Department and in schools attached to certain missions, to arrange and supervise necessary treatment, to ensure continuity and to provide a medical record of all pupils from the time they enter the kuttab until they leave school for Government service or other employment.

It is unnecessary to emphasise the importance of this side of public health work, both as a means of improving the general health of the population and as a measure of economy. A study of out-patient statistics will show that a large proportion of attendances are for diseases which could have been prevented by early treatment in schools.

The approximate number to be dealt with under this scheme is in the neighbourhood of 8,000. This year owing to insufficiency of staff it has only been possible to start on the more important schools and colleges, but the results as far as they go have been satisfactory.

The Gordon Memorial College, the Omdurman Technical School, eleven other Government schools and Kuttabs and two mission schools were inspected.

2,197 pupils were examined and of these 1,428 were referred for treatment. With the exception of eye cases, treatment has been completed in 13 of the 15 schools and is being continued in the remaining two.

The following is a resumé of the cases referred for treatment :—

No. of colleges and schools inspected	15
No. of pupils examined	2,197
No. referred for treatment	1,428
Trachoma	972
Defective vision	235
Conjunctivitis	79
Dental caries	222
Infected tonsils	119
Albuminuria	57
Glycosuria	8
Haematuria (unclassified)	1
E. histolyica in stools	44
T. nana in stools	26

T. saginata in stools ...	1
A. duodenale in stools	2
Urinary schistosomiasis	5
Cardiac defect	35
Pulmonary disease	13
Splenomegaly...	19
Hepatic enlargement	3
Skin disease	10
Aural disease	3
Vaginal discharge	3
Adenitis of groin (septic)	1
Physical defect	11
Markedly poor physique	4

Trachoma,

In all schools, arrangements for the treatment of trachoma have been instituted and in the majority of cases the masters themselves have been trained to apply simple remedies under the supervision of the Medical Officer of Health and the Eye Specialist.

It is too early to assess the results of this work but the improvement in the trachoma among students of the Gordon Memorial College in encouraging.

98 of the senior boys, all of whom have had six months or more treatment, were re-examined at the end of 1932 with the following result :—

1st. Examination.

No. of boys examined	98
Cases of trachoma	84

Re-Examination.

No. of boys examined	98
Cases of trachoma	17
,, ,, slight trachoma	19
,, ,, quieacent trachoma	48
No evidence of trachoma	14

CONSERVANCY AND REFUSE DISPOSAL.

In spite of a reduction in staff, the conservancy system throughout the three towns has remained satisfactory.

74 buckets were installed in new latrines during the year and the average number of daily clearances in the three towns totalled 6,127—an increase of 80 over that of last year.

Pit Latrines—Omdurman.

One 15 bucket public latrine was converted into a pit latrine of 8 compartments. 535 sites were selected for pit latrines of approved type and permits numbering 492 were issued.

The sanitary survey of properties in the vicinity of the main Suk commenced in 1931 was continued and 3 new surveys embracing 68 dwelling houses were completed. Notices were served on 53 of the property owners where the existing accommodation was found to be unsatisfactory, and the work of improving existing accommodation or providing entirely new latrines was completed in connection with 73 hoshes.

The sum of £E. 150 was made available to grant assistance to property owners unable to afford the whole cost of providing approved type latrines on their premises.

Early in 1932 a scheme was prepared for the conversion into pit type accommodation all bucket latrines in the Abu Ruf and Military Area of Omdurman.

It is intended that latrines containing 115 buckets should be dealt with but apart from the alteration made to the public latrine at Abu Ruf, no further progress towards the conversion was made. Financial provision has now been obtained for the work to be continued in 1933.

Pit Latrines—Khartoum Deims.

There are now 374 auger bore latrines in Deim Saad, Khartoum, compared with 145 given in my 1931 report. Quarterly readings have been taken at each bore but proved inconsistent. In many instances bores are rapidly filling while in others readings are fairly low.

There are several possible explanations for this variation of results. Houses may have been unoccupied for a period, or householders may have reverted to their former habit of going out into the desert for fear of their latrine filling up and thereby causing a nuisance.

Readings are also liable to vary according to the nature of the strata—the soil is more sandy in some areas than in others.

It is impossible to know the correct number of people using a latrine. In many instances others apart from the actual families contribute to the rapid filling of a bore. Again, the number of persons in each house seldom remains the same owing to change of tenants.

A bore was sunk at the house of our Conservancy Foreman in March 1930, as an experiment, with strict instructions that only members of the family, consisting of two adults and 3 children, were to make use of it. The instructions were rigidly adhered to. A reading taken on 21.12.1932 recorded an " unfilled depth " of only 1.2 metres. There are other similar cases to this.

The average extent of filling amounts to approximately half depth of bore in a period of just over 12 months. I therefore consider that the average life of a bore can be placed at approximately 18 months, as allowance must be made for filling in with earth when the contents reach to within about two metres from the ground level.

The auger bore scheme at Danagla Village, Khartoum North, has proved itself unsuccessful. During the past 18 months 47 bores were sunk—24 of these are now full and out of use and 5 of these remaining must be abandoned almost immediately. The majority of the others will have to be similarly dealt with in the near future.

Before giving a final decision on the efficacy of auger bore latrines, I intend making further investigations. So far the results as regards life and service are definitely disappointing.

It may be necessary to develop the alternative scheme of ordinary square pit latrines which have been successful elsewhere. There is only one doubtful factor regarding the adoption of this type of latrine at Khartoum Deims, and that is the extremely small hosh area in the majority of the premises which allows of very little space to sink a pit latrine of this type.

The householders of Hillet Khogali, Khartoum North, are anxious to have the bucket system abolished and replaced by pit latrines. The inhabitants of this village are mostly poor and therefore consider it a hardship to pay the town conservancy rates.

This village has recently been laid out on good lines and the area is ideal for the introduction of the deep type pit latrine. The compounds are large and the chance of water contamination is very slight.

It is therefore proposed to eliminate all buckets in this village and replace them by pit latrines of this type.

Scavenging and Refuse Collection.

The standard of cleansing in the three towns has been well maintained throughout the year.

House and trade refuse is collected expeditiously but garden refuse is still a serious problem in Khartoum. Through force of circumstances it was necessary to revert to the old practice of burning garden refuse but that again is giving a good deal of trouble as it cannot be directly controlled by this Service.

Garden refuse dumps have appeared everywhere and the trouble arises when they are also used as dumps for all sorts of house and kitchen refuse. On many occasions this year fly breeding has been traced to what appears to be an inocuous heap of garden refuse but which on investigation has been found to contain a good deal of household refuse also, thus forming an ideal site for fly breeding.

The number of refuse carts remains the same but in Khartoum all the old vehicles have now been replaced by the new improved type of cart.

As it is impossible for this Service to undertake the regular removal of garden rubbish, a uniform system of burning this on the premises concerned should be adopted, and the gardeners held responsible.

In Omdurman good results have been obtained by burning refuse on the sites of large holes on the outskirts of the town and by filling in the depressions with the burnt material.

The old type of box cart is still in use for refuse collection in Omdurman but these are now in an unserviceable condition. Replacement by modern type carts will greatly facilitate this branch of the Service and it is strongly recommended that this be carried out.

MARKETS.

The standard of cleanliness at the markets has been well maintained. Difficulty has again been experienced in disposing of the waste water from the East Blocks and additional soak pits have been dug to overcome this but they appear to be functioning very poorly and are constantly full.

The conveyance of meat from the slaughter house to the market is far from satisfactory. Ordinary suk carts are used and the mode of transport is primitive and insanitary. It is suggested that this work be given to a contractor who could be made to provide a proper vehicle and to convey the meat in a hygienic manner.

Unsound Food.

The undernoted is a statement of the unsound foods destroyed during the year :—

Khartoum.

	lbs.
Fruit and Vegetables	4,555
Butcher Meat	101
Meat (tinned)	196
Fish	212
Bacon	90
Fish (tinned)	1491
Sauces	338
Jams	48
Pickles	482
Miscellaneous	506
Total	8,019

Omdurman.

	lbs.
Beef	140
Camel Flesh	44
Tinned and Bottled Fruits	333
Tinned Vegetables	15
Total	532

Khartoum North.

Tinned Sauces and Fish	224

Bakeries.

The total number of European bakeries in the three towns is as follows :— Khartoum 17, Omdurman 11, Khartoum North 6, while the number of native bakeries is 8, 37 and 5 respectively.

It is satisfactory to note a vast improvement in the standard of Khartoum bakeries. Several new premises have been built and all can be classed as " modern " and of a much higher standard than existed before.

Following the enormous increase in the street hawking of foodstuffs last year, regulations were approved which made it possible to control this undesirable trade. The sale and distribution of bread is now under strict supervision. The old practice of carrying bread in open trays and in insanitary baskets has been abolished. The sale of bread in the streets is prohibited, though delivery, to customers only, is permitted. Properly made boxes which are comparatively dust proof are now used in dustributing bread and men employed on delivery work previously subjected to medical examination.

The control of this important article of food from its preparation until the time it reaches the customer is thus complete.

Milk Supply.

The following milk samples were taken during the year :—

Khartoum	179
Omdurman	107
Khartoum North	104
Total ...	390

which is an increase of 31 compared with 1931.

Of the samples taken in Khartoum 47 or 26% were below standard and the average presumed extent of adulteration was 5.87% added water.

The Omdurman figures are 22 or 21.5% and 7.7% respectively, while those of Khartoum North are 21 or 26% and 5.88%.

The following is a comparison of percentage of adulterated samples in the three towns compared with 1931 :—

	1931	1932	
Khartoum	27.8%	26%	a decrease of 1.8%
Omdurman	20.4%	21.5%	an increase of 1.1%
Khartoum North ...	23.0%	20%	a decrease of 3.8%

Proceedings were instituted in 68 cases of adulteration.

Warnings were issued in the remaining 22 cases as they were only slightly below standard.

The total fines inflicted for adulteration was £E. 23.100m/ms.

4 vendors in Khartoum were prosecuted for selling milk without licences and for using unregistered milk vessels. Fines amounting to £E. 1.500 m/ms were inflicted.

RESTAURANTS, EATING HOUSES AND COFFEE SHOPS.

All the old insanitary coffee shops have now been replaced by the new class of building. Native proprietors readily seized the opportunity and quickly took over the larger and better class premises. So great has been the demand that already there appear to be more than sufficient coffee shops and eating houses to supply the needs of the community. Unless the issue of further licences is severely restricted, there is a danger that dissatisfaction will be caused amongst the original proprietors who went to the trouble and expense of giving up their old premises at our request.

The disposal of waste water from coffee houses always presents a difficult problem, and if their number is further increased, the sanitary benefit from the new type of building is likely to be impaired.

The total number of licenced premises in Khartoum is :—

Eating Houses	"A" Standard	...	12
,, ,,	"B" Standard	...	10
Coffee Shops	"A" ,,	...	13
,, ,,	"B" ,,	...	20
	Total	...	55

INSANITARY PREMISES.

The housing situation in Khartoum is far from satisfactory. Prior to 1929 it was the practice to put forward yearly a list of houses which were unfit for human habitation and it was thus possible gradually to improve housing conditions.

In 1930 a list was submitted but owing to the acute housing shortage which then prevailed no action could be taken except in a few individual cases where closing of the houses concerned was deemed essential in order to abate existing nuisances. In 1931 similar conditions prevailed and naturally the standard of housing has fallen considerably as a result. Further lists of insanitary premises have not been submitted as the closure of more houses would only have aggravated a condition that was already acute.

The lack of houses in Khartoum has given rise to another form of nuisance, one that may have serious consequences should there be an epidemic of infectious disease. I refer to the subletting of houses, a practice which has increased enormously of late. In many houses each room is occupied by a different family. In some cases it is the tenant himself who sublets rooms while in others the landlord lets the house by the room. The worst feature is that the subletting is most prevalent in the lower class type of mud brick house which is least suited to this form of abuse.

Although not coming strictly within the scope of public health it is relevant to point out that the rents being collected for these insanitary dwellings are excessive. The owners and tenants have not been slow to take advantage of the demand for this type of accommodation.

