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REPORT

ON

MEDICAL & HEALTH WORK

IN

THE SUDAN

FOR THE YEAR

1928.

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ANNUAL REPORT 1928.

SUDAN MEDICAL SERVICE.

GENERAL REMARKS ON HEALTH AND PROGRESS.

The health condition of the Sudan generally speaking was satisfactory.

Malaria.

The lower rainfall, the better spacing of the rains, and the lower humidity throughout the central and much of the northern Sudan resulted in a lower incidence of malaria throughout this region. The high malaria rate which had prevailed during the autumn of 1927, as a result of heavy rains followed by a warm winter, persisted in the early months of 1928, but the malaria rate fell throughout March, and by April had returned to normal. In the Gezirah irrigated area the lower malaria rate throughout the autumn of this year was very marked.

Relapsing Fever.

The relapsing fever epidemic (which spread to Darfur from Wadai in 1926) was finally brought under control in the spring of 1928, and no cases have been reported since October 1928. This disease had caused very heavy loss of life and had constituted a grave threat to the rest of the Sudan, and it may be considered satisfactory that the disease has been brought under complete control without the infection having spread outside Darfur to other parts of the Sudan.

Small Pox.

Epidemics of small-pox occurred throughout the greater part of the northern and central Sudan. The epidemic in Darfur reached serious proportions and caused considerable loss of life. In the other provinces the outbreaks were brought under control without serious difficulty.

Increase of Medical Work.

There was a still further increase of medical work carried out among the natives. This was due to increase of work at existing hospitals, and to additional dispensaries being opened in outlying places.

Chiefs' Dressers.

Progress has been made in selecting and training chiefs' dressers. The object in view is to give a simple first-aid training to men selected from among

the untaught, unsophisticated tribesmen and to give this training in such places and in such manner as to prevent them from adopting the habits and dress of the townsmen. It is thought that by treating wounds, abrasions and simple ulcers in their own villages and cattle camps they will prevent such lesions from becoming chronic and thus causing prolonged or permanent disablement.

Sleeping Sickness.

A further decrease in new infections took place. In Mongalla Province only one new infection occurred, and that was contracted in Belgian territory. In the Bahr-el-Ghazal area 29 new cases occurred as against 52 last year and 82 in 1926 (see report on Sleeping Sickness page 9).

Leprosy.

Interesting experimental work has been carried out in dealing with lepers in the sleeping sickness areas where the leprosy incidence is very high. The principle adopted was the voluntary segregation of lepers in agricultural settlements. The results obtained as regards the contentment and the physical improvement of the lepers, and as regards their ability to become largely self-supporting, have been most encouraging. Additional funds have been provided to extend this work so as to enable the voluntary segregation in these settlements of the whole leper population of the sleeping sickness areas in the course of the next two years (see report on Leprosy page 13).

HEALTH OF OFFICIALS.

This has been generally satisfactory, and shows some improvement on that of the previous years.

Out of 949 British officials, 266 were placed on the sick list.

The average number of days lost through sickness by British officials was 3.8 as against 4.7 last year.

Out of 2,399 Sudanese officials, 440 were placed on the sick list. The average number of days lost was 1.9 as against 2.0 for last year.

Out of 1,522 Syrian and Egyptian officials, 323 were placed on the sick list. The average number of days lost was 1.9 as against 2.3 for last year.

Sickness of classified officials 1928.

NATIONALITY.	No. of officials employed.	TOTAL		Average days' sickness		Died	Invalided
		Placed on sick list.	No. of days' sickness.	For all officials.	For those who were sick		
British	949	266	3,650	3.8	13.7	3*	12
Other Europeans ..	87	14	151	1.7	10.8	—	—
Egyptians and Syrians..	1,522	323	2,908	1.9	9.0	3	11
Sudanese..	2,399	440	4,472	1.9	10.0	4	12
Other non—Europeans..	25	1	17	.7	17.0	—	—
TOTAL ..	4,982	1,044	11,198	2.3	10.6	10	35

*These died out of hospital :—1 at sea, 1 in England and 1 in Darfur.

EPIDEMICS.

CEREBRO-SPINAL MENINGITIS.

This disease was again epidemic in Mongalla Province. 335 cases occurred during the year with 274 deaths, as against 426 cases last year with 242 deaths.

In the rest of the Sudan three cases occurred with three deaths.

Mongalla Province. The main incidence of the disease was in the Latuka district where famine conditions prevailed in 1927. A number of cases also occurred among the workmen on the Juba-Dikala road and a few cases in Yei district. Kajo-Kaji and Meridi districts were exempt.

The predisposing causes in this province appear to have been :—

(i) Deficient nourishment. This was particularly the case in the Latuka area.

(ii) Bad housing; the huts throughout the greater part of the province are small, badly constructed, and overcrowded.

In Meridi district, and in particular in the western part of this district inhabited by the large Zande tribe, conditions are better. Food is more plentiful owing to the fertility of the soil and the greater industry of the people. The huts are better built and separate huts are occupied by the man and by each of his wives, and thus overcrowding is avoided. It is noticeable that the Zande tribe as a whole has not been seriously affected by cerebro-spinal meningitis since it has come under effective administration.

(iii) Exposure to infection from across the border. The province marches with Abyssinia, Uganda and the Belgian Congo. In the first of these countries no effective health administration exists.

This disease used to occur in epidemic form throughout the Sudan, but for many years now has failed to reach epidemic proportions. It is hoped that the further development of an organised medical service, the raising of the general standard of life, and in particular the better nourishment and the better housing of the people, will have the effect of eliminating this disease as an epidemic factor in the outlying and less developed provinces.

DENGUE.

No outbreak of dengue occurred in the Sudan; a few cases occurred in persons freshly arrived in the Sudan in which the infection had presumably taken place in Egypt. As dengue was epidemic in Egypt and Greece, with both of which countries communication is frequent, this freedom would appear to be attributable to a low stegomyia index. Dengue was seasonably endemic in Port Sudan up to 1908. It was epidemic in Kordofan, White Nile and Berber Provinces in 1924, but since then no cases have been reported.

The following list shews the number of collections of mosquito larvae and pupae found during each month at Port Sudan, and the distribution of the collections of larvae found among Anopheles, Stegomyia and Culex.

It will be seen that the greatest number of collections of Stegomyia found during any month was 24 in December and the least, 1 in October. The total population of Port Sudan is 30,000.

No collections of stegomyia larvae were found in Khartoum or Omdurman.

Month	Number of infections of larvae	Number of infections of pupae	Species A.	S.	C.	TOTAL
January	15	10	–	6	19	25
February	7	3	–	7	3	10
March	6	4	–	4	6	10
April	12	1	1	7	5	13
May	11	—	–	11	–	11
June	12	2	1	10	3	14
July	6	—	–	6	–	6
August	2	—	–	2	–	2
September	3	1	–	3	1	4
October	1	1	–	1	1	2
November	24	6	–	16	14	30
December	27	5	–	24	8	32
Totals ..	126	33	2	97	60	159

A=Anopheles. S=Stegomyia. C=Culex.

DIPHTHERIA.

Diphtheria was again epidemic in Khartoum Province and in Wadi-Halfa Merkaz. Sporadic cases also occurred at Port Sudan, Malakal, Sennar, Wad-Medani, El-Obeid and in Berber Province.

139 cases occurred this year in Khartoum, Khartoum North and Omdurman, with 25 deaths. 58 cases with 17 deaths occurred in the rest of the Sudan.

The disease is active from October to April, when it dies down, to appear again in the following October. Until the last two years outbreaks of diphtheria could usually be traced to infected persons or carriers newly-arrived from Egypt. This is still the case in Wadi-Halfa and Berber Province, but the disease appears to have established itself as endemic in Khartoum and Omdurman, and these towns must be looked on as a probable centre of dissemination.

INFLUENZA.

An outbreak of influenza occurred at Shambe in the Upper Nile Province. 47 cases were reported with no deaths; otherwise only sporadic cases were notified.

RELAPSING FEVER. (Darfur)

This epidemic can be said to have been definitely brought under control by the spring of 1928. In May only 6 cases were reported. In July for the first time no cases were reported nor were any reported until September when two small outbreaks occurred. By the end of October the province was again clear of the disease and no further cases occurred up to the end of the year. The epidemic appears to be definitely at an end.

Epidemic louse-borne relapsing fever first appeared in French West Africa in 1921. It spread freely throughout French and British West Africa, extended to the Tchad area and Wadai, and finally appeared in Darfur in September 1926. The loss of life was at first very heavy, and in the Zalingei district in the autumn of 1926, 10,000 deaths were estimated to have occurred out of a population of 45,000 persons.

Considerable anxiety was felt, lest it should spread to Kordofan and thence to the Gezirah irrigated area. Had it effected an entry into this thickly populated area, the incidence of the disease would have been very heavy and the cotton cultivation would have been seriously interfered with.

Every effort was made to prevent the eastwards spread of the epidemic, but the people and the country alike presented many difficulties. The country had only recently been occupied and the people were still aloof and suspicious, communications were bad and some of the country mountainous and very difficult. The people chiefly affected—the Fur—were timid, drunken, and very dirty.

As primary measures, quarantine posts were established on the roads leading eastwards, widespread delousing operations and widespread treatment were carried out in the epidemic areas, and as a result the first impetus of the epidemic was checked. Smaller epidemics, however, continued to occur all over the province, and before the disease could be got under control roads had to be made, motor transport to all parts of the province established, and the confidence of the sheikhs and leaders in the necessary medical and health measures had to be won. In this, to a greater extent than in epidemics occurring in more closely administered and longer occupied areas, the anti-epidemic measures had to be carried out by the administrative officials, and it was largely due to their efforts that the epidemic was at first confined to one province and finally brought under complete control.

SMALL POX.

Epidemics of small pox occurred in Darfur, Kordofan, Nuba Mountains, Blue Nile, Red Sea, Kassala, White Nile and Berber Provinces.

Darfur. Small pox broke out in Dar Masalit, the westernmost district of Darfur, in December 1927, where it was carried by immigrants from Wadai. It spread to Zalingei district in February 1928 and to Nyala district in May. In the course of the year 1,942 cases were reported with 357 deaths. It is probable that many cases remained unreported. The heaviest incidence was in Zalingei district where 1,312 cases were reported. By the end of the year the epidemic was still not under control.

It is difficult under the conditions of distance, transport and temperature to preserve the activity of vaccine in its journey from railhead in Kordofon to the remote districts of Darfur and the epidemic broke out among a largely unvaccinated population. Fortunately many of the staff and much of the organisation that had been built up to deal with the relapsing fever epidemic remained, and was used to deal with this epidemic; moreover the people had to some extent learnt the benefits derived from medical interference and the inconveniences resulting from disobedience. Had it not been for these two factors the incidence of the disease on the population of this remote province would have been far heavier.

Steps are being taken, by the establishment of dispensaries at important centres in Darfur, to build up a medical organisation which will win the confidence of the people in medical work and medical administration.

Kordofan. Small outbreaks of small pox occurred in western Kordofan, but they were soon dealt with.

Blue Nile. The outbreak in the Blue Nile Province, which started at the end of January, was complicated by two factors :—

(i) The cheapness and ease of motor transport for natives favours the rapid dissemination of infectious disease.

(ii) The presence of a large number of immigrants, westerners from Wadai who are unvaccinated, have no sheikhs, and no fixed dwelling places, constitutes an element in the population which it is very difficult to watch or control.

The epidemic was dealt with very vigorously, and by the end of April was at an end. A total of 34 cases occurred in 28 villages. This small number of cases occurring in such a dense population speaks well for the vaccination of the local population. A total of 82,308 vaccinations were carried out in this province during the year, of which 67,170 were successful. The limitation of the epidemic must be largely attributed to the commendable promptitude with which the omdas and sheikhs found and reported all suspicious cases.

WHOOPING COUGH.

Unimportant sporadic outbreaks of whooping cough occurred in various parts of the country.

SLEEPING SICKNESS.

Personnel.

Province.	Name.
Bahr El Ghazal	Major J. R. N. Warburton, M.C., R.A.M.C., Senior Medical Officer.
,, ,, ,, ...	El-Sagh. Nesib Eff. Baz.
,, ,, ,, ...	El-Yusb. Joseph Eff. Tannous Nasr.
,, ,, ,, ...	El-M. A. Husni Eff. Abdullah.
,, ,, ,, ...	,, Emmanuel Eff. Terzian.
,, ,, ,, ...	,, Taufik Eff. Minassian.
,, ,, ,, ...	,, Joseph Eff. Wienstein.
Mongalla	El-Bimb. Yusef. Eff. Derwish, O.B.E., Senior Medical Officer.
,, ...	El-Sagh. Negib Eff. Yusef Yunes, M.B.E.
,, ...	El-Sagh. Faiz Eff. Suleiman Nassar.
,, ...	El-Yusb. Abdullah Eff. Mansur.
,, ...	,, George Eff. Murad Rizk.
,, ...	,, Joseph Eff. Khouri Tabet
,, ...	,, Mohamed Eff. Emin Talhouk.

The following changes in personnel are recorded during the period covered by this report :—

El Mulazim Awal Husni Eff. Abdullah transferred from the Army for Sleeping Sickness duties 7.7.1928

El-Yusbashi Khalil Eff. Jabbour, M.C., retransferred to the Army 21.12.28.

El-Mulazim Awal Joseph Eff. Wienstein transferred from the Army for Sleeping Sickness duties 21.12.28.

Admissions by Years.

Year.	Mongalla.			Bahr El Ghazal.		
	Yei	Kajo-Kaji	Nimule	Source Yubo	Yambio	West. Dist.
1909	—	—	—	—	—	2
1911	268	—	—	—	—	—
1912	140	—	—	—	—	—
1913	139	—	—	—	—	—
1914	24	—	—	—	—	—
1915	17	187	6	—	—	20
1916	21	197	14	—	—	—
1917	14	95	4	—	—	31
1918	32	42	2	255	—	—
1919	15	63	8	621	—	—
1920	32	54	2	192	—	10
1921	24	31	12	656	—	2
1922	7	68	35	434	—	3
1923	3	5	4	839	4	—
1924	—	82	9	276	14	—
1925	—	10	9	203	6	1
1926	—	3	—	79	—	3
1.10.26. to end 1927 ..	1	—	18	49	3	—
1928	1	—	—	26	2	1
Total ..	738	837	123	3630	29	73

Total - Mongalla 1698
Total - Bahr-el-Ghazal 3732
5430

Summary of Work Done 1928.

Station.	Admissions	Deaths	Discharged	Remaining
Mongalla.				
Yei	1	—	20	14
Kajo-Kaji	—	10	16	110
Nimule	—	1	5	35
Meridi	—	—	—	—
Bahr-El-Ghazal.				
Source Yubo	26	114	593	942
Yambio	2	—	4	21
West. District	1	3	—	19
TOTALS	30	128	638	1141

Gland punctures done 1,877
Palpations 584,483

Mongalla. The one case found in Yei was proved to be a Congo infection from Faradje district. There have been no indigenous cases in the district since 1924. In Kajo-Kaji district no cases have been found since 1926 and in Opari none since 1927.

Bahr-El-Ghazal.

Admissions. Yambio district gave two cases and the Western district one.

A small local outbreak in Tembura district in the latter part of the year raised the admissions to 26, only seven less than the previous year. The outbreak was confined to an area round Tembura station. A number of cases were traced to infection from an old blind woman in an advanced stage of the disease. She had long been concealed from inspections and was found living in a house hidden on the banks of a stream. On discovery of this woman the outbreak was soon brought to an end.

The scanty reduction in the admission rate this year was also in part attributed to an abnormally long incubation period in certain people who had lived for some time in the French Congo. They were found to be infected a few months after completing the usual six months' quarantine. After their discharge they no doubt spread infection to some extent, before the disease was detected. Some of them, it was afterwards found, had received Atoxyl in French territory and this had obscured the diagnosis.

Dicharges. 593 patients who were admitted before or during 1923 were discharged, but are being kept under observation for one more year and are still occupying ground in the settlement. Thirty of these had to be re-admitted on shewing signs of the disease.

Treatment. Atoxyl remains the routine treatment, but acetyl-arsan is being tried. Observations following injections of acetyl-arsan show that trypanosomes often disappear from the gland fluid in eight hours, and the cases receiving this treatment are at present showing no signs of the disease. Further trial is necessary before the value of the drug can be ascertained. It is a particularly easy drug to administer and will replace atoxyl if it proves efficient.

The Settlement (Source Yubo). The settlement continues to prosper and must be exerting an influence on the district. It occupies an area of roughly 20 square miles and a leper settlement has been started adjoining it on the east. The population of the settlement including relatives is a little less than six thousand, nearly a tenth of the total population. All the able-bodied become self-supporting from private cultivation within six months, yet some 450 tons of cassava were issued during the year as rations to the sick, helpless, newcomers and immigrants in quarantine.

A brick making machine is turning out some 1500 bricks a day. The herd of cattle introduced last year is doing well. A number of cows died of trypanosomiasis contracted on the road, but the calves, born after arrival, survived. Bulls are being trained to pull the newly-imported plough. The water ram is working satisfactorily, but the water tower cracked for lack of enough cement, which the meagre funds available could not buy. A new one is being built.

By arrangement with the District Commissioner the industrial school of chair making and carpentry has been transferred from Tembura to the settlement. Sixty chairs were turned out in one month to fulfil a contract with the Sudan Government Railways and Steamers. The silk-worm industry, still in its infancy, is progressing in spite of set-backs, and the mulberry cultivations have been extended.

Reports emphasise the assistance given by the District Commissioners, and the Tembura report lays special stress on the achievements of El-Sagh. Nesib Effendi Baz in carrying out, in addition to the routine administration of the settlement, many extensive improvements.

(Sgd.) G. K. Maurice,
Major, R.A.M.C.,
Assistant Director S.M.S.
Border Provinces.

ENDEMIC DISEASES.

LEPROSY.

There is little leprosy in the northern and central zones of the Sudan, but southwards the disease becomes increasingly familiar until southern Bahr-el-Ghazal and Mongalla are reached, where the incidence is high.

The North.

In the north, lepers are dealt with at Omdurman. Segregation is not compulsory, but sheikhs and omdas are encouraged to send in their infected people. This colony is admirably conducted by a surgeon of the Church Missionary Society. The patients are not self-supporting, but are given a generous and selected diet. The colony is especially useful for testing experiments in drugs and treatment.

The report of the surgeon in charge is given below :—

Report on Leper Hospital, Omdurman, by C.M.S. Surgeon.

"The number of inmates on December 31st 1928 were 47; 32 men and 15 women. During the year there have been 5 admissions, 4 deaths and 4 left without leave.

Outpatients. There are 22 patients on the books, 11 men and 11 women and girls. Two of the girls have been free from all signs of the disease for a year, but attend monthly for inspection.

Medical Treatment—General. Courses of 914 have been given to those with positive Wasserman. During the last two months each patient has received raw liver daily. It was felt that they were in need of cod liver oil, but that it was of prohibitive expense.

Specific. 29 of the inmates and all the outpatients are in stage 1, 2 or 3 of Group II. ("Leprosy" Rogers and Muir). For the first four months weekly intramuscular injections of Wightiana oil were given starting with ½ c.c. and going to 3 c.c. The second four months the patients received graduated doses of Alepol intramuscularly from ½ c.c. to 5 c.c. bi-weekly. The last four months patients have had bi-weekly intravenous injections of Alepol combined with Potassium Iodide by mouth. The initial dose given is ½ c.c. of Alepol with 10 grains of Potassium Iodide a day. The reaction is checked by the patient's temperature and the dose increased until they are taking 5 c.c. bi-weekly and 30 grains Potassium Iodide daily, which should keep their temperature at about 99.

Patients showed little or no general reaction to the Wightiana oil or the intramuscular Alepol; they complained of pain at the site of injections, but with Potassium Iodide and Alepol some of the patients have shown marked reaction. There have been no fatal cases. None of the inmates have become bacteriologically negative, but two of the outpatient girls have had negative skin results.

General Management. The inmates have put the hosh under cultivation growing a large number of various green vegetables. The garden is of the greatest interest to them, provides them with fresh vegetables, and give them mild exercise. Those under treatment do physical exercises daily, as the greatest difficulty is experienced in getting the patients to take violent exercise.

Seven of the inpatient women have been treated with Hydnocarpus nuts, half a drachm twice daily".

The East.

In the east there is a colony of 25 at Gedaref. These lepers grow their own crops and are already self-supporting, but receive a supplementary ration from Government.

The South.

In the south there are seven leper colonies, all established within the past two years. These began as experimental centres, and it was considered prudent to limit the numbers to be treated until more could be found out about the value of treatment and the possibilities of extensive segregation.

The number under treatment during 1928 are given below:—

Bahr-el-Ghazal:—	
Wau	94
Source Yubo	496
Yambio	55
Mongalla:—	
Meridi	224
Yei	114
Kajo-Kaji	75
Opari	56
	1114

It became clear before the middle of the year that leper treatment was popular among the natives; that many responded to treatment, and that in some areas at any rate the patients could become self-supporting. The whole difficulty of dealing with large numbers is the prohibitive cost of feeding.

Where patients had already by the middle of the year made considerable cultivations, instructions were issued to admit patients to these places up to the limit which the Government grant and the local crops would support, and some 500 more lepers came under treatment than had been originally intended.

Up till 1926 the medical staff in the south of Bahr-el-Ghazal and Mongalla had been so heavily engaged on sleeping sickness that there had been no time for leprosy. A census taken in 1923 had revealed 200 lepers in Tembura district, mostly advanced cases, but in 1927 when a more leisurely census could be made, 1,000 lepers were detected, and the disproportionately large number of early cases was very striking. As detection of early cases became more expert the estimate for Tembura and Yambio districts of Bahr-el-Ghazal reached over 4,000. Similarly in Mongalla, where for years past, more accurate observation had been

possible, the leprosy census was showing a rapid increase. All investigation suggested that leprosy was introduced into the southern Sudan not much more than a quarter of a century ago and that it had reached a period at which either definite measures must be taken to check it or it would cripple a big percentage of the population.

In the original plan, dict was to play an important part in treatment, but it was considered that, in those areas at any rate, where the sleeping sickness regime had accustomed the people to segregation camps and settlements, in which the individual must support himself and often his dependents, lepers could become self-supporting in two years; and that, therefore, and especially since leprosy appeared to be increasing rapidly, it was better to segregate all the lepers of an area, and feed them on what they could grow for themselves than limit the numbers for the sake of a therapeutic diet.

It was reckoned that £ 8,000 spread over two years would cover the cost of dealing with all the lepers of the sleeping sickness areas, some5, 000 from information available, or about five sixths of all the lepers of the Sudan. The yearly maintenance and treatment of these lepers after the first two years was estimated to cost under £ 1,000.

Financial approval was obtained for this, and all arrangements made to start the scheme early in 1929.

The sleeping sickness areas for obvious reasons were chosen for the first experiments on a big scale, but the continuance of the colony at Wau, which is outside the sleeping sickness area and where conditions are a good deal different to those further south, was also provided for. The intention was, if the scheme proved successful in the sleeping sickness areas, and the Wau colony could be made self-supporting and popular, to bring the remaining areas where leprosy was common into line with the rest. It was felt that, even if treatment did not produce results expected of it, segregation alone must influence the control of the disease.

Patients are not compelled to enter the colonies, but the influence of chiefs in the south is such that most in fact do come in. The people know the early signs of the disease well, and in the past many seeking admission have been turned away. Local orderlies are quick at detecting the earliest signs, which are commonly erythematous patches, and at every sleeping sickness inspection, while the medical officer is looking for sleeping sickness, trained orderlies are looking for leprosy.

The administration of the colonies is almost the same as that of sleeping sickness settlements. Where the camp system has prevailed in the past, a leper camp is made; a settlement, where a settlement has prevailed. The distinction between the two is that in a camp, which is only possible where numbers are limited, the patients are fed from communal cultivations worked by themselves. In settlements the individual grows his own crops, works once a week on a communal crop for the maintenance of new comers and the helpless, and for the provision of seed for the community. Fortunately physical exercise is an important part of treatment.

The organisation of the settlements is also the same as that used for sleeping sickness. The lepers are divided into divisions, and sub-divided into sections, each having its headman and sub-headman who is himself a leper. The duty of these is to report absentees, deaths, etc. and arrange the weekly working parties. The chief crops grown are cassava, telebun, dura, simsim and ground nuts. This is supplemented for the first year by a daily ration of two rottles of dura; the second year one rottle; the third year nothing but the usual weekly ration

of salt. A meat ration is occasionally issued when one of the larger game is shot; at other times meat is unprocurable, since, in most parts there are no cattle.

The routine treatment is Alepol and Sodium Gynocardate "C." It is too early to give an opinion on results of treatment but the figures in the table below are encouraging. It will be noticed that thirteen were discharged. This was done from motives of propaganda. The cases were not bacteriologically examined, but all signs visible to the naked eye had vanished. The cases are remaining under observation.

Place	Admissions	Discharged	Died	Remaining
Bahr El-Ghazal:—				
Tembura	372	13	4	496
Yambio	—	—	—	55
Wau	—	—	—	94
Mongalla:—				
Yei	70	—	6	114
Kajo-Kaji	29	—	4	75
Opari	44	—	—	56
Meridi	181	3	7	224
Totals	696	16	21	1114

The outlook appears hopeful, but two or three years must elapse before any accurate forecast can be given.

(Signed) G. K. Maurice,
Major, R.A.M.C.,
Assistant Director S.M.S.
Border Provinces.

ANKYLOSTOMIASIS.

This disease is endemic in Dongola, Halfa, and to a limited extend in certain areas of Kordofan and the Fung Provinces. Systematic treatment throughout Dongola Province was commenced in 1924, and since then a notable decrease in the incidence has been noted. The matter is one of some importance, as the native of Dongola goes all over the Sudan to work and is apt to carry his diseases with him.

It is interesting to note that ankylostomiasis has not up to the present established itself in the irrigated area of the Blue Nile Province, in spite of the fact that the dampness of the irrigated soil and the increased density of the population are factors likely to favour the spread of this disease.

ANTHRAX.

An outbreak of human anthrax occurred in July at Gebel Kindermah in the Nuba Mountains. 23 cases were reported with 8 deaths. Gebel Kindermah is near Tira-el-Akhdar, where 7 human cases occurred in 1917 and 30 human cases in 1925. In 1925 the human outbreak was preceded by an outbreak among cattle, but no outbreak among cattle has been reported in this area during the years 1927 and 1928.

BILHARZIASIS.

Methodical work has been continued with a view to diminishing the incidence and spread of this disease. Especial efforts have been made to render the anti mollusc and propaganda side of the work more effective, while combining it with the treatment of infected persons; thus at the same time attacking the disease in its human and its mollusc hosts and endeavouring to prevent its transmission from the one to the other.

The essential object of this work is to prevent the Gezirah irrigated area becoming infected. It is difficult to over-rate the importance to the future of the Sudan of preventing the infection of this area.

The measures taken to prevent the infection of the irrigated area are:—

(i) Quarantine at Wadi-Halfa of labour imported from Egypt.

(ii) Quarantine at Kosti and El-Dueim on the White Nile, of immigrants entering the Gezirah from Kordofan and the west.

These immigrants are chiefly from Wadai, and from British and French West Africa.

(iii) Anti-bilharzial work in the principal endemic areas in the Sudan.

(iv) Enforcement of regulations to prevent bathing in canals, and urination and defaecation into canals in the Gezirah irrigated area.

(v) Destruction of snails in the distributary canals during the non-watering season.

(vi) Treatment of all infected cases that can be found in the irrigated area.

It is clear that no two or three of these lines of action would be sufficient in themselves to prevent the infection of this area, but it remains to be seen if, by the combination of all these methods of defence, it will be possible to save it from becoming permanently infected. It is possible also that further investigation in the Sudan and elsewhere may furnish us with more effectual methods of combating the spread of infection.

Distribution.

This disease has been found occurring endemically over large areas in the northern Sudan. In the central Sudan although definite endemie areas occur it is less widely distributed. Proceeding south two infeeted areas limited in extent are found in the Fung Province on the Blue Nile, and the disease is widely disseminated in the Nuba Mountains distriet. Further south still in the Upper Nile Province, although cases are found among Arabs from the north, no indigenous eases have been found among the negroid natives of the country. Similarly, in the Bahr-el-Ghazal Province no indigenous cases have yet been reported. In the extreme south, indigenous eases both of bilharzia haematobium and bilharzia mansoni have this year for the first time been reported from the Yei district of Mongalla Province, and infected bullinus and planorbis snails have been found in khors in this district. The bullinus snails sent to Khartoum for identification were identified as bullinus brochii.

Distribution of Snails.

On the Blue Nile, bullinus is the common variety although planorbis is also present in considerable numbers.

On the White Nile, planorbis snails are generally greatly in excess of the bullinus varieties. As far south as Renk, both varieties are found in large numbers. At Kaka and Kodok both varieties are to be found, but in diminished quantities. On the Bahr-el-Zeraf and Bahr-el-Gebel, only planorbis has been found up to date. On Lake No both kinds have been found, but in small numbers.

It is questionable whether the elimatie conditions in northern provinces are more favourable to the spread of this disease than is the case in the southern areas, or whether there is some other determining factor to account for the wider prevalence of this disease in the northern areas. It would appear to be most probable that it is purely a question of exposure to infection. The northern provinces have long been exposed to infection by numerous infected persons coming from Egypt; officials, soldiers, artizans, merchants, and navvies for construetion work. The central Sudan has been exposed to infection for a shorter period and to a less degree. The southern Sudan has been very little exposed to infection. It is disquieting to find an endemic area at Yei, as this suggests that various other endemic centres may exist and only await detection.

