PHILOSOPHICAL SOCIETY OF THE SUDAN

THE HEALTH OF THE SUDAN

A STUDY IN SOCIAL DEVELOPMENT

PROCEEDINGS OF THE EIGHTH ANNUAL CONFERENCE 14TH AND 15TH JANUARY 1960

KHARTOUM 1963

PROCEEDINGS OF THE EIGHTH ANNUAL CONFERENCE ON THE HEALTH OF THE SUDAN

A Study in Social Development

14th and 15th January, 1960.

Edited by the Convener

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Arranged in conjunction with the Ministry of Health and under the Distinguished Patronage of His Excellency El Ferik Ibrahim Abboud, President of the Supreme Council for the Armed Forces.

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C O N T E N T S

The Nurse, by Evelyn Matheson, M.A., Reg. N. Director, Khartoum Nursing College.

International Aspects of Public Health, by A.O. Abu Shamma, D.K.S.M., D.P.H. Deputy Director, Ministry of Health.

Mental Health, by Taha Baasher, D.K.S.M., D.P.M. (London), Senior Psychiatrist, Ministry of Health.

The Midwife, by Suliman Modawi, D.K.S.M., D.G.O.K., Consultant Gynaecologist, Khartoum Hospital.

The Training of the Modern Midwife of the Sudan, by Miss P.H. Wright, S.R.N., S.C.M., Principal, Midwives Training School.

Health Education of the Public, by Khalafalla Babiker El Bedri, M.R. San. Inst., Chief Public Health Inspector, Ministry of Health.

The Role of the University of Khartoum, by Anis Mohammed Ali Shamy, D.K.S.M., D.T.M. & H. (London), D.P.H. (London), Senior Lecturer, Department of Public Health, University of Khartoum.

The Veterinary Officer, by E.N. Dafalla, Dip. Vet. Sc. (Khartoum), Dip. Bact. (Manchester), Dean, Faculty of Veterinary Science, University of Khartoum.

Health Visiting in the Sudan, by Helen C. Simpson, S.R.N., R.F.M., S.C.M., H.V.P.

A Survey of the Future Requirements for maintaining and improving the Health of the Sudan, by Dr. Ahmed Ali Zaki, O.B.E., D.K.S.M., D.P.H., D.T.M. & H.

Director, Ministry of Health.

Chairman : Dr. Abdel Halim Mohammed,

D.K.S.M., M.R.C.P., Director and Senior Physician, Khartoum Hospital.

Summary of final discussions.

Appendices:

1. Table showing the annual revenue of the Sudan from 1924 to 1959/60 and the yearly expenditure of the Ministry of Health.

2. Bibliography of the Stack Laboratory.

3. Chart showing the present organisation of the Medical Services.

4. Chart showing the proposed organisation of the Ministry of Health.

5. Map of the Sudan.

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The Society gratefully acknowledged the loan of sound equipment by the Director, Posts & Telegraphs Department and to the University of Khartoum for the use of various lecture theatres.

Exhibition of Photographs

An exhibition of photographs illustrating health problems of the Sudan, arranged by the Director (Dr. Ali Kheir) and A/Curator (Sayed Barodi) of the Graphic Museum, were exhibited.

Opening Address by His Excellency the Minister of Health, Dr. Mohammed Ahmed Ali, M.B.E., D.K.S.M.

The President of the Philosophical Society,

Ladies and Gentlemen :

When I was a child in the town of Wadi Halfa, at the beginning of World War I, I used to see in that town, which was then an important river-port and the capital of a Province with a population of about 60,000 souls, a small 20-bedded hospital with one doctor, a very old "sanitary barber" and the skeleton of a quarantine system. All the three were in Wadi Halfa town: the rest of the Province had nothing in the way of medical or public health services. During that period also, the well-known 1918-1919 influenza epidemic (known to many of my Sudanese colleagues now present only from history and not, like the speaker, from actual experience and suffering). All the six of our household were down with it for a long time. Never-the-less, I did not see either the doctor or the senile sanitary barber. I do not deny that our father was financially unable to call the doctor as the fees, at that time, were far too high. However, although illness during an epidemic is more the concern of the doctor than it is of the patient, and despite the fact that the house was so near to the hospital, still I never did see the doctor or his man. Despite this, however, all the household survived, "hamdu lillah"!!

Ladies and Gentlemen,

This is a true portrait of what medical and public health services were like during those days in a very renowned region. Gradually this picture gets bigger and clearer until, at present, these services are seen to be very successfully run in all their branches. The region now has two hospitals with 251 and 60 beds, respectively. Bedded and non-bedded dispensaries are scattered in 15 villages and dressing stations in 26 villages. Trained midwives serve in 19 localities and there is a big health-centre in the capital of the District. The skeleton quarantine system has grown into an immense unit, with its own hospital and laboratory and so can serve and accommodate thousands of people.

All the services are, besides the over-all supervision by both Khartoum Headquarter and Atbara provincial personnel, run by 2 Doctors (soon to be three), 15 Medical Assistants, 150 Nurses (male and female) and a big number of clerks, store-keepers, accountants and non-nursing staff. On the Public Health side, both environmental and preventive, there is a Senior Public Health Inspector assisted by a Public Health Officer, three Sanitary Overseers, tens of mosquitomen, conservancy-men sanitary labourers and others. All the medical units are connected with each other throughout the area by a carefully equipped mobile unit that plies between them at regular and fixed intervals. Specialists of all branches pay visits when required from either the Province Hospital or Khartoum as well as Senior Public Health staff who visit he area from both places. On the Public Health side, there is also a special squad always ready to visit the region for any assistance, supervision or check.

Referring to the way the above-mentioned influenza epidemic was tackled in the first era, it is gratifying to mention here that within the years from 1942-1943, four big epidemics were very successfully checked from coming into the Sudan from the North. These were the 1942 malaria, the 1943 typhus, the 1944-45 small-pox and the 1947 cholera epidemics.

Ladies and Gentlemen,

Such is the contrast in the medical and public health services in the same region in this country in two eras of this Ministry's development. By and large, this can be taken as a yard stick of the same development elsewhere in the Country, with conspicuously, more advance, naturally, in all services in the Three Towns. Here the advances in the curative, preventive, research and medical education fields have won for us the admiration of our academic and professional visitors from all parts of the World. An admiration which encouraged us to join the World Health Organization and, later, helped in electing the Sudan as member in the Executive Council of this International Organization. This is considered as one of the turning points of the history of medicine in the Sudan.

It, therefore, gives me great pleasure to send, on behalf of all my colleagues in the fields of medicine, research, public health and medical education in particular, and the Sudan in general, our admiration to the World Health Organization and its various programme personnel in this country our support and appreciation, not only for their spreading health and well-being, but also for their deeds for human brother-hood and altruistic cooperation. To the good work of the World Health Organization programmes we owe much in controlling various endemics or epidemics in our country and also to the NAMRU - 3 Team of the United States of America.

We have undoubtedly benefited very much from the research work frequently under-taken by the Professors and Lecturers of the Faculty of Medicine of the Khartoum University in the four corners of the Sudan and, to them, we extend our heartiest gratitude.

Ladies and Gentlemen,

As for this sacred army of doctors, research workers and public health workers who accomplished this vast and glorious change; to those who are dead we record our deep appreciation and send them our prayers; to those who have gone back to their home-lands we send our sincere recognition for their loyalty, to their profession and to the Sudan; as for those who still carry the banner, with a long and dreary road still ahead of them, we look forward to a day like this one, when we gather again together to celebrate solving the last medical problem and getting rid of the last endemic in the Country.

THE PROBLEM OF HEALTH IN THE SUDAN

BY

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BLUE NILE PROVINCE.

Such a vast country like the Sudan, which constitutes one tenth of Africa, with so sparse and heterogenous population and uncontrollable boundaries, the problem of health is of such magnitude and diversity to be most difficult to define. An assessment of the effect of such a multitude of problems is equally difficult owing to the lack of statistical data which are the accurate basis of MEASUREMENT.

This paper, therefore, cannot claim to cover the whole range of the problem, which embraces wider fields, but it may throw light upon such factors that figure prominently in the prevailing conditions.

This is necessarily a very sketchy view of the situation. I can perhaps give you an inkling by quoting what happened in a parallel case of which most of you know. In 1937, PEP (Political and Economic Planning) in England made a survey of a wide range of social and economic planning covering the Press, Education, Coal Mining, Electricity, Agricultural supply, etc. The Health Report was the largest of all the others. It ran to cover 200,000 words; and was compiled with the help of more than 200 authorities and organisations concerned. It was a non-technical report, at that, but, nonetheless, a good reference work. This gives us a rough idea of the magnitude of the effort necessary, taking into consideration the easier accessability in civilized communities.

Our limitations in this way, however, should not detract from the value we can derive from this sketchy view. Perhaps it is as well it is so, because then we can pick up only the highlights and look at the major problems that stare us in the eye. In that way we can deal with major issues first, which is the logical beginning, and avoid a lot of misery as result of the immensity that is bound to come out of accurate statistics. It is as well, a

situation where, to some extent, one may say that "ignorance is bliss" or, at least, comfort since with such a sketchy view, everyone and all of us will keep telling ourselves that, "it is not accurate; it is not correct; it has flaws; it could be overestimation". In point of fact it could be overestimation; it could be underestimation; there is a chance in a million perhaps it could be accurate. But, one thing is sure, it is as near as possible as we can get to the problem at present, and as a working sketch, as opposed to exact statistical data, it is correct.

Perhaps, I would be allowed to digress here for a moment. For all of us here who have the health of the Nation at heart, what is important is not so much credit or criticism, or skirting around the problems, or glossing over ugly truth, so much as stating the naked facts. We are here to develop one facet of the truth to the exclusion of others, and that facet is our health problems. So the picture is of necessity going to be a dim one. However, this is a time when the limitations of language may produce undesirable and un-meant side-effects. It is a situation that calls for some scientific language, which we lack, and in using everyday language with its inevitable affective component, some undesirable subjective effects may be produced. So let us remember that this is an objective consideration and if any emotion, like annoyance, creeps in, let us remember that it is not intended and is irrelevant. The existance and the magnitude of the problem are no slur on anybody, since in the same sphere we are doing a lot to be proud of, even though there is a lot more to be done. It is not so much ignorance or apathy that handicap us but lack of adequate material means and full trained staff. Also, it is inherent in the very nature of our particular subject and our limitations that one should resort to generalisations, which have a fatal habit of spilling dogma which, in turn, is very annoying.

The problem of health is not as simple and pure as it sounds. It overlaps with economics, backwardness, education, poverty, housing, transport, agriculture etc. It is therefore influenced by social and political structure, local history and tradition and by the relative importance of different diseases.

This country attained its statemanship at a time when the rest of the World had taken immense strides along the road of progress, and this at the end of a prolonged period of modern warfare that kept every other thing in a subsidiary state. All efforts were given to the cause of freedom to the exclusion of many works and crafts that resulted in elevation of standard of living in other countries and so we found ourselves riddled with problems.

Whenever I go to our Province Medical Officers of Health meetings, I feel we are all like the blind men who are trying to identify the elephant. Everyone of us gets preocupied by the immensity of his particular problems so that there is scarcely room for appreciating that there are other problems which can be more urgent or as urgent; on the contrary, some of the presented problems can easily be solved if the right approach has been taken and all the necessary facilities are given. For instance, in our Conference due consideration was given to the ratio of number of hospital beds to number of population and how many hospitals should be assigned to each Province; the number of Specialists and other personnel and how much motor transport should be allotted. Our plans are drawn in such a haphazard way that 80% of our hospital beds are occupied by cases preventable disease; our cars could easily be wrecked within the first year of their assignment because of bad roads, and that the possibility of finding Doctors to run hospitals is very meagre. To embark on ambitions schemes of curative measures while infection and re-infection is unavoidable, and when 70% of the population of the country are suffering from preventive diseases, is the wrong approach to our health problem.

The elimination of diseases does not depend on such large measures of cure but on the adjustment between man and his environment; either man should alter his way of living to suit his environment or to modify his environment to suit his way of living. The ultimate objective should be the creation of conditions in which disease cannot survive by coordinated progress in economic, cultural and social spheres leading to a better pattern of life. The problem does not therefore fall within the range of the Ministry of Health alone, but embraces many fields of jurisdiction in other Ministries.

Anyhow, I would be probably right in stating here that few subjects in this country today are of such importance as that of individual health. Individual health matters to the State because it is the effector of its power and energy and thus the national economy depends on good health which is now defined as a state of complete physical, mental and social well being and not only freedom from diseases and infirmity. I am just touching at the positive aspect of health here, and will not take up more of your time by dilating on the negative aspect because I am sure you know all about its deleterious effects and the havoc it can play with life and economy. However, it would be to the point to remind you of its repercussion on the community, since from one individual's illness a whole epidemic may be unleashed, and that may constitute a local problem for the country, or an international problem, which may be of great gravity even though the epidemic may be limited to smolder within the locality or the country until it has burnt it self out to cinders.

Well, having given these broad lines, let us look at the problem or problems themselves and let us first remember that the heritage of the past is the seed that brings forth the harvest of the future and that such an account cannot be completed without touching on the background of the country and its people :- historically, socially and environmentally.

The Sudan has an area approximately of one million square miles extending from latitude 22°N to 4°N and longitude 38°E to 22°E. With the exception of the Nile banks, the greater part of this plain north of Khartoum is barren desert unsuitable for plant or animal life. It is expected that many problems may crop up after the construction of the High Dam in the north and this should be watched carefully. South of Khartoum in the triangle between Blue and White Niles is the Gezira plain, the main cotton growing scheme covering, with the new Managil Scheme, an area of one and half million acres and providing one-third of the country's export figures. Before 1925, the total population of Gezira was 120,000 and the people lived in most primitive conditions and abject poverty. Infant and maternal mortality rates were very high. Malaria and dysenteries were prevelant but Bilharzia was not known.

With the inception of the scheme, the resident population increased to about 600,000 with an additional 200,000 immigrant pickers from neighbourhood of the Gezira, Western Sudan and West Africa. This mobile population is responsible for the spread of C.S.M. and small pox which are of common occurence in this area. While economic development has brought prosperity and raised the standard of living, it has brought with it many health problems by creating insanitary conditions due to over-crowding and bad habits. Hence Bilharzia, tuberculosis and typhoid are rife in this area. Further south and east on the Dindir and Rahad valleys are the congregations of nomad population who start seasonal migration, from January to May, in search of water and grazing; the main tribes are the Kinana and Rufaa El Hoy. The Kinana tribe is known to have come into the District during the Mahdia and there is a great possibility that they introduced Kala-azar from Darfur. The Rufaa El Hoy are sub-groups of Juheina and are said to have made a long journey through the Eastern part of the Sudan and Ethiopia before they settled in the Dindir area. This movement is of great significance on account of a variety of socio-medical problems. The nature of this land is that of cotton soil with high retentive capacity during the rainy season but it dries early in January, leaving deep cracks which harbour sand flies, the common vector for transmission of Kala-azar.

Across the Blue Nile and White Nile Rivers, two dams have been constructed, one at Sennar and one at Jebel Aulia. In the reservoir areas, where vegetations and weeds are growing, colossal number of snails and mosquitoes are breeding which explains the hyperendemicity of malaria and Bilharzia in White Nile and Sennar Districts. In a survey which I carried out in 1944-45, 70% of the population of White Nile were infected with Bilharzia. Recently a rapid growing plant, the Water Hyacinth has been imported from the south with the result of obstructing the White Nile River and stopping navigation. Many types of poisonous snakes were encountered on these vegetations.

Along both sides of both White and Blue Nile Rivers are large irrigation schemes, privately owned by Sudanese. Here the people are not as prosperous as those of Gezira where there is a separate budget for social development. Here also villages are scattered and water supply is not pure.

Similar to these schemes are the alluvial projects of the Gash and Baraka Rivers where large colonies of Fallata are established creating social, political and health problems. On Baraka River a dam will be constructed to irrigate a livelihood scheme for the Nubian population who will soon settle in this area. The main health problems will be Kala-azar and malaria. In 1927, mass movement of population had occurred, because of hyperendemicity of Kala-azar, but we know, too, that recession of endemic and epedemic disease accompany social and economic progress.

In all these agricultural schemes, the holdings are mainly tenancies producing cotton, legumes and grain and contribute to the wealth of the population. From these schemes, the family can obtain their staple food, the grain and vegetables, and fodder for their animals from which they get their milk supply.

South of Kosti, the country changes from desert and cotton clay plains to grasslands and savannah forests. The low lying region around latitude 9^{o} is swampy, with thick growths of water plants, which constitute a major public health problem with regard to malaria. These swamps also split the country into North and South by forming a natural barrier to communications and retarding progress and development in the South. For seven months of the year, all roads out of Malakal are under water. The only way of getting medical help to the population of this area is by hospital steamer. Here live the Nilotic tribes of Dinka, Nuer and Shilluk. They lead so primitive a life that venereal diseases, dysenteries, conjuctivitis etc., are widespread. This area is also endemic for Kala-azar (Maban and Mallut areas). Recently, it was discovered that T.B. is rife; about 50% of the people are positive reactors. Immediately south of the Dinka swamps and across the Nuba Mountains is the most important belt of Moristan Country (Sleeping sickness of the cattle). This effectively shuts off the cattle - owning tribes of the Northern part of Equatoria from the agricultural tribes of the South. The Zandi area, extending from Maridi to within sixty miles of Wau, is Tse-Tse fly country and the people have never kept cattle. This affects not only the health of the people but their whole economic life.

Thus the Tse-Tse fly has caused man to retreat from large slices of land, decimated his cattle and reduced his wealth, health and happiness. Further south are gallery forests, with streams running underneath, which form the most suitable breeding places for Glossina palpalis which carries Trypanosome Gambiense of human sleeping sickness. The disease is well established in the western part of Equatoria adjacent to French Equatorial Africa where measures of control are not intensified. Until 1948, the people were LIVING IN STATE RESTRICTIONS ALONG THE ROAD and the disease was almost reduced to minimum and only 47 cases were recorded in 1947. Fly catching was also negligable. When restrictions were removed and new village planning was introduced along the infected streams, the Baria system, and the active measures of control were released, the incidence of disease has increased to about 1000 cases in 1956/57. The problem is very complicated and its solution is not an easy one. Firstly, it is unfair to keep people under restriction for ever and make them lose interest in life. Secondly, it is as fruitless, as it is futile, to continue treatment while infection is continuously introduced from French Eastern Africa and where there is no natural barrier. Thirdly, agriculturists are resisting our attempt to clear out the gallery forests because of the causation of erosion which may cause the rich clay to be washed out because of the natural gradient of the land. Other socio-medical problems, in this region, which need careful study and research work are the spread of hydatid diseases in eastern Equatoria, venereal diseases and leprosy in the centre and Sudan Blindness in the western part of Equatoria and Bahr El Ghazal Provinces. These conditions, while incapacitating many, are closely connected with the mode of living of the people. You cannot eradicate hydatid diseases without killing dogs which are useful for hunting and self-security; you cannot stop people from fishing in Sue River where Simulia responsible for transmission of Sudan Blindness (onchocerciasis), are breeding and the need of the people for protein is very high as meat is scarce; you cannot stop venereal diseases when the system of loose marriage and polygamy are in practice; you cannot isolate and treat more cases of leprosy if those who report are stigmatized by segregation in leper colonies. The solution of these problems is not alone within the sphere of Ministry of Health.

In the south-eastern part is the Nuba Mountains. Here, near the hills, the cotton soil gives place to light gravel soil and the intervening plains consist chiefly of thin forest (Moristan Country) at a level of 2000 feet above sea level. Mountainous streams tumbling over the smooth rocks worn into deep pools, join the flood in the sandy water courses in the plain. Rock pools are formed and tree holes are filled with water. At the top of the hills, water is found collected in caves or collected by people in excavations and stored for summer time. These form the most favourable conditions for breeding of Aedes Egyptii the vector for transmission of yellow fever. On the top of these mountains, which could hardly be reached, live old men and women who have never been down to the plain. Again, dogs are bred in large number for hunting and thus rabies is prevalent. Such were the conditions when we fought hard in 1950-51, to combat the menace of C.S.M. when 13000 cases were encountered with a 5% mortality.

Similar environment is found in Kurmuk District which lies in the same latitude and along the common frontier separating Southern Fung from Abysinnia. Twelve species of Aedes Egyptii were identified in 1941, by Lewis, as vectors of Yellow Fever. In that year an epedemic had occurred where 3000 deaths were recorded in the Nuba area. A similar epedemic is now raging in Kurmuk District and 120 cases, with 97 deaths have been recorded.

In the western part of the Sudan, the sandy soil of the western plateau has little water holding capacity while that of the eastern and central part of the southern plain are almost impervious alkaline clay, which causes rapid evaporation. Consequently, the scarcity of drinking water in Kordofan and Darfur Provinces presents a serious problem for economic development and for inculcating hygienic habits. During the rainy season, water is collected in Foolas and Haffirs; this explains the heavy infection with guinea worm and Bilharzia in these Provinces and the Fung area.

The eastern part of the Sudan is almost mountainous north of latitude 18° but, south of latitude 16°, lies the cultivable delta of El Gash. Here syphilis, malaria, Kala-azar, and malnutrition are the main problems.

Before the Mahdia, the population of the Sudan was estimated at 8,500,000. Owing to famine and diseases, particularly cholera, Small pox and C.S.M., it is estimated that it fell to 1,850,000 in 1905.

The indigenous people fall into three groups:- the Nubians, the Bija and the Negroids. After the conquest of the Sudan two Nomadic tribes, Rabia and Juheina, pressed southward and by treaty and inter-marriage they gradually dominated the Nubians and Bija and gave them Islamic religion and culture. Favourable condition further afield in the west and south led the Arab to press on the Negroids and replace them. The result is that the Central Sudan has become predominantly Arab and culturally homogenous as a unified social system. In spite of such fusion, the majority of the Arab population in the Northern Provinces have preserved their entity and lead a nomadic life.

The main problem is how to settle them and cater for their social development and health care. Their mobility is closely linked with their mode of living, as lovers of freedom and as animal breeders, to whom the safety of their animals from flies, on the one hand, and, on the other hand, the finding of water and grazing fields are a matters of survival or extermination.

The country is falling short in manpower. With the inception of the Kinana Agricultural and other similar schemes, together with establishing new industries, the problem will become more accentuated. This problem requires the co-operation of psychologists for convincement, the Administrator, Agriculturist and Veterinany Officer for re-settling and re-habilitation, and social workers and health people for adaptation to the new environment.

Further south, people remained pagan but with some converted to Christianity or Islam. They are primitive and live on rain cultivation of ground-nuts, sesame, cassava and talaboon which form their staple diet. In the greater part, animals cannot live because of the Tse Tse fly and so meat is scarce. This had led to one tribe to practice canibalism during the past.

The people are believers in magic and extremely slow in movement, having been incapacitated by debilitating diseases and drug addiction (Bango). Sterility is rife from venereal diseases. In conducting a clinical survey investigation, in conjunction with Miss Culwick in 1947 in the Zandi area, I was struck forcibly by the prevalence of signs of malnutrition in their various clinical entities.

The climate varies from absolute desert in the north, where the recording of 120°F in summer is not uncommon, to verdant vegetation in the south where the maximum recorded is 111°. The relative humidity, in the south, remain high during the whole year and the annual average is 70%. In the north it is reduced to 25% and the highest reached is 43% in December. The rainfall varies from practically nothing in the desert to 60" near the Equator and spread over a period of from three to four months in the north and central region but covering the greater part of the year in the south.

These climatic variations determine the distribution of malaria in the country and the fluctuation in the morbidity rate from 1.7% in Darfur Province to 9.6% in Bahr El Ghazal (these are only the reported cases, vide Ministry of Health Annual Report, 1951/52). In the southern most areas of the country the conditions of temperature, relative humidity and rainfall support the continuous transmission of malaria through the whole year and hence the type of malaria is stable. Further north, with the exception of areas close to the river and near agricultural schemes, the transmission of malaria is interrupted and the type is unstable. In the most northern parts the incidence is negligable.

To sum up, the country enjoys all sorts of climatic and geographical variations which tell on its populace. To this we may add the obstruction created by bad roads and transport which limit medical activities and stop the transportation of the sick during the rainy season. We have also a vast country where tribal existence is still the hallmark. As a matter of fact, the community is so heterogenous and the differences are so vast in their customs, way of life, mode of thinking, that it would be probably correct to say that the only true citizens of this community are to be found amongst the educated classes.

The inhabitants vary between the primitive Nilotic, going about stark naked and living as near to Mother Nature as possible, and the modern University Graduate who, with a few self-educated people, are enjoying a standard of civilization second to none.

Having surveyed the situation on its various aspects, we proceed to discuss problems of great significance which have reflect upon the health of the community and its social well-being as well as the future economic development of the country.

