

Report on the public health / Southern Rhodesia.

Contributors

Southern Rhodesia. Department of Health.

Publication/Creation

Salisbury : Argus, [1922]

Persistent URL

<https://wellcomecollection.org/works/b392rayq>

License and attribution

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

SOUTHERN RHODESIA.

REPORT

ON

The Public Health

FOR THE YEAR 1922.

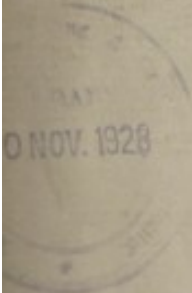
Presented to the Legislative Council,
1923.

Salisbury, Rhodesia :
Printed by the Government Printer

—
1923.

[A 18—1923.]

Don 2600



CONTENTS.

PART I.

	PAGE
Introductory	1
Vital Statistics	2
Population, Births, Deaths	
Infectious, Communicable or Preventable Diseases	3
Smallpox, Chickenpox, Influenza, Enteric Fever, Malta Fever, Bilharziasis, Venereal Disease, Tuberculosis, Infectious and Contagious Diseases of Childhood, Endemic Diseases of the Tropics	
Health of Natives on Mines	7
Government Medical Service	9
Salisbury, Gwelo, Shamva, Rusape, Marandellas, Charter, Bulalima-Mangwe, Inyati, Que Que, Ndanga, Lomagundi, Bindura	
Hospitals and Asylums	14
Public Health Laboratory and Research	16
Legislation	16

PART II.

Report on Ingutsheni Mental Hospital	17
Report on Pasteur Institute and Public Health Laboratory	19
Tabular Appendix	25

SOUTHERN RHODESIA.

Report on the Public Health for the Year 1922.

Presented to the Legislative Council,
1923.

PART I.

In presenting this the twenty-third annual report on the state of the public health of Southern Rhodesia, in all probability the last to be presented to the Administration of the British South Africa Company and this Legislature, it may not be out of place to commence with a short review of the health of the community since the occupation, and a statement of the situation as it exists to-day, with special reference to the expansion of preventive medicine and its influence on the welfare of the individual and the future prosperity of the country.

When Rhodesia was first occupied its prosperity and indeed its very settlement at all was dependent on the subjugation of tropical and sub-tropical diseases, both in man and stock, and it was fortunate that just about this time scientific research, encouraged and fostered by the then Colonial Secretary, was directed to the cause and prevention of malaria and allied diseases, which from the dark ages had held back civilisation in the countries where they existed. The knowledge acquired was startling, brilliant and of untold benefit to mankind in general and to ourselves in particular, for without our present day knowledge of the propagation and prevention of insect-borne diseases in man and beast, it is difficult to say how far beyond the mere fringe of mining camps and centres of population civilisation would have been economically possible.

To a certain extent Rhodesia stands to-day as an example of how beneficial colonisation in a tropical country can be effected in the light of recently acquired knowledge, but unfortunately beyond this point and within her own borders she also provides many examples of what might have been accomplished, if only the knowledge had been more universally and practically applied.

In the early days when the population was still small and the public health and sanitary problems were limited to the prevention of malaria, which was common to almost everyone, the control of the health of the community could well and profitably be left in the guiding hands of a central authority; but with the growth of population, improved conditions of life and the practical application of methods of prevention, malaria in the process of time is being slowly but surely eliminated as a disease of outstanding importance in the welfare of our towns, villages and more settled parts of the country, and to-day we have arrived at the transition stage when the direct control of the public health must pass more and more into the hands of local authorities.

This change in the sanitary life of the people is well illustrated by the change in the character of the death rate; in 1904, when the registration of births and deaths first became compulsory, and accurate statistics could be obtained, the death rate was 18.8 per thousand, and that amongst a population consisting largely of young adult males in whom under more settled conditions of life the death rate is normally at its lowest.

whilst to-day, with an age and sex distribution more nearly approaching that of older established communities, the crude death rate has fallen to 8.98 per thousand.

But to the benefits of increased population and extension of civilisation are invariably to be added additional responsibilities connected with the welfare of the people as a whole; and the mighty problems of tuberculosis, the control of venereal disease, maternity and child welfare, and the isolation of infectious and contagious diseases, are already beginning to take their place as questions of outstanding public interest.

Town councils and other local authorities are still inclined to avoid these responsibilities and claim that they involve expenditure which should rightly be borne by the Government; this has already been the subject of criticism and controversy, and in what form and in what proportions the expenditure involved shall be shared by the State and by the local rates is becoming a matter for the legislature of the country to decide.

With the establishment of municipalities, village management boards and other sanitary authorities the functions of a central health department become limited to the control, supervision and co-ordination of the work as a whole, and the administration of our sanitary laws and their local application must eventually devolve on the local authorities concerned. It is they who are brought into direct contact with the needs of the people; it is they who are the first line of defence in the battle against disease; and on them and on the general practitioner must fall the primary responsibility for its prevention and cure.

From this it would appear as if only the European population were to be taken into account, but that is not so, for in South Africa in association with the European element we have always a large floating native population working for and dependent on the white man. They also have to be considered in every scheme of sanitary control and reform, and, owing to their low standard of living, and their liability to disease when congregated in limited spaces, they add materially to the difficulties and the cost of the public health services as a whole.

Vital Statistics.

Population.—The census completed in 1921 gave a population of 33,620, and if we adopt the Registrar General's method of estimating the population in inter-censal years, that is, assuming that the population will increase in geometrical progression in every year of each censal period, then the European population of Southern Rhodesia in the middle of 1922 may be taken as 34,838.

There is no means of accurately arriving at the native population in inter-censal years.

Birth Rate.—The total number of births registered was 909, giving a birth rate of 26.09 per thousand of the population, a decrease of 1.04 per thousand since last year. It is, however, a higher birth rate than that for England and Wales in 1921, which was returned as 22.4 per thousand of the population.

There were 14 plural births—all twins—10 illegitimate and 17 still births.

Death Rate.—The deaths recorded numbered 313, giving a crude death rate of 8.98 per thousand of the estimated population; and if the population is corrected for age and sex distribution as in England and Wales, a corrected death rate of 10.09 per thousand is arrived at, this

being the lowest death rate on record in Southern Rhodesia since the occupation.

Infantile Mortality.—The number of deaths occurring in infants under one year of age was 54, giving a death rate of 17.25 per cent. of the total deaths and a mortality of 59.4 per thousand births, which approximates to the average infantile mortality rate in the rural counties in England and Wales for 1920, apart from counties such as Lancashire and Yorkshire, etc., where large manufacturing centres exist.

The infantile death rate for 1921 in Southern Rhodesia was 62.4 per thousand births.

Under normal conditions of life in settled communities where the people are proportionately divided into labouring, professional, commercial, clerical and idle classes, and consist of one race, speaking one tongue, governed by the same laws and influenced by similar social conditions, variations in the infantile mortality rate may be looked upon as a measure of the success or failure of the sanitary authorities concerned, and are consequently closely studied by sanitary administrators and students of social reform. The same conditions do not apply here, however, where the labouring class is in actual fact the indigenous native, whose social welfare cannot yet be judged by European standards, and on this account comparison of our European infantile mortality with that of other countries as a guide to the health of the community is of somewhat doubtful value.

Under ordinary conditions it may generally be assumed that a low death rate implies a low birth rate, or a preponderance of the population at the periods of life when death is least liable to occur, that is, in young adult life, and conversely a high birth rate implies an increase of the population at the periods of life when they are most susceptible to disease, viz., in the first few years of life, and old age.

But in Rhodesia, though the mortality at young ages is proportionately low, in adult life it is still above the normal, affecting particularly the rural as opposed to the urban sections of the population, and most marked between the ages of thirty and fifty years.

This abnormal mortality amongst young adults in country districts implies that the climatological conditions to which this section of the people are peculiarly exposed are still exerting an adverse influence on the health of the community; but, these diseases being largely preventable, it is fair to assume that as more settled conditions prevail this mortality in these periods of life will tend to decrease.

Infectious, Communicable or Preventable Diseases.

Small-pox.—Twenty separate and distinct outbreaks were reported and placed under police control during the year; the number of outbreaks and the number of persons infected being very much the same as in 1921. The long drought and hot dry spring with short rainfalls in the rainy season were conducive to an extension of the disease, which, though more or less constant amongst the native population as a whole, generally reaches its height in October and dies away with the advent of the rainy season. With two exceptions these outbreaks were limited in extent and did not spread, the exceptions being in the Darwin and Gutu native districts, in both of which sharp epidemics affecting 100 and 260 persons respectively were dealt with. Only one case is reported as occurring in a European, a pauper of no fixed abode, who was living on the veld with the natives in the Victoria district.

Vaccination.—These periodic outbreaks of small-pox amongst the native population have the merit of being the most efficient factor in ensuring the systematic vaccination and re-vaccination of the European population, most of whom are well protected, with perhaps the exception of a few scattered children in the more remote parts of the country.

There were 70,324 vaccinations carried out during the year, chiefly on natives, but these figures do not include the vaccinations done by district Medical Officers at Government and state-aided schools.

Chicken-pox.—Thirteen outbreaks of chicken-pox were reported, both amongst Europeans and natives, though it is possible that some of the latter, especially those reported from native districts, were mild and limited outbreaks of small-pox.

Influenza.—Influenza in an epidemic form again visited the country, attacking some districts more than others, and occurring chiefly amongst natives employed on mines. Eleven separate outbreaks were reported to this Department, whilst 51 deaths were registered, 16 Europeans and 35 natives; 65 deaths were also recorded amongst native mine labourers as being due to this disease. These figures may be somewhat misleading, as undoubtedly a considerable proportion of the deaths returned as due to pneumonia, especially amongst native mine labourers, were primarily influenzal in origin. The type was not on the whole as severe as that encountered in previous epidemics. At the same time these recurrent waves of this disease are disquieting and are the cause of considerable loss of life annually, more especially amongst natives in employment.

Enteric Fever.—No epidemic of enteric fever was reported, and if the sporadic incidence of this disease is to be taken as any guarantee of the sanitary life of the people, especially in the towns, then it is gratifying to note that the incidence has shown a steady decline in the last three years.

The admissions to hospitals in the last three years were as follows:—

1920	...	...	...	...	74	cases
1921	...	...	...	...	53	„
1922	...	...	...	...	46	„

The mortality amongst Europeans in 1921 was singularly low, being only 4.25 per cent. of those treated in hospitals, but it has risen again this year to 13.86 per cent.

Malta Fever.—Malta fever presents as many difficulties as ever. The admissions to hospitals on this account totalled 12. So far it has not been found necessary to declare it an infectious disease, and it is not possible to gauge even approximately to what extent it is prevalent in the districts. It is, however, the cause of some anxiety in certain parts of the country where it has declared itself most prominently, not so much on account of its mortality, which to date has been nil, but rather on account of the protracted illness and lengthy period of invalidity. Up to now the disease has shown no tendency to become epidemic in type—in fact, it is rather the contrary, for the scattered nature of the cases and the manner in which only one member of a family is infected adds considerably to the difficulty of tracing the origin of the infection.

Research has been continued in the Public Health Laboratory during the year on the relationship between the organism of Malta fever and that of contagious abortion in cattle. That there is a definite bacteriological relation between them there is little doubt; but what influence, if any, the presence of contagious abortion in cattle, especially in dairy

herds, has on the occurrence of Malta fever in man is still a matter of conjecture.

The remarks in this connection of the Government Bacteriologist as contained in his report, which is to be found in the appendix of this report, are worthy of study.

Bilharziasis.—Very few reports on the prevalence of bilharziasis have been received during the year, and I have not had the opportunity of examining the returns of the Medical Inspector of Schools, who is brought mostly into contact with it.

A number of cases have received hospital treatment with intravenous injections of tartrate of antimony, with satisfactory results.

Little or no work has been done in the clinical laboratory on this disease owing chiefly to pressure of other work, but also to lack of material.

Venereal Disease.—It is difficult to gauge whether venereal disease is increasing to any great extent or not amongst the native population. Reports of its prevalence and spread are as a rule found on investigation to be considerably exaggerated. It would be difficult to arrive at any accurate knowledge of its prevalence without a systematic survey of the native population, especially those employed in towns and on mines, and this would probably require special legislation. Regulations for the medical examination of natives in employment in European areas have only so far been applied by the Salisbury Municipality, and the results to date show that approximately about one per cent. of the natives examined are affected with venereal disease, a large proportion being gonorrhœa, this being very much in accordance with the official estimate made prior to the promulgation of the regulations. The machinery for dealing with venereal disease in the country, whether in towns, villages or mining areas, is, I am sorry to say, quite inadequate, and I am afraid must remain so until a more modern and up-to-date Public Health Act is brought into force.

Salvarsan and allied synthetic preparations of arsenic are issued to Government Medical Officers on request, for treatment of certified paupers suffering from syphilis, whilst other anti-syphilitic remedies are issued free of charge to Native Commissioners, missionaries and others for free distribution to affected natives applying to them for relief.