If the snail hosts of bilharzia are as widely disseminated in the south as in the north, and if other conditions are as favourable to the development of the bilharzia cycle in man and snail, then the fact that intercommunieation between the north and the south and between different areas in the south is yearly increasing and the fact that for the greater part of the year lakes, streams and pools are to be found everywhere throughout this area, would seem to render the wide dissemination of this disease in the southern areas almost inevitable.

Berber Province.

No further spread to the irrigation farms to the south of Atbara has taken place, but it has not been possible to free from this disease any of the already-infected farms. Especial efforts have been made to kill off all snails during the non-watering period—April and May—and it is hoped that considerable progress will result from these measures. The broken briek work of the sluice gates have been found to be the most populous sheltering places for snails. It is hoped that these sluice gates will be faeed with cement at an early date.

It is noticeable that where the intake of pumps is in deep water and at a distance from sand banks and rocks lying under shallow water, very few snails find their way into the canals. It is thought that the entry of snails into the canals would be markedly diminished by extending the intake of the pumps into deep water. This matter is being investigated.

Every effort is being made to popularise the treatment of bilharzia, which is voluntary. The great difficulty encountered is the length of time required for complete cure and the interference with agricultural work thus involved.

The accompanying list shows the cases discovered and treated at the various centres during the last three years :—

1926	.. ..	2,447 cases.
1927	.. ..	718 „
1928	.. ..	742 „

The methodical inspection of 19 schools throughout the province shows a percentage of 2.7 bilharzial cases as against 9.84 per cent. last year and 15.82 per cent. in 1926.

Of 1,761 people examined or re-examined during the year, on the infected irrigation farms 645 (36.6 per cent.) were found infected. 333 of these were new cases (18.8 per cent.) 256 cases previously reported as cured were found to be positive, and presumably re-infected.

Dongola Province.

The examination for this disease and the treatment of infected cases has continued to be on an entirely voluntary basis, thus it is impossible to give figures of any value for the whole population. There is a noticeable increased willingness on the part of the people to come forward for treatment. 12,213 persons came forward for examination and 2,259 persons were found to be infected; 1,480 received complete treatment.

Examination of school children for bilharzia infection gave a percentage in five vernacular schools of 7.4 and in forty four village schools of 15.7.

Anti-mollusc Work. This side of the work has been vigorously pushed. The distributary canals on the irrigation farms are dried off every 15 days and any remaining pools of water are treated with molluscicide. River pools are similarly treated.

White Nile Province.

The infection in this province is for the most part rectal in type and with few exceptions is from the river. In certain areas, water in pools and khors left by the falling river can be treated by molluscicides, but for the most part the planorbis snails are to be found in the shallow edges of the slowly flowing river. Mollusc destruction is thus impracticable as a general measure of anti-bilharzia work. The common variety found is planorbis boissyii. Fifty per cent. of snails taken from the river were found to be infected.

Treatment is optional, except in schools and at the quarantine stations at Kosti and El Dueim. Every effort is being made to enlighten the people as to the ways in which the disease is contracted and re-transmitted to others through snails.

Efforts are being made to combat the transmission of the disease by :—

(i) preventing fouling of the river edge. This can only be done at the Merkaz towns and over a limited length of river,

(ii) digging wells to provide an alternative water supply.

These are only used when the well supply is nearer than the river supply, but if suitably placed, they considerably diminish the numbers exposed to infection. It is hoped to increase largely the number of these wells as it is considered that this is the line of action most likely to be effective in this province.

The disease in the White Nile Province (unlike the desert reservoir infections of Kordofan which are seasonal) is transmitted from snail to man throughout the year excepting only during the two months when the flood is at its height. As a result of this, the infections tend to be intense, and profound anaemia and constitutional symptoms result. Although a large percentage of the riverain population remains infected with this disease, the general health has been improved as the result of treatment.

The nearness of this infected river area to the Gezirah irrigated area of the Blue Nile Province, and the impossibility of preventing the population from entering this area in large numbers to help in the cotton picking, renders it a source of grave danger to the irrigated area. It is, therefore, additionally important that the bilharzial incidence in the White Nile Province should be reduced as much as possible.

Work was carried on in 11 hospitals, dispensaries and treatment centres. The following show the numbers of cases treated during the year at the various centres, and the percentage of bilharzial infection at the schools :—

El-Dueim hospital	1,549
Kosti ,, ...	319
Aba Island Dispensary	45
Kawa ,, ...	27
Gebelein ,, ...	139
Geteina ,, ...	217
Wad-el-Zaki ,, ...	30
El-Dueim quarantine	738
Kosti ,, ...	2,887

Schools.

	% positive.
El-Dueim	31.7
Geteina	32.1
Kawa	28.0
Aba Island	95.5
Tendelti	03.6

Bilharzia Quarantine. Quarantine stations were maintained at Kosti and El-Dueim with a view to preventing the immigrants from the west, infected with bilharzia, from crossing the river and entering the Gezirah.

Only persons believed to be going to the Gezirah to work in the irrigated area are thus stopped. Such persons, whether attempting to cross the river by the White Nile bridge or by one of the ferries, are turned back and sent either to Kosti or El-Dueim. There they are examined and if found to be infected with bilharzia are detained and cured ; otherwise they are allowed to proceed on their way. They are housed and fed free during the period of detention.

A total of 19,402 persons were examined at these two stations and 3,820 were found to be infected with bilharzia, i.e. 19.9 per cent. were found to be infected. These are all cases of bilharzia haematobium infection. It was not found possible to examine for rectal bilharzia, but it is believed to be uncommon among these immigrants. A percentage of all cases will be examined for rectal bilharzia in 1929.

The 19,402 cases examined were composed as follows :—

(i) British West African pilgrims 29%
(ii) French Sudan (including Wadai, Chad, and Ubange-Chare) 35%
(iii) Sudanese 36%

The following lists show the number of cases examined at Kosti and El-Dueim respectively for each month of the year together with the number and percentage found infected :—

Month.	Kosti		El-Dueim	
	Total No. examined	per cent. infected	Total No. examined	per cent. infected
January	1328	20.0	591	20.6
February	2206	9.0	327	21.3
March	418	14.0	157	24.7
April	1026	16.0	82	40.2
May	1134	8.0	85	49.4
June	1824	20.6	115	26.9
July	966	22.0	605	17.7
August	1824	20.6	396	26.8
September	1670	19.0	152	38.8
October	1700	17.0	92	20.6
November	1110	22.0	150	34.0
December	1171	23.5	273	21.6
TOTAL ..	16377	19.0	3025	24.7

Blue Nile Province.

Sennar Merkaz. Snail Survey. Mature snails were found in the main canal within a week of the re-admission of water. The number of bullinus snails increased until the end of February, after which they gradually diminished until the closing of the canal in April. Snails were found on palm branches inserted along the whole length of the canal. Mature and immature forms were found together, with no preponderance of the latter at any particular season. Spat was also found under similar conditions, but it is probable that little breeding normally takes place in this part of the canal owing to the strength of the current. Bullinus truncatus was the common variety found in the main canal, but bullinus innesii were also found.

The following is a note by Medical Inspector in charge of the district on the Gebel Moya Hafir, a semi-artificial water storage reservoir :—

" Six tame ducks were put on the Hafir in December 1927, and were observed to gobble the snails with avidity. The last mature snails were found on February 15th. The water dried up on March 22nd and refilled again in June. The first snails were recovered on July 10th. They were immature and uninfected. The expanse of water was great and all the surrounding country was under water. As the water subsided the snails were found in great numbers. The ducks were replaced on the Hafir on November 4th but the number of snails remained undiminished.

" Three hundred persons (males) in the vicinity of this Hafir were examined and 10 were found infected."

Irrigated Area. Bilharzia Snails Increase. The rapid increase in the bilharzia snail population during the last two years is very striking. In the autumn of 1926, the irrigation system had been working for over a year, and at that time bilharzia snails could only be found in six of the canals. They are now present in large numbers in every canal of the system. Three new blocks in the north of the area were not irrigated until August last, and yet both the bullinus and planorbis varieties were found in these canals in November.

Varieties. Both kinds of snail are now found. In 1927 the planorbis variety was found in two blocks only (Barakat and Tayiba, the two oldest blocks). This variety is now found in twenty blocks.

The snails found in the canals and sent to the Wellcome Tropical Research Laboratories for identification have been indentified as follows :—

Bullinus	Innesii Contortus Dybowski	} in order of frequency.
Planorbis	Boissyii Alexandrinus Pfeifferi	} in order of frequency.

Snails infected with bilharzia cercaria have been found in Tayiba, Barakat, Suriba and Medina canals. It is probable that several other canals contain infected bilharzia snails. To meet this state of affairs the snails in all the distributary canals will be systematically destroyed during the non-watering season, either by completely drying out the canals or by partially drying out the canals, and treating the residual water with Sizolin.

This is done, not with the purpose of diminishing the snail population, as the dried out canals, very soon after they have been refilled from the main canal, are again infested with mature snails, but with the intention of killing all the infected snails, and starting again with canals infested, but not infected.

Destruction of snails during the non-watering season 1928. All irrigation ceases between April 15th and July 15th but water has to be run in the main canals and in something like half of the distributary canals to ensure a supply of water for the houses and gardens of the Syndicate Inspectors, and for the native population and their animals. 1,185 kilometres of distributary canals had to be dealt with. 376 kilometres had to be treated with Sizolin, the remainder were dried off in rotation.

In spite of this systematic destruction, the four canals referred to above were found to contain infected snails. Either these snails must have been reinfected between August and the end of the year, or else owing to some lack of co-operation between the sanitary authorities and the water controllers, water was re-admitted to these canals before the snails were completely dead. If this latter were the case it remains to be seen if the snail destruction can be made more final and more universal in the coming year.

Bilharzia infection of children in the irrigated area. During the 1926 survey of human bilharzia infection in the irrigated area, locally infected children were found in the villages in the following blocks :—

Hosh	7
Hamad-el-Nil	3
Komor and Radma	3
Tayiba	8
Barakat	15
Abdel Rahman	1

A resurvey of the children in these villages carried out in 1928 gave the following results :—

Hosh	2 (new infections in a different village)
Komor and Radma	0
Tayiba	1
Barakat	4 (3 new infections and 1 recurrence)
Abdel Rahman	1 (fresh infection)

Seeing that in any community the children are always the most likely to be infected with bilharzia, this resurvey would seem to indicate that up to the present there is no appreciable infection of the villages in these older irrigated areas.

Source of possible infection. There are two principal potential causes of infection :—

(i) The Takroori (the genuine West African pilgrim)

(ii) The wandering westerner from Wadai.

An endeavour is made to examine and if necessary treat all immigrants entering the Gezirah from the west, at quarantine stations at Kosti and El-Dueim. During the year under report nearly 20,000 Takrooris and Westerners passed through these two quarantine stations.

This quarantine, although diminishing the danger very considerably, does not exclude the entry of all infected westerners because :—

(i) the disease may have been latent at the time of inspection.

(ii) the immigrant may have escaped the quarantine station. At the end of December 685 westerners sleeping on the river bank in Wad-Medani were rounded up and examined ; 85 were found to be infected (i.e. roughly 12 per cent.).

Further measures to be adopted. (i) The *Takrooris*, although migrants, have definite villages where they live during the period of their stay in the Gezirah. They have sheikhs and a village organisation, and can be dealt with in the ordinary way. These villages are now being examined for bilharzia cases and all detected cases are being treated either at the neighbouring block dispensaries or by a travelling dispensary hakim. Many of these villages are in close proximity to canals. It is hoped to be able to move them away from the canals to the neighbourhood of a well-water supply.

(ii) The *Westerners* are more difficult to deal with. They have no villages nor any settled abode, nor have they any sheikhs or tribal or village organisation. There is no way of persuading these men to attend for treatment or to remain in hospital except by forcible detention. To meet this difficulty a bilharziasis camp hospital is being formed, in which all infected immigrants who can give no guarantee of regular attendance will be detained until cured.

There are two other less important potential sources of canal infection :—

(i) Natives of the White Nile Province come across in large numbers to help in the cotton picking ; many of these are riverain people and a considerable proportion of the riverain population are infected with rectal bilharziasis, but it is not possible to prevent their free entry as they are living on both sides of the river and constantly crossing from bank to bank. To protect the canals against this source of infection it is only possible to rely on the strict enforcement of regulations against fouling the canals and bathing in the canals. These people only come for a period of three months while the cotton is being picked. As soon as

the picking is finished, watering is discontinued, and the systematic destruction of snails in the canals is commenced.

(ii) A small filtration into the Gezirah takes place from infected areas in Berber and Dongola Provinces. The numbers concerned are small, and it is hoped to be able to find and cure these people soon after their arrival. They are easier to deal with than the other three classes, moreover they tend to live in the old established villages where wells exist.

Conclusion. It has been pointed out above that infected snails have been found in four canals and it is probable that if a long enough search were made, occasional infected snails would be found in other canals. It has been mentioned also that a few children have contracted this disease since 1926. The position, however, would not appear to be hopeless. It should be possible to kill all the snails in the distributary canals during the non-watering season of 1929 and thus the canals would start afresh when watering recommences, infested with snails it is true, but with uninfected snails.

It is doubtful if we can make the quarantine measures on the White Nile much more effective than they are at present, but it is hoped that by inspecting and treating the Takrooris pilgrims in their villages and by searching for and isolating until cured all infected westerners, it will be possible to find and cure the great majority of the infected persons who have escaped detention at the quarantine stations.

It is hoped also, by continued propaganda and by the enforcement of police regulations, to prevent to an increasing extent the contamination of the canals by infected persons and of the people by infected canals. In the future we have a good deal to hope for from further study of the habits of the snails and of methods designed to prevent their introduction into and their propagation in the canals.

The position then as to the likelihood of the permanent infection of this area and as to the serious consequences to the health efficiency of the population which would inevitably result appears to be grave, but by no means without hope of prevention.

BLACKWATER FEVER.

Twenty one cases of blackwater fever were reported. The distribution was as follows:—

Province	Hospital	Nationality	Result
Berber	Atbara	1 Egyptian	Recovered
Dongola . .	Dongola	1 Native	,,
Blue Nile . .	Wad-Medani	1 ,,	,,
,, . .	Makwar	1 ,,	Died
Kordofan . .	El-Obeid	2 Natives	1 ,, & 1 recovered
,, ...	,,	2 Syrians	1 ,, & 1 ,,
,, ...	Nahud	2 Natives	Recovered
Kassala	Kassala	1 Native	,,
Fung	Roseires	2 Natives	,,
Upper Nile . .	Malakal	3 ,,	2 died & 1 recovered
,,	,, from Gambela	1 Swiss man	Died
Nuba Mountains	Talodi	1 Greek girl	Recovered
,,	Kadugli	1 Syrian	,,
Mongalla . .	Juba	1 Khartoum native	Died
,,	Lul	1 Italian priest	Recovered

It is seen from these figures that the incidence of blackwater fever is not heavy, that it is distributed over the Sudan generally, cases being reported in every province excepting Khartoum, Halfa, Red Sea, Bahr-el-Ghazal and Darfur Provinces, that no cases occurred amongst British officials, that three cases occurred in Europeans living in southern areas under semi-native conditions. In every case there was evidence of previous malaria.

DYSENTERY.

A total of 1,334 cases of dysentery occurred in 1928 as against 1,172 in 1927. This increase was in proportion to the increase of total admissions to hospitals. Of these 1,334 cases, 1,116 were amoebic and 248 were bacillary. A total of 59 cases occurred among Europeans, of these 38 were bacillary and 21 were amoebic.

The bacillary type of dysentery appears only to have established itself among the native population in provinces such as Khartoum, the Blue Nile, Berber and the Red Sea Provinces where there is considerable contact with Europeans and even in these provinces the cases are confined to the vicinity of the towns or areas with a considerable European population such as the irrigated area of the Gezirah.

The bacillary type is the commonest type among Europeans and particularly so when the Europeans are in considerable numbers. In Khartoum Province, out of a total of 33 cases occurring among the British population, 29 were bacillary and only four amoebic. Similarly, in the irrigated area of the Blue Nile Province out of 27 European cases, 24 were bacillary and three amoebic.

On the other hand in the Sennar district of the Blue Nile Province, where the European population is small, out of a total of 81 cases all were found to be amoebic.

The following list shows the total number of cases admitted for amoebic and bacillary dysentery respectively during each of the last eight years :—

	1921	1922	1923	1924	1925	1926	1927	1928
Amoebic	477	390	504	605	483	543	835	1086
Bacillary	89	48	27	111	326	271	337	248
TOTAL ..	566	438	531	716	809	814	1172	1334
Percentage of all dysentery admissions to total admissions ..	3.0	2.4	2.9	3.6	4.3	3.7	4.5	4.2

GUINEA WORM.

North of the 9th parallel cases of this disease are only occasional; south of this parallel the disease increases greatly in frequency and next to yaws and chronic ulcers is the most common cause of temporary disablement. Even in these southern latitudes the country becomes relatively waterless for the early months of the year, and the natives are compelled to water at a few permanent watering places. These watering places whether wells, rivers or storage ponds, are very liable to become infected and thus large numbers of the natives watering there contract the disease. The question of dealing with these infected watering

places is under consideration. If this is found to be possible, the elimination of this disease as an important crippling factor among the population will be greatly hastened; otherwise it will be necessary to await the slower action of making the treatment of infected cases as universal as possible and thus gradually diminishing the number and the intensity of the infected watering places.

KALA-AZAR.

Forty-two cases of this disease were reported in 1928 as against 21 in 1927 and 24 in 1926. The principal increase is in Kassala Province where 18 cases are reported. These are from the valleys of the Setit and the Upper Atbara, on the western side of the province.

Owing to the construction of the Kassala-Gedaref railway, inter-communication between this hitherto secluded area and the neighbouring districts has been greatly stimulated. It is questionable whether this increase in cases reported is due to existing disease coming under notice owing to freer movement of the population, or to an increase of the disease owing to unimmune persons visiting infected, but largely immune villages.

A third explanation is possible. The natives of the district have evacuated certain parts of the rivers Atbara and Setit as being very unhealthy owing to the prevalence of a continued fever other than malaria. It is suggested that the increase of kala-azar may be due to reoccupation of or increased traffic in these evacuated areas. Colour is lent to this suggestion by the following incident.

A Company of the Eastern Arab Corps was in camp at a place on the Upper Atbara far from a village or any human habitation; seven soldiers contracted kala-azar. There appears to be little doubt that the disease was contracted while the Company was in camp.

It is possibly of some significance that the site of the camp although deserted by man is inhabited by a large colony of baboons.

The following list shows the cases reported in the Sudan during the year, their place of origin and probable place of infection :—

Reported from	No	Origin of patient	Probable place of infection
Khartoum	9	1 Shulkawi from Omdurman	Gallabat
		1 Furawi ,, ,, ...	,,
		1 Abyssinian ,, Gedaref	Wad Arrat
		1 Nubawi ,, Deim Salman ...	Gedaref
		1 Tagalawi ,, Khartoum	
		1 Bargawi ,, Dem	
		1 Messelemawi from Makwar	Kassala
		1 Bediri from Kassala	Kassala-Gedaref
		1 Greek from Singa	Singa
Berber	2	1 Dongolawi from Argo	Gedaref
		1 Shaigi from Goz Regeb	Goz Regeb
Kassala	8	1 Beni Amer from Kassala	Kassala
		1 Abyssinian from Gedaref	Abyssinia
		1 Kurdi }	Wad Amd.
		1 Beni Amer	
		1 Shulafab } from Gedaref	
		1 Abyssinian	
		1 Shazi	
		1 Karawi }	

Reported from	No.	Origin of patient	Probable place of infection
Blue Nile	2	1 Nubawi from Hag Abdulla	Gezirah
		1 ,, ,, Sennar	Wad-Medani
Fung	18	1 Shaigi from Kurmuk...	Kurmuk
		9 Abyssinians, 1 Sudanese, 1 Zaghawi, 1 Firtitawi, 1 Borgawi, 1 Bornawi, 1 Somali, 2 Bertawi — from Roseires	Roseires
White Nile	1	1 Shukri from El-Dueim	El-Dueim
Kordofan	2	1 Gami from Um-Ruaba	Gebelein
		1 Kanana from Um-Talha	Um Talha
Total ...	42		

MALARIA.

Irrigated area, Blue Nile Province.

The high malaria rate which prevailed in the autumn of 1927 as a result of the heavy rains and humid atmospheric conditions persisted in the first two months of 1928, but it fell throughout March and had returned to normal by April.

A lower malarial rate throughout the autumn months was very marked. This is to be attributed in part to the absence of the widespread flooding which had resulted from the heavy rains in 1927, but in part to the fact that all officials both of the Government and Syndicate, as a result of the heavy malarial rate of the previous autumn, were actively alive to the importance of ensuring the execution of all anti-malarial measures laid down as necessary by the medical authorities. Field channels were promptly and completely baled out, accumulations of water were dealt with, and mosquito nets issued against payment to tenants for themselves and for their dependents. Over 20,000 nets were thus issued.

The following list shows the attendances for malaria during 1926, 1927 and 1928 at the 22 dispensaries in the irrigated area and the three other dispensaries in the same province, but outside the irrigated area :—

	1926	1927	1928
22 Gezirah dispensaries	357	2160	979
Rufaa dispensary	210	779	324
Kamlin ,, ...	102	583	221
Managil * ,, ...	24	95	—

The figures show :—

(i) The high malarial incidence following the rains in 1927.

(ii) The higher incidence of malaria at dispensaries in the province, but outside the irrigated area.

*The Managil District is higher and on sandy soil and has therefore always been less malarious than the heavy cotton soil areas.

This latter would seem to indicate that even in the heavy malarial year of 1927 when anti-malarial measures in the irrigated area had to a considerable extent broken down owing to the tenants being incapacitated for the proper baling out of the irrigation channels the malaria rate outside the irrigated area was higher than that in the area. The indication is interesting, but needs further confirmation. It is hoped during the ensuing year to carry out spleen counts to elucidate this and other points.

Additional measures taken to diminish the malarial incidence. Apart from the routine measures ordinarily enforced, *i.e.* the complete drying off of the small distributary canals between waterings, the oiling of seepage or other accumulations of water, the early treatment of all infected cases at dispensaries and the adequate mosquito protection of all European houses the following additional measures were taken :—

(i) The banks of all canals which seeped badly were heavily strengthened with earth.

(ii) Mosquito nets were issued to all tenants and their dependents.

(iii) Insistent propaganda among Europeans as to the importance of the routine killing of all mosquitoes lurking in the house.

(iv) A medical inspector was seconded for the special study of mosquito conditions and malaria in the irrigated area, under the direction of the Director, Wellcome Tropical Research Laboratories.

As regards (i). This strengthening of the banks was only effective in preventing seepage in 50% of the cases. The determining factor in seepage from the canals appears to be the high storage level of water which has to be maintained to obviate night watering. It is possible that a lowering of the storage level might be obtained :—

(a) By stricter water control and thus having to store less water.

(b) By cutting out certain high areas so as to obviate the high storage level needed to irrigate these small areas of higher land.

In the canalisation of new areas regulators are being placed at more frequent intervals to diminish the height of the storage level that has to be maintained.

Northern Provinces.

Small epidemics of malaria occurred in Dongola and Halfa Provinces in April and May as a result of the falling Nile leaving pools over wide areas of river bank.
They were dealt with by routine measures.

Southern Provinces.

Progress is being made in improving the mosquito protection afforded to all officials serving in the southern stations.

Efforts are being made to popularise the use of the mosquito net among the natives living in their natural conditions and some progress is noticeable.

MALTA FEVER.

Twelve cases of this disease were reported, as against sixteen last year. The cases were distributed as follows :—

Omdurman	2	
Port Sudan	1	
Merowe	2	(of whom one came from Kassala)
El-Dueim	1	(one fatal)
Kassala	6	(one fatal)

All these cases occurred among natives of the Sudan.
In 1926 five of a total of 12 cases occurred in Kassala.
In 1927 thirteen of a total of 16 cases occurred in Kassala.
In 1928 seven of a total of 12 cases occurred in Kassala.

It is interesting to note that only one case is reported from Red Sea Province, which is inhabited by the same Hamitic races which contribut the cases to Kassala Province.

This may be due to the fact that Port Sudan hospital is largely a town hospital, and deals with a smaller percentage of the non-Arabised Hamitic population.

RABIES.

No cases of this disease were reported in the Sudan before the year 1924, but the disease has now definitely established itself and appears to be on the increase. Cases of rabies in dogs or other animals occurred in Kordofan, the Nuba Mountains, Bahr-el-Ghazal, Kassala and the Red Sea Provinces. Of these, the Red Sea Province had not previously been known to be infected.

Five human cases occurred (they were all fatal). Of these cases, four came under treatment. The distribution of the cases is given below :—

Kordofan Province—		Abu Zabad	1	case.
,,	,,	Rahad	1	,,
,,	,,	Rashad	1	,,
Red Sea	,,	Tokar	1	,,
Kassala	,,	Kassala	1	,,

Sixty persons who had been bitten by, or had come into close contact with, rabid dogs received treatment with antirabic vaccine ; of these two died before they had completed the course of treatment.

The following measures were taken to diminish the danger of further spread of the disease :—

(i) A regulation was put in force to prevent the transport of dogs by rail or steamer except on the certificate of a veterinary officer, or in his absence, of a magistrate.

(ii) Measures were taken to render more complete the destruction of homeless or uncared-for dogs.

SCURVY.

Outbreaks of scurvy occurred in the Blue Nile Province and Red Sea Province.

Blue Nile Province.

This outbreak was limited to immigrants from Wadai and the Tchad region who were working as labourers in the Gezirah irrigated area. They were livi g on dried meat, dried fish and assida (a preparation of millet) only, while the local inhabitants who were unaffected could obtain milk, merissa (native beer) and fresh meat.

The cases occurred as follows :—

	Men	Women	
August	34	2	These immigrants unlike the West Africans, only exceptionally bring their women with them.
September	81	0	
October	12	0	
	127	2	

After the rains had brought on the wild vegetables (*e.g.* weika and maleita) no further cases occurred.

The most marked feature was the common occurrence of haemorrhages into the thigh muscles and the con equent inability to walk. This symptom was accompanied by the characteristic spongy gums, offensive smell, and profound anaemia.

The symptoms cleared up on treatment with fresh vegetables and frcsh limes.

Red Sea Province.

This outbreak occurred at Adobana and Akik, situated on thc maritime plain towards the extreme south of the Red Sea Provincc.

The epidemic outbreak occurred in October at a time when owing to the lateness of the rains there was practically no grazing, (and consequently very little milk) and all but the wealthy members of the tribe were living only on dry millet. Four hundred persons were affected. The symptoms cleared up on treatment with fresh limes and fresh vegetables.

SYPHILIS.

In the southern provinces, for purposes of prophylaxis and treatment, syphilis and yaws are dealt with as one disease. A marked diminution in the incidence of these dis.ases has been noted (vide Yaws page 31).

In the northern and central provinces a steady improvement has been taking place for several years both in the incidence of the disease and the severity of the cases which come under treatment. This is due to the general recognition by the people of the efficacy of Novarsenobenzol injections in removing the symptoms of the disease, and to their ready application to the nearest dispensary for treatment.

An exception to this general improvement is found in the irrigated area of the Blue Nile Province. Up to 192 : the condition as regards syphilis in this province was steadily improving; since then, however, the influx of a heterogeneous and often bachelor population from various parts of thc Sudan, thc large and fluctuating immigrant population from the west, the contract labour from Egypt, and thc oftcn demoralising effect of quickly-won money on the indigenous population havc all tended to the increased incidence of this disease.

It is to be hoped that as this arca adjusts itself to the new conditions thrust upon it and as thc newly-arrived elements of the population settlc down and form villages or become absorbed into existing villages and towns, the opportunities afforded for immediate treatment will again prevail over the opportunities for infection, and the incidence of the disease will once more decrease. There is a dispensary for every 15,000 acres of this irrigated area so that no sufferer from syphilis has more than a few miles to walk for treatment. In the meanwhile it must be remembe ed that the prosperity that has increased the incidence of this this disease as at the same time brought corresponding advantages, notably improved general nutrition and improved housing.

Cerebro-Spinal Syphilis.

One case of locomotor ataxy was reported from Makwar, the Wassermann reaction strongly positive. Late cerebro-spinal syphilis is rare among natives of the Sudan.

TUBERCULOSIS.

The following table shows the total number of admissions for tuberculous disease both pulmonary and non-pulmonary, for each of the years 1918 to 1928, and the percentage rate of tuberculous cases in relation to total admissions for each of these years :—

1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
216	191	219	220	234	251	290	292	371	404	497
Percentage of total admission rate										
1.5	1.4	1.3	1.35	1.38	1.46	1.46	1.46	1.71	1.55	1.57

It is seen that there is a slight increase of this percentage rate over any of the preceding years, excepting only 1926 in which year it was considerably higher.