EPEDEMICS OCCURRING IN CYCLES :

Prominent among these are waves of the epedemic diseases i.e. small pox, C.S.M. and yellow fever. These form a permanently recurring scourge of the country. They appear in cycles when people exhaust their immunity and burn out when they exhaust their susceptibility. These diseases are often reported from adjacent countries and usually follow the pilgrim's routes across the Sudan and those routes followed by Westerners who come for work in the agricultural schemes, etc. These main routes penetrate through Geneina and Nyala in Darfur Province and Source Ybo in Equatoria. Having reached Kosti and crossed the White Nile they become absorbed in the Gezira cotton fields or others in Kassala Province to earn money before they embark on the second stage of pilgrimage or return home and the cycle is repeated. Along these routes colonies and villages are formed to lodge in-comers and out-comers without careful planning or sanitary measures and so many health problems crop up. Epedemics occur and account for many deaths in addition to the heavy expenditures incurred and the heavy strain thrown upon the local staff. There is no central organisation to deal with such problems and an average of one million vaccinations were carried out yearly for the last five years. The problem is that every year there are new comers to replace those leaving. Another factor is that the percentage of successful vaccinations is unsatisfactory. This is due partly to the imperfect techniques of inexperienced operators but largely to deterioration of vaccine lymph when carried to rural areas where means of refrigeration are not available. The problem of combatting small pox epidemics will remain outstanding until dry lymph is manufactured in the Sudan and collective measures are taken by adjacent countries.

SEASONAL EPEDEMICS:

An example of this is malaria, which constitutes a health problem of social and economic importance and taking a heavy toll of manpower and the capacity for work. About half million of the population fall sick yearly with the disease. The official figures in 1956/57 show half a million cases. To have the accurate figures one should multiply this figure by five. In other word, twenty five per cent of the population are at least infected yearly. The number of population protected by Gamexine spraying constitute a percentage of thirty five and nearly two millions rooms are treated. This is a colossal effort and heavy expenditures. The highest incidence of malaria is recorded in the three Provinces of Blue Nile, Kassala and Equatoria which have common boundaries with the neighbouring countries. In Kordofan Province where water is collected for summer time, the incidence is equally high.

The problem is that of eradication and this is not possible owing to the lack of natural barriers; control cannot be profitable without co-operation of adjacent countries and W.H.O., which has no international boundaries. The economic out-look is equally unsatisfactory. Many people are disabled yearly and prevented from earning their living, in addition, there is the killing effect on infants. It is now eight years since mosquito control has been started in the Sudan. The problem now is that of resistance which has been developed among many species in more that one country.

THE PROBLEM OF DISEASES ATTRIBUTABLE TO INSANITARY HABITS:

Examples of these diseases are typhoid, gastro-enterities of children, dysenteries, Bilharziasis, respiratory diseases, ancylostomiasis, eye disease, diptheria, whooping cough, which are related to habits, and Kala-azar, sleeping sickness, Sudan blindness, Guinea worm infection and malaria which are associated with our mode of living. With the exception of a few, localised in certain areas, the majority are of common occurrance in all parts of the Sudan. As we know, these diseases are the true measure of the inadequency of the health services in any country and a true picture of prevailing conditions.

About two million cases of intestinal disease, one million and half of both eye and respiratory diseases, 50000 of Bilharzia infection and 17000 of Guinea worm infections are treated annually in our medical centres. All these are preventable diseases. In the Zandi District, 70% of the population were found infected with Bilharzia and Ancylostoma in a random sample which I carried out in 1947 during the sleeping sickness inspection. In Darfur, the Nuba area and the Fung District, a large section of the population are yearly incapacitated from Guinea worm infection. Most of these diseases have one feature in common and perhaps it is the very feature that leads to their continuance and propagation. It is the fact that they are closely connected with our way of living and habits. In that much they rest on a solid basis, since it is most difficult to change a way of living, if not impossible in some cases, perhaps for long period of time. Habit with an economic value for individuals is also very difficult to change. For instance, Kala-azar, malaria, Bilharzia, sleeping sickness, Sudan blindness etc. have very strong connections with our ways of living:- fishing, hunting, cultivation etc. Agriculture with its hosts of thriving insects and mosquitoes and flies, pools of water, irrigation canals and the farmer living closely knitted with all this, offer ideal conditions for propagation of disease. On the other hand, dysentery, typhoid, are to a great extent linked with our habits of living. For instance people in the rural areas prefer to go to toilet in the open air because they hate to be conspicuous. They believe that latrines are not places for privacy so long as they are within sight and hearing of the people. The habits of washing hand after toilet will then be reduced to minimum. The structure of our society does not allow for the breaking up of the family; we are still conservative to our strong family ties. We have large families, like the Victorian age in England, consisting of father, mother, brothers, sisters and possibly other dependents in addition to the main members of the family. The result is a state of gross overcrowding and spread of respiratory diseases.

THE PROBLEM OF SOCIAL DISEASES RELATED TO POVERTY.

Tuberculosis ranks as the top socio-economic disease and a major public health problem. The official figures in 1937 were 500, were doubled

during the last war, and has now reached 9000; a very rapid increase. The improved diagnostic facilities might have played some part but, even so, the increase is significant. As we know, T.B. is one of the important trends of public health and is universaly admitted to be a sensitive index of living conditions. It rises with density of population, state of overcrowding and industrialization and falls with conditions of free open-air life, with good food and freedom from exhaustion. The survey, which has been carried recently, revealed that 50% of the population under the age of 25 require protection by B.C.G. vaccination. In children of school age the incidence reaches 90%. in certain parts. The infection is, therefore, widespread as 60 are found to give a positive Tuberculin reaction.

There are about 709 beds to accommodate all cases which is inadequate, even though they are doubled during the next five years. The solution of the problem, therefore, is not to be found in building more hospitals which are only necessary aids or in B.C.G. campaigns which touch only one side of the problem. The new trend is for ambulatory and domiciliary care. But what about the staff ? There are only 26 Health Visitors in the Ministry who are engaged in Health Centres and only 18 Home Visitors, under training, who are going to be enlisted in the Tuberculosis Service. The second question concerns social security contemplated for T.B. patients. There is no scheme, at present, of sickness insurance. Tuberculosis, as was mentioned before, is a social problem as well as a medical one. The sufferer is unfit to earn his living for years. If he tries to support his family, the disease will surely be precipitated and he will break and be a source of infection to others. When a patient is discharged as non-infective he requires a long period of convalescence, more food, good surrounding and, later on, rehabilitation. The problem of sanitary housing with fresh air, when and where it is wanted, will arise. As we know the number of insanitary houses is pretty high in our country. Bad structure, shortage of space, small windows and earth floors are the rule, to which we add a state of overcrowding. The problem will therefore remain outstanding and social legislation to provide for this group will alleviate the problem but will not solve it.

KALA-AZAR:

This disease occupies the forefront among endemic diseases in the three Provinces of Blue Nile, Kassala and Upper Nile with possible disemination in other parts of the Sudan. The disease has firmly established itself in Dindir, Bong and Gedaref District. Kala-azar is a deblitating disease sapping the energy and strength of the people and reducing the manpower of the country when it is badly needed for economic development. Three successive campaigns were waged during the last four years in Blue Nile and Upper Nile Provinces where more than 15000 cases were isolated and treated. The problem is the detection of the possible vectors for transmission of the disease and the animal reservoir of the infection. This needs the co-operation of the Ministry of Animal Resources and the Medical Entomologist. The epidemics usually start during July when roads are closed and impassable. The problem is the means of communications to succour the victims. The problem may need central organisation with laboratory service and a good system of transport to organise and harmonise the work in the three provinces which are exposed to risk with the object of complete eradication. The problem is of socio-economic importance because of the establishment of two large agricultural schemes in Kinana and Khashm El Girba. The problems for solution are three :-

1. Grouping of scattered villages and resiteing in suitable places accessible to roads to provide people with better health and social services.

2. To control the movement of nomads and make them settle to maintain treatment. It is now evident that their movement is responsible for dissemination of the disease to other parts of the country and for continuation of the endemicity of Kala-azar.

3. The destruction of the sand fly which needs a separate programme of spraying other than that for malaria since the breeding season starts in January and goes on to the end of April. The practical difficulty is that the sandy fly lives in cracks to the depth of half a metre and where she lays eggs. The accessibility of insecticide, whether by surface spraying or through the air, is debatable and even its effect on the sand fly is not confirmed.

It is essential to investigate fully the breeding, feeding habits and the biology of sand flies. There is no conclusive evidence that they enter human dwellings and stay in there.

VENEREAL DISEASES:

The problem of venereal diseases in the Sudan is equally serious. More than quarter of a million of cases are seen annually in hospitals and dispensaries. Syphilis alone accounts for 160,000 excluding undetected cases. The larger reservoirs of infection are found in the less developed areas of the Southern Provinces, Darfur, Kordofan and Northern Province. Poverty plays an important role in the dissemination of the disease. As we know, immorality and easy virtue can come as a result of poverty in its narrowest of meanings. There is perhaps no better example to quote than the fate of the inhabitants of Ora, a tribe in the Southern Fung, where sterility is rife as a result of syphilis after the demobilisation of the troops at the end of the last war. The tribe is on the way to extermination yet the fertility rate was previously very high.

There are also many individual habits which may have a very great insanitary bearing on the propagation of venereal diseases; these habits are more or less common to the majority of the population. Yet there are others which constitute tribal customs, the Ingassana being a good example. A bride-to-be goes and lives in a shelter or a hut outside the village where she is visited by all the bride-groom's friends in loyalty to their friend. Also, during the very frequent dancing evenings any couple who are good and strong dancers go together. The propagative effect of such customs, on venereal diseases and other communicable diseases, is obvious.

Having dealt with the social side, we proceed to the medical one. Our effort in this field is still very limited. Case finding in the reservoir of infection, which perpetuates the transmission of the disease, is based on superficial manifestation which are invariably misleading.

The main problem is that a rapid seriological test for ambulatory use in the establishment of diagnosis and for rapid application of treatment in dispensaries and dressing stations is not available. Detection of syphilis among pregnant women and, later on, among infants is only available in big towns where Health Centres are functioning. Even so there is a practical difficulty; syphilis in the pregnant female is frequently without clinical signs and so serological examination is essential in all expectant mothers. This cannot be done at present even in big towns where there are hospitals. Perhaps the solution lies in application of Penicillin in a mass eradication scheme in all infected area but our financial limitation may not allow us since Penicillin is used for the greater part for acute cases. Another problem is the rush of the Southerners to the North in search of work and better living. Such movement can possibly lead to the further spread of the disease.

LEPROSY:

This is a social disease. Apart from being so it is a general public health problem and its control is dependent upon measures of treatment of open cases and improvement of nutrition and sanitary conditions. The disease is well established in Equatoria, Bahr El Ghazal, Nuba area, Zalingi, and Southern Fung. The estimated number of cases is about 10000 and Equatoria alone accounts for 5000 cases. There are ten Leper Colonies lodging about 2000 inmates of whom 1695 are in Equatoria.

The problem arising is a social one. Compulsory segregation in colonies has serious disadvantages. It breaks up the family and leaves dependents unprovided for. Another problem is that the stigma of being in a colony leads the patient to conceal the disease and remain without treatment and makes him a danger to the community. The problem is what provision can be made for the children of the infected inmates. As we know, leprosy is commonly acquired during infancy and childhood. The sufferer from leprosy and his dependents are particularly entitled to the sympathy and care of the community rather than to be a terror for public fears and prejudice. Plans for control of leprosy should also include welfare schemes which can possibly be conceived by the Local Government.

PROBLEMS OF SUBNUTRITION AND MALNUTRITION:

It is now accepted that many components go to the maintenance of health and prominent among these is sufficient food of proper variety and quality. To provide for this, it is necessary to employ instruments of social and economic policy which is outside the sphere of the medical profession. The role of the Ministry of Agriculture is very important. Need also exists for investigation in the field of nutrition. The problem of food shortage is very common in certain areas of the Sudan. Conditions may attain such serious levels as to produce famine and starvation as happened in Southern Fung, Nuba area and Southern Provinces where durra relief is regularly sent. As we know, nutritional standards are related to income levels and educational status which, in turn are dependent on social and economic problems such as already mentioned in those areas where the sleeping sickness of cattle is found and meat is scarce. Apart from famine, nutrition plays a great part in health and disease. We are not here concerned with overfeeding which could produce a lot of diseases notably diabetes mellitus and obesity with their manifold problems. We are here concerned with underfeeding from lack of adequate supplies. There is a general subnutrition in most parts of the country with a decided shortage of proteins which, although widespread, is more obvious in some localities. Judging by a nutritional survey which we have carried out in a village of the Gezira Irrigated Area where many schoolboys complained of defective vision and in the dietary survey in Zandi District, in conjunction with Missculwick, and by our experience in the Kala-azar campaign and by discussion with my colleagues in Blue Nile hospitals, vitamin A is the most widely deficient of its class, then riboflavin, general vitamin B complex and, least of all is, vitamin C deficiency. The picture is the reverse in Kordofan and Darfur Provinces where milk and meat are abundant and vegetables are lacking.

Apart from general fitness and unfitness, sub- and malnutrition constitute their own problem. Deficiencies of proteins lower the resistance of the population for disease in general. Examples are tuberculosis, leprosy etc. and for some epedemics, in particular, Kala-azar and C.S.M. thrive on debility.

The lack of adequate protein or meat in the diet seems to delay antibody formation signficantly. It also plays a part in formation of anaemia which is so common among a poor population. Vitamin deficiencies, apart from their role in health and disease create their own diseases, notably night blindness which is now of common occurrence in prisons and rural schools. The solution of nutritional problem rests, in the first place, on taking measures to prevent food shortage and limit their severity before they bring about a state of malnutrition and undernutrition. This involves measure of production, procurement and storage from rodents, birds and decomposition which render them nutritionally valueless. Secondly the creation of a Food Department in the Ministry of Agriculture. This department needs to have a standing Scientific Committee to advise on the nutritional aspects of food and an agricultural feeding programme, not cotton, which is occupying all our attention. Agricultural Bank loans can play their part very well in this field.

HEALTH PROBLEMS OF INDUSTRALIZATION:

The country is now shifting towards industralization in order to be self-sufficient and save her currency. The Government is encouraging this drive. In fact, there will be steady increase in this respect in chemical, metallic and textile industries. Urbanisation also dictates self-evident health problem. Both the absolute and relative role of accidents are increasing and will be on the increase. This will cause new problems in the field of rehabilitation and after-care, which are not at present provided. Our health services for the population in the working class age is limited to normal prevention and treatment of certain diseases other than industrial ones. There might be many industrial diseases like Sporosis etc. in Ginning Factories and progressive metallic poisoning in electric plants which are not detected because our specialised means are falling short. There is no proper industrial health service but there should be provision in each new industry. Prevention of accidents is also a prominent problem of current interest to those of working age and its importance should be further emphasised.

As we know, the worker is the unit of industry with the co-operation of the machine. To him the industry owes its out-put and to him the country owes its wealth and national security and the population their happiness and prosperity. It is therefore incumbent to create the suitable environment for him. Admittedly there are legislations but it is not enough to have them but it is important that they should operate through supervision by qualified staff. At present there is no provision for Factory Inspectors to scientifically control the environment, no Psychologist to study worker's problems and no Welfare Officer to give them assurance and security. As we know, the worker must not only be able to do the work but he must also be able to get along with other people as one team and have some qualities of regularity, thoroughness and willingness to stick to his job. Such social adaptability and interest seem to be the fundamental conception of his vocational fitness. The prevailing state of frustration, laziness and absenteeism in this country among our working classes, which raises the cost and reduces the productivity, should be studied and treated before we embark on heavy industries which will only be a losing undertaking.

As Professor Crowden said: "In modern industries, man's physiological and psychological needs and limitation give rise to variety of problems, the satisfactory solution of which depends on the understanding of the nature of the problem and defining measures for their solution through medical people, engineers, psychologists and good management". These factors are found in the nature of the work, its intensity, period of pause, hours of rest and recreation. Good design of the machine will guard against strain and fatigue: deformity and neurosis which will eventually lead to absenteeism.

Another problem which will crop up very soon, is the expected drain of the people from the country to the cities attracted by industry and trade. The standard of living of those new comers is low and even poor. Their experiences are limited and their knowledge about social, economic and cultural matters is fragmentary. Many of them live in economic and social dependency and their care and education in their childhood have been neglected.

When they are exposed to unaccustomed stress, the danger of neurosis and psychological disorder will be unavoidable. They will also be exposed to the diseases of overcrowding such as tuberculosis which may stress the need for early immunization. They need vocational training and selection to suit them for their special job to guard against injuries and disabilities.

MENTAL HEALTH SERVICE:

There are no accurate statistics of the number of cases of mental disorder in the country, but in my experience in the seven provinces in the Sudan in which I had served, the incidence is very high, especially in Darfur, Kordofan and Blue Nile. There is only one psychiatric clinic for extramural treatment in the country with one psychiatrist to run the whole service. The minimum requirement for a country like ours is one for every 200,000 of the population which, in our case, is equal to 50 psychiatrists. Our main problem is the transportation of sick from far distant places to Khartoum for treatment. At Province and District level all cases of mental disorders are kept in prisons cells without provision of therapeutic facilities. Training of the psychiatrists will take time and it will not be possible, within the foreseable future, to appoint one psychiatrist with his team of social workers in each province. The problem is very difficult to solve. Should a start be made to impart knowledge of mental health principles in the University and equip doctors with therapeutic facilities to practice in province and district hospitals or to resort to the preventative application of psychiatric knowledge through social workers ? Even in the latter, special training is required.

Another problem is that of juvunile delinquency which is now widely prevelant. The adopted methods at present are the probation system and the reformatory. But this will not solve the problem as it is deeply rooted in childhood and may need the provision of child guidance clinics.

THE PROBLEMS OF INFANT AND MATERNAL MORTALITY:

The needs of children and expectant mother in the Sudan are poorly represented. Analysis of the coverage gives a gloomy picture, irrepairable in the near future. Our health plan, drawn up in 1956, could not be executed owing to our financial difficulties and so very slight improvement has been achieved. Our main problem is the difficulty of recruiting literate nurses who will later on be trained Health Visitors. Perhaps this is due to cultural and traditional reasons and local prejudice. It is for our educated classes to give an example by enlisting their relatives in this cadre with the object of enhancing the standard and giving prestige to the profession. If we look on our coverage of the maternity side, we find that while the School of Midwives had been established in 1918, we have only 700 midwives or one for every 15000 of the population compared to 4328 midwives in Finland or one for 1800 of the population and in England the percentage is one for every thousand.

We have only 21 Health Centres in the Country with 26 Health Visitors or one Health Visitors for 400,000 of the population. All centres are established in the Province Headquarters while 70 of the population living in the rural areas. We have no trained nurses specialised for children while in Finland there are 2061 such nurses or one for every one thousand of the population.

Another problem is the question of provision of a clean milk supply, particularly for children. We are daily hearing of cases of food poisoning arising from this source. Until now there was no method of sterilization in this country, even in the capital. In the rural areas the condition is very appalling. Milking is performed in the most primitive way. The country woman just kicks her cow to stand and, without washing the udder or wiping the flanks, starts to collect milk in her unclean receptacle which has never been washed and when milk does not run, she either brings the cow's young to suck during the process of milking or she makes some scratches in the cow's skin to stimulate the running of milk. This will explain the high rate of infant mortality in rural areas. Another insanitary habit is plastering the cow's nipple with animal excreta to divert the calves.

We need a bold drive in health education. The desire for a better standard be fostered and implanted in people by enhancing their general awareness so that the people, by their own efforts and activities import it to their environment and adjust themselves to it. Imposition of sanitary standards without awaking in the people the desire for them, is fruitless.

The last census for the country revealed that the infant mortality rate (deaths under one year of age) per 1000 births varies from 54.1 in big towns to 141 in places like Dueim and Fung districts compared to 44 in Iraq (1954) and 25.4 (1954) in U.K. The maternal mortality per 1000 still and live births varies from 2.97 to 7.2, in certain rural areas, compared to 0.70 in U.K. (1954). This shows us that still there is much to be done in the field of maternity and child welfare.

As we know, a child may die from infection and it happens in all countries, but preceding that infection, there is a long chain of related circumstances such as premature wearing, mismanaged artificial feeding, ignorant mothers and poor homes. Our deeply ingrained sanitary habits are those acquired in childhood and an ignorant mother, with bad and dirty habits, results in bringing up children with the same habits. The duty of Health Visitors is to go on inculcating good habits until people realise that insanitary behaviour results in ill-health. She must be able to guide the family towards social health and educative agencies and not merely pay visits. She must be able to observe and recognise the health needs of the family, which is the unit of the community, and the home, which is the unit of the environment.

MEDICAL CARE:

The need for more expansion of the hospitals service is sounding loudly from all sections of the population. The population has become health conscious and confident in modern medicine. In towns and rural areas patients are coming in great number and at earlier stages for treatment. Ten millions new cases and twenty millions daily attendances are seen annually in the out-patient of hospitals, dispensaries and dressing stations.

Nearly every individual has been seen twice. The ratio of hospital beds per thousand of the population is 0.9 compared to four per thousand in U.K. There are 184 general practitioners, excluding 54 specialists, and with an additional 80 private practitioners and percentage is one doctor to 30000 of the population which is a heavy strain. Moreover, the total number of admissions during the year is about 180000 or, in other words, every doctor has to see 1000 admissions during the year. Our financial resources are limited and so we cannot cope with the international formula of one doctor for 2000 of the population. Our national budget should be divided proportionately among the four pillars of progress namely education, health, economic development and administration with its security forces, so that our progress should march simultaneously along a broad front with the object of raising the standard of living of the people. To work within this limit it is, therefore, expedient that endeavours should be made for the creation of better methods which will satisfy the health needs of the population without over-taxing the national budget. The conceived plans should also meet the future development and expansion with their outcome of problems.

As hospitals reflect the culture of the people, their economic condition and way of life, plans should therefore be adapted to the area and type of people they are intended for. It is impossible to impose what is believed to be the best in highly developed countries. Standard national plans should not therefore be implemented without modification to suit the regional differences as well as the difference between urban and rural areas, not only in structure and type of materials used, but also to suit the customs and traditions and the standard of living of the people. The plans should combine economy, efficiency and utility. This needs the co-operation of the architects and medical planners.

Another problem which, will crop up in the future, is the expected change in the structure of the society following the new economic development and the increase of the population which will need new types of services. Curative schemes are not in any way an isolated problem, but on the contrary, are intimately linked with the general framework of the structure of the society.

The present socio-economic conditions are characterised by a great contrast between the small minority of rich people and the huge majority of poor people. Our present system of medical care is to maintain the principles of hospitals for the poor and leaving the development of nursing homes, private hospitals and private clinics for the local initiative to cater for the well to do. With the introduction of industries in towns and rural areas and the development of Kinana scheme and other projects, which will bring with them prosperity, the middle class population will increase. They will not be content with the existing system of mass medical care in out-patient departments and open wards. They will claim better accommodation and treatment. This cannot be met without paying wards or scheme of sickness insurance covering invalidity and maternity.

Another problem which is likely to arise is the expected change in the composition of our population by age groups which will demand new services. The life expectancy in the country is, on an average, 35 to 40 years due to the high incidence of infant mortality and maternity deaths, together with epidemics and unhealthy sanitary conditions. It is expected that in the near future, when immunisation is generalized and health environment is improved, health education is extended, refuse transferred into harmless products and pure water supply is available to all the population, the life expectancy will rise. So one may expect a more aged population. This means that geriatrics and the problems of the chronic sick will arise. This again means a heavy patient load on hospital accommodation unless plans are made by Welfare Services to cater for those groups of people who need lodging and rehabilitation.

PERSONNEL PROBLEM:

Another problem of great importance is the expected disappearance of old Public Health Administrators from the field of practise. This will take place in a few years through retirement. This will create a great gap which can hardly be bridged in the near future.

Most of those social, serviceable and indefatigable men have acquired the qualities of leadership through their personality, their background in medicine and health and from their qualifications. They have succeeded in unification and integration of curative and preventative medicine and in making them function harmoniously and infusing their energy and enthusiasm into their staff. The problem will arise as to how to fill these posts and the available candidates are young doctors with less experience in health administration to preserve the integrity of the service. So far the University has given no recognision to the public health branch in housemanship rotation. The Ministry of Health has not yet considered the posting of Registrars to be attached to the P.M.O.H.'s department.

PROBLEMS OF DOCTORS:

A state of frustration is now growing among young doctors with regard to their future prospect towards specialization. As a small side-light of interest, but which has some practical bearing in our doctors situation, is the fact that the limited places available in the Medical School can accommodate only the few, and hence the most advanced students. It is, of necessity, selection of the best as a just measure. Now the type of student taken is necessarily the ambitious and having a higher intellectual quality. He is usually satisfied by nothing less than a promise and a chance of specialization. He goes further to say that to give equity to the older graduate at the expense and sacrifice of a much younger and promising aspirant is not warranted. Experience has proved that such an experiment is a total failure. He maintains that selection should be direct after the probationary period, to preserve continuity of study and before his mind is toned down by the worries and the routine of daily work. He suggests that the criteria should be based on demand and suitability plus :-

1) a brilliant school career
2) an excellent housemanship record
3) an earnest desire and
4) he must be under 30 years of age.