The underlying cause is no doubt the steady and gradually diminishing number of old mud brick houses in Khartoum. In their place are now houses of a better type, more in accordance with the Khartoum standard, but of course of a much higher rental and out of reach of the pockets of the old occupiers. It appears that the latter have gradually concentrated on the fewer old houses remaining with the result that the demand now exceeds the supply. This practice of subletting is so thoroughly established that people who would normally reside in the deims or at Burri find that by sharing a room of a home by several others they can afford to pay the high rentals demanded. In most cases the occupants are persons who individually are unable to rent a house but who do not mind paying even P.T. 75 for a single room.

Provision for this class of people does not exist now in Khartoum and it is obvious that alternative accommodation must be sought elsewhere. On enquiry, it was discovered that no less than 392 houses were vacant in the Deims. If evicted tenants can be persuaded to reside there, herein appears to be the solution of the problem.

This housing question is an urgent one and should be faced without delay. Insanitary premises have been kept reasonably clean to avoid nuisance but this can only go on for a limited time. Owners cannot be asked to carry out other than urgent repairs nor be involved in any other heavy expense when it is intended to close the premises at the first opportunity.

Already a list of 58 houses requiring immediate action has been submitted. If the project is successful further lists will be submitted from time to time and thus it is hoped to regain the ground lost during the past few years.

RURAL DISTRICT.

Pumping Schemes.

All the pumping schemes North of Khartoum had very small areas under cultivation and thus lessening the probable breeding places for mosquitoes. Owing to shortage of money among the pump owners difficulty was experienced in getting essential major repairs carried out.

During the year sanitary approval was given to three new pumping schemes and two others, after being in disuse since 1930, were again put under cultivation. The main canals were not remade before pumping commenced, however, and were a continual source of trouble from leaks and seepages.

The pump at Wad Ramli closed down after the 1931-1932 season.

Village Sanitation.

Notices were sent to numerous Omdas and Sheikhs requiring them to thoroughly clean up their villages and to arrange the filling in of all borrowpits likely to become a menace during the rainy season.

A marked improvement in the cleanliness of villages and other surroundings resulted—but further action is required with regard to the filling in of borrow pits.

Gordon's Tree Dockyard.

A Native Overseer was appointed at Gordon's Tree to supervise the sanitary work there. The auger bore latrines proved unsuccessful owing to the nature of the soil and the scheme was abandoned in favour of a single bucket system.

Towards the end of the year an incinerator was built and has helped greatly in the disposal of house refuse.

Transport.

Approval has been obtained for a box car for the use of the Sanitary Inspector on the Rural District and is now being prepared. This will be a welcome addition and will greatly facilitate the work.

WORKSHOPS.

In the early part of the year the Workshops Committee decided that, in the interests of economy, the Sanitary Workshops should be taken over by the Public Works Department. It is a matter for regret that after years of building up, this workshop has had to be handed over. A maintenance staff is left who carry out minor and running repairs and also attend to the greasing of axles etc. Latrine buckets, refuse bins, etc., are still made in the workshop.

CONCLUSION.

In spite of the reduction in staff and the consequent reorganisation of the work, the standard of health throughout the population has been satisfactorily maintained.

It must be remembered, however, that 1932 was a fairly healthy year and that routine work was not interfered with by the occurrence of any epidemic.

It remains to be seen if in future the reduced personnel of this Service is able to cope with conditions which depart seriously from the normal, or with any experimental work.

METEOROLOGICAL OBSERVATIONS
AT
GORDON MEMORIAL COLLEGE, KHARTOUM.
1932.

Month.	Temperature in Degrees Fahranheit				Average Relative Humidity % at 8 a.m.	Average Evaporation in mms.	Rains in mms.	Sand storms	Prevailing Winds
	Highest Max.	Average Max.	Lowest Min.	Average Min.					
January ...	97.9	86.7	49.5	60.1	35	11.7	Nil	—	N-NNW
February...	104.7	91.7	48.2	61.1	29	13.1	Nil	—	N.N.W.
March ...	104.9	97.4	58.9	66.7	19	16.9	Nil	—	N.N.W.
April ...	110.5	103.9	66.4	73.4	17	14.8	1.3	—	N.
May ...	110.8	106.0	66.4	76.5	16	20.1	drops	1	N.N.W.
June ...	113.4	108.6	71.6	79.3	41	16.6	2.8	10	S.S.W.
July ...	108.5	99.8	67.1	76.8	62	12.4	50.8	4	S.S.W.
August ...	101.6	94.8	69.8	75.4	73	7.2	80.7	—	S.S.W.
September	106.4	99.7	65.8	76.7	63	9.0	55.9	—	S.
October ...	106.0	103.5	71.3	76.7	41	12.4	drops	—	N.
November	103.1	95.0	63.8	69.3	31	13.0	Nil	—	N.
December	94.1	86.7	50.0	61.9	36	11.7	Nil	—	N.
							191.5	15	

(b) (i) PORT SUDAN

Population 19,000.

The general health has been good. There were no epidemic outbreaks.

FLY BORNE DISEASES.

Owing to the high degree of humidity during the winter months, with a moderate temperature the prevention of fly breeding is a matter of great difficulty.

In spite of this fly breeding and fly borne diseases have been kept within moderate limits.

The figures for 1931 and 1932 are :—

Year.	Amoebic Dysentery.	Bacillary Dysentery.	Typhoid Fever.
1931	25	46	9
1932	9	28	13

The essential problem in the prevention of the transmission of these fly borne diseases is to prevent the access of flies to infected foecal material and in a bucket system used by natives this can only be prevented by adding to each bucket an adequate quantity of an efficient disinfectant. The methodical use of this precaution has had a most valuable effect on the reduction of fly borne disease.

CONSERVANCY.

Water Borne System :—

Septic tanks	42
Cesspits with water closet connections	54

These septic tanks and cesspits have proved very satisfactory, and their number would be considerably increased were it not for the high level of the subsoil water and the undesirability in a climate such as Port Sudan of this water becoming fouled.

Double Bucket System.

The rest of the town and surrounding villages are served by double bucket system with the exception of one village which is served by deep pit latrines.

This bucket system is working satisfactorily, but as in the case of all bucket systems serving native communities the access of flies to feocal material can only be prevented by the liberal use of disinfectant in the buckets and frequent house to house inspection. The disposal of the bucket contents is satisfactory.

WATER SUPPLY.

The quality of the water supplied as judged by monthly bacteriological and chemical examinations is excellent.

There was a fall in the quantity of dissolved solids as a result of the heavy rainfall in 1931.

The average daily consumption for the year was 1,234 tons of which 296 tons was used for gardens.

MOSQUITOES.

The mosquito incidence was kept at a very low level. Adult Anopheline mosquitoes are very rarely found. Apart from preventive measures Anopheline mosquitoes do not seem to thrive at Port Sudan and those that do hatch out quickly die.

The following is a list of Anopheline, Stegomyia and Culex infestations found and dealt with during the year :—

Month.	No. of infections of larvae.	No. of infections of pupae.	A.	S.	C.	Total.
January	10	3	—	2	11	13
February ...	9	—	—	2	7	9
March	12	3	1	3	11	15
April	14	3	5	4	8	17
May	16	—	5	5	6	16
June	19	2	6	13	2	21
July	18	1	4	6	9	19
August	14	—	—	6	8	14
September ...	14	—	—	6	9	15
October	11	—	—	6	5	11
November ...	5	2	—	1	6	7
December ...	17	1	1	8	9	18
Total	159	15	22	62	90	175

RATS.

Every effort is made to keep down the rat population to a low level. All warehouses are as far as possible rat-proofed or made unsuitable to the harbourage of rats. Every effort is made to prevent any food or drink being available for rats in the vicinity of the quays, and with this object in view the quarters for the native stevedores have been removed from the quay side to a village a mile away from the nearest quay.

The total number of rats caught during the year has increased by 49%. This increase is probably due to more efficient rat catching and not to an increase in the rat population.

A conparison of the total number of rats caught in the last five years is as follows :—

In 1928 there were 4,807 rats caught.
,, 1929 ,, ,, 3,491 ,, ,,
,, 1930 ,, ,, 5,184 ,, ,,
,, 1931 ,, ,, 4,630 ,, ,,
,, 1932 ,, ,, 6,885 ,, ,,

Distribution of Main Town and East Side.

Month	West Town				East Town				Grand Total
	Shops etc.	Villages	Other Places	TOTAL	Quays Encl.	Deim Hashish	Other Places	TOTAL	
January	161	116	1	278	77	142	146	365	643
February	145	95	30	270	37	185	151	373	643
March	154	111	—	265	49	144	242	435	700
April	124	67	—	191	79	184	184	447	638
May	166	126	—	292	58	140	187	385	677
June	155	100	19	274	66	114	153	333	607
July	113	55	11	179	41	144	109	294	473
August	94	31	11	136	26	108	60	194	330
September	121	52	2	175	30	80	42	152	327
October	154	61	10	225	30	147	41	218	443
November	98	84	1	183	21	100	27	148	331
December	106	190	11	307	29	189	48	266	573
Total	1591	1088	96	2775	543	1677	1390	3610	6385
Percentage	24.9%	17.0%	15.0%	43.4%	8.5%	26.3%	21.8%	56.0%	100%

In addition 500 rats have been caught on the south side.

Rat Fleas.

The flea census per month together with the prevailing atmospheric conditions was as follows :—

Month.	Fleas per rat.	Average Temperature Shade.		Average Relative Humidity.
		Maximum °F.	Minimum °F.	
January	1.1	80.4	69.9	63.7
February	1.2	81.2	67.7	63.9
March	1.0	84.5	69.5	63.8
April	1.3	89.0	79.6	53.3
May	1.1	93.2	75.2	40.0
June	1.3	102.3	78.8	42.7
July	1.0	105.0	85.0	39.8
August	1.1	105.0	84.8	39.1
September	1.3	101.4	80.6	41.3
October	1.4	93.8	77.0	67.7
November	0.6	88.8	75.6	74.8
December	0.8	83.0	70.6	76.2

(ii) ATBARA

Population 14,000.

FLY BORNE DISEASES.

The incidence of the Enteric Fevers and the Dysenteries was low.

WATER SUPPLY (CANTONMENT).

Water is pumped from the river at a point below the junction of the Atbara river with the main Nile, it is sedimented, and chlorinated but not filtered. The water is examined every month both bacteriologically and chemically.

The water supply of Atbara native town (population 10,000) is from wells, and wherever the nature of the soil permits tube wells are insisted on.

There are 160 open wells and 303 tube wells.

CONSERVANCY (CANTONMENT AND NATIVE TOWN).

A single bucket system is in force. Buckets are cleared twice in 24 hours and the contents removed to the sewage trenches by Tumber carts. At the trenches, carts are washed down and smeared over with crude fuel oil. The latter acts as a deodorant and deterrent to flies and also a preservative to the metal of the cart. Crude oil is also used in latrine buckets.

CONSERVANCY (DAKHLA).

This village is continuous with the cantonment. Auger-bore latrines to the number of 104 have been installed. Two or even three Auger-bores have been sunk in each yard so as to prevent overfilling. During the Nile flood the fluid contents of these holes rises to within six feet of the surface.

ANTI-MALARIAL WORK.

Crude fuel oil was principally used, but Pesterine or anti-malaria mixture was used along the river bank in pools with vegetation.

The river did not attain the same height as last year, but maintained its peak for a longer period.

River work is carried out by means of a felucca and during the flood by means of a motor launch.

Malaria Admission to Hospital.

1926	1927	1928	1929	1930	1931	1932
188	244	736	288	292	274	232

Thus 290 to 300 cases per annum is the normal run of admissions, but are not all locally contracted cases.

AUGER-BORE HOLES AND KITCHEN AND TAP WASTES.

Experiments were made in several houses and in the British Barracks. The Auger-bore holes deal satisfactorily with ordinary tap wastes. For kitchen waste a grease trap is installed.

(iii) WAD MEDANI

Population 33,000.

The incidence of fly borne and water-borne diseases in Wad Medani town is low.

CONSERVANCY.

The European quarter is served by a double bucket system; the native quarter by deep pit latrines. Auger-bore latrines to the number of 63 were installed in the yards of native houses, but in 27 cases they have already been replaced by deep pit latrines. These latter when properly dug and properly seated are very satisfactory. Deep pit latrines are being substituted for bucket latrines in public latrines, and are found to be much more satisfactory. They are found to fill at the rate of 1 c.m. a day.

WATER SUPPLY.