The following list shows the number of tuberculous cases dealt with in each of the provinces of the northern and central Sudan :—

Province.	Natives.		Foreigners.	
	Pulmonary	Non-Pulmonary		
Khartoum	53	51	7	1 European
Berber	24	27	1	1 ,,
Red Sea	14	37	8	2 ,,
				2 from Yemen
				2 ,, Hedjaz
				2 Indians
Dongola	21	15	—	
Halfa	11	8	1	European
White Nile	6	4	—	
Blue Nile	51	19	3	1 from Yemen
				1 Abyssinian
				1 Somali
Kordofan	11	9	—	
Kassala	23	20	18	Abyssinians and Eritreans
Upper Nile	6	20	—	
Fung	3	—	—	
Nuba Mountains ..	17	9	—	
Total	240	219	38	

It is seen from the above list that 38 out 497 admissions for tuberculosis were immigrants or foreigners. It is noticeable that no cases of tuberculosis were reported from among the western immigrants who supply far the largest part of the immigrant population. The incidence among the comparatively small Abyssinian immigrant population is very high. These Abyssinians are badly nourished and show little resistance to disease, and are therefore undesirable as immigrants.

As a result of the medical examination of 128 schools with a total of 8852 pupils, four boys were found to be affected with pulmonary tuberculosis. It is possible that some very early cases were overlooked, but it points to the conclusion that the rising generation of school age is not affected by this disease to any serious extent.

Southern Sudan.

The inhabitants of these provinces have until recently been largely cut off from communication with the outside world, and might well be expected to have little acquired immunity against this disease ; whilst at the same time the ever-increasing intercommunication and intermixing of previously isolated population might be expected to favour the dissemination of disease.

It has not yet been possible to obtain much data as to the incidence of this disease, but such information as is available appears to indicate that the tuberculosis incidence is not at present heavy, nor is there any indication of its increase.

It had been suggested that the incidence of pulmonary tuberculosis was heavy among the Shilluk, a negroid tribe which owing to its northern position has been longer exposed to infection by natives of the northern and central Sudan. A careful survey of the southern portion of this tribe was carried out. The villages inspected were those situated south of Kodok, and comprised approximately 50,000 people. Twenty men and two women were found infected with pulmonary tuberculosis. The youngest infected were two boys of 18 years of age. The infection had for the most part originated while the patients had lived in a town, e.g. Malakal, Kodok, Tonga.

Five cases of surgical tuberculosis were seen, and five others were said to be undergoing treatment in hospital, bringing the total for all cases of tuberculosis to 37, equivalent to a percentage rate of .07. This would appear to be reassuring, but none the less the position as regards the incidence of this disease among the negroid population is being carefully watched.

TYPHOID FEVER.

132 cases of typhoid and para-typhoid fever with 31 deaths were reported this year, as against 52 cases with 10 deaths in 1927. To some extent this increase may be attributed to better diagnosis and to a larger number of cases being brought forward by their relations for treatment, but after all allowances have been made, it would appear that this disease is going through a phase of increased activity in the Sudan.

The following list shows the distribution of the cases :—

Place.	Europeans.		Natives.	
	Admitted.	Died.	Admitted.	Died.
Khartoum	—	—	22	3
Omdurman	—	—	28	7
Khartoum North	—	—	3	—
Atbara	—	—	3	—
Port Sudan	2	—	3	1
Wadi-Halfa	—	—	2	1
Wad Medani	—	—	5	2
Nahud	2		—	—
Kassala	—	—	20	10
Gedaref	—	—	10	2
Makwar			1	—
Malakal	2	—	24	5
"Lady Baker"			5	
Total	6	—	126	31

YAWS.

Yaws is not commonly found to the north of the 9th parallel, but to the south of that line it is widespread in its incidence. In the 1927 report, yaws was described as the most widespread and most crippling disease affecting the negroid races of the upper reaches of the White Nile and its tributaries. This is probably still the case, but a very great diminution in the incidence of primary and secondary cases as a result of wide-spread treatment is becoming increasingly obvious. This is particularly noticeable in the Upper Nile Province, in the sleeping sickness areas of Mongalla Province, and in the central area of the Bahr-el-Ghazal.

In the Upper Nile Province the attempt to render a definite area of the country completely free of the disease by the treatment of all infectious cases had to be discontinued owing to political unrest, and an interesting experiment in the complete elimination of a disease from a self-contained area was thus interfered with, but on the other hand the increase in the number of dispensaries throughout the province has led to a marked general advance in combating the disease. In certain areas of this province, notably the Bahr-el-Zeraf area and the Shambe-Yirrol area, the condition of the population has been completely changed in the course of the last few years. Whereas previously a large proportion of the population showed extensive secondary lesions and were largely incapacitated for work, or hunting, now it is not only rare to see active signs of the disease in these areas, but in addition there is an obvious general improvement in the nutrition and well-being of the population.

The invariable mode of treatment for this disease in its active manifestations is Novarsenobenzol. In the majority of cases it is not possible to persuade the patient to stay for more than two injections. It is found, however, that active lesions nearly always clear up after the second injection. The aim in view is to cure all active manifestations of the disease in as many cases as possible, so as to render th m non-infectious and thus prevent the transmission of the disease.

The decrease in the incidence of this in disease the sleeping sickness areas is indicated by the following figures, which show the number of active cases of this disease seen and treated during the last three years :—

1926	6,193
1927	593
1928	639

The following is the total number of Novarsenobillon injections given for yaws in the Upper Nile Province for the years 1927 and 1928 respectively. It is anticipated that in spite of the further spread of medical work the number of injections given for this disease during the next few years will shew a steady decrease :—

1927	1928
29,607	21,468

PROGRESS IN MEDICAL WORK.

There was a large increase in the number of inpatients and outpatients that came under treatment. The numbers compared with previous years are as follows :—

Year	1922	1923	1924	1925	1926	1927	1928
Inpatients ..	17742	18172	19827	18637	21738	26023	31510
Outpatients	355727	388863	394418	470697	833990	1096839	1445683

This increase is partly due to increased work at existing hospitals, which has in some cases involved the provision of additional accommodation, and partly to an increase in the number of dispensaries.

The following additions to existing hospitals were made:—

Nahud	2nd class male ward (19 beds)
Wad Medani	3rd class ward (30 beds) Female outpatient department. Drug sto e. Two 2 roomed isolation wards
Port Sudan.	Outpatient department
Malakal	Kitchen and servants' block Dispenser's quarters. 5 attendants tukls (huts)
El-Dueim	3 quarantine tukls (huts)
Khartoum	Garage for ambulance
Bara	House for dispensary hakim Two tukls (huts) 1 dahr-el-tor (grass-built ward)
Muglad	Two tukls (huts)
Dilling	Alteration to main block
Kassala	Drug store Piped water supply for the hospital 3 quarantine tukls. (huts) Attend nts' quarters 4 tukls at Khatmia and Railway Station.
Gebeit.	12 bedded hospital.

The following new dispensaries were opened :—

Khandak **Ghaba.**	Dongola Province.
Yirrol.	Bahr-el-Ghazal Province
Gelhak **Kaka**	Upper Nile Province
Hassa-Heissa	Blue Nile Province

Istarahna. **Dolga.** **Um-Degarsi**	Irrigated area, Blue Nile Province.
Kas. **Kuttum.** **Kebkebia.** **Kubbum.** **Kubbe.** **Zalingei.**	Darfur Province.

The three new dispensaries in the irrigated area were opened to serve three new 15,000 acre areas which were brought under cultivation. Similarly, seven new dispensaries will have to be opened in this area in 1929.

The six new dispensaries in Darfur were opened primarily as an anti-epidemic measure, to win the confidence of the people in medical work and administration and thus to get early information of any epidemic outbreak, and to ensure the trustful co-operation of the people in dealing with such an epidemic. The number of these dispensaries will need to be further increased in the near future, if Darfur is to be effectually protected from the destructive epidemics which have caused such heavy loss of life to the people, and so much effort and expense to the Government.

Progress in certain Provinces.

Khartoum hospital. The transfer of the Pathological Section of the Wellcome Tropical Research Laboratories to the new building in the hospital enclosure has enabled a more intimate collaboration between the staffs of the two institutions and has been of great benefit to the work of the hospital.

Continued progress has been made in the development of a good and efficient outpatient department which is available for teaching purposes.

A useful and efficient Massage and Electro-Therapeutic Department has been built up in connection with the outpatient department.

The Xray Department is now working at a high level of efficiency and a greatly increased amount of work has been carried out.

Plans for a new European block in the general hospital enclosure were prepared and approved, but the commencement of work has been delayed. It is hoped that it will be completed in 1929.

Omdurman hospital. The inpatients at this hospital have increased by 54 per cent. The provision of some additional accommodation would appear to be inevitable.

A dispensary for women and children was opened in the Wad Nubawi quarter and placed under the charge of one of the newly-trained native nurses ; in the nine months during which it has been opened there has been an attendance of 12,680. This is interesting as being the first dispensary placed in charge of a native woman in the Sudan. It is hoped that further development on these lines will be possible.

Kordofan Province. The number of admissions to El-Obeid hospital showed an increase of 22 per cent. This is a continuation of the steady increase that has been taking place at this centre over the last few years. There are now nine dispensaries in this province in addition to two winter treatment centres opened in the Dago Hills. The total outpatients treated in the province during the year was 160,000 compared with 28,399 in 1924.

It may be said that in the course of the last four years, by a system of medical tours and by the establishment of dispensaries at important centres, the medical confidence of the people of this province has been gained. Whereas before information as to epidemic outbreaks was haphazard and often long delayed, now prompt information of any outbreak of disease is at once received and before the news has reached the province headquarters the immediate measures of treatment and quarantine have been carried out by the dispensary hakim of the nearest dispensary.

Kassala Province. The eastern part of this province may now be said to have an adequate medical administration, sufficient to ensure immediate information as to epidemic outbreaks, and the adequate treatment of the native population. The confidence of the shy, suspicious Beja tribesmen has been completely won, a matter of political as well as medical importance.

There are now eight dispensaries situated at important centres of this area and two travelling dispensaries working among the camel owning nomads of the Butana. This has for the most part been accomplished since 1925, *i.e.* since the present medical inspector was posted to this part of the province. The western part of the province is still undeveloped medically, but it is hoped to commence organised medical work in this part of the province in 1929.

Upper Nile Province. The extensive and very beneficial work which was being carried out among the Nuers has been largely interfered with owing to political unrest. It is hoped that the re-establishment of complete administrative control will enable the further development of medical work in this tribe during the coming year. In spite of the large diminution of medical work among this large and important section of the population, medical work continued to make steady progress throughout the rest of the province. The total outpatients treated in the province increased from 128,679 to 155,353 an increase of 27,674. Two additional dispensaries were opened at Gelhak and Kaka, thus bringing the number of dispensaries working in the province up to a total of sixteen ; this includes the s.s. " Lady Baker " and s.s. "Kerreri."

The system of chiefs' dressers which had been introduced in the western Nuer district was this year extended to the large Shilluk tribe.

The improvement in the health and physique of the tribes in this province since medical work was initiated in 1921 is every year becoming more apparent, and this is particularly noticeable in the Zeraf, Shambe and Yirrol areas, where the people were previously very heavily infected with yaws.

A systematic medical survey of the southern part of the Shilluk tribe was carried out by a medical inspector of the Upper Nile Province. This tribe is the northern-most of the negroid tribes ; it extends chiefly on the western bank of the river from Latitude 9.5 to Latitude 12. The people are settled in villages along the higher ground a mile or so inland from the river. They do not migrate with their cattle as do the two neighbouring tribes the Dinkas and the Nuers. They

live by fishing, by hunting hippopotamus and various species of antelope, and by cultivating millet. They use the millet for food, and for making beer. During the last three years they have undertaken the cultivation of cotton as a rain crop. The people are of good physique, the men varying from 5 feet 9 in to 6 feet or an inch or so more. They are well developed and, unlike the Dinkas and Nuers, their lower limbs are powerfully muscled. Although the tribe, owing to its situation, has been much in contact with Arabs and Arabising influences yet the tribal organisation and the tribal customs and dress have remained unaffected. The report is given below verbatim.

Medical Survey of the Shilluk Tribe.

Area examined. The area covered so far has taken in practically all villages south of Kodok and embraces roughly 50,000 people.

Procedure. The method of procedure is as follows :—

The inhabitants of a village are induced to assemble. Usually the offer of free medicine and vaccination is enough to accomplish this with the aid of the local village chief, laggards being rounded in with the assistance of a couple of chiefs' police. Fifty average looking males and a like number of females are examined for splenic enlargement. Children were similarly dealt with at first, but latterly all have been examined. All except the sick and those requiring vaccination are then invited to retire, the remainder being dealt with according to their needs. On the whole medicine is in great demand especially Epsom salts, for its ready action and Novarsenobillon, as often for its reputed aphrodisiac action as for its specific properties.

Chiefs' dressers. From some of the big villages boys were recruited, trained for about a fortnight in the actual work occurring in the field, and returned to their villages equipped with first-aid boxes to act as chiefs' dressers. Some of these boys have turned out very well, and have become very keen in their new vocation.

General Health. The general health of the people appears to be of a high standard, but most of the inspection was carried out during the dry season which is for the Shilluk the healthiest time of the year. Though the actual sickness rate works out from the register at 93 per 1,000 the majority of this consists of minor ailments, *e.g.* 25 per 1,000 were cases of constipation and a further 25 per 1,000 were cases of conjunctivitis

Birth rate. One was greeted everywhere by large numbers of children. The average family would appear to number 4 or 5 and sterility is practically unknown in married women. Unfortunately no actual figures of births could be ascertained, but judging by the number of pregnant females encountered everywhere it shows every likelihood of continuing at a high level. The tribal custom that intercourse is forbidden during lactation tends to keep the birth rate down.

Death rate. Regarding the death rate the Shilluk is very reticent as to death; religion and the hereafter are to him closely related subjects, mention of which is to be avoided wherever possible. Talking with the chiefs, however, practically everywhere elicited the fact that the death rate among children is decreasing, though many still die during the rains of a disease the natives do not understand. In the few cases I have been able to see during the actual illness, the diagnosis has practically always been malignant tertian malaria. This disease has

in my opinion, since the introduction of vaccination, taken the place of small-pox as the chief cause of child mortality in the whole tribe. Other causes of child mortality are chiefly infantile diarrhoea, congenital syphilis or yaws, pneumonia and bronchitis.

Amongst the adult population one is struck by the large numbers of healthy old people. This is I think attributable to the very appreciable decrease in the last few years of interfamily feuds and strifes which used invariably to result in deaths on both sides.

Epidemiology. In 1919 an epidemic of small-pox swept through the whole tribe and practically decimated the people. The lesson in prophylactic vaccination learnt then is still fresh in their minds, and has considerably eased the work of teaching prophylaxis in all directions. No serious epidemic has occurred since that time.

General Diseases. The following is a list of diseases encountered during the survey. These have been tabulated in accordance with Sudan Medical Service Form No. 20 and will be dealt with in that order.

Tubercular :—

(a) Pulmonary tuberculosis appears to be a new disease amongst the tribe and its control requires careful observation. Twenty men and two women were found infected. These were mostly adults and amongst the men at least, infection usually originated from some time when the patient had lived at places like Malakal, Kodok, Tonga or had travelled further afield. The youngest cases infected were two boys both aged 18 years.

(b) Surgical tuberculosis. Five cases of definite tuberculosis of bones were found. This is certainly lower than the actual figure, but the increasing popularity of Malakal hospital attracts many cases of this kind. The correct figure of all cases would probably be about ten.

(c) Adenitis. Seventeen cases of general adenitis were found. 75 per cent. of these occurred in children, but with the prevailing incidence of syphilis and yaws I am not prepared to diagnose these as definitely tubercular.

From these figures it may be concluded that tuberculosis is not an endemic disease amongst the Shilluks and the disease is probably introduced through contact with infected Arabs and others. Were the disease endemic one would expect to find a very definite number of children infected even though bovine tuberculosis is extremely rare in the province.

Venereal disease—Gonorrhoea. Though no case of primary gonorrhoea was treated during the trek there is every reason to suspect its existence. The disease is certainly prevalent in Kodok and Malakal amongst the Malakia, as is shown by hospital attendances. A woman might certainly conceal the disease as its existence would considerably decrease her market value in the eyes of a prospective suitor. Outside those Merakiz, however, the disease is not likely to establish itself widely as the tribe as a whole is really very moral—the penalty for immorality being very severe. Sequelae—Four cases of gonorrhoeal orchitis were dealt with.

Syphilis and Yaws. Unfortunately those two conditions must be considered together as it is in most cases impossible to differentiate between late yaws, tertiary syphilis and congenital syphilis.

Three cases only of undoubtable primary chancre and one of secondary syphilis presented themselves for treatment. This is remarkable in view of the large numbers of cases showing lesions resembling tertiary and congenital

syphilis. Concealment may be eliminated as all the tribe appreciate the benefit of injections and know they can have them free if a lesion of the genitalia can be produced. It can only be concluded that the majority of these syphilide-like lesions is due to some other condition or conditions one of which is yaws. Undisputable cases of yaws, however, are also comparatively few so I think we must look further afield still. Malaria as will be seen later in the report is a very common disease of children and I think that it is conceivable that this disease may have certain sequelae of a syphilitic like nature.

Tertiary Syphilis and Yaws. The following analysis of cases of this type will show that more are attributable to yaws than to syphilis. There still remain, however, many which may arise from either condition.

Deformities of bones (sabre-shaped tibiae, etc.) ..	30
Clavus (?) all in old people	20
Gangosa (two in children)	8
Onychia	2
Emaciation with history of a rash	15
Ulceration of scrotum in adults	5
Nocturnal headache with history of rash	2
Bilateral synovitis	2
Osteo-myelitis	2
	86

Congenital syphilis or yaws (?) Sixty cases of syphilide-like affections occurred in children born of parents having either a history of some syphilis-like infection or actually showing one or other of the conditions enumerated above. The most common manifestations were sabre-shaped deformity of the tibiae, symmetrical skin lesions, and emaciation. These may have been congenital syphilis, but on the other hand they could quite as readily be diagnosed as late yaw lesions following on evanescent unnoticed primary affections.

Primary and secondary yaws. A fair number of cases were found; their chief characteristic being a lack of conformity to the typical text-book descriptions of this condition. The following is an analysis of the lesions found.

Ulceration of the fore-skin in boys mostly about five years old	10
Ulceration of vulva in two girls both aged 4 years	2
Condylomata round anus of four young girls ..	4
Mucous plaques on the mucous membrane on the inner side of the lips	28
	44

It is interesting to note that these lesions occurred usually without any other manifestation or history thereof.

In addition to these about forty cases of secondary yaws were included under skin infection making a grand total of 84.

The sites of the lesions enumerated would appear to suggest that the virus was contracted from the ground, and that the mucous membrane was more prone to infection than the skin. Also I failed to get in lesions of the mucous membrane any history of antecedent abrasions as appears to be necessary to ensure infection through the skin.

Juxta Articular Nodes. These are included here as they are considered by most authorities a tertiary yaw manifestation. In more than 50% of cases however, I failed to elicit any history of antecedent yaws or syphilis. They are

more common on women than men and involve chiefly the prepatellar region of the knee. Other common sites are over the lateral malleolus, great trochanter, and olecranon. I have practically never found them on situations not exposed to hard rubbing or pressure on the ground. I have never, however, found a case with them on the gluteal region.

Ulcers. Sixty eight cases of ulceration were treated. These are included here, as about 75 per cent. appeared to owe their origin to syphilis or yaws. The remainder chiefly confined to the lower leg appeared to originate in the implantation of a mixed infection on a preceding abrasion or other injury. The specific ulcers occurred chiefly on the neck, axilla, and groin and in many cases were multiple. No Leishman-Donovan bodies have so far been found in ulcers, but further investigations are being carried out.

General bone pains. If this condition is a tertiary yaw or syphilitic manifestation, its incidence appears to me to be out of proportion to the number of primary and secondary lesions encountered. The impossibility of clinically verifying the symptoms may encourage imposition to a certain extent, but the fact that most cases are prepared to go to any inconvenience to receive treatment shows that the condition really widely exists. This is the chief type of case which I think might originate from antecedent malaria, deposition of pigment in the tissues and bone capillaries leading to deficient nutrition and consequent pain. The improvement acknowledged after treatment with Novarsenobillon might be attributable to the general tonic action of the drug commonly observed in chronic malaria. On the other hand it is difficult to explain on this hypothesis why at least 75 per cent. of cases occur in adults.

Many of these cases if encountered in England would be diagnosed " chronic rheumatism " but if the " micrococcus rheumaticus" exists it is remarkable that no case of acute rheumatism has been found.

Eye. Trachoma. Several hundred of children were examined, but no cases of trachoma were found.

Other eye diseases include :—

Conjunctivitis	1253
Corneal opacities	25
Cataract	36
Trichiasis	115
Total	1429

Children were the greatest sufferers especially from conjunctivitis and trichiasis.

The large numbers of cases of conjunctivitis appear to be due to dust and smoke as most of a child's early life is spent grovelling in the former and in an atmosphere of the latter. Smear preparations of discharges will be made during the continuation of the trek to try and identify the affecting organism. Trichiasis would appear to originate from those cases of severe conjunctivitis in which the chief lesions are on the palpebral conjunctiva. Healing whether spontaneous or otherwise results in cicatrical contraction which presumably induces the deformity.

Corneal opacity also seems in many cases to originate from antecedent conjunctivitis.

Cataracts occurred mostly in the aged. Unfortunately the majority of these owing to hypermaturity and deliquescence are unlikely to give successful results on operation.

Skin diseases. The 142 cases of skin disease were made up as follows :—

Late syphilis or Yaws	50%
Scabies	20%
Eczema	10%
Vitiligo	10%
Other skin infections	10%

As has been said before it is impossible in most cases to distinguish in children at least the difference between a late yaw dermatitis and one due to congenital or tertiary syphilis.

Scabies is a fairly common infection especially in parts of the country where natives are beginning to wear more clothes. Sulphur ointment is keenly sought after as its beneficial effect seems to be appreciable.

Eczema is fairly widely met with generally throughout the tribe apparently owing its origin in most cases to conditions like sweating, and to irritating messes applied to the skin.

Vitiligo is found affecting chiefly the extremities, especially the lower. In very few cases did the leucoderma extend on to the body. Many of the cases are I think due to late yaws.

Among " other diseases " are included a certain number of mycotic dermatitis. It is hoped that microscopic work in the field during the remainder of the survey will permit of a more definite classification of these. Some cases of nodular dermatitis (the so called craw-craw) are also included.

Wounds and other injuries. Type of wounds usually met with are spear-wounds, contusions, burns and abrasions. The last named occurring on the skin are rather important as a starting place of ulcers which by neglect are apt latterly to become a very incapacitating disability. In this column are included ten cases of congenital deformity consisting of three cases of double hare lip, two being brothers, three cases of deformity of the spine, one case of congenital deafness and the remainder affections of the limbs.

Tumours. Eleven cases only of tumour were found :— Their analysis is as follows :—

Benign	— Adenomata of thyroid	5	
	Cystic tumours of female breast	2	
	Tumour of uterus	1	
			8
Malignant	—Carcinoma of female breast	1	
	Carcinoma of male breast	1	
	(?) Secondary nodules on liver	1	3
		TOTAL	11

The low incidence of malignant tumour is remarkable, but would appear to be a general finding amongst all primitive races.

Gynaecology. Two cases only of endometritis presented themselves for treatment. Diseases of women would appear to be very rare in the tribe.

Tropical diseases :—

Dysentery. Of the seven cases found only one was amoebic, contracted at Malakal and six were bacillary. The bacillary cases were all sporadic in origin and subacute or chronic in character. Clinically they were apparently Flexner infections.

Malaria. From the observations recorded this would appear to be the most prevalent endemic disease affecting the tribe. The splenic index is as follows :—

Males	0.51%
Females	1.11%
Children	30.66%

Actual figures are included as these show intimately splenic enlargement is related to topographical conditions.

For example Tonga and Fanyikang divisions are affected by the proximity of the Khor Lolle, Dettim by Khor Harami, and so on.

The index for children though comparatively high is lower than one would expect considering that practically every child apparently passes through one or more attacks of malaria. The youngest child with an enlarged spleen was 13 months old.

Though malaria does occur earlier than this, it would appear to be rare in the first twelve months owing, I presume, to the constant care of mother. (Incidentally Shilluk women are very good mothers). From that age the numbers rapidly increased to reach an acme from the 5th to the 6th year after which they showed a fairly even decrease until by the 16th year the index practically approximated that of adult life.

The low index for adults is probably attributable to a certain degree of immunity conferred by previous attacks in childhood. Debilitating conditions whether physiological or pathological would appear to weaken this immunity, hence the higher incidence of the disease in women. Further practically all adults actually suffering from the disease were in a more debilitated condition than one would expect to originate from the actual attack itself.

These observations are borne out to a certain extent by the actual cases of clinical malaria seen which were :—

Adult males	16
,, females	27
Children	74

These figures are low, but it must be remembered that the trek occurred in the non-malarial time of the year.

Few microscopical examinations of the bloods were made and work in this direction proved rather disappointing. Of 200 slides examined only 10 per cent. were positive. Slides taken from actual cases of clinical malaria in adults were less productive of result than those from children with enlarged spleens only.

This may be attributable to the theory of acquired immunity diminishing the free circulation of the parasites in the blood stream.

In children with enlarged spleens the age most productive of parasites in the blood was 5-6 years, presumably just before any acquired immunity became manifest. It will be noted that this is also the age at which enlarged spleens were most prevalent.

From the examinations made it appears that malignant tertian is the most prevalent parasite except on the Zeraf where quartan parasites only were found.

The latter all occurred in children with enlarged spleens whose ages ranged from one year to ten years. No quartan was found in any other part of the area covered.

Unfortunately time did not permit during this part of the Survey of any investigation of the classification or infectivity of the prevailing mosquitoes. It is hoped that it will be possible to investigate those on the continuation of the survey.

Guinea worm. One case only was met with. The parasite though very prevalent further south, does not seem to have obtained hold in the the Shilluk country.

Gastro-enteritis of children. Fifteen cases of this infective condition were treated. These all occurred sporadically in infants. The disease though rare has a sinister reputation as a cause of infantile mortality. It is remarkable that with the prevailing filth and flies everywhere this disease is not more widely met with.

Leprosy. This disease would appear to have been endemic in the tribe probably for generations.

The following cases were met with: —

Early. Four children aged 4 to 12 years, the progeny of a man at 35 suffering from the disease in its active stage. These had thickened nerve trunks and enlarged glands only.

Active. Four cases all suffering from nodular or mixed leprosy. One child at 5, of one year's duration, and three men, average age 40, and average duration 3 years.

Burnt out cases. Fourteen men and eight women average duration said to be 5 years, but probably much longer. Their ages averaged 50 to 60 years or more.

It would appear from these figures especially from the relative number and ages of the burnt-out cases that the disease is really on the decrease, and this I believe to be the case owing to the increased health and better feeding throughout the tribe generally.

Circulatory system. Four cardiac cases only were treated. Two cases of mitral stenosis and the other two of cardiac failure due apparently to myocardial degeneration.

Respiratory system. The 686 cases encountered included 679 bronchitis and 7 pneumonia.

Bronchitis is very common throughout the tribe especially among children during the cold season, pneumonia occurs only sporadically throughout the tribe.

Alimentary system. The 1388 cases treated were practically all minor complaints speedily cured with a sufficiency of Epsom salts.

Nervous system. Complaints of the nervous system are not common, but are very interesting from an etiological point of view. An analysis of the cases is as follows :—

Spastic paraplegia of lower limbs	8
" Pseudo " paralysis agitans	2
Epilepsy	5
Flaccid paralysis of lower limbs	1
Myelitis	1
Hemiplegia	1
	18

The cases of spastic paraplegia all occurred in adult males and appeared to be due to a sclerosing condition of the pyramidal tracts, attributable I think to tertiary syphilis or more probably yaws.

The affection I have called "pseudo" paralysis agitans resembled the disease met with in England, but the tremor affected the whole body, was of a gross character and could not be localised. Further the muscles of deglutition seemed to be affected so that in both cases saliva continually dribbled from the mouth. In both cases considerable amelioration of the condition followed treatment with Novarsenobillon.

The other C. N. S. affections were all equally interesting, but examination of cerebro-spinal fluids and other laboratory tests will be necessary before the etiology of these conditions can be ascertained.

Vaccination. The numbers of children brought up for vaccinations show how appreciation of medical methods is extending in the tribe, especially considering that much of the area was vaccinated in the preceding year.

Summary. The general health of the Shilluk people has reached a high standard, owing to lack of recent epidemics and inter-family fighting.

The birth rate is definitely on the increase.

The death rate is high amongst children due probably to malignant tertian malaria.

Tuberculosis is a new disease, probably increasing.

Gonorrhoea is prevalent near merakiz, but not likely to spread widely.

Syphilis and yaws. The clinical differentiation between those two diseases is undetermined and a matter for future investigation.

Ulcers are very prevalent and their etiology also requires further investigation.

The relation of general bone pains to syphilis, yaws, malaria and rheumatism is not manifest.

Eye diseases form a considerable proportion of the minor ailments which could be satisfactorily dealt with by chiefs' dressers, with elimination of the more distressing sequelae.

Malaria. There is no doubt that this negroid tribe suffers severely from this disease and that malaria causes a high mortality amongst children. It is also apparent that a degree of immunity is acquired by the time adult life is reached. Malignant tertian seems to be the most prevalent parasite. Quartan occurs to a less extent and is confined to the Zeraf area.

Leprosy exists, but is apparently on the decrease.

The etiology of diseases of the C.N.S. is a matter of considerable interest.

Conclusions. A system of closer medical attention would considerably improve the general health of the tribe as the bulk of the diseases encountered would readily yield to medical treatment.