He considers local post-graduate courses are premature before preparation for the staff to run such courses. Moreover, this may create different standards which may, in turn, create more malcontent and frustration. Another school of thought maintains an opposite view. They consider that experience before specialization and that local post-graduate courses are a good start and, at least, will satisfy the ambition of those who have not succeeded to get their degrees from abroad. They maintain that doctors, after the probationary period should be sent to district hospitals for at least two years where patient, home, and medicine are indivisible. In such an atmosphere, he tends to equate economic circumstances with social one and moves away from his earlier impression that human relations are the all important factor in the study of medicine. During this early period, he should be encouraged to carry out investigations in any clinical entity or any epidemiological research work. When he returns back, to take his speciality he returns with ripe experience which will give him more balance and breadth of wisdom in dealing with any clinical problem. Moreover, he becomes more actively aware of the nature of social problem and more responsible as individual and as a citizen in the community.

Another reason for frustration is the growing attitude of disparaging doctor's efforts by the public which, at the same time, is disturbing doctor-patient relationship. They feel that they are working under heavy strain and physical impossibility and yet their efforts are neither known or brought to the public eyes. They believe that the problem is that of shortage of staff, lack of diagnostic facilities and some defect in the organisation. Even the sophosticated classes who clamour for special treatment, are not realising this fact and that treatment is not a privilege but is extended to cover the whole population. The doctors might have some side-defects, like all human beings, but what is sure is that they are perpetually dragged by strong impulses liberated from their scientific training and love of the profession towards humanity and thus they sacrifice and tolerate.

RESEARCH WORK:

The duties of the state are manifold. Apart from all others there are some particular duties which should be initiated and largely financed. Research work is such an item. This is necessarily a very expensive project, being in the main scientific, even though the ultimate hope is to fall upon something of practical value for the service of humanity. The cost is still very high and the results are not guaranteed even when one is doing research with a specific problem in mind at the outset. We have many medical problems to solve which are costing us a lot of money to control. Kala-azar still stands in need of a lot of work to solve the vector problem, madura, sleeping sickness and guinea worm infection are other items. Research will need laboratories, housing, special staff and a lot of expenditure; but it is a necessity.

RELATIONS WITH LOCAL GOVERNMENT:

The paradox about the Sudan is that, while there are many problems and our resources are limited, there is considerable overlapping which hinder our progress. An example is the relation between the Ministry of Health and that of Local Government. The most difficult point to settle is the simultaenous approach of the two Ministries as far as curative and preventative services. Both perform the same kind of work which needs readjustment and organisation. In principle, the Ministry of Health is the competent authority responsible for tackling the health and medical services in general through its medical agencies; she must see that the local authorities fulfil their obligations. She must pay attention to co-ordination and rationalization of activities and take care of these special activities which cannot be properly centralized and must give financial support. On the other hand, the local authority should look to the welfare of the people. Provision for maternity and child welfare, old people and chronic sick, are important items. Chronic sickness is now a major problem increasing the patient load of hospitals.

It results in reduced income and impaired economic condition. Another item also is, the care of mentally and physically disabled persons. There is much to be done for the provision of pure and wholesome water supply in such a tropical country where heat is a great stimulator of thirst. There is much to be done in housing and slum clearance, refuse collection and sewage and fighting against bad habits.

CONCLUSION:

As we have stated at the beginning of this paper this is a very rough and very gloomy picture of health problems of the Sudan. The many different demands on our economy will prevent tackling them for sometime to come. However, to my mind, there is good reason for taking great heart in what we are doing, and there is good cause for gratification if we can actually graph, or make an imaginary mental graph, of the recentness of medical service in the Sudan, its rate of progress and the much greater acceleration that we have brought about since we ran our own country. It is not only something to be proud of, even though it gives us no satisfaction, but the rate of development itself is something promising. While we are pondering all this, let us not forget that the problem itself is far from being an overall uniform one, but varies with different localities, different people and different standards a thing which will need a lot of study before the problem can be managed with maximum efficiency instead of with maximum uniformity as it is at present.

THE ORGANIZATION OF THE MEDICAL SERVICE

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The object of this paper is to present to you the organization of the Health Services as it stands today and all through that long period of ups and downs from the dawn of the 20th. Century until the year 1959/60. I shall leave the future for my friend Dr. Zaki who is the right person to speak to you about his future proposals for the running of such a gigantic organization.

The seed of health care was planted as far back as the year 1900 when the army of occupation, with its very limited resources, started to establish the elementary principles of cleanliness and sanitation together with vaccination against smallpox. The long years of wars, famines and epidemics left behind a small population scattered here and there in an area of one million square miles.

This vast country lies well within the tropics and so it is extremely hot, especially in the centre. Its climate is to a great extent influenced by the rainfall which is heavy in the south and centre. This rainfall ranges between 50 inches in the extreme south and 4 inches in the extreme north. The rainfall causes the flooding of the rivers which leaves behind a considerable number of pools as they recede towards the end of October each year. These pools together, with those caused by rains in towns and villages, form breeding places for various types of mosquitos. Consequently, serious outbreaks of malaria occurred. Flies also flourish during the hot wet seasons thus causing dysenteries and diarrhoeas. Leishmaniasis, Bilharzia, trachoma and venereal diseases were equally rife. Periodical outbreaks of C.S.M., small pox and Asiatic influenza also occurred. The country was at that time very poor and the whole budget was a few hundreds of thousands of pounds.

Few station hospitals were erected by the conquering army in the capital towns but these were mainly concerned with the health of the troops.

These hospitals were run by British doctors, seconded from the R.A.M.C., and assisted by Egyptian and Syrian doctors. Soon after security was established these army doctors started to get interested in the health of the country and the investigation of the then prevailing diseases. The Sudan Government then started to appoint civilian British doctors, who with the co-operation of the army Doctors, started the foundation of the State Medical Service.

In 1902 Mr. (later Sir) Henry S. Welcome made a generous gift to the Sudan Government by equipping the Research Laboratories which were then attached to the Gordon Memorial College. The functions of those Laboratories were :-

1. To promote technical education
2. To promote the study of Bacteriology and Physiology of all tropical disorders and to render assistance to the health workers and to the clinicians of the Civil and the Military Hospitals.
3. To carry out such Chemical and Bacteriological tests in connection with water, food supplies and other health and sanitary matters as may be found desirable.
4. To undertake the testing and assaying of the agricultural, mineral and othersubstances of practical interest and the industrial development of the country.

At that time the Sudan was considered privileged by securing the services of Sir Andrew Balfour as the first Director of the Research Laboratories and the first Medical Officer of Health of Khartoum. Dr. Balfour introduced, for the first time, Public Health and sanitary services in the Sudan. The Health Services went on developing from year to year until 1915 when the Sudan Medical Service, as an organized State Service, was created. It is worth mentioning here that the total income of the country was about Ls.130,000 in 1899 and had risen gradually to about Ls.800,000 in 1906 and to Ls.1 1/2 million. in 1915. As from that year the work of the Medical Department, which by now had separated completely from the army, had to be acquired gradually and had to be limited to the

6 Northern Provinces leaving the medical work in the rest of the Provinces under the supervision of the Army Officers of the Egyptian Army. Between 1924 and 1930 many civilian British and Syrian doctors joined the service. Expansion in the Civil Department, together with atrophy of the Military Medical Services, went on according to plan up to 1931 when all the State Medical Service of the country was taken over by the Civil Medical Department. As from that particular year the economic position in the Sudan was greatly affected by the World Slump when trade was diminished by about 50% and the revenue fell by about the same ratio, thus a cut of 40% was made in the Medical Service budget. Most of the Military Doctors disappeared and the remnant of the medical work for the Sudan Defence Force was carried by the Medical Department.

In 1935 the Welcome Tropical Research Laboratories were re-organized when the Stack Medical Laboratories and the Analytic Chemical Section (Wellcome Chemical Laboratories) became incorporated in the Sudan Medical Services, thus all the Clinical, Public Health, Pathological and Chemical Services became incorporated in one single Service.

From the very early days of the Organization, training of the Auxillary staff was considered and was thought to be the backbone of a successful service.

THE MEDICAL ASSISTANT:

From the very beginning it was found impracticable to establish hospitals in every locality. In order to satisfy the increasing need for medical help in both fields of medicine it was considered most essential to establish a system of dispensaries under Medical Assistants who received empirical medical training and carried out specific duties under organized supervision by qualified Medical Inspectors. The training of such Medical Assistants started on avery small scale in 1919 and was, all through the long period between 1919 and 1945, going on experimental basis. A few experienced orderlies used to be selected every other year and then sent to one of the Provincial Hospitals for a period of practical training which extended over two years.

The standard could not be kept even as the training was conducted by the Hospital Doctors in their leisure time. When it was seriously realized that such services would be required for many years to come, because the country is mostly inhabited by nomads and semi-nomads who are difficult to settle in community centres, it was again considered essential to review the system of training in order to centralize it in one of the big hospitals of the Three Towns.

In 1945 a proper School, with a Medical Inspector in charge, was established at Omdurman and a Board of Studies, under the chairmanship of the Assistant Director, Hospitals, was formed. This Board was assigned with the duties of preparing the curriculm, reviewing the syllabus and the supervision of the entry and the final examinations, together with the selection of the new candidates. The candidates for training are chosen from among the certified male nurses of all the hospitals. In each Province candidates are nominated by the Province Officer of Health after holding an examination for all the certified nurses of his area. Selected candidates from all the Provinces are then subjected to an entrance examination in Arabic. Arithmetic and General knowledge. The specified intake will then be chosen from among the successful candidates.

The course of training extends over two years. The first 18 months are spent in the School where the students study elementary anatomy and physiology, medicine, surgery and pharmacology with practical clinical teaching in the various wards and out-patient departments. The remaining six months are spent in practical public health work, rural dispensaries of Khartoum Province, Graphic Museum together with revision and preparation for the final examination. At the end of the course all the students who satisfy the Medical Inspector in Charge are allowed to sit for the final examination which is conducted entirely by external examiners as appointed by the Board of Studies each year from among the senior doctors of the Ministry. The successful candidates are awarded the Medical Assistant School Certificate and are appointed as Medical Assistants under probation for six months and this period is usually spent in some of the big rural hospitals under the supervision of qualified doctors. After that period they are posted to dispensaries.

While under training they are housed and fed free and in addition they are given the pay they were drawing before joining the School. When they are qualified they are absorbed in the pensionable service.

The Medical Assistant in charge of a dispensary acts as the general practitioner and the family doctor for the villagers. He lives with the people and sets an example for a healthy way of living. He acts as an advisor for the village councils in all matters of health and social activities. Undoubtedly the public health work in the rural areas started through his own initiative and interest. He supervised the markets, water supplies and elementary sanitation and cleanliness. He had to shoulder both curative and preventive medicine.

The development of the Dispensary Service is admitted to be the main spring for the development of Health Services in the country. Many of the Dispensaries have so far developed into Health Centres where curative, preventive and social medicine have been going side by side. At present there are 496 Dispensaries and 36 Health Centres in the country. In addition there are 395 Dressing Stations conducted by qualified male nurses.

Besides the Omdurman School there was another one at Juba for the training of Medical Assistants for the Southern Provinces. The training in that particular school was conducted in English and candidates were selected from among the orderlies who completed the 4th year Intermediate Examination. These graduates form part of the same service but because of their proficiency in local vernacular they are posted in the South to serve their own kinsmen. They also do not speak Arabic and therefore not suited for service in the North. After self rule the Juba School was closed and candidates from the Southern Provinces had come to Omdurman for training. As their knowledge of Arabic does not enable them to grasp their course in classical Arabic they are taught in English.

The Midwives Training School was started as early as 1921 at Omdurman for training illiterate midwives for the whole country. As this service was found to be vital and very popular there are now 8 schools at the Headquarters of the Provinces.

In 1924 the Kitchener Medical School was started to build up a staff of Sudanese doctors to carry out medical and public health work in the country under the guidance of highly trained British doctors and give them the chance in the development of their own country.

The system of training Sudanese as Public Health Officers was introduced in 1931. The students have to take a course of 3 years after which they should obtain the diploma of the Royal Sanitary Institute. Sanitary overseers, assistant S.O.'s and Mosquito men have to undergo a specific course of training before being qualified to carry on with their jobs.

The training of Dispensers and Radiographers followed in 1936 and in 1939, respectively.

With this gradual development of medical work in the country the establishment of expatriate Nursing Sisters began to increase and so the systematic training of women nurses was started in 1926 on a very small scale. The obstacle from the start was to find suitable girls for this profession. The period of training was 2 years to start with any by 1944 it was advanced to 3 years and gradually several hospitals were recognized as training centres. The Central Nursing Council was formed in 1948 when the system of training for both men and women became efficient. As from that year a register has been kept and the number added yearly has been very regular.

In the year 1936 re-organization of the Medical Department began to take its proper shape. In the Headquarters, with the Director, Medical Services there were then three Assistant Directors dealing with the three Sections of Clinical medicine, Preventive Medicine and Laboratory Research, designated as Assistant Director Hospitals, Assistant Director Public Health and Assistant Director Research.

This division of work at the Headquarters was carried down to lower levels by the appointment of Province Medical Officers of Health for some of the Provinces. These Province Medical Officers of Health were doing clinical work in addition to their duties in the field of preventive medicine and administration. (See Appendix '3').

By the end of the second World War development in all fields progressed rapidly. Post-graduate courses were regularly increased and specialization in some of the Province Headquarters was established. This obviously incurred more expenditure on buildings and equipment. The 10 Provinces were then fully provided with Province Medical Officers of Health and they were all assigned with the duties of preventive medicine and all round administration of medical and health work. The general duty doctors and the specialists were left with the clinical work only. It is to be mentioned here that the mission hospitals and dispensaries which were spread here and there in the Sudan, mostly in the Southern Provinces and Southern Kordofan, were smoothly functioning under the supervision of the Province staff of the department and were in no way working outside the frame work of the S.M.S. regulations. In 1954 the Gezira Irrigated Area was separated from the Blue Nile for medical administration and an additional Province Medical Officer of Health was appointed. In addition to his normal duties he carried out research in Bilharzia Control.

FINANCE:

In 1915, when the Civil Medical Department first came into existance the revenue of the country was just about 1 1/2 million pounds and out of that a few thousands only were paid for health services. By 1926 the revenue went up to nearly 6 millions and so a sum of 130 thousand pounds was spent by the Medical Department. In 1935 when the Medical Department was then entrusted with the whole health services in the entire country the total revenue, which was then effected by the World Slump, came down to just over 4 millions and still about a quarter of million was spent by the Medical Department. In 1947 the revenue went up again to 10 millions and the budget of the Medical Department just exceeded 3/4 of a million.

In 1950, when the real expansion started to take place, the revenue went up sharply to 42 millions and the expenditure on health services approached 2 millions. This figure ascended gradually year by year until it reached 3 1/2 millions in the current year. In this connection I should not forget to mention here that most of the services of environmental sanitation and social medicine are paid for by the local authorities. (See Appendix 'I').

UP-TO-DATE ORGANIZATION OF THE MINISTRY OF HEALTH:

With the introduction of the constitutional reform in the Sudan, the Sudan Medical Services developed into a full Ministry of Health in 1949 and a graduate of the Kitchener School of Medicine took office as the first Minister of Health.

The Sudan was fortunate enough to join the World Health Organization in 1955 as an associate member and as a full member in 1956, although valuable services have been rendered as from 1950. Fellowships for postgraduate courses were generously awarded and the flow of advisors and equipment for pilot schemes have so far flooded all fields of activities. Other international organizations, particularly UNICEF and F.A.O. have also kindly augmented the services of the W.H.O. It is rather appropriate to mention, at this juncture, that the Faculty of Medicine with its highly qualified personnel have been contributing a great deal in all fields of preventive and clinical medicine together with research.

It has to be realized, however, that independence and self rule have brought with them public enlightment and the people have become more conscious of health. This sudden change, together with the marked increase in the population as revealed by the new census, has compelled all the Ministries to review their development policies. As far as the Ministry of Health was concerned cries came from every corner for the construction of hospitals and dispensaries together with health centres and mobile health units. A louder cry also came from those in charge of the existing medical services pressing for expansion and more treatment facilities. All is resulted in the construction

new rural hospitals and dispensaries and marked expansion in all the different sections of the existing institutions. The cadre of specialists has to be increased and that of general duty doctors has to be nearly doubled. Again new divisions have to be created and more international schemes have to be invited.

The need for designing a new structure for the Ministry was lately felt and as far as I am informed this was well studied and presented to higher authorities for final consideration. As far as this paper is concerned the existing structure is illustrated in appendix '3'.

You will notice that with the Minister at the top there come the Director, Medical Services and his deputy. The Director is again assisted by three Assistant Directors together with a Chief for the Medical Supplies Division and another for Tuberculosis Services.

The Assistant Director, Public Health deals with all the public health and social medicine from the level of the international schemes down to the mosquito-men in the village. He is assisted at the headquarters by the Chief Public Health Inspector and the Principal Matron. The Chief Public Health Inspector in his turn is assigned with the following duties :-

1. To advise on all matters of environmental sanitation.
2. Organization and management of the public health personnel.
3. Quarantine installation.
4. Food control and its relation to health.
5. Sanitary control of Khartoum Aerodrome.
6. Health education.
7. Malaria and allied endemic diseases.

The Principal Matron is responsible to both Assistant Directors, Public Health and Hospitals,

for the following :-

1. Administration of the Nursing Services in the whole country together with their training schools.
2. The organization of health visiting and the training of Health Visitors.
3. The organization and administration of the midwives schools, courses, training and examinations.
4. She is the secretary of the Central Midwifery Council.
5. She keeps the register of all the qualified nurses in the country.
6. She is responsible for the supervision of the work of the Superintendant Nursing Officers which includes the supervision of the village midwives.
7. She is responsible for collecting and compiling all the figures of attendance of the Health Centres.
8. She acts as an examiner for the Midwives School and the Nurses Training School in the whole country.

The Assistant Director, Hospitals, is responsible for all hospital and Dispensary services. The Assistant Director, Research, is responsible for all the laboratory services from the level of his ownself down to the Laboratory Assistant in the rural hospitals.

THE DUTIES OF THE CHIEF DIVISION OF MEDICAL SUPPLIES:

With the wide expansion of the services in the last few years it was found most essential that this Division should be administered by a medical man. His duties are as follows :-

1. Re-organization of the different sections of the Stores.
2. Re-standardization of all the equipment, instruments and medical facilities for the different units of the Service.

3. Preparation and supervision of tenders and receipt of materials.
4. Contact with all the medical firms for the supply of the best materials.
5. Supervision of the preparation of the Budget Provision for the routine and development schemes.
6. Even distribution of the right materials for the Medical Institutions.
7. Supervision of the Controllers of Stores in the Headquarters and all the units in the country.

THE DUTIES OF THE CHIEF OF THE DIVISION OF THE TUBERCULOSIS SERVICES:

With the advent of the International Tuberculosis Project and owing to the magnitude of the problem of tuberculosis in the country as revealed by the surveys a separate division for these services was created. It is now headed by a doctor who has had a lot of experience in the field and who had been conducting the Mass Campaign with the W.H.O. Team. His duties are as follows :-

1. To plan and administer future developments.
2. To co-ordinate the curative and preventive aspects at the control level.
3. To co-ordinate and supervise field work of B.C.G. teams and to collect data for analysis in order to assess the problem in the country.
4. To advise on epidemiological and mass miniature radiography survey units.
5. To advise on the settlement and rehabilitation for the cured and arrested cases.
6. To advise on the methods of prompt notification.
7. To understudy the work of the International Teams of both B.C.G. and Demonstration Projects now operating in the country in order to prepare for taking over by national workers.

At the Provincial level the Province Medical Officer of Health is responsible for the general medical administration of his Province :-

1. He is responsible for the preparation and supervision of methods of control of all endemic and epidemic diseases.
2. Organization and supervision of Welfare Centres together with the Midwives and Nurses Training Schools.
3. The administration of the School Medical Service.
4. Health of prisoners and sanitary conditions of all the Prisons of the Province.
5. He is the adviser and inspecting officer to all the Province Local Government Councils. He is in direct contact with them through his Medical Inspectors and Public Health staff.
6. He is responsible for the formulation of the development budget of his Province in both fields of preventive and curative medicine.
7. He is the technical advisor to all other Government Units in his area.
8. He is the Chairman of the Province Board of Public Health.
9. He is the chairman of the Provincial Hospital, Management Committee and the final authority for appeal in staff problems.
10. Complying with the policy of decentralization, which is practiced by the Ministry of Health, he is the sole director of Medical and Health Services in his Province.

The Province Medical Officer of Health is assisted at his Headquarters by an Assistant Medical Officer of Health and a Senior Public Health Inspector. The Assistant Province Medical Officer of Health deputises for him in his absence and, in addition,

the duties assigned to him are :-

1. He is responsible for the day to day routine of the School Medical Service in the vicinity.
2. Periodical inspection of the Province Central Prisons and Reformatories.
3. Supervision of the clinics of the Welfare Centres.
4. Supervision and inspection of private practitioner's clinics and local pharmacies.
5. Collection and co-ordination of all the data for the compilation of the Annual Report.
6. Trekking the Province alternatively with the Province Medical Officer of Health in order to inspect the district hospitals and dispensaries.
7. Immunisation and certification of pilgrims.

The Senior Public Health Inspector assists the Province Medical Officer of Health in all matters relating to the environmental health and reports to him all the work of the public health staff in the Province. He is also responsible for the supervision of food hygiene, town and village sanitation as well as industrial health and planning. He is responsible for the quarantine and disinfections in case of epidemics and for the routine control of endemic diseases. He also advised all the local government councils on budget preparation for environmental hygiene services and for the preparation of Public Health Local Orders. At the Districts level the Province Medical Officer of Health is assisted by the Medical Inspectors who are dealing with both preventive and curative medicine. On the preventive side their duties nearly coincide with those of the Assistant Medical Officer of Health.

ADMINISTRATION OF HOSPITALS:

Except for the Hospitals at Khartoum and Omdurman which are administered by Directors, all the hospitals in the country are administered by the Province Medical Officers of Health through the Hospital Management Committees.

The Senior Medical Officers, with the assistance of the matrons and Hospital Managers act as executive officers.

DISCUSSION:

Dr. B.B. Waddy: I should like to make a few comments on Dr. Ibrahim Ahmed Hussein's brilliantly comprehensive review of the health problems of the Sudan, and Dr. Hadi El Nagar's paper. Both speakers have, I think, shown a full comprehension of the scope of the country's health problems, and the uneasiness one must feel when considering the dimensions of the task of controlling them. I do feel that it can be too readily assumed that disease is always imported into this country from outside. My own experience is mainly West African, and I am fully sensible of the fact that much disease does travel from there to the Sudan with uncontrolled immigrants on the pilgrimage etc. But in two instances I believe that trouble is mainly internal. The spread of cerebro-spinal meningitis can be traced, year by year, in the Annual Medical Reports of the Sudan from Equatoria in the south in the 1920's up to Khartoum, westwards to Darfur and thence on towards West Africa. As for sleeping sickness, this did originally spread from West Africa to the Congo and thence to Uganda (probably with H.M. Stanley's Emin Pasha expedition). But its recent recrudescence in the south should, I believe, be looked on as of internal origin. I had 16 year's experience of sleeping sickness work in Ghana, and am acutely aware of the speed with which the disease can re-establish itself of control is relaxed for a moment. Dr. Ibrahim Ahmed Hussein mentioned French Equatorial Africa in this connection. It was there that in 1915 Jamot first set out the principles according to which sleeping sickness has been treated successfully ever since, throughout West Africa. These were :- that diagnosis, and later treatment, must be carried out in the villages themselves; that everyone must be examined, whether apparently ill or not; and that, since diagnosis is rapid and treatment slow, the two types of team must move at independent speeds. Such teams, originally dealing only with sleeping sickness, now carry out comprehensive surveys and treatment of endemic and epidemic diseases in all West African territories.

They are immensely valuable, not only for the work they do but for the training they provide; training which I believe all medical staff destined for rural work should undergo. It makes them "mobile minded" for life, and gives them a conception of the patient as a unit in a family, a village and a district. There would be great scope for such teams in this country.

But where are the doctors to do the work ? Everyone agrees on the paramount importance of preventive medicine in the Sudan. I may quote the recent report on the Faculty of Medicine by the Visitor (though he himself is a physician, not a public health worker). In actual fact, public health is at present a depressed trade. The teaching given at the School of Medicine, with the trips to the Provinces is excellent, but by itself is not enough; surely a period of public health work is just as necessary a "house appointment" as those in medicine, surgery and gynaecology. The status of public health in this country needs deliberate lifting. Our chairman at this session has been in sole and complete charge of the University's Department of Public Health for nearly a year - and remains with the rank of senior lecture. It is well known that he cannot attract an assistant at present. This country must be almost unique in the world in not according specialist status to the Diploma of Public Health. Finally, it is notorious that the financial rewards of a public health career do not compare with those of clinical medicine: some official balancing of the two should be done. If resolute action be taken in these matters, there will no longer be difficulty in attracting able young men into this fascinating career. If I may refer to Professor Morgan's paper, it is perfectly correct to say that the clinician gives us our treatments for disease. It is for the public health service then to apply them - tryparsamide for sleeping sickness, sulphones for leprosy, sulphonamides for cerebro-spinal meningitis, penicillin for treponematoses etc - to the thousands and tens of thousands who suffer in rural areas.