A piped water supply has been installed. The water is pumped from the river above the town and is filtered and chlorinated. Regular bacteriological examinations are carried out and the water has been found to be potable and safe.

Much water is still drawn from the Nile by the native population, this difficulty will be met by increasing the number of stand-pipes. There are 39 wells in the town.

The milk supply is carefully controlled.

Fly breeding and mosquito breeding are controlled. The latter is a matter of great difficulty owing to the thousands of pools left by the falling Nile.

(c) GENERAL REMARKS

HOUSING.

Perhaps the most pressing need for the improvement of the general health in the Sudan is the improvement of housing. Housing conditions in the three northern provinces are generally speaking not unsatisfactory and there is a definite tendency towards improvement, but in the centre little improvement in this direction has taken place during the last twenty years, and in many districts the housing conditions are definitely deleterious to health.

As regards certain areas the people have but recently come under Government administration and little improvement could yet be hoped for, and in the case of certain tribes such as the Nuers and Dinkas the people are very primitive and their circumstances of life are such as to render any alteration in their type of dwelling a matter of considerable difficulty. In other cases, however, both in the centre and the south the construction of houses and the laying out of villages admit of great and immediate improvement.

The Gezira Irrigated Area is a crying example of this need for better housing. The central and southern part of the irrigated area first came under irrigation in 1925 and for a succession of years money poured into this area, but in spite of this very little improvement in the standard of housing has taken place. The majority of the houses in the southern part of this area are little or no better than the huts of the pagan tribes of the south, and it is not uncommon to find men who own and use private motor cars still living in the veriest hovels.

Similarly in Mongalla Province where frequently recurring epidemics of Cerebro-Spinal Fever have swept the province since 1918 the housing and the lay out of the villages are extremely bad. The inhabitants of this province are very amenable to control and the proper construction of houses is a question of the expenditure of effort rather than of money, and it is reasonable to hope, therefore that it will be possible in the near future to improve the type and spacing of houses, and by this means to reduce the incidence of Cerebro-Spinal Meningitis.

It is not possible to lay down type model dwellings applicable to the whole Sudan nor is it possible in view of the great distances to be travelled to set up model villages at various centres in the Sudan, but the line of action suggested and already to some extent adopted is to persuade the tribal leaders of the village notables themselves to build a better type of house standing in its own enclosure and with its own latrine and thus to procure in each village a model house to be imitated by the more ambitious and the more enlightened. The proper layout of villages, almost equally important to the public health, needs authorative organisation and control. With a diminished staff this is difficult, but it should be possible to lay out properly a few villages in each district to afford an example which could be followed by the native administrations.

CONSERVANCY.

A careful administered double bucket system with an ample inspecting staff and a liberal supply of disinfectant to prevent fly infection has proved a satisfactory method of conservancy in Khartoum and in special quarters of other towns where these necessary adjuncts are available, but in the smaller towns and poorer quarters and suburbs of the larger towns where adequate inspecting staff is not forthcoming, bucket conservancy has proved unsatisfactory. Moreover the cost of bucket conservancy is a heavy tax on small and poor communities, and in places where there is a heavy rainy season the disposal of bucket contents becomes a matter of great difficulty of transport, flooding of the disposal trenches and sickness among the animals.

In view of these considerations an endeavour is being made to substitute a system of properly constructed deep pit latrines for bucket latrines in the smaller towns and in the poorer quarters and suburbs of the larger towns. It is hoped in this way to obtain a diminution of fly borne diseases and at the same time lower the burden of rates.

VILLAGE SANITATION.

Almost nothing has been accomplished up to the present towards the establishment of latrine accommodation in the larger villages and generally speaking this development will have to await a demand encouraged by education and propaganda, but in the case of the thickly populated Gezira Irrigated Area and to a less extent of villages situated on the edge of pump irrigation schemes the matter is one of urgent need and cannot await the slow growth of a public demand.

(5) REPORTS ON SPECIAL SUBJECTS

(a) ASTHMA AT PORT SUDAN.

A report on the incidence and treatment of Asthma at Port Sudan occurs in the Senior Medical Inspector's Annual Report and is given below :—

Eighty cases of Asthma have been investigated during the year. Clinically the disease has presented its usual features and laboratory investigation has borne out the results of recent work. Associated intranasal abnormalities have been present in 45% of cases. Polycythaemia during the Paroxysm has been a constant feature and differential blood examination has shewn an increase of Monocytes at the expense of Polymorphs together with an average Eosinophilia of 10%. Gastric acidity, as estimated by test meal, and blood pressure were within normal limits while the sputum invariably contained abundant Eosionopil cells. A family history was discovered in only one case and, though the evidence was unreliable, it was clear that the familiar nature of the disease was not pronounced in Port Sudan. A survey of these cases, together with those of the last five years, shows that the Asthma Paroxysm occurs most commonly under conditions of high relative humidity in Port Sudan. By inoculation experiments each patient has been proved to be sensitive to moulds, which thrive in such moist atmospheres while controls have shewn no such sensivity. Prophylactic administration of a mould vaccine has produced encouraging results and it is hoped that a wider application of this treatment in future will prove it to be a useful and successful procedure.

(b) UNEXPLAINED CASES OF BLINDNESS OCCURRING IN THREE NEIGHBOURING TRIBES IN THE BAHR-EL-GHAZAL PROVINCE.

An interesting report has been received from Medical Inspector, Rumbek district, on cases of Blindness occurring among the Jur, Bellanda and Bongo tribes. The report is based on 47 cases seen among the Jur living on the Naam river, and a number of cases seen subsequently among the Bellanda on the Sueh river. Similar cases are said to occur among the Bongo tribe living on the Tonj river.

It is interesting to note that the Bellanda tribe affirm that they did not suffer from this disease until they moved seven years ago from the Zande country to their present country on the Naam river.

A short summary of the report is given below :—

This disease appears to be a gross form of Retino-Choroiditis the onset of which is characterised by lachrymation and swelling of the eyelids, followed by night blindness and progressing to complete blindness in from five months to two years. The Retino-Choroiditis is followed by Optic Atrophy, and in many cases the disease is associated with a generalised Uveitis with exudate and synechiae, and cataractous changes in the lens. Vitreous opacities do not appear to be common in the cases where the other media are clear. Only in very long established cases was Phthisis Bulbi found.

The Medical Inspector is of the opinion that these are not cases of Retinitis Pigmentosa, and although in the Jur tribe a family history of blindness was given in eleven cases, this was rare in the Bellanda and Bongo tribes. Again the usual causes, syphilis, metallic poisons, family tendency and heredity, nephritis, diabetes, etc. all fail to account for the condition. Most of the cases examined were males ranging from 11 to 70 years.

The first case seen was that of a Jur boy of 12 years of age who was said to have been blind for three years.

The history given was, that a swelling of the eyelids developed with lachrymation about the time of the sowing of the dura crop. Shortly the boy found that he had difficulty in seeing near objects in the semi-twilight and stumbled over ant hills, etc. By the time of the ripening of the dura crop, a period of four or five months, he had become completely blind except for light perception.

Family History.

Father killed in Nuer raid. Brother killed by buffalo. This brother had a paralysed arm. Mother alive, no eye trouble, no syphilis. There is no history of any other member of this family being affected with blindness. The boy was born near Rumbek.

General Examination.

No abnormality found. Boy well grown and nourished. Stools nil. Blood count showed 10% Eosinophilia. (The Medical Inspector remarks that it is unusual to find a normal differential blood count amongst these tribes.) Urine normal. Pupils equal, corneae clear. 1% Atrop. drops produced equal and wide dilation of pupils. No trachoma. Lenses clear.

Ophthalmoscopic examination showed what appears to be a disseminated Retino-Choroiditis. The discs, though not completely white as in Atrophy, had a faint pinkish tinge near the entrance and exit of the Retinal vessels and waxy in the remaining areas. No vitreous opacities and the anterior chamber was normal. No evidence of Irido-cyclitis.

In view of this case and others said to exist among the Jur tribe, a rapid journey was made into the Jur country along the Rumbek-M'volo road where 47 cases of blindness were seen, of which 30 were able to be examined ophthalmoscopically before the battery of the ophthalmoscope gave out.

The impressions gained on this journey were :—

(i) Most of the cases of blindness showed slight Proptosis.
(ii) No pain on pressure applied to eye-balls.
(iii) Majority of eyes on casual examination showed no obvious evidence of blindness.

(iv) Strong family histories of blindness were found in some cases. Thus six cases had each six blind relations, two cases had each five blind relations and three had each four blind relations.

(v) 40% of the cases showed Posterior synechiae and a few of the cases could not be examined ophthalmoscopically owing to small adherent pupils, although most allowed enough examination to reveal evidence of gross Retino-Choroiditis.

(vi) Some cases showed marked choroidal and retinal destruction without any evidence of the rest of the uveal tissue being involved, whereas others showed synechiae completely binding the Iris to the lens, but not very marked retinal and choroidal changes.

The disease is attributed by the local natives to :—

(i) Magic.
(ii) Eating a certain fish (Abu Nake).
(iii) The eyes being splashed by the blood of a buffalo.

The districts occupied by the Bellanda and Jur tribes both show a certain amount of similarity, being traversed by rocky streams with heavily-forested banks infested with tse-tse flies and mosquitoes.

A point of interest noted by the Medical Inspector was that the Bellanda poison their fish by means of a seed from a tall leguminous plant, the seed being of the appearance of a lentil of a blackish green colour.

The leaves of the plant are rather fleshy with the under surface covered by silvery hairs.

The poison is obtained by crushing the seeds in water and the extract is thrown into the pools and after a short time according to the natives "the fishes' eyes become full of blood and they have to rise to the surface."

It is noteworthy that tumours due to Onchocerca Volvulus have recently been found in this area.

(c) OBSERVATIONS ON THE INCIDENCE OF CARIES AND PYORRHOEA IN THE TEETH OF FOUR TRIBES WITH DIFFERENT DIETARY AND HABITS OF LIFE.

The following figures show the incidence of caries and pyorrhoea in a number of adults selected from among :

(1) settled Arab cultivators,
(2) camel owning nomad Arabs,
(3) Nubas (hill dwelling negroids),
(4) the Zande tribe.

Tribe.	No.	Caries.		Pyorrhoea.		Caries and Pyorrhoea.	
		No.	%	No.	%	No.	%
Settled Arabs	1,000	83	8.3	98	9.8	—	—
Nomad Arabs	1,607	466	29.0	353	21.9	207	12.8
Nubas	1,288	206	16.0	155	12.0	—	—
Zande	1,250	214	17.1	188	15.0	91	7.3

The cases were taken as they came without any kind of selection.

(1) The settled Arabs live principally on grain, with some vegetables ; milk is taken with the food regularly but in limited quantities, and meat is eaten once or twice a week.

(2) The camel owning nomads' staple article of diet is camel milk. He eats grain and meat, but in very limited quantities.

(3) The Nubas are hill dwelling negroids. Their staple diet is grain : milk is only available in very small quantities, and meat is eaten only occasionally.

(4) The Zande tribe inhabit a heavily infected Glossina Morsitans area They live on grain, vegetables and fruit, also fish, vermin and, more rarely, game

The infants in each of these classes are suckled from eighteen months to two years.

It is interesting to note that the incidence of both caries and pyorrhoea is heaviest among the nomad milk drinkers, and least common among the cultivators, who live on grain, vegetables, milk and some meat. The Nubaa and Zande occupying an intermediate position.

The numbers examined are too small to justify any deduction being made but they are sufficiently interesting to warrant further investigation.

(6) PROGRESS OF MEDICAL WORK

In view of the urgent need for economy many of the most pressing needs for hospital development and improvement have had to be postponed, but it has still been possible to extend the network of dispensaries which is gradually being established in the various parts of the Sudan. In particular a commencement has been made in the establishment of a network of these dispensaries in the Sleeping Sickness area and much is to be hoped from this development. The establishment of dispensaries is the cheapest form of medical development and although they can only meet the simpler needs of the people they bring that assistance within the reach of the most suspicious and the most remote. They are the most effective means of winning the confidence of the people and of obtaining early medical intelligence as to the existence and concealment of disease. The total number of these dispensaries has been increased from 184 to 197. In order to prevent epidemic outbreaks and the further spread of endemic diseases such as Sleeping Sickness, it is very important to extend this system in certain areas notably in Mongalla Province where Cerebro-Spinal Fever has been a recurrent scourge, in the Sleeping Sickness areas and in the cataract country of Halfa Province where a very severe outbreak of Diphtheria showed how completely these isolated people were at the mercy of an epidemic outbreak.