The institution of a system of chiefs' dressers is the most economical way of initiating this.

A properly equipped dispensary should be established at Tonga. It is a very unhealthy division, and acts as a buffer between the Nuer and Dinka and the rest of the tribe. It appears that yaws at least has spread northward from these tribes and with freer intercommunication which is bound to increase, other diseases also might spread in a similar manner.

The control of existing diseases with the probable exception of malaria should not present many great difficulties.

Tuberculosis is best dealt with by instructing the patients and their associates in simple prophylactic measures.

Judging by the results obtained in the treatment of yaws in other parts of the province, this disease will probably decrease when closer medical attention is available.

The venereal disease is contracted mostly at the merakiz and the establishment of female venereal disease clinics there should check the spread of this disease. This is at present being done.

Malaria still remains the bete noir of the tribe and is likely to continue so until accurate investigation is carried out to ascertain the mosquito carriers and their breeding habits.

Prophylaxis could then be carried out by attacking the breeding grounds in close proximity to the larger villages.

Proposed lines of procedure during the continuation of the survey. Many of the points raised require elucidation by laboratory methods. It is proposed to continue the survey equipped with a field laboratory. The following investigations could then be carried out :—

(i) Serological tests to determine the existence or otherwise of congenital syphilis or congenital yaws in the tribe.

(ii) Similar tests to determine the etiology of bone pains, ulcers and C.N.S. lesions.

(iii) To identify the causative organism of eye inflammations.

(iv) Further investigations in malariology (a) parasites, (b) mosquitoes, (c) acquired immunity and (d) splenic index.

(Signed) **L. H. Henderson,**
Medical Inspector.

REPORT

on the

HEALTH AND SANITATION

of

KHARTOUM PROVINCE 1928.

GENERAL.

The general health of the population has been good except for an increased incidence of primary malaria in Khartoum and the Rural District during the first four months of the year and a steady increased incidence of diphtheria in Omdurman throughout the year. The probable causes of the increase of these diseases will be examined in detail under their respective headings later in this report.

The most marked improvement in the health conditions was the almost complete absence of sand fly fever among the British troops, who in 1926 had 112 cases, in 1927, 310 cases and in 1928 only 2 cases ; this was almost certainly due to the cessation of building operations in the barracks.

The total rainfall was only 120.8 m/ms. which was considerably below the average and in consequence gave no trouble either from flooding in the towns or mosquito breeding outside the towns.

The average relative humidity was consistently higher during the first half of the year which may have accounted in part for the increased mosquito incidence and for the second half of the year it was generally lower than in the previous year owing to the small rainfall.

CONSERVANCY SYSTEM AND REFUSE COLLECTION.

These have worked smoothly throughout the year in Khartoum and Khartoum North, but strikes for higher wages among the cleaners in Omdurman have been experienced. It is hoped to rectify the grievances during the coming year.

FOOD SUPPLIES.

The new abattoir was taken into use towards the end of the year and is proving very satisfactory; it has, however, been found to be too small and funds have been applied for to double its size, it would then suffice for a number of years.

The food markets in Khartoum continue as before and with constant supervision can be kept reasonably fly free and clean ; proposals are now under consideration for an improved type of tables for the butchers, a special type of cage for the live stock market and certain improvements to the vegetable stands.

Other improvements to be asked for are directed towards reducing the dust nuisance in the neighbourhood of the markets, they are (1) a metalled road running from east to west through the centre and (2) an irrigation scheme for grass and trees on the open squares north and south of the markets.

The fresh food markets in Omdurman are still very fly ridden and an attempt has been made during the year to reduce this nuisance by repeated daily spraying with a mixture of paraffin and disinfectant ; some improvement is noticeable but the surroundings of these markets still require a great deal of cleaning up.

An additional meat and fish market for Khartoum North was approved during the year and is now under construction.

These matters are dealt with in greater detail later in this report.

LEGISLATION.

Regulations were published under the Public Health Ordinance 1924 preventing passenger vessels and barges making fast to the south bank of the Blue Nile between the British barracks and moghren quays.

Regulations under the Public Order Ordinance have been published preventing the landing of firewood between the same points.

The object of these regulations was to minimise the risk of adult mosquitoes being imported into the town via the river, and also to prevent the nuisance of collections of natives in front of houses occupied by Europeans.

STAFF.

The attached table shows the distribution of staff in the Sanitary Service for this province.

DISTRIBUTION OF STAFF.

Locality	British Sanitary Inspectors	Native Overseers	Mosquito Men	Conservancy	Refuse	Workshops	Clerical	Other Staff
Headquarters and Khartoum ..	3	5	24	157	77	45	6	22*
Khartoum North ..	1	2	7	39	29	6	1	3
Omdurman.. ..	1	2	7	21	57	1	1	7
Rural District ..	1	–	6	1	1	–	–	2
Total ..	6	9	44	218	164	52	8	34

* Includes light railway squad.

EXPENDITURE.

The total expenditure on sanitary services for the year was £E.25,915.

POPULATION.

The population of the province is estimated at 241,033 made up as follows : —

	Men	Women	Children	Total
Khartoum..	11,989	11,518	17,253	40,760
Khartoum North..	5,834	6,880	7,351	20,065
Omdurman..	29,330	39,801	33,514	102,645
Rural District	23,060	29,487	25,016	77,563
Total	70,213	87,686	83,134	241,033

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

	Khartoum	Khartoum North	Omdurman	Rural District	Total
Indians.					
Men	22		33		55
Women	16		15		31
Children	24		29		53
Egyptians and Syrians					
Men	687	285	122		1,094
Women	617	157	101		875
Children	1,133	271	297		1,701
Europeans and Americans ..					
Men	1,297	30	27	5	1,359
Women	684	15	19	3	721
Children	1,249	10	2	2	1,263
Other non-Natives ..					
Men	140		362		502
Women	48		150		198
Children	94		250		344
Total	6,011	768	1,407	10	8,196

These figures which are obtained from the District Commissioners of their respective districts show very considerable alterations compared to the figures given for the preceding two years. I am given to understand, however, that special care has been taken to obtain more accurate figures and that those now given represent more truly the state of the population. There would appear to be an increase of 40,109 in the native population and a decrease of 3,261 in the non-native population.

In consequence of the marked difference in the estimated population, the crude birth and death rates bear no comparison with those of previous years and are of no value as such. The data obtained from the birth and death registration are however consistent with those of previous years and may be taken as a fairly accurate representation of the steady increase of the population.

BIRTHS AND DEATHS.

3,646 births and 2,646 deaths were registered during the year, showing an excess of births over deaths of 1,000.

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	40,760	551	13.3	437	10.7
Khartoum North ..	20,065	499	24.8	299	14.9
Omdurman ..	102,645	1,490	14.4	1,040	10.1
Rural District ..	77,563	1,106	14.2	870	11.2
Total ..	241,033	3,646	15.1	2,646	10.9

133 still births were also registered in the four localities.

The infantile mortality for the four localities was 75.7 per 1,000 births and in each locality was as follows :—

	per 1,000 births.
Khartoum	68.9
Khartoum North	74.1
Omdurman	87.9
Rural District	69.7

The infantile mortality for the natives of the Sudan in the four localities was 79.8 per 1,000 births in contrast to 86.1 in 1927.

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	18	23	19	32	55	56	44	48	136	159	7	2
February	19	20	16	20	49	55	41	48	125	143	8	2
March	22	19	15	24	55	63	43	33	135	139	5	4
April	24	18	16	14	60	75	41	47	141	154	2	9
May	18	31	21	17	57	66	14	6	110	120	6	1
June	19	23	15	26	59	50	63	53	156	152	9	5
July...	25	23	23	30	74	57	62	67	184	177	9	6
August	23	24	19	22	76	75	23	27	141	148	6	3
September	28	23	31	16	69	57	65	56	193	152	2	4
October	25	25	18	20	46	74	79	36	168	155	8	2
November	35	16	22	22	78	58	48	63	183	159	12	8
December	22	28	19	22	73	53	47	52	161	155	9	4
Total	278	273	234	265	751	739	570	536	1833	1813	83	50
	551		499		1,490		1,106		3,646		133	

	Births		Total	Still Births	
	M.	F.		M.	F.
Khartoum	278	273	551	19	9
Khartoum North	234	265	499	8	5
Omdurman	751	739	1,490	27	20
Rural District	570	536	1,106	29	16
Total ...	1,833	1,813	3,646	83	50

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	3	4	—	—	—	—	—	—	3	4	1	—
Greek	6	5	—	—	1	—	—	—	7	5	—	—
Other Europeans	3	6	—	—	2	2	—	—	5	8	—	—
Egyptians & Syrians	60	52	26	17	27	25	—	—	113	94	8	1
Natives of the Sudan	204	203	208	248	718	710	570	536	1,700	1,697	74	49
All Others... ...	2	3	—	—	3	2	—	—	5	5	—	—
Total ...	278	273	234	265	751	739	570	536	1,833	1,813	83	50
	551		499		1,490		1,106		3,646		133	

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	13	20	11	18	45	44	29	40	98	122
February	16	16	7	12	27	43	45	38	95	109
March	15	11	10	12	25	53	49	40	99	116
April	17	13	12	7	46	50	37	46	112	116
May	20	20	10	9	31	44	28	22	89	95
June	20	13	20	12	37	62	46	56	123	143
July	14	26	12	19	33	47	28	40	87	132
August	20	16	10	11	38	59	10	23	78	109
September	21	21	18	20	49	59	47	40	135	140
October	28	13	7	14	31	52	31	37	97	116
November	25	16	11	14	35	50	32	41	103	121
December	27	16	10	13	26	54	36	29	99	112
Total ...	236	201	138	161	423	617	418	452	1,215	1,431
	437		299		1,040		870		2,646	

DEATHS RECORDED BY NATIONALITIES, AGE PERIODS AND SEXES.

Khartoum, Khartoum North and Omdurman.

NATIONALITY.	Under 1 Year	1 to 5	5 to 10	10 to 20	20 to 40	40 to 60	over 60	Total M.	Total F.
British	1	—	—	—	5	—	—	6	—
Greek	2	1	—	—	1	4	5	12	1
Other Europeans	—	—	—	—	2	—	—	1	1
Egyptians and Syrians	12	7	—	2	6	4	12	22	21
Natives of the Sudan	271	459	125	124	353	329	912	1,168	1,405
All others	—	—	—	—	5	2	2	6	3
Total	286	467	125	126	372	339	931	1,215	1,431
								2,646	

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

Month	Khartoum				Khartoum North		Omdurman		Rural District	Total
	British	Greek	Egyptians and Syrians	Natives of the Sudan	Egyptians and Syrians	Natives of the Sudan	Egyptians and Syrians	Natives of the Sudan	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	5 2	— —	4 6	— —	6 13	6 14	57
February ...	— —	— —	— —	1 5	— —	1 6	— —	8 11	6 19	57
March	— —	— —	— —	1 2	— —	1 9	— —	11 11	1 10	46
April	1 —	— —	2 —	3 4	— —	1 5	1 —	15 11	18 12	73
May	— —	— —	— 1	3 8	— —	2 4	— —	10 17	3 3	51
June	— —	2 —	1 —	1 3	2 —	4 4	1 —	20 20	4 18	80
July	— —	— —	— —	1 3	1 —	5 6	— 1	9 21	4 9	60
August	— —	— 1	— —	2 3	— —	4 5	— —	11 23	1 9	59
September ...	— —	— —	2 —	4 5	— —	4 12	— 1	14 26	10 20	98
October	— —	— —	— —	2 5	— —	1 5	— —	9 14	6 15	57
November ...	— —	— —	— 1	5 2	1 —	4 4	— —	10 20	10 9	66
December ...	— —	— —	1 1	1 4	— —	2 3	— 1	9 13	8 6	49
Total ...	1 —	2 : 1	6 : 4	29 : 46	4 —	33 : 69	2 : 3	132 : 200	77 : 144	753

	Under one year	From one to five years	Total
Khartoum ...	... 38	51	89
Khartoum North	... 37	69	106
Omdurman ...	... 134	203	337
Rural District ...	... 77	144	221
Total...	286	467	753

COMMUNICABLE DISEASES.

The following tables show the total number of cases of communicable diseases notified by hospitals and medical practitioners in the three towns during the year ; the figures for the Rural District are unreliable as they only represent cases notified by the dispensaries at Geili and Gebel Aulia. The more important of these communicable diseases are dealt with separately under their respective headings.

TABLE I.

SHOWING NUMBER OF CASES OF 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	4	2	—	6	—	3	—	9
Diphtheria	19	19	104	142	—	3	—	145
Small Pox	—	—	—	—	—	1	—	1
Ankylostoma ...	10	—	1	11	9	1	—	21
Bilharzia	22	5	16	43	2	8	—	53
Dysentery, Amoebic...	56	23	137	216	3	23	1	243
Dysentery, Bacillary	36	24	8	68	—	10	5	83
Typhoid Fever ...	12	13	39	64	—	9	—	73
Kala Azar	1	—	1	2	—	6	—	8
Leprosy	3	—	5	8	—	6	—	14
Malaria	155	112	30	297	1,734	62	1391	3,484
Measles	5	41	3	49	—	2	—	51
Phlebotomus Fever ...	1	1	—	2	—	—	—	2
Puerperal Fever ...	2	—	4	6	—	—	—	6
Pulm. Tuberculosis ...	10	8	21	39	3	24	—	66

COMMUNICABLE DISEASES.

TABLE II.

Showing cases Notified by Month and Place.

Key:— K: Khartoum, K.N.: Khartoum North, O.: Omdurman, R.D.: Rural District, I.: Imported, R.: Relapsed.

Diseases	Place	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Grand Total
Chicken Pox	K.	—	—	1	—	—	1	—	—	1	—	—	1	4	
	K.N.	—	—	—	1	—	—	—	—	—	—	1	—	2	
	I.	—	—	1	—	—	—	—	—	1	1	—	—	3	9
Diphtheria	K.	—	5	3	—	—	—	—	—	—	3	4	4	19	
	K.N.	1	2	—	1	—	—	—	—	3	3	8	1	19	
	O.	10	6	6	12	4	1	7	6	23	16	9	4	104	
	I.	1	1	—	—	—	—	—	—	1	—	—	—	3	145
Ankylostoma	K.	3	—	—	1	—	—	4	- -	—	1	1	—	10	
	O.	—	—	1	—	—	—	—	—	—	—	—	—	1	
	R.D.	2	1	—	3	—	—	—	1	—	1	1	—	9	
	I.	—	—	—	—	—	—	—	—	1	—	—	—	1	21
Bilharzia...	K.	1	1	1	2	4	1	1	—	4	5	1	1	22	
	K.N.	—	—	1	—	1	2	1	—	—	—	—	—	5	
	O.	1	1	—	1	2	6	1	1	—	1	1	1	16	
	R.D.	—	—	—	—	1	—	—	—	—	—	—	1	2	
	I.	2	—	—	1	—	—	—	—	—	1	4	—	8	53

(Contd.)

COMMUNICABLE DISEASES.

TABLE II.—(*Continued*).

Disease	Place	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Grand Total
Amoebic Dysentery	K.	3	3	5	6	5	7	5	4	4	6	6	2	56	
	K.N.	2	1	1	1	1	5	4	1	1	1	3	2	23	
	O.	7	9	8	11	9	20	14	13	12	9	12	13	137	
	R.D.	1	—	—	—	—	—	—	—	—	—	—	2	3	
	I.	—	2	2	1	5	—	1	4	1	3	1	3	23	
	R.	—	—	—	—	—	—	—	—	—	—	—	1	1	243
Bacillary Dysentery	K.	4	5	3	—	4	—	—	6	2	1	5	6	36	
	K.N.	5	1	2	2	6	4	—	2	—	1	—	1	24	
	O.	1	2	2	—	—	—	—	2	—	—	—	1	8	
	I.	—	—	—	—	—	—	—	2	1	1	4	2	10	
	R.	2	1	—	1	—	—	—	—	—	—	—	1	5	83
Typhoid Fever..	K.	—	2	3	1	1	—	2	1	—	1	—	1	12	
	K.N.	2	—	1	1	—	—	—	3	1	2	3	—	13	
	O.	4	3	—	2	2	3	2	8	5	5	4	1	39	
	I.	2	—	—	—	1	—	2	3	—	—	—	1	9	73
Kala Azar	K.	—	—	—	—	—	—	—	—	—	1	—	—	1	
	O.	—	—	—	1	—	—	—	—	—	—	—	—	1	
	I.	—	—	—	—	—	—	—	—	1	—	4	1	6	8
Leprosy	K.	—	—	—	1	—	1	—	—	—	—	1	—	3	
	O.	—	1	—	—	1	—	—	—	1	2	—	—	5	
	I.	1	—	—	1	—	—	—	1	—	1	2	—	6	14

COMMUNICABLE DISEASES.

TABLE II.—(*Continued*).

Disease.	Place	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Grand Total
Malaria	K.	40	47	22	16	9	2	4	1	6	6	2	—	155	
	K.N.	22	59	23	3	1	1	—	—	2	—	—	—	111	
	O.	8	11	6	2	—	—	—	—	2	1	1	—	31	
	R.D.	126	454	277	134	72	85	69	53	55	141	134	144	1734	
	I.	12	6	4	8	1	2	2	2	14	4	2	5	62	
	R.	193	327	319	60	61	42	48	59	102	70	60	50	1391	3484
Measles	K.	—	—	—	—	—	1	3	—	—	1	—	—	5	
	K.N.	—	—	—	—	—	—	1	2	—	2	35	2	42	
	O.	—	—	—	—	—	1	1	—	—	—	—	—	2	
	I.	—	—	—	—	1	—	—	1	—	—	—	—	2	51
Phlebotomus Fever	K.	1	—	—	—	—	—	—	—	—	—	—	—	1	
	K.N.	1	—	—	—	—	—	—	—	—	—	—	—	1	2
Puerperal Fever	K.	1	—	—	1	—	—	—	—	—	—	—	—	2	
	O.	—	2	—	—	—	—	—	—	—	2	—	—	4	6
Pulmonary Tuberculosis	K.	1	—	—	2	1	2	—	2	1	—	—	1	10	
	K.N.	—	—	—	3	—	—	2	—	1	1	—	1	8	
	O.	—	2	—	1	4	5	5	1	2	1	—	—	21	
	R.D.	—	—	—	2	—	—	—	—	—	—	—	1	3	
	I.	—	—	1	4	3	5	2	—	2	3	1	3	24	66

Malaria.

In the report for 1927 attention was drawn to the fact that anopheline infections had been very markedly in excess of culex infections during the months of October and November and that an increased malaria incidence was likely to follow during the winter months. Fresh infections of malaria in Khartoum began to be reported in December and these were followed during the months of January, February and March by a small epidemic in the three towns. In the Rural District, which is much less under our control, it is probable that about 70 per cent. of the population suffered from new infections or relapses during these months. As will be seen from the tables, the total number of new infections notified in the three towns during the year was—Khartoum 155, Khartoum North 111, Omdurman 31, total 297. These were the highest figures recorded during the past five years, but were in no way comparable to the figures for the two years of 1922 and 1923 when the figures recorded reached 1,071 and 1,576 respectively.

Observations recently published on the epidemiology of malaria in certain parts of India shew that epidemics tend to occur at five yearly intervals and are dependent amongst other things on an optimum temperature and relative humidity following on an increased rainfall and a lowered resistance of the population.

It is interesting to note that all these points were clearly demonstrated in Khartoum Province during the months of August 1927 and April 1928 ; *i.e.* it was five years since the previous epidemic of 1923, the rainfall was the highest recorded since 1923, the temperatures and relative humidity were higher for these months than the previous year and approximated more to those recorded in 1922 and 1923 and the resistance of the population other than Europeans had been lowered by four years of very poor rains and corresponding high price of staple foods. The previous epidemic to that of 1923 occurred in 1918 and provides further evidence of the five yearly interval for epidemics of malaria in Khartoum Province.

There is also evidence which shows that there is a tendency for two consecutive years to have a higher malarial incidence, thus in the years 1917 and 1922 there were malarial epidemics which reached their peaks in the following years. If there is anything in this observation is would appear to predict an increased incidence of malaria during the year 1929 ; up to the time of writing (end of February, 1929) this has not been the case although the anopheline infections found in river pools have been far higher than in 1928, but the intensive campaign against mosquitoes has not permitted any large breed out of adults. It remains to be seen whether conditions will be favourable during the coming rainy season and if so whether they can be adequately dealt with.

Adult mosquitoes were not markedly in evidence during the winter months, which means that they were not locally bred out, but rather that a few heavily infected mosquitoes were brought into the towns from outside, more particularly along the river front of Khartoum as evidenced by the distribution of the cases.

During the rainy months of August and September numbers of mosquitoes were brought into the town by the railway trains arriving from the south, particularly from Makwar. No less than six different species were obtained in and around the railway station and in various parts of the town. A routine inspection and disinfection of trains was begun in September and a visit was paid to Wad Medani and Makwar in order to arrange for a closer inspection of railway carriages at these points. It must be recorded that the measures taken by the authorities at Makwar had an almost immediate effect on the importation of mosquitoes into Khartoum and by the beginning of October it was rare to find any mosquito on trains from Makwar.

The types imported in this manner, which were previously foreign to Khartoum, were as follows :—

Anopheles pharoensis.
Anopheles squamosus.
Anopheles mauritianus (paludis).
Mucidus scataphagoides.
Culex quasigolidus (tenax var. maculipes).

The type common in Khartoum is Anopheles gambia (costalis).

ANTI-MOSQUITO WORK.

The total cost of this work within the Province was £E. 2084.501 m/ms. *i.e.* labour £E. 1615.681 m/ms., larvicide £E. 468.820 m/ms. The total number of infections found was 7,348 of which 5,757 were found in Khartoum district, 477 in Khartoum North, and 1,114 in Omdurman.

Of the total infections found 211 were in the pupal stage and 689 were eggs. The pupal infections show a decrease of 178 compared with 1927.

As previously intimated we are now concentrating on a much extended area and more frequent inspections are being carried out. This has been made possible by the Headquarters and the Rural District staff working in conjunction with each other. Even then it is a case of working against time on many occasions owing to the insufficiency of trained men, and leave has been entirely suspended meantime.

In Omdurman 21 public wells and 9 borrow pits were filled in during the year, 1,888 cubic metres of material being used for this purpose. A smaller sum than in former years was made available for this work and for this reason the total number of wells and pits filled in was less than in former years. It is to be hoped that adequate provision will annually be made for this necessary work.

Following the systematic filling in of wells, applications for the town water supply were received. In each instance the premises to be connected up were inspected and suitable sites selected for the placing of taps.

Tables will be found at the end of this report giving details of the mosquito infections found during the year.

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	300
Females	59

Nationalities :—

British	194
Other Europeans	10
Egyptians and Syrians	1[illegible]
Natives of the Sudan	139
All others	3

Age Periods :—

0 - 1	1 - 5	5 - 10	10 - 20	20 - 40	40 - 60	Over 60	Undefined
5	30	20	62	199	12	1	30

Type of Parasites :—

	Civil	Troops
Malignant Tertian	205	83
Benign Tertian	75	42
Quartan	45	26
B. T. and M. T.	2	2
Undefined	32	14

Cases amongst British troops :—

Khartoum	74
Khartoum North	82
Imported	11

No primary cases of malaria occurred amongst Sudan Defence Force troops or in Central Prison.

Deaths. 5 deaths occurred amongst the abovementioned cases and 8 more deaths were presumed as caused from malaria.

DIPHTHERIA.

The epidemic of diphtheria which began in Khartoum in August, 1927 had been controlled in that town by the end of the year and except for a few cases in February and March no further cases were reported until October, 1928.

The total number of cases in Khartoum was only 19 compared to 61 in 1927 and 16 in 1926.

In Khartoum North only 4 cases had been notified until September, but during the three months following the rains 15 cases occurred.

In Omdurman, the epidemic in 1927 began a month later than in Khartoum, but unlike the latter, it did not die down by the end of the year. Although there was some evidence of diminished intensity during the summer months of May, June, July and August, a marked exacerbation took place in September and October, dying down towards the end of the year.

In spite of all our efforts it has not been possible to trace any source of infection in the majority of cases. The greatest difficulty has been experienced in rounding up contacts as the people do not appreciate the contagion and resent having their throats swabbed and having prophylactic injections.

During August and September it became increasingly difficult to deal with all the cases in the civil hospital compounds, so it was decided to rent a house adjacent to the hospital for cases which were convalescent or were carriers of the disease. A circular in Arabic pointing out the seriousness and symptoms of the disease was widely circulated and the district commissioner impressed upon all omdas and sheikhs the necessity of early notification.

Of the 104 cases notified during the year, 45 of these or 44 per cent. of the total were discovered as the result of swabbing the throats of contacts, few of these showed any febrile disturbance or were at all ill; in one instance a case was under treatment in hospital for chronic otitis media and it was only after an acute case of diphtheria occurred in the ward that the ear discharge was examined and found to contain virulent diphtheria bacilli; it was not uncommon to find positive carriers among children who were supposedly suffering from a common cold, these harboured the disease in the nasal discharge.

In one instance, a child was treated for 5 days in its house for whooping cough and was eventually brought to hospital in a moribund condition due to diphtheria.

Deaths. 32 deaths occurred from this disease or 22 per cent. of the total notifications.

Case mortality :—

Khartoum ..	.. 15.7 per cent.	3 deaths.
Khartoum North	.. 15.7 per cent.	3 deaths.
Omdurman ..	.. 25.0 per cent.	26 deaths.

Sexes :—		**Deaths :—**	
Males	86	Males	19
Females	59	Females	13

Nationalities :—

British	3
Other Europeans	4
Egyptians and Syrians	14
Natives of the Sudan	124

Age Periods :—

0 - 1	1 - 5	5 - 10	10 - 20	20 - 30	30 - 40	Over 40	Undefined
12	55	29	20	10	3	3	13

Cases among Sudan Defence Force troops	1
,, ,, British troops	2

No cases occurred in Central Prison.

PULMONARY TUBERCULOSIS.

Although the total notifications of this disease remain the same as in the previous year, there was a very appreciable decrease in the number of presumed locally contracted cases, viz. a 50 per cent. decrease in Khartoum and 30 per cent. in Omdurman. Cases contracted outside the province boundaries, but coming to one or other of the hospitals for treatment show an increase of approximately 75 per cent.

During the last 17 years notifications of locally contracted pulmonary tuberculosis have shewn a steady increase from 9 in 1912 to a maximum of 52 in 1926. These figures may at first suggest that this insidious disease is gaining ground among the people of this province.

Since the population have been exposed to this disease by contact with the outside world for probably more than 40 years, one would have expected a higher incidence among such susceptible people; an explanation of the apparent increase is however to be found in the increased population together with greater facilities for hospital and general medical treatment. With the steady economic development of the country, the individual is enabled to feed and clothe himself and his family better and in many instances to improve his housing conditions.

The following table shows the result of investigation at the end of the year of all notified coses. The case mortality of all cases was 50 per cent. and of locally contracted cases was 61.9 per cent.

	Khartoum	Khartoum North	Omdurman	Rural District	Total
Died	12	6	11	3	32
Left District	10	—	6	—	16
Still in Hospital	3	—	1	—	4
Still in District	1	3	7		11
Untraced	—		3	—	3

Sexes :—

Males	51
Females	15

Nationalities :—

British	1
Other Europeans	1
Egyptians and Syrians	2
Natives of the Sudan	60
All others	2

Age Periods :—

10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Over 60	Undefined
7	24	15	13	2	3	2

One case of pulmonary tuberculosis occurred amongst the British troops, three cases with one death among Sudan Defence Force troops and two cases with one death in the Central Prison.

Of the 24 cases which were contracted outside the province, 22 were contracted in the following localities.

Syria	1
Egypt	1
Dongola Province	5
Kassala Province	1
Berber Province	3
Blue Nile Province	5
White Nile Province	3
Fung Province	1
Kordofan Province	2

TYPHOID FEVER.

Notifications of this disease continue to show a slight increase, 6 more cases were notified than during the preceding 12 months ; this increase is due to the fact that no less than 7 positive contacts or carriers were discovered during the course of our investigations into cases.

Special attention has been paid during the year to the examination of the stools and urine of all contacts, since it has not been possible to incriminate milk or water supplies. In one instance the Government Bacteriologist isolated a typhoid like organism from well water in Khartoum North, the bacillus was typical in certain re-actions, three cases of typhoid fever occurred amongst persons using this well water. The well has since been closed.

Although notifications were made throughout the year, there appears to be a special seasonal preference for the months of August, September and October.

Sexes :—

Males	48
Females	25

Nationalities :—

British	2
Other Europeans	2
Egyptians and Syrians	9
Natives of the Sudan	59
Abyssinian	1

Age Periods :—

0 - 1	1 - 5	5 - 10	10 - 20	20 - 30	30 -40	Undefined
2	20	15	17	15	3	1

Types of Typhoid :—

Para Typhoid A	2
Para Typhoid B	1
Para A and Para B	2
Typhosus	68

Carriers :—

Khartoum	2
Khartoum North	1
Omdurman	4

Deaths :—

Males	10
Female	3

6 cases occurred among the Sudan Defence Force troops and no cases occurred among the British troops or in the Central Prison.

DYSENTERIES.

It is to be regretted that no reduction in the incidence of these diseases can be recorded this year, but at the same time it should be noted that the figures for the last three years show no marked increase and are specially consistent with regard to the bacillary type, to which the European population are more prone.