May I also refer to a point in the paper by Dr. Anis Mohammed Ali Shamy, (which I know he put in as a debating point rather than as a didactic statement of opinion,) namely the possibility of controlling onchocerciasis by quarantine measures between south and north. I do not believe that onchocerciasis can be prevented from spreading by quarantine. Moreover, as an ex-West African I must freely admit that onchocerciasis is certainly one of our important exports to the Sudan.

Professor J.H.G. Lebon: commented on the deceptive nature of statistics and pointed out that no allowance had been made for change in the value of money in considering expenditure on health in relation to the total budget. Values since 1945 must be reduced by 1/2 to 2/3 to achieve measurement in real terms. Since the population of the Sudan has certainly doubled since the mid-twenties it may be that, despite total increase in health expenditure, the expenditure per capita is decreasing.

The Minister of Health: re-iterated his view that epidemics are brought into the Sudan from outside, particularly the northern and eastern borders.

Dr. Hadi El Nagar: in reply, pointed out that the sleeping sickness epidemic of 1910-12 came in from Uganda and in 1926 relapsing fever came in from West Africa. He pointed out that the monetary values given in the chart were proportional.

Dr. Abdel Halim Mohammed: commented upon the apparent appearance of divorce between the curative and preventive services despite the reality of their integration. Positive health and the standard of living are the concern of the community as a whole. Peptic ulcers, hypertension are diseases imported as part of the benefits of civilisation. He appealed to the community to remove prejudices against the training of women for there is great need, throughout the country, for use and integration of all kinds of workers in the field of health.

Dr. Ahmed Ali Zaki: related how he had seen smallpox brought into Darfur over the long border between Darfur and French Equatorial Africa. He had seen infected children smuggled over the border at a time when Darfur was free from smallpox. We certainly do get diseases from our neighbours but it is not always one way traffic nor do we get all our diseases from outside.

INTRODUCTION TO THE WRITTEN CONTRIBUTIONS

BY

THE CONVENER

H. BUTLER, M.A., M.D., B.Chir,(Camb)

PROFESSOR OF ANATOMY IN THE UNIVERSITY OF KHARTOUM

As Convener of this Conference it is my pleasant duty to introduce the twelve written contributions and, on behalf of the Philosophical Society, to thank the authors for sparing so much of their valuable time to prepare these interesting articles. Perhaps, too, I should explain how it is that an anatomist, who is not entrusted with live patients but only the dead, came to be the Convener of this very live Conference. A year ago, when the Council of the Philosophical Society were discussing possible themes for this Conference, the late Professor Saad El Din Fawzi proposed that the Health Services and their work was a highly suitable topic. It was my misfortune to be the only medical member of the Council and as a result of firm, but friendly pressure, on the part of Professor Fawzi I find myself here to-day. However, it must not be forgotten that all branches of medical science play their part in constructive health measures, even though their role is not immediately obvious. Nearly all health workers, in addition to doctors, must have some knowledge of the structure and function of the human body :- medical assistants, midwives, nurses, physiologists and so on. Recently, I have had the privilege of teaching quite advanced anatomy to the staff and senior pupil midwives from the Midwives Training School in Omdurman. Truly, a privilege because I learned far more than I taught to them. The intelligence, integrity and natural dignity of these women is most remarkable. In particular I must mention the work of Sit Bitoul, whose simple, but effective, methods for training illiterate midwives are quite remarkable. It is little wonder that the Midwives Training School is the showpiece of this country, indeed, of the whole of the Middle East.

I do not intend to discuss each contribution separately, you will be given the opportunity to do that in a few minutes. I propose to outline the things that I, as a doctor and teacher have learned from them.

Firstly, numerous historical side-lights which form a valuable supplement to the official history of the Sudan Medical Services and, secondly the unhesitating, and even militant manner, in which contributors have put forward their personal views. One of the major justifications for holding this sort of Conference is to enable people to use the, as it were, neutral ground of the Philosophical Society to express controversial views.

The contribution by the Government Analyst is outstanding for its volume but this is made necessary by the vast range of work done by the Welcome Laboratory. Fascinating as these matters are, I think that the really important part of this contribution is its historical survey. It brings into the lime-light a man to whom the Sudan, as well as many other parts of Africa and medical science as a whole, owes a great debt. Henry Solomon Wellcome was born in 1853 in a long cabin about 125 miles from Milwaukee in the State of Wisconsin. At the age of 15 he became a druggist's clerk in Rochester and here came under the influence of Dr. W.W. Mayo, the father of the famous Mayo brothers who did so much for the development of modern surgery in the U.S.A. He qualified as a pharmacist and, after travelling for various drug firms in the States and South America, he settled in England in 1880. Together with Burroughs, he founded the world famous firm of Burroughs and Wellcome. Wellcome used the profits from the firm to found a series of research laboratories in England and, in 1903, he equipped the Medical Research Laboratories in the Gordon Memorial College, under the directorship of Andrew Balfour. Wellcome early realised that freedom of research was essential to real scientific progress and recognition, and by granting these privileges to his research workers he at once raised the laboratories above those of many business concerns, placed them on a sound scientific basis, and established the principle that the researches carried out were not to be subordinated to commercial demands. Wellcome was also interested in archeology, ethnology and mythology in relation to the history of medicine and, apart from visiting ancient movements, he undertook his own investigations. His early travels in the Sudan took him to Sennar and he arranged for the excavations at Jebel Moya.

For several years, up to 1914, he personally supervised these excavations. Truly, the Sudan owes a great debt to this most generous benefactor to medical science.

The Stack Laboratories, whose work is so ably described by Dr. Mansour, is one of the many off-shoots of the original Wellcome Laboratories. And the Stack Laboratories lead us directly across the road to the Kitchener School of Medicine and its role in health problems. The militant article by Dr. Anis will, I am sure, provoke a considerable amount of discussion. Professor Morgan's article lucidly sums up the clinician's role in striking the balance between curative and preventitive medicine. I always feel that the public health officers and doctors are at a great disadvantage in so far as putting oil on pools of water does not have so dramatic effect as curing a patient desperately ill of black water fever. This produces a sort of inertia towards preventitive measures on the part of the public. However, Sayed Khalafalla's article on Health Education indicates that this inertia is rapidly disappearing.

It is to be noted that 5 of the 12 contrib-utions are concerned with the work of auxillary personel, without whose devoted labours the doctors of the Medical Services would be unable to function. With a country of 1,000,000 square miles containing some 10,000,000 people it is clearly economically impossible now, and for a long time to come, to replace medical assistants by doctors. Indeed, where can one get the enormous number of doctors required ? It takes 12 years of school education and 6 years of university education to produce an embryo doctor. At present the yearly intake into the K.S.M. is 30 students and no more than 25 of these will eventually qualify. One must remember that doctors, like other human beings, die or retire at 55. The present rate of output barely exceeds the losses. It is true that the new buildings of the Medical School are designed to produce on eventual output of 50 doctors per year but this can only be achieved when the secondary schools can turn out more than 50 students of the required standards each year.

At the moment it is barely possible to achieve 30 students of the required standard. Also, it is to be remembered that the medical specialists and future medical teachers will have to be drawn from the total output of Sudanese doctors. There seem to be 3 possible answers to this problem :-

(i) Lower the standards for entry to the K.S.M. This sureky, is the one answer to be immediately rejected, as being absolutely undesirable.

(ii) Recruitment of expatriate doctors to fill in the gap until the required output of Sudanese doctors is attained. The Sudan, like many countries that have recently acquired their independence, is a competitor in an open world market. Clearly, this is unlikely to be a good proposition.

(iii) To support its meagre number of doctors by a large number of well trained medical assistants.

Allied to the auxillary medical personel, and so often forgotten, is the Veterinary Officer. Available figures indicate that there are at least two domestic animals, counting only camels, cattle, sheep and goats, to each human being in this country. Apart from being a source of wealth such animals can also be a source of disease and, in addition, to these domestic animals, there are innumerable cats, dogs, poultry and wild animals.

Finally, we are warned by the Psychiatrist that developmental advances in a country, so-called "civilisation", brings with it its own diseases. Before I came to the Sudan I worked in London and commuted daily between my home and St. Bartholomew's Hospital, a total distance of some 28 miles per day requiring the best part of two hours travelling. One either drove a car in the mad rush of London traffic or struggled for breathing space in a crowded tube train - incidentally, being far more over-crowded than was ever permitted in a truck carrying cattle ! It is, unfortunately, true that the pressure of modern life will inevitably raise the tempo of living in the Sudan but perhaps the very vastness of the country may save it from reaching such an extreme degree.

THE ROLE OF THE CLINICIAN

BY

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It is obvious that, in medicine, prevention is better than cure. Nevertheless it is only relatively recently that particular emphasis has been placed upon the environmental factors responsible for disease. Although knowledge of such factors is essential for the effective control and prevention of disease, study of them has been comparatively limited.

Since the beginning of this century, bacteriologists have successfully demonstrated the micro-organisms responsible for an increasing number of diseases. Drugs have been discovered or synthesized which will destroy many of these micro-organisms in the human body. The interest of clinicians has, in consequence, been focussed on the invading micro-organism which is the immediate cause of the disease. The conditions in the environment which enable that micro-organism to flourish and the faults in the patient which predispose to the infection have received much less attention. A new branch of medical science has developed called Social Medicine, which is concerned with the investigation of personal environmental factors in disease.

In the maintenance of health responsibility falls first on the community as a group. The prevention of war, famine road accidents and industrial ill health can only be accomplished by action on the part of the community. The morals and standards of the community will profoundly influence the pattern of disease within the community and the hazards to which the citizen is exposed. The prevention of infectious disease is primarily the concern of the hygienist, although without the co-operation of the community he can achieve very little. The individual citizen himself, by his manner of life, morals, hobbies and pleasures will often ultimately determine whether he is healthy or not.

Although as a private citizen the clinician is involved with the rest of the community in preventing disease he has by virtue of his occupation, a particular contribution to make. This springs primarily from the intimate nature of his contact with his patients.

Before patients will accept the necessity for public health measures designed to eradicate diseases, they must be convinced that those responsible know what they are doing. The patient, who has had his malaria cured by the clinician, is more likely to accept advice on how to avoid a recurrence of the disease or to prevent spread of the disease to others.

The clinicians first contribution to public health is the spreading of confidence in the medical services of the country. In this way he can facilitate the preventive work of the hygienist. It is obviously ideal that the clinician and the hygienist should be one and the same person. With the increasing complexity of medical science this ideal is realised less and less often. Where the clinician is not the hygienist he can still reinforce the latter's pronouncements by his personal influence with his patients. Many clinicians practising in Khartoum were able to assist in steadying public opinion during the recent outbreak of acute poliomyelitis. The fact that they were not executive officers of the Ministry of Health gave their views an apparent independence and, therefore, added weight in the patient's opinion. Fear is a contagion which sometimes only the clinician can eradicate.

The hygienist's duty is to the community as a whole, that of the clinician to the individual patient. The clinician must often, however, point out to his patient that he, the patient, has a responsibility to the community. If the patient's occupation makes him a danger to society, he must be persuaded to change his job. The children's nurse with leprosy or the cook who is harbouring typhoid germs must be induced to change their occupation.

Infectious disease must be notified and here the clinician's skill in early diagnosis enables the hygienist to take effective action at an early stage in an epidemic to prevent further spread.

The clinician is often criticised by the less enlightened of hygienists for the amount of time he devotes to the minutiae of diagnosis. Without accurate diagnosis however, the vital statistics on which the hygienist depends for so much of his work, cannot be produced. Diagnosis means "through knowledge", not merely the attaching of the correct diagnostic label to a patient. The natural history of the disease, its development, infectivity and progress are important not merely as an intellectual study but from the practical necessity of dealing with the patient. The functions of the clinician and the hygienist are complementary. The hygienist, who is satisfied with a mere diagnostic label on a certificate, or the clinician, who is not concerned about the origin of his patient's disease, are both failing in their duty. Every patient admitted to hospital should be regarded as evidence of a breakdown in the health service.

To the clinician, accurate observation and diagnosis have a vital function in establishing the presence of hitherto unrecognised disease. The preponderance of one disease in a community may lead to other rather similar diseases being entirely overlooked. Clinicians are rightly concerned with making the correct diagnosis and in most instances this will be the commonest prevailing disease. The clinician must be alert, however, to recognise and prove the presence of diseases which have not previously been found in the area. This may present the hard pressed hygienist with yet another problem to solve, but at any rate the true nature of the disease pattern in the community has been established.

Health is not an end in itself. The community and the hygienist may succeed in placing the citizen in an ideal environment free from disease. Too often the individuals own outlook on life is wrong, his ambitions vain, his philosophy selfish and his moral standards low.

The clinician has often the duty of pointing out the effect that such mistakes have had on the patient's health. Even the most intelligent of mortals seem to get tangled up with life's problems. The clinician is often the only educated man to whom the ordinary citizen has read access. It behoves us to ensure that our medical training produces not only competent medical technologists but truly educated men of deep human sympathy. Such men can make a very great contribution, by their example, to the mental health of a community.

THE WELLCOME CHEMICAL LABORATORIES

BY

ABDEL HAMID IBRAHIM, M.Sc., D.I.C., GOVERNMENT ANALYST

HISTORICAL

The Wellcome Research Laboratories of the Gordon Memorial College were founded in 1903 the equipment of which formed the generous gift of the late Sir Henry Wellcome to the Sudan Government and they were intended to serve the following purposes :-

(a) To promote technical education.

(b) To promote the study, bacteriologically and physiologically, of tropical disorders, especially the infectious diseases of both man and beast peculiar to the Sudan, and to render assistance to the officers of Health, and to the clinics of the civil and military hospitals.

(c) To aid experimental investigations in poisoning cases by the detection and experimental determination of toxic agents, particularly the obscure potent substances employed by the natives.

(d) To carry out such chemical and bacteriological tests in connection with waters, foodstuffs and health and sanitary matters as may be found desirable.

(e) To undertake the testing and assaying of agricultural, mineral and other substances of practical interest in the industrial development of the Sudan.

The whole department, a part of the Education Department, was situated on the first floor in the east wing of the Gordon Memorial College (present University main building) and formed three separate laboratories, bacteriological, entomological and chemical under the charge of a Director.

The first Director was Dr. Andrew Balfour, and the first head of the Chemical Section Dr. W. Beam. The name of the Laboratories were later changed to The Wellcome Tropical Research Laboratories.

A floating laboratory became an accomplished fact in 1907 and started its maiden trip up the White Nile. Sir Henry Wellcome presented the excellent equipment, chiefly intended for protozoological and entomological work, and the Government housed it and placed it upon a special barge. The working room was of considerable dimensions, completely ventilated and mosquito proofed, in every way fitted for the purpose it is intended to fulfil.

Then a heavy calamity has befell the Laboratories. From some unknown cause a disastrous fire broke out in its buildings early on the morning of May 11th. 1908. In a couple of hours the dark room, the bacteriological room and the kitchen were completely gutted. Not only was a large quantity of equipment destroyed but all the trypanosomiasis strains were lost, together with records of two year's work on this subject. Many valuable microscopical specimens, collected since the foundation of the Laboratories, were consumed, as was a considerable portion of the Review, newly written, and of which there was no duplicate. The office files for five years, books and sanitary records, housed for lack of space in the bacteriological room, perished. Unfortunately many museum specimens, some of special interest, were in the kitchen awaiting preparation and remounting, and these were all lost. So were the cultures of bacteria isolated from gum. The chemical and entomological rooms escaped destruction, though considerable damage was done to the chemical equipment. At the same time sympathy and help were not lacking. Sir Henry Wellcome at once cabled his intention to refit the Laboratories in the most up-to-date manner possible and promptly despatched a large quantity of the more necessary equipment. Every aid was rendered by the Director of Education and his staff who undertook the reconstruction of the building, and from many other quarters offers of assistance were received.

The Chemical Section:

The importance of soil investigations in the Gezira necessitated the opening of a branch laboratory at Wad Medani in order that the large number of samples involved in alkali studies might be examined rapidly, and so that a closer connection could be established between field and laboratory experiments than could be maintained when all the work had to be carried out at Khartoum. The laboratory was opened in temporary quarters in February 1924 and was moved into a new building in October the same year.

A further development was the provision of a new laboratory at Atbara for dealing with the various chemical problems of the Sudan Government Railways and Steamers, especially those dealing with boiler water supplies and corrosion. This laboratory was opened in January, 1925. Unfortunately, owing to the World Crisis of the Thirties, the Atbara Laboratory was closed in 1932 and the staff and equipment transferred to Khartoum. The chemical laboratories in Khartoum were, until 1934, part of the original Wellcome Tropical Research Laboratories.

In 1934 dismemberment of the original Laboratories took place, the Bacteriological Section being taken on by the Sudan Medical Service, the Geological Survey by the Public Works Department and the Chemical and Entomological Sections by the Department of Agriculture and Forests as the Agricultural Research Institute. The original chemical laboratories then became two sections of the Agricultural Research Institute, the Soil Research Section centred at Wad Medani, and the Chemical Analytical Section, in Khartoum, the latter retaining also the name of Wellcome Research Laboratories. In July 1939 the Chemical Laboratories in Khartoum were transferred to the Sudan Medical Service and the name of the laboratories modified to "The Wellcome Chemical Laboratories". It became part of the Research Service of the Sudan Medical Service. The outstanding event of the year 1940, so far as these laboratories were concerned was the evacuation, enforced by military necessity, of the quarters

which they had occupied in the Gordon Memorial College since 1903 and their reinstallation in temporary quarters in Shambat. The transfer had to be effected at the shortest notice and was rendered doubly difficult by the fact that the new accommodation in Shambat was only half of that previously occupied in the College and was in no way prepared as a laboratory. The transfer commenced in September 1940.

At the end of 1948 work had been commenced on the alterations to the accommodation on the first floor of the River Hospital into which, it had been agreed, the Laboratories should move from Shambat. Evacuation of Shambat commenced in May 1949 and was completed at the end of June the same year.

The accommodation which the laboratories now occupy is of approximately the same floor area as that from which they were evicted in 1940, but is rather more conveniently disposed and is a vast improvement on that which they occupied for nine years in Shambat. It consists of seven laboratories, a dark room, small laboratories for distillation, milling operations and repairs, storage accommodation, four offices and the library. The last is the outstanding individual feature of the laboratories and has been greatly admired by all visitors. Every effort was made from the start to maintain a room worthy of the excellent collection of scientific books and journals which has accumulated since the foundation of the Welcome Tropical Research Laboratories in 1903 and the library is now adequately housed.

<u>The work of the Chemical Laboratory may be classified as follows :-</u>

(a) Examination and analysis of goods and materials for Government Departments and other Establishments for quality control and to ascertain whether they fulfil specifications and other requirements.

(b) Work in connection with Public Health Administration e.g. with regard to foods, waters, effluents and economic poisons.

(c) Penal Code analysis for detection of adulteration, false description and labelling and fitness for public sale and human consumption.

(d) Forensic work in connection with criminal investigation.

(e) Examination of agricultural materials and products.

(f) Supply of prepared reagents and standard solutions, to Government Departments and other Establishments.

(g) Information and advice of a chemical nature e.g. Laws and Regulations for drug control, Excise and food standards; advice on specifications and standards for materials and goods, etc.

(h) Research, separately or in conjunction with other Government and academic scientific Establishments, and the examination of products and processes which are or may be of economic or social importance to the country.

(i) Training and instruction of Technicians for various Government and semi-Government Departments.

The number and distribution of samples examined used not to vary very much from one year to another. But it is expected in future to increase two- or three-fold within a few years through the establishment of our Drug Control Section and the many new industries. The following table shows the number of samples received in different categories during the year 1958/59 :-

Water and Sewage	319
Foods	388
Drugs and Phamaceuticals	48
Clinical Specimens	30
Toxicological Specimens	183
Forensic Specimens	13
Edible Oils, Seeds & Oil Cakes	925
Damaged Materials	186
Miscellaneous	156
	2248

The following table gives the number of samples submitted by Government Departments and others :-

	1958/59
Ministry of Health	541
Ministry of Agriculture	83
Ministry of Animal Resources	29
Ministry of Commerce, Industry & Supply	6
Ministry of Communication	26
Ministry of Finance & Economic	29
Ministry of Social Affairs	1
Ministry of Stores & Equipment	18
Ministry of Works	207
Mechanical Transport Department Ministry of Defence	3
Sudan Police	61
Local Authorities	6
Khartoum University	6
Sudan Gezira Board	61
Province Governors	5
Commercial Firms & Others	1152

In much of the Sudan wholesome water is in very short supply. This problem is on its way to be solved due to the enormous efforts put in by the Ministry of Works and Department of Land Use and Rural Water Supply. Deep bore-holes are being bored all over the country and soon one expects that every citizen will have his needs for wholesome water satisfied. Meanwhile, the little water now present has to be made use of as far as humanly possible. All water supplies, whether bore-holes or surface wells, have to be chemically analysed in these Laboratories. An official certificate is issued showing whether such water is chemically suitable for human consumption, animal watering, other domestic purposes or agriculture.

Judging fitness for human and animal consumption is something of a problem. If International Standards or those recommended by the World Health Organization were applied at present, human consumption and large areas would probably have to be evacuated. Hence our criteria for fitness are different from those applied in countries where alternative sources of better quality water are abundant. Our experience has shown that susceptability of humans, say, to water salinity differs from one country to another or even from one area to another within the Sudan. Hence a water containing, say, 6000 p.p.m. would have been used for tens of years without any apparent ill effects. All this is taken into consideration in deciding on local standards for water.

A constant unfortunate feature in many bore-hole waters in the Sudan is the high nitrate content derived from natural sources. High nitrate is becoming more and more of a problem because of the high cost of bore-holes and the scarcity of water in areas that give high nitrated waters. On deciding on the 5 p.p.m. Nitrate Nitrogen limit we took a middle course between conflicting opinions and our practical experience, and this has led many authorities to question the responsibility of our limit in condemning waters for their nitrate content. It is known that water containing over 50 p.p.m. of Nitrate Nitrogen may give rise to infantile methaemoglobinaemia in infants under one year of age. Apart from this, very little has been reported on the ill effects of nitrates in water. W.H.O. recommends using high nitrate water for adults only and warning the population against its use of infants. On the other hand our experience has shown that cattle are very susceptible to nitrates. Water with 500 p.p.m. Nitrate Nitrogen has proved to be fatal to cattle within a few hours of watering. As nitrite is the toxic compound it seems that in ruminants nitrates are reduced by the bacteria in the rumen of cattle to the toxic nitrite. Year after year waters that have caused death to cattle were always found to contain over 200 p.p.m.

Nitrate Nitrogen. Hence one is bound to assume that humans may be equally susceptible like cattle if ever the nitrates were reduced for one reason or another. The unhygienic environment of most of the population in water scarce areas makes that more than possible. Hence our insistance on the 50 p.p.m. limit for passing a water as fit for human and cattle consumption.

Another problem is the excess alkalinity in waters from boreholes in certain areas e.g. Gedaref. An experience at Shendi has shown that a water containing about 1800 p.p.m. excess alkalinity as $Na_2 CO_3$ has caused several incidents of nephritis. Hence this year, for the first time, a limit of 600 p.p.m. excess alkalinity as $Na_2 CO_3$ was adopted irrespective of pH. This is also becoming a subject of controversy, although it is higher than the American Public Health Standards permit. Anyway in the near future we hope that enough sources of wholesome water will be available and then we are bound to review our limits to ensure better water for the population. It is also hoped that we shall find the time to investigate the problem of human and animal tolerance to certain chemical constituents in drinking water, with the cooperation of the Public Health and Veterinary Authorities.

Certain industries need a particular quality of water, and analysis of these is usually done for various industrial concerns e.g. for tanning, textiles, pottery, building materials, breweries, etc.

Also regular analysis of water samples taken from the Blue and White Niles at Khartoum and the Khartoum Mains Supply continues. Since this series was started four years ago many bodies have made use of it. Copies of Analytical data were supplied on request many people intending to start industries in Khartoum Area. Distilled and deionised water are supplied to aircraft, workshops and service stations, each of certain standards. The prepared water is analysed for pH, acidity, conductivity, total solids and silica which are the usual determinations needed in most specifications.

The examination of foods and drinks and materials that go into their manufacture and preparation constitutes the greater part of the work of these laboratories. The routine examination of these articles is usually done for the following purposes :-

(a) To ensure fitness for human consumption.

(b) To ensure absence of adulteration.

(c) To check quality standards and nutritive value to be tested for fitness for human consumption.

Samples to be tested for fitness for human consumption above are usually submitted by Public Health Authorities. Suspected articles are examined for poisonous metals, extraneous matter e.g. dirt, moulds, insects and any other possible contaminants, except bacteria. Packing is also examined for blowing, leakages, unhygienic packing materials and improper labelling. Utensils used in food preparation or service are also analysed for metallic poisons in their plating. Perhaps the most common reason for condemning articles in this category are heavy iron contamination in foods prepared in iron vessels, e.g. honey; zinc contamination of milk from the zinc galvanised milk vessels; excessive dirt in many foods, e.g. dura, flour, and kisra; insect infestation in wheat and dura flours; rancidity in butter, semin oils, biscuits, and dried milk; moulds and wild yeast in squashes, beer, and wines; blowing in canned foods and arsenic in grape wines and sherries.