The following table shows inpatients, outpatients and operations performed during 1931 and 1932 :—

	1931	1932	Increase percentage.
Inpatients...	59,736	59,642	—
Outpatients	4,044,439	4,264,412	5.4
Operations	6,798	7,287	7.3

New dispensaries were opened at the following places :—

Tonj	Gondal	Badein	Abyei
Gogrial	Kebbi	Korti	Ghabeish
Wad Hamed	Dar Gimr	Doushat	Gordon's Tree

and a Travelling dispensary on the Dar-el-Ahamda, White Nile Province.

The following dispensaries have been closed :—

Ajwong	Taweisha
Pibor	Kafia-Kingi

The following additions were made to buildings during 1932 :—

DARFUR :—

El-Fasher —6 hut wards for prisoners.

1 Isolation ward.

FUNG :—

Kurmuk	— 5 hut wards and kitchen completed.

KORDOFAN :—

Kadugli	— 1 second class ward.
Talodi	— 4 hut wards.
Suggee-el-Gamel	— Mud brick dispensary replacing grass.

MONGALLA :—

Torit	— 1 Kitchen and 2 store-rooms.
Opari	— New dispensary.
Kajo-Kaji	— New dispensary.
Taali	— 2 hut wards.

PORT SUDAN AND SUAKIN :—

Suakin	— Waiting shelter and latrine for pilgrims, outside quarantine enclosure. Permanent walling to shelters within the enclosure.

WHITE NILE :—

El-Dueim	— Operating and Administrative block completed. Two eight bedded wards.
Aba Island	— New dispensary and Dispensary Hakim's house.
Kosti	— 2 huts for outpatient work.

(7) MEDICAL WORK CARRIED OUT BY MISSIONS

MISSION HOSPITALS.

(1) Omdurman (Church Missionary Society).

This hospital has a British staff of :—

3 doctors	1 dispenser.
3 nurses	1 housekeeper.

The bed capacity is 60.

Inpatients during the year numbered 1,071 an increase over the previous year of 74.

Outpatients totalled 34,744 an increase of 3,762.

131 major and 221 minor operations were performed as against 180 major and 120 minor operations in 1931.

The Welfare Clinic —530 attendances during 1932.

Abu Ruf Dispensary treated 14,175 outpatients during 1932, a decrease of 2,858 (caused by the illness of the British nursing sister in charge).

The work carried out at this hospital is excellent and the co-operation of the Medical Staff is much valued.

(2) Lui, Mongalla, Province (Church Missionary Society).

Staff—one British doctor.

2,562 inpatients were treated during the year.

Outpatient attendances numbered 13,762.

Major operations numbered 103.

483 of the outpatients were suffering from Yaws and 160 were lepers.

Dr. Fraser who is in charge of this hospital undertakes the medical charge of the Moru district on behalf of the Government. The hospital is an excellent one and very good work both medical and surgical is carried out. Near to the hospital is a leper settlement providing treatment for the more infectious lepers of the district. The outlying parts of the district are served by nine bush dis-dispensaries staffed by young men educated at the Mission school and trained in medical work at the Mission hospital. The dispensaries are economical in construction, equipment and administration, but are in every way adequate and suitable to their work. The whole organisation is in every way a model of non-official medical administration.

(3) **Melut, Upper Nile Province** (Sudan United Mission).

Staff—one British doctor.

A total of 105 inpatients and 2,914 outpatients were treated during 1932.

Seven operations were performed and 300 injections of Novarsenobenzol were given during the year.

MISSION DISPENSARIES.

(1) **Khartoum North** (American Mission).

In connection with the Girls' Boarding school.

(2) **Kordofan** (Sudan United Mission and Italian Mission).

At **Abri, Heiban** and **Tabanya**—37,303 outpatients were treated, 288 injections of Novarsenobenzol being given.

(3) **Upper Nile**

The Mission dispensaries in this province with the exception of Malik and Rom are administered on the following lines :—

The building and furniture are provided by the Mission and each Mission station sends one of its most intelligent young men to be given a year's training at the Province hospital as a Sanitary Hakim. On completion of his training this Sanitary Hakim is posted to his own Mission station dispensary. The work at these dispensaries is carried out under the general supervision of the Senior Medical Inspector on exactly the same lines as Government dispensaries. The same routine of work is observed and the same monthly returns are sent in to the province hospital. Drugs, dressings, instruments and medical equipment are supplied by the Government. With the exception of the Church Missionary Society dispensaries in the Moru district and the Church Mssiionary Society dispensary at Abu Ruf, these dispensaries are the best Missionary dispensaries in the Sudan. They constitute a most interesting example of how Missions can co-operate with the Government Medical Service in carrying out medical work as an assistance to their Missionary work while at the same time ensuring the best medical results, and the regular monthly information as to the incidence of epidemic and endemic disease needed by the Government.

Detwok treated 4,118 outpatients and gave 217 injections of Novarsenobenzol

Tonga treated 1,414 outpatients.

Yoynyang treated 265 inpatients and 2,255 outpatients, 721 injections of Novarsenobenzol were given.

Doleib Hill (American Mission).

1,451 outpatients were treated and 268 injections of Novarsenobenzol were given.

Rom (Sudan United Mission).

14 inpatients and 2,028 outpatients were treated, 39 injections of Novarsenobenzol being given.

Malik (Church Missionary Society).

At the dispensary attached to the Boys' school 8,824 outpatient attendances were recorded.

(8) VITAL STATISTICS.

The returns of births and deaths can only be considered to be in any way correct in Khartoum, Berber and Dongola Provinces and in Wadi Halfa district. The returns for the Blue Nile Province are still very incomplete; they are included in the list given below, but it would not be safe to draw any conclusions from them :—

NON-EUROPEAN VITAL STATISTICS.

Province.	1929		1930		1931		1932	
	Total.	Rate.	Total.	Rate.	Total	Rate.	Total.	Rate.
Khartoum :—								
Births	4,189	17.2	4,574	18.5	5,071	20.3	5,006	18.0
Deaths	2,519	10.7	2,316	9.3	2,862	11.4	2,521	9.0
Still births ...	157	37.1	203	44.3	202	44.0	165	32.9
Infantile mortality	281	66.4	238	52.0	405	88.4	287	57.3
Berber :—								
Births	4,721	31.2	5,284	34.9	6,275	41.4	5,721	34.5
Deaths	3,707	24.5	2,557	16.8	3,004	19.7	2,878	17.3
Still births ...	103	21.8	127	24.0	112	21.1	95	16.6
Infantile mortality	341	72.2	282	53.4	526	99.6	474	82.8
Dongola :—								
Births	5,481	33.6	5,935	36.4	6,732	41.2	6,005	37.9
Deaths	2,451	15.0	2,637	16.4	3,029	18.8	2,729	17.1
Still births ...	309	52.7	273	46.0	344	57.9	385	55.7
Infantile mortality	464	84.6	433	73.0	620	52.9	623	103.7
Blue Nile :—								
Births	11000	31.5	15328	43.5	18306	51.9	10255	20.6
Deaths	7,784	22.1	9,668	27.4	9,908	28.0	5,948	11.9
Still births ...	171	15.5	241	15.6	402	26.0	186	18.1
Infantile mortality	432	39.3	385	25.1	900	58.6	637	62.0
Wadi Halfa Merkaz :—								
Births	746	16.5	828	20.1	904	21.9	785	15.0
Deaths	490	10.8	451	10.8	494	11.8	460	8.7
Still births ...	6	8.0	6	7.2	4	4.8	10	12.7
Infantile mortality	70	93.8	79	95.4	124	149.7	120	152.8

Shows the births, deaths by ages and still–births of Khartoum, Berber, Blue Nile and Dongola Provinces, and of Wadi Halfa Merkaz, which are considered to be approximately correct.

Nationality.	Births.		Deaths by ages.							Total deaths.		Total still-births	
	Male.	Female.	Under 1 year	1-5	5-10	10-20	20-40	40-60	Over 60	Male	Female	Male	Female
British	5	3	—	—	—	—	2	1	—	3	—	—	—
Greek	15	15	—	1	—	1	3	7	4	13	3	3	3
Other Europeans	7	6	—	1	—	—	2	2	1	5	1	—	—
Egyptians & Syrians	342	272	49	11	2	10	15	23	48	84	74	9	3
Natives of Sudan	14,044	12,598	2,168	1,755	841	920	2,389	2,277	3,771	7,115	7,006	458	315
All others ...	250	180	20	28	22	24	62	30	48	153	81	1	2
Total	14,663	13,074	2,237	1,796	865	955	2,473	2,340	3,872	7,373	7,165	471	323
Grand Total...	27,737		14,538							14,538		794	
% deaths by ages..			15.3	12.3	5.9	6.5	17.0	16.0	26.6				

(9) MEDICAL EXAMINATION OF SCHOOLS.

The following table shows the result of medical examination of pupils in one secondary, one technical, 11 primary, 68 elementary and 114 village schools during 1932 :—

Province.	Number examined.	Trachoma. No	Bilharzia. No.	Spleen. No.	Pulmonary Tuberculosis. No.	Ankylostoma. No.
Bahr-el-Ghazal :—						
1 Elementary ...	91	2	1	8	—	—
2 Artizans ...	42	1	1	3	—	—
1 Intermediate ...	89	—	1	5	—	—
Berber :—						
2 Primary ...	144	54	8	8	—	—
2 Elementary ...	209	104	—	21	—	—
4 Village	277	145	—	21	—	—
Blue Nile :—						
2 Primary ...	112	30	—	30	—	—
13 Elementary ...	906	364	3	186	—	—
29 Village ...	878	304	—	203	—	—
Darfur :—						
1 Elementary ...	116	42	43	72	—	—
4 Village... ...	421	305	65	191	—	—
Dongola :—						
8 Elementary ...	1,030	328	43	87	—	7
Fung :—						
2 Elementary ...	129	35	1	74	—	—
7 Village... ...	294	132	—	135	—	—
Halfa :—						
1 Primary ...	53	43	17	—	—	3
3 Elementary ...	360	291	126	—	—	18
Kassala :—						
4 Elementary ...	283	53	—	86	—	—
33 Village... ...	1,323	343	—	360	—	—
	5757	2576	509	1490		

Province.	Number examined.	Trachoma. No.	Bilharzia. No.	Splean. No.	Pulmonary Tuber-culosis. No.	Ankylos-toma. No.
Khartoum :—						
Gordon College ...	524	390	1	1	1	—
Omdurman Tech. School	200	108	1	—	—	—
Khartoum Primary	151	52	—	—	—	—
Omdurman „	82	11	—	—	—	—
Khtm. North „	22	11	—	4	1	—
Khartoum Kuttabs	279	74	3	2	—	—
Omdurman „	625	193	—	13	—	—
American Mission Khtm. North ...	283	124	—	3	—	—
Unity High School for Girls ...	31	9	—	—	—	—
Kordofan :—						
1 Primary ...	98	8	—	15	—	—
8 Elementary ...	1,114	103	103	439	—	—
10 Village... ...	903	217	22	259	—	—
Mongalla :—						
2 Intermediate ...	211	7	—	55	—	—
Port Sudan :—						
1 Primary ...	104	1	2	1	—	—
5 Elementary ...	633	19	2	6	—	—
4 Village... ...	136	21	5	7	—	—
Upper Nile :—						
1 Elementary ...	141	48	—	63	—	—
White Nile :—						
1 Primary ...	35	2	1	4	—	—
6 Elementary ...	626	150	62	106	—	—
13 Village ...	503	206	57	148	—	—

(10) QUARANTINE

(a) PORT SUDAN QUARANTINE.

Quarantine restrictions for Cholera were enforced against Bombay for certain periods during the year. In December Alexandria was declared to be infected with Small-Pox.