	1926	1927	1928
Bacillary	88	84	83
Amoebic	279	221	243

Only 4 cases of amoebic dysentery occurred among the British population.

Of the total cases of both varieties notified, 23 deaths were presumed to have been due to dysentery or a case mortality of 7%.

With regard to bacillary dysentery among Europeans, a circular is being printed and issued giving advice on the protection of foodstuffs in kitchens, pantries and ice-chests and recommending a yearly examination of all servants. Also a trial is being made with disinfectant in each conservancy bucket, and greater attention is being paid to inspection of servants latrines which are thought to be a source of danger. Constant inspection of the stables, kitchens and outbuildings of all European houses, by a British sanitary inspector and immediate remedying of all nuisances in and around these houses, offer the best of hope of reducing the incidence of dysentery in Khartoum.

The following tables show the incidence of each variety by nationalities, sexes, age periods and the types of organism isolated in cases of bacillary dysentery.

Amoebic Dysentery.

Sexes :—

Males	157
Females	42
Undefined	44

Nationalities :—

British	4
Egyptians and Syrians	4
Natives of the Sudan	191
Undefined	44

One case of amoebic dysentery occurred among the British troops, 11 among Sudan Defence Force troops and one in Central Prison.

Age Periods :—

Under 1	1 - 10	10-20	20-30	30-40	40-50	50-60	Over 60	Undefined
2	23	34	79	32	12	10	6	45

Bacillary Dysentery.

Sexes :—

Males	67
Females	16

Nationalities.

British	33
Other Europeans	2
Egyptians and Syrians	6
Natives of the Sudan	42

Age periods :—

1 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	Undefined.
7	9	35	17	5	3	7

Types of organism :—

Hiss and Russell	4
Flexner	44
Shiga	23
Undefined	12

British troops cases :—

Khartoum	7
Khartoum North	2
Imported	2
Total	11

Types of organism :—

H'ss and Russel	2
Flexner	6
Shiga	1
Undefined	2

Sudan Defence Force troops cases :—

Khartoum	2
Khartoum North	4
Omdurman	2
Imported	1
Total	9

Types of organism :—

Flexner	7
Shiga	2

Central Prison Cases :— 7 (Flexner 5, Shiga 2).

FLY PREVENTION.

The number of permits issued in the three towns for zibla making was 4,211. I am convinced that as long as this practice is allowed to continue there will never be a real diminution in the number of flies. I suggest, in Khartoum, where the land is now classed as first and second and on which only buildings of stone or brick-work are allowed that the use of zibla be prohibited on all new work and that all existing buildings be made to conform to such a regulation within a given time.

The disposal of waste water is becoming a greater problem each year. In the centre of the town where the number of restaurants and coffee-houses is gradually increasing and where there are no proper means of waste water disposal other than throwing it out on the street, it is very liable to give off objectionable smells. This also applies to many private dwellings where there is insufficient ground area to dispose of waste water properly. Considerable nuisance is also caused by the discharge of waste water on to ground which is shaded from the sun. The ground at these places is invariably water logged and a source of danger from a mosquito and fly breeding point of view.

SMALL POX AND VACCINATION.

During February and March small pox was prevalent in the Blue Nile Province and appeared to be spreading northwards towards Khartoum, cases being reported at Bagair and Eilafun on the province boundaries. The cases in these two places were controlled from Khartoum owing to the greater distance to Wad Medani and active measures were taken to vaccinate all villages along both banks of the Blue Nile.

With the additional facilities for transport both by motor car and train the danger of a spread of small pox to Khartoum and Omdurman is greatly increased and control is more difficult to ensure. Every facility was offered by the railway staff in Khartoum, enabling us to examine travellers from the Blue Nile and to vaccinate large numbers.

In November a case of small pox occurred in a fireman of the railways, he had contracted the disease probably at Atbara; immediate measures of isolation and vaccination prevented any further cases locally. The case though confluent made a good recovery.

Below is a table showing the number of vaccinations done in the province during the year.

	Successful	Failed	Unknown	Total
Khartoum Civil Hospital ..	2,741	92	7	2,840
British Military Hospital ..	1,006	774	84	1,864
S.D.F. Hospital	642	379	50	1,071
Khartoum North Dispensary ..	1,562	57	95	1,714
Omdurman Civil Hospital ..	2,565	55	51	2,671
Geili Dispensary	150	—	—	150
Gebel Aulia Dispensary ..	136	68	58	262
Rural District	—	—	2,162	2,162
Railway staff, Khartoum ..	—	—	812	812
TOTAL	8,802	1,425	3,319	13,546

OTHER COMMUNICABLE DISEASES.

Rabies.

Two cases of hydrophobia were notified during the year, both having been bitten in Kordofan Province. One case was a male aged 60 years who had been bitten by his own dog 45 days previously and died two days after admission to hospital The second case was a child aged 4 years which had had symptoms for 14 days on arrival. This case also died.

The usual measures of dog destruction in and around the three towns was undertaken by the Veterinary Department resulting in the destruction of 1,019 ownerless or unregistered animals.

Dengue Fever.

The severe epidemic of this disease which took place in Greece during the autumn later spread to Egypt. A very careful watch was kept for the appearance of the disease in the Sudan, but only one case imported from Cairo was notified from this (Khartoum) province.

Puerperal Fever.

Only 6 cases of this disease were notified compared to 14 in the previous year. This great improvement is almost entirely the result of the training of native midwives at the school of midwifery in Omdurman.

CONSERVANCY.

During the year 134 buckets were installed in new latrines in Khartoum. The average number of daily clearances in the three towns is as follows :—

Khartoum	3,559
Khartoum North	1,176
Omdurman	390

Proposals are being put forward to increase the number of buckets in Omdurman by a further 400 to bring a complete area under conservancy and abolish all pit latrines in this area.

With regard to pit latrines in Omdurman it is proposed to increase the depth permitted from four to six metres and to insist as far as possible on pits being rendered dark by a roof and surrounding walls.

Sewage Entrenching Ground.

Additional land to the extent of approximately 70 feddans has been acquired to extend our existing area. This should meet all requirements for a number of years and enable a proper rotation to be carried out.

Scavenging and Refuse Disposal.

Khartoum generally is kept in a fairly clean condition but I should like to see a higher standard of cleanliness, especially in the minor streets and lanes and this can only be attained by the employment of additional sweepers.

In Omdurman additional sweepers and public refuse bins are needed and have been applied for.

The two motor refuse vans in Khartoum and one in Omdurman are doing good work and have certainly passed the experimental stage with credit and I recommend that this part of the service be augmented.

Although the four-wheeled all iron type of refuse cart is giving satisfaction a certain amount of delay is caused by tyre punctures and bursts and it is now obvious that the inflated tyre cannot stand up to the load. I therefore recommend that solid tyres be fitted to all existing carts and any new carts made in future.

Stable manure is still being collected from privately owned stables in Khartoum as usual. This work is most necessary from a fly breeding point of view.

The amount of garden refuse is steadily increasing and is a real source of worry to this Service. Many accumulations of this class of refuse are to be found in most of the gardens and are in a good number of instances the dumping place for stable manure and household refuse. On examination of these dumps flies have been found breeding on many occasions. Until transport is provided for the removal of this refuse the nuisance is likely to continue.

MINERAL WATER FACTORIES.

Owing to a working arrangement made by four owners of mineral water factories in Khartoum three factories were closed down and the business which had previously been run separately is now carried on at one place. One new factory was opened during the year making a total of three compared with five in 1927. There are two such factories in Omdurman and none in Khartoum North.

All have been periodically inspected as usual and on the whole have been conducted satisfactorily.

BAKERIES.

There are 31 European bakeries in the three towns i.e. Khartoum 22, Khartoum North 4 and Omdurman 5. The native bakery figures are 15, 6 and 48 respectively. All have been inspected from time to time and are more or less in a satisfactory condition.

RESTAURANTS, NATIVE EATING HOUSES AND COFFEE SHOPS.

There are 95 restaurants, native eating houses and coffee shops licensed in Khartoum *i.e.* restaurants (European) 14, coffee shops (European) 13, native eating houses 19, native coffee shops 49. Special attention has been given to these premises which have been regularly inspected with a view to maintaining a higher standard and the results have been favourable from a sani ary point of view.

MARKETS.

The offal market in Khartoum was extended towards the end of the year and a considerable improvement has been effected as this market was very congested before the alterations were carried out.

The vegetable market has been cleared of all unnecessary equipment, and the platforms, which were previously heaped with all sorts of lumber are now much more satisfactory from a sanitary point of view.

Special attention has been drawn to the unsatisfactory state of the poultry market. Fowls are housed in old and defective wooden boxes which are almost impossible to keep clean. I suggest that modern metal cages of approved pattern be installed.

All the markets were frequently inspected and fines to the amount of £E. 15.900 m.ms. were inflicted on stallholders for contravention of the regulations.

The primitively constructed markets still exist in the Deims. They have been periodically inspected with a view to trying to keep them as sanitary as possible under present conditions.

The four meat markets in Omdurman have been maintained in a more satisfactory condition and prosecutions undertaken against butchers were consequently fewer than in 1927.

UNSOUND FOOD.

5,631 ½lbs. and 93 pints of unsound food were destroyed in the three towns during the year i.e.

Khartoum	5,379 ½lbs. and 93 pints
Khartoum North	90 ,,
Omdurman	162 ,,
	5,631 ½lbs.

MILK SUPPLY.

There are 353 registered milk vendors in the three towns i.e.

Khartoum	191
Khartoum North	52
Omdurman	110
Total	353

These figures show an increase of 16 in Khartoum and Omdurman compared with 1927, while the Khartoum North figure shows a decrease of 6.

The following milk samples were taken during the year.

Khartoum	145
Khartoum North	42
Omdurman	70
Total	257

Of the samples taken in Khartoum 51 or 33.10 p.c. were below standard, and the average presumed extent of adulteration was 7.67 p.c. added water. The Khartoum North figures are 15 or 35.71 p.c. and 5.51 p.c. respectively, while those of Omdurman are 13 or 18.5 p.c. and 9.3 p.c.

The percentage of adulterated samples in all three towns shows an increase compared with 1927. The figures are.

	1927	1928	Increase
Khartoum	31. 0%	33.10%	2.10%
Khartoum North ..	13. 3%	35.71%	22.41%
Omdurman ..	16.66%	18. 5%	1.84%

It will be noted that the percentage of adulteration in Khartoum remains high and shews a slight increase on 1927 while the Khartoum North figures have increased considerably.

Proceedings were instituted in 71 cases of adulteration as follows.

Khartoum	48
Khartoum North	13
Omdurman	10
Total	71

The remaining eight being slightly below standard, warnings were given. The Khartoum fines for adulteration amounted to £E. 30.750 m.ms., the maximum fine inflicted being £E. 1 and the minimum P.T. 40 while the average was 639 m.ms.

Fourteen vendors were fined for selling milk without licences and fines amounting to £E. 3.200 m.ms. were inflicted.

NUISANCES.

The nuisances dealt with in Khartoum and Khartoum North are given in detail in the appended tabular statements. Apart from these many verbal notices were issued. In Omdurman 616 written notices were issued and 1,311 verbal.

PROSECUTIONS.

658 prosecutions were undertaken in the three towns during the year, and fines amounting to £E. 218.800 m.ms. were inflicted. Details of these prosecutions are given in the accompanying tabular forms.

OFFENSIVE TRADES.

In my last report, I intimated that a new site had been selected for the carrying on of offensive trades. No buildings have been erected on the site which has not yet been brought into use.

INSANITARY PREMISES.

55 insanitary premises were closed against human habitation in Khartoum during the year. Many such properties still remain to be dealt with and it is hoped to give them attention during the ensuing year.

Good progress has been made in Omdurman in dealing with insanitary undeveloped properties. Much still remains to be done in this connection, and unless properly developed, these sites rapidly develop into a most insanitary condition and require constant attention.

RAT CATCHING.

1,382 rats were trapped and destroyed during the year.

WORKSHOPS.

Blacksmiths Workshops.

The following is a note of the amount of new work or existing stock extensively renewed.

Conservancy lorries	11
Refuse trollies	2
Axles for lorries	13
Axles for 4 wheeled carts	20
Public refuse bins (conical)	17
Public refuse bins (square)	1
Tanks for washing buckets	11

The total number of general repairs executed was 5,800 while the general repairs to buckets were 16,200. 213 new hub bushes were cast for wheels of conservancy lorries and refuse carts and 10 new hubs were made.

In addition to the above, the following new stock was made for the provinces.

6 four wheeled all metal refuse carts
2 two wheeled all metal refuse carts
1 two wheeled water tank cart

Carpenters Workshops.

Eight new box carts were made in the carpenters workshops during the year, and 850 general repairs were carried out.

Saddlers Workshops.

16 sets of camel harness, and 11 sets of mule harness were made while 4,250 general repairs were carried out.

The supervision of these workshops is entirely in the hands of Mr. Boyle, Chief Sanitary Inspector, who also undertakes repairs to the Municipal Engineer's vehicles. This work, which extends every year, is of very great value to the Province but is not strictly speaking part of the duties of a sanitary inspector. A proposal has been put forward to appoint an engineer for this work and thus release the Chief Sanitary Inspector for the important duties of food sampling and inspections in connection with dangerous drugs under the Public Health Ordinance.

RURAL DISTRICT.

The farms in this district were inspected frequently throughout the year by the Rural District sanitary inspector and were reported to be in a generally satisfactory condition. Only one farm gave constant trouble owing to seepage from a canal which crossed a khor; at the close of the present season, arrangements will be made to put this canal in proper order.

Pools formed by the falling river as usual gave rise to considerable trouble, very heavy larval infections were found and dealt with. Four additional mosquito men were added to the staff making six in all; these men under the British sanitary inspector are able to cover a distance of approximately 10 miles of river banks along the Main and Blue Niles in eight days. This period should and is being reduced to five days with further additions to the mosquito brigade.

The tour of a Syrian medical officer round all the villages along the river north of Khartoum during January and February was extremely successful, nearly 3,000 cases of malaria were treated and 1,000 cases of other diseases.

The splenic index of 16 villages varied from 65 p.c. to 100 p.c. in one case, a state of affairs which clearly calls for stringent anti-mosquito action and intensive treatment of the carriers.

The dispensary at Geili continues to do most useful work, 6,467 persons received treatment during the year.

(Sgd.) **J. C. N. HARRIS,**
M.D., CANTAB, D.P.H.
Medical Officer of Health,
Khartoum Province,
Asst. Dir., Sudan Medical Service.

METEOROLOGICAL OBSERVATIONS AT GORDON COLLEGE STATION FOR THE YEAR 1928.

Month	Temperature Degrees in Farenheit				Average Relative Humidity % at 8.30 a.m.	Rain in m/m.
	Highest Maximum	Average Maximum	Lowest Minimum	Average Minimum		
January	99.0	92.7	52.7	64.7	37	Nil
February	103.1	90.5	64.2	62.8	24	,,
March	111.6	101.0	54.0	70.2	19	16.0
April	112.0	102.3	64.4	76.7	19	Drops
May	113.0	108.2	73.2	74.2	36	5.1
June	111.4	107.5	74.2	80.5	31	1.8
July	109.8	104.4	73.4	80.1	45	42.0
August	105.0	98.8	72.5	76.3	61	52.6
September	110.5	105.0	78.1	80.3	46	3.3
October	109.4	103.1	72.9	77.2	25	Drops
November	101.5	94.3	60.8	67.3	25	Nil
December	100.2	90.7	52.5	63.3	37	,,
					Total ...	120.8

I am indebted to Mr. R. Cottam, the Meteorological Observer, for the above table, which he kindly supplied.

STATEMENT OF BUILDING PETITIONS APPROVED UNDER THE TOWN BUILDING REGULATIONS, 1925. DURING THE YEAR 1928.

	KHARTOUM CITY.				KHARTOUM N. TOWN			OMDURMAN TOWN		
	1st Class Land	2nd Class Land	3rd Class Land	Total	2nd Class Land	3rd Class Land	Total	2nd Class Land	3rd Class Land	Total
No. of petitions for new buildings ..	11	109	1	121	12	4	16	14	23	37
No. of building permits for minor alterations	7	88	—	95	2	—	2	—	—	—
Total ..	18	197	1	216	14	4	18	14	23	37

STATEMENT OF ESTIMATED COST OF BUILDINGS APPROVED UNDER THE TOWN BUILDING REGULATIONS, 1925, DURING THE YEAR, 1928.

Estimated cost of new buildings £E.	1607	30683	10	32300	2499	130	2629	2431	4400	6831
,, ,, ,, work under minor permits ,,	427	485	—	912	4	—	4	—	—	—
Total £E.	2034	31168	10	33212	2503	130	2633	2431	4400	6831

STATEMENT OF NUMBER OF NOTICES ISSUED DURING THE YEAR, 1928.

Notices issued for dilapidated buildings	6	23	—	29	—	—	—	—	—	—
Notices issued for contraventions ..	3	8	15	26	—	—	—	—	—	—
Notices issued for removal of obstructions ..	7	5	—	12	—	—	—	—	—	—
Total ..	16	36	15	67						

MOSQUITO STATEMENT FOR YEAR ENDING 31st DECEMBER, 1928.

MONTH 1928.	Infections found inside municipal boundary.															Wells		Last year's percentage.	Infections found outside municipal boundary.											
	No. of wells infected			No. of zeers pits and other small receptacles infected			No. of steamers and boats infected.			No. of pools infected			Total infections.			No. of permanent collections.	Percentage of permanent collections infected.		Burri.			Blue Nile above Burri.			Omdurman and Main Nile.			Total Infections		
	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.				C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.
January	2	—	—	31	—	13	3	—	—	42	—	133	78	—	146	239	0.83	1.25	—	—	—	42	—	665	89	—	43	46	—	694
February	3	—	—	23	—	2	6	—	2	67	—	167	99	—	171	239	1.25	0.83	—	—	—	21	—	280	75	—	10	21	—	280
March	2	—	—	50	—	14	1	—	—	16	—	27	69	—	41	240	0.83	0.41	—	—	—	18	—	121	79	2	7	35	—	126
April	3	—	—	88	—	31	2	—	—	122	—	71	215	—	102	239	1.25	0.41	—	—	—	38	—	192	58	—	9	40	—	198
May	2	—	1	50	—	21	1	—	—	52	—	26	105	—	48	239	0.83	1.25	--	—	—	107	—	98	137	—	24	169	—	116
June	—	—	—	49	—	2	4	—	—	28	—	--	81	—	2	237	—	—	—	—	—	20	—	1	98	—	—	37	—	1
July	4	—	—	114	—	12	10	—	1	44	—	4	172	—	17	237	1.6	4.62	—	—	—	9	—	1	62	—	—	18	—	1
August ...	5	—	—	97	—	17	4	—	—	77	—	35	183	—	52	237	2.1	2.13	—	—	—	10	—	9	93	—	61	10	—	9
September ...	6	—	2	155	—	143	2	—	—	62	—	103	225	—	248	237	2.5	3.40	1	—	—	6	—	7	98	—	22	7	—	7
October ...	4	—	2	57	—	18	1	—	—	29	—	59	91	—	79	237	1.6	5.12	—	—	—	4	—	—	95	—	12	4	—	—
November ...	1	—	—	8	—	1	9	—	—	4	—	6	22	—	7	237	0.42	1.28	—	—	3	22	—	168	120	—	22	22	—	171
December	1	—	—	16	—	—	13	—	1	11	—	49	41	—	50	237	0.42	1.28	—	—	5	2	—	7·	77	—	39	32	—	114
TOTAL	33	—	5	738	—	274	56	—	4	554	—	680	1381	—	963	—	—	—	1	—	8	319	—	1612	1081	2	249	441	—	1717

C. = Culex. S = Stegomyia. A. = Anopheline.

KHARTOUM NORTH.

MOSQUITO STATEMENT FOR YEAR ENDING 31st DECEMBER, 1928.

MONTH.	Infections found inside municipal boundary.															No. of permanent collections.	Percentage of permanent collections infected.	Last year's percentage.	Infections found outside municipal boundary,								
	No. of wells infected.			No. of pits, zeers, or other receptacles.			No. of steamers and boats infected.			No. of pools infected.			Total infections.						No. of river pools infected.			Farms in Shambat district.			Kfouri's Farm.		
	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.	C.	S.	A.				C.	S.	A.	C.	S.	A.	C.	S.	A.
January	7	—	—	4	—	—	—	—	—	—	—	1	11	—	1	485	1.44	1.24	—	—	20	31	—	12	34	—	15
February	7	—	—	4	—	7	—	—	—	—	—	1	11	—	8	486	1.44	2.90	—	—	48	17	—	—	36	—	1
March	16	—	—	5	—	3	3	—	1	—	—	—	24	—	4	489	3.27	1.87	1	—	21	19	—	1	25	—	2
April	5	—	—	9	—	4	3	—	—	1	—	—	18	—	4	490	1.02	1.87	8	—	36	20	—	5	52	—	3
May	8	—	—	18	—	—	—	—	—	4	—	—	30	—	—	500	1.6	0.42	—	—	17	20	—	4	18	—	1
June	3	—	—	2	—	—	—	—	—	1	—	—	6	—	—	502	0.57	1.08	—	—	12	11	—	2	9	—	—
July	6	—	4	6	—	1	—	—	—	3	—	1	15	—	6	502	1.19	1.08	—	—	—	19	—	1	12	—	2
August	2	—	—	1	—	3	—	—	—	2	—	4	5	—	7	502	0.37	1.45	—	—	—	3	—	1	8	—	12
September	3	—	2	3	—	2	—	—	—	5	—	5	11	—	9	503	0.59	1.45	—	—	—	10	—	19	6	—	17
October	4	—	—	2	—	1	—	—	—	9	—	1	15	—	2	503	0.79	1.45	—	—	—	18	—	2	6	—	9
November	3	—	—	1	—	1	—	—	—	—	—	—	4	—	1	503	0.59	1.03	—	—	35	22	—	3	14	—	9
December	6	—	—	5	—	—	—	—	—	1	—	—	12	—	—	503	1.19	1.63	2	—	2	16	—	2	12	—	—
TOTALS.	70	—	6	60	—	22	6	—	1	26	—	13	162	—	42	—	—	—	11	—	191	206	—	52	232	—	71

QUARANTINE STATIONS — MOSQUITO STATEMENT FOR YEAR ENDING 31st DECEMBER, 1928.

MONTH 1928	White Nile Quarantine Station.													MONTH 1928	Blue Nile Quarantine Station.												
	No. of vessels inspected.			No. of mosquito infections found.					No. of vessels and holds fumigated.			Undeveloped mosquito infections.				No. of vessels inspected.			No. of mosquito infections found.					No. of vessels and holds fumigated			Undeveloped mosquito infections.		
				Adult.		Undeveloped.													Adult.		Undeveloped.								
	Steamers.	Barges.	Native boats.	Few.	Many.	C.	S.	A.	Steamers.	Barges.	Total No. of holds.	Steamers.	Barges.	Native boats.		Steamers.	Barges.	Native boats.	Few.	Many.	C.	S.	A.	Steamers.	Barges.	Total No. of holds.	Steamers.	Barges.	Native boats.
January	16	45	42	—	—	8	—	—	—	—	—	—	1	7	January	—	—	188	—	—	10	—	—	—	—	—	—	—	10
February	14	34	80	—	—	6	—	—	—	—	—	—	—	6	February	1	1	147	—	—	1	—	—	—	—	—	—	—	1
March	24	55	80	1	—	3	—	—	1	—	4	1	—	2	March	—	—	189	—	—	4	—	—	—	—	—	—	—	4
April	22	49	71	—	—	8	—	—	—	—	—	—	—	8	April	—	—	304	—	—	5	—	1	—	—	—	—	—	5
May	25	64	78	—	—	14	—	6	—	—	—	—	—	14	May	—	—	297	—	—	5	—	—	—	—	—	—	—	5
June	12	29	47	—	—	13	—	—	—	—	—	—	—	13	June	—	—	196	—	—	4	—	—	—	—	—	—	—	4
July	2	—	176	—	—	10	—	—	—	—	—	—	—	10	July	17	51	32	—	—	9	—	2	—	—	—	1	1	8
August	27	81	32	—	—	4	—	—	—	—	—	—	2	2	August	3	4	178	—	—	7	—	—	—	—	—	—	—	7
September	21	64	23	—	1	2	—	1	1	—	4	—	—	3	September	2	3	163	—	—	6	—	2	—	—	—	—	—	8
October....	18	68	40	—	—	6	—	1	—	—	—	—	—	7	October	3	9	175	—	—	13	—	2	—	—	—	—	—	13
November	17	49	103	—	—	13	—	—	—	—	—	—	—	13	November	6	14	201	—	—	1	—	—	—	—	—	—	—	1
December	19	53	114	—	—	14	—	—	—	—	—	—	—	14	December	1	2	198	—	—	—	—	—	—	—	—	—	—	—
TOTALS.	217	591	886	1	1	101	—	8	2	—	8	1	3	99	TOTALS.	33	84	2268	—	—	65	—	7	—	—	—	1	1	66

C. = Culex. S. = Stegomyia. A. = Anopheline.

KHARTOUM.

NUISANCES DEALT WITH DURING YEAR ENDING 31st DECEMBER, 1928.

MONTH 1928.	Defective latrines.		Latrines not on external walls		Dirty latrines.		Insufficient latrine accommodation.		Insanitary premises.		Defective wells.		Unnecessary wells.		Objectionable waste water disposal.		Accumulation of water.		General.		TOTAL.		GRAND TOTAL.
	B	N.	B.	N.	B.	N.	B.	N.	B.	N.	B.	N.	B.	N.	B.	N.	B.	N.	B.	N.	B.	N.	
January	1	20	—	—	2	8	—	—	5	83	—	—	—	—	2	3	5	—	10	282	25	396	421
February	13	20	—	2	10	28	—	—	15	76	1	—	—	1	13	2	1	—	61	382	124	511	635
March	1	33	—	5	—	9	—	—	6	33	—	2	—	—	5	2	—	—	17	100	29	184	213
April	1	81	—	2	—	5	—	1	26	5	—	8	—	—	1	—	4	—	14	25	46	127	173
May	5	64	—	4	4	18	3	3	10	38	—	—	—	—	3	14	2	—	33	73	57	214	271
June	5	24	—	2	3	18	1	—	3	55	—	—	—	2	2	4	—	5	31	110	45	220	265
July	1	18	—	7	1	14	—	—	3	41	—	—	—	1	2	7	—	—	9	82	16	170	186
August	5	9	—	2	4	6	—	1	1	21	—	—	—	—	4	7	—	4	2	73	16	123	139
September	4	16	—	—	4	18	—	—	3	40	—	—	—	—	2	11	—	—	4	42	17	127	144
October	2	43	—	—	2	8	2	—	4	31	—	—	—	—	4	15	—	2	11	92	25	191	216
November	3	44	—	1	—	20	—	1	4	43	—	—	—	—	3	13	1	—	16	87	27	209	236
December	3	30	—	1	—	20	—	2	9	30	—	—	—	—	3	21	—	—	16	78	33	182	215
TOTALS.	44	402	—	26	30	172	6	8	89	496	1	10	—	4	44	99	13	11	224	1,426	460	2,654	3,114

B = British staff.

N = Native staff.

KHARTOUM NORTH.

NUISANCES DEALT WITH DURING YEAR ENDING 31st DECEMBER, 1928.

MONTH.	Defective latrines		Latrines not on external wall		Dirty latrines		Insufficient latrine accommodation		Insanitary premises		Defective wells		Unnecessary wells		Objectionable waste water disposal		Accumulation of water-		General		TOTAL		Grand Total
	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	B. S.	N. S.	
January	—	11	—	—	4	—	—	—	7	4	—	3	—	—	3	—	4	—	8	23	26	41	67
February	1	12	—	—	2	—	—	—	10	4	—	2	—	—	2	—	5	—	9	5	29	23	52
March	—	3	—	—	5	—	—	—	9	2	2	17	—	—	1	—	6	—	15	8	38	30	68
April	2	16	—	—	9	—	2	—	20	74	1	10	—	—	4	—	2	—	23	3	63	103	166
May	—	4	—	—	6	—	—	—	11	2	—	2	—	—	—	—	—	—	14	—	31	8	39
June	4	16	—	—	5	—	1	—	17	4	1	2	—	—	2	—	4	2	28	6	62	30	92
July	2	6	—	—	4	—	—	—	14	13	3	3	—	—	—	—	8	—	26	13	57	35	92
August....	1	7	—	—	8	—	3	—	15	7	1	1	1	—	1	—	9	—	21	1	60	16	76
September	5	3	—	—	10	—	2	—	24	4	3	2	—	—	3	—	3	—	31	18	81	27	108
October	6	13	—	—	8	2	1	—	23	3	2	1	—	—	—	3	3	—	29	16	73	38	111
November	3	6	—	—	4	1	—	—	28	3	3	2	1	—	3	1	2	—	22	17	66	30	96
December	2	22	—	—	3	—	—	—	29	9	2	13	—	—	2	1	4	—	24	7	66	52	118
TOTALS	26	119	—	—	68	3	9	—	207	129	18	58	2	—	21	5	50	2	250	117	652	433	1,085

KHARTOUM and KHARTOUM NORTH.

LIST OF PROSECUTIONS FOR YEAR ENDING 31st DECEMBER, 1928.