What is most urgently required is suitable buildings at convenient centres for the hospitalisation and systematic treatment of these diseases in natives, irrespective of whether they are in employment or not.

Tuberculosis.—The mortality from all forms of tuberculosis shows a decrease, there being 87 deaths as compared with 106 in 1921, of which 72 were natives and 15 Europeans.

Tuberculosis of the lung or phthisis claimed 73 deaths, the balance being ascribed to tuberculosis of other organs.

Phthisis amongst Europeans and coloured is not spreading to any marked extent, but the same cannot unfortunately be said of its prevalence amongst indigenous natives. Here, however, it is mostly found in those who are in employment or in direct contact with civilising influences; the native mining community, by virtue of their employment and congregation in compounds, being the greatest sufferers.

Any relation between bovine and human tuberculosis is so far conspicuous by its absence in this country, as apart from the fact that bovine

tuberculosis has not yet been found to be a serious disease in cattle in Rhodesia; the persons most affected belong mainly to non-milk-drinking races.

Infectious and Contagious Diseases of Childhood.—Outbreaks of an infectious and contagious character in childhood tend to increase, especially amongst school children, and outbreaks of measles, whooping cough and scarlet fever have all been reported during the year. The type in every instance has been mild, and it is satisfactory to note that only three deaths occurred from any of these causes, there being one European and two native deaths from whooping cough. This is in no way unusual, as only 20 deaths have been reported in the last four years from these diseases.

They are made up as follows:—

	European.			Native.			
	1922.	1921.	1920.	1922.	1921.	1920.	1919.
Scarlet fever ... ..	...	...	...	...	...	...	...
Measles ... ..	...	...	...	...	...	...	...
Diphtheria ... ..	...	3	2	5	...	...	1
Whooping cough ...	1	4	...	1	2	1	...
Mumps, etc. ... ..	...	...	...	...	...	...	...
Total	1	7	2	6	2	1	...

The prevalence of endemic diseases of the tropics which are commonly met with in Southern Rhodesia and which together form the bulk of the invalidity of the European population for three to four months in every year, and here I refer to malaria, blackwater fever and dysentery, was markedly affected by the climatic conditions of the past year. The prolonged drought in January, February and March meant that malaria reached its maximum earlier than usual, but also owing to the drying up of their breeding pools anophelines were reduced in numbers, with a marked reduction in the cases of malaria and blackwater fever, there being 668 cases admitted to hospitals, as against 1,060 in 1921. Conversely dysentery and diarrhoeal diseases showed an increase in their number, owing chiefly to the lowering of the sources of water supply, this being especially noticeable in rural districts, though the water supplies in one or two of the towns, apart from being a cause of anxiety as to their permanency, were far from free from the risk of pollution common to prolonged stagnant water. It is interesting to note the dysenteries reported upon by the Bacteriologist were most frequently bacterial in origin.

Research into the causes of blackwater fever was commenced by Dr. J. G. Thomson, of the London Tropical School, early in the year, and continued by him up to the end of July, when owing to other duties he had to return to London. During the period he was in Rhodesia he was able to personally investigate a number of cases of blackwater fever, both in Salisbury and in the districts. His labours at first were naturally of a preliminary character, being devoted largely to the confirmation or otherwise of results already published, and so far he has got little beyond the stage of determining the close relationship of blackwater fever to malaria.

At the time this report is going to Press, Dr. Thomson is again in Rhodesia and is applying himself chiefly to investigations into the presence or absence of hæmolytic toxins in the blood of those who are potential sufferers.

Apart from the annual variations in the general incidence of malaria and blackwater fever, which are largely determined by the seasonal con-

ditions, it is satisfying to be able to record that if we take the last three censal years we find that the admissions to general hospitals from malaria have decreased by nearly 50 per cent. in proportion to the population in the last fourteen years. In the census year of 1907 a total of 47.5 per thousand of the population were admitted to the various hospitals on account of malaria; in 1911 this fell to 31.3 per thousand, whilst in 1921 this was further reduced to 14.35 per thousand.

Health of Natives on Mines.

There was a slight decrease in the average number of natives employed on mines throughout the country during the year, being 35,718, as compared with 37,605 in 1921 and 37,669 in 1920.

The sickness incidence rate per thousand of natives employed was lower, being 640.07 per thousand, as against 735.12 per thousand in 1921. The death rate from all causes was slightly higher, being 21.47, as compared with 20.82 in the previous year, the chief causes of sickness being malaria, influenza and pneumonia.

There was a marked increase in the number of cases of pneumonia, 1,527 cases being recorded with 311 deaths, as against 1,000 with 215 deaths in 1921; the death rate per thousand per annum employed in 1922 being 8.71, as compared with 6.73 in 1921.

In one or two instances, notably on the King's Asbestos Mine, the type of pneumonia presented peculiar features, which were the subject of laboratory investigation and which are commented upon by the Bacteriologist in his report.

A number of preventative inoculations of susceptible natives were carried out during the year on several of the larger mines, without, however, much apparent result. In some hands, however, curative inoculation with Lister's eight strain vaccine proved distinctly beneficial.

The epidemic of influenza which visited the country attacked some of the mines, though the general mortality was not so high as in 1921, that is, if we exclude those deaths from pneumonia which were returned under that heading.

The compound inspectors carried out their work efficiently and tactfully throughout the year. A good deal of their time was occupied in enquiring into and dealing with cases of alleged non-payment of wages. The natives themselves are largely to blame in many of these cases, as it is either difficult to get them to complain when they really have a cause, or else their complaints apply only to trivialities. These cases only indirectly influence the health of the community, but are included amongst the duties of Government Inspectors of Compounds.

The following table is a comparative statement of mortality amongst natives employed on mines in Southern Rhodesia for the twelve months January to December, 1922, with rates for the last thirteen years for comparison:—

*Comparative Statement of Mortality amongst Natives Employed on
Mines in Southern Rhodesia, January to December, 1922.*

Month.	Average No. of natives employed.	No. of deaths from disease.	Death rate per 1,000 per mensem from disease.	No. of deaths from accident.	Death rate per 1,000 per mensem from accident.	Total No. of deaths.	Death rate per 1,000 per mensem from all causes.
January ...	34,501	35	1.01	6	.18	41	1.18
February ...	35,331	43	1.21	3	.09	46	1.30
March ...	34,664	39	1.13	7	.20	46	1.33
April ...	35,664	26	.73	4	.11	30	.85
May ...	36,000	39	1.08	8	.22	47	1.31
June ...	35,884	55	1.53	12	.33	67	1.87
July ...	36,335	53	1.46	5	.14	58	1.60
August ...	35,805	59	1.65	11	.31	70	1.95
September ...	36,202	104	2.87	6	.17	110	3.04
October ...	36,548	88	2.40	10	.27	98	2.67
November ...	35,959	69	1.90	9	.25	78	2.15
December ...	35,723	71	1.99	7	.19	78	2.18

Totals and Averages.

Year.			Per annum.		Per annum.		Per annum.
1922 ...	35,718	681	19.07	86	2.40	767	21.47
1921 ...	37,605	689	18.30	94	2.50	783	20.82
1920 ...	37,669	599	15.90	75	1.99	674	17.90
1919 ...	30,296	507	16.73	90	2.97	597	19.71
1918 ...	32,766	3,629	110.76	88	2.69	3,717	113.44
1917 ...	38,861	700	18.01	149	3.83	849	21.85
1916 ...	40,420	911	22.48	172	4.24	1,083	26.73
1915 ...	37,928	832	21.94	159	4.19	991	26.13
1914 ...	36,100	897	24.85	135	3.74	1,032	28.59
1913 ...	33,543	783	23.49	158	4.71	946	28.20
1912 ...	34,494	1,073	31.11	163	4.73	1,236	35.83
1911 ...	37,909	1,085	28.62	164	4.33	1,249	32.95
1910 ...	37,826	1,682	44.74	182	4.81	1,864	49.28
1909 ...	32,721	1,383	42.27	161	4.92	1,544	47.19

The distribution of labour amongst these employers in 1922 was as follows:—

3	properties	employing	2,000	natives	and	over
1	property	"	1,500	"	"	"
4	properties	"	1,000	"	and	under 1,500
7	"	"	500	"	"	1,000
1	property	"	400	"	"	500
8	properties	"	300	"	"	400
11	"	"	200	"	"	300
46	"	"	100	"	"	200
57	"	"	50	"	"	100
72	"	"	25	"	"	50
246	"	"	under 25 natives			

The following table shows the number of cases of sickness, number of deaths, death rate per cent., sickness incidence per thousand per annum, and death rate per thousand per annum amongst natives employed on mines in Southern Rhodesia for the year 1922:—

Number employed, 35,718.

Name of disease.	Total sick.	Total deaths.	Case mortality per centum.	Sickness incidence rate per mille per annum employed.	Death rate per mille per annum employed.
Malaria	3,611	46	1.28	99.48	1.29
Scurvy	386	25	6.50	10.63	.70
Syphilis	158	9	5.69	4.35	.25
Pneumonia	1,527	311	20.36	42.07	8.71
Phthisis	89	36	40.45	2.45	1.01
Other Diseases of Chest ...	2,410	30	1.24	66.40	.84
Dysentery	273	16	5.86	7.60	.45
Diarrhoea	476	3	.63	13.22	.08
Other Intestinal Diseases ...	179	19	10.06	4.70	.53
Heart Disease	46	26	56.52	1.30	.73
Debility	285	9	3.16	8.00	.25
Other Diseases	3,658	86	2.35	101.61	2.40
Minor Ailments	7,794	...	...	216.50	...
Accidents	245	86	35.10	6.81	2.40
Influenza	1,905	65	3.41	52.98	1.82
Totals	23,042	767	3.33	640.07	21.47

Government Medical Service.

No changes have been made in the conditions of service of doctors or nurses.

District Medical Officers have been maintained at full strength, with the exception of Inyanga, where the existing Medical Officer being retired on account of age, no further appointment was considered necessary, Inyanga being now included in the district of the Medical Officer at Rusape, and the establishment of a district nurse who will reside at Inyanga and be in touch with the Medical Officer by telephone is at present under consideration.

The Government nursing service has been strengthened by an additional eight appointments.

The following extracts are taken from the annual reports of the Government Medical Officers as having some bearing on the public health of their several districts:—

SALISBURY DISTRICT.—There were 176 cases of malaria treated in the Salisbury Hospital with three deaths, as against 320 cases with three deaths last year.

Seasonal Mortality from Disease.—The following table shows the number of deaths from the principal diseases occurring month by month among European and coloured in hospital:—

Disease.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Malaria	1	1	...	...	...	1	...	...	...	...	...	...
Blackwater ... ..	...	1	1	...	...	...	...	...	...	...	...	...
Pneumonia	2	4	4	4	2	1	2	6	14	4	2	2
Dysentery ... ..	...	2	...	...	...	...	...	...	...	...	1	...
Enteric	1	...	...	...	...	...	...	...	...	...	...	...
Influenza ... ..	...	...	...	1	...	...	...	...	3	1	...	...

Remarks on Important Disease.—The above six diseases represent only about 30 per cent. of the total recorded cases in hospital, as against over 60 per cent. last year. This, as will be seen, was due to the great drop in the number of cases of malaria, blackwater and influenza.

There were only seven cases of blackwater fever in the European hospital with two deaths, as compared with 18 cases with three deaths last year, and 25 cases with two deaths in 1920. There were nine cases of enteric fever in the European hospital with one death, as compared with 14 cases and one death last year, and 23 cases and three deaths in 1920. There were no cases in the native hospital, nor were there any last year. Three deaths were recorded in the district. There have been several small outbreaks of infectious diseases, including measles, mumps, chicken-pox, scarlet fever and diphtheria. Most of the cases have been of mild type, and there were no deaths.

The Gaol.—The general health of the prisoners in the gaol was very good during the year. There were only 16 cases of sickness amongst the Europeans, all of a mild character. The total cases of sickness amongst the natives were 251, as compared with 294 cases last year.

GWELO DISTRICT.—*European Population.*—The population of the town and commonage was returned as 925 at the last census; of these, 484 were males and 441 females. The district population was returned as 1,049 males and 817 females. This return includes the districts of Que Que and Selukwe, but not the towns.

Births.—The registered births were 66, as compared with 75 last year; this number includes the district births.

Deaths.—There were 16 deaths registered, as compared with 23 last year.

Influenza.—It would appear that yearly about July we are to expect cases of influenza with different degrees of severity, varying from a fairly mild catarrh to the severe pneumonic type. During the year under review this is precisely what occurred here, mild cases coming under notice in July, increasing in severity till about the middle of September, and then gradually subsiding.

One hundred and eighty-three Europeans were treated in hospital for various complaints.