The following table shows the number of ships entering the port during the last five years :—

	1928	1929	1930	1931	1932
Ships arriving	932	885	944	879	803
Sambuks	633	526	529	530	546
Men of War —British	12	17	20	18	7
„ „ „ —French	4	5	9	4	—
„ „ „ —Italian	4	6	3	4	—
Ships Quarantined	12	—	—	—	—
Persons isolated from ships ...	2	—	2	—	—
	£E.	£E.	£E.	£E.	£E.
Total Receipts	1,163	800	626	538	448

No ships have been placed in quarantine and no persons have been admitted to the Quarantine station from ships at Port Sudan during the year.

(b) SUAKIN PILGRIM QUARANTINE.

General Remarks.

The number of pilgrims leaving for the Hedjaz via Suakin again showed a diminution over that of the previous year. This was in accordance with the diminution of the total number of pilgrims arriving at Jeddah. The corresponding figures are shewn in the table given below :—

	1930	1931	1932
Total pilgrims arriving at Jeddah...	120,000	64,000	60,000
Pilgrims via Suakin...	4,791	2,414	1,348

Yom el Arafat fell on April 15th and the last pilgrim ship left Suakin on April 11th. The first pilgrims to return left Jeddah for Suakin on April 23rd. The pilgrimage was declared clean on April 29th. An improved water supply and a general improvement of the roads ensured better health conditions for the pilgrims.

The distances and time taken by cars on the various roads are as follows :—

Roads.	Distance. miles.	Time. hours.
Jeddah-Mecca	47	2
Jeddah-Medina	280	16
Yanbo-Medina	156	8
Mecca-Mt. Arafat	14	undertaken on foot.

Outgoing Pilgrims.

A total of 1,348 pilgrims left Suakin for the 1932 pilgrimage.

They were all vaccinated against Small-Pox and received a single inoculation against Cholera. They all paid their return fare by steamship in advance and paid a deposit for their quarantine charges in the Hedjaz and on their return to Suakin. No pilgrims left or returned by sailing vessel.

The dates of departure and details of race and sex of the outgoing pilgrims are given in the following table :—

Steamer	Date of departure	Sudanese			Total	West Africans				Grand Total
		Men	Women	Children		Men	Women	Children	Total	
Taif ...	27. 8.31	2	—	—	2	—	1	—	1	3
Talodi ...	6. 9.31	—	—	—	—	1	1	—	2	2
Talodi ...	30.11.31	—	—	—	—	—	1	—	1	1
Talodi ...	27.12.31	1	—	—	1	7	5	1	13	14
Talodi ...	24. 1.32	1	—	—	1	10	7	2	19	20
Talodi ...	22. 2.32	3	1	—	4	15	6	2	23	27
Talodi ...	6. 3.32	6	6	—	12	33	30	12	75	87
Talodi ...	19. 3.32	87	39	1	127	80	98	24	202	329
Talodi ...	30. 3.32	157	93	6	256	159	195	39	393	649
Talodi ...	11. 4.32	106	10	—	116	49	34	17	100	216
Total ...		363	149	7	519	354	378	97	829	1348

Returning Pilgrims.

On their arrival in the Sudan pilgrims are detained in the Quarantine Camp for five days. They usually arrive at Suakin badly nourished and exhausted, and this period of detention in the camp, where they are well fed and well looked after is very valuable to the well being of the pilgrim quite apart from its value as a quarantine measure.

A total of 1,403 pilgrims were received in the quarantine station. The following table gives the dates of departure from Jeddah, and the race and sex of the returning pilgrims :—

STEAMER	Date of departure	SUDANESE				WEST AFRICANS				Grand Total
		Men	Women	Children	Total	Men	Women	Children	Total	
Talodi ...	6. 3.32	—	1	—	1	124	63	38	225	226
Talodi ...	19. 3.32	—	—	—	—	5	1	2	8	8
Talodi ...	30. 3.32	—	1	—	1	1	1	2	4	5
Talodi ...	24. 4.32	148	54	2	204	4	1	—	5	209
Talodi ...	13. 5.32	107	38	2	147	74	56	25	155	302
Talodi ...	27. 5.32	52	7	—	59	21	8	4	33	92
Talodi ...	8. 6.32	22	8	2	32	50	52	6	108	140
Talodi ...	20. 6.32	4	4	—	8	34	35	4	73	81
Talodi ...	18. 7.32	2	15	—	17	53	72	16	141	158
Talodi ...	15. 8.32	1	1	—	2	17	22	2	41	43
Talodi ...	15. 9.32	1	—	—	1	18	21	7	46	47
Talodi ...	10.10.32	1	1	—	2	20	22	17	59	61
Talodi ...	7.11.32	—	—	—	—	9	15	3	27	27
Talodi ...	5.12.32	1	—	—	1	1	2	—	3	4
TOTAL ...	—	339	130	6	475	431	371	126	928	1403

It is seen that the bulk of the pilgrims returned in May, June and July and that from August onwards there were only small batches of pilgrims to the end of the year.

The returning pilgrims exceeded the outgoing pilgrims by 55. The following table shows the differences between the outgoing and returning pilgrims over the last five years :—

Returning Pilgrims.

YEAR.	SUDANESE.			WEST AFRICANS.			TOTAL.
	Men.	Women.	Child.	Men.	Women.	Child.	
1928 ...	— 19	+ 40	— 5	— 278	— 154	— 17	— 433
1929 ...	+ 28	+ 12	+ 5	— 70	— 96	— 63	— 184
1930 ...	— 87	— 126	— 5	— 124	— 235	— 125	— 702
1931 ...	— 75	— 13	— 1	— 111	+ 84	— 4	— 120
1932 ...	— 24	— 19	— 1	+ 77	— 7	+ 29	+ 55
BALANCE...	— 177	— 106	— 7	— 506	— 408	— 180	—1384

Thus during the last five years a total of 1,384 pilgrims, of which 290 are Sudanese and 1,094 West Africans, have failed to return to the Sudan.

Pilgrims Leaving By Massowah and Returning by Suakin.

It has been common in the past for pilgrims to leave via Massowah by sambuk and to be repatriated as destitutes via Suakin. This arrangement appeals strongly to the pilgrims as in this way they are able to make the pilgrimage at a minimum cost although at some personal risk, but for several reasons it was unsatisfactory from the point of view of quarantine efficiency. From 1928 onwards an effort has been made to prevent the return of Massowah pilgrims via Suakin.

The following table shows the number of Massowah pilgrims returning via Suakin during the last five years :—

In	1928	there	were	97
,,	1929	,,	,,	33
,,	1930	,,	,,	8
,,	1931	,,	,,	2
,,	1932	,,	,,	223

The large increase of such pilgrims in 1932 was due to an especial appeal made to the Sudan to repatriate 223 of these destitute pilgrims stranded at Jeddah after 500 stranded pilgrims had already been repatriated via Massowah. This relaxation of a definitely determined policy is not likely to occur again.

All these 223 pilgrims had left Massowah by sambuk (sailing vessels) to Qahma and from there had completed the journey to Mecca on foot. They returned to Jeddah destitute and with no arrangements made for their return journey. It is hoped that stricter control at Massowah will prevent a recurrence of this undesirable state of affairs.

Health of Pilgrims in the Pilgrim Camp at Suakin.

The health of the pilgrims was good. No deaths occurred and only six cases were admitted to the hospital.

The following table shows the cases admitted to the quarantine and isolation hospitals during the last four pilgrimages :—

Disease.	1929	1930	1931	1932
Anaemia	—	2	1	—
Chicken-Pox	—	3	—	1
Confinements	3	3	—	—
Disease of the Alimentary System ...	6	8	—	—
,, ,, ,, Circulatory System ...	1	—	—	—
,, ,, ,, Genito-Ur nary System ...	3	—	—	—
,, ,, ,, Nervous system	2	—	—	—
,, ,, ,, Respiratory system ...	3	1	2	—
Debility and old age	—	—	—	2
Dysentery, Amoebic	1	8	2	—
,, Bacillary	1	—	—	1
Malaria	2	7	2	—
Pneumonia	2	6	2	2
Scabies	—	2	1	—
Syphilis	—	1	—	—
Typhoid Fever	1	—	—	—
Wounds and Injuries	4	6	—	—
	29	47	10	6
Deaths	6	9	4	—

Quarantine Dues.

The total payment that has to be made at Suakin by a pilgrim wishing to leave that port on the pilgrimage is £E. 2.970 m/ms. This sum is made up as follows :—

	£E. m/ms.
Return steamer fare	1.200
Hedjaz quarantine dues	.970
Sudan consolidated charge	.800
TOTAL	2.970

The Sudan consolidated charge is made up as follows :—

	£E. m/ms.
Quarantine fees (including landing charges, etc.)	0.500
Passport	0.050
Food	0.100
Cash to be handed to the pilgrims on departure	0.150
TOTAL	0.800

Payment of Quarantine Dues by West Africans.

YEAR.	Full dues paid.	Half dues paid.	No dues paid.	Total.
1928	1789	2	65	1856
1929	1839	216	258	2313
1930	2252	220	399	2871
1931	1176	117	63	1356
1932	785	43	100	928

Total Quarantine Dues Paid.

	£E.
In 1928 was	1,400
,, 1929 ,, ...	1,692
,, 1930 ,, ...	1,707
,, 1931 ,, ...	1,028
,, 1932 ,, ...	682

Improvements to the Quarantine Camp.

(1) A large shelter has been erected outside the Quarantine Camp to protect the newly landed pilgrims from the sun while they are waiting their turn for medical inspection previous to admittance to the camp. Latrine accommodation for this shelter has also been provided.

(2) The shelters in the 1st Class section and two of the 3rd Class section were boarded in laterally in time for the 1932 pilgrimage, and similar work is being carried out on the shelters in the remaining four sections and will be completed in time for the 1933 pilgrimage. These shelters were previously protected laterally by canvas.

(3) Doors were fixed to the cubicles in the 1st Class latrines.

(4) Improved accommodation has been provided for the staff of the camp.

(11) TRAINING.

(a) MEDICAL

KITCHENER SCHOOL OF MEDICINE.

Students under Tuition.

Ten new students were admitted in 1932, the classes being composed as follows :—

	Students.
1st Year	10
2nd ,, ...	8
3rd ,, ...	8
4th ,, ...	9
TOTAL	35

The 4th Year class included one student who was unable to sit for the Final Examination in 1931 on account of ill-health.

Progress of Classes.

Examinations were held in 1st, 2nd and Final Year subjects.

1st Year Examination Results.

Ten candidates were examined in Chemistry, Physics and Biology. Of these seven students reached the required standard and will continue their medical studies. Two students failed to reach the standard required for medical students, but were accepted for training as Sudanese Sanitary Officers. One student was advised to discontinue the medical course.

2nd Year Examination Results.

Eight candidates were examined in Anatomy and Physiology. All of them passed in both subjects.

Final Examinations.

The School was fortunate in obtaining the services of Mr. V. Warren Low, F.R.C.S., (Consulting Surgeon to St. Mary's Hospital, member of the Examinations Board of the Royal College of Surgeons and member of the Senate of London University) and Major A. G. Biggam, F.R.C.P., (Professor of Medicine, Egyptian University, Cairo) as assessors inthe Final Examinations.

Nine candidates were examined in Medicine, Surgery, Midwifery, Gynaecology, Pathology, Public Health, Forensic Medicine, Psychiatry and Pharmacology.

All were successful and will be posted to the larger hospitals of the Sudan as House-Surgeons and House-Physicians for one year on probation.

The successful candidates were :—

Abdel Halim Mohamed (passed with distinction).
Mohamed Zaki Mustafa.
Abdalla Omar Abu Shamma.
Mohammed Hassan.
Mohamed Ahmed Ali.
Abdel Aziz Mohamed.
Ahmed Bukhari.
El Hadi Fadail Alla.
Bashir Abdel Rahim.

Prizes were awarded as follows :—

Waterfield Prize in Surgery ... ... — Mohamed Zaki Mustafa.
Prize in Medicine ... ... — Abdel Halim Mohamed.
Pathology Prize (Presented Mr. C. Grantham-Hill) ... ... — Abdel Halim Mohamed.

(b) MIDWIFERY TRAINING SCHOOL OMDURMAN

Twenty-two midwives had been selected for training by the Inspectress of Midwives and the Matron during their autumn tours. They came from the following provinces :—

Berber	1	Kassala	4		
Blue Nile	7	Khartoum ...	5		
Halfa	2	Kordofan	2	(one of whom from the Nuba Mountains.)	
White Nile	1				

In addition three midwives from Khartoum and Khartoum North asked to be admitted to the school without pay and meeting their own expenses. This is a great contrast with the position in the early years of the school's existence when it was only with the greatest difficulty that any midwives, however, old and decrepit, could be persuaded to undertake a four months' course receiving pay and with all their expenses paid. These 25 midwives received the usual six months' training and passed out successfully. They returned to carry on their work in their own villages.