The most common practice is that of watering milk and adulteration is detected here by Freezing Point Depression determination. Unfortunately only the three towns are served in this respect as the milk becomes sour on arrival from distant areas. Next comes ground coffee which is usually adulterated with roasted wheat. Also honey which is sometimes mixed with cane syrup or treacle; semin which is adulterated with hydrogenated vegetable oils; meat vinegar which is diluted with water; sherries which are also diluted with water.

Samples for quality standards and nutritive value are sent by Public Health Authorities, Customs Department, Ministry of Agriculture, Department of Stores and Equipment, Ministry of Commerce Industry and Supply, Sudan Gezira Board, the Fisheries Department and many others. Most of these send their products or articles, sent to them under contract, for checking their quality against universally accepted standards or standards specified by the particular Department. Many other articles in the market are also examined to check on the quality standards and constituents alleged by the suppliers, whether on the label or advertisements.

Unfortunately very few prosecutions are brought to courts under the existing food laws. The main reason is the obvious defect in these laws, and that is the absence of statutory food standards. Many articles of food and drink offered for sale are below the quality standards recognised in most countries. This makes it difficult to launch prosecutions in the absence of such standards as it will be a matter of convincing the magistrate of the reasonability of the standard suggested by the prosecuting authority. This means lengthy and costly prosecutions which are sometimes unsuccessful. On the other hand different courts are liable to give adverse decisions and some of these may constitute a permanent interpretation of the existing laws. Hence the need is vital for statutory food standards and food standard Regulations and Orders. These are Ministerial responsibilities and in the near future they will be assumed by the Minister of Health who would be advised by the Central Board of Public Health on such standard Regulations and Orders. The Laws will have to be amended accordingly to enable the Minister to issue Standards and make Regulations and Orders to regulate, direct and supervise the conditions of sale of foods and drinks.

Drug samples submitted for analysis include pharmaceutical preparations, therapeutic substances, medical specialities and crude drugs. These are usually either :-

(a) Unknown drugs for identification.

(b) Samples of drugs from the Ministry of Health and others to see if they comply with pharmacopoeial or other specifications.

(c) Samples of drugs from the Custom Department for classification.

(d) Destruction of dangerous drugs and old stocks.

Unknown drugs are usually brought in cases of destroyed labels or unclaimed drug consignments, or drugs confiscated by the Police. Checking samples for compliance with specifications constitute the major part of our work on drugs. These samples are checked according to relevant Pharmacopoeia or any other specifications or standards. Only chemical and physical tests and assays are done in these laboratories. As for Customs classification, analysis is done to ensure that the drug in question contains less than the admissible limit of Part 1 Poisons, if any. Also alcohol content of any preparation is determined. Destruction of dangerous drugs in Part 1 of the Poisons List is done on the request of drug stores and pharmacies. A certificate is issued which will enable them to amend their Poison Registers with the relevant authorities.

It is expected soon now to start a separate Pharmaceutical Control Section. This was decided when some concern was felt by the Ministry of Health about the existing laws, regulations and procedures controlling trade in drugs. The present procedure with regard to the importation, manufacture and sale of drugs in the country gives no adequate mean of control by any competent authority on the quantity, quality or mode of administration, distribution and sale of most of these danagerous and vital substances. The existing procedure is roughly as follows :-

(1) Application for a licence for a pharmacy or drug store.

(2) When the above is granted, the local authorities issue the necessary trading licence,

(3) The licencee is then free to import any type and quantity of any drug not containing a dangerous drug of addiction through a general open licence from the Ministry of Commerce, Industry, and Supply.

This has led to the present huge influx of numerous brands of drugs into the country without restrictions or even the knowledge of a competent medical authority. It was then realised that such an attitude, if allowed to continue, may constitute a grave hazard to public health, economy and, may be, social behaviour. Here are some of the dangers inherent in such ineffective control and which are recognised in many countries and by the World Health Organization.

(1) With internationally recognised therapeutic substances like penicillin, the competition among manufacturers in an open unrestricted market, would tempt some of these to produce cheaper varieties. The saving would have to be at the expense of quality of the drug or the packing although the potency may be the same.

(2) Manufacturers in a competitive market are usually forced to produce new pharmaceutical products in a short time without sufficient knowledge of the toxicity, clinical action or side-effects of the product. According to W.H.O., over 200 new medicinal substances are introduced in the market every year, and these are usually not fully investigated or tested and hence constitute a public health hazard.

(3) Many concerns may enter the pharmaceutical manufacturing field and tend to prepare specialities and brand mixtures. These have little or no research facilities or proper experience in drug manufacture and hence their products may be harmful or useless.

(4) Availability of various brands of drugs and keen competition of traders lead to wide publicity which is sometimes misleading. It also brings to the notice of the ordinary people the alleged effect of many of these.

This may encourage self medication which has actually reached wide proportions in the Sudan. This may lead to drug tolerance and medicinal addiction to things like tranquilisors, analgesics, hypnotics and even laxatives.

(5) Many manufacturing concerns in Europe have little or no experience in tropical storage. Drugs which may remain in a certain form of packing in Europe for years in a condition fit for medical use may deteriorate under tropical conditions within a few months. There are actually many such cases of deterioration and such drugs may be dangerous to use for medicinal purposes.

(6) In the absence of restriction on quantity of imported drugs, importers try to procure huge stock far beyond the reasonable need of the country. A lot of these stocks deteriorate and hence foreign currency is lost. On the other hand the price is increased to make up for the loss.

Moreover pharmaceutical preparations are susceptible to many deficiencies. There is composition, the limit of impurities, the physical properties, potency, activity, consistency, disintegration, weight or volume, dose, toxicity, packing, storage, labelling, advertisement and, if not up to certain standards, the medicine might be unfit for use and not worth the price paid for it.

Hence the need for effective control through accurate definition, adequate legislation and proper administration. In the first place it is important, in any suggested system of control, that any drug to be sold in the country should first get the approval of a competent medical authority. Such authority should have the power to regulate, restrict or prohibit the sale of such drugs. In this country the Central Board of Public Health may bear the primary responsibilities of such control. It may have its powers extended through amendment of the Pharmacy and Poisons Ordinance. It can also delegate some of its power to a special Drug Control Sub-Committee whose memebers should have the relevant knowledge of medicine, public health, pharmaceutical

chemistry, pathology, bacteriology and biochemistry. It could have external members from the University, the Pharmaceutical Industry and from the professional associations.

The Board or its Drug Control Sub-Committee should have the following duties :-

a) Granting certificates of registration and establishment of register of all approved registered drugs.

b) Approve the name, quality, composition, labelling and advertisement of drugs.

c) The determination of novelty, safety and therapeutic effect of drugs.

d) The issuing of regulations and orders for the control of trade in drugs.

e) The control of sale price.

f) To advise the medical and pharmaceutical professions on the use of drugs.

g) Laying down standards and specifications for drugs.

To enable the Board to perform these duties and to look into the possibilities of any drug or speciality for consideration for registration it rests on the manufacturer or importer to provide the Board with the following information :

a) A report of all the investigations that has been made to show the safety of the drug in medical use.

b) A complete disclosure of the components of the drug and their properties.

c) A statement of the composition of the therapeutically active components and their properties.

d) A detailed description of the method used in manufacture, processing and packing of the drug.

e) Full information concerning analytical, essay and other control methods employed to ensure identity, strength, quality, purity and stability of the drug.

f) Data showing whether expiry date is necessary and date of batch, code registration and other control numbers and their significance.

g) Recommended methods of selling (prescription etc.) .

h) Therapeutic indications, mode of administration and dosage.

i) Labelling, packing, storage, advertisement and publicity.

j) Publications, documents and data regarding pharmacological action of the drug, its toxicity, clinical effects, therapeutic efficacy and side effects.

k) Whether a drug is official or registered or approved for sale anywhere in the world.

l) Whether local manufacture is possible.

In addition the Board should have the power to ask for other information or exempt any applicant from any of the above requirements. The Board can then either ;

a) Accept the preparation for registration and hence its use for medical purposes.

b) Restrict the sale of the drug after registration or make temporary registration or any conditions for import, sale or manufacture.

c) Refuse registration and so prohibit its manufacturer, import or sale.

d) Direct and advise of certain alteration in composition, quality, packing, labelling, or advertisement for reconsideration.

e) Ask for more research information documents or certificates of analysis.

This is the sort of adequate control recommended by the World Health Organization and applied in one form or another in many countries, and it is hoped that within the next year adequate control along similar lines will be enforced in the Sudan.

To be able to decide on any particular drug, and to be sure that the registered drugs keep to their standards, the Board should have at its disposal a properly equipped and staffed laboratory to carry out the control examinations and investigation required.

Such a Laboratory will have to perform the following tests :-

1) Sterility,

2) Toxicity,

3) Potency and activity,

4) Indentification,

5) Purity,

6) Composition and assay,

7) Clinical and pathological. So apart from the need for apparatus, instruments, chemicals and biological requisites a variety of competent staff in the fields of analytical chemistry, pharmaceutical chemistry, biochemistry, bacteriology, and clinical chemistry are also needed. In our present Chemical Laboratories most of the chemicals, apparatus and instruments needed for chemical and physical tests are already available. Only staff and space are needed in that respect. The Stack Laboratories may have enough equipment for the biological, bacteriological, clinical and pathological work which constitutes a vital section of the work of a drug control laboratory. The whole proposal of control of trade in drugs may seem difficult and complicated. But the scheme could be introduced with out much difficulty and the ultimate procedure could be simplified at first. For example, all drugs which are official in the B.P., U.S.P. French Pharmacopoeia, U.S.S.R. Pharmacopoeia, International Pharmacopoeia or any pharmacopoeia or formulary the Board may approve of could be registered without any further investigation of their therapeutic uses etc. The Board may also register drugs which are registered in countries where the control on drugs is, in their opinion, adequate.

In this way, most of the vital drugs could be registered without much difficulty and it only remains to check that these drugs keep to the standards laid down in the relative pharmacopoeia or formulary. Other drugs and specialities could be registered temporarily pending further investigation. Plans have already been drawn to expand these laboratories and equip the Pharmaceutical Section with the necessary staff and equipment. It is hoped that within a few years we shall have an adequate system of control of manufactured, prepared or imported drugs.

Few clinical specimens are examined in these Laboratories as most of such work is done in Stack Medical Research Laboratories. Only work of a chemical nature is usually done here. Clinical specimens are usually submitted by various hospitals, the Stack Medical Research Laboratories and other private practitioners.

The Police Department in this country has not yet established a laboratory for itself and these laboratories have maintained a special section for forensic investigations. To-day the forensic section is well staffed and equipped to deal adequately and properly with all the present police work to the standard of the better police laboratories abroad. The staff have had practical training in several police laboratories in the United Kingdom and the United Arab Republic, and have at their disposal some of the most modern instruments for crime investigations. The laboratories have dealt with all types of crimes, house-breaking, poisoning, rape, road accidents, counterfeiting, forged documents, murders, explosions, fires and others. Although our contribution in crime investigations is now small it is hoped that the Police Department will make more use of the facilities as more and more criminals adopt the modern ways of committing crimes, the usual outcome of more civilisation. So far most crimes are simple and the Police usually find no difficulty in their investigations.

Forensic or Legal Chemistry is chemistry applied to the solution of certain problems that arise in connection with administration of justice.

The scope of Forensic Chemistry is very wide, because apart from the purely chemical side of criminal investigation it also includes the physical examination of any material or physical evidence that may lead to legal proceedings. But why it is done mostly in a chemical laboratory is because such a place is naturally provided with many amenities, i.e. instruments, chemicals, apparatus and references. On the other hand an analytical chemist is usually trained in the art of observation, precision, and deduction.

Most forensic samples are submitted by the police, but in more serious cases the staff themselves collect their examples from the scene. This ensures better handling and preservation. On the other hand, the scene gives the analyst a background which could be very helpful in his work in the laboratory and could narrow down the field of his examination considerably, hence saving much time and trouble.

Since the foundation of the Welcome Chemical Laboratories in Sudan, the laboratories have included a section for toxicological investigation. Now the section uses highly trained forensic chemists and toxicologist who have acquired experience in forensic laboratories abroad. Toxicology is the study of poisons and is concerned with their detection, isolation, quantitative estimation, action on the organism, and the antidotes employed to counteract their toxic effects. A poison is a substance which acts on the body chemically or physiologically, consistently causing, in toxic doses, a disturbance of function which may result in illness or death.

The laboratories receive samples of post-mortem specimens, vomit, suspected poisoned foods and poisonous plants for detecting the suspected poison. Each specimen that reaches the laboratories is thoroughly investigated to detect the nature of the poison and its amount. Lethal doses of certain drugs and poisons are in the range of a few milligrams.

But after ingestion, metabolism and distribution in the body, we are faced with the problem of detecing the few micrograms of the poison left in an organ like the liver. So it is very important to be extremely accurate and careful and to avoid contamination from other sources. Moreover the analyst has to confirm and reconfirm every positive result he gets to dispel any uncertainly, and hence there is no place for doubt. Hence the toxicologist should be a highly skilled, trained and reliable chemist, as he assumes a great legal responsibility. Sometimes the toxicologist receives no information about the suspected poison and yet he has to detect and identify it. If we imagine that he has at least five hundred poisons to look for, we can realise what difficulties he has to put up with.

Toxicological work has greatly increased in recent years. For example, during 1922 the number of toxicological samples examined were 10 while in 1958 the number jumped to 137.

It is very difficult to classify poisons in this country where we get a big variety of poisons and poisonous plants, most of which are unique and their active ingredients unknown.

The following are the most prominent inorganic poisons in the Sudan :-

(a) Arsenic: This has been used for many homicidal purposes in the past, but in the last few years has been rare. Accidental poisoning by arsenic occured in the Sudan few years ago as a result of drinking wines and sherries imported from Egypt. The wines contained arsenic from the grapes which were sprayed with arsenical compounds.

Animal poisoning used to occur after the ingestion of locust bait which used to contain arsenical compounds. This has now disappeared since gammexane has superseded arsenic in locust bait.

(b) Mercury: Some homicidal cases of poisoning with mercuric compounds were detected in the laboratories. Accidental poisoning with mercury happened in several cases mostly through its ingestion in medicines and veterinary preparations. Some cases have also occured among workers involved in dressing cottonseed with "ABAVIT B".

(c) Lead: Homicidal poisoning by lead is very rare but many accidental poisoning cases occured during the last war as a result of using petrol tins for household utensils. Those tins were then made from a lead alloy. Very few other poisoning cases due to lead are usually reported. But lead continues to be detected in food as contaminant.

(d) Zinc: Accidental poisoning by zince frequently happens. Most of the cases are due to milk contamination with zinc dissolved from zinc galvanised cans. Zinc phosphide is a very powerful rodenticide and a highly toxic compound. Accidental poisoning to animals has occurred as a result of ingestion of zinc phosphide in their feed.

Poisoning by alcohol is very common. It occurs when an individual drinks to excess and absorbs more than his system can bear. Poisoning by "araki Aeish" is very common in Sudan, as some people consume huge quantities of it.

Hydrocyanic acid is present in many plants in combination with glycosides e.g. amygdalin, so ingestion of such plants causes poisoning. Accidental poisoning in humans takes place in the South where cassava and other roots are eaten. These contain cyanides which are usually dissolved away by rotting in water overnight. In the Sudan accidental poisoning of animals by cyanides is frequent. Unripe dura plant, "Gasab", that contains the poison is the common cause.

Few cases of suicidal poisoning by harbiturates have occured in Sudan, while in other countries of Europe and America barbiturate are considered to be the most popular suicidal poison.

That is because barbiturates are often prescribed and hence available for accidental or suicidal poisoning. Offenders usually go to doctors and complain of lack of sleep and nervousness, and consequently get a fatal dose of barbiturate prescribed.

Many plants in Sudan contain glycosides and most of these are unique to our country. Such plants are usually found in the South and are used as fish poisons. Poisoning by glycosides happens frequently but it is very difficult to identify most of these as direct chemical tests for most of them are unknown. We have to carry out in most cases biological feeding on animals to detect the toxicity of these glycosides.

The smoking of hemp is classed among the drug habits and is a distinct social evil. The reputed attraction of the drug is that it causes dreams of a pleasant nature, a feeling of timelessness and wonderful visions which last until the dose can be renewed. The type of Hashish used in the Sudan, better known as "BANGO" or "KAMANGA" is fortunately very weak. That is because the seeds, leaves and small stems are included with the potent flowering tops. The addiction to Bango smoking is widespread. Eradication is being planned and executed by the Police Authorities who have started to destroy its plantation fields, mostly in the South, and keep a close watch on all goods coming from there. Many cases of homicidal, accidental and suicidal poisoning by alkaloids have been investigated and identified in the laboratories. The group of alkaloids includes a number of toxic compounds present in various plants. The Sudan is one of these countries which is rich in these plants which contain alkaloids.

The atropine group of alkaloids includes about eight or nine natural compounds of which the important ones are atropine, hyoscyamine and hyoscine. The chief sources of these alkaloids in the Sudan is Datura metel, locally known as "SAKARAN". Homicidal poisoning by Datura metel frequently takes place in many areas of the Sudan.

Tea parties are made for nomads travelling in the deserts with their cattle, and Datura metel is added to their tea to poison them and rob them of their money and baggage. In certain areas in the Sudan, Datura metel seeds are boiled with the tea or added Araki Aeish. We do not know exactly why this is done or what effect it has. Cases of poisoning by Datura as a result of drinking such tea frequently happen, with fatal results sometimes.

Opium is one of the most dangerous drugs and cases of its trade and addiction have increased in the Sudan in recent years. The police department is now taking positive steps to curb the danger by watching all ports of entry. Opium is obtained from the unripe capsules of the Poppy (Papaver Somniferum). It contains about 20 alkaloids and the most important of these is morphine which is considered to be the most poisonous ingredient of opium. Poisoning by opium is quite common. Its use is dangerous, being a habit-forming drug. Hence much attention is paid to the use of morphine in medicine. Opium addicts find the effects of the physiologic dose pleasant and they gradually increase the amount until they can take enormous doses of the drugs, orally. They might even turn to the white evil, the drug morphine itself, which is administered by injection. A definite proportion of morphine habitues die of pulmonary tuberculosis because of malnutrition due to the fact that they spend their on the drug instead of food. Their families are neglected and they suffer consequently. Hence it is a great social evil. Accidental poisoning by opium frequently happens when the addicts exceed their doses. There is no proper control of addicts in the Sudan. Treatment of addicts is rare and hence they continue to be addicts till the end. May be the very few cases do not make such supervision necessary at present.

Cases of strychnine poisoning are fairly numerous, most of them are either homicidal or accidental. Homicidal cases happen in the south of Sudan where nux vomica grows in abundance.

Several cases of poisoning by strychnine have been detected in the laboratory. The source seems to be from veterinary preparation used for destroying wild animals.

Colchicine poisoning was confirmed several times and always due to consumption of the plant Gloriosa virescens known locally in the South as "Malual Dit". Ghat which contains the alkaloid cathine, although prevalent in Yemen and Ethiopia, has not reached this country yet.

For a number of years chemicals have been used as insect toxicant or repellants. Some of them such as arsenic compounds, have been the cause of fatal poisoning in humans and animals. Since the end of the World II new toxic insecticides have been developed and their uses have widened in agriculture and public health. Insecticides like D.D.T. BHC, toxaphane and organic phosphates cause poisoning which is due to the accidental ingestion of their residues on crops or inhalation or contact abortion of the insecticide during application. Cases of poisoning of animals eating locust bait containing BHC is the most frequent. Poisoning to human and animals as a result of application of parathion, endrin and dieldrin has been also reported.

The number of oil bearing seeds and oil cakes that have been received for analysis continues to be maintained at a high level. These are mainly submitted by commercial producers and exporters of these merchandise, and also by the Research Division, Ministry of Agriculture and by the Jonglei Investigation Team and the Gezira Board. The principal oil bearing seeds which are examined are cottonseed, groundnuts, castor, sunflowerm sesame and melon seeds. Most of these samples come from commercial firms for issue of official certificates of analysis for export purposes in connection with their oil content, free fatty acids, moisture, crude filler, proteins, impurities and injurious insects.

Samples of castor seeds and groundnuts are usually sent by the Plant Propagation section of the Agricultural Research Division of the Ministry of Agriculture.

These samples are taken from observation and trials are conducted in various areas of different weather, soil and cultural conditions. The results of analysis are required in connection with the future development of castor as a cash crop in this country, and the propagation of oil-rich varieties of groundnuts. Samples of castor seeds have been cultivated in Alliab, Kitiab, Bouga, Sennar Wad El Huri, Gash and Tokar, while groundnut samples have come from Tozi, also oil content determinations on groundnuts have been done for the Gezira Board in connection with the possible future development of groundnut cultivation in the area.

Most of the pesticides samples submitted are insecticides for agricultural and public health use. A small number of fungicide samples or media treated with it are sent. Weed killers were also sent during the last year in connection with papyrus weed infestation of the White Nile. The analysis done is mainly on formulations to check the amount of active ingredient specified in the Government contracts. This is continuously being done for the Ministry of Health, Ministry of Agriculture and the Sudan Gezira Board. Many firms also supply their own formulations to check their active ingredients after mixing. As to residue analysis, very little of it is usually done, and when it happens, it will be in connection with poisoning cases.

It has been noted with concern in this Ministry that in the last four years the number and quantities of highly toxic insecticides increased enormously. Before then comparatively safe insecticides, like D.D.T. and B.H.C., were mainly used against cotton pests and for public health purposes. As more resistant pests started to appear in the cotton cultivation areas, more and more toxic insecticides were imported for their control; like parathion, endrin, toxaphene metasystox, Rogor and many other similar compounds. It was then obvious that, in the absence of any adequate system of control, the use of such compounds is liable to constitute a serious public health hazard, specially among farmers used to D.D.T. and ignorant of any dangers inherent in more toxic agricultural chemicals.

It was thus felt by the Public Health Authorities that it is high time that laws and regulations be made to ensure public safety in importing, conveying and applying toxic insecticides. This may need a special ordinance and a special controlling authority in the form of something like a Pesticide Board under the Ministry of Agriculture on which the Ministries of Agriculture, Health, Commerce Industry and Supply, Agricultural Boards and the Agricultural Bank are represented. The Central Board of Public Health has already appointed a subcommittee to advise the Board on the steps to be taken for control of insecticides. Meanwhile insecticides come under the Prohibited and Restricted Goods Ordinance and their import is subject to a licence issued by the Director, Medical Service, for each consignment entering the Country. For the import of toxic insecticides the licence is now being given subject to the importer signing and undertaking to observe certain conditions of sale, storage, conveyance and application. This will offer adequate temporary protection to the public till the proposed insecticides laws are passed.

There is always a big demand on the advisory services provided by the staff to various Government Departments and private concerns. Advice in revision and amendment of many laws, drawing regulations and orders is always sought. The advice of the laboratories was extended to many private concerns, intending to start industries for pharmaceuticals, spirits, sugar, sweets, etc..etc.. Moreover the laboratories have advised on references to various subjects, and made inquiries through its contacts for many more. It also helped in the equipment of many laboratories with the appropriate equipment, apparatus, instruments, references and reagents.

The Wellcome Tropical Research Laboratories of the early days was mainly a research centre with very little routine work. It had every facility to be one of the most active research centres in this continent. Its early annual research reports are still the original references in many medical, pathological, bacteriological, encological, anthropological, chemical and agricultural problems.

But, as routine work increased over the years and the division that occurred later, research work was greatly handicapped, and more and more attention and time was paid to routine, training and advice. To-day the Wellcome Chemical Laboratories do far less research work than it used to thirty years ago. That is because routine work has overwhelmed the staff and left them little time to investigate any problem on a large scale. The research work maintained now usually comes out of the routine, e.g. nitrates in drinking water or origin of stringiness in gum etc. Moreover, more time is spent in investigating new methods of analysis employing the various new physical techniques.

It is however, hoped that the plan of bringing all the laboratories of the Ministry of Health together will enormously increase the volume of research. The amalgamation will ensure coordination of work and cooperation in investigating many problems. In the Chemical Section we intend to start an industrial research centre to investigate the many prospective potentialities of industrialisation of the country.

The library has always been the centre of attraction and admiration by visitors. We were fortunate that all your predecessors believed in maintaining a first class library that included all the possible references they may need in their work. In a country like the Sudan, where there are no other similar scientific establishments to consult, it is vital to have every possible information at our finger tips. In more scientifically advanced countries, any problem that confronts an analyst can be solved by phoning an authority or visiting a near by laboratory or library. But here in the Sudan we cannot expect prompt help in inquiries and problems except from our reference libary.

THE STACK MEDICAL RESEARCH LABORATORIES

BY

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The Stack Laboratories are the descendants of the Wellcome Research Laboratories which used to be housed in the second floor of the east wing of the old Gordon College. The Wellcome Research Laboratories, the equipment of which formed the generous gift of Sir Henry S. Wellcome to the Sudan Government, started work February 1st. 1903. Dr. Andrew Balfour, the first Director of the Wellcome Research Laboratories, stated that the aim of the Laboratories was to serve the following purposes :-

a) To promote technical education.

b) To promote the study, bacteriologically and physiologically, of tropical disorders, especially the infective diseases of both man and beast peculiar to the Sudan, and to render assistance to the officers of health, and to the clinics of the civil and military hospitals.

c) To aid experimental investigations in poisoning cases by the detection and experimental determination of toxic agents, particularly the obscure potent substances employed by the natives.

d) To carry out such chemical and bacteriological tests in connection with water, food stuffs, and health and sanitary matters as may be found desirable.

e) To undertake the testing and assaying of agricultural, mineral and other substances of practical interest in the industrial development of the Sudan.