Natives.—The health of the native community has on the whole been satisfactory. Malarial fever has, as is usual, been the most frequent cause of ill-health; there were no deaths from this disease. Scurvy was the next disease that a fair amount was seen of; the reason for this can but be put down to the exceptionally dry season, with the consequent shortage of the items of diet that are of an anti-scorbutic nature. Tropical ulcer was prevalent and proved most difficult to treat. Numerous remedies have been tried, but not one has earned the name of specific. Of the other more noted diseases, pneumonia, bronchitis and influenza occurred in the order of frequency stated; there is nothing of special interest to record about these. One case of small-pox occurred on a farm at Hunter's Road, but due to prompt measures being taken, the disease fortunately was prevented from spreading. A few cases of chicken-pox came under notice and were suitably dealt with. There was one case of tetanus.

Vaccination.—A number of children were vaccinated during the year, both in and out of school. The native population is fairly well protected in this respect, especially as far as the adults are concerned.

SHAMVA DISTRICT.—This year gave us the greatest number of blackwater fever cases—21, as against the last greatest number of 15.

The local river—the Shamva Nyama—has now been cleared of bush and scrub along its banks and the bed of the stream cleared as far as possible.

Those of the school children who needed it were vaccinated. There were three cases of small-pox during the year. All natives in surrounding quarters, possible contacts, etc., were duly vaccinated. The district is now well protected against another invasion of this disease.

RUSAPE DISTRICT.—Estimated European population, 530, of which children, 183. Births: European, 15; males 7, females 8. Deaths: Male 1, females nil; cause, old age.

Very little malaria occurred during the year until the rain set in in October. Blackwater fever has been conspicuous by its absence. Only one case, that of a native child, occurred, and that unfortunately proved fatal. An epidemic of small-pox broke out in a portion of the Chiduku reserve, bordering the Marandellas district, from which locality it had spread. The outbreak was confined to one kraal, in which between twenty and thirty cases occurred. The mortality was high, ten deaths occurring, 3 adults, 7 children. Segregation was not attempted, it being deemed likely to lead to concealment and further spread. All the natives in that part of the district not recently vaccinated were vaccinated. The disease did not spread to other parts and rapidly died out. Mosquitoes are rather prevalent in Rusape township. Much needed steps are, I

understand, being taken to clear scrub bush from the vicinity of the township, and to keep the grass down.

The local hospital, erected partly by local subscription, partly by a grant from Red Cross funds and partly by a donation from the British South Africa Company, has been opened. It is run officially by a very small committee on efficient and economical lines.

MARANDELLAS DISTRICT.—No new case of Malta fever occurred, as compared with six cases last year. It is understood the district is now clear of contagious abortion.

The village sanitation and water supply are satisfactory. Incinerators have been provided for the Police camp and the village.

A native location has been opened during the year, and good work has been done in clearing undergrowth, draining and making up roads and tree-planting.

There was an outbreak of small-pox in the Wedza district, almost entirely confined to unvaccinated children and young adults. A total of 23 deaths was reported. Twenty-one thousand nine hundred and sixty-one vaccinations were done, of which 7,828 were at Wedza. The last systematic vaccination is said to have been undertaken over ten years ago.

A small nursing home was opened in February, but had to be closed in August owing to lack of support. There is now no hospital in the district, and all serious cases have to be sent to Salisbury.

CHARTER DISTRICT.—The estimated European population of Charter district is 912; Chilimanzi, 916. The births in Charter were 30, and the deaths 6 outside Umvuma.

Sporadic cases of influenza occurred throughout the year, and quite an epidemic broke out amongst the prisoners in the local gaol from August to October; in fact, there were 42 cases of illness in the gaol during the year, which is rather a large number. Other diseases noted were malaria and rheumatism, mostly at the end of the rainy season; while among natives the chief diseases met with have been varicella, low forms of influenza, an odd case of leprosy, many cases of tertiary syphilis, and about 20 cases of small-pox in the Sabi Reserve, Seed and Antelope Farms.

The rainfall for the year was 21.98 inches, which is rather less than in the previous year, when it was 29.63 inches.

BULALIMA-MANGWE DISTRICT.—Among the European population there has been very little sickness, and except for the outbreak of influenza there have been no epidemics.

GWANDA DISTRICT.—*European Population.*—Males: Rural, 41; urban, 168. Females: Rural, 32; urban, 73.

Births.—Male: Rural, 1; urban, nil. Females: Rural, 3; urban, 1.

Deaths.—Males: Rural, 2; urban, nil. Female: Nil.

No definite relation between climatic conditions and sickness has been observed since my arrival at Gwanda in November, 1922.

A case of typical encephalitis lethargica is at present in Gwanda Hospital.

INYATI DISTRICT.—*Estimated European Population.*—Males, 268; females, 165; children, 310.

Births.—Thirteen.

Deaths.—Three.

One cannot say that any particular disease is prevalent at any particular time of the season, the general health is so good amongst the Europeans.

During the period September to December there was a slight outbreak of influenza amongst some of the natives, but it was not of a serious nature.

The general sanitation of the district is good. No improvement has yet been made in connection with the water supply to the Inyati camp. It is still the unsafe bucket haulage as last year, from an open well.

QUE QUE DISTRICT.—*Population.*—The estimated population of the Que Que Police district is 875, consisting of about 575 adults and 300 children.

Births.—There were registered 26 births, consisting of 15 males and 11 females.

Deaths.—There were 7 deaths, 6 being males and 1 female.

Influenza was prevalent throughout the year and was the cause of much sickness, both amongst Europeans and natives, and many deaths among the latter. There were very few cases of malarial fever, either amongst Europeans or natives. One case of blackwater in a patient recently from the Shamva district occurred here at the latter end of the year.

NDANGA AND BIKITA DISTRICTS.—In spite of the drought, there has been a considerable amount of malaria amongst the European population of these districts during the year. In the last three months of the year there were three cases of blackwater fever, contracted in the Ndanga district—two European and one native. I mention these cases as it is most unusual in these districts to see blackwater at this time of the year.

The vaccination of natives was continued in the early months of the year in both Ndanga and Bikita. During February over 1,100 were vaccinated. Although it is impossible to say how many failed to come for vaccination, it is considered that these districts may be now looked upon as well protected against any severe epidemic of small-pox.

Following on the low rainfall of the season 1921-1922, there has been a severe famine in these districts. The possibility of a shortage of food was very apparent early in the year. In the month of February two cases of collapse from want of food occurred at one of the vaccination camps. The natives were reduced to eating bark, roots, etc., until the wild fruit began to ripen. The eating of some of these substances had the peculiar result of distending the stomach to an enormous degree. This was particularly noticeable in children. The pinched faces, wasted thorax, arms and legs and extremely protuberant abdomen gave a visual effect that was uncanny.

During the year 196 new cases were admitted to hospital and 877 treated as out patients. These figures appear to indicate that European medicine and treatment are being appreciated by the natives.

It is surprising the number of natives who suffer from epilepsy; seventeen were admitted during the year. There is probably a connection between this condition and the syphilitic disease that is rampant. As far as can be seen at present, amongst the natives in the kraals three diseases stand prominently above all others—syphilis, leprosy and epilepsy.

LOMAGUNDI DISTRICT.—Population, as at 31st December, 1922, estimated at 740 (467 males, 273 females). Census, May, 1921, estimated at 739.

One case of Malta fever occurred, and one was suspected, these being the first cases known in the district and the first patient I have attended with the disease.

Mica Township.—This was selected last year without any medical advice, and I have not yet seen it. There appears to be some dissatisfaction with it from a health point of view. Doubtless on account of the large area over which the mica occurs there was some difficulty in selecting a suitable spot.

Sinoia Hospital.—The total number of European patients has been 65, as against 87 for the previous year. Thirty-one cases of malaria were treated, 18 males, 13 females, with one death—a child of two years, moribund on arrival. The others received the greatest benefit as regards their malarial condition, and doubtless blackwater and death were averted in many cases. The other cases call for no comment.

Maternity.—Five cases have been admitted and attended. The greatest satisfaction has been expressed by all. All these cases were farmers' wives.

Native Hospital.—The number of cases treated was 114, the same as last year. Thirty-one of these were wounds of all degrees of severity, many of them seriously infected on admission. Two deaths from compound fractures were due to a gunshot wound of the thigh which had severed either the femoral or a large branch, and death occurred within half an hour. The other was a fracture of the pelvis, etc. The three fatal cases of pneumonia were advanced on arrival. All early cases make early recovery.

BINDURA DISTRICT.—The outstanding disease amongst Europeans showing seasonal characteristics has been blackwater fever. There were six cases and one death. The first case of this season was 22nd February, and the last case 20th June. There was an epidemic of influenza in September, there being nine cases, all mild in character. A severe epidemic of influenza amongst natives occurred, frequently followed by pneumonia, causing numerous deaths at the Asp Mine and elsewhere, but the number of recoveries increased after a visit of the Native Commissioner, who impressed on the natives the need for early treatment.

The diseases as a whole were of a milder character, and illness was less prevalent.

Vaccinations.—European, 17. The European population is very well protected against small-pox.

Hospitals and Asylums.

The new native hospital at Salisbury was completed and occupied during the year, together with the additions to the nursing home and the new theatre block.

At Shamva a new ward for native patients was completed and occupied.

The building of a new nurses' home for the hospital at Victoria was postponed, as it was difficult to divorce this from the larger scheme of a new and enlarged European and native hospital on a more spacious site outside the township, which is still under consideration and will presumably be commenced when funds are available.

Funds have not yet been found for the buildings foreshadowed in last year's annual report, the most urgent of which is the extension to the Ingutsheni Mental Hospital to allow of the accommodation of European female lunatics, all of whom have now to be sent to one or other of the asylums in the Union of South Africa at considerable expense to the Administration.

Reports from the branches of the Loyal Women's Guild and other associations which control the local maternity homes and district nurses, and which are in receipt of grants-in-aid from Government, show a steady progress and extension of work, but owing to general depression and in most cases a depleted exchequer, the demands for increases in the grants-in-aid are almost universal.

The Beit Trustees have in the past been contributing generously to the support of a number of these maternity homes, but have given notice that their contributions will be withdrawn this year, and a sympathetic attitude, in the form of some tangible assistance, will probably have to be adopted, even if only as a temporary measure, in order to carry some of these useful and necessary institutions over a hard time, and prevent them closing their doors.

Ingutsheni Mental Hospital, Bulawayo.—The report of the Superintendent of the Ingutsheni Mental Hospital will be found in Part II. of this report. In this Dr. Eaton has laid particular stress on the general overcrowding of native patients and the need for accommodation for European females, not only on the grounds of expediency, but also in the interests of the patients, especially in cases of early insanity which may be adversely and perhaps permanently affected by the trials of a long railway journey.

The number of lunatics admitted and remaining under treatment shows little variation from the previous year.

The cost of maintenance was on the whole low, and a considerable revenue is now beginning to accrue from the asylum farm and garden.

Morgenster Leper Settlement, Fort Victoria.—The leper settlement at Morgenster remains as before. A number of lepers applied voluntarily for admission during the famine period, as their relatives were unable and unwilling to further shelter and feed them.

A scheme for the systematic treatment of selected groups by the esters of chaulmoogra oil and other recent remedies has been inaugurated, but it is still too early to render any report on the results.

The statutory meeting of the committee appointed under section 28 of the regulations promulgated under the Leper Repression Ordinance of 1919 was held in the first week of September, and issued a report to the Administration. Some arrested cases were allowed free on probation, and it is expected a number more who have been noted for special observation will be allowed similar freedom next time the committee meets.

There were 41 admissions during the year and six deaths. The total number of lepers segregated at the settlement on 31st December, 1922, was 136, of which 96 were male and 40 female.

Admissions to general hospitals were slightly decreased, both European and native, there being 297 fewer Europeans and 143 fewer native admissions than the previous year. This is largely due to the abnormally low rainfall in January, February and March, and a consequent decrease in the malarial incidence.

The revenue from paying patients in Government hospitals, that is, all hospitals exclusive of Bulawayo, amounted to £13,812, being practically the same as last year. The expenditure amounted to £42,878; in these figures, however, are included for the first time the revenue and expenditure for the mental hospital at Ingutsheni, and if we deduct this the revenue and expenditure will be found both to be reduced more or less in proportion to the reduction in the number of admissions.

Public Health Laboratory and Research.

The report of the Bacteriologist is a very full epitome of the work done in the laboratory during the year, and should be widely read. It is especially interesting in that it covers Dr. J. G. Thomson's first term of work on blackwater fever.

The new laboratory buildings in the grounds of the Salisbury Hospital were completed and occupied in the early part of this year. They are a great contrast to the old accommodation provided, and allow of infinitely better work, both as regards routine and research.

Legislation.

The regulations for the medical examination of natives has so far only been applied in Salisbury, but with encouraging results, and it is hoped that other municipalities when they see the benefits accruing both to employers and to the natives themselves will also agree to apply them to the towns under their control.

Regulations dealing with the traffic in habit-forming drugs have now been agreed upon, and a proclamation by His Royal Highness the High Commissioner giving effect to these may be expected in the immediate future.

No further enactments bearing on the public health have been brought forward this year, the proposed Public Health Act and the re-introduction of a Medical and Pharmacy Bill being held over in view of the approaching administrative changes.