Anti-Natal Work.

In 1932 ante-natal work has been regularised. Definite hours for ante-natal consulations have been appointed and regular instruction in this side of the work given to the pupil midwives. At first it was very difficult to persuade expectant mothers to come up for routine examination and advice, but the ante-natal clinic is now being well attended.

Revision Class.

This year a short revision class was instituted. Nine midwives presented themselves from the following provinces :—

Blue Nile	1
Khartoum	7
Kordofan	1

Tours of Inspection.

Tours of inspections were carried out by the Inspectress and the Matron, and twenty midwives were selected for the 1933 course of training as follows :—

Berber	3	Fung	2
Blue Nile	2	Khartoum	4
Dongola	4	Kordofan	3
Upper Nile	2		

This is the first time candidates have presented themselves from the Upper Nile Province for training. The two candidates were from the Shilluk tribe, a large Negroid tribe of about 100,000 persons still maintaining its tribal organisation and tribal customs in their integrity. It will be interesting to see how these women react to training.

Owing to the need for economy it has been necessary to restrict the tours of inspection to the more accessible towns and villages and Darfur Province has had to be omitted from the itinerary altogether. This has not been entirely bad as it has involved concentration on the older provinces. A trained midwife alone in an isolated village far from inspection and support has a very hard time, she is exposed to the calumny and intrigues of her untrained colleagues and unless she is a woman of strong character and real faith in her training she is very likely to backslide. It is better, therefore, to make a more concentrated effort in defined districts and to leave the less accessible districts until their needs can be met adequately. It is hoped, however, that it will be possible to extend this most beneficial work to the more distant provinces in the near future and that the funds necessary for transport and other expenses will then be available.

The new buildings for the Midwifery Training School were completed at the beginning of the year and were brought into use for the new 1932 training class ; they comprise a lecture room, tutorial rooms, Matrons' office and midwives dormitories, bath room and kitchens.

For years the work had been carried on in a collection of small native rooms insufficient in size and only with difficulty admitting of order and cleanliness. The contrast is striking, the accommodation provided is simple, but sufficient and the midwives live in accordance with their own customs and carry out their own native cookery under circumstances of precise order and perfect cleanliness.

The school has now been established for 12 years and 169 midwives have been trained. Of these 128 are still practising their profession. Their distribution is as follows :—

Berber	15	Kassala and Red Sea Hills ...	6
Blue Nile	8	Halfa	7
Darfur	9	Khartoum	37
Dongola	22	Port Sudan and Suakin	3
Fung	3	Kordofan	5
White Nile	12		

The work initiated and carried out by the Inspectress has been one of unremitting struggle, at first to persuade women of any sort however old and however ignorant to submit to a course of training, later when the first battle had been won and a better class of woman was coming forward for training, to persuade the midwives alone and unsupported in their villages to hold on patiently against the slanders and opposition of their ignorant colleagues until eventually they had gained the confidence of the people and had won the battle for clean midwifery against dirt and supertition. Omdurman has for some years been entirely staffed by these trained midwives and the effect has been shewn most strikingly in the lowered maternal and infantile death rate, the early notification of complications and the rarity of Puerperal Septicaemia. In the Berber, Dongola, Khartoum Provinces and in limited areas of the Blue Nile, the White Nile and Kordofan provices the superiority of the trained midwife is now recognised by a majority of the people. In the other districts and provinces progress is being made.

In a previous report (1929) the following comment was made " The midwives at this school do not constitute an " extraneous agency, they are the children and the grandchildren of the village or tribal midwives, they return "after training to work in their own villages, they have the entry to every hut and they should prove to be a great power for enlightenment where it is most needed " among the most conservative element of all, the women of the villages." These trained midwives are in actual fact missionaries of cleanliness and progress in the very heart of the village life of the people.

The work is still only at its commencement it admits of great development, the ultimate goal is one or more clean, well trained and enlightened midwives in every village throughout the Sudan. The benefit to be derived from this development is incalculable.

(c) NURSES TRAINING SCHOOL, OMDURMAN

Sixteen pupil nurses were under training during 1932. Of these eight commenced their course in 1931 and eight in 1932.

Six nurses passed their final examination in January, 1933, and were granted certificates. They were posted to various provincial hospitals.

It is still very difficult to find suitable girls to undertake this course, and it is only very exceptionally that any of the selected candidates are able to read or write on admission to the school.

STAFF AND ORGANISATION

(a) BRITISH STAFF.

The staff employed by the Sudan Medical Service consist of :—

(1) (a) A Director, who is responsible for the Medical and Public Health work throughout the Sudan, and the health of the Sudan Defence Force.
(b) An Assistant Director.

(2) (a) A Medical Specialist, and
(b) A Surgical Specialist
both posted to Khartoum Hospital and teaching Medicine and Surgery respectively at the Kitchener School of Medicine.

(3) Medical Officer of Health, Khartoum, who acts in an advisory capacity to the Director, Sudan Medical Service, on Public Health questions.

(4) Thirty five Medical Inspectors and Senior Medical Inspectors.

(5) Sixteen British Sanitary Inspectors who work under the direction of the Medical Officer of Health, Khartoum Province, and the Medical Officers of Health of the other Provinces where they are employed.

(6) A Matron, Khartoum Civil Hospital.
A Charge Sister, Omdurman Civil Hospital (in charge of the Nurses Training School).
A Charge Sister, Atbara Civil Hospital.
Ten Nursing Sisters.
An Inspectress of Midwives who is in charge of the Midwives Training School at Omdurman and who inspects midwives throughout the northern and central Sudan.
A Matron who assists the Inspectress.

(b) SYRIAN AND SUDANESE MEDICAL OFFICERS.

Syrian Medical Officers. There are at present 27 Syrian Medical Officers employed in civil medical work. They are gradually being replaced by Sudanese Medical Officers.

Twenty-five Sudanese Medical Officers. These are natives of the Sudan trained at the Kitchener School of Medicine, and they are gradually replacing the Syrian Medical Officers.

(c) SUDANESE SUBORDINATE STAFF.

(1) Dispensary Hakims (in charge of "A" Dispensaries).

There are 67 Dispensary Hakims in charge of a similar number of larger dispensaries. They are relieved by Saniatry Hakims.

Dispensary Hakims are men selected from the more abler and more reliable Sanitary Hakims (see below) and given one year's further training. Their training is largely a repetition of that given to the Sanitary Hakims except that it is somewhat wider in scope. They receive further instructions in the use of the stethoscope, dispensing, in simple microscopic work and in minor surgery.

(2) Sanitary Hakims (in charge of "B" Dispensaries).

There are 131 Sanitary Hakims in charge of smaller and less isolated dispensaries.

These men are selected from the most intelligent and trustworthy hospital orderlies. They can all read and write well. They receive a year's intensive training. They are taught very elementary Anatomy and Physiology, to recognise the common diseases of the country, to give simple treatment and to become proficient in intravenous injections. They also receive instruction in simple sanitary work and, in particular, anti-malarial work.

(3) Sanitary Barbers.

A Sanitary Barber is a man who has received a very simple surgical and medical training in his province hospital. His duties are to dress wounds and ulcers, and to attend criminal cases, to view dead bodies (where no higher medical authority is avialable), to report outbreaks of disease and to vaccinate. They are especially used to carry out anti-trachoma work in the villages. Sanitary Barbers are confined to the Riverain districts of the northern and central Sudan and are attached to an Omodiyeh (a collection of villages under an Omdah) or to a group of Omodiyehs.

(4) Sheikhs' Dressers and Chiefs' Dressers.

A cadre of Shiekhs' and Chiefs' dressers has been instituted to meet the need for simple treatment among the pagan tribes in the south, and among the Nomad Arabs of the northern and central Sudan, where the Sanitary Barber of the settled Arabs would be out of place. The chief or sheikh is invited to send a limited number of youths for training. These, if they meet with the approval of the Medical Inspector, are given a three months' course of training at the nearest dispensary. They are taught to dress wounds, to treat inflammatory conditions of the eye, to treat ulcers, to vaccinate and to administer simple stock mixtures. They send or bring more serious cases to their local dispensary. They are under the chief or shiekh for discipline, and are sent up to a hospital every year for a short "refresher" course.

(5) Laboratory Assistants.

These are youths of some intelligence and education who receive a course of instruction at the Medical Research Laboratories in simple laboratory work. They are taught to prepare and examine blood films for Malaria, to carry out Vidal tests, to examine for urinary and intestinal parasites, and to carry out other simple laboratory work. They have proved themselves most useful in carrying out this work at the provincial hospitals and at the quarantine stations, under the supervision of a Medical Inspector or a Medical Officer.

(6) Sanitary Overseers.

These are natives with some elementary education, who are trained by British Sanitary Inspectors and who work under their supervision. In the towns, under the British Sanitary Inspectors, they supervise conservancy work, inspect for nuisances and do anti-malarial work in and around the towns. In the irrigated areas they inspect for and report mosquito breeding and leakages from the canals, and are in charge of oiling parties. In certain larger towns, where there are no British Sanitary Inspectors, they carry out the duties of a Sanitary Inspector under the general suprvision of the Medical Inspector.

HEALTH ORGANISATION.

Public health work in Khartoum Province, which includes the towns of Khartoum, Khartoum North and Omdurman, is under the control of the Medical Officer of Health of Khartoum. The population of the three towns is estimated at 174,264, that of the rest of the province at 86,588.

In the other provinces the Medical Officer of Health is the Senior Medical Inspector of the Province. In these provinces it is necessary, in order to ensure economy of effort and the maximum efficiency in the use of personnel, that the administration, both of preventive and curative medical work, should be combined under a single head. This is not only the case in the less developed provinces, but is felt to be even more important in a thickly populated area such as the Gezira Irrigated Area.

THE NURSING SERVICE.

Sisters are in one of two categories :—

(i) Sisters serving for a period of two years, commonly extended to four years, and leaving with a gratuity at the end of this period.

(ii) Sisters selected from these as possessing certain special qualificiations, including knowledge of the Arabic language and aptitude for work among native women, who are invited to stay on for a further period of six years.

Sisters are now stationed as follows :

Khartoum	Matron.—
	1 Outpatient sister (massage and electrical work)
	4 Sisters.
Atbara	1 Charge Sister.
	1 Sister.
Port Sudan	1 Sister.
Wad Medani	2 Sisters.
Omdurman	1 Charge Sister (in charge of Nurses Training School).
	1 Sister.

Sudanese Nurses (**Momaridat**) are trained at the Nurses Training School at Omdurman, They receive a two years' course of training and at the end of that time they undergo a final examination. If the results of this examination and their previous work are both sarisfactory they are awarded a certificate of proficiency, and are posted to one of the provincial hospitals.

(Signed) O. F. H. ATKEY.

DIRECTOR,

SUDAN MEDICAL SERVICE.

SUDAN MEDICAL SERVICE STAFF.

1932.

Appointment	Establishment
Medical Staff.	
Director	1
Senior Surgeon	1
Senior Physican	1
Assistant Director	1
Medical Officer of Health	1
Senior Medical Inspectors	10
Medical Inspectors	22
Senior Medical Officers	4
Medical Officers (Syrians)	27
Medical Officers (Sudanese)	25
Dispensary Hakims	67
Sanitary Hakims	131
Dispensers	2
Radiographers	1
Assistant Radiographers	2
Laboratory Assistants	10
Midwifery Staff.	
Inspectress of Midwives	1
Matron Midwifery Training School	1
Nursing Staff.	
Matron	1
Charge Sisters	3
Nursing Sisters	9
Sanitary Staff.	
Chief Sanitary Inspector	1
Senior Sanitary Inspectors	6
Sanitary Inspectors	9
Native Sanitary Inspectors	3
Sanitary Overseers	6
Clerical Staff.	
Superintendent	1
British Clerks (Grade V)	2
Translator (Grade V)	1
Translator (Grade VI)	1
Translators (Grade VII)	8
Translators (Grade VIII)	5
Clerks (Grade VII)	14
Clerks (Grade VIII)	19
Clerks (Ungraded and S.P.G.)	5
Superintendent of Accounts (Grade IV)	1
Accountant (Grade VI)	1
Accountants (Grade VII)	4
Accountants (,, VIII)	5
Storekeepers (Grade VIII)	3
Stores Staff.	
Medical Storekeeper	1
Asst. Medical Storekeepers (Grade V and VI)	2
Storemen (Sudanese)	8
Tailor	1
Carpenter	1

CHANGES IN PERSONNEL.