The Laboratories were an autonomous affair and for all practical purposes independent. Dr. Andrew Balfour was at the same time the M.O.H. for Khartoum Town.

The Wellcome Tropical Research Laboratories included sections for bacteriology and pathology, chemistry and entomology. Much time was devoted to soil chemistry, and the identification of various pests, mosquitos, sandflies, ticks etc. Early attempts at locust control were also made. Balfour's main preoccupation, however, was with sanitation. We owe our present water supply and the sanitary condition of Khartoum to his pioneer work. Balfour and his associates published four most invaluable reports covering the period 1904 to 1911. The work of Balfour in the Sudan was only a prelude to work in wider fields. He resigned his post in 1913 and was succeeded by Dr. Albert J. Chalmers, who gained his experience mainly from work done in the Gold Coast and Ceylon. For seven years Chalmers devoted himself to laboratory work and research. Together with Dr. Aldo Castellani he wrote a manual of tropical medicine that went through three editions and has been consulted by many workers in various tropical countries. Chalmers made many contributions to medical science and his name is further prepetuated in the Chalmer's Medal of the Royal Society of Tropical Medicine and Hygiene which is bestowed, from time to time, for outstanding contributions to Tropical Medicine. Chalmers was succeeded by Sir Robert Archibald who did a great deal of research work in Bilharzia, Kala azar and cotton disease. For fifteen years Archibald was directing research and routine work in the Laboratories. In 1925 the Laboratories were taken over by the Sudan Government under the Department of Education. Need was however felt for the reorganization and expansion of laboratory work in the Sudan. The materialization of the Gezira scheme and the Kitchener School of Medicine, however, had created a situation requiring a readjustment of views. The former necessitated a considerable expansion of the chemical and entomological sections, while the latter required a reorganization of the bacteriological section so that it would be placed in a more favourable position and status for obtaining material for teaching pathology and chemical pathology to medical students. The Wellcome Research Laboratories were therefore split up into various sections. Some sections were attached to the Department of Agriculture and some to the Sudan Medical Service.

The Stack Medical Research Laboratories, which were built in 1927/28 as a memorial to the late Sir Lee Stack, formed the Bacteriological Unit of the Wellcome Tropical Research Laboratories and became an integral part of the Sudan Medical Service as from April 1st. 1933 under Dr. E.S. Morgan as Assistant Director for Research. On April 7th. 1956 the Sir Lee Stack Indemnity Fund Committee gave a sum of twenty-four thousand Egyptian pounds to cover the cost of building and equipping the laboratories and for providing a travelling railway saloon for laboratory work in the outstations. The building and equipments of the Stack Medical Research Laboratories were completed and work started on Saturday, October, 13th. 1928.

The activities of the Laboratories may be classified under three main headings: Research, Routine activities and Educational.

RESEARCH: Of the three main activities research has always been the nearest to the heart of the staff of the Laboratories since its start. However, for various reasons, the other two activities seem to become heavier and to take the greater part of the time. Research work in the Stack is of a practical nature and usually initated as a definite problem connected with endemic diseases. Ad hoc research is carried out as and when required to reveal the cause of an epidemic or to help in control measures. The research work done in the last quarter century of the Laboratories includes research on malaria, Kala azar, yellow fever, relapsing fever, schistosomiasis, enteric and undulant fevers, pox diseases, onchocerciasis and other related subjects. As it is impossible to cover all the research work done during this period I am appending a list of some of the publications made by the staff of the Laboratories.

ROUTINE ACTIVITIES: These may be divided into two :-

(a) Routine examination of specimens.

(b) Preparation of vaccines.

Routine specimens are sent in from all parts of the Sudan. They include tumours for histopathology, brains for rabies, bloods and the like for culture or

biochemical tests, snakes and skins for identification and so forth. They are characterised by their diverse nature and purpose of examination. A recent feature is the large and steady increase in the number of specimens sent for examination. Although such increase is gratifying there seems to be a certain risk in allowing it to choke the essential research activities of the Laboratories.

The vaccine prepared in the Stack Laboratories are: small-pox vaccine, anti-rabic vaccine, cholera and T.A.B. vaccines. In the past these vaccines used to be imported from abroad at a high cost. Moreover, most of them suffered on the way during transport and the time they reached the country they were either completely useless or only of very poor potency. The vaccines produced locally have the double advantage of being both potent and cheap. It is not possible within the space at my disposal to go into the details of these vaccines as regards their methods of production or the number of doses produced annually throughout the past years.

The Educational activities of the Laboratories include teaching medical students of the Kitchener School of Medicine, the students of the Police College, laboratory technicians, laboratory assistants, and students of the Khartoum Nursing College.

The teaching of pathology, bacteriology and parasitology to medical students was undertaken by the laboratory staff from the establishment of Kitchener School of Medicine in 1924 until 1952. In that year a Chair of Pathology was created in the School but still bacteriology, parasitology and forensic medicine continued to be taught by the staff of the Stack Laboratories.

Laboratory assistants and technicians : The proper training of laboratory assistants started in 1953. Candidates were recruited from hospital orderlies, who had completed at least five years of nursing and had had a standard of education comparable to that of the intermediate schools. The trainees are given six months training in clinical pathology with special emphasis on parasitology. The training is mainly practical and refresher courses are given every other year to keep the assistants informed of new techniques.

The training of laboratory technicians started comparatively recently, In 1952 candidates were selected from graduates of the secondary schools and started on an advanced course on bacteriology, parasitology, haematology and pathology. The training continued for three years and was mostly of practical nature. The successful candidates filled a gap in the Laboratories and proved to be very useful. Much thought and time are being devoted to the training of technicians and new reforms are constantly introduced in the course to raise it to a level worthy of the development of the country.

THE NURSE

BY

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The Sudan is undergoing the profound economic and sociological changes which attend the rapid development of all a spects of life in a growing country. This phase in the evolution of so vast a country will continue for years to come and with this development will come changes in the health needs of the people, changes which will entail a greater need and demand for health services. the health services will not only have to be expanded but taking place within them will be great technological change and development. As these health services expand and develop, the nurse will be invested with additional functions and new responsibilities, with a role of increasing importance to the health of the nation and to the effective functioning of the medical services, for it is this member of the health team who is most directly and most constantly in contact with the "client", be he ill or well, with the family, with the community.

In the nurse in the Sudan is to make the important contribution required of her, the role she is to take must be well defined and understood, and her education must be adequate to prepare her for this role. The questions which arise then are :- what are or will be the duties and responsibilities of the nurse; how can the nurse be prepared for these; who can contribute towards this preparation and how; what conditions and support does the nurse need in order to function effectively ?

The role of the nurse:

The role of the nurse in the Sudan will change as the level of the general nursing educational standards in the country are raised and as the health services are further developed and expanded. Moreover, her role will vary according to the particular health problems, and to the availability of other health personnel, in the area in which she is to serve.

However, it is considered that the essential functions of the nurse are :-

a) To give skilled nursing care to the patient: nursing care which, whether it be given in the hospital, the home or in community agencies, is planned to meet the patient's individual physical, emotional and spiritual needs; nursing care which includes assisting in the achievement of the optimum rehabilitation of the patient.

b) To assist other members of the health team in the performance of diagnostic and therapeutic procedures; to make the accurate observations of physical and emotional conditions and situations which will assist her co-workers in the health services, or members of other agencies, in the execution of their responsibilities in the cure of disease, in its prevention, and in the promotion of health.

c) To assist in activities aimed at the prevention of disease.

d) To serve as an educator in the promotion of the health of the individual and of the community.

e) To supervise and give guidance and leadership to junior members of the nursing team and to auxilliary health agency personnel.

f) To appraise nursing needs and to advise on how they can be met,

g) To participate with other members of the health team in studying health needs and community resources, in determining services needed, in planning for future developments.

<u>The preparation of the nurse:</u>

If the role of the nurse in the Sudan is to be as outlined above, she must receive a sound preparation for it as her functions are not only important but also difficult.

Moreover, she will at times serve in areas where, for some time to come, she will not receive constant supervision assistance from more highly trained members of the health team. What then are the major considerations which should be borne in mind when selecting and educating those who are to serve the nation in this capacity ?

Selection: The choice of a candidate whose training will be for responsibilities which revolve around the health and well-being of others must be made with extreme care. The aim of nursing is that people be served. An individual who can so serve is one possessed of the enthusiasm, integrity and intelligence required in a career devoted to the interests of society. Such qualities are to be found in those who have not had the opportunity to receive a formal education. However, it is considered that, in view of the anticipated technological advances in the health services, and of the increasingly important role of the nurse in these services, emphasis should be placed on gradually raising the requirements in relation to the pre-nursing general education.

Education: In considering the preparation of the individual for nursing in this developing country, it would appear that there are certain major needs:-

a) For the appointment, at the Ministry of Health Headquarters level, of a chief nursing education officer who has the ability, the vision, the nursing qualifications and the experience to carry the overall responsibility for planning, administering and supervising the nurse training programmes and institutions.

b) For a revision of the present curriculum, aimed at the upgrading of standards.

c) For the provision of a tutor-training programme which will give the preparation required of those responsible for implementing this curriculum, for those responsible for educating individuals to carry new and additional nursing functions.

d) For the closing of some of the large number of schools of nursing presently being operated and the establishment of selected central schools in areas where the health team personnel, clinical services, facilities and equipment are of the quantity and quality required for a sound, broad and well-supervised training.

It is considered that within the curriculum itself emphasis should be placed on :-

a) The inclusion of increased opportunity to learn of the bases of individual behaviour, of human relations, of social institutions, of mental hygiene.

b) The methods by which the patient can be assisted, and can assist himself, to optimum rehabilitation.

c) The provision of opportunities to acquire skill and accuracy in observation, recording and reporting and of such instruction in the biological, physical and medical sciences as will lead to a sound knowledge of the principles underlying and the practice of, the technical procedures carried out by the nurse herself or with which she is called upon to assist.

d) The provision of constant supervision and increased teaching in the practice areas.

e) The principles and practices of disease prevention and health promotion, with teaching in such subjects as personal and community hygiene, normal nutrition, preventive medicine, public health nursing, and with opportunities for nursing practice in the maternity services, the home, the outpatient clinics, the health centres, and other community health and social agencies.

f) Introducing the student to the principles of learning, to the principles and methods of teaching, and providing opportunities for teaching practice in the hospital, home and community.

g) Assisting the student to an understanding of the overall health services, needs and problems of the country: through an introduction to these services, through study of these needs and problems, through affiliation experiences in district hospitals, dispensaries, dressing stations, public health projects and units.

h) Developing leadership qualities: through controlled experiences in administering small nursing units, supervising auxiliary personnel and more junior nursing students, participating in problem-solving projects, contributing to research activities, assisting at local and national health and educational conferences and conventions;

i) Providing that experience in working as a team member begins early: through membership in nursing teams, through learning and working with medical and other students, through observation of the health team in action.

Contributors to the preparation of the nurse:

The teaching staff and the administration of a school of nursing cannot alone prepare the nurse: valuable contributions can and must be made the home, the public and the field of general eduaction. The making of these contributions must start early in, and continue throughout, the development of the individual who is to eventually serve her country as a responsible member of the health team.

The home assists by encouraging and supporting interest in a career of public service; by aiding in the development of personal and social responsibility through permitting active participation in family and community affairs; by training towards the development of the independence and maturity of thinking and action required of an individual who is to serve her country as a nurse.

The public contributes through recognition of the importance of nursing in bringing health to the nation; through acceptance of nursing as an honourable career; through sustained interest in, and support of, nursing programmes and affairs; through active participation in matters relating to the position and functioning of the nurse in the community.

The field of general education assists by providing a programme which :-

a) Engenders the spirit of public service.

b) Encourages early interest in giving consideration to the selection of a career.

c) Provides opportunities for learning personal and social responsibility, for developing social poise and leadership qualities.

d) Assists the student to an understanding and acceptance of the great individual and cultural differences which exist among the peoples of the Sudan.

e) Develops in the student a desire for a dynamic knowledge of all aspects of the life of her country and of the relationships of her country with the rest of the world.

f) Gives the student a sound, basic education in home economics and general science.

<u>The effective functioning of the nurse:</u>

Effective functioning is possible only when the nurse gains personal and professional satisfaction from her career. It is important, therefore, that personnel policies :- hours of work, salary, vacation and sick leave allowances, promotion policies, pension schemes and working conditions :- adequacy of auxiliary personnel, work space, equipment, supplies, offer a standard of comfort and convenience comparable to that enjoyed by other members of the health team.

However, it is equally as important that the nurse have the recognition, respect and prestige due to an individual who is making a valuable contribution to society. The other members of the health team, especially the medical group, can create a good impression of nursing, an opinion which will result in public interest and support of nursing as an honourable vocation.

The objectives and the final goal of the entire health team are the same, that the health of the nation be raised to, and maintained at, the optimum level. Through mutual agreement on the functions, and responsibilities of the nurse, through respect for her dignity, through appreciation of her value, through an atmosphere of confidence can be demonstrated that the nurse is "the valued collaborator of the doctor, an indispensable member of the health team".

1. Canaperia, G.A. The Contribution of the Doctor and the Health Administrator to the Future Development of Nursing.

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INTERNATIONAL ASPECTS OF PUBLIC HEALTH

BY

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Certain diseases were known to be infections several centuries ago and they were noted to be carried from one country to another by men who were engaged in war, business, pleasure or as seafarers. Every country at that time made certain restrictions against the invasion of these diseases. The first international sanitary conference was covened in 1851. The intention was to protect Europe from cholera which was prevalent in Central Asia and was progressing gradually towards Central and Western Europe. Series of international sanitary conferences followed afterwards, until the culmination was reached by the establishment of the League of Nations Health Organization and the Office International d' Hygiene Publique. The present World Health Organization is the heir of these two bodies.

The Member Governments of W.H.O. agreed that six diseases :- plague, cholera, yellow-fever, small-pox, typhus and relapsing fever still constituted a threat to international traffic and needed universal rules for dealing with them but at the same time, in so far as possible, with a minimum of interference with world traffic. The Sudan revised and issued its Quarantine Law in 1955. It was based on and differed but little from the International Sanitary Regulations. Our sanitary law is enforced at our sea and air ports in order to protect the Sudanese from any of the six quarantinable diseases.

The Sudan is unique in its geographical situation. It is a cross road of Africa and is surrounded by many countries whose sanitary laws and control of infectious diseases vary from strict enforcement to complete lack of any observation. Pilgrims, other tourists and pursuers of work evade control stations on the border, and enter the Sudan through thousands of illicit roads. It is no secret that, as far back as 1920, all major epidemics that invaded this country were traced to have originated from outside it, crossed the borders and caused untold damage in human life and financial expenditure.

The famous 1926 Relapsing Fever epidemic that swept through Dar-Fur killed at least one fourth of the population of that province. C.S.M. and small pox in their unchecked waves made high tolls of human lives and their visitations followed their appearance from across the borders.

Plague has not established itself at all in the Sudan. Measures are taken against it at ports and by elimination of rats in all big centres.

Cholera was last seen in 1896, among the invading troops of Lord Kitchener before they crossed our Northern frontier; a few cases appeared then at Wadi Halfa and the disease was confined there. It appeared in an epidemic proportion in 1885-90 and the disease was carried by returning pilgrims from Hedjaz. International health cooperation was highly manifested when this disease appeared in Egypt in 1947. Restrictions and other measures were taken in the Sudan and not a single case appeared here.

Yellow-fever is still a menace. In 1939 it appeared suddenly in the Nuba Mountains and the number of victims rose to thousands. Intensive research followed and the mouse protection test was found to be positive in all the areas of the Sudan, south of latitude 15 . Eradication or control of Aedes, the transmitting vector mosquito of the disease, was initiated and the graph markedly dropped in most of the areas. Yellow-fever vaccine, an excellent immunising agent, has been widely and successfully used. The duration of immunity of this vaccine is undoubtedly longer than six years, the presently accepted period of time. Mass immunisation and insecticidation were carried out on West Equatoria border last year when the disease appeared near our frontier inside the Belgian Congo. An outbreak of the disease took place in the Kurmuk area in September 1959. It was quickly checked. The whole area and a wide perimeter around it were immunised and the total number of cases, until the disease was over, was 142 with 87 deaths. The first cases were diagnosed in Kurmuk hospital and they came from Ethiopia.

Small pox is still a serious problem. Foci appear every now and then in various areas of the Country. Whenever the disease appeared, a campaign of vaccination for the whole area and areas around was initiated. Lack of success was usually due to the liquid (glycerinated) lymph vaccine which lost its potency from exposure to heat and the non-cooperation of the West African tramp who either evaded vaccination or washed it out after the operation. These tramps hid the cases and transmitted the disease from one village to another all through from west to east, thus exposing to danger the inhabitants of all these provinces on route.

WHO is embarking on a universal campaign to eraicate this disease from the whole world. Dry lymph vaccine has been perfected and the Sudan will produce it very soon. The dry lymph vaccine is not affected by exposure to heat or storage and can be used with success in the field and under all weather conditions. It is hoped that when we take part in this universal eradication campaign, our neighbours will also participate with zeal and endeavour to eradicate the disease in their territories.

Typhus has never been a threat in this country. It has never been known in either its louse or tick form. The very few recorded louse borne type cases were imported.

Relapsing fever has completely disappeared from the country. The wise use of D.D.T. powder and its availability in dispensaries and in the village shops have been responsible for eliminating body lice from those who harboured them.

When one of these six diseases appears in a country, the neighbouring country or countries may impose restriction on travellers coming from the infected country. Such restrictions should comply with the International Sanitary (Quarantine) Regulations and should interfere as little as possible with normal travel or traffic. The Sudan has declared that travellers from any country should be in possession of valid small pox vaccination certificate (validity three years), valid Yellow fever certificate (validity six years) and valid Cholera certificate (validity six months) for

travellers coming from infected areas. Travellers who do not comply with these requirements, will be put under surveillance during the incubation periods of these disease. Other countries have similar requirements on travellers from the Sudan or elsewhere. It is advisable that travellers from the Sudan should enquire about these requirements before they leave otherwise they may be put to hardships on arrival. Countries impose these restrictions when they are in receptive conditions and an infected or incubating traveller on arrival may put fire on the local oil and cause an epidemic.

The world is still getting smaller in this Comet age. There is an ever increasing international traffic. Countries will need a world wide and rapid epidemiological intelligence warning system which has already been established by WHO. International cooperation is not only necessary in such notifications so that each country can take measures before hand, but it is also needed in rushing supplies and other assistance to help the threatened country in treatment and control.

But it will be a grave mistake to depend wholly on international assistance of any form without the country itself continuing parallel action in the improvement of its public health services and rasing the immunity status of its population. International assistance will fit in when there is a programme where the assistance can be utilised. International cooperation and assistance are provided by W.H.O. in the control and elimination of infectious diseases, endemic or epidemic; in environmental sanitation; in international health statistics; biological standardisation; advice and control in addiction-producing drugs; pharmaceutical standards and nomenclature; planning, stimulation and co-ordination of research, and in improving the health services of the country whether by providing experts or awards of fellowships to local personnel for gaining knowledge.

It is appropriate to conclude by quoting Dr. Brock Chisholm the first Director General of W.H.O. "Let us face it as W.H.O. had to do ten years ago: no group, no culture, no people, has yet found the perfect way of living, not even of providing medical care.

Until quite recently man's environment had been his locality only, his village or town, or at the most his own country. He had learned to live more or less at peace with his own emotions and had contrived to get along with his immediate neighbours. Now that situation had changed entirely, the environment of every person was the whole world, and it was essential to the health of every individual that he develop beyond the capacity to live with his own kind of people and be able to live with all the kinds of people all over the world".

MENTAL HEALTH

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It is very fitting that the question of mental health has been included in the programme of the annual conference of the Phiolosophical Society. Indeed, philosophy with its aim of pursuit of wisdom and knowledge has done a lot in the understanding of mental health. Part of this wisdom has illuminated the concept of mental health. The various philosophers have attempted in one way or another to enrich the knowledge of life and to contribute to the wellfare, and happiness of mankind. Abu el Hassan Ahmed Ibn Mohd. el Tabari, the Arabian Physician of the 13th. century, in his manuscript of Hippocratic aptly described "the physician philosopher as the physician who has the equipment of knowledge which transcends the practical knowledge of man himself and of his universe".

Other Arabian physicians were well aware of the place of philosophy in the practice of medicine and rightly stated that it was the duty of physician to philosophise. By this they meant to have a good insight into the problems of human beings with the view to solve them correctly. It is by knowing more about the field of mental life that it may be possible to promote the health and well being of the people. Mental health workers are concerned with human behaviour and the reactions and interreactions of the individuals within the frame work of the social milieu. These general principles embrace in essence part of the fundamental concepts of mental health.

A pertinent question may be asked at this juncture. What about mental illness ? The answer is that mental illness is regarded as a special form of psychological disturbance in the mental health of a certain individual in a certain social set-up.

Social evils like addiction, divorce, illegitimacy, crime and a host of other disorders of human behaviour are abnormal manifestations in the mental health of communities. To achieve good mental health is not only by striving to remove these social evils but by establishment of healthy measures for their preventions, and the provision of reasonable means to make life enjoyable.

Mental health is as complex as the life of the people with all their systems of values, attitudes, liking and disliking prejudices and sentiments. Worry and fear may affect the physical health of the people, just like infection by a bacterial organism or infliction by a chemical substance. The clinical manifestations may be different but the end result is a bodily illness all the same. The old dualistic theory of the islated work of body and mind is no longer held. The word, psychosomatic, is very commonly used in the literature now. To instil faith in place of fear, and confidence in place of worry mean a lot for the mental rest of a person. Fear and worry come under the psychiatric term of anxiety which is the commonest psychological disorder (see the table of new patients attending the Clinic for Nervous Disorders for the month of October/ November, 1959).

Categories of disorders	Number
Anxiety Reaction	72
Depression	33
Epilepsy	9
Hysteria	8
Manic/Depressive Psychosis	4
Headache	18
Mania	3
Schizophrenic Reaction	22
Psychosomatic Disorders	36
Total	205

Man may conquer outer space or travel to a new planet, but unless he can learn to attune his emotions to his environment, he will continue to suffer from anxiety and be handicapped by psychosomatic disease e.g. peptic ulcer, certain types of diabetes and skin diseases etc.

It is fascinating to look down the ages on the history of pioneer work of mental health; certainly the work has not been confined within the medical field. In ancient Egypt the priests were primarily concerned not only with the mental health of the living people but also with their "life beyond the grave". Here in the Sudan, some religious men had contributed greatly to the mental peace and social adjust-ment of their followers. The influence of great Sudanese religious leaders of the 17th century like Sheikh Hamad and Hassan Wad Hussouna (Wad Deifalla) had been markedly felt in the social satbility of their communities. Up to this date some people uphold their religious principles, and find mental peace and alleviation of their fears by invoking their sacred names or visiting their shrines. Sultans, Kings, national leaders, educationalists and politicians had done their share of mental health work before the establishment of proper mental health services.

The great Sudanese leader, Mohed. El Mahdi (1843-1885), apart from his remarkable national achievements, enforced all the relevant Islamic laws to prevent alcoholism and stop the use of habit-forming drugs, tobacco and the smoking of cigarettes. It may be of interest to note here one of the first recorded attempts to combat alcoholism in Dar-Fur. W.G. Browne (1799) in his "Travels in Africa", stated that "some excess had been committed by persons in a state of inebriation, and the Sultan having had cognisance of the fact, could find a remedy only in force", and added that he "directed that those who should be found in a state of intoxication should be capitally punished; and the women who made it should have their heads shaved, be fined severely, and exposed to all possible ignominy".

Today fortunately enough there is no need to resort to such drastic measures, and so far alcoholism has not constituted an outstanding sociomedical problem in the Sudan. But with the impact of foreign influence, the changing culture, the construction of breweries and the proposed schemes for distillation of spirits, the question of alcoholism may enter into a new phase and become a disturbing mental health problem.

Civilization and Mental Health.

If the ultimate aim of mental health is self-content and happiness, are social progress and civilization to have any deleterious effect on the mental health of the people ? Certain philosophers, writers and mental health workers believe that civilization brings in its wake harmful psychological disorders.

They believe that the more civilized the people become the more their emotions are repressed. Their living conditions become overcrowded and thay they are more subjected to stressful situations. The theme in itself is not new. "The Yellow Emperor" (2600 B.C.) descried the intemperate and disorderly habits of his time as compared with those of a more ancient era; sex, liquor, and irregular sleep and eating, combined with inner bitterness caused by grief; calamity, and evil, were ruining the people, who did not know how to find contentment within themselves". (M.D. Altschule, Roots of Modern Psychiatry). More quotations could be brought forward to strengthen these statements. On the other hand strong arguments could be produced in favour of civilization as a promoting factor in mental health. However, as Altschule stated "a definite relation between civilization and mental and emotional disorders have never proved to exist". But, as a matter of fact, certain variations of mental health problems have been shown to exist under the influence of various cultures.