A. M. FLEMING,

Medical Director.

PART II.**Annual Report of the Medical Superintendent,
Jngutsheni Mental Hospital.**

I have the honour to submit my report for the year ending 31st December, 1922.

On the first day of January, 1922, there were 183 patients on the register. During the year 52 were admitted, 27 were discharged recovered and 36 died. On the 31st December, 1922, there remained on the register 172. In residence there were 171, *i.e.*, 32 male Europeans, 1 female European, 26 female natives and 112 male natives. One male native was absent on pass. The total number under treatment during the year was 235.

The 52 cases admitted included 1 male European and 1 native re-admissions. There is no accommodation provided for female Europeans, but as a temporary measure two were admitted during the year.

The daily average number resident was 172, as against 167 in the previous year. The recovery rate calculated on the number of admissions was 51.91. The death rate calculated on the total number of patients under treatment was 15.32.

There was one death only among the European patients. The death rate among the natives is higher than in any previous year, and occurred chiefly among those who were attacked by Spanish influenza in 1919 and failed to regain normal physical health. The recovery rate is very satisfactory and would appear to compare favourably with that obtained in similar institutions in other countries.

There were a few attempts made to escape during the year, but all were recovered on the day of escape or on the following day, except in the case of one native, who managed to remain absent for twelve days.

Mechanical restraint was not used during the year, and no seclusion was necessary.

Probation was allowed in five cases, all of whom were discharged at the end of their period of probation.

The farm and garden, which have shown a balance on the right side for a number of years, shared the scanty rainfall so general throughout the country. Mealies failed to cob and were converted into ensilage, thereby effecting considerable saving in food supply for cattle. Despite the adverse seasonal conditions, we were able to keep the hospital well supplied with dairy produce. Owing to the poor prices offered for pigs on hand for sale, a number were converted into bacon, and although the bacon-making was purely experimental, a six months' supply of excellent bacon was obtained at a much lower cost than the prevailing market rate.

The water supply from the wells was not satisfactory, but without incurring the expense of sinking an additional well it is difficult to know how to deal with the recurring seasonal shrinkage.

The Public Works completed a new kitchen during the year, and hospital labour was able to build an additional room to native staff quarters.

Overcrowding among the natives is still bad, and buildings for both male and female natives have long been promised, but as I referred to this subject in my last two reports it is only necessary to say that I hope the building requirements submitted to the Public Works for 1923 will be carried out in their entirety.

I called attention to the need of providing some accommodation for female Europeans last year, and since then I had to make arrangements to admit two female European patients, one of whom is still in residence. Whatever arrangements we have with the Union authorities regarding the treatment of our European female insane, I am of the opinion that incipient cases of insanity, especially when there is hope of recovery, should be treated in this Territory.

Regarding maintenance of buildings, I regret to have again to call attention to repairs and general upkeep; and as considerable deterioration is taking place I would suggest that, as a matter of routine, an officer of the P.W.D. should pay periodical visits of inspection and cause necessary repairs and painting to be effected as occasion demands.

Revenue from paying patients and sales of live stock amounted to £1,266 0s. 5d., *i.e.*, maintenance fees £1,121 12s. 6d., sales £44 7s. 11d. Supplies from the farm and garden for the use of the hospital amount in value to £645 10s. There were outstanding from maintenance fees the sum of £105 18s. on the 31st December, 1922.

The total expenditure for the year, including produce supplied from farm and garden, was £6,236 7s. 8d. This works out at £36 2s. per patient per annum.

The cost of maintenance calculated on the gross expenditure is 1s. 11½d., and the cost per patient per diem, excluding produce, is 1s. 9d. The net cost to the Government, after deducting revenue from hospital vote of maintenance, is 1s. 6¾d. per caput per diem.

W. M. EATON,

Medical Superintendent.

Pasteur Institute and Public Health Laboratory.

ANNUAL REPORT FOR YEAR 1922.

The new laboratory was completed eventually in the early part of the year, and our apparatus was transferred to it successfully without any interference with our work.

Pasteur Institute.

During the year the strain of fixed virus was kept going satisfactorily. There was no sickness amongst the rabbits beyond an outbreak of sarcoptic mange, but their numbers have been diminishing from failure to breed. This is due probably to many years of in-breeding. We are buying some new ones to restore our numbers.

During the year three patients were treated; all European males and all from Northern Rhodesia, where the disease seems permanently established, though I see no reason why the measures that were successfully applied in this Territory should not be tried there. We have had no cases from Southern Rhodesia since 1913 and no patients from parts other than Northern Rhodesia since 1919. The three patients treated were all well on discharge.

Public Health Laboratory.

A.—ANALYSIS OF WORK DONE.

1. RESEARCH.—Special research work on blackwater fever was carried out in the west wing of the laboratory by Dr. Thomson and his assistant, with such assistance as was required of the rest of our staff.

Some work was done by myself on blackwater, malaria, the town water supply, Malta fever, pneumonia and diphtheroid organisms. The results will be found under their respective headings.

2. ROUTINE.—During the year 807 examinations were made, as opposed to 814 in 1921. There was an increase in the number of specimens received from outside Salisbury, but a decrease in those from Salisbury for the following reasons: (1) Many specimens were diverted to Dr. Thomson for research purposes, (2) Dr. Hurworth was away for six months, (3) the doctors are tending to send fewer specimens, as they find themselves out of pocket frequently owing to non-receipt of laboratory fees from their patients. The question of the doctors' responsibility for laboratory fees is receiving attention, and as soon as this grievance has been removed I anticipate a good increase in the work from all parts.

The following table shows the use made of the laboratory by different parts:—

	1921.	1922.
Salisbury	747	715
Rest of Rhodesia	65	92
(from 13 towns)		(from 20 towns)
Portuguese East Africa ...	2	...
	<hr/> 814	<hr/> 807

These figures for other parts of the Territory are, I consider, a reproach to the doctors concerned. While the distance involved prevents such things as urgent blood smears being sent, there is no reason why

other work, such as widals, cultures and vaccines, should not be asked for, and it is a pity that the modern methods of diagnosis and treatment offered by us are not made more use of.

The following table shows the methods employed :—

(a) <i>Bacteriological and Protozoological</i> —	
Microscopical examinations	337
Agglutination tests	137
Preparation of vaccines	62
Decomplementising serum	24
Cultural examinations	79
Examination of water supplies	18
(b) <i>Helminthological</i> —	
Microscopical examinations	44
(for bilharzia, intestinal worms, etc.)	
(c) <i>Entomological</i> —	
Identification of insects	2
(d) <i>Pathological</i> —	
Microscopical examinations	29
Sections of tumours, etc.	16
(e) <i>Chemical</i> —	
Tests	8
Estimations	1
Biologic tests on animals	4
(f) <i>Medico-Legal</i> —	
Microscopical or chemical tests	37
Biologic test for human blood	9
	807

B.—REMARKS ON DISEASES, ETC., DEALT WITH.

1. *Blackwater Fever*.—The special research carried out by Dr. Thomson will be dealt with by him in a separate report. After his departure no further cases of blackwater were reported to the laboratory, but a beginning was made of a study of the hæmolysis (destruction of the patient's red blood cells), which is the central feature of the disease, as the discovery of its cause is most likely to lead us to the prevention or cure of the actual disease.

This hæmolysis may be due to physical agents (*e.g.*, chill) or to chemical agents (*e.g.*, quinine) or to direct destruction by parasites (*e.g.*, malarial) or to hæmolytic toxins of parasites (*e.g.*, spirochætes) or to hæmolytic substances (hæmolysins) formed by the patient.

The last two seem most probable, for Dudgeon has demonstrated (in 100 consecutive cases of blackwater) that hæmolysins were present in the tissues of every case. But it is not yet known whether these were parasitic toxins or hæmolysins formed by the patient.

Three experiments were made therefore :—

- (a) A guinea pig was inoculated with rabbit's red cells for a month, till it developed (as always happens) a strong hæmolytic power for rabbit's red cells. This was for use in the second experiment.

- (b) A rabbit was then inoculated for a month with the above guinea pig's hæmolytic serum. It was then found that the rabbit's serum had acquired the power of protecting its own red cells against the inimical hæmolytic serum (which otherwise has the power of killing the rabbit by destruction of its red cells, causing a condition of malignant jaundice not unlike blackwater).
- (c) A rabbit was also inoculated for a month with its own red cells. It was then found that it had developed an hæmolytic power for its own red cells. (A similar condition has been supposed to occur in blackwater fever from constant destruction of red cells.) I think, however, that this result was a lucky one, for experiment (b) shows that the presence of an inimical hæmolysin leads to the production of a protective anti-hæmolysin eventually.

The above results are only of importance in indicating promising lines of research, which would be:—

- (a) To obtain the hæmolysins that are apparently present in all cases of blackwater, and then to find out their origin, *i.e.*, whether they are parasitic toxins or hæmolysins formed by the patient.
- (b) To try to produce immunity, either actively by graduated doses of the hæmolysins or passively by the injection of an anti-hæmolytic serum; we might thus succeed in either preventing or curing blackwater.

2. *Malaria*.—One hundred and seventy-seven examinations were made, giving 2 probable and 18 positive results. Malignant tertian was found 13 times, benign tertian 3 times, quartan once, and quartan and malignant tertian combined once. The benign tertian was found in April, May and July, the quartan in October and December, and the malignant tertian at any time of year.

In the examination of blood smears negative results are only too common, even where there is little doubt that malaria is present. This is usually due to the fact that only a portion of a drop of blood can be examined. Neither serum tests nor cultures are yet reliable, and the only remedy is to examine larger quantities of blood and to concentrate the parasites. Both doctors and patients object to blood being taken from a vein. A method of obtaining a fair quantity of unclotted blood from the finger was thought out and tried therefore, and is now being tested on actual cases.

3. *Malta Fever*.—Sixty-five agglutination tests were made against the group of organisms *M. melitensis*, *B. abortus* (institute strain) and *B. abortus* (Bevan strain). Ten gave doubtful but probably negative results. Seventeen gave weak probable or fair positive results. No special preference was shown for any given organism; the serum might agglutinate *M. melitensis* or *B. abortus* only, but usually affected both equally.

Cultures were attempted several times from blood, uterine clot and an inflamed elbow, and from this last we succeeded in isolating the Rhodesian strain of the disease, which is now being studied.

Two points require investigation in this disease:—

- (a) *Methods of Diagnosis*.—Cultures often fail and patients object to vein puncture for the purpose. One has to rely usually

on agglutination tests, but unfortunately these are often doubtful, because normal and febrile bloods may agglutinate to a high degree. A way out of this difficulty is being studied. A series of normal bloods was examined for this purpose, and further tests will be made.

- (b) The Connection of Malta Fever with Contagious Abortion in Cattle.—The undoubted similarity of the organisms points to some connection, but experiments so far point to *B. abortus* being far less virulent than *M. melitensis*, which may account for the scarcity of human disease in these and other parts where contagious abortion is common. This great difference in virulence has caused the suggestion that it may even be beneficial to drink the milk of infected cows, as it may cause the development of immunity (as occurs in vaccination with calf lymph against small-pox). In any case, it seems probable that the chances of infection are very small.

The question will, however, be studied. It is proposed to inoculate a pregnant cow with *M. melitensis* to see if it aborts, and Mr. Bevan has kindly consented to co-operate with me in this experiment. Unfortunately the reverse experiment (inoculation of men with *B. abortus* to see if Malta fever develops) is impossible, but it is hoped that recent discoveries in agglutination will help us in this part of the problem.

4. *Enteric and Similar Fevers*.—Sixty-three agglutination tests were made against the group of organisms *B. typhosus* and *B. paratyphosus* (A and B). Thirteen were positive, all being typhoid. Other organisms causing enteric-like symptoms are kept in stock to be tested against when required.

The agglutination test is open to two main objections: (1) It is not positive in the first week of the disease; (2) it may not be positive later on, even in undoubted cases. The first objection is met by blood cultures, which are positive in over 90 per cent. of cases, and it is astonishing that doctors do not avail themselves of this fact. The second objection can be met by a blood culture or a fixation of complement test, while recent investigations on the agglutination test promise to give us better results.

5. *Tuberculosis*.—Fifty-nine tests (chiefly sputum) gave 7 positive results. The disease does not appear to be increasing, at any rate among Europeans, in this Territory.

6. *Influenza*.—No epidemic occurred to give us opportunity for study. *B. influenzae* is common in other lung conditions, and was found in 30 per cent. of the sputums sent us. Olitsky and Gates in America have reported the discovery of a filtrable virus in this disease, and work is being done at the institute in Johannesburg on a similar organism. As doubt has been cast on *B. influenzae* being the cause of pandemics, the results will be awaited with interest.

7. *Pneumonia*.—The pneumococcus was frequently found in other lung conditions. An outbreak at the King's Mine was investigated by me personally, and various organisms were isolated, including the pneumococcus, *B. influenzae* and *B. protens*. The presence of the last organism is especially interesting. Two sputums were sent up from the Cam & Motor Mine, from which two strains of pneumococcus different from any of the institute strains were obtained. Before they could be

included in a stock vaccine it would be necessary to prove that they were responsible for a large number of cases.