The following changes in personnel occurred during 1932.

Medical Inspector.

Captain W. H. Scriven	Reverted to British Army	14.2.1932
Major G. H. Barry	Reverted to British Army	20. 2.1932
Mr. R. M. Buchanan	Appointed	1. 5.1932
Mr. H. Richards	,,	1. 5 1932
Captain R. J. Rosie	Reverted to British Army	6. 8.1932
Mr. F. K. Wilson	Resigned	1. 9.1932
Mr. F. B. Turner	Resigned	21. 9.1932
Major J. R. N. Warburton	Reverted to British Army	21. 9.1932
Mr. E. K. Malone	Appointed	4. 9.1932
Mr. J. L. D. Roy	,,	4. 9.1932
Mr. R. W. Stephenson	,,	4. 9.1932
Mr. F. Bartholomew	,,	4. 9.1932
Mr. T. W. MacDowell	Resigned	10.12.1932

Nursing Staff.

Miss I. Patton	Resigned	22. 7.1932
Miss L. E. C. Lawlor	Appointed	24. 7.1932

Medical Officers (Non-Sudanese).

9 Were retired to Pension.
9 Were retrenched.
1 Resigned.

Medical Officers (Sudanese).

Dr. El-Fadel Dafalla—	Appointed	1. 1.1932
Dr. El-Sayed Abdel Razik	,,	1. 1.1932
Dr. Mahmoud Ali Hamdi	,,	1. 1.1932
Dr. Khalil Abdel Rahman	,,	1. 1.1932
Dr. Mamoon Hussein Sherif	,,	1. 1.1932
Dr. Mahmoud Hamad Nasr	,,	1. 1.1932

Sanitary Inspectors.

1 Was retired to Pension.
3 Were retrenched.

British Clerical Staff.

1 British NCO retired to Pension.
1 British NCO reverted to British Army.

Dispensary Hakims.

1 Was discharged.

Sanitary Hakims.

1 Was invalided from the service.

NOMINAL ROLL OF BRITISH MEDICAL STAFF

SUDAN MEDICAL SERVICE.

ON 31.12.1932.

Director	Mr. O. F. H. Atkey, C.M.G., M.B., F.R.C.S.
Assistant Director ...	Mr. E. D. Pridie, D.S.O., O.B.E., M.B., B.S.
Senior Surgeon ...	Mr. C. G. Hill, O.B.E., M.B., F.R.C.S.E.
Senior Physican ...	Dr. R. M. Humphreys, D.M., B.Ch.
M.O.H., Khartoum	Mr. H. A. Crouch, O.B.E., M.C., M.R.C.S., L.R.C.P., D.P.H.
Senior Medical Inspector	Lt. Col. G. K. Maurice, D.S.O., M.C., M.R.C.S., L.R.C.P.
,, ,, ,,	Mr. E. A. H. Grylls, M.B., B.Ch.
,, ,, ,,	Mr. A. Cruickshank, M.B., B.Ch.
,, ,, ,,	Mr. A. E. Lorenzen, M.R.C.S., L.R.C.P.
,, ,, ,,	Mr. F. E. Anderson, M.B., B.Ch.
,, ,, ,,	Mr. F. S. Mayne, M.B., F.R.C.S.E.
,, ,, ,,	Mr. F. H. Goss, M.C., M.B., B.Ch.
,, ,, ,,	Mr. N. Macleod, M.B., Ch.B.
,, ,, ,,	Dr. L. H. Henderson, M.D., Ch.B., D.T.M. and H.
Medical Inspector ...	Mr. J. S. Hovell, M.B., F.R.C.S.E.
,, ,, ...	Mr. D. R. Macdonald, M.B., Ch.B.
,, ,, ...	Mr. E. P. Pratt, M.B., B.S.
,, ,, ...	Mr. J. W. Wallace, M.B.B.Ch.
,, ,, ...	Mr. G. D. Rankin, M.B., B.Ch.
,, ,, ...	Mr. H. M. Elliott, B.Ch.
,, ,, ...	Mr. A. R. McKelvie, M.B., Ch.B.
,, ,, ...	Mr. J. Bryant, M.B., Ch.B., M.R.C.P.E., D.T.M. and H.
,, ,, ...	Mr. C. B. Drew, M.R.C.S., L.R.C.P.
,, ,, ...	Mr. J. S. Aldridge, M.R.C.S., L.R.C.P.
,, ,, ...	Mr. E. D. T. Morris, M.R.C.S., L.R.C.P.
,, ,, ...	Mr. H. M. Woodman, M.B., B.Ch.
,, ,, ...	Mr. A. P. Farmer, M.B., B.S., D.T.M. and H.
,, ,, ...	Mr. N. L. Corkill, M.M., M.B., Ch.B.
,, ,, ...	Mr. G. J. Clarke, M.R.C.S., L.R.C.P., D.T.M. and H.
,, ,, ...	Mr. D. Ellis, M.B., B.S., D.T.M. and H.
,, ,, ...	Mr. L. Brown, M.R.C.S., L.R.C.P.
,, ,, ...	Mr. R. M. Buchanan, M.B. Ch.B. D.T.M. and H.
,, ,, ...	Mr. H. Richards, M.B., B.S., D.T.M. and H.
,, ,, ...	Mr. E. Malone, M.B., B.Ch.
,, ,, ...	Mr. J. L. D. Roy, M.B.Ch.B.
,, ,, ...	Mr. R. W. Stephenson, M.R.C.S., L.R.C.P.
,, ,, ...	Mr. F. Bartholomew, M.R.C.S., L.R.C.P.

Senior Medical Officer	Captain E. H. Hall, M.B.
,, ,, ,,	Captain S. M. Burrows.

TABLE I.

Shows the admissions and deaths by disease.

DISEASE.	TOTAL.							
	Europeans.				Natives.			
	Male.		Female.		Male.		Female.	
	A.	D.	A.	D.	A.	D.	A.	D.
Table "A"								
Tubercular								
1. Disease of lung	2	—	2	1	351	86	66	17
2. All other tubercular diseases ...	1	1	—	—	212	30	68	11
Venereal								
3. Syphilis	1	—	—	—	3,700	16	1,298	8
4. Gonorrhoea	3	—	—	—	1,583	5	290	—
5. Soft Sore	—	—	—	—	208	—	6	—
Eye.								
6. Trachoma...	4	—	—	—	581	—	181	—
7. All other eye diseases	4	—	3	—	1,296	—	708	—
8. **Ear**	5	—	2	—	150	1	61	—
9. **Skin**	8	—	—	—	611	1	265	1
10. **Wounds and other injuries** ...	173	1	19	—	10,415	141	1,762	36
Tumours.								
11. Malignant	1	1	1	—	80	10	75	10
12. Non-Malignant	1	—	—	—	309	2	150	7
Of Women.								
13. Gynaecological	—	—	14	—	—	—	387	2
14. Confinements	—	—	34	—	—	—	197	17
15. **Poisoning**	—	—	1	—	20	2	27	6
Total Table "A" ...	203	3	76	1	19,516	294	5,541	115
Table "B" (Tropical).								
1. Ankylostomiasis	1	—	—	—	344	1	151	2
2. Bilharziasis	—	—	—	—	277	3	28	—
3. Blackwater Fever	14	3	4	—	46	19	2	1
4. Dysentery, Amoebic	6	—	3	—	1152	40	339	12
5. Dysentery, Bacillary	14	1	9	—	202	10	22	—
6. Filariasis	—	—	—	—	64	3	4	—
7. Madura disease	—	—	—	—	179	—	44	—
8. Malaria	83	—	13	—	6536	56	851	13
9. Leishmaniasis (Kala-Azar) ...	—	—	—	—	83	21	20	1
10. Trypanosomiasis...	—	—	—	—	63	—	—	—
11. Yaws	—	—	—	—	238	1	245	1
12. Sunstroke...	2	—	—	—	6	1	—	—
13. Heatstroke	3	1	—	—	89	1	9	—
14. Guinea Worm	—	—	—	—	688	—	310	—
15. Tropical Ulcer	—	—	—	—	253	—	97	—
Total Table "B"	125	5	29	—	10,220	156	2,122	30

TABLE I. (*Continued*).

Disease.	TOTAL.							
	Europeans.				Natives.			
	Male.		Female.		Male.		Female.	
	A.	D.	A.	D.	A.	D.	A.	D.
Table " C " (Infective).								
1. Anthrax	—	—	—	—	—	—	—	—
2. Beri-beri	—	—	—	—	—	—	—	—
3. Cerebrospinal–Meningitis ...	—	—	—	—	235	85	13	9
4. Chicken Pox	—	—	—	—	436	1	24	—
5. Cholera	—	—	—	—	—	—	—	—
6. Dengue	1	—	—	—	—	—	—	—
7. Diphtheria...	—	—	6	—	73	5	59	8
8. Enteric (Including Paratyphoid)	3	—	3	—	62	7	17	2
9. Erysipelas	1	—	—	—	7	1	8	1
10. Gastro enteritis of children ...	—	—	—	—	5	1	4	2
11. Influenza	10	—	4	—	567	2	193	—
12. Leprosy	—	—	—	—	85	30	25	10
13. Malta Fever	—	—	—	—	22	2	4	—
14. Measles	—	—	1	—	97	2	50	—
15. Mumps	—	—	—	—	169	—	11	—
16. Pellagra	—	—	—	—	—	—	—	—
17. Puerperal Fever	—	—	1	1	—	—	10	4
18. Phlebotomus Fever	1	—	1	—	60	—	1	—
19. Plague	—	—	—	—	—	—	—	—
20. Pneumonia (Epidemic)	7	2	—	—	570	104	92	21
21. Rabies *	—	—	—	—	8	2	3	1
22. Relapsing Fever	—	—	—	—	24	2	—	—
23. Rheumatic Fever	1	—	—	—	179	3	31	3
24. Tetanus	—	—	—	—	9	—	1	—
25. Typhus	—	—	—	—	—	—	—	—
26. Whooping Cough	—	—	—	—	13	—	1	—
27. Small Pox	—	—	—	—	47	2	—	—
Total Table " C " ...	24	2	16	1	2,668	249	647	61
Table " D."								
1. Circulatory System	8	1	—	—	526	39	224	25
2. Respiratory System	6	1	3	—	2,526	49	460	19
3. Alimentary System	26	1	12	1	3,720	176	857	10
4. Genito-Urinary System	19	1	5	—	2,559	48	256	10
5. Nervous System	6	—	6	—	502	15	74	7
6. Scurvy	—	—	—	—	57	4	4	—
7. Diabetes	1	1	—	—	96	3	30	3
8. Fever of uncertain origin ...	25	1	7	—	1,725	44	186	8
9. All other diseases	25	2	6	—	3,582	76	918	29
Total Table " D "	116	8	39	1	15,293	454	3,009	105
" " " A "	203	3	76	1	19,516	294	5,541	115
" " " B "	123	5	29	—	10,220	156	2,122	30
" " " C "	24	2	16	1	2,668	249	647	61
Grand Total	466	18	160	3	47,697	1,153	1,1319	311

* Includes cases admitted for Anti-rabic treatment.

TABLE II.

Shows admissions and deaths in hospitals during 1932.