It is not civilization as much which is the determining factor in the mental health of a devloping community or nation, but the dynamic social forces within the matrix of everyday life and its human relationship, which may lead to a better or worse ends. Traditions, customs, and the adherence to certain idelas and beliefs may act as cementing factors in the integration of personalities and enforce social stability in a community. Contrary to this, there may exist harmful superstitions.

Take the question of the evil eye. Some Sudanese people do not give it a thought. Others are very disturbed by its psychological results. A certain tribe in Southern Fung, called the Uduk, associates the birth of twins with the evil eye, and this trend in thinking usually subject the twins and their mother to great sufferings. Apart from this disturbing problem, the Uduks like most other Sudanese tribes have admirable harmonising social means in the cooperation of communal work and group entertainment, where the whole village may partake and act as one unit. By applying proper mental health principles it may be possible to augment the effects of good habits and remove bad practices.

With the change of culture the attitude of the people towards traditional institutions may also change. Take the example of Zar, which is a form of traditional healing - cult, and its essentially a simpler method of psycho-dramatic technique seen in certain European or American psycho-therapeutic units. The practice of zar has been very popular among the laity, especially in central, northern and eastern Sudan. It is no longer accepted to by the majority of the educated class of people in its present form. Whether it will regain its popularity or not that depends on many factors. It is possible that in future it may be developed scientifically and adapted to serve new socio-psychological needs in a changing society.

Migration and Mental Health

The question of emmigrants and displaced persons is one of the current problems of mental health generally, especially with the millions of refugees now present in the world. The uprooting of human being from their home lands, and their resettlement into a new environment entail certain socio-psychological features.

Through its past history the Sudan has felt the impact of migrational contact from surrounding countries. Whether it was due to climatic changes, periods of drought, or motivated by political or material gains, there were certain racial movements notably from the north, and from races and Kingdoms across the western frontiers like the old Nigerian Burno and Kanem Kingdom; to eastern and later the northern Sudan had witnessed the settlement of certain nomadic tribes from the Arabian

Peninsula early in history until it culminated in the historic movement in the seventh century A.D. It is still the practice of some tribal people to move temporarily for short distances along certain boundaries mainly in search of pasture and water. The influx of immigrants across the western boundary caused by economic factors or in the form of groups of Moslem pilgrims on their way to Mecca has remained the main feature of present day external migration.

In 1957 an investigation was carried out in a psychologically disturbed prison community at Kassala. The number of inmates was sixty. Out of this number 32.6% were recent immigrants from across the western border of the Sudan. Apart from the psychological disturbance, the language difficulty loomed greatly as a social barrier between some of the immigrants and the rest of the group. The socialisation of such immigrants and their integration into Sudanese society is a hard task, which needs great efforts.

Detribalisation.

Under a tribal system the people usually follow a certain mode of living and conform to certain codes of behaviour. Tribal life is a basic and traditional social structure in the Sudanese nation. In the last census (1955/56) it was estimated that 92% of the population of the Sudan live in rural areas and 8% in towns. In rural areas, the people either live in villages or lead a nomadic life and they are well-adjusted to the rules, regulations, and ways and means of living under the tribal system. Roughly speaking about half the people in the Sudan live as nomads. This pattern of behaviour is imposed on them by the existing economy. They subsist on animals and their products, and on account of climatic and geographical factors have to migrate seasonally in search of good pasture and adequate water supply. The psychology of the nomads need a separate study by itself. The various tribes offer a facinating field of research for students of social anthropology. With the inception of independence, previous administrative barriers have been removed from closed districts and so some of the nomads have come in contact with other tribes. The procedure is certainly a healthy nationa movement. Tribal friction was observed in certain areas. Tribal interrelationship is a field for further research. A lot could be done to remove the frustration, apprehension and the misunderstanding between the tribes.

With an expanding economy and social development of the country tribal life is bound to be affected. If the socio-economic changes of development are well planned and organised to suit the socio-psychological needs and abilities of the tribe naturally no harmful results are expected to ensue. But if the process of detribalisation has been wrongly managed through political, administrative or socio-economic influence, then this social institution may be disrupted and the mental health of its individuals may suffer.

Mental Health and mass movement.

In view of the fact that there will shortly be a mass movement of Halfa people, amounting to roughtly 60,000 persons, as a result of inundation of their homes lands by the water of the High Dam, it may be appropriate to allude briefly to the psychological health factors involved in this matter and offer some suggestions which I hope may be helpful in the maintenance and protection of mental health.

The situation so far is that Halfa people, through their long history and social development, have acquired and adopted a healthy and unified social system which is in harmony with their capacities and their environment. In spite of all economic hardship the individuals have adapted themselves to their limited means and the human inter-relationships have been admirably good. It is the object now, of all concerned, to maintain this healthy social integratio during the environmental change and to prevent any social disorders, frustration, or dissatisfactions. The existing administrative agencies are adequate enough to carry out the movement. The whole questions i a matter of sound planning. The time has been set an the various phases of the plan has to fall within its limits. Among the healthy signs shown by the people are their awareness of their problems and their readiness and preparation to face the situation.

Three parties are primarily concerned :-

(a) Halfa people

(b) the Government

(c) the people in whose territory or with whom Halfa people are going to settle.

The human element in this mass movement is very

essential. The cooperation between the three parties is a determining factor in this matter. It is, therefore, suggested thay after the committees have been made from the three parties that their representatives should meet as often as reasonably possible to discuss and help in the execution of the various plans. In this respect an anthropologist, social and psychological-health workers, could very useful in the socio-psychological surveys of the population, and in looking after the human side of the work. It goes withoug saying that compensation will be rightly given. But it has to be directed and utilized wisely to ensure a sound economic security. It is through working with the people, explaining to them the situation, assuring them of their future prospects that the fear and doubt, if any, will be removed, and healthy drives for a better life will be created.

Dr. M. Pfister of the Mental Health Section, W.H.O. who visited the Sudan in February, 1958 had the chance of assessing and discussing problems of mass movement of the population. She submitted a very illuminating and instructive report (May, 1958) and made some suggestion on protection of mental health during environmental change. It may be worthy to summarize very briefly some of these suggestions here. She divided the work into four phases :-

Phase I is planning. which entails the various meetings, sociopsychological pilot surveys and the establishment of organizational committee.

Phase II (a) Preparation of the people.

(b) Preparation of the teams.

Emphasis has been made on the maintenance of traditional social units, the family and the tribe.

Coordination of all agencies, organizations of socio-economic means and services, and the preservation of cultural back-ground attitudes and languages.

Mental Health Surveys and Psychiatric Service

Preliminary surveys in mental health have been carried out in Kassala, Blue Nile, Kordofan and Darfur Provinces. It is the intention to do the same in Northern and Southern Provinces. Having regard to the socio-cultural patterns, the psychiatric care hase been

established on an extra-mural basis in the Clinic for Nervous Disorders, Khartoum North. Very few patients have been admitted to the general wards in hospitals. The family plays a very important role in the treatment and with its members and through them therapeutic measures are usually administered. The work in the Clinic is ever increasing (See table from annual reports).

Year	No. of New Patients	No. of Interviews
1956/57	872	6,498
1957/58	1643	11,073
1958/59	2154	16,614

With the new tranquillisers, electrotonic treatment, and the mutiple psychotherapeutic techniques great advances in psychiatric treatment have been achieved. Even violent and excited patients could be treated as out-patients. The merits of extra-mural services out number greatly those of hospitalisation. The latter, except for the very few exceptional cases, is contrary to the nature of the existing social structure. Furthermore hospital treatment needs so much trained personnel and experienced staff, who are not available now.

Much emphasis has been laid on the social side and due considerations will be given to the development of community services.

The field of mental health offers fascinating subjects for research. Valuable results will be obtained from the study of social anthropology and racial psychology. Certain mental health disorders like addiction, juvenile delinquency, suicide etc. do not pose as serious problems at the present moment. But their study will give better insight into their management and control.

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The Midwife

By
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The act of reproduction is a natural and inevitable process. For thousands of years children have been born into the world, have survived labour and childhood and have grown to adult life to form the parents of the next generation. Because children have been born under all sorts of conditions since the beginning of human history, childbirth is considered a physiological process for the species and that nature should be given the chance to complete the process with very little or no aid. In few individuals the process may turn out to be pathological and in such cases expert help will be needed.

Among the most primitive people of which any record exists help, according to the customs of the time, was given to women in labour. In most cases this help was simple and given by a relative, a neighbour or any person, who happened to be on the spot and could render assistance. A Midwife is thus any person, male or female, who helps a labouring woman to deliver herself of her baby. The word midwife is now used when refering to female helpers, and when a male acts as such he is called "male midwife". The word midwife literally means "with the woman". There is an equivalent in every known language. The arabic equivalents are Gabilah, Daya and Na fasa.

A Short History of World Midwifery.

Customs associated with childbirth are part of the culture of every people. Except in every primitive communities a woman in labour had another woman attending to give voluntary help. Gradually these helpers became professional helpers through heredity and experience. They were usually old women who had no professional teaching and their methods were very primitive. Very early in history the training of a midwife was recognised. HIPPOCRATES (500 B.C.), the father of scientific medicine, organized, trained and supervised midwives. His teaching was carried on by Aristotle. In the Roman era, the scientific methods of the Greek School were forgotten and the training of midwives was ignored. In the second century A.D., the Greek Soranus wrote a treatise on midwifery and disease of woman. For the next 1000 years science and medicine were superseded by magic. In the mediaeval period midwifery was

practised by untrained women. Difficulties in childbirth were considered to be the just punishment for a carnal sin. In the 16th and 17th centuries there was a great revival of science in general and midwifery, as a branch, flourished. Some eminent obstetricians of that time took great interest in teaching and training midwives. In France the most distinguished were Ambrose Pare (1510 - 1590) and Mauriceau (1637 - 1709). In England, Harvey, (1578 - 1657) was considered the father of British Midwifery, and he wrote a book on midwifery. To William Smellie goes the credit of the modern practice of midwifery in England. He was considered a male midwife, had an extensive obstetrical practice, and trained a large number of students who spread his ideas. Although he was antagonistic to most midwives practising, he realised that it was an advantage to leave the routine attendance in normal labour in the hands of women who had time at their diposal, provided that they were well trained. He laid down the requisite qualifications and training of a midwife and advised that a midwife should be a decent sober, sensible woman of middle age with good health and clean manners. She should have some basic general education to enable her to understand the professional training. The latter will include a knowledge of anatomy and physiology of pregnancy and labour, the care of the mother during pregnancy, the conduct of normal labour, the care in the lying-in period and the care of the new born in its first few weeks of life. It should also include the recognition of any abnormality for which more qualified help is needed. In the 19th century many obstetricians and societies in England pressed the need of state recognition, training and supervision of midwives. As a result, in 1902, the first Midwives Act was passed in England. This act sanctioned the setting up of the Central Midwives Board, prescribed its constitution, laid down its duties and powers and made the board an effective machine to control the teaching and practice of midwifery.

Historical review of Midwifery in the Sudan.

The regular medical services in the Sudan were started after the reoccupation of the country in 1898. In the early years of the occupation public health and medical care were only important in so far as they kept the security forces free from disease and was confined to few places. In 1904 a small cadre of civil doctors was appointed to take over the medical work in the big towns. In

1919 a Civil Medical Director was appointed and he gave more attention to the public health side of the services. Up to this time the midwifery work in the midwifery work in the Sudan was done by a traditional village midwife, "Dayat El Habl or Rope Midwife".

In 1919 the Civil Director started building the first Midwives Training School in Omdurman. The school was opened in 1921 and the Sudan was lucky to secure the services of Miss M.E. Wolff as the first Principal of the School. The birth of the school, its success in its early days and its survival were due almost entirely to the great faith, patience, perseverance and courage of Miss Wolff. The example she set for future Principals and Staff of the school was faithfully followed by all those who succeeded her. The idea of the school was to train women to act as midives under the conditions that were to be found in the Sudanese homes of that time. As in all backward countries the profession of midwife was largely a hereditary one, passing from mother to daughter. Miss Wolff was wise to appreciate the difficulties she would face and was anxious not to antagonise those already in practice. Her plan was to offer training to practising midwives and, if they showed some degree of proficiency, they were issued with certificates allowing them to continue practising. Great difficulty was experienced in persuading these women to come for training and in persuading the Sudanese women to be delivered in any other way than the traiditional rope method. Eventually, with perseverance from Miss Wolff and propaganda by the Government and some religious figures of the Sudan, classes were started for four old midwives. Once the ice was broken more women came for training. As more newly trained midwives became available a higher standard was demanded. In the case of the old untrained women, their daughters were invited to take the course instead. By 1924 all the existing old midwives of Khartoum and Omdurman were either trained or replaced by younger trained illiterate midwives.

The next step, a more difficult one, was to start training midwives for the provinces. The women chosen had to leave their homes and come to Omdurman for the duration of the course. The result of this experiment was gratifying. On returning to their villages these trained midwives became missionaries in the homes of their people, preaching simple public health and hygiene and practising midwifery in a new way. The success was reflected in the demand from all parts of the country for trained midwives. The demand was met by opening

training schools for village midwives in all provinces. The Omdurman School became the training centre for Khartoum Province and for higher training of literate midwives to act as hospital midwives, midwives teachers, superintendent midwives and health visitors.

Types of Midwives at present in the Sudan

1. DAYAT EL HABL, the rope midwife.

This is the traditional birth attendant of the Sudan as was earlier elsewhere. She is being replaced gradually by the trained midwife. Up to now in some areas of the Sudan and among the nomads the midwifery practice is still under the hands of these Dayat. They are elderly women who, by heredity and experience, became the recognised helpers in labour. In their capacity as midwives they act as consultants in disease of women, they practise Pharaonic circumcision and its repair after marriage and labour, they attend women in abortion and some of them practise criminal abortion. They are called rope midwives after the method which they use to deliver women. When in labour, the expectant mother is asked to kneel or stand on a special mat, "Birsh or Natu", with a hole in the centre opposite another hole dug in the gound. To assist the mother bearing down she has to support herself by holding a rope fixed to the roof. The midwife sits on the same mat and when the baby shows she incises the woman to effect delivery. The instruments used are always primitive and dirty and if there is bleeding from the wound it is controlled by digital pressure or by pouring hot oil on the would. The wound is later closed by thorns which are held in place by thread wound round the projecting ends. Infection, fever, and other complications follow such deliveries and all these are treated in the primitive ways by administering herbs etc. These Habl midwives are not now allowed to practise in a locality where a trained midwife is available.

2. The illiterate trained midwife, the village midwife of today.

Midwives trained in the Omdurman M.T.S. or other provincial schools are certified midwives. The way in which these illiterate women are trained now is a credit to the method adopted by Miss. Wolff. The instructions have to be given in an entirely practical forms. Lessons in theory have to be learnt by repetition. A methodical, and practical routine was devised and the equipment and instruments used were the simplest. On arrival

in the school the pupil midwife is provided with house dress and uniform. She is allowed four days to get familiar with the new town life and during these days she is shown how to clean the dormitories, bath rooms, and class room. She is also taught how to wash her clothese according to school standards. During the first two weeks they receive instructions on the use of scissors and forceps, and to distinguish medicines by sight, smell and taste. They are then taught the care and use of midwifery boxes and equipment and how to cut dressings and sterilise them by a method possible in their own homes. In the second two weeks they are shown how to prepare the room, bed, table, instruments and equipment necessary for a labour case. They are then instructed in simple nursing care:- the taking of the pulse and temperature, the administration of drugs, the introduction of a catheter and giving a simple enema. Normal delivery is then demonstrated to them by using a phantom doll and a dummy pelvis. After delivering at least two cases on the phantom, without a mistake, the pupil midwives are taken out to cases in the district by a staff midwife to practise delivery and after-care of the mother and baby in the first week after delivery. During the 4th and 5th and 6th months, cases and visits to the district are continued with a little less upervision if the pupil midwife shows satisfactory progress. She attends lectures given by the obstetricians and staff midwives in simple anatomy, physiology, public health, midwifery and child health. The duration of training is nine months after which candidates sit for an oral and practical examination. Successful candidates are given a certficate to practise midwifery. These midwives do almost 95% of deliveries at home. They act as private midwives and receive fees from their patients according to their means. Midwives working in towns get a substantial income but in the rural areas and small villages their remmneration is very little and has to be supplemented by payments and grants from the local council.

3. Literate trained town midwives.

In the last few years literate girls were accepted as candidates for training. They are given a more advanced course of training for two years. At the end of the training they sit for an oral, written and practical examination and successful candidates are issued with certificates allowing them to practise privately in towns.

4. Literate trained hospital midwives.

The pupils of this category are drawn from hospital nurses whohave had three years training as a nurse and acquired the nursing certificate. The course lasts for one year and is designed to cover all aspects of training necessary to qualify a candidate to work as an efficient hospital midwife and later be eligible for more advanced training to get the post of health visitor, staff midwife or midwifery teacher.

The first month is spent in learning by practise on the model how to deliver normal and abnormal cases. After proficiency has been obtained in the classroom pupils are sent out to take cases in the district. Each pupil is first shown 20 cases and then allowed to deliver 20 cases under supervision. Running concurrently with the practical teaching, and linking up with each part of it, are the lectures in Arabic with note taking. An important part of the training is the attendances at antenatal and child-welfare clinics and home visits with a health visitor. Towards the end of the course the pupils take duties in the lying-in wards of the Training School for normal cases and in Omdurman Hospital for abnormal cases. At the end of the course the pupils sit for an oral, written and practical examination and successful candidates are issued with midwifery certificates. The midwives of this category are not allowed to take private cases. The majority of them remain in Government Hospitals awaiting selection for higher courses. A few of them resign and are issued with a licence to practise in the towns and villages.

5. Staff midwives, midwifery teachers and health visitors.

Applicants for these posts must hold the Certificate of Nursing and the Midwifery Certificate. They sit for an entrance examination in general and technical subjects prior to appearing before a selection board. The duration of the course is eighteen months. In the first year they are given lectures on public health, paediatrics, elementary psychology, maternity welfare, ante-natal care, post-natal care, methods of teaching and inspecting midwives and the administration of health centres and training schools. In the last six months of the course, they are given lectures in infant welfare, infectious diseases, tuberculosis, social medicine, dietetics, school medical services, Local Government and its machinery and health regulations. Successful candidates are appointed to fill the posts of health visitors, midwives superintendents and midwifery teachers of the Ministry of Health.

6. Midwives trained outside the Sudan.

There are a few midwives who had their training in recognised institutions outside the Sudan. They are issued with licences to practice in the Sudan.

The Central Midwives Council.

The Director, Medical Services, Ministry of Health is responsible for the training and practice of midwives. He is advised by the Central Midwives Council which is responsible for :-

1. Co-ordination of training in schools of midwives
2. Inspection of training schools.
3. Standardisation of the courses of instruction and teaching facilities in schools.
4. Conduct of examinations fro the Certificate of Midwifery of the Ministry of Health.
5. Maintenance of a register of trained midwives.
6. Presentation of annual report to the Director.

The Central Midwives Board is constituted as follows:-

The Assistant Director, Public Health, is the Chairman. The Controller of Midwives and the Superintendant Nursing Officers, Khartoum Province are joint secretaries. The members are the Principal, Midwives Training School, Omdurman, the Senior Consultant in Obstetrics, a Senior Midwife and a Senior Health Visitor. In the provinces some of the powers and duties of the council are designated to a local Board of Studies with the Medical Officer of Health as Chairman and the membership of the Superintendent of the Training School, the Superintendent Nursing Officer and the Staff midwife.

Instructions regulating the practice of midwives.

1. Midwives who have been trained and licensed in the Sudan should use the designation "Licensed Trained Midwife".

2. A licensed midwife must enter, in a personal register of cases kept in a form approved by the Board, every case which is delivered by her in the capacity of a midwife.

3. A licensed midwife must give the Medical Officer of Health of any person authorised or any supervisor of Midwives every facility for inspection of her personal register of cases and other records, her appliances, such part of her residence as is used for professional purposes, her method of practice, and, when the authority

deems it necessary for preventing the spread of infection, must allow herself to be medically examined.

4.(a) A midwife must not, except in a grave emergency, undertake any treatment which is outside her normal province. The question whether in any particular case such treatment was justified will be judged by the facts and circumstances of the case.

(b) A licensed midwife must not, on her own responsibility, use any drug unless in the course of her training, whether before or after granting the licence, she has been thoroughly instructed in its use and is familiar with its dosage and method of administration and application.

5. A licensed midwife must call on a registered medical practitioner or medical assistant in all cases of illness of the patient or child or in the case of any abnormality becoming apparent in the patient or child during pregnancy.

6. If the emergency on account of which medical aid has been called in is a condition which threatens immediate danger to the life of the patient or child, the midwife must remain in with, and do her best for the patient or child until the crisis has passed.

7. If a licensed midwife has been in contact with a person, whether or not a patient, suffering from any condition which is or may reasonably be suspected to be a source of infection, she must without delay notify the Medical Officer of Health of the fact.

8.(a) No licensed midwife may administer a general anaesthetic or analgesic, unless she holds a certificate of competence in their use, which is approved by the Council.

(b) No licensed midwife may administer a local anaesthetic, unless under the direct supervision of a licensed medical practitioner.

9. No licensed midwife may administer any drug by injection except under the direct supervision of a medical practitioner, unless she is authorised by the P.M.O.H. to do so.

10. A licensed midwife must notify her place of practise to the licensing authority. She must give any change of address within seven days of such change.

11. A midwife should regard all information she may obtain about a patient as confidential, but she should make the relevant information available to a doctor or medical assistant, or another midwife or health visitor, if the circumstances so require.

12. The Medical Officer of Health may suspend a midwife from the practice for as long as may be necessary for the purpose of prevention of spread of infection.

13. A Medical Officer of Health may suspend a midwife for such a period as he thinks fit if she has been found guilty of disobeying instructions or misconduct.

Midwives Schools.

Omdurman Midwives training School is now solely responsible for the training of village midwives for Khartoum Province and literate trained midwives for hospitals. There are midwives training schools in El-Obeid, Kassala, Juba, Malakal, Medani and Atbara. In these schools 104 midwives have been trained and in 1958 there were 68 midwives under training. A new school was opend recently in Omdurman for training health visitors, midwifery teachers, and midwife superintendents.

The present position of midwifery services in the Sudan.

At present there are only 553 licensed village midwives, 78 literate hospital midwives, 28 health visitors, 13 superintendent midwives and 11 holding other administrative posts. In the Sudan about 95% of deliveries are done at home. The number of trained midwives available, at present, is far below the required standard. When we take into consideration the scattered population of the Sudan and the difficulty of transport the need for more trained midwives will be appreciated. The target to be aimed at should be one midwife per 5 to 10,000 population. This figure, with the present output of midwifery schools, will be reached in about 15 years. The acceleration of the output of schools depends on various factors. Among these may be mentioned, the availability of funds, the trained staff for teaching and supervision and last, but no least, the type of candidates willing to take the training. Another difficulty which will face the Ministry of Health is the distribution of midwives. As private practitioners midwives prefer to work in thickly populated towns,

and there is the difficulty of inducing them to work in the thinly populated villages. To overcome this difficulty it is suggested that the midwife in the village should be a salaried official paid by the central or local Government. There are at present few hospital maternity beds and these are just sufficient for the admission of abnormal cases. It is always desirable to encourage normal cases to have their babies at home. The Ministry is trying to develop the maternity services of the country on this principle. The back bone of this service is the home midwife. The country is rapidly developing socially and economically and it is hoped that the progress of the maternity services will keep pace with this development.

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THE TRAINING OF THE MODERN MIDWIFE OF THE SUDAN

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Three different courses of training are given at the Omdurman Midwives Training School:-

1. For illiterate or semi-literate women wishing to train as domicilary midwives for work in the towns and villages. Candidates for this course are most carefully selected. They must be under thirty years of age, from a good family and recommended by the Sheikh or Omda of the district concerned. Candidates must come from the actual town or village where they are going to work after completion of their training. The duration of this course is eight months. This course of training is also given in the Province Schools.

2. For trained Hospital Nurses who hold the nursing certificate of the Ministry of Health. They must have reached 4th year elementary standard of education before being accepted. The duration of this course is twelve months. It is only given in the Omdurman M.T.S. It is designed to cover all aspects of training necessary to qualify a candidate to work as an efficient Hospital Midwife. She may later, if she is considered suitable, be eligible for mor advanced training to enable her to qualify as a Health Visitor or Staff Midwife.

3. For girls who have reached the 4th year intermediate standard of education. The duration of this course is two years. On obtaining their midwifery certificate they may, if they wish, take the course for the nursing certificate at the Omdurman General Hospital starting in the 2nd year. If they do not want to take this course they continue to work as Hospital Midwives in the Omdurman Maternity Hospital. They have to work for Government for five years, after completion of their training, before being permitted to apply for a licence to practice as a district midwife.