8. *Gonorrhœa*.—Forty-two examinations gave 14 positives and 3 probables. This disease is often difficult to diagnose, and where smears are negative other tests should be tried. A skin test (resembling the tuberculin test) seems likely to give good results.

Other organisms, moreover, can cause similar symptoms; for instance, diphtheroid bacilli. An interesting case occurred in which smears showed only gonococci, and cultures gave only diphtheroids. A vaccine was made from the diphtheroid (in desperation); it cured the patient rapidly!

9. *Diphtheroid Bacilli*.—These organisms are little understood and are interesting owing to their varying shape and the possibility of converting them into other organisms such as staphylococci and streptococci, while the case just quoted would point to a similar connection with gonococci.

During the year I studied a fair number of those isolated from various conditions, and with accumulation of facts hope to elucidate some of their peculiarities. They are extremely common and deserve study therefore.

10. *Syphilis*.—Serum was decomplexed 24 times and sent off for the Wasserman test. Five direct examinations were made for the organism (*T. pallida*), with one positive result. I am in correspondence with Oxford University regarding the Sachs Giorgi test, as their standard method seems as good as the Wasserman, is simpler and also gives a good idea of the patient's progress.

11. *Tick Fever*.—Three negative examinations. We have had no positives for some years.

12. *Trypanosomiasis*.—Seven smears from a case infected with *T. Rhodesiense* were examined.

13. *Diphtheria*.—Three positives (in one case from the ear) out of 18 examinations. There must have been very few cases.

14. *Dysentery* (bacillary and protozoal).—Twenty-one examinations showed *E. histolytica* 5 times, giardia (*lamblia*) twice and *E. coli* once. One case showed both amœbic and bacillary infection, agglutinating *B. dysenteriae* (*Shiga*) strongly. Our cases seem usually bacillary.

15. *Schistosomiasis* (*Bilharzia*).—Forty-four examinations gave 29 positives, as opposed to 15 examinations and 4 positives last year. The disease is either more prevalent or more frequently suspected. No further snails were asked for in view of last year's disappointing response. I received an offer of some from Bulawayo, which I accepted gratefully, but so far none has been received. I think that (when black-water has been disposed of) this subject should be chosen for research. Meanwhile it would do good if municipalities and Native Commissioners instructed the natives (of whom 30 per cent. are infected) not to urinate near streams or ponds. This would lessen the amount of infection enormously, as there is no other way of keeping up the infectivity of a stream. The usual precautions against bathing should of course be observed too.

The question of swimming baths is of importance, but as the cercariæ do not live long in water (though they can pass through filter beds apparently), and as the water takes some time to reach the swimming

bath, there does not seem to be much danger, and actual results seem to confirm this.

Interesting complications of bilharzia were met with during the year, *e.g.*, cirrhosis of the liver and appendicitis; and one extraordinary case of possible blackwater in a native was studied, in which severe bilharzial disease was found, with no definite proof of malarial infection.

16. *Tumours, etc.*—The following were found:—Carneous mole (1), carcinoma of breast (3), carcinoma of liver (1), myeloid sarcoma (1), melanotic sarcoma (1), glioma of orbit (1), Lænnec's cirrhosis (1), and one case of mycetoma (madura foot).

17. *Chemical.*—Several alkaloids were tested on rabbits, including an extract of buphane, which is stated to be poisonous to cattle and to be used by the natives. These native poisons are very interesting, and I believe they use nicotine on their victims sometimes. The whole question of native drugs needs research.

18. *Water Supplies.*—A private well was condemned; three samples of Bulawayo water, three from the Citrus Estate and numerous samples from Salisbury were examined.

The Salisbury supply was found to be quite safe, but the filter beds are not satisfactory. Mechanical filters are to be installed. I think settling beds would help considerably, as these remove over 90 per cent. of impurities and thus throw less work on the filters.

I made some investigations as to the cause of the unpleasant smell often noticed in the town water at the end of each dry season. I found several varieties of organisms present, each of which could give rise to such smells. The only remedy is to get the whole purification system into a satisfactory state.

C.—STATEMENT OF FEES EARNED.

The fees classed below as "Government" are for gratuitous work for Government patients, Police and others. "Private" represents actual cash from private patients. There is a tendency to do an increasing amount of gratuitous work for the doctors. Three patients (instead of 11) from Northern Rhodesia for Pasteur treatment made a difference of £51.

	1921.	1922.
Pasteur Institute—Private	£71 5 0	£20 5 0
Government ... ..	...	...
Total	£71 5 0	£20 5 0
Public Health Laboratory—Private	£315 4 0	£305 2 6
Government	107 1 6	129 8 0
Total	£422 5 6	£434 10 6

By an increase of staff and buildings, which would be well worth while, a saving of some thousands could be effected by our taking over the preparation of stock vaccines and small-pox lymph. The laboratory would then be more than self-supporting. Quite apart from this, funds expended on the laboratory are always well spent in view of the value of the work done to the community.

L. J. JOHN ORPEN,

Bacteriologist.

TABLE 1.—EUROPEAN BIRTHS REGISTERED.

	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	
	Percentage of total births.	Percentage of total births.	Percentage of total births.	Percentage of total births.	Percentage of total births.	Percentage of total births.	Percentage of total births.	Percentage of total births.	Totals Males and females.
Father and mother British ...	58.42	61.54	57.08	57.53	54.63	54.39	58.05	57.20	520
Father and mother Dutch ...	23.85	20.03	24.56	24.33	25.80	28.77	25.41	24.42	222
Father and mother Jewish ...	3.95	3.93	3.27	2.40	2.10	2.11	1.42	.55	5
Father and mother Italian ...	.51	.37	.58	.38	.80	.70	.33	.55	5
Father and mother Greek ...	1.02	.25	.94	.38	.93	.58	.87	.88	8
Father and mother French ...	...	...	...	...	.13	...	...	.11	1
Father and mother Belgian...	...	...	...	...	...	...	.10	...	...
Father and mother Swedish ...	.13	.12	.23	.25	...	...	.22	.11	1
Father and mother Turkish ...	...	...	...	...	.13	...	.10	...	...
Father and mother Norwegian ...	...	...	.12	.12	...	...	...	.11	1
Father and mother American ...	...	.37	...	...	...	.12	.22	...	...
Father and mother Portuguese ...	.26	...	.12	...	...	...	.10	...	...
Father and mother Roumanian ...	.13	.37	.12	...	.26	...	.33	.11	1
Father and mother Swiss ...	.26	...	...	...	...	.35	...	...	...
Father and mother Russian ...	...	...	...	...	...	...	.65	.99	9
Father and mother Austrian ...	.26	.12	.12	...	.26	.12	...	...	...
Father and mother German...	.13	.12	.23	.38	.13	.23	...	.11	1
Father and mother Polish ...	...	...	...	...	...	...	...	.22	2
Father British, mother Dutch ...	5.87	6.63	6.78	6.72	8.33	7.72	6.46	8.47	77
Father British, mother French ...	.38	...	...	.12	.26	.23	...	.33	3
Father British, mother Jewish ...	...	...	...	...	...	...	.10	.11	1
Father British, mother Japanese ...	.13	...	...	...	...	...	...	...	...
Father British, mother Norwegian ...	...	...	...	...	.26	...	.22	...	...
Father British, mother Russian ...	...	...	.23	...	.13	...	...	...	...
Father British, mother Danish ...	.13	.12	...	...	...	...	...	.11	1
Father British, mother Swedish ...	.26	.12	...	...	...	...	...	...	...
Father British, mother American ...	.26	.37	.12	...	...	.12	...	...	...
Father British, mother German ...	.51	.49	.47	.88	.53	...	...	.11	1
Father Belgian, mother British ...	...	...	...	...	...	...	.10	...	...
Father Dutch, mother British ...	1.02	1.23	1.28	2.15	1.85	2.22	2.19	2.31	21
Father Dutch, mother German ...	...	...	...	...	...	...	.10	.11	1
Father Jewish, mother British ...	.26	.25	.23	.12	.13	.12	.43	.22	2
Father Jewish, mother Dutch ...	.38	.12	...	.12	...	...	...	.11	1
Father Jewish, mother German ...	...	...	...	...	...	...	...	.11	1
Father Italian, mother British ...	...	.12	...	...	...	...	...	...	...
Father Italian, mother Dutch ...	.13	.12	...	...	.13	.12	.33	...	...
Father Italian, mother Egyptian ...	...	.12	...	.12	...	...	...	...	...
Father Italian, mother Spanish ...	...	...	...	...	...	...	...	.11	1
Father Italian, mother Russian ...	...	...	.12	...	...	...	...	...	...
Father Greek, mother British ...	...	...	...	...	...	.12	...	...	...
Father Greek, mother Dutch ...	...	.25	.23	...	.13	.12	...	.11	1
Father Greek, mother Roumanian...	...	...	.12	.12	...	...	...	.11	1
Father Greek, mother Italian ...	...	...	...	...	...	...	...	...	...
Father Greek, mother Egyptian ...	...	.12	...	...	.13	...	...	.11	1
Father French, mother British ...	...	...	...	...	.26	...	...	.11	1
Father Danish, mother British ...	...	...	.12	...	.13	.12	...	...	...
Father Serbian, mother German ...	...	...	...	...	...	...	.10	...	...
Father Swiss, mother German ...	...	...	.12	...	...	...	...	...	...
Father Russian, mother British ...	...	.25	.12	.12	...	...	.10	.33	3
Father Russian, mother Dutch ...	...	.12	...	...	...	...	...	...	...
Father Russian, mother Austrian ...	...	...	...	...	.13	...	.10	...	...
Father Russian, mother German ...	...	.25	.12	...	...	...	...	...	...
Father Russian, mother Spanish ...	...	...	...	...	.13	...	...	...	...
Father Russian, mother Roumanian ...	...	...	...	...	...	...	...	.11	1
Father Norwegian, mother British ...	...	...	...	.12	...	...	...	...	...
Father Swedish, mother British ...	...	.12	...	.12	...	...	...	...	...
Father Swedish, mother Dutch ...	...	.12	.35	...	...	...	...	...	...
Father American, mother British ...	.38	.49	.23	.12	...	...	...	...	...
Father American, mother Dutch ...	...	...	.23	...	...	.12	.10	...	...
Father American, mother Greek ...	...	.12	...	...	...	...	...	...	...
Father Austrian, mother British ...	...	.12	...	.12	...	...	...	...	...
Father Austrian, mother Russian ...	...	...	.12	.12	...	...	...	...	...
Father German, mother British ...	.13	.25	.23	.38	.53	.23	...	.11	1
Father German, mother Dutch ...	.38	.37	.12	.25	.13	.23	.10	.33	3
Father German, mother Jewish ...	.13	...	.12	...	...	...	...	...	...
Father Roumanian, mother Jewish ...	...	...	...	...	...	...	.10	.11	1
Father Roumanian, mother Russian ...	...	...	...	...	.13	...	.22	...	...
Father French, mother Belgian ...	...	...	...	...	...	.12	...	...	...
Father Portuguese, mother British...	...	...	...	...	...	.12	.10	...	...
Illegitimate—mother of European parentage, paternal parentage unknown ...	.51	.49	1.29	2.15	1.32	.94	1.09	1.10	10
Total births ...	784	815	855	789	756	855	913	...	909

TABLE 2.
EUROPEAN BIRTHS, 1922.

District	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Salisbury	23	19	25	20	20	25	23	25	22	23	22	17	264
Bulawayo	18	23	17	31	20	24	25	27	29	24	24	15	277
Umtali	11	7	7	9	12	9	13	7	4	8	4	8	99
Gwelo	4	8	9	1	9	7	3	3	5	5	4	6	64
Fort Victoria ...	3	2	4	2	3	1	1	2	2	2	3	1	26
Gatooma	3	2	1	3	3	2	4	3	6	2	2	3	34
Gwanda ... ..	...	2	...	...	...	1	...	...	...	1	...	2	6
Selukwe	1	5	1	1	1	...	2	...	5	1	1	1	19
Charter	4	3	2	2	...	4	2	6	6	1	...	1	31
Melsetter	1	3	4	1	1	2	4	2	1	1	4	3	27
Umvuma	3	1	2	1	1	...	5	4	2	1	3	1	24
Hartley ... ..	...	2	2	...	2	1	...	...	...	2	...	3	12
Que Que	1	3	1	1	...	3	5	5	2	...	4	1	26
Totals	72	80	75	72	72	79	87	84	84	71	71	62	909

TABLE 3.
EUROPEAN BIRTHS AND DEATHS, 1922.