MONTH 1928.	Insanitary condition of premises		Unsound and adulterated food		Obstructing inspector		Offences by merchants in suk		Breeding mosquitoes		Defective and insanitary latrines		Causing nuisance on public street		Not calling at mosquito quarantine station		Stagnant water		Other offences		TOTAL Prosecutions		FINES			
																							Khartoum		Khartoum N.	
	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	K.	K. N.	£E.	m/ms.	£E.	m/ms.
January	8	—	—	—	—	—	2	1	2	1	3	—	—	—	2	—	—	—	5	1	22	3	5	800	—	350
February	1	2	9	—	—	—	—	—	1	—	1	—	—	1	—	—	—	—	15	7	27	10	6	850	1	250
March	—	—	8	—	1	—	—	—	—	4	1	—	—	—	—	—	—	—	3	1	13	5	6	400	—	550
April	24	—	3	4	—	—	34	—	5	3	4	—	2	—	—	—	—	—	29	3	101	10	41	850	2	650
May	6	—	15	3	1	—	—	—	7	4	13	—	—	—	—	—	—	—	22	2	64	9	27	100	2	800
June	2	—	8	—	—	—	1	—	7	2	4	—	1	—	4	—	1	—	10	8	38	10	12	200	1	800
July	1	—	6	3	—	—	—	—	2	—	—	1	—	—	5	—	—	—	3	1	17	5	6	450	1	800
August	2	—	2	2	—	—	—	—	3	—	—	—	—	1	—	—	—	—	29	2	36	5	8	900	2	000
September	1	2	—	—	1	—	1	4	2	4	—	—	—	—	—	—	—	—	5	2	10	12	3	500	14	450
October	3	1	2	1	—	—	—	—	3	1	1	—	—	—	—	—	—	—	7	2	16	5	3	950	2	100
November	18	1	—	—	—	—	—	13	3	1	7	—	—	—	—	—	—	—	12	2	40	17	9	500	4	850
December	5	1	2	—	2	—	10	2	—	7	5	—	1	1	—	—	—	—	13	6	38	17	11	900	2	550
TOTALS	71	7	55	13	5	—	48	20	35	27	39	1	4	3	11	—	1	—	153	37	422	108	144	400	37	150

K.— KHARTOUM.
K.N.—KHARTOUM NORTH.

LIST OF PROSECUTIONS UNDERTAKEN BY THE SANITARY SERVICE, OMDURMAN, DURING 1928.

MONTH	Protection of food supplies Sec. 17 & 18, The Schedule, P.H.O.–1924	Mosquito infection	Unsound and adulterated food	Digging pits	Depositing refuse in street or on public land	Dirty workshops or other premises	Unlicensed food distributors	Contravention of zibla control regulations	Other offences	TOTAL	FINES
											£E .m/ms.
January	6	1	—	1	—	—	—	—	—	8	3.800
February	2	1	—	—	—	—	1	1	—	5	2.050
March	6	—	—	2	—	—	—	—	—	8	3.100
April	8	—	1	1	—	1	1	1	1	14	5.600
May	3	—	1	—	—	1	—	1	1	7	1.350
June	6	—	—	—	1	—	—	7	3	17	4.900
July	—	3	3	—	3	2	1	1	6	19	4.200
August	2	1	—	—	1	—	—	—	1	5	1.350
September	1	3	—	—	2	—	—	—	—	6	1.100
October	—	3	1	—	1	1	—	—	—	6	1.100
November	10	1	—	—	1	1	—	—	7	20	5.350
December	6	—	4	—	1	—	—	2	—	13	3.350
Totals	50	13	10	4	10	6	3	13	19	128	37.250

VITAL STATISTICS.

The returns of births and deaths can be considered to be approximately correct in the northern provinces, *i.e.* Khartoum, Berber, Dongola Province and in the Wadi-Halfa Merkaz (in the remainder of Halfa Province the people are thinly scattered over a rocky barren strip of country bordering the river which is largely broken up by cataracts, and for this reason accurate returns are difficult to obtain and verify).

In these northern provinces a fairly close administration has been carried out for over 20 years, the people from father to son are stationary on the land which they cultivate by water-wheel irrigation. The returns are collected by maazuns whose primary duty it is to register marriages. There is a Maazun in these provinces for every 3 or 4 villages and he has, therefore, no difficulty in obtaining the returns.

The accuracy of the returns for the Blue Nile Province has been very much improved, but they cannot yet be considered to be correct. There the villages are thickly scattered over a wide area and the maazuns are too few to be able to obtain accurate returns. The duty has therefore been handed over to the omdas and sheikhs and the returns, although not yet complete or correct, are steadily improving.

The births and deaths, and still-births for 1927 and 1928 in these provinces are given below. The higher death-rate and lower-birth rate in the Blue Nile Province are attributed to the high malaria rate in the early part of 1928 following heavy autumn rains and a warm winter. The birth-rate is expected to show a compensatory increase in 1929 as the women who miscarried owing to malaria in 1928 will have children in 1929 instead of waiting the accustomed two years and nine months, the period occupied in lactation and pregnancy.

NON-EUROPEAN VITAL STATISTICS.

Province.	1925	Per 1000	1926	Per 1000	1927	Per 1000	1928	Per 1000
Khartoum :—								
Births	3393	14.07	3709	15.2	3542	14.7	3646	15.1
Deaths	1962	8.1	2115	8.7	1567	10.6	2646	10.9
Still births ..	153	0.6	115	.47	114	.47	133	.5
Berber :—								
Births	3456	22.8	4178	27.6	4271	28.2	4343	28.7
Deaths	2107	13.9	2952	19.5	2509	16.6	3453	22.8
Still births ..	71	.46	52	.34	71	.46	102	.74

Province.	1925	Per 1000	1926	Per 1000	1927	Per 1000	1928	Per 1000
Dongola :—								
Births	4926	32.0	5476	33.5	5539	33.9	5678	34.8
Deaths	2025	12.4	2385	14.6	2323	14.2	2628	16.1
Still births ..	171	1.04	235	1.44	228	1.39	262	1.66
Wadi Halfa Merkaz :—								
Births	652	144.8	688	152.8	776	172.4	688	152.8
Deaths	412	91.5	521	115.7	519	115.2	448	99.5
Still births ..	—	—	8	1.7	—	—	4	.88
Blue Nile :—								
Births	6779	20.8	10331	31.7	13952	42.9	12449	38.2
Deaths	3338	10.2	6026	18.5	8562	26.3	9599	29.5
Still births ..	392	1.2	151	.46	182	.59	169	.55

X Alteration in method of collection took place in 1926 and the returns became more complete, but the full effect of this change was not secured until 1927.

HEALTH & MEDICAL INSPECTION OF SCHOOLS.

There are four different types of schools which are subject to medical inspection.

The Village Koran Schools, the Elementary Vernacular Schools, the Primary Schools and the Gordon College which is a Secondary School.

INSTRUCTION IN HYGIENE.

Instruction in Hygiene is given at all schools. At the village schools this instruction is of a very simple character emphasising the simple rules of hygiene necessary in home and village life, and pointing out their importance in the avoidance of certain common diseases well known to village children, e.g. malaria and bilharziasis.

This instruction is progressively elaborated at the elementary and primary schools, and finally at the Gordon College in a series of lectures including :—

(a) instruction in the simple physiological processes of the human body and the principles that must be observed to ensure its healthy growth and development.

(b) the rules of hygiene and sanitation for the home, the village and the town necessary to ensure the health of the individual and the community, and their protection from infectious and insect and mollusc-borne diseases.

MEDICAL EXAMINATION AT PRIMARY SCHOOLS AND THE GORDON COLLEGE.

All pupils entering a primary school are medically examined on admission and during the 2nd, 3rd and 4th years. The results of the examination are entered on a card.

The following points are examined for and recorded at each medical examination :— height, weight, chest measurement, general physique, the condition of the eyesight, hearing, of the teeth and skin and of the various organs of the body. If the boy passes on to the Gordon College, the card is sent with him and he receives a second card recording the examinations made on entering the college and during the 2nd, 3rd and 4th years.

If the boy, on leaving the primary or secondary school, enters for Government service, the cards go with him and are included in his dossier.

MEDICAL EXAMINATION AT THE ELEMENTARY & VILLAGE SCHOOLS.

In the elementary and village schools records of medical examinations are confined to certain specific points, i.e. general physique, trachoma, bilharziasis, ankylostomiasis, tuberculosis and splenic index.

Medical examination of village schools have been carried out and recorded this year for the first time.

	Number Examined	% Trachoma	% Bilharzia	% Splenic Index	% Ankylostoma	% Tuberculosis Pulmonary
Khartoum Province —						
Gordon College ..	201	8.4	0.5	6.2	0.5	0.5
Gordon College Workshops ..	34	8.8	—	8.8	—	—
Khartoum Primary..	160	6.2	—	5.0	—	—
Omdurman Primary	213	29.0	0.65	—	—	—
Berber Province :—						
2 Primary	188	36.7	2.1	4.2	—	—
9 Elementary ..	857	48.4	3.7	5.7	0.24	—
12 Village	733	62.0	1.6	3.2	0.27	—
Blue Nile Province :—						
2 Primary	259	12.0	2.3	23.1	—	—
18 Elementary ..	925	28.3	0.1	13.6	—	—
Kordofan Province :—						
1 Primary	101	10.0	6.0	20.0	—	—
7 Elementary ..	—	9.1	13.8	18.2	—	.39
1 Village	56	43.0	—	25.0	—	—
Nuba Mountains Province :—						
4 Elementary ..	275	5.0	20.0	25.0	—	—
Kassala Province :—						
1 Elementary ..	121	8.25	0.825	10.0	—	—
Halfa Province :—						
1 Primary	218	83.0	21.0	2.3	0.9	—
2 Elementary ..	273	55.0	16.5	—	5.1	—
3 Village (Districts)	822	38.0	48.0	18.2	2.8	—
Dongola Province :—						
5 Elementary ..	554	35.8	7.4	7.7	—	—
44 Village	1315	41.7	15.7	8.3	0.15	—
White Nile Province :—						
1 Primary	61	26.2	31.1	—	—	—
6 Elementary ..	469	38.6	28.1	23.2	0.42	0.21
4 Village	255	46.6	41.5	21.5	—	—
Upper Nile Province :—						
2 Elementary ..	148	7.4	—	23.7	—	—
Red Sea Province :—						
2 Primary	86	12.7	3.5	3.5	—	—
5 Elementary ..	540	12.7	1.1	0.9	—	—

The following points call for comment :—

(i) The schools in Kassala, Red Sea and Upper Nile Provinces are not representative of the people of the provinces in which they are situated, but for the most part represent populations alien to the provinces which have settled in the towns in which the schools are situated. The figures given for these provinces afford no indication therefore as to conditions among the native population of the provinces. Similarly, the schools at Khartoum, Omdurman, Atbara, and Wad-Medani represent the mixed populations of large towns and do not correctly indicate conditions among rural populations of the provinces. With these exceptions the figures afford a fair indication of the conditions under the headings given of the children and boys and girls of the provinces concerned. (There are two girls' schools included in the figures).

(ii) The high trachoma rate in Halfa, Dongola, Berber and the White Nile Provinces is noticeable. The boys, although treated at the schools, return re-infected after their summer holidays. The disease is not likely to be eliminated from the schools until treatment can also be carried out among the whole juvenile population of all the villages. This is being attempted in Dongola Province.

(iii) The high bilharzial rate in Halfa, Dongola and the White Nile Provinces and the Nuba Mountains.

Systematic anti-bilharzial work is at present undertaken in Dongola and the White Nile Provinces, but not in Halfa Province or in the Nuba Mountains. The bilharzia incidence percentage was recorded for the elementary schools in Dongola in 1921 as 20 p.c. It would appear therefore from the present figures that a definite improvement has taken place during that period of years.

(iv) Tuberculosis. Five cases of tuberculosis are recorded (of which one at the Gordon College was glandular). The others were pulmonary. One occurred at the Gordon College, two of the others occurred in Kordofan and the third in the White Nile Province close to the Kordofan border.

QUARANTINE.

WADI-HALFA QUARANTINE.

With the exception of two small batches which arrived on April 12th. and June 21st. respectively, the station was not opened until September 27th. From that date it was in continual use until December 11th.

Up to October 15th. the less seriously infected bilharzia cases (up to a maximum of 12% of the whole) were treated, cured, and allowed to proceed to their destinations. This was in accordance with the procedure in previous years and was carried out to avoid an overwhelming number of rejections for this disease.

From October 15th. onwards it was found possible to arrange for a preliminary examination of all the labourers to be carried out at Luxor by a British doctor, and during this period no further cases were detained in the quarantine station for treatment. This very greatly lightened the work of the station. In spite of the preliminary examination at Luxor a considerable number of bilharzia cases succeeded, by substitution and by other means, in getting through to Wadi-Halfa. From October 15th. onward 341 persons (7.29%) were rejected for bilharzia. This compares with a percentage of 16.5 bilharzia cases (found on examination) for the period before a preliminary examination was in force. It is hoped that this percentage will be further reduced in the coming year.

The total number of Egyptian labourers passed through the station was 7,743 as against 8,763 in the previous year.

The staff employed at the station during the active periods was as follows:—

Two Syrian medical officers; one of these was also in charge of the district, the other was only employed on quarantine work.

Permanent:—

Two laboratory assistants.
One fitter.
One chief ghaffir.

Temporary:—

21 ghaffirs and workmen.
One cook.

A medical inspector was only able to be spared for the supervision of this work from 30th October to 28th November, 1928.

The following list shows the numbers, dates and destinations of the various batches of labourers passed through the quarantine :—

No. in Batch	Date.	Destination.
99	13. 4.28	Wad-Medani.
96	22. 6.28	,,
502	27. 9.28	,,
579	1.10.28	,,
100	6.10.28	Gedaref.
494	,,	Kassala (Dinder).
599	10.10.28	Messellemia.
602	14.10.28	Wad-Medani.
500	18.10.28	Barakat.
100	,,	Mesellemia.
353	22.10.28	,,
58	26.10.28	Semna (Halfa Province).
588	30.10.28	Mesellemia.
593	6.11.28	Gedaref.
599	12.11.28	,,
483	17.11.28	,,
139	,,	Aroma.
601	21.11.28	Wad-Medani.
360	4.12.28	Mesellemia.
224	,,	,,
74	8.12.28	Gedaref.
7,743		

It is found that with the staff available the maximum number that can be properly dealt with is 600. Each batch remains three days in the station and at least one clear day is needed between despatching one batch and receiving another.

The following table shows the number of rejections for various causes :—

Bilharzia	558
Favus	2
Myocarditis	2
Blindness	4
Old age	3
Various	3

It is seen that out of a total of 572 rejections, 558 were rejected for bilharzia.

Bilharzia. During the first period when no preliminary examination was made 17.0% of the total passing through the quarantine were infected with bilharzia. This compares with 22.2 per cent. in 1927 and 17.0% in 1926.

The following table shows the number and percentage of labourers showing certain symptoms and infestations :—

Total passed	Haematuria	Bilharzia ova	Oxyuris	Ankylostoma	Ascaris	Taenia	Enlarged spleen
7171	866	854	1309	1293	414	261	43
	12.0%	11.9%	18.22%	18.0%	5.8%	3.6%	.6%

PILGRIM QUARANTINE (SUAKIN).

The pilgrims began to leave Suakin for the Hedjaz in January, but the majority of the outgoing pilgrims left Suakin between April 7th and May 21st.

Departure.

The total numbers of pilgrims leaving Suakin for Jeddah was 3237 as against 1732 in 1927. These pilgrims were all vaccinated against small-pox and inoculated against cholera. They had all taken return tickets from Suakin to Jeddah. They had also paid a small deposit to meet their quarantine expenses on their return.

Return.

The first shipload of pilgrims arrived on June 10th and the return flow continued steadily during June, July and August. From September it continued at a diminished rate till the end of the year.

The total number of pilgrims who returned by Suakin up to the end of the year was 3124 as against 2727 in 1927. This total was composed as follows :—

(a) Natives of Sudan 948, of which 684 men; 254 women, 10 children.

(b) Takrooris (West African pilgrims) 1856 ; of these 960 were men, 724 women and 172 children. There were in addittion 320 persons who had not visited the Holy places, but who having travelled as passengers on pilgrim ships were subjected to routine pilgrim quarantine measures:

One of the quarantine enclosures was set aside for better class pilgrims. Here for the payment of 50 P.T. a man was given for the use of himself and his family a separate tent containing an angareeb and a zeer. This special accommodation was very much appreciated.

The health of the returning pilgrims was good. 34 pilgrims were admitted to hospital. Of these 8 died. 5 of these were elderly persons and 3 were infants. The diseases were dysentery, bronchitis, pneumonia and infantile diarrhoea. Three cases of small-pox occurred in the sections, two in the second shipload and one in the third shipload. They were isolated at once and no further cases occurred.

General Remarks.

The number of pilgrims who left for the pilgrimage via Massowah and return by Suakin was 97 ; this compares with 1113 in 1927.

Only 20 pilgrims returned by sambuk, as compared with 1,119 last year.

Pilgrim Ships. The vessels employed in carrying pilgrims were :—

Boat	Flag	Tonnage
Mansourah	British	834 tons
Keneh	,,	1,000 ,,
Taif	,,	748 ,,
Talodi	,,	742 ,,
Rashida	Arabian	36 ,,
Masoud	,,	15 ,,

The following statement shows the date of departure of the various pilgrim steamers :—

Steamer	Date of departure	Nationality	Men	Women	Infants	Total
Keneh	17.6.27.	Sudanese	—	—	—	—
		W. Africans	4	—	—	4
Mansourah	30.7.27.	Sudanese	—	—	—	—
		W. Africans	1	2	—	3
Mansourah	26.9.27.	Sudanese	—	—	—	—
		W. Africans	1	3	—	4
Keneh	6.10.27.	Sudanese	—	—	—	—
		W. Africans	1	1	—	2
Keneh	26.10.27.	Sudanese	—	—	—	—
		W. Africans	2	2	—	4
Mansourah	7.11.27.	Sudanese	—	—	—	—
		W. Africans	9	4	1	14
Keneh	19.11.27.	Sudanese	2	1	—	3
		W. Africans	3	5	1	9
Mansourah	27.11.27.	Sudanese	1	—	—	1
		W. Africans	2	2	2	6
Keneh	7.12.27.	Sudanese	1	—	—	1
		W. Africans	6	10	2	18
Mansourah	17.12.27.	Sudanese	1	—	—	1
		W. Africans	11	3	—	14
Keneh	27.12.27.	Sudanese	—	—	—	—
		W. Africans	20	11	1	32
Mansourah	7.1.28.	Sudanese	—	—	—	—
		W. Africans	20	16	4	40

Steamer	Date of departure	Nationality	Men	Women	Infants	Total
Mansourah	27. 1.28.	Sudanese	—	—	—	—
		W. Africans	1	3	3	7
Keneh	8. 2.28.	Sudanese	—	—	—	—
		W. Africans	29	23	12	64
Mansourah	17. 2.28.	Sudanese	1	—	—	1
		W. Africans	15	13	5	33
Keneh	27. 2.28.	Sudanese	—	—	—	—
		W. Africans	30	23	6	59
Mansourah	7. 3.28.	Sudanese	—	—	—	—
		W. Africans	25	20	5	50
Keneh	17. 3.28.	Sudanese	—	—	—	—
		W. Africans	35	12	3	50
Mansourah	27. 3.28.	Sudanese	—	—	—	—
		W. Africans	7	3	—	10
Keneh	7. 4.28.	Sudanese	7	1	—	8
		W. Africans	106	73	24	203
Mansourah	17. 4.28.	Sudanese	36	14	1	51
		W. Africans	111	90	17	218
Keneh	28. 4.28.	Sudanese	72	38	—	110
		W. Africans	244	249	43	536
Mansourah	4. 5.28.	Sudanese	84	39	9	132
		W. Africans	178	131	25	334
Mansourah	19. 5.28.	Sudanese	236	94	3	333
		W. Africans	176	108	23	307
Mansourah	21. 5.28.	Sudanese	262	27	2	291
		W. Africans	201	71	12	284
						3237

The following statement shows the dates of arrival of the various pilgrim steamers :—

Steamer.	Date of arrival	Nationality.	Men	Women	In-fants	Total
Mansourah ..	7.1.28.	Sudanese	1	—	—	1
		W. Africans	—	—	—	—
		Passengers	—	—	—	—
Keneh	18.1.28.	Sudanese	—	—	—	—
		W. Africans	1	—	—	1
		Passengers	—	—	—	—
Mansourah ..	17.2.28.	Sudanese	—	—	—	—
		W. Africans	1	1	—	2
		Passengers	—	—	—	—
Mansourah ..	7.3.28.	Sudanese	—	—	—	—
		W. Africans	—	—	—	—
		Passengers	1	—	—	1
Rashida	30.4.29.	Sudanese	—	—	—	—
		W. Africans	—	—	—	—
		Passengers	39	—	—	39
Mansourah ..	4.5.28.	Sudanese	—	—	—	—
		W. Africans	—	—	—	—
		Passengers	2	—	—	2
Masoud	8.5.28.	Sudanese	—	—	—	—
		W. Africans	9	10	1	20
		Passengers	36	—	—	36
Mansourah ..	10.6.28.	Sudanese	275	99	2	376
		W. Africans	32	17	5	54
		Passengers	12	—	1	13
Keneh	24.6.28.	Sudanese	209	68	4	281
		W. Africans	212	141	34	387
		Passengers	16	1	—	17
Keneh	7.7.28.	Sudanese	103	44	2	149
		W. Africans	89	55	14	158
		Passengers	38	3	4	45
Mansourah ..	18.7.28.	Sudanese	75	39	2	116
		W. Africans	138	96	27	261
		Passengers	29	6	2	37
Keneh	26.7.28.	Sudanese	8	1	—	9
		W. Africans	96	56	13	165
		Passengers	8	2	2	12
Taif	6.8.28.	Sudanese	5	—	—	5
		W. Africans	110	103	23	236
		Passengers	11	2	2	15

Steamer.	Date of arrival	Nationality	Men	Women	Infants	Total
Talodi	18.8.28.	Sudanese	4	1	—	5
		W. Africans	87	89	23	199
		Passengers	10	6	3	19
Taif	26.8.28.	Sudanese	2	—	—	2
		W. Africans	44	36	11	91
		Passengers	13	1	—	14
Talodi	7.9.28.	Sudanese	2	2	—	4
		W. Africans	27	20	3	50
		Passengers	10	2	—	12
Taif	16.9.28.	Sudanese	—	—	—	
		W. Africans	18	18	1	37
		Passengers	2	—	—	2
Talodi	27.9.28.	Sudanese	—	—	—	—
		W. Africans	39	25	7	71
		Passengers	11	4	1	16
Taif	6.10.28.	Sudanese	—	—	—	—
		W. Africans	7	15	3	25
		Passengers	6	3	—	9
Talodi	17.10.28.	Sudanese	—	—	—	—
		W. Africans	6	8	—	14
		Passengers	11	3	1	15
Taif	26.10.28.	Sudanese	—	—	—	—
		W. Africans	10	8	3	21
		Passengers	7	1	—	8
Talodi	7.11.28.	Sudanese	—	—	—	—
		W. Africans	15	12	2	29
		Passengers	2	—	—	2
Taif	16.11.28.	Sudanese	—	—	—	—
		W. Africans	17	9	2	28
		Passengers	4	—	—	4
Talodi	18.12.28.	Sudanese	—	—	—	—
		W. Africans	2	5	—	7
		Passengers	2	—	—	2
TOTAL		Sudanese	948			
		W. Africans	1856			
		Passengers	320			3124

SHIPPING QUARANTINE.

(A) Port Sudan.

The quarantine work at Port Sudan was considerably increased this year owing to :—

(a) the increased number of ships and sambuks entering the port.

(b) the special precautions that had to be taken with regard to ships coming from Aden, which was a plague-infected port from January 14th to June 1st.

Considerable anxiety was experienced during this epidemic lest infection of the rat population should ensue.

The position will remain a dangerous one until :—

(i) the rat population can be further reduced.

(ii) arrangements can be made for ships from infected ports to unload without coming close alongside the quays, *i.e.* to unload into lighters.

The following list shows the ships dealt with by the quarantine authorities in 1926, 1927 and 1928 respectively :—

	1926	1927	1928
Ships entering	820	845	932
Sambuks entering	393	562	633
Ships of War.			
British	20	21	12
French	—	5	4
Italian	—	1	4
Ships quarantined	—	2	12
Patients placed in quarantine hospital	—	5	2

The following table gives the number of fleas per rat per month and also shews the average maximum and minimum temperatures with the average relative humidity for the month. All the rat fleas caught were of the Xenopsylla Cheopis species :—

Month.	Fleas. per Rat.	Average Temperature (Shade.)		Average relative Humidity.
		Maximum °F.	Minimum °F.	
January	Record.	83.1	70.5	70
February	Incom-	81.7	68.6	61
March	plete.	82.8	68.0	62
April	1.1	90.0	72.0	53
May	1.7	98.6	68.0	44
June	1.4	102.7	79.0	33
July	0.3	106.0	81.0	41
August	0.3	114.6	84.0	43
September	No. Fleas.	100.0	81.0	53
October	,,	94.5	68.0	65
November	,,	87.6	74.5	70
December	,,	85.5	70.5	67

(B) Suakin.

Ships entering-pilgrim ships	—	21
,, ,, -non- ,, ,, ...	—	16
Sambuks entering-pilgrim	—	1
,, ,, -non- ,, ...	—	218

STAFF AND ORGANISATION.

(A) BRITISH STAFF.

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

1. (a) A Director, who is responsible for Medical and Public Health work throughout the Sudan,

(b) An Assistant Director,

(c) An Assistant Director for the three Border Provinces (Mongalla, Bahr-el-Ghazal and Darfur) and for Sleeping Sickness and Leprosy work, who is also Principal Medical Officer of the Sudan Defence Force and directly responsible to the Kaid El 'Amm (Commander in Chief) for the health of this Force.

(2) A Medical Specialist and a Surgical Specialist stationed at Khartoum and holding the posts of Directors of Khartoum and Omdurman Civil Hospitals respectively. They also teach these subjects (medicine and surgery) at the Kitchener School of Medicine.

(3) Medical Officer of Health, Khartoum (see page 94 Health Organisation).

(4) Twenty seven Medical Inspectors and Senior Medical Inspectors, and one British Medical Officer (seconded from the R.A.M.C.) employed on Sleeping Sickness duties.

(5) In addition there are twelve British Medical Officers seconded from the R.A.M.C. who under the Principal Medical Officer form the medical staff of the Sudan Defence Force and who devote the remainder and greater part of their time to carrying out civil medical work in the three Border Provinces. (See under 1.)

(6) Seventeen British Sanitary Inspectors who work under the direction of the Medical Officer of Health of Khartoum Province and the Medical Officers of Health of the other provinces where they are employed.

(7) A Matron, Khartoum Civil Hospital.

A Matron, Omdurman Civil Hospital (in charge of Nurses Training School).

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.

(B) SYRIAN AND SUDANESE MEDICAL OFFICERS.

Twenty seven Syrian Medical Officers employed in civil medical work either serving under British Medical Officers at the larger hospitals or in charge of smaller hospitals.

Fourteen Sudanese Medical Officers trained at the Kitchener School of Medicine and carrying out similar duties to the Syrian Medical Officers.

Twelve Syrian Medical Officers employed on Sleeping Sickness duties. As this disease is now under control, a large proportion of these Medical Officers' time is employed on general medical work in the Sleeping Sickness area.

Thirty six Syrian Medical Officers serving with the Sudan Defence Force under the Principal Medical Officer. These Medical Officers also carry out civil medical work in so far as time and opportunity allows.

(C) SUDANESE SUBORDINATE STAFF.

(1) Sixty five Dispensary Hakims in charge of "A" dispensaries.

Dispensary Hakims are men selected from the more able 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. In addition they are taught the use of the stethoscope, to do simple dispensing, to do simple microscopic work, and to carry out minor surgical operations.

The "A" dispensary usually consists of three rooms ; an outpatient room where patients are examined and dressed, a small room for dispensing and an injection room equipped with a wooden operating table and the instruments and equipment necessary for minor operations. There are usually in addition a varying number of brick huts attached to the dispensary for the accommodation of patients who cannot return to their own homes. These dispensaries have a standard "A" dispensary equipment, adapted to the work they have to carry out. They are commonly in isolated situations and are not therefore subject to very frequent inspection by the medical inspectors.

(2) Fifty seven Sanitary Hakims in charge of "B" 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 with stock mixtures and to become proficient in intravenous injections. They also receive instruction in simple sanitary work and in particular, anti-malarial work. They are not taught to use the stethoscope, nor to do microscopic work beyond recognising bilharzia ova.

The "B" dispensary commonly consists of one room equipped with tables, cupboards and shelves for stock medicines. They have a standard "B" equipment considerably more restricted than the "A" dispensary equipment. These dispensaries are usually so situated as to admit of frequent inspection by the medical inspectors.

Sanitary Barbers.

A Sanitary Barber is 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 available), to report outbreaks of disease and to vaccinate. Sanitary barbers are confined to the northern, and to parts of the central, Sudan and are attached to an Omodiyeh (a collection of villages under an Omda) or more frequently to a group of Omodiyahs.

The usefulness of these men varies in different provinces according to the supervision and encouragement that can be afforded them, the pay they receive and the number of villages they have to serve In Dongola Province for instance,

where trachoma is a most pressing problem, their number is being increased and they are being employed to do anti-trachoma work in the villages among the children not attending the village schools. It is thought that as it becomes possible to supervise their work better and to reward their services more adequately, they will become a very useful body of men carrying out primary medical and health work in the non-tribal areas of the northern and central Sudan.