	EUROPEAN.			NATIVE.		
	Adm.	Died	%	Adm.	Died.	%
Bahr el Ghazal :—						
Wau	—	—	—	1,935	34	1.7
Raga	—	—	—	295	1	0.3
Tembura	—	—	—	1,303	8	0.6
Aweil	—	—	—	565	6	1.0
Li Rangu	—	—	—	955	48	5.0
Meridi	—	—	—	1,120	9	0.8
Province Dispensaries ..	—	—	—	354	3	0.8
Berber Province :—						
Atbara	59	1	1.6	1,878	50	2.6
Abu Hamed	—	—	—	78	1	1.2
Shendi (Military) ...	—	—	—	599	1	0.1
Shendi (Civil)	—	—	—	624	3	0.4
Province Dispensaries ..	—	—	—	232	—	—
Blue Nile Province :—						
Wad Medani	129	3	2.3	4,120	225	5.4
Abu Usher	—	—	—	718	35	4.8
Sennar	2	1	50.0	1,906	49	2.5
Darfur Province :—						
El Fasher	—	—	—	1,451	40	2.7
Geneina	—	—	—	865	18	2.0
Nyala	—	—	—	414	7	1.6
Province Dispensaries ..	—	—	—	2,351	20	0.8
Dongola Province :—						
Merowe	—	—	—	800	15	1.8
Dongola	—	—	—	599	19	3.1
Fung Province :—						
Singa	1	—	—	1,039	61	5.8
Roseires	2	—	—	455	14	3.0
Province Dispensaries ..	—	—	—	315	9	2.8
Halfa Province :—						
Wadi Halfa	2	—	—	475	26	5.4
Kassala Province :—						
Kassala	11	—	—	1,614	63	3.9
Gedaref (Civil)	1	—	—	878	74	8.4
Gedaref (Military) ..	—	—	—	537	—	—
Province Dispensaries ..	—	—	—	1,020	2	0.1

TABLE II—(*Continued*)

	EUROPEAN.			NATIVE.		
	Adm.	Died.	%	Adm.	Died.	%
Khartoum Province:—						
Khartoum	280	7	2.5	2,933	129	4.3
Khartoum North ..	—	—	—	1,090	14	1.2
Khartoum North Prison	1	—	—	333	2	0.6
Omdurman	2	1	50.0	2,335	67	2.8
River Hospital	—	—	—	1,078	20	1.8
Kordofan Province:—						
Obeid	6	—	—	1,562	63	4.0
Nahud	—	—	—	1,133	19	1.6
Kadugli	—	—	—	1,256	17	1.3
Dilling	—	—	—	1,047	17	1.6
Talodi	—	—	—	515	9	1.7
Province Dispensaries ..	—	—	—	2,057	30	1.4
Mongalla Province:—						
Juba	13	2	15.3	1,949	31	1.5
Yei	—	—	—	489	5	1.0
Torit	1	—	—	892	11	1.2
Kiripi	—	—	—	658	10	1.5
Kapoeta	1	—	—	510	11	2.1
Province Dispensaries ..	—	—	—	1,257	—	—
Port Sudan and Suakin:—						
Port Sudan	108	6	5.5	1,753	50	2.7
Port Sudan Prison ..	—	—	—	193	6	3.1
Suakin	—	—	—	30	1	3.3
Suakin Quarantine ..	—	—	—	6	—	—
Upper Nile Province:—						
Malakal	7	—	—	2,594	61	2.5
Rumbek	—	—	—	754	20	2.6
Province Dispensaries ..	—	—	—	1,983	—	—
White Nile Province:—						
Dueim	—	—	—	658	22	3.3
Kosti	—	—	—	456	8	1.7
TOTAL	626	21	3.3	59,016	1,464	2.4

Grand Total 59,642 admissions, with 1,485 deaths.

TABLE III.

Vaccinations Performed during the year 1932.

Province.	Primary.			Re-vaccination.		
	Success.	Failed.	Ukn.	Success.	Failed.	Ukn.
Bahr El Ghazal ...	—	—	475	—	—	—
Berber	3023	1364	905	—	—	—
Blue Nile	6163	2311	1823	—	—	—
Darfur	1347	624	6067	—	—	—
Dongola	4542	930	84	—	—	—
Fung	17	61	31	—	—	—
Halfa	1050	338	1084	—	—	—
Kassala	68	40	28	17	7	8
Khartoum	2082	106	189	355	48	85
Kordofan	6578	1723	2260	1682	366	720
Mongalla	1485	1908	—	—	—	—
P. Sudan and Suakin	272	764	5	1150	366	4767
Upper Nile ...	1164	1675	11081	—	—	—
White Nile	2673	615	2250	—	19	—
Total ...	30464	12459	26282	3204	806	5580

Total of all vaccinations—78795.

TABLE IV.

Shews In-patients, Out-patients, Endemic Diseases and Operations during 1931 and 1932.

Province.	Hospitals	Dispensaries	In-patients.		Out-patients.		Bilharziasis.		Trachoma.		Ankylostomiasis.		Malaria.		Syphilis and Yaws.		Operations.	
			1931	1932	1931	1932	1931	1932	1931	1932	1931	1932	1931	1932	1931	1932	1931	1932
Bahr-el-Ghazal ...	4	5	6,238	6,527	325,818	226,486	8	28	20	71	—	52	460	1,072	43,416	38.597	979	671
Berber	2	14	3,175	3,470	409,322	441,925	1,266	763	10,446	18,266	151	109	6,326	14,846	2,577	2,747	443	591
Blue Nile ...	3	44	7,039	6,875	372,185	490,301	1,820	834	24,381	38,262	2	134	34,575	51,679	2,274	3,579	971	845
Darfur	3	14	4,343	5.081	210,446	206,112	330	723	3,856	4.591	18	—	3,912	2,057	9,666	16,795	470	466
Dongola	2	11	1,276	1,399	527,878	544,587	576	1,142	32,868	54,142	108	324	1,494	3,495	210	499	309	462
Fung	2	12	1,427	1,812	98,860	134,042	42	58	2,441	6,268	—	9	7,652	13,984	445	455	201	214
Halfa	1	4	629	477	57,788	68,790	389	348	229	6,431	270	29	1,857	1,115	64	91	108	80
Kassala	2	27	3,433	4,061	244,976	248,136	27	11	9,866	9,852	6	5	22,146	16,148	1,103	1,345	453	600
Khartoum ...	4	9	7,646	8,052	295,926	306,201	212	259	2,411	12,856	11	10	1,368	1,498	603	468	1016	1,242
Kordofan	5	15	7,485	7,576	580,382	587,105	2,167	1,351	5,917	9,590	17	10	17,368	21,869	8,074	8,977	509	797
Mongalla	5	9	4,148	5,770	463,728	532,294	21	13	—	1.888	34	389	493	1.388	3,500	3.662	160	246
P. Sudan & Suakin...	1	3	2,369	2,090	93,947	92,205	195	199	1,754	3,010	1	5	8	476	241	176	440	438
Upper Nile ...	1	21	9,064	5,338	194,613	192,201	81	24	70	688	9	5	5,843	6,648	25,483	21,309	540	417
White Nile ...	2	9	1,464	1,114	168,570	194,027	2,753	1,489	9,374	9,564	—	—	8,539	10,746	4,206	4,265	199	218
TOTALS	37	197	59,736	59,642	4,044,439	4,264,412	9,887	7,242	103,633	175,479	627	1,081	112,041	146,421	101,865	102,965	6,798	7,287

TABLE V.

List showing hospitals and dispensaries during 1932.

Hospitals and Dispensaries.	Beds equipped
Bahr el Ghazal Province.	
Wau	181
Rumbek	78
Aweil	17
Gogrial	—
Li Rangu	20
Miridi	36
Raga	17
Tembura	12
Tonj	—
Berber Province.	
Atbara	85
Abu Hamed	7
Berber	4
Bouga	—
El Damer	—
Eneibis	5
Kabushia	—
Kitiab	3
Metemma	—
Manaseir	—
Shendi (Civil)	19
Shendi (Military)	35
Shereik	—
Wad Ban Naga	—
Wad Hamed	—
Zeidab	—
Blue Nile Province.	
Wad Medani	249
Sennar	125
Abu Usher	80
Abdel Galil	—
Abdel Hakam	—
Abdel Rahman	—
Amara Kasir	—
Derwish	—
Dolga	—
Efaina	—
East Bank Trav. Disp.	—
Futais	—
Ghubshan	—
Gandal	—
Hamad El Nil	—
Hosh	—
Hassa Heissa	—
Hag Abdulla	—
Istarihna	—
Kamlin	—
Kab El Gidad	—
Komor	—
Keteir	—
Laota	—
Managil	—
Medina	—
Meatig	—
Messalemia	—
Merngan	—
Nidiana	—
Rufaa	—
Rufaa Trav. Dispensary	—
Radma	—
Remeitab	—
Sabi Deleib	—
Seleima	—
Tabat	—
Tayiba	—
Tebub	—
Turabi	—
Um Degarsi	—
Wad El Atia	—
Wad El Bur	—
Wad Hussein	—
Wad Medani Prison	33
Wad Naaman	—
Wad Saadalla	—
Wad Sulfab	—
Darfur Province.	
El Fasher	114
Geneina	35
Nyala	14
Abu Mataric	—
Buram	—
Dar Gimir	—
Dereisa	—
Darfur Province (*Contd*).	
Kas	—
Kebkebia	—
Kubbe	—
Kubbum	7
Kuttum	6
Mellit	—
Taweisha	—
Um Buru	1
Um Kidada	—
Zalingei	18
Dongola Province.	
Merowe	53
Dongola	40
Argo	—
Badein	—
Debba	—
El Seir	—
Ghaba	—
Gureir	—
Kareima	—
Khandak	—
Korti	—
Mansurkoti	—
Nuri	—
Fung Province.	
Singa	60
Roseires	36
Kurmuk	—
Wisko	2
Abu Hashim	—
Attib	—
Chaali	—
Dar Agil	—
El Sukki	—
Fazogli	—
Gule	—
Karkoj	—
Kurmok Trav. Disp.	—
Lokandi	—
Halfa Province.	
Wadi Halfa	28
Abri	—
Delgo	—
Doushat	—
Dobura	—
Kassala Province.	
Kassala	120
Gedaref (Civil)	36
Gedaref (Military)	24
Gebeit	13
Tokar	18
Abu Deleig	—
Akik	—
Aroma	2
Car Dispensary	—
Derudeib	4
Doka	4
Degein	—
Gallabat	8
Goz Regeb	3
Goz Regeb Trav. Disp.	—
Galaat en Nahl	3
Hawata	2
Hadaliya	—
Kassala Station	2
Khashm El Girba	2
Khashm el Girba T.D.	—
Kassab	—
Khatmia	—
Mekali	—
Metatib	—
Musmar	—
Mafaza	—
Shawak	2
Sinkat	—
Tenilai	—
Khartoum Province.	
Khartoum	104
Khartoum North	35
„ „ Prison	31
Omdurman	121
River Hospital	100
Gebel Aulia	—
Khartoum Prov. (*Contd.*)	
Geili	5
Gordon Tree	—
Kheleila	—
Murada	—
Rail-head Gebel Aulia	—
Wad Nubawi	—
Kordofan Province.	
El Obeid	95
Nahud	81
Dilling	48
Talodi	25
Um Ruaba	12
Rahad	7
Abu Zabad	12
Abyei	—
Bara	11
Delami	6
El Odaiya	4
El Liri	24
Ghabeish	—
Kadugli	34
Lagowa	—
Muglad	6
Rashad	10
Sug El Gamel	—
Soderi	—
Sherkeila	—
Mongalla Province.	
Juba	117
Kajo Kaji	47
Yei	30
Kiripi	36
Mongalla	15
Torit	57
Kapoeta	10
Amadi	6
Ikotos	14
Ideli	—
Opari	—
Taali	—
Treakekka	—
Port Sudan and Suakin.	
Port Sudan	89
„ „ Prison	13
Suakin	10
„ Quarantine	20
Port Sudan East Side	—
Upper Nile Province.	
Malakal	200
Akobo	9
Abwong	9
Bor	22
Detwok	6
Doleib Hill	—
Fungak	8
Gambeila	6
Kodok	13
Kongor	8
Kaka	8
Lul Mission	—
Melut	4
Nasser	5
Renk	9
Rom	—
S.S. Atbara	22
S.S. Kerreri	3
Shambe	40
Tunga	3
Yirrol	17
Yoynyang Mission	6
White Nile Province.	
El Dueim	44
Kosti	24
Aba Island	—
Dar El Ahamda T. D.	—
Fashishoya	—
Gebelein	—
Geteina	—
Kawa	—
Shawati	—
Tendelti	—

INDEX.

L.

M.

N.

O.

P.

P.—*Contd.*

Q.

R.

S.

S. *Contd.*

T.

T. *Contd.*

U.

V.

W.

Y.