Month	Births	Deaths	Ages of the dying										Age un-known
			0-1	1-5	5-15	15-25	25-35	35-45	45-55	55-65	65-75	75-85 and over	
January ...	72	33	6	3	2	1	5	2	7	4	2	1	...
February ...	80	26	4	1	1	1	2	5	6	4	1	1	...
March ...	75	18	1	...	1	1	3	3	2	3	2	2	...
April ...	72	21	4	1	...	1	1	5	6	2	1	...	...
May ...	72	25	6	...	1	1	3	2	5	5	1	1	...
June ...	79	33	8	1	3	3	4	6	1	2	4	1	...
July ...	87	19	2	3	3	2	2	2	1	3	1	...	...
August ...	84	20	4	1	...	1	2	5	2	1	2	2	...
September ...	84	24	4	3	...	1	5	4	1	4	1	...	1
October ...	71	32	4	3	1	1	3	5	7	4	4	...	...
November ...	71	33	7	...	...	3	1	4	7	7	3	...	1
December ...	62	29	4	4	3	2	3	2	6	4	...	...	1
Totals ...	909*	313	54	20	15	18	34	45	51	43	22	8	3
Per cent. of total	...	...	17.25	6.39	4.54	5.75	10.86	14.38	16.29	13.74	7.03	2.60	0.91

²³⁻⁶⁴ 20.64 per cent. of total.

* Illegitimate births 1.10 per cent. of total births.

TABLE 4.
EUROPEAN DEATHS, 1922.

District	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Salisbury ...	8	10	9	9	6	19	5	3	6	13	17	9	114
Bulawayo ...	14	6	5	6	6	7	7	9	10	4	8	12	94
Umtali ...	6	1	1	3	3	4	2	1	...	1	1	1	24
Gwelo ...	1	1	...	...	1	2	1	1	3	3	1	2	16
Fort Victoria ..	2	1	1	...	4	...	1	1	1	1	2	2	16
Gatooma ...	1	2	...	1	1	...	1	...	2	4	2	1	15
Gwanda ...	...	...	...	...	1	...	...	...	...	1	...	...	2
Selukwe ...	...	2	1	...	...	...	...	...	...	...	...	2	5
Charter ...	...	2	...	...	...	...	...	2	...	2	...	...	6
Melsetter ...	...	...	...	1	1	1	1	1	...	...	1	...	6
Umvuma ...	1	...	1	...	1	...	1	...	1	1	...	...	6
Hartley ...	...	1	...	1	1	...	...	...	...	...	...	...	3
Que Que ...	...	...	...	...	...	...	...	2	1	2	1	...	6
Totals ...	33	26	18	21	25	33	19	20	24	32	33	29	313

TABLE 5.
EUROPEAN DEATHS, 1922.

Age periods	Males	Females	Totals
0—1 ...	39	15	54
1—5 ...	6	14	20
5—15 ...	10	5	15
15—25 ...	9	9	18
25—35 ...	22	12	34
35—45 ...	30	15	45
45—55 ...	38	13	51
55—65 ...	31	12	43
65—75 ...	13	9	22
75—85 and over ...	4	4	8
Age unknown ...	3	...	3
All ages ...	205	108	313

Name of disease.	EUROPEANS												NATIVES						Grand totals																		
	0-1		1-5		5-15		15-25		25-35		35-45		45-55		55-65		65-75			75-85		Age unknown		Under 5 years			Over 5 years			Totals							
	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	M	F	M	F						
	Totals	Totals		Totals		Totals		Totals		Totals		Totals		Totals		Totals		Totals		Totals		Totals		Totals			Totals			Totals							
Brought forward ...	5	...	2	8	4	4	5	3	10	4	17	7	7	8	4	5	3	1	1	...	76	41	5	3	166	7	171	10	247	51							
II. DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																																					
60. Encephalitis ...	2	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2	...	
61. Simple meningitis ...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
61c. Meningitis, other forms ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
63. Other diseases of the spinal cord ...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
64. Cerebral hæmorrhage, apoplexy ...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
66. Paralysis without specified cause ...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
68. Other forms of mental alienation ...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
69. Epilepsy ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
71. Convulsions of infants ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
74. Other diseases of the nervous system ...	4	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
75. Diseases of the eyes and their annexa ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
III. DISEASES OF THE CIRCULATORY SYSTEM.																																					
78. Acute endocarditis ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
79. Organic diseases of the heart ...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
80. Angina pectoris ...	...	...	...	...	...	...	...	...	...	...	3	1	1	1	1	1	1	1	2	...	...	1	2	2	...	...	...	...	...	...	...	...	...	...	...	...
81. Diseases of the arteries, aneurysm, etc.
82. Embolism and thrombosis
85. Hæmorrhage; other diseases of the circulatory system
IV. DISEASES OF THE RESPIRATORY SYSTEM.																																					
87. Diseases of the larynx
89. Acute bronchitis ...	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
90. Chronic bronchitis
91. Broncho-pneumonia ...	3
92. Pneumonia ...	1	4	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
93. Pleurisy
95. Gangrene of the lung ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
98. Other diseases of the respiratory system (tuberculosis excepted)
98a. Miner's phthisis
V. DISEASES OF THE DIGESTIVE SYSTEM.																																					
100. Diseases of the pharynx
Carried forward ...	16	5	5	11	7	4	5	6	16	9	25	12	23	10	20	10	9	6	3	1	...	129	74	11	7	319	19	330	26	459	100						

Name of disease.	EUROPEANS																		NATIVES						Grand totals							
	0-1		1-5		5-15		15-25		25-35		35-45		45-55		55-65		65-75		75-85		Age unknown		Totals			Under 5 years		Over 5 years		Totals		
	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	M	F	M	F	M	F
Brought forward ...	16	5	5	11	7	4	5	6	15	9	25	12	10	20	10	10	6	9	3	1	...	...	129	74	11	7	319	19	330	26	459	100
103. Other diseases of the stomach (cancer excepted)
104. Diarrhoea and enteritis (under two years) ...	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	2	1	...	...	...	...	...	...
105. Diarrhoea and enteritis (two years and over)
108. Appendicitis and typhilitis
109. Hernia, intestinal obstruction ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
110. Other diseases of the intestines
112. Hydatid tumour of the liver
113. Cirrhosis of the liver
114. Biliary calculi
115. Other diseases of the liver
116. Diseases of the spleen
117. Simple peritonitis (non-puerperal)
VI. NON-VENTERAL DISEASES OF THE GENITO-URINARY SYSTEM AND ANNEXA.																																
119. Acute nephritis
120. Bright's disease
122. Other diseases of the kidneys and annexa
124. Diseases of the bladder
132. Salpingitis and other diseases of the female genital organs
VII. THE PUERPERAL STATE.																																
134. Accidents of pregnancy
136. Other accidents of labour
137. Puerperal septicemia
VIII. DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																																
142. Gangrene
144. Acute abscess ...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
145. Other diseases of the skin and annexa
IX. DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.																																
146. Diseases of the bones (tuberculosis excepted)
Carried forward ...	21	6	5	14	7	4	5	7	18	11	30	15	30	23	11	8	3	1	...	...	...	...	152	90	13	9	341	25	354	34	506	124

Name of disease.	EUROPEANS																		NATIVES						Grand totals													
	0-1		1-5		5-15		15-25		25-35		35-45		45-55		55-65		65-75		75-85		Age unknown		Totals		Under 5 years		Over 5 years		Totals		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	M	F	M	F										
	M		F		M		F		M		F		M		F		M		F		M		F		M		F		M		F							
Brought forward ...	21	6	5	14	7	4	5	7	18	11	30	15	30	13	23	11	10	8	3	1	...	152	90	13	9	341	25	354	34	506	124							
X. MALFORMATIONS.																																						
150. Congenital malformations (stillbirths not included) ...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...			
XI. EARLY INFANCY.																																						
151. Congenital debility, icterus and sclerema	14	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14	6	2	2	...	...	...	...	...	...	...	16	8			
152. Other causes peculiar to early infancy ...	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...	...	2	1	...			
XII. OLD AGE.																																						
154. Senility ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	2	...	2	3	...	...	...	4	1	4	1	6	4	...	...		
XIII. EXTERNAL CAUSES.																																						
155. Suicide by poison ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	
159. Suicide by firearms	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...
163. Other suicides ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
165. Other acute poisonings ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
166. Conflagration ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
167. Burns (conflagration excepted)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
169. Accidental drowning ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
170. Traumatism by firearms	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
172. Traumatism by fall ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
175. Traumatism by other crushing (vehicles, railways, landslides) ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
183. Fractures (cause not specified)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186. Other external violence
186a. Execution
XIV. ILL-DEFINED DISEASES.																																						
187. Ill-defined organic disease
188. Sudden death
189. Cause of death not specified or ill-defined	2	1
Grand totals ...	39	15	6	14	10	5	9	9	22	12	30	15	38	13	31	12	13	9	4	4	3	205	108	15	13	366	28	331	41	585	149	...	...	...	...

TABLE 7.

CLASSIFICATION OF DEATHS (EUROPEANS), 1922.

Deaths classified according to the international classification of causes of sickness and death.

Classifi- cation No.	Disease.	No. of Deaths, 1922.
1	Typhoid fever	6
4	Malaria	12
4a	Blackwater fever	24
8	Whooping cough	1
10	Influenza	16
14	Dysentery	6
20	Purulent infection and septicaemia	1
24	Tetanus	3
28	Tuberculosis of the lungs	11
30	Tuberculous meningitis	2
32	Pott's disease	1
34	Tuberculosis of other organs	1
37	Syphilis	1
40	Cancer and other malignant tumours of the stomach, liver	10
41	Cancer and other malignant tumours of the peritoneum, intestines, rectum	2
42	Cancer and other malignant tumours of the female genital organs	2
43	Cancer and other malignant tumours of the breast	1
45	Cancer and other malignant tumours of other organs or of organs not specified	4
46	Other tumours (tumours of the female genital organs excepted)	1
47	Acute articular rheumatism	3
50	Diabetes	2
53	Leuchæmia	2
54	Anæmia, chlorosis	1
55	Other general diseases	1
56	Alcoholism (acute or chronic)	3
60	Encephalitis	1
61	Simple meningitis	5
63	Other diseases of the spinal cord	3
64	Cerebral hæmorrhage, apoplexy	9
68	Other forms of mental alienation	1
69	Epilepsy	1
71	Convulsions of infants	6
74	Other diseases of the nervous system	1
78	Acute endocarditis	3
79	Organic diseases of the heart	18
80	Angina pectoris	3
81	Diseases of the arteries, atheroma, aneurysm, etc.	1
87	Diseases of the larynx	1
89	Acute bronchitis	3
90	Chronic bronchitis	1
91	Broncho-pneumonia	4
92	Pneumonia	20
93	Pleurisy	1
98	Other diseases of the respiratory system (tuberculosis excepted)	1
98a	Miners' phthisis	2
100	Diseases of the pharynx	1
103	Other diseases of the stomach (cancer excepted)	1
104	Diarrhœa and enteritis (under two years)	5
105	Diarrhœa and enteritis (two years and over)	1
106	Appendicitis and typhilitis	7
109	Hernia, intestinal obstruction	3
110	Other diseases of the intestines	1
113	Cirrhosis of the liver	1
114	Biliary calculi	1
115	Other diseases of the liver	1
117	Simple peritonitis (non-puerperal)	2
119	Acute nephritis	5
120	Bright's disease	3
122	Other diseases of the kidneys and annexa	1
132	Salpingitis and other diseases of the female genital organs	1
134	Accidents of pregnancy	1
136	Other accidents of labour	1
137	Puerperal septicaemia	2
144	Acute abscess	2
150	Congenital malformations (still-births not included)	1
151	Congenital debility, icterus and sclerema	20
152	Other causes peculiar to early infancy	3
154	Senility	5
155	Suicide by poison	1
159	Suicide by firearms	8
163	Other suicides	2
165	Other acute poisonings	3
166	Conflagration	3
169	Accidental drowning	1
170	Traumatism by firearms	3
172	Traumatism by fall	1
175	Traumatism by other crushing (vehicles, railways, landslides, etc.)	3
187	Ill-defined organic disease	3
188	Sudden death	1
189	Cause of death not specified or ill-defined	13
	Total	313

TABLE 8.

CLASSIFICATION OF DEATHS (NATIVES), 1922.

Deaths classified according to the international classification of causes of sickness and death.