Sheikhs Dressers and Chiefs Dressers.

To meet the need for treatment among the pagan tribes of the south, and among the nomad Arabs of the northern and central Sudan where the sanitary barber of the settled Arab would be out of place, a system of sheikhs' dressers and chiefs' dressers has been recently instituted. The chief or sheikh is invited to send a number of youths for training. These, if they meet with the approval of the medical inspector, are given a course of first-aid training. They are taught to dress wounds, to treat inflammatory conditions of the eye, to treat ulcers, to vaccinate and to administer simple stock mixtures.

In the rainy season an abrasion or a simple wound rapidly becomes an ulcer, and these ulcers in course of time become chronic and intractable and rank only second to yaws as a cause of permanent disablement. It is thought that by providing first-aid treatment in villages, cattle camps and nomad encampments many of these disastrous cases could be prevented.

These dressers are under the chief or sheikh for discipline, and are sent up to the hospital or dispensary every year for a short "Refresher" course. The arrangement is still largely experimental, but up to the present shows promise of success.

Laboratory Assistants.

These are youths of some intelligence and education who receive a course of instruction at the Wellcome Tropical Research Laboratories in simple laboratory work. They are taught to prepare and examine blood films for malaria, to examine for urinary and intestinal parasites, to carry out the various urinary tests and other simple laboratory work. They have proved themselves most useful in carrying out this simple laboratory work at the provincial hospitals and at the quarantine stations, for the most part under the supervision of a medical inspector.

Sanitary Overseers.

These are natives who have received some elementary education who are trained for the most part by the 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 round 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.

The training of these men has up to the present been haphazard and no definite terms of service have been laid down. It is now proposed to build up a native subordinate sanitary service on somewhat similar lines to the existing subordinate medical service.

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 139,315, that of the rest of the province at 73,870. This post for the last six years has been combined with that of the Assistant Director, Sudan Medical Service, but the combination of offices, initiated for reasons of economy, is found to be no longer practicable and a separate Medical Officer of Health has been approved.

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 Gezirah irrigated area. For instance, the two most important health problems in this area are bilharziasis and malaria. In both one and the other the measures to be taken are :—

(i) against the disease in the human host.

(ii) against the propagation of the mollusc or the insect host.

(iii) to prevent the transmission of the disease from one host to the other.

(iv) propaganda.

No (i) comes under the head of curative medicine, Nos (ii), (iii) and (iv) under the head of preventive medicine and yet it is only by a just appreciation of the importance of all four methods of attack and the economical use of staff, hospitals, dispensaries and equipment to carry out all these measures that the diseases in question can be successfully combated.

In addition to his medical staff of various grades which he uses to the best advantage to achieve the objects of preventive and curative medicine, the provincial Medical Officer of Health may have under him one or more British sanitary inspectors. These men are especially employed for the supervision of town sanitation and conservancy and for anti-malarial work in the important irrigated areas. The British sanitary inspectors supervise a subordinate native sanitary staff of sanitary overseers and mosquito men.

The distribution of British sanitary inspectors is as follows :—

Headquarters (travelling)	1
Berber Province	3
Blue Nile Province	4
Kassala	1
Khartoum Province	6
Red Sea	2
TOTAL	17

An additional British sanitary inspector has been approved for work in Kassala Province and on the Kassala-Gedaref railway.

THE NURSING SERVICE.

Improved terms for sisters have been approved and are now in operation.

The intention is to have sisters serving under two separate 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 qualifications 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.

Nurses are now stationed as follows :—

Khartoum	Matron.	
	Outpatient Sister	
	3	Sisters.
Atbara	1	Sister.
Port Sudan	1	Sister.
Wad Medani ..	1	Sister.
Omdurman	1	Sister working under the Matron of the Nurses Training School.

An additional sister has been approved for work at Wad Medani civil hospital.

SUDAN MEDICAL SERVICE STAFF.

Appointment	Establishment
Medical Staff :—	
Director	1
Asst. Director & Senior Sanitary Officer, Khartoum	1
Director, Khartoum Civil Hospital	1
Director, Omdurman Civil Hospital	1
Senior Medical Inspectors	2
Medical Inspectors	25
Medical Officers (Syrians)	44
Medical Officers (Sudanese)	7
Dispensary Hakims (Sudanese)	63
Sanitary Hakims (Sudanese)	47
Dispensers	6
Radiographer	1
Laboratory Assistants (Sudanese)	6
Midwife	1
Nursing Staff :—	
Matron, Khartoum Civil Hospital	1
Matron, Omdurman Civil Hospital	1
Matron, Midwives Training School	1
Nursing Sisters	8
Sanitary Staff :—	
Chief Sanitary Inspector	1
Senior Sanitary Inspectors	3
Sanitary Inspectors	11
Sanitary Overseers (Sudanese)	3
Clerical Staff :—	
Chief Clerk	1
Clerk (British)	1
Translator (Grade V)	1
Translators (Grade VI)	3
Translators (Grade VII)	9
Translators (Grade VIII)	4
Clerks (Grade VII)	10
Clerks (Grade VIII)	15
Chief Accountant (Grade V)	1
Accountant (Grade VI)	1
Accountants (Grade VII)	5
Accountants (Grade VIII)	3
Stores Staff :—	
Medical Storekeepers	2
Asst. Medical Storekeeper	1
Storemen (Sudanese)	6
Tailors	1
Carpenter	1

CHANGES IN PERSONNEL.

The following changes in personnel occurred during 1928 :—

Medical Inspectors :—

Mr. G. R. Footner	To pension	18. 5.28.
Mr. F. K. Wilson	Appointed	3. 6.28.
Dr. C. Voigt	Resigned	23.10.28,
Mr. A. R. McKelvie	Appointed	24.12.28.

Medical Officers :—

Dr. George Khouri..	Discharged	18, 5.28.
Dr. Riad Mocmalgi..	,,	3. 7.28.
Dr. G. Churukian	,,	16.10.28.
Dr. Daud Iscandar..	Appointed	1. 1.28.
Dr. Ali Bedri	,,	,,
Dr. Ahmed Akasha	,,	,,
Dr. El Fadil El Bushra	,,	,,
Dr. Mohamed Amin El Sayed ..	,,	,,
Dr. El Nur Shams El Din ..	,,	,,
Dr. Taher Yusef	,,	,,

Sleeping Sickness Officers :—

M. A. Husni Abdulla	From S.D.F.	7. 7.28.
Yusb. Khalil Jabbour	To S.D.F.	21.12.28.
M. A. Joseph Weinstein	From S.D.F.	,,

Sanitary Inspectors :—

Mr. A. W. E. Porter	Appointed	16.4.28.
Mr. E. Hollis	,,	20.8.28.

Dispensary Hakims :—

Suliman El Hag	Died at Malakal	21.12.28.

Sanitary Hakims Promoted after Training :—

Ismail Abdullah	Appointed	1.1.28.
Zubeir Rashid	,,	,,
El Nur Mohamed El Nur	,,	,,
Medani Mohd. El Amin	,,	,,
Abdel Magid Mohamed	,,	,,
Ahmed Abdel Kader	,,	,,
Ibrahim Issa	,,	,,
El Nur Babikr	,,	,,
Hassan Mohamed El Amin	,,	,,
Ismail Ismail	,,	,,
Gasmalla Rizgalla	,,	1.3.28.
Mohamed Ahmed Ibrahim	,,	,,

Sanitary Hakims under Training :—

16 Hospital attendants who were selected to be trained as sanitary hakims.

TRAINING.

(1) KITCHENER SCHOOL OF MEDICINE.

The work of this school made satisfactory progress during the year under report.

A total of 24 students were under training during the year.

The classes were composed as follows :—

	Students.
1st Year.	
Chemistry, Physics and Biology	10
2nd Year.	
Anatomy, Physiology and Materia Medica ..	7
3rd Year.	
Medicine, Surgery and Pathology	—
4th Year.	
Medicine, Surgery, Midwifery and Gynaecology, Public Health	7
TOTAL	24

The absence of a 3rd year class was due to the fact that no fresh students were admitted to the school in 1926. This omission was made to meet special circumstances and is not likely to be repeated. In 1929 there will still be only three classes as there will be no senior class in that year, but after that the full establishment of four classes should be continuously maintained, giving a total of between 30 and 40 students under training at one time. The admissions to the first year class will be increased to 12 in 1929 to allow for a reduction in the higher classes owing to students being referred for a further period of tuition in one of the lower classes or being advised to give up the course through unsuitability.

Biology.

By arrangement with the Education Department a biologist has been appointed to that department whose duties will include as a primary obligation, the teaching of this subject to the first year students of the School of Medicine. He will also teach the same subject to the fourth year science class at the Gordon College. Thus he will continue to teach at the School of Medicine, students chosen from among those whom he has previously taught in the Gordon College science class. The teaching of this subject has suffered during 1927 and the early part of 1928, owing to there being no one whose primary duty it was to carry out this work.

The teaching of biology as a preliminary subject in medical education is felt to be additionally important in such a country as the Sudan where a student's conception and understanding of life is of necessity, much more restricted and less informed than that of a European boy of the same age. The satisfactory settlement of this difficulty is in consequence very welcome.

Practical Midwifery.

A course of practical midwifery was arranged for the fourth year students during the vacation. The class was divided into groups and each group lived at Omdurman for a fortnight and under the supervision of the matron of the Midwifery School attended midwifery cases in the district, and also such obstetrical and gynaecological cases as were admitted to the hospital.

Progress of various Classes and the Examination.

1st Year Class. Two students had been referred for a further year's tuition at the end of 1927. Eight additional students had been selected from the Gordon College thus making for the year 1928 a total 1st year class of ten. Of these 10 students, 7 satisfied the examiners in the first year class examination and 3 were referred for a year's further tuition.

Nine new students have been selected from the Gordon College thus making a first year class of 12 for 1929.

The second year class consisted of seven. These seven all satisfied the examiners at the second year examination held at the end of the year 1928.

There was no third year class.

The members of the fourth year class, seven in number, presented themselves at the final examination early in January.

The Final Examination.

The school was fortunate in being able to obtain the services of Sir Robert Philip, President of the Royal College of Physicians of Edinburgh as assessor in the examination in medicine and to retain the services of Mr. Robert Dolbey, M.S., F.R.C.S., F.A.C.S., as assessor in the examination in surgery.

The papers in medicine and surgery were set by the assessors. All the candidates satisfied the examiners, including one candidate who had been referred from the year before and whose papers and practical examination shewed that he had derived great benefit from the extra year's instruction. The report of the assessors on the final examination is given below.

The seven graduates, after a short holiday, will be posted to the seven largest hospitals in the Sudan where they will carry out the duties of house surgeon and house physician for the period of one year under the supervision of a British medical inspector. At the end of this time if they have shewn themselves to be skilled and trustworthy in their medical duties and to have acquired the necessary knowledge of hospital administration, they will be appointed as medical officers to other hospitals.

Of the seven Sudanese doctors who graduated in January, 1928, six were very well reported on and were considered to have gained the necessary proficiency and to have shewn the necessary qualities to justify their appointment as medical officers. They will be placed in sole charge of six small hospitals. One who had not shewn sufficient energy and initiative was retained in his hospital for a year's further experience as house surgeon and house physician. There appears to be little doubt that with this additional experience and with this encouragement to further effort, he will be qualified to take his position as a medical officer at the beginning of 1930.

ASSESSORS' REPORT.

"We have been honoured by the invitation of the Government of the Sudan to act as assessors at the Final Examination in Medicine at Khartoum, 1929, and now beg to report as follows :—

1. The Range of the final examination is extensive embracing as it does pathology, medicine, surgery (including opthalmology) midwifery, gynaecology, public health and forensic medicine. The group of subjects in which the candidate is expected to pass, at one and the same time, is thus larger than that required in many of the older schools in the United Kingdom. This implies considerable concentration of attention and of effort on the part of the candidates.

2. The Method of examination is thorough. The examination includes written papers, viva-voce, and ample practical tests. We, ourselves, severally set written papers in medicine and surgery; and pitched the questions, advisedly, on ~~the~~ a standard similar to that of the leading Examining Boards in Great Britain.

3. The Candidates. Seven in number impressed us most favourably. Their appearance and deportment seemed to us comparable to those of the English public schoolboy. It is difficult to realise that eight or ten years ago these candidates were completely illiterate children. Their response to the various tests, both written and practical, was strikingly good. Their method of handling the patients entrusted to them was careful, kind and considerate.

As observed by one of us, in the subjects of surgery the method of approach in the examination of a sick person shewed a considerable improvement on that displayed by the candidates at last year's examination.

4. Results of the examination. Four of the seven candidates made an admirable appearance; the remainder attained a sufficient standard to justify their admission to the Diploma. We believe that, allowing for the difficulties of the language and the relatively short course of instruction available, they would have been favourably considered by examiners attached to corresponding Boards in Great Britain.

5. Our Impressions. From the evidence before us it is safe, in our opinion, to anticipate, in the case of each of the successful candidates, a useful career in the practice of medicine in the Sudan. We believe that these young doctors will be found qualified to realise the purposes for which the Kitchener School of Medicine was founded.

"It seems to us that the close relationship between teacher and student which is made possible by the limited number of students at the school has played an important part in the production of so capable, practical and adaptable young doctors. This close touch should be maintained and developed in the future. Granted a further obligatory year of practical experience in a well equipped hospital under the eye of a senior officer, the Government of the Sudan may justly expect to create and establish a Medical Corps amply equipped and well adapted to the growing needs of the country and, at the same time not unworthy of the high traditions of medicine."

(2) MIDWIFERY SCHOOL.

This school continues to make steady progress. Year by year a better and more intelligent class of women is obtained for training and a gradually increasing standard of proficiency is obtained.

The Inspectress of Midwives, who is in charge of the school carried out her annual tour of inspection in November and December. She visited the Blue Nile, Fung, Kassala, Red Sea and Berber Provinces. During her tour she inspected all the trained midwives and wherever possible saw them at work. She also checked the work of the licensed, but untrained midwives, arranging for the cancellation of the licences of any of these who were flagrantly unfit to carry on their work. She selected 14 candidates for the 1929 class. These were chosen from various of the northern and central provinces of the Sudan.

Up to the present a total of 97 midwives have been trained. Of these 83 are alive and practising their profession.

They are distributed as follows:—

Staff Nurses at Midwifery School	3
Omdurman	22
Khartoum	7
Khartoum North	4
Berber Province	10
Dongola Province	11
Kordofan Province	9
White Nile Province	8
Kassala Province	2
Blue Nile Province	5
Halfa Province	1
Red Sea Province	1

The towns of Khartoum, Khartoum North and Omdurman are now well served with trained midwives. In Omdurman where this work has now been effective for several years there would appear to be a marked improvement of the health of mothers during the puerperium and a diminution of puerperal infection and of the maternal and infant death rates.

In the provinces the number of trained midwives at work is too small to affect the situation materially, but it is confidently expected that as the number of trained midwives in the provinces is gradually increased a notable improvement in maternal health during the puerperium will be evidenced. In the meanwhile the trained midwives scattered as they are and in a great minority nevertheless serve to set a standard of relative enlightenment in matters of midwifery and of home sanitation.

It is to the growing influence of these women that we must look in the future to combat the almost universal habit of Pharaonic circumcision, so cruel in its execution, and so fraught with danger to the mother during the puerperium.

(3) NURSES TRAINING SCHOOL.

This work is still very hampered by :—

(i) The difficulty in obtaining suitable girls to train, owing to the prejudice of the better class Sudanese against allowing their daughters to be trained as nurses.

(ii) The absence of education and discipline among Sudanese girls.

In spite of these difficulties steady if slow progress has been made Seven nurses in all have completed their training. They are posted as follows :—

Malakal	1
Wad-Medani	1
Kassala	1
Port Sudan	1
Atbara	1

In addition two nurses are in charge of two dispensaries in Omdurman which are largely attended by women and children for the treatment of simple ailments.

Four of the senior nurses are retained at the nursing school (Omdurman women's hospital) as staff nurses.

Thirteen nurses remain under training and seven new probationers were admitted at the beginning of the year making a total of twenty under training.

The nurses who have been sent to work in the provincial hospitals are very much appreciated, their attainments being very greatly in advance of those of the locally trained women.

(Sgd.) **O. F. H. ATKEY,**
Director
Sudan Medical Service.

Khartoum.
2.6.1929.

TABLE I.

Shows number of out-patients during 1928.

	Total.	%	Free.	%	On Payment.	%
Government Employees ...	275,990	19.10	272,481	18.86	3,513	0.24
School Children	137,524	9.51	137,524	9.51	—	—
Prisoners	79,500	5.50	79,422	5.49	74	0.01
All others	952,669	65.89	903,574	62.50	49,095	3.39
Grand Total	1,445,683	100	1,393,001	96.36	52,682	3.64

TABLE II.

Registration of births and deaths by Provinces, 1928.

Province.	BIRTHS.				STILL BIRTHS				DEATHS.				DEATHS Under One Year of Age	
	Europeans.		Natives.		Europeans.		Natives.		Europeans.		Natives.			
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	No.	Per 1000
Khartoum	15	17	1,818	1,796	1	—	82	50	19	2	1,196	1,429	302	83.0
Halfa	—	—	727	652	—	—	5	6	1	—	352	376	93	67.4
Red Sea	4	6	148	148	—	—	10	5	8	2	334	303	68	222.3
Berber	4	5	2,300	2,043	—	—	70	32	2	1	1,712	1,741	391	89.8
Dongola	1	2	2,915	2,763	—	—	166	96	—	—	1,252	1,376	462	81.3
Kassala	2	3	647	514	—	—	20	11	—	—	713	423	24	20.6
Blue Nile	4	4	7,088	5,361	—	—	120	49	1	1	5,502	4,097	583	46.8
Fung	—	—	2,197	1,798	—	—	42	25	—	—	1,641	1,078	100	25.0
White Nile	—	—	1,451	1,374	—	—	51	16	—	—	1,091	953	111	39.3
Kordofan	1	—	4,517	3,552	—	—	52	36	1	—	2,370	1,781	216	26.8
Bahr-El-Ghazal	—	—	16	12	—	—	—	—	—	—	15	15	—	—
Upper Nile	1	1	36	48	—	—	1	—	—	—	52	50	7	79.1
Nuba Mountains	—	—	28	49	—	—	—	—	—	—	38	26	7	90.3
Mongalla	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Darfur	—	—	117	77	—	—	1	—	—	—	310	242	20	103.1
Total ...	32	38	24,005	20,187	1	—	620	326	32	6	16,578	13,890	2,384	53.9
Total ...	70		44,192		1		946		38		30,468			
Grand Total ...	44,262				947				30,506					

% of still births = 2.15.

TABLE III.

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	—	—	1	—	209	38	50	7
2. All other tubercular diseases ...	2	—	2	—	174	16	59	4
Venereal								
3. Syphilis	4	—	—	—	1,356	13	518	6
4. Gonorrhoea	9	—	—	—	1,217	4	84	1
5. Soft Sore	3	—	—	—	154	1	—	—
Eye.								
6. Trachoma...	1	—	—	—	171	—	42	—
7. All other eye diseases	4	—	—	—	746	2	279	—
8. **Ear**	6	—	—	—	90	1	16	—
9. **Skin**	5	—	—	—	230	3	74	2
10. **Wounds and other injuries** ...	98	—	10	—	6,541	90	742	14
Tumours.								
11. Malignant	2	—	—	—	48	8	51	9
12. Non-Malignant	4	—	—	—	160	3	61	5
Of Women.								
13. Gynaecological	—	—	4	1	—	—	184	7
14. Confinements	—	—	39	1	—	—	149	7
15. **Poisoning**	—	—	—	—	3	1	4	2
Total Table "A" ...	138	—	56	2	11,099	180	2,313	64
Table "B" (Tropical).								
1. Ankylostomiasis	—	—	—	—	27	—	2	—
2. Bilharziasis	—	—	—	—	293	3	13	—
3. Blackwater Fever	1	—	—	—	13	3	1	1
4. Dysentery, Amoebic	20	—	1	—	905	59	160	19
5. Dysentery, Bacillary	35	—	3	—	199	4	11	2
6. Filariasis	—	—	—	—	5	—	—	—
7. Madura disease	—	—	—	—	246	2	43	1
8. Malaria	219	1	10	—	6,431	59	320	5
9. Leishmaniasis (Kala-Azar) ...	2	—	—	—	35	9	2	—
10. Trypanosomiasis...	—	—	—	—	—	—	—	—
11. Yaws	—	—	—	—	6	—	6	—
12. Sunstroke...	1	—	—	—	2	1	—	—
13. Heatstroke	—	—	—	—	3	—	—	—
14. Guinea Worm	—	—	—	—	107	1	4	—
Total Table "B"	278	1	14	—	8,272	141	562	28

TABLE III. (*Continued*).

Disease.	TOTAL.							
	Europeans.				Natives.			
	Male.		Female.		Male.		Female.	
	A.	D.	A.	D.	A.	D.	A.	D.
Table " C " (Infective).								
1. Anthrax	—	—	—	—	5	1	1	—
2. Beri-Beri	—	—	—	—	—	—	—	—
3. Cerebrospinal Meningitis ...	—	—	—	—	7	4	1	1
4. Chicken Pox	—	—	—	—	246	—	15	—
5. Cholera	—	—	—	—	—	—	—	—
6. Dengue	—	—	—	—	—	—	—	—
7. Diphtheria...	2	—	1	—	101	19	63	9
8. Enteric (Including Paratyphoid)	4	—	—	—	106	28	20	3
9. Erysipelas	—	—	—	—	5	2	1	—
10. Gastro-enteritis of children ...	—	—	—	—	2	—	—	—
11. German Measles	—	—	—	—	1	—	—	—
12. Influenza	10	—	3	—	341	6	11	—
13. Leprosy	—	—	—	—	35	3	8	—
14. Malta Fever	—	—	—	—	9	2	3	—
15. Measles	—	—	—	—	36	3	22	—
16. Mumps	4	—	—	—	130	—	1	—
17. Pellagra	—	—	—	—	—	—	—	—
18. Puerperal Fever	—	—	1	—	—	—	15	5
19. Phlebotomus	6	—	—	—	23	—	—	—
20. Plague	—	—	—	—	—	—	—	—
21. Pneumonia (Epidemic)	2	1	—	—	394	109	53	17
22. Rabies *	—	—	—	—	23	2	6	1
23. Relapsing Fever	—	—	—	—	—	—	—	—
24. Rheumatic Fever	1	—	—	—	61	2	7	—
25. Scarlet Fever	—	—	—	—	—	—	—	—
26. Small Pox	—	—	—	—	88	33	30	8
27. Tetanus	—	—	—	—	6	4	1	1
28. Typhus	—	—	—	—	—	—	—	—
29. Whooping Cough	—	—	—	—	11	1	8	—
Total Table " C " ...	29	1	5	—	1,630	219	266	45
Table " D."								
1. Circulatory System	3	—	—	—	431	83	96	14
2. Respiratory System	14	—	2	—	1,257	50	138	16
3. Alimentary System	102	2	5	—	2,024	125	349	22
4. Genito-Urinary System	15	—	3	1	672	34	112	6
5. Nervous System	9	—	1	—	382	10	56	5
6. Scurvy	—	—	—	—	151	6	2	—
7. Diabetes	1	—	—	—	36	2	12	—
8. Fever of uncertain origin ...	12	1	2	—	327	28	44	6
9. All other diseases	30	—	3	—	456	8	101	3
Total Table " D "	186	3	16	1	5,736	346	910	72
,, ,, " A "	138	—	56	2	11,099	180	2,313	64
,, ,, " B "	278	1	14	—	8,272	141	562	28
,, ,, " C "	29	1	5	—	1,630	219	266	45
Grand Total	631	5	91	3	26,737	886	4,051	209

*Includes those admitted for Anti-rabic treatment.

TABLE IV.

Shows births, deaths by ages and still-births.

Nationality.	Births.		Deaths by ages.							Total deaths.		Total still-births.	
	Male.	Female.	Under 1	1-5	5-10	10-20	20-40	40-60	Over 60	Male	Female	Male	Female
British	5	6	1	1	—	—	6	2	—	9	1	1	—
Greek	16	17	9	2	—	—	3	4	7	20	5	—	—
Other Europeans	14	12	1	1	—	—	4	—	—	6	—	—	—
Egyptians & Syrians	319	295	64	49	7	11	54	16	45	136	110	13	3
Natives of Sudan	23,647	19,856	2,302	4,835	2,022	2,739	6,057	5,522	6,608	16,340	13,745	604	323
All others ...	35	40	7	8	—	8	62	29	20	99	35	3	—
Total	24,036	20,226	2,384	4,896	2,029	2,758	6,186	5,573	6,680	16,610	13,896	621	326
Grand total ...	44,262					30,506				30,506		947	
% deaths by ages..			7.8	16.1	6.6	9.0	20.3	18.3	21.9				

TABLE V.

Vaccinations Performed during the Year 1928.

Province.	Primary.			Re-vaccination.			Total.		
	Success.	Failed.	Unknown.	Success.	Failed.	Unknown.	Success.	Failed.	Unknown.
Khartoum	5,818	98	169	1,904	96	24	7,722	194	193
Halfa	1,424	354	8,828	—	—	137	1,424	354	8,965
Red Sea	2,227	503	3,322	28	12	1,664	2,255	515	4,986
Berber	53,477	3,161	2,170	117	5	—	53,594	3,166	2 170
Dongola	7,269	1,455	209	913	503	238	8,182	1,958	447
Kassala	28,496	2,275	7,740	1,370	1,701	2,130	29,866	3,976	9,870
Blue Nile	43,554	5,257	19,440	23	—	—	43,577	5,257	19,440
Fung	3,579	852	700	602	116	168	4,181	968	868
White Nile	8,861	2,271	8,208	80	5	2	8,941	2,276	8,210
Kordofan	11,320	4,462	12,227	392	243	—	11,712	4,705	12,227
Bahr-El-Ghazal	747	335	383	7	2	2	754	337	385
Upper Nile	735	—	4,242	—	—	—	735	—	4,242
Nuba Mountains	628	833	4,064	35	55	307	663	888	4,371
Mongalla	1,804	6,541	623	61	4	—	1,865	6,545	623
Darfur	5,143	1,395	6.240	200	690	310	5,343	2,085	6,550
Total ...	175,082	29,792	78,565	5,732	3,432	4,982	180,814	33,224	83,547

Total all vaccinations = 297,585

TABLE VI.

Shows admissions and deaths in hospitals during 1928.

Hospital or Dispensary.	EUROPEANS						NATIVES					
	1927			1928			1927			1928		
	Adm.	Deaths	%	Adm.	Deaths	%	Adm.	Deaths	%	Adm.	Deaths	%
Atbara	107	1	1.0	185	2	1.1	1,802	34	1.9	2,181	64	2.9
Abu Hamed	—	—	—	—	—	—	129	1	0.8	149	4	2.7
Shendi	—	—	—	—	—	—	—	—	—	383	1	0.3
Wad Medani	183	1	0.5	185	—	—	3,899	125	3.2	5,991	283	4.7
Makwar	58	—	—	18	—	—	1,830	62	3.4	1,750	66	3.8
Merowe	—	—	—	—	—	—	768	16	2.1	707	13	1.8
Dongola	—	—	—	—	—	—	264	8	3.0	337	8	2.4
Wadi-Halfa	2	—	—	3	—	—	542	21	3.9	526	15	2.9
Singa	—	—	—	—	—	—	—	—	—	—	—	—
Roseires	1	—	—	3	—	—	230	8	3.5	253	15	5.9
Abu Sheneina	—	—	—	—	—	—	15	—	—	2	—	—
Kurmuk	—	—	—	—	—	—	111	2	2.0	128	1	0.8
Kassala	19	1	5.3	26	—	—	2,343	51	2.2	2,454	91	3.6
Gedaref	—	—	—	—	—	—	240	17	7.1	656	19	2.9
Galaat El Nahl	—	—	—	—	—	—	29	1	3.4	28	—	—
Derudeb	—	—	—	—	—	—	238	1	0.5	272	3	1.1
Goz Ragab	—	—	—	—	—	—	139	—	—	62	—	—
Abu Deleig	—	—	—	—	—	—	2	—	—	32	—	—
Aroma	—	—	—	—	—	—	—	—	—	110	—	—
Khashm El Girba	—	—	—	—	—	—	—	—	—	30	—	—
Khartoum	208	7	3.4	188	3	1.6	2,056	89	4.3	2,743	79	2.9
Omdurman	—	—	—	—	—	—	1,267	76	6.0	1,788	102	5.7
Khartoum North	—	—	—	—	—	—	511	4	0.8	767	9	1.2
Khartoum North Prison	—	—	—	—	—	—	410	8	2.0	326	11	3.4
El Obeid	3	—	—	2	—	—	1,287	31	2.4	1,566	41	2.6
Nahud	—	—	—	—	—	—	1,087	32	2.9	785	21	2.7
Bara	—	—	—	—	—	—	—	—	—	179	6	3.4
Talodi	—	—	—	—	—	—	131	2	1.5	329	6	1.8
Dilling	—	—	—	—	—	—	504	5	1.0	626	9	1.4
Rashad	—	—	—	—	—	—	70	1	1.4	109	1	0.9
Kadugli	—	—	—	—	—	—	—	—	—	228	7	3.1
Delami	—	—	—	—	—	—	—	—	—	22	—	—
Port Sudan	117	4	3.4	94	3	3.2	1,773	46	2.6	1,528	61	4.0
Suakin	—	—	—	—	—	—	65	2	3.1	69	5	7.2
Tokar	—	—	—	—	—	—	87	—	—	125	6	4.8
Suakin Quarantine	—	—	—	—	—	—	45	7	15.5	33	8	24.2
Port Sudan Prison	—	—	—	—	—	—	245	5	2.0	293	10	3.4
Gebeit	—	—	—	—	—	—	—	—	—	95	2	2.1
Malakal	—	—	—	16	—	—	2,370	49	2.1	2,103	62	2.9
Lady Baker	—	—	—	1	—	—	—	—	—	37	—	—
Dueim	—	—	—	—	—	—	313	18	5.7	353	19	5.4
Kosti	—	—	—	1	—	—	523	10	1.9	633	47	7.4
Total	698	14	2.0	722	8	1.1	25,325	732	2.9	30,788	1,095	3.6

TABLE VII.

Average daily constantly sick during 1928.

HOSPITAL OR DISPENSARY	No. of beds equipped	January		February		March		April		May		June		July		August		September		October		November		December		Average daily throughout year	
		M.	F.	M.	F.	M.	F.	M.	F,	M.	F.	M.	F.	M.	F,	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Atbara	85	71.5	3.1	72.0	4.7	61.0	4.8	70.0	5.7	75.2	5.6	77.9	5.5	71.9	5.5	69.7	9.0	80.4	9.3	81.3	9.5	81.9	8.1	112.5	19.5	77.0	6.7
Abu Hamad	6	2.4	—	2.9	—	3.1	—	3.8	—	2.4	--	5.2	—	3.8	—	4.3	—	3.5	—	5.5	—	5.2	—	3.4	—	3.8	—
Sherdi	10	7.7	—	6.2	1.0	8.4	—	9.3	—	11.8	--	6.4	—	8.1	—	5.5	2.0	11.0	1.0	5.6	1.0	6.4	1.0	6.9	1.0	7.8	0.6
Wad Medani	200	148.4	26.2	174.6	21.3	199.2	27.2	208.5	23.6	183.9	29.5	196.0	29.9	207.4	27.5	189.2	27.9	182.6	30.5	148.6	24.3	142.5	27.0	146.6	23.3	177.3	26.9
Makwar	114	73.4	62.0	69.0	11.0	59.0	12.0	60.0	13.0	55.6	12.2	56.9	11.9	34.0	11.0	49.6	5.7	48.9	0.3	57.1	1.9	29.1	7.1	51.3	12.8	53.7	13.4
Merowe	40	21.6	7.0	18.7	11.2	13.0	8.4	20.6	16.0	18.5	16.5	15.3	18.8	19.3	14.0	15.7	11.7	16.3	13.0	17.5	14.3	23.4	16.5	19.1	14.4	18.3	13.5
Dongola	21	7.7	4.7	7.1	4.4	6.5	3.9	9.0	6.2	8.2	3.1	8.0	4.0	7.5	3.8	8.6	5.3	8.6	6.8	7.0	6.2	6.2	6.0	7.4	4.4	7.7	4.9
Wadi Halfa	28	8.2	1.3	9.1	1.8	6.4	0.7	7.3	3.1	9.3	3.8	7.5	5.1	7.0	5.0	7.9	4.0	8.4	2.7	11.5	2.8	12.0	2.1	12.2	5.2	8.2	3.0
Roseires	20	15.3	1.5	21.5	1.5	17.7	1.7	10.4	2.3	7.4	0.5	10.4	0.6	4.5	—	1.5	0.1	12.2	—	11.0	—	11.6	—	12.8	—	11.4	0.7
Abu Shen ina	—	—	—	0.2	—	—	—	—	—	—	--	0.8	—	—	—	—	—	—	—	—	—	—	—	—	—	0.1	—
Kurmuk	2	2.2	—	2.3	0.8	0.8	0.5	1.7	1.5	4.1	1.8	0.7	0.8	3.0	0.4	3.3	0.6	2.4	—	3.3	0.1	1.4	—	3.1	0.5	2.4	0.5
Kassala	120	82.6	7.7	87.3	6.9	73.0	4.4	80.7	7.3	82.2	4.9	87.0	7.2	86.0	6.5	77.0	4.2	86.6	4.7	97.9	5.5	92.1	6.9	83.3	9.6	88.0	6.3
Gedaref	12	13.6	2.0	14.0	—	14.8	—	16.0	0.8	14.2	0.7	14.5	0.3	13.4	1.6	16.5	0.7	18.4	0.2	21.1	—	22.0	0.3	27.6	—	17.2	0.6
Derudeb	4	3.2	—	3.4	—	3.3	—	3.0	—	5.5	--	5.3	—	4.4	—	8.0	—	5.6	—	6.1	—	4.9	—	5.8	—	4.9	—
Gebat El Nahl	3	0.2	0.1	0.5	0.4	1.0	0.5	1.3	0.3	1.8	--	1.3	0.6	0.2	0.5	0.5	—	0.8	—	1.6	—	1.2	—	1.2	—	1.0	0.2
Goz Rageb	2	0.5	—	1.2	—	1.5	1.5	3.0	0.5	0.5	--	1.0	—	0.5	—	0.2	—	1.8	0.4	3.8	—	1.3	—	1.2	—	1.4	0.2
Abu Deleig	2	—	—	0.6	—	—	—	—	—	0.6	--	0.5	—	1.5	—	0.8	—	0.1	0.1	0.5	—	1.2	0.2	0.5	—	0.5	—
Aroma	2	0.6	—	0.7	—	0.7	—	1.0	—	1.4	--	1.1	—	0.5	—	0.7	—	3.4	—	3.0	—	1.0	—	1.4	0.1	1.3	—
Khartoum	104	73.3	18.0	84.8	16.4	87.7	16.5	85.9	18.1	78.7	12.7	75.5	20.5	85.0	20.5	83.2	21.0	99.1	17.9	102.0	20.8	98.2	19.3	85.9	18.7	86.6	18.4
Omdurman	105	30.5	25.0	28.1	29.1	26.3	24.5	36.5	41.4	33.9	35.5	35.1	33.6	28.4	34.3	30.6	32.0	27.5	33.8	38.7	46.3	45.9	42.2	38.7	34.8	33.4	34.4
Khartoum North	12	10.5	—	11.8	0.3	11.1	0.7	9.9	0.3	10.1	--	9.7	—	16.7	—	20.9	—	27.4	—	23.1	—	32.8	—	22.2	—	17.2	0.1
Khartoum North Prison	30	15.7	—	15.4	—	9.7	—	9.7	—	18.6	--	14.3	—	19.0	—	14.1	—	8.5	—	13.2	—	13.6	—	12.1	—	13.7	—
El Obeid	70	42.7	11.7	58.7	10.6	61.7	12.2	62.1	11.6	64.5	10-4	48.3	9.8	49.1	9.1	43.4	8.0	60.1	9.9	50.2	10.1	60.6	15.1	49.7	13.8	54.3	11.0
Nahud	36	25.6	8.4	21.1	5.9	23.4	5.7	24.1	4.0	19.1	4.6	22.2	3.6	19.6	3.8	17.3	1.5	21.3	4.5	27.3	4.5	22.7	8.9	25.1	5.8	22.4	5.1
Bara	14	5.7	—	6.2	—	8.0	—	8.1	—	5.3	--	5.0	—	6.0	—	7.7	—	1.7	—	3-0	—	5.0	—	2.7	—	5.4	—
Talodi	16	6.9	—	5.8	—	11.5	0.8	9.6	0.8	12.5	1.1	8.2	1.0	9.0	3.3	9.5	6.0	11.6	11.4	13.5	11.3	15.3	14.6	14.1	11.2	10.6	5.1
Dilling	8	15.4	11.0	18.5	8.0	19.0	18.0	21.0	13.5	18.0	4.0	8.7	6.0	6.5	7.5	6.5	7.2	8.7	10.0	8.3	8.3	12.5	8.4	20.1	24.6	13.6	10.5
Rashad	—	6.3	—	4.0	2.5	5.6	0.9	4.0	0.8	6.2	1.5	4.1	0.7	4.5	2.1	2.5	3.6	1.6	0.7	1.9	1.3	3.3	0.8	4.1	1.0	4.0	1.3
Kadugli	—	12.5	—	6.9	—	12.0	—	12.1	5.5	15.7	7.0	12.9	8.1	16.1	6.0	17.0	7.0	11.0	14.2	13.3	11.6	7-0	8.3	6.9	10.4	12.0	6.5
Port Sudan	89	52.7	3.2	62.1	5.1	50.9	2.9	50.8	6.2	51.4	3.7	52.6	3.6	56.0	3.0	54.3	5.1	61.4	4.8	61.6	3.6	70.8	5.4	76.2	6.2	58.4	4.4
Suakin	10	1.9	—	3.6	—	2.0	—	2.2	—	0.5	--	1.9	--	0.9	0.3	1.2	0.4	2.4	—	1.8	—	3.3	—	1.5	—	1.9	0.1
Tokar	18	6.0	1.0	2.3	3.3	16.3	3.3	6.1	4.6	5.0	5.0	--	—	—	—	—	—	—	—	3.0	0.2	3.7	0.7	4.7	0.9	3.9	1.6
Suakin Quarantine	20	—	—	—	—	—	—	—	—	—	—	2.0	0.7	1.0	4.0	0.1	1.4	—	—	—	—	—	—	—	—	0.3	0.5
Port Sudan Prison	13	12.0	—	13.5	—	15.8	—	6.2	—	7.3	—	14.3	—	15.4	—	12.3	—	30.4	—	17.5	—	10.1	—	11.8	—	13.9	—
Geteit	13	—	—	—	—	—	—	—	—	—	—	--	—	—	—	—	—	6.2	—	5.6	—	6.5	—	8.0	—	2.2	—
Malakal	140	89.9	33.3	103.5	35.9	114.1	42.5	103.7	38.2	90.9	19.6	82.7	18.0	98.4	14.7	97.4	20.5	93.0	19.2	106.2	30.6	96.2	34.4	75.7	21.0	96.0	27.3
Lady Baker	8	2.5	—	8.1	0.2	3.5	0.1	2.5	0.5	0.6	--	2.6	0.1	0.5	0.1	—	—	0.6	0.2	2.6	1.1	1.0	0.2	0.9	0.3	2.2	0.2
Dueim	38	1.6	12.3	16.3	0.6	15.7	1.5	11.5	4.0	14.2	2.9	17.1	0.9	18.5	0.3	17.4	1.0	0.6	13.8	14.4	1.4	11.4	3.7	29.2	2.4	14.0	3.7
Kosti	24	16.0	1.2	19.5	0.5	16.8	—	18.2	—	16.0	5.3	22.0	7.7	17.6	6.2	2.8	2.6	19.7	4.5	16.5	3.7	17.6	0.8	19.7	2.4	16.9	2.9
Total No. of beds.	1439	—	—	—	—	—	—	—	—	—	—	--	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average daily all hospitals	—	886.8	240.7	981.5	183.4	980.5	195.2	989.8	234.8	951.1	191.9	934.1	199.0	941.2	191.0	897.2	188.5	983.8	213.9	1006.1	220.4	980.9	238.0	1005.6	244.3	964.9	210.6

Average daily throughout year, all hospitals = 1175.5.

TABLE VIII.

RETURN OF CIVILIANS TREATED IN MILITARY HOSPITALS IN THE SUDAN

For the Year 1928.

Hospital	In-patients.		Out-patients.	
	1927.	1928.	1927.	1928.
Rumbek	359	418	18,144	12,432
Bara	212	181	5,282	6,612
Rejaf	274	299	5,921	11,749
Mongalla	401	444	27,390	32,889
Torit	655	821	21,265	23,826
Wau	783	1,182	27,400	34,880
Gallabat	65	38	1,354	843
Raga	208	283	4 171	4,232
Akobo	33	83	5,709	10,839
Fasher	702	508	7,923	13,805
Aweil	109	76	3,533	4,516
Nimule	58	105	8,316	22,101
Geneina	135	248	2,678	4,089
Yambio	233	353	33,130	40,747
Kajo-Kaji	465	326	43,778	40,496
Meridi	152	185	17,789	36,785
Yei	632	511	21,044	44,592
Kadugli	64	—	2,843	—
Tembura	823	955	52,433	106,087
Nyala	86	47	4,599	6,214
Ikotos	399	263	12,682	7,134
Kapoeta	37	171	2,260	4,602
Taali	—	—	3,502	—
Singa	499	513	12,136	12,164
Juba	—	444	—	18,964
Trav. Hospls.... ...	—	—	15,585	58,000
Total	7,384	8,454	360,867	558,598

TABLE IX.

Shows Medical Boards and Examinations held during the Year, 1928.

PLACE	Sick Leave		Service South		Invaliding		Pensionable Service		Permanent Service		Temporary Service		Check Examination	Assessment of Age	Grand Total
	Recd.	Not Recd.	Fit	Unfit	Recd.	Not Recd.	Fit	Unfit	Fit	Unfit	Fit	Unfit			
Khartoum... ...	28	—	35	8	137	33	61	31	178	33	39	6	77	5	671
Omdurman ...	1	—	2	—	14	2	—	—	2	—	—	—	—	—	21
Atbara...	—	—	1	2	70	24	16	7	32	12	48	—	15	4	231
Port Sudan ...	1	1	—	2	46	6	26	6	23	2	41	1	9	—	164
Suakin	—	—	1	—	1	1	—	—	—	—	—	—	—	—	3
Wad Medani ...	4	—	—	—	20	4	12	1	10	1	3	—	9	—	64
Makwar	—	—	—	—	14	5	3	1	1	2	1	—	1	—	28
Merowe	5	—	2	1	4	2	1	2	3	1	—	—	2	4	27
Debba	2	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Dongola	—	—	—	—	6	1	1	1	—	—	1	—	—	—	10
Singa	—	—	—	—	—	—	2	—	1	—	1	—	—	—	4
Malakal	—	—	1	1	8	—	5	—	2	—	—	—	—	1	18
El Obeid	4	1	3	1	7	—	4	3	1	—	2	—	—	2	28
Nahud	—	—	3	—	—	—	—	—	—	—	—	—	—	—	3
Wadi Halfa ...	—	—	—	—	2	—	2	—	—	—	—	—	—	—	4
Kassala	—	—	2	1	1	1	9	1	1	—	—	—	—	—	16
Gedaref	—	—	—	—	1	—	1	—	1	—	—	—	1	—	4
El Fasher	—	—	—	—	—	—	2	—	2	—	—	—	—	—	4
Talodi	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
El Dueim	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Tembura	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Greece	4	—	—	—	—	—	—	—	—	—	—	—	—	—	4
Paris	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
London*	56	19	—	—	7	3	—	—	137	—	—	—	—	—	222
Egypt*	60	4	1	—	3	—	—	—	6	—	46	2	—	—	122
Syria*	9	—	—	—	2	—	—	—	4	—	—	—	—	—	15
	175	25	52	16	343	82	147	53	404	51	182	9	114	16	1,669

* By Sudan Government Representatives.

TABLE X

Shows Receipts, In-patients, Out-patients, Operations during 1928.

Province.	Hospital or Dispensary.	In-patients.		Out-patients.		Hospital Charges.		Sale of Medicines.		Total Receipts.		Operations.	
		1927	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927	1928
						£E.	£E.	£E.	£E.	£E.	£E.		
Berber	Atbara	1,909	2,366	43,103	58,148	898	978	405	409	1,303	1,387	174	206
	Abu Hamed ...	129	149	11,025	15,394	13	15	14	11	27	26	8	14
	Berber	—	—	22,376	21,153	6	—	30	20	36	20	—	1
	Damer	—	—	7,876	7,170	1	—	—	—	1	—	—	—
	Shendi	—	383	23,427	26,694	29	56	47	27	76	83	—	—
	Trav. Hosp. ...	—	—	—	—	—	—	52	—	52	—	—	—
	Wad Hamid ...	—	—	1,566	2,332	—	—	—	5	—	5	—	—
	Zeidab	—	—	2,169	4,476	—	—	—	1	—	1	—	—
Blue Nile ...	Wed Medani ...	4,082	6,176	33,131	49,524	1,731	2,184	629	967	2,360	3,151	314	403
	Makwar	1,888	1,768	8,321	14,786	318	336	105	165	423	501	351	377
	Hag Abdulla ...	—	—	3,069	3,644	—	—	6	7	6	7	—	—
	Kamlin	—	—	5,166	4,784	—	—	—	4	—	4	—	—
	Managil	—	—	1,637	3,621	—	—	6	—	6	—	—	—
	Rufaa	—	—	9,759	11,233	—	—	—	—	—	—	—	—
	Abdel Galil ...	—	—	1,444	1,740	—	—	—	—	—	—	—	—
	Abdel Hakam ...	—	—	2,559	3,985	—	—	—	—	—	—	—	—
	Abdel Rahman ...	—	—	2,420	5,866	—	—	—	—	—	—	—	—
	Derwish	—	—	825	3,125	—	—	—	—	—	—	—	—
	El Radma	—	—	2,184	2,463	—	—	—	—	—	—	—	—
	El Remitab ...	—	—	1,908	4,155	—	—	—	—	—	—	—	—
	Ghubshan	—	—	2,694	2,389	—	—	—	—	—	—	—	—
	Hamad El Nil ...	—	—	2,451	2,725	—	—	—	—	—	—	—	—
	Hosh	—	—	2,713	3,168	—	—	—	—	—	—	—	—
	Komor	—	—	2,228	3,807	—	—	—	—	—	—	—	—
	Medina	—	—	4,796	6,334	—	—	—	—	—	—	—	—
	Nidiana	—	—	1,818	1,555	—	—	—	—	—	—	—	—
	Sabi Deleib ...	—	—	1,080	3,129	—	—	—	—	—	—	—	—
	Seleima	—	—	4,510	4,141	—	—	—	—	—	—	—	—
	Tayiba	—	—	2,323	2,307	—	—	—	—	—	—	—	—
	Tebub	—	—	1,997	2,320	—	—	—	—	—	—	—	—
	Wad El Atia ...	—	—	3,897	5,454	—	—	—	—	—	—	—	—
	Wad Naaman ...	—	—	1,993	2,329	—	—	—	—	—	—	—	—
	Wad Saadalla ...	—	—	2,528	2,811	—	—	—	—	—	—	—	—
	Wad Sulfab ...	—	—	2,892	2,651	—	—	—	—	—	—	—	—
	Hassa-Hissa ...	—	—	—	5,118	—	—	—	—	—	—	—	—
	Um-Degarsi ...	—	—	—	995	—	—	—	—	—	—	—	—
	Istarihna	—	—	—	1,687	—	—	—	—	—	—	—	—
	Dolga	—	—	—	620	—	—	—	—	—	—	—	—
Dongola ...	Merowe	768	707	24,160	31,182	218	298	93	91	311	389	182	155
	Dongola	264	337	34,201	36,639	69	55	41	46	110	101	88	102
	Argo	—	—	17,396	16,341	—	—	22	13	22	13	—	—
	Debba	—	—	11,132	14,150	—	—	27	6	27	6	—	—
	El Seir	—	—	10,129	10,599	—	—	1	—	1	—	—	—
	El Ghaba	—	—	3,178	7,739	—	—	3	—	3	—	—	—
	Kareima	—	—	12,633	21,301	—	—	12	11	12	11	—	—
	Mansurkoti ...	—	—	12,946	10,836	—	—	9	6	9	6	1	—
	Nuri...	—	—	12,746	18,517	—	—	16	20	16	20	—	—
	El Khandak ...	—	—	—	4,663	—	—	—	—	—	—	—	—
	Gureir	—	—	—	19,995	—	4	—	5	—	9	—	—
Halfa	Wadi Halfa ...	544	529	31,562	33,352	140	106	57	96	197	202	36	62
	Abri	—	—	7,316	6,054	—	—	1	3	1	3	5	5
	Delgo	—	—	2,110	2,843	—	—	—	2	—	2	—	—
Fung	Roseires	231	256	6,400	7,959	66	88	28	37	94	125	27	12
	Abu Sheneina ...	15	2	1,859	1,882	—	—	4	2	4	2	—	—
	Karkoj	—	—	5,298	6,035	—	—	—	—	—	—	—	—
	Kurmuk	111	128	5,183	10,797	8	4	12	17	20	21	—	—
Kassala ...	Kassala	2,362	2,480	31,740	39,565	580	696	388	592	968	1,288	403	639
	Gedaref	240	656	8,853	22,379	84	35	85	111	169	146	6	13
	Abu Deleig ...	2	32	3,972	4,563	—	—	—	2	—	2	—	—
	Aroma	—	110	3,999	6,172	—	—	—	—	—	—	—	—
	Derudeb	238	272	6,240	6,223	—	—	5	13	5	13	—	—
	Goz Rageb ...	139	62	4,292	4,573	—	—	—	22	—	22	—	—
	Haiya	—	—	493	—	—	—	—	—	—	—	—	—
	Hadaliya	—	—	4,579	4,035	—	—	—	—	—	—	—	—
	Khashm El Girba	—	30	5,198	10,163	—	—	1	1	1	1	—	—
	Galaat El Nahl ...	29	28	4,730	3,323	—	—	3	18	3	18	—	—
	Degein	—	—	3,411	5,566	—	—	—	—	—	—	—	—
	Mekali	—	—	5,417	6,125	—	—	—	—	—	—	—	—
	Khatmia	—	—	—	—	—	—	—	—	—	—	—	—
	N. Butana Trav. Disp.	—	—	—	3,679	—	—	—	—	—	—	—	—
	S. Butana Trav. Disp.	—	—	—	3,160	—	—	—	—	—	—	—	—
	Gallabat	—	—	—	—	—	—	—	—	—	—	—	—
	Abu Deleig Bridge	—	—	—	10,371	—	—	—	—	—	—	—	—
Khartoum ...	Khartoum	2,264	2,931	37,066	45,187	1,642	1,843	695	699	2,337	2,542	418	548
	Omdurman ...	1,267	1,788	53,763	49,868	576	512	570	434	1,146	946	207	433
	Khartoum North ...	511	767	30,108	24,133	90	173	278	505	368	678	18	18
	Ktm. Nor. Prison ...	410	326	9,730	12,967	—	—	—	—	—	—	8	1
	Gebel Aulia ...	—	—	1,237	990	—	—	—	—	—	—	—	—
	Geili...	—	—	7,092	7,097	—	—	1	—	1	—	—	—
	Wad Nubawi ...	—	—	—	12,680	—	—	—	—	—	—	—	—
	Murada	—	—	—	649	—	—	—	—	—	—	—	—
	Various	—	—	—	918	—	—	—	—	—	—	—	—
Kordofan ...	El Obeid	1,290	1,220	—	19,626	500	460	461	509	961	969	238	219
	Nahud	—	693	18,886	4,289	238	251	210	263	448	514	—	—
	Abu Zabad ...	—	—	17,271	20,994	—	—	—	—	—	—	—	—
	Bara	—	179	—	6,607	—	—	—	—	—	—	—	1
	Muglad	—	—	6,518	8,140	—	—	—	—	—	—	—	4
	Rahad	—	—	15,127	15,238	—	—	—	—	—	—	—	27
	Soderi	—	—	3,845	3,483	—	—	—	—	—	—	—	—
	Trav. Hosp. ...	—	—	—	—	—	—	—	—	—	—	—	—
	Um Ruaba ...	—	—	12,082	16,218	—	—	4	4	4	4	4	15
	El-Odaya	—	—	—	8,040	—	—	—	5	—	5	—	1
Nuba Mountains ...	Talodi	131	329	12,577	31,999	—	—	—	5	—	5	4	18
	Dilling	504	626	27,859	34,425	—	—	—	—	—	—	9	1
	Rashad	70	109	8,739	13,632	—	—	—	—	—	—	3	4
	Kadugli	—	228	—	20,068	—	5	—	46	—	51	—	—
	Delami	—	22	—	4,454	—	—	—	—	—	—	—	—
	Various	—	—	—	2,767	—	—	—	—	—	—	—	—
Red Sea... ...	Port Sudan... ...	1,890	1,622	35,831	40,898	1,448	1,464	574	597	2,022	2,061	220	205
	Suakin	65	69	7,996	8,252	17	13	54	34	71	47	—	—
	Tokar	87	125	9,228	12,185	35	48	71	80	106	128	20	9
	P. S. Prison ...	245	293	8,938	8,526	—	—	945	—	945	—	14	2
	Suakin Quarantine	45	33	—	—	—	—	—	—	—	—	—	—
	Akik	—	—	640	3,161	—	—	4	—	4	—	—	—
	Gebeit	—	95	12,680	7,853	—	—	12	2	12	2	—	—
	Gebeit Mine ...	—	—	6,057	3,973	—	—	7	—	7	—	—	—
	P. S. Quarantine ...	—	—	2,682	12,408	—	—	931	—	931	—	—	—
	Sinkat	—	—	10,715	9,500	—	—	18	4	18	4	—	—
	Musmar	—	—	—	6,328	—	—	—	—	—	—	—	—
Upper Nile ...	Malakal	2,370	2,119	45,351	36,324	235	257	92	72	327	329	475	204
	Akobo	—	—	306	—	—	—	9	—	9	—	—	—
	Abwong	—	—	4,797	3,328	—	—	80	43	80	43	—	—
	Bor	—	—	5,248	6,990	—	—	—	—	—	—	—	—
	Duk Faywil ...	—	—	3,821	3,007	—	—	—	—	—	—	—	—
	Kaka	—	—	111	6,957	—	—	—	—	—	—	—	—
	Fangak	—	—	1,777	4,842	—	—	129	51	129	51	—	—
	Gambeila	—	—	4,004	7,036	—	—	32	13	32	13	—	—
	Hillet Nuer... ...	—	—	4,271	572	—	—	—	—	—	—	—	—
	Kodok	—	—	7,191	5,474	—	—	19	8	19	8	—	—
	S. S. Kerreri ...	—	—	14,309	1,282	—	—	—	—	—	—	—	—
	S. S. Lady Baker ...	—	38	2,655	2,574	—	—	116	15	116	15	31	3
	Melut	—	—	4,061	6,017	—	—	—	—	—	—	—	—
	Nasser	—	—	2,548	2,850	—	—	64	45	64	45	—	—
	Renk	—	—	8,372	9,609	—	—	30	22	30	22	—	—
	Shambe	—	—	6,651	5,641	—	—	—	—	—	—	2	—
	Gelhak	—	—	—	2,238	—	—	—	—	—	—	—	—
	Yirrol	—	—	—	13,953	—	—	—	2	—	2	—	—
	Various	—	—	9,609	36,007	—	—	—	—	—	—	10	6
White Nile ...	Ducim	313	353	18,105	31,435	164	282	157	202	321	484	57	38
	Kosti	523	634	8,242	9,162	103	137	96	105	199	242	6	2
	Gebelein	—	—	5,404	5,815	—	—	1	—	1	—	—	—
	Kawa	—	—	5,695	5,697	—	—	—	3	—	3	—	—
	Geteina	—	—	8,116	5,862	—	—	20	39	20	39	—	—
	Shawal	—	—	2,119	—	—	—	3	2	3	2	—	—
	Wad El Zaki ...	—	—	884	—	—	—	—	—	—	—	—	—
	Aba Island ...	—	—	3,582	8,230	—	—	3	7	3	7	—	—
	Fashashoya ...	—	—	2,805	1,324	—	—	16	8	16	8	—	—
	Tendelti	—	—	10,179	9,019	—	—	—	—	—	—	—	—
	Zenuba	—	—	2,366	—	—	—	1	—	1	—	—	—
	Shegeig	—	—	—	4,006	—	—	—	57	—	57	—	—
Mongalla ...	Rejaf	—	—	2,167	—	—	—	—	—	—	—	—	—
	Quarantine...	—	—	—	—	—	—	—	—	1,875	2,771	—	—
	Fines	—	—	—	—	—	—	—	—	54	56	—	—
	Miscellaneous	—	—	—	—	—	—	—	—	555	506	—	—
		26,023	31,510	1,066,830	1,445,083	9,209	10,368	7,805	6,433	19,408	20,134	3,415	3,913

TABLE XI.

Statement of estimated expenditure during the year 1928 and Budgetary estimates for 1929.

Item.	1928. Actual Expenses £E.	1929. Budget Estimates £E.
Personnel :—		
1. HEADQUARTERS :—		
(a) Classified	14,872	
(b) Unclassified	465	
2. HOSPITALS :—		
(a) Classified	40,363	
(b) Unclassified	9,318	
3. QUARANTINE :—		
(a) Classified	2,388	
(b) Unclassified	770	
4. SLEEPING SICKNESS :—		
(a) Classified	8,180	
(b) Unclassified	496	
5. GEZIRA SCHEME :—		
(a) Classified	2,861	
(b) Unclassified	3,030	
6. BILHARZIA AND OPHTHALMIC TRAVELLING HOSPITALS :—		
(a) Classified	2,914	
(b) Unclassified	3,286	
	88,943	
Allowances and Services :—		
1. Headquarters	49,863	
2. Hospitals	27,832	
3. Quarantine	3,399	
4. Sleeping Sickness	5,918	
5. Gezira Scheme	6,712	
6. Bilharzia and Ophthalmic Hospitals	4,071	
	186,738	238,534
To be recovered from other sources	16,856	22,099
	169,882	216,435

N.B.—Budget set out in new form for 1929

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