Classifi- cation No.	Disease.	No. of Deaths, 1922.
1	Typhoid fever	5
4	Malaria	6
8	Whooping cough	2
10	Influenza	35
14	Dysentery	6
20	Purulent infection and septicæmia	9
24	Tetanus	4
26	Pellagra	1
28	Tuberculosis of the lungs	62
30	Tuberculous meningitis	2
31	Abdominal tuberculosis	2
32	Pott's disease	2
34	Tuberculosis of other organs	3
35	Disseminated tuberculosis	1
37	Syphilis	7
38	Soft chancre, gonococcus infection	1
40	Cancer and other malignant tumours of the stomach, liver	6
45	Cancer and other malignant tumours of other organs or of organs not specified	5
46	Other tumours (tumours of the female genital organs excepted)	1
48	Chronic rheumatism and gout	1
49	Scurvy	17
54	Anæmia, chlorosis	1
55	Other general diseases	1
55a	Trypanosomiasis	1
60	Encephalitis	1
61	Simple meningitis	16
61c	Meningitis, other forms	1
63	Other diseases of the spinal cord	1
64	Cerebral hæmorrhage, apoplexy	1
66	Paralysis without specified cause	2
68	Other forms of mental alienation	31
69	Epilepsy	6
74	Other diseases of the nervous system	2
75	Diseases of the eyes and their annexa	1
78	Acute endocarditis	1
79	Organic diseases of the heart	4
82	Embolism and thrombosis	1
85	Hæmorrhage; other diseases of the circulatory system	1
91	Broncho-pneumonia	4
92	Pneumonia	96
93	Pleurisy	2
95	Gangrene of the lung	2
103	Other diseases of the stomach (cancer excepted)	3
112	Hydatid tumour of the liver	1
113	Cirrhosis of the liver	3
116	Diseases of the spleen	5
119	Acute nephritis	9
122	Diseases of the kidneys and annexa	1
137	Puerperal septicæmia	2
142	Gangrene	2
145	Other diseases of the skin and annexa	3
146	Diseases of the bones (tuberculosis excepted)	3
151	Congenital debility, icterus and sclerema	4
154	Senility	5
166	Conflagration	4
167	Burns (conflagration excepted)	1
170	Traumatism by firearms	1
172	Traumatism by fall	1
185	Fractures (cause not specified)	4
186	Other external violence	2
186a	Execution	5
187	Ill-defined organic disease	1
189	Cause of death not specified or ill-defined	6
	Total	422

TABLE 9.

Table showing Infectious Diseases reported to the Public Health Department during 1922.

Disease.	District.	Number of cases.		Number of deaths.		
		European.	Native.	European.	Native.	
Smallpox	Enkeldoorn	...	1st outbreak unknown ;	...	...
		...	2nd outbreak 10	...	1	
	Rusape	...	24	...	4	
	Selukwe	...	3	...	...
	Darwin	...	100	...	17	
	Mtoko	...	1	...	1	
	Mrewa	...	1	...	...
	Marandellas	...	13	...	6	
	Wedza	...	8	...	1	
	Que Que	...	1	...	...
	Victoria	1	2	...	...
	Nuanetsi	...	Several	...	...
	Umvuma	...	30	...	1	
	Gatooma	...	2	...	...
	Bikita	...	Unknown	...	...
	Shamva	...	2	...	1	
	Salisbury	...	2	...	...
	Chilimanzi	...	46	...	2	
	Gutu	...	260	...	7	
		Hunter's Road	...	1
	Ndanga	...	2	...	...
Influenza	Umvuma	5	1	1	1	
	Gatooma	2	800	...	...
	Shamva	...	129	...	8	
	Inyati	...	50	...	...
	Salisbury	Several	5	...	...
	Mazoe	...	50	...	2	
	Filabusi	...	32	...	...
	Marandellas	3	...	...	...
	Enkeldoorn	20	71	...	...
	Plumtree	40	...	...	...
	Mtetengwe	...	Several	...	...
		Umtali	1
	Typhoid fever	Arcturus	3
Mazoe		1	...	...	...
Filabusi		...	1	...	...
Marandellas		1	...	...	...
Que Que		2	...	...	...
Bindura		1	...	...	...
Scarlet fever	Salisbury	2	...	...	...
	Que Que	...	1	...	...
Chickenpox	Enkeldoorn	1	...	...	...
	Umtali	2	...	...	...
	Hartley	...	19	...	...
	Gadzema	...	3	...	...
	Shabani	1	10	...	...
	Gwelo	...	1	...	...
	Mazoe	...	1	...	...
	Que Que	9	15	...	...
	Umvuma	7	1	...	...
	Gatooma	6	1	...	...
	Bindura	2	1	...	...
	Salisbury	1	...	...	...
	Gutu	...	9	...	...
	Measles	Melsetter	2	2
		Que Que	1
Cerebro-spinal meningitis	Hartley	...	1	...	...
	Fuller's Siding	...	1	...	...
	Gatooma	...	1	...	1	
Encephalitis lethargica	Que Que	...	1	...	...

Total number of natives vaccinated on behalf of the Public Health Department during the year 1922: 70,324.

TABLE 10.

Cases, with mortality rate per cent., admitted to hospitals during 1922, as compared with 1921.

Name of hospital.		1921.			1922.		
		Cases.	Deaths.	Mortality rate per cent.	Cases.	Deaths.	Mortality rate per cent.
Salisbury ...	White	1,009	37	3.66	982	39	3.95
	Native	846	111	13.12	853	112	13.13
Umtali ...	White	409	13	3.18	331	10	3.02
	Native	183	18	9.83	147	14	9.52
Gwelo ...	White	208	6	2.88	183	10	5.46
	Native	424	48	11.32	389	40	10.28
Victoria ...	White	109	4	3.67	112	7	6.25
	Native	123	13	10.56	116	8	6.90
Gwanda ...	White	19	...	...	13	1	7.69
	Native	131	16	12.21	122	16	13.11
Enkeldoorn ...	White	34	1	2.94	22	...	...
	Native	35	1	2.77	24	5	20.83
Gatooma ...	White	195	6	3.07	193	6	3.11
	Native	356	64	17.97	428	73	17.06
Bulawayo ...	White	1,034	35	3.38	911	35	3.84
	Native	904	120	13.27	770	97	12.60
Shamva ...	White	151	3	1.98	148	10	6.76
	Native	...	...	...	52	9	17.31
Sinoia ...	White	94	2	2.12	72	4	5.56
	Native	129	13	10.08	112	9	8.04
Belingwe ...	White	11	1	9.09	9	...	...
	Native	64	2	3.12	40	3	7.50
Totals ...	White	3,273	108	3.30	2,976	122	4.10
	Native	3,196	406	12.70	3,053	386	12.61

TABLE 11.

Cases, with mortality rate per cent., of malarial fever admitted to hospitals in 1922, as compared with 1921.

Name of hospital.		1921.			1922.		
		Cases.	Deaths.	Mortality rate per cent.	Cases.	Deaths.	Mortality rate per cent.
Salisbury ...	White	229	...	...	105	...	...
	Native	91	3	3.29	71	3	4.23
Umtali ...	White	209	...	...	134	...	...
	Native	15	...	...	6	...	...
Gwelo ...	White	30	...	...	21	...	...
	Native	39	4	10.25	33	...	...
Victoria ...	White	28	...	...	28	...	...
	Native	8	2	25.00	8	...	...
Gwanda ...	White	4	...	...	4	...	...
	Native	13	...	...	11	...	...
Enkeldoorn ...	White	12	...	...	2	...	...
	Native	6	...	...	...	...	...
Gatooma ...	White	71	1	1.40	33	...	...
	Native	19	...	...	9	...	...
Bulawayo ...	White	88	...	...	64	...	...
	Native	35	1	2.85	19	...	...
Shamva ...	White	102	1	.98	76	3	3.95
	Native	...	...	...	4	...	...
Sinoia ...	White	46	...	...	29	1	3.45
	Native	13	...	...	7	...	...
Belingwe ...	White	2	...	...	4	...	...
	Native	...	...	...	...	...	...
Totals ...	White	821	2	.24	500	4	.80
	Native	239	10	4.18	168	3	1.79

TABLE 12.

Cases, with mortality rate per cent., of hæmoglobinuric fever (blackwater) admitted to hospitals in 1922, as compared with 1921.

Name of hospital.		1921.			1922.		
		Cases.	Deaths.	Mortality rate per cent.	Cases.	Deaths.	Mortality rate per cent.
Salisbury	White	18	3	16.66	7	2	28.57
	Native	...	...	...	...	...	...
Umtali	White	5	...	...	11	4	36.37
	Native	...	...	...	...	...	...
Gwelo	White	1	...	...	...	...	...
	Native	...	...	...	...	...	...
Victoria	White	...	...	...	2	1	50.00
	Native	...	...	...	...	...	...
Gwanda	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Enkeldoorn	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Gatooma	White	7	1	14.28	3	...	...
	Native	...	...	...	...	...	...
Bulawayo	White	2	...	...	1	1	100.00
	Native	...	...	...	...	...	...
Shamva	White	13	...	...	21	5	23.81
	Native	...	...	...	...	...	...
Sinoia	White	6	1	16.66	3	1	33.33
	Native	...	...	...	...	...	...
Belingwe	White	1	1	100.00	1	...	...
	Native	...	...	...	...	...	...
Totals	White	53	6	11.32	49	14	28.57
	Native	...	...	...	...	...	...

TABLE 13.

Cases, with mortality rate per cent., of dysentery admitted to hospitals during 1922, as compared with 1921.

Name of hospital.		1921.			1922.		
		Cases.	Deaths.	Mortality rate per cent.	Cases.	Deaths.	Mortality rate per cent.
Salisbury	White	11	...	...	19	1	5.26
	Native	40	1	2.50	13	2	15.38
Umtali	White	2	...	...	10	1	10.00
	Native	2	1	50.00	1	...	...
Gwelo	White	6	...	...	6	1	16.67
	Native	4	1	25.00	4	...	...
Victoria	White	1	...	...	9	...	...
	Native	...	...	...	5	1	20.00
Gwanda	White	...	...	...	1	1	100.00
	Native	3	1	33.33	1	...	...
Enkeldoorn	White	...	...	...	...	...	...
	Native	2	...	...	1	...	...
Gatooma	White	...	...	...	2	...	...
	Native	2	...	...	3	1	33.33
Bulawayo	White	13	...	...	13	...	...
	Native	6	2	33.33	9	4	44.44
Shamva	White	1	...	...	1	...	...
	Native	...	...	...	4	1	25.00
Sinoia	White	1	...	...	4	...	...
	Native	1	1	100.00	3	1	33.33
Belingwe	White	...	...	...	2	...	...
	Native	1	...	...	...	...	...
Totals	White	35	...	...	67	4	5.97
	Native	61	7	11.47	44	10	22.73

TABLE 14.

Cases, with mortality rate per cent., of pneumonia admitted to hospitals during 1922, as compared with 1921.

Name of hospital.		1921.			1922.		
		Cases.	Deaths.	Mortality rate per cent.	Cases.	Deaths.	Mortality rate per cent.
Salisbury ...	White	27	5	18.51	23	4	17.39
	Native	163	20	19.41	153	43	28.10
Umtali ...	White	8	1	12.50	8	...	...
	Native	8	3	37.50	22	7	31.82
Gwelo ...	White	7	1	14.48	6	3	50.00
	Native	53	20	37.73	19	8	42.11
Victoria ...	White	2	1	50.00	5	3	60.00
	Native	4	1	25.00	4	2	50.00
Gwanda ...	White	...	...	...	...	...	...
	Native	8	5	62.50	7	3	42.86
Enkeldoorn ...	White	1	1	100.00	1	...	...
	Native	1	...	...	4	4	100.00
Gatooma ...	White	13	3	23.07	11	3	27.27
	Native	40	13	32.50	63	23	36.51
Bulawayo ...	White	9	1	11.11	12	5	41.67
	Native	55	17	30.91	46	19	41.30
Shamva ...	White	...	...	...	3	1	33.33
	Native	...	...	...	4	3	75.00
Sinoia ...	White	3	1	33.33	3	...	...
	Native	10	1	10.00	10	3	30.00
Belingwe ...	White	...	...	...	...	...	...
	Native	5	1	20.00	1	...	...
Totals ...	White	70	14	20.00	72	19	26.39
	Native	287	81	28.22	333	115	34.53

TABLE 15.

Cases, with mortality rate per cent., of typhoid fever admitted to hospitals during 1922, as compared with 1921.

Name of hospital.		1921.			1922.		
		Cases.	Deaths.	Mortality rate per cent.	Cases.	Deaths.	Mortality rate per cent.
Salisbury ...	White	14	1	7.14	9	1	11.11
	Native	...	...	...	...	...	...
Umtali ...	White	4	...	...	5	...	...
	Native	...	...	...	...	...	...
Gwelo ...	White	7	...	...	9	1	11.11
	Native	...	...	...	3	...	...
Victoria ...	White	2	...	...	1	...	...
	Native	...	...	...	...	...	...
Gwanda ...	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Enkeldoorn ...	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Gatooma ...	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Bulawayo ...	White	19	1	5.26	12	3	25.00
	Native	6	2	33.33	7	4	57.14
Shamva ...	White	1	...	...	...	...	...
	Native	...	...	...	...	...	...
Sinoia ...	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Belingwe ...	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Totals ...	White	47	2	4.25	36	5	13.86
	Native	6	2	33.33	10	4	40.00

TABLE 16.

Cases, with mortality rate per cent., of scurvy admitted to hospitals during 1922, as compared with 1921.

Name of hospital.		1921.			1922.		
		Cases.	Deaths.	Mortality rate per cent.	Cases.	Deaths.	Mortality rate per cent.
Salisbury ...	White	...	...	...	...	...	...
	Native	4	...	...	11	...	...
Umtali ...	White	...	...	...	...	...	...
	Native	18	1	5.55	2	1	50.00
Gwelo ...	White	...	...	...	...	...	...
	Native	12	1	8.33	29	1	3.45
Victoria ...	White	...	...	...	...	...	...
	Native	1	...	...	...	...	...
Gwanda ...	White	...	...	...	...	...	...
	Native	5	1	20.00	28	2	7.14
Enkeldoorn ...	White	...	...	...	1	...	...
	Native	...	...	...	...	...	...
Gatooma ...	White	...	...	...	...	...	...
	Native	41	1	2.44	60	8	13.33
Bulawayo ...	White	...	...	...	...	...	...
	Native	50	12	24.00	94	7	7.45
Shamva ...	White	...	...	...	...	...	...
	Native	...	...	...	...	...	...
Sinoia ...	White	...	...	...	1	...	...
	Native	...	...	...	...	...	...
Belingwe ...	White	...	...	...	...	...	...
	Native	2	...	...	7	...	...
Totals ...	White	...	...	...	1	...	...
	Native	133	16	12.03	232	19	8.19



TABLE 12
STATEMENT OF PROGRESS AT GOVERNMENT HOSPITALS FOR THE YEAR 1921

State or Territory	Total population	NO. OF CASES MAINTAINED										EXPENDITURE										REVENUE										TOTAL AMOUNT RECEIVED		Percentage of total population receiving treatment	Per cent of total					
		Male		Female		Total		Average length of stay	Average cost per case	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated	Percentage of total cases treated											
		White	Colored	White	Colored	White	Colored																							White	Colored	White	Colored			White	Colored	White	Colored	White
Alabama	1,840	14,774 11 3	13,940	14,774	12,761	30,925	30,925	30,925	1,211 51 31	114	1,096 30 8	111	1,000 30 4	65	1,237 27 4	54	219 50 3	13	30 35 0	62	2,277 6 3	194	4,511 6 6	229	373 8 2	21	7,224 1 11	1,000 4 3	2,944 10 20	11,011 6 6	4,262 7 4	101 5 3	1,105 12 7	261	3 1	3 33 1	4,264 17 1	3,000 14 3	742 3 0	43
Alaska	465	1,047 1 1	1,111	4,282	3,302	3,302	3,302	3,302	308 10 7	114	300 9 4	73	246 14 30	68	219 31 7	54	30 7 2	14	39 12 11	19	712 10 6	169	1,505 16 0	372	4 36 8	62	4,226 17 3	108 4 3	305 10 20	1,896 9 20	1,174 3 0	134 1 3	1,006 9 9	30	2 4	4 14 0	222 11 30	301 6 7	100 0 0	39
Arizona	335	1,302 3 8	1,300	2,640	1,875	3,335	3,335	3,335	102 9 8	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
Arkansas	140	721 3 7	300	1,967	30	3,325	3,325	3,325	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
California	31	1,221 21 9	317	1,897	176	3,321	3,321	3,321	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
Colorado	494	1,700 9 4	1,432	4,742	1,174	3,114	3,114	3,114	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
Connecticut	200	1,104 10 10	1,217	3,945	2,626	739	3,045	3,045	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
Delaware	114	1,120 6 1	730	1,104	905	1,074	1,074	1,074	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
District of Columbia	45	104 1 9	303	730	64	1,000	1,000	1,000	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
Florida	117	6,200 11 9*	3,700	1,781	11,212	14,796	14,796	14,796	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34
Georgia	4,761	42,078 3 4	30,638	32,112	61,062	120,000	120,000	120,000	102 11 3	143	100 6 3	44	144 8 1	13	74 3 20	41	11 1 3	64	19 10 9	14	326 8 9	139	923 9 9	424	11 8 1	97	107 36 3	10 14 0	486 7 2	306 1 1	107 3 11	10 12 0	309 16 7	101	4 3	6 12 0	107 11 1	120 14 2	62 4 0	34

* Includes value of supplies from hospital farms and gardens, \$145,514.34

† Includes value of food from hospital farms and gardens, \$79,196.95

‡ Includes value of vegetables, etc., from hospital farms and gardens, \$174,174.41

§ In tabulating this figure, the value of dress supplies is deducted from the total expenditure.

20 NOV. 1928
LONDON SCHOOL OF ECONOMICS
LIBRARY

TABLE 18.

Table showing European admissions to hospitals during 1922.

Name of hospital	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Salisbury ...	95	73	93	63	75	71	79	89	83	85	94	82	982
Bulawayo ...	74	81	63	53	72	60	95	88	87	72	81	85	911
Umtali ...	55	27	40	33	9	12	23	21	24	26	24	37	331
Gwelo ...	20	11	8	21	19	8	6	16	25	14	15	20	183
Fort Victoria	19	6	6	7	11	1	6	12	15	10	8	11	112
Gatooma ...	14	12	23	20	15	16	18	17	25	9	9	15	193
Enkeldoorn	6	1	...	1	1	3	1	3	...	...	2	4	22
Gwanda ...	...	1	2	1	1	1	...	4	...	...	2	1	13
Shamva ...	22	17	16	21	19	8	9	6	9	6	8	7	148
Sinoia ...	6	6	5	9	9	5	2	12	6	8	2	2	72
Belingwe ...	2	...	...	3	1	...	...	1	...	...	1	1	9
Totals ...	313	235	256	232	232	185	239	269	274	230	246	265	2,976

TABLE 19.

Table showing Native admissions to hospitals during 1922.

Name of hospital	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Salisbury ...	76	67	79	70	62	67	58	87	106	64	73	44	853
Bulawayo ...	86	66	59	34	62	46	57	76	96	72	57	59	770
Umtali ...	7	13	23	11	12	12	11	5	6	24	9	14	147
Gwelo ...	59	28	21	27	31	26	37	30	41	39	27	23	389
Fort Victoria	23	9	14	4	9	2	7	6	10	5	13	14	116
Gatooma ...	40	26	26	35	37	24	33	46	50	39	34	38	428
Enkeldoorn	5	3	2	2	4	3	...	1	2	1	...	1	24
Gwanda ...	11	7	12	11	10	11	7	11	2	14	18	8	122
Shamva ...	...	...	...	...	...	11	4	5	6	10	9	7	52
Sinoia ...	3	8	9	13	8	13	17	6	7	10	6	12	112
Belingwe ...	10	...	6	1	2	2	1	6	3	1	1	7	40
Totals ...	320	227	251	208	237	217	232	279	329	279	247	227	3,053

TABLE 20.

Table showing monthly admissions to hospitals during 1922 from malaria, blackwater fever, dysentery, pneumonia, typhoid fever and scurvy.

EUROPEANS.

Disease	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Malaria	87	56	69	78	49	17	23	21	10	18	28	44	500
Blackwater fever	5	7	5	11	5	3	3	5	2	...	1	2	49
Dysentery	6	2	3	4	1	3	2	10	8	7	6	15	67
Pneumonia	8	1	1	2	3	6	10	5	16	9	6	5	72
Typhoid	9	5	1	2	2	...	...	1	3	5	3	5	36
Scurvy	...	...	...	...	...	...	...	...	...	...	...	1	1

NATIVES.

Malaria	28	28	23	19	11	13	5	11	3	4	9	14	168
Blackwater fever	...	...	...	...	...	...	...	...	...	...	...	...	...
Dysentery	3	3	2	2	...	6	2	3	3	6	6	8	44
Pneumonia	37	25	25	25	14	23	31	33	51	29	20	20	333
Typhoid	...	4	1	1	2	...	...	...	...	1	1	...	10
Scurvy	24	18	5	10	15	15	25	18	30	28	25	19	232

TABLE 21.

Table giving the number of beds in each Government hospital, the daily average of patients treated, the revenue and expenditure of each, and the approximate charge on public funds for each patient treated in hospital during 1922.

Name of hospital	No. of beds		Daily average of patients treated		Gross expenditure	Revenue	Deficit of revenue over expenditure	Approximate charge on public funds for each patient treated
	White	Coloured and native	White	Native				
Salisbury	56	100	48.6	58.1	£ s. d. 18,170 11 5	£ s. d. 7,195 12 7	£ s. d. 11,974 18 10	£ s. d. 5 13 5
Umtali	30	16	9.3	10.7	3,647 1 1	1,308 6 9	2,338 14 4	4 14 6
Gwelo	28	34	6.0	33.0	4,132 10 5	968 8 2	3,164 2 3	5 12 7
Fort Victoria	12	12	3.48	8.67	1,932 2 5	358 18 5	1,573 4 0	6 12 9
Enkeldoorn	4	4	0.58	0.72	725 17 8	35 4 7	690 13 1	14 7 9
Gwanda	10	18	0.22	6.25	721 3 7	252 9 9	468 13 10	3 6 11
Gatooma	16	60	6.0	55.12	3,760 3 4	1,584 0 7	2,176 2 9	3 3 7
Shamva	17	10	4.3	3.1	1,563 15 10	461 7 9	1,102 8 1	5 10 3
Sinoia	8	7	2.63	6.16	1,129 6 1	234 8 3	894 17 10	4 12 3
Belingwe	12	14	0.16	6.20	594 1 9	134 3 8	459 18 1	9 7 8

TABLE 22.

Return of Government and pauper patients treated in Government hospitals during 1922.

Name of hospital	Number of free patients	Total number of units treated	Cost of maintenance			Loss of revenue represented, reckoning 5/- a day for whites, and 2/6 a day for natives		
			£	s.	d.	£	s.	d.
Salisbury	553	18,409	4,678	19	1	2,844	19	10
Umtali	111	3,402	907	4	0	585	19	0
Gwelo	225	9,225	1,845	0	0	1,325	14	5
Fort Victoria	128	3,318	715	1	6	494	7	2
Enkeldoorn... ..	30	407	135	13	4	52	8	0
Gwanda	63	1,749	218	12	6	232	6	0
Gatooma	315	14,545	1,878	14	7	1,851	0	0
Shamva	62	571	109	8	10	241	15	0
Sinoia	41	1,599	279	16	6	264	11	11
Belingwe	40	2,193	374	12	9	279	5	5
Totals	1,568	55,418	11,143	3	1	8,172	6	9

TABLE IV

Notes of Government and other railway receipts in the ...

Year	...	...	...	...
1920	...	...	...	...
1921	...	...	...	...
1922	...	...	...	...
1923	...	...	...	...
1924	...	...	...	...
1925	...	...	...	...
1926	...	...	...	...
1927	...	...	...	...
1928	...	...	...	...
1929	...	...	...	...
1930	...	...	...	...
1931	...	...	...	...
1932	...	...	...	...
1933	...	...	...	...
1934	...	...	...	...
1935	...	...	...	...
1936	...	...	...	...
1937	...	...	...	...
1938	...	...	...	...
1939	...	...	...	...
1940	...	...	...	...
1941	...	...	...	...
1942	...	...	...	...
1943	...	...	...	...
1944	...	...	...	...
1945	...	...	...	...
1946	...	...	...	...
1947	...	...	...	...
1948	...	...	...	...
1949	...	...	...	...
1950	...	...	...	...
1951	...	...	...	...
1952	...	...	...	...
1953	...	...	...	...
1954	...	...	...	...
1955	...	...	...	...
1956	...	...	...	...
1957	...	...	...	...
1958	...	...	...	...
1959	...	...	...	...
1960	...	...	...	...
1961	...	...	...	...
1962	...	...	...	...
1963	...	...	...	...
1964	...	...	...	...
1965	...	...	...	...
1966	...	...	...	...
1967	...	...	...	...
1968	...	...	...	...
1969	...	...	...	...
1970	...	...	...	...
1971	...	...	...	...
1972	...	...	...	...
1973	...	...	...	...
1974	...	...	...	...
1975	...	...	...	...
1976	...	...	...	...
1977	...	...	...	...
1978	...	...	...	...
1979	...	...	...	...
1980	...	...	...	...
1981	...	...	...	...
1982	...	...	...	...
1983	...	...	...	...
1984	...	...	...	...
1985	...	...	...	...
1986	...	...	...	...
1987	...	...	...	...
1988	...	...	...	...
1989	...	...	...	...
1990	...	...	...	...
1991	...	...	...	...
1992	...	...	...	...
1993	...	...	...	...
1994	...	...	...	...
1995	...	...	...	...
1996	...	...	...	...
1997	...	...	...	...
1998	...	...	...	...
1999	...	...	...	...
2000	...	...	...	...
2001	...	...	...	...
2002	...	...	...	...
2003	...	...	...	...
2004	...	...	...	...
2005	...	...	...	...
2006	...	...	...	...
2007	...	...	...	...
2008	...	...	...	...
2009	...	...	...	...
2010	...	...	...	...
2011	...	...	...	...
2012	...	...	...	...
2013	...	...	...	...
2014	...	...	...	...
2015	...	...	...	...
2016	...	...	...	...
2017	...	...	...	...
2018	...	...	...	...
2019	...	...	...	...
2020	...	...	...	...