DETAILS OF TRAINING

COURSE ONE

The training is based on the method adopted by Miss Wolff but the curriculum of the course has been widened and brought up to date. The instruction has

to be given in the simplest possible manner and in entirely practical form. Lessons in theory have to learned by repetition. Throughout the course great stress is laid on the importance of hygiene and cleanliness.

On arrival the pupil midwife is issued with house dress and uniform. She is first taught how to clean the dormitories, bath-rooms and class-room. She is then shown how to wash and iron her clothes according to school standards. During the first 2 to 4 weeks she is taught how to use scissors and artery forceps; to read a clinical thermometer; to insert and remove sutures; to distinguish medicines by sight, smell and taste and memorize their uses. She is then given a test, during, which she must be able to distinguish the drugs whilst blindfolded. If she is found proficient she is allowed to proceed to more advanced work. She is then taught:-

1. The care, use and sterilization of midwifery equipment.

2. How to cut dressings and sterilize them by a method possible.

in the home.

3. The technique of "scrubbing - up".

4. Preparation of the room, bed, table, instruments and equipment.

5. Giving of a simple enema and the passing of a catheter.

6. Nursing care of mother and child before, during, and after delivery.

7. The technique of delivery of vertex, breech, and twins which is demonstrated by means of a phantom doll and dummy pelvis. Each pupil has to deliver at least two cases on the models without a mistake in routine before being considered ready to take cases on the district.

When proficient the pupils are taken out to cases on the district by the staff midwives. They work in pairs, each pupil delivering at least twenty cases. They visit their patients daily for at least seven days and again on the tenth day to give post-natal care to the mother and baby. Each pupil has to attend at least twenty-four ante-natal clinic sessions during their training.

In the Omdurman M.T.S. the pupils spend about two months in the wards and nurseries of the Maternity Hospital in order to observe abnormal deliveries and to learn the care of premature babies and the management of artificial feeding. Theoretical lessons are given on five evening a week from the begining of the third month of the course. The instruction is given as simply as possible. The following subjects being covered in an elementary manner, only essentials being given:-

1. Simple anatomy and physiology.
2. Ante-natal care.
3. Complications of pregnancy.
4. Normal and abnormal labour.
5. Normal and abnormal puerperium
6. Child welfare.

Towards the end of the course observation visits are made to child welfare clinics.

On completion of the course the pupil takes an oral and practical examination conducted by the Senior Consultant Obstetrician and a Senior Midwife. If she is successful she is given a certificate of training and is issued with a licence by the Province Medical Officer of Health to enable her to practice midwifery.

In this course 95% of deliveries are done in the home by the midwives. The midwives act as private practitioners and receive fees from their patients according to their means. Midwives working in the towns get a substantial income but in the rural areas and small villages they receive very little remuneration and it is supplemented, in some cases, by small payments from the local council. The trained midwife receives her drugs and equipment from the Government free of charge.

COURSE TWO

The trained nurses spend about three months on the district where they deliver twenty cases under supervision and undertake the post-natal care. The remaining nine months are spent in the Maternity Hospital where they gain wide experience of both normal and abnormal midwifery. They have to deliver at least ten cases in the hospital in addition to their district cases. They have to keep a detailed case-book of all their deliveries which includes a record of the puerperium.

Running concurrently with the practical teaching, and linking up with each part of it, are lectures in Arabic with note-taking. Lectures are given on five days a week. Test-papers are given frequently throughout the course. The syllabus of training is much wider and more detailed than that given to the village midwife pupils. The pupils attend ante-natal clinics throughout the course and they learn to take blood presssures. At the end of the course the pupils sit for an oral, written and practical examination and successful candidates are issued with Midwifery Certificate.

COURSE THREE.

The first year is spent working in the Maternity Hospital. At the commencement of the second year they join the course of training given to the trained nurses.

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HEALTH EDUCATION OF THE PUBLIC

By

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I have taken the liberty to alter the proposed title of this article from Health Propaganda to Health Education of the Public for propaganda is only one aspect of the task of educating the public in matters of health. The work propaganda carries with it a sense of exageration and its repeated use during war and party politics has made it unpopular. There is a great need for educating the public in health matters and this is a joint matter for the authorities need the cooperation and active participation of the people. It is, also, very essential to evaluate the results of the systematic application of sound Health Education based on scientific, sociological and psychological grounds.

During technical discussions on Health Education in Geneva in May 1959, it was generally agreed that:- "Health Education is more than mere information or propaganda; it is a continuous and active process of learning by experience. It is one of the fundamental Public Health methods that assist in achieving the goals of a Public Health Programme". Health Education, as it is known to-day, is new to many countries. One major effort of the World Health Organization during the last ten years has been to develop the idea of Health Education as an integral part of all health services and to establish this idea in the minds of all types of health workers and teachers. Now adays Health Education tends to be science, indeed, a group of sciences. It has a University Degree and its own journals. In some way or other it is being included in school curricula.

HISTORY OF HEALTH EDUCATION IN THE SUDAN

There is no record to show the progress of Health Education in the Sudan. The organized medical and health services are comparatively young, about 30 to 40 years old. Both doctors and sanitarians were aliens and they hardly had a way of attracting people to them. There was no health education technique, not even health propaganda in the proper sense. The first qualified Sudanese doctors graduated in 1928 and the first qualified Sudanese sanitarians in 1935. Prior to these

dates, there were some non-qualified Sudanese (of both cadres) working as assistants to the British and Syrians. Their efforts in Health Education were only very limited. The mere fact that those qualified doctors and sanitarians were Sudanese, speaking the language of the people, sharing their feelings and living the same life, marked the first practical step towards Health Education. Talks in clubs were given on subjects such as venereal diseases and on general health problems. The local press published articles on medical and health problems under the signatures of Sudanese doctors and sanitarians. During World War II a Broadcasting Station was established and Sudanese Radio Doctors broadcast regularly on health topics.

THE PRESENT ORGANIZATION

At present there are more organized medical and health services including 51 hospitals, 202 qualified doctors, 76 qualified sanitarians, in addition to a good number of trained Medical Assistants, Nurses, Health Visitors, Midwives and Sanitary Overseers. In addition there are 34 Health Centres, 468 Dispensaries and 320 Dressing Stations. (1958 figures). At the Province level, the Medical Officer of Health is the representative of the Ministry of Health. He has a Doctor Assistant and a Senior Sanitarian. The further breaking down of the set-up brings us to Regional Medical Inspectors, Medical Officers and Public Health Officers. The latter work for the local Government Councils. At the rural level is the Sanitary Overseer and the Medical Assistant.

There is no department or division for Health Education within the existing service. Every health worker in the Sudan seems to feel the need for health education and so, individual efforts which are encouraged by by responsible people, can be felt in the Health Centres and in talks and writings of the senior health workers. Health Education is inculcated in the day-to-day work of the sanitarian, the midwife and the health visitor. The School Medical Officer has also a great part to play. The Graphic Museum in Khartoum, opened in 1936, plays a prominent part. It is a good institution for training medical and health students and it is very frequently visited by members of the public, school boys and girls. The Graphic Museum sends models, posters and leaflets to the outstations to form materials for display in annual shows and tribal gatherings. Other functions of the Museum include short courses to administrative officers (including police, prison and local government

'ficers), members of the Medical Corps, auxiliary hea-
h workers, school boys and girls.

NO COORDINATION

The above picture is given to illustrate the sca-
ered efforts of health education. Every health worker,
mentioned above, uses his own or her own technique to
part knowledge of health to the people of his orher
ea. The response varies according to methods used,
e way of approach and more important then these, to
e social and economic standard of the community.

With our existing set up and scattered non-coor-
nated efforts one would naturally ask what have we
hieved? To evaluate the efforts is not always
easy thing, even if the fundamental data were ava-
able. In the case of the Sudan, the first proper
nsus was completed in 1957 and reliable vital statis-
cs are not yet available. We are therefore left with
ly a crude system of evaluating our scattered efforts.
e keen observer can record incidents referring to cer-
in health achievements and out of such recording can
ss a judgement for or against our existing ways and
ans of imparting health knowledge. In the following
amples of achievements no health legislation was nee-
d at all. It was just the public enlightement based
on the bits the people read and hear about health or
seases.

(a) The hospital records include in incident when the people of a certain district burnt their only Dispensary and sacked the Medical Assistant. A few years later the same people were crying to have more Dispensaries and Health Centres. In many cases people contributed by providing the building. Nowadays, the majority of the demands are reflected in the local press from people in the most remote areas and by people who never before welcomed the establishment of Health Centres but who are now demanding more or the upgrading of the existing ones to full hospitals. The demands for hospitals are far more ambitious than could be effected yet there is no law to force people to go to hospitals.

(b) Many people started by objecting strongly to having their houses sprayed with residual insecticide, some 6 to 7 years ago. Now complaints are being received from individuals that their

houses were missed during the spraying campaign. Petitioners often ask the Minister of Health why their villages were not sprayed. The WHO team working on the Malaria Project in areas not previously sprayed met with success after launching a health education campaign before starting. The following few lines are extracted from a report made by a WHO Team Leader :- "The Health Education Activity carried out by the team was in this form :- Posters about Malaria were distributed to Schools, Councils and Medical Centres. Broadcasts were arranged before the spraying. Talks in Sennar and Singa clubs were given by the Team Leader. Group talks were always given by P.M.O.'S. in villages. Participation in Singa exhibition in 1957. Pamphlets were also left in clubs. Talks were given in the cinema during the interval on two occasions. We now have talking films and we have asked the National Gidance Hire to supply us with a projector for showing these films. On the whole the evaluation of the activity was high. The public were very interested and this led to co-operation from all people. We only feel we need more posters. If you agree we will draft our posters and send them to you for reproduction".

(c) B.C.G. Campaign. The idea met with opposition in Khartoum when the "initiative" was taken by the local press in a way which horrified the Townees. The school boys walked out when the team visited the school. The campaign met with great success in the Souther Provinces as a result of direct contact with the influential tribal leaders. Now the Townees are eagerly waiting for their turn in the campaign. This example illustrates the amount of damage which could be done when technical matters are handled by an ignorant press, their false ideas preceding the facts and creating a bias against the campaign.

(d) The opposition which faced the Maternity and Child Welfare Centres in the Sudan was most incredible. Few years ago people (even in big towns) could not imagine even the idea of sending their pregnant women for examination or their babies for after-care. Their motives were a mixture of ignorance and superstition. A healthy child should not be sent for fear of the evil-eye and the diseased one can be left to the care of the grand-mother who knows better!! What can a doctor do to a pregnant girl? She is pregnant and she will deliver at

the end of term. If she is continually sick that is to be expected. Is she not pregnant? "Well, she must be sick". This was the logic and the attitude of the people towards maternity and child welfare a few years ago. Now there is a wating list for maternity beds in big towns and there is a waiting list for building Maternity Hospitals in many towns of the Sudan. There is a cry manifested in the local press and in Local Government Councils to build more Maternity Hospitals and more Health Centres to provide more health visitors and trained midwives to replace the old untrained ones. Again there is no law to force people to send their wives and daughters to Maternity and Child Welfare Centres; it is just the slow process of public enlightment.

(e) It was repeatedly felt that, during epidemics, curative medicine plays a prominent part in Health Educatic The 1950/51 epidemic of C.S.M. records some interesting facts in Darfur Province when the good results of sulpha drug encouraged the people (who formerly used to hide themselves from inspection) to bring their patients carried on beds to the doctors' tents and to sit round the tent listening to the advice of the doctor and responding to his instructions. The people could see for themselves that a great majority of the patients who were given sulpha reovered while the majority of those who were left in the houses died. The writer noted the following examples of spontaneous public participation in health matters during 1959.

(a) One morning, nea r my home in Omdurman, there was a great shouting crowd in the neighbouring houses. On enquiry I was told that a dog had dashed into a house, bitten a boy and run away. Some twenty men, none of whom was a health worker and, indeed, none had had secondary education, chased the dog. It was finally caught by an elderly man who cut off its head and was already on his way to the hospital so tha an examination for rabies might be carried out. What more can one expect from such a citizen?.

(b) During the Smallpox epidemic in C.I.A. (in April - May, 1959) the villagers kept the lymph in their own refrigerators. To evaluate this we must remember the attitude of the same people, a few years ago, to vaccinators and to lymph. Is not this a dramatic change of outlook?.

(c) The Health Week conducted in Khartoum was quickly repeated in many towns and villages and, in many

instances, the local schoolboys played an active part.

PLANNING FOR HEALTH EDUCATION IN THE SUDAN

The following are the main points of the plan as laid down by the Ministry of Health :-

(a) In the five years plan (1957-62), there is a proposal for creating a Division of Health Education within the Ministry of Health. The Head of the Division will be under the Assistant Director (Public Health).

(b) As soon as the Division is formed, the Ministry of Health can invite the Ministries of Education, Information, Labour and Local Government to form a standing advisory Council.

(c) The Head of the Division can work as a co-ordinating officer for the services, and his Department will play a similar role to that played by the Central Council for Health Education in England in the in-service training. The staff can visit the various provinces, meet the local authorities, give talks, show films etc. The experts of the H.Q. can help the local Council in producing local posters, film strips etc. after studying the local problems with the local health officers.

(d) An expert Departmental Committee (may be an ad-hoc committee of the Boards of Study) is to be set up to examine the syllabus of training in the schools which are under the Ministry of Health with a view to introducing Health Education to all (School of Hygiene, Midwifery School, Medical Assistants School, Health Visitors, Nurses etc.) Great emphasis is made on having Health Education inculcated in the routine of all health workers.

(e) The expert committee referred to above or the individual Boards of Study can be entrusted with suggesting the suitable content of health education for each school.

(f) In the School of Hygiene a step has already been taken to train public health students in making film strips, posters and simple leaflets.

(g) One more public health officer is now in the United Kingdom to take a Diploma Course of Health Education in London University. This is in addition to the two already graduated and practising in the Sudan.

(h) Introducing health education into schools. This may be worked in consultation with the Ministry of Education with a view to :-

(i) including Health Education in the Syllabus of teachers of both sexes. If it is already included in some form or other, the Ministry of Health may examine its content and assess its suitability.

(ii) making Health Education as one of the vital subjects for teachers.

(iii) including Health Education in the various grades of schooling, particularly in girls' schools.

The result of the expected consultation with the Ministry of Education is hoped to lead into the formation of a joint committee to write books on Health Education suitable for teachers and for all grades of schools. Voluntary organisations, such as the Sudan Red Crescent, the Women's Union, the Workers Union can all be made use of in this campaign. The above are the main lines of the plan as set out by the Minstry of Health. All the existing non-coordinated efforts will be grouped together. Good human relations are highly stressed; whether between the health-workers themselves (seniors and juniors working as one team towards one objective) or between Health Workers on one side and the members of the public on the other. The very nature of life in the Sudan, with no distinct classes and with strong family ties, encourages good human relations.

HANDICAPS AND BARRIERS

In both the scattered efforts and the proposed plan there are certain barriers which have to be removed. The barrier of language between the North and the South cannot be ignored. It is one of the major barriers like the difference in culture. The mode of living is different from one part of the country to another. The Nomads in both West and East Sudan need a particular way of approach. One fact is well realised; all classes of the community from the University graduate at Khartoum to the naked Dinka or Shilluk in the South need Health Education of some sort or other and our services must be of such a magnitude as to cater for all.

To overcome the barriers, some steps are already being taken. The following are examples :-

(a) steady progress is being made to teach Arabic to the non-Arabic speaking classes.

(b) technical and professional training is attracting boys and girls from all part of the country. Medical Assistants, Public Health Officers and Sanitary Overseers from the Southern Provinces and Beja tribes in the East have successfully graduated in the School of Hygiene and in the Medical Assistant's School. They are now practising amongst their own villagers.

(c) midwives, nurses and health visitors are coming from all parts of the country to have their training in Omdurman and Khartoum and go back to practise amongst their own people in the outstations.

(d) Even the nomadic Kababish have their Medical Assistants, drawn from amongst their own boys, who spend most of their lives on a camel's back.

It must be admitted that all the above steps cannot be considered sufficient to break the barriers if some stronger effort is not made to overcome the still stronger barrier of the social and economic state of the community i.e. to prepare the community to accept and make use of the health teaching by raising the social and economic standard. There is at present a glimpse of hope for attaching this problem. Some serious thinking is going on to create a community development organization in the country. This is hoped to contribute towards breaking the main barrier. Other minor handicaps to exist but the normal development of the country is solving these gradually. Inaccessibility to certain parts of the country during the rains makes it difficult to approach those parts at times when approach may be most needed.

URGENT ADMINISTRATIVE AND ORGANIZATIONAL NEEDS

It was mentioned earlier that the creation of a Division for Health Education was included in the five years plan of the Ministry. To convince the Ministry of Finance is not always an easy matter! The administrative discussion so far conducted as to what type of

man should head the Division did not reveal much difference of opinion, so long as the job will be that of a co-ordinating officer from all the various sections of the Ministry of Health. The formation of a Central Advisory Council, as suggested above, is sure to facilitate the administrative and organizational needs. The officers immediately concerned shall all have a say in the administration and must be represented in the organization.

To achieve our goal, as set out above, the following immediate training needs are felt :-

(a) more general education for girls.

(b) more technical and progessional training for girls in the spheres of nurses, health visitors and health educators.

(c) Attracting a better standard of girls for health training.

In general we are at a stage of having to educate more of the health educators and to improve the quality as well. The female plays the biggest role in the house and it is the house which we should first attack, hence the critical need for training more and more of the girls in all spheres of health.

CONCLUSION

In our suggested plan for Health Education we aim at grouping all the existing activities and enforce them by introducing the up-to-date techniques which suit the country. Our aim is to enable the people to have a better idea of their way of living, to be more co-operative than dependent and to appreciate life and participate in all the efforts exerted to make it worthy of living.

The Role of the University of Khartoum

By

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I should need to write a book if I tried to discuss the role played, directly and indirectly, by the different Faculties of the University of Khartoum in solving the health problems of the Sudan. The more we understand of the complex nature of the problems and the socio-economic and environmental conditions which lie at the root of most of such problems, the further we can see into the role that is played, not only by the University, but by any educational institute in the country. The Faculty of Medicine, being the University Faculty which is direcly concerned with health problems as it produces medical personel, is the one whose role I shall discuss here.

Historical Review of the Faculty of Medicine. (The Kitchener School of Medicine.)

The Kitchener School of Medicine, which was built in memory of Lord Kitchener, was opened in the year 1924 and was put under the direct responsibility of the Director of the Sudan Medical Service because of its intimate connection with the Service. The objectives laid down for the school were :-

1. to build a cadre of Sudanese doctors who would be in a particularly favourable position to combat the epidemic and endemic diseases that were wasting and debilitating the population of the country and preventing its natural increase.
2. to afford an opportunity to educated Sudanese to take part in the development and betterment of their country.
3. to provide-graduate courses for doctors trained at the School and to provide opportunities for special study and research.

In September 1951 the School was amalgamated into the University College of Khartoum which then became the University of Khartoum in July, 1956 and since then the school was named the Faculty of Medicine. These

historical facts and especially the objectives laid down for the school will be referred to later in my discussions.

Role of the Faculty of Medicine.

This can be described under the following activities of the faculty :-

1. undergraduate medical training.
2. post-graduate medical training.
3. research work by the faculty academic staff and
4. availability of academic advice for the Ministry of Health personnel or others, if and when they ask for it.

1. Undergraduate Medical Training.

I shall discuss this against the background of disease incidence in the Sudan, the objectives laid down for the School of Medicine, and the modern conception of disease control and health promotion.

A simple study of any consolidated Form 78 of the Sudan Ministry of Health showing diseases encountered in the different parts of the country will immediately tell us that nearly all the important diseases are preventable. Briefly speaking they are simply diseases of :-

(a) insanitary physical environment e.g. enteric fevers; dysenteries; gastro-enteritis of children.

(b) bad or low social environment e.g. leprosy, tuberculosis, trachoma.

(c) low standard of personal hygiene e.g. Bilharzisis, Ankylostomiasis, Ascariasis, Guinea-worm infection, food poisoning.

(d) insect-borne diseases e.g. malaria, kala-azar; sleeping sickness, relapsing fever, filariasis including onchorcerciasis, yellow fever.

(e) unhealthy contact and overcrowding e.g. cerebro-spinal meningitis, diphtheria, measles, smallpox, yaws.

(f) unhealthy sexual contact e.g. syphilis and gonorrhoea.

(g) nutritional diseases e.g. scurvy, pellagra, goitre, Kwashiorkor.

Many of these diseases are agravated by the other four of what Lord Beveridge called "The five giants on the road to Reconstruction". The five giants are disease, want, squalor, indolence and ignorance. The four giants, other than disease, lie outside the legitimate sphere of action of the medical profession but the doctor, particularly in this country, cannot ignore them as they lie at the root of the illness he is tackling whether in the individual or in the mass of this community. An infant may lie, as many do in this country, from gastroenteritis which is a bacterial infection. The infection has terminated the life of the infant, but proceeding that infection there often exist other factors which lead to it, such as, premature weaning of the infant, dirty, unhygienic artificial feeding by an ignorant mother or aunt, poverty in the family leading to lack of the necessary required nutrient food stuffs, broken homes through divorce or death etc. All or some of such predisposing factors cannot be ignored by the treating doctor nor will he achieve much if he disregards them and only thinks of his therapeutic cure to the specific bacterial infection in the baby. Many countries have found the remedy to such calamities causing great loss of human life (human wastage) not inside childrens' hospitals nor doctors' clinic, but in the home of such infants where they have discovered and rectified the causes through socio-economic and health education tools. Maternity and child welfare centres and health centres have proved to be more valuable to them than hospitals.

The concepts of the medical profession have changed considerably. The medicine of to-day includes, other than the clinical diagnosis of the disease, the interest in the patient as a member of the community. The clinician must be interested in his patient's environment whether physical or social and the relation of such environment to the disease he is facing. The patient's economic and social state, the nature of his work, the type and state of house he lives in, his diet, his personal habits, his water supply etc., etc., all have bearings on his health condition and cannot be divorced from his illness nor can they be ignored if his health is to be restored, maintained and promoted. Any conception of medicine which does not relate the patient to his environment is incomplete and hence it is a grave mistake to separate the curative aspect of medical training from the preventive and health promotion aspects. Public health then, being so important a branch in tackling health problems, must be integrated into the

other branches of medicine and as early as possible in medical training. I am glad to say that this is now being done in the Faculty. The attention of the medical students is directed, during most of their study years, towards disease prevention and health promotion. Field training of the students in the rural parts of the country is encouraged and is getting more organised. Such field training enables the students to study diseases in relation to the environment. It gives them a much wider scope of understanding the health problems of their country as they exist in its different parts. The students are enabled to get in contact with the rural people and visit their homes. They are taught how to investigate into the people's water supply, refuse disposal, their food and nutritional standards, their educational standards, traditions and beliefs, practice of native medicine, presence or absence of insect vectors of disease, etc. They also visit the rual medical units, whether hospitals, dispensaries or dressing stations, to study records of diseases encountered in the area, school medical records and the available midwifery services etc. Similar visits are paid to the Rural Councils where they discuss with the authorities the activities of Local Government on environmental hygiene. In the Blue Nile Province the field training includes, other that what has been mentioned, especial training in pulmonary tuberculosis in Wad Medani, Bilharziasis in the Gezira Irrigated Area, malaria in Sennar, and Kala-azar in the Fung Area. Similarly, and on a wider scope, the students receive practical training on a variety of health problems during their extensive tour of the Southern Provinces. They are shown many cases of Onchocerciasis (blinding disease) and its insect-vector the Simulium damnosum; cases of human Trypanosomiasis (sleeping sickness) and its insect-vector the Tse-Tse fly (Glossina palpalis); malaria and its insect-vector the Anopheline gambia; Kala-azar and its insect-vector the Sand fly (Phebotomus); leprosy with its prominent low social beackground; anaemias with predisposing conditions of malnutrition and intestinal worm infections (rectal bilharziasis and Anklostomiasis); hydatid diseases; yaws, tropical ulcers; crocodile bites and buffalo infuries etc. All the existing primitive environmental and socio-economic conditions lie at the root of nearly all the diseases encountered there become so obvious to the medical students who start to realize the complexity of our health problems with so many factors involved other than the germs or the pathological changes they cause. They are made to believe that it is in the villages where most

of our problems exist and that it is there where we should concentrate our attention and action. They also learn that as doctors they can do very little if they work alone but can do very much if they join a team of workers consisting of the agriculturist, the veterinarian, the educationist, the social worker, the administrator, the tribal chief, the religious leader. Field training of medical students is sponsored by the Department of Public Health of the Faculty of Medicine, and although I feel satisfied with its results in moulding the future Sudanese doctor into a promising citizen medical field worker greatly required by the country, yet I feel such training can achieve better results if the other departments of the Faculty participate in it, as I have seen it done in Beirut University and in Yugoslav Medical Faculties. As a Sudanese citizen I feel bitter about the Faculty of Medicine existing in Khartoum. I would have liked it to be anywhere else in the country away from Khartoum which to me is an artificial town which given a false representation of the country. If we are expected to train medical men to cope with the health problems of this country, the Sudan, then let us train them where the problems exists and through that, it is not only the student who will benefit, but equally the teacher who will advance his knowledge of the local problems and who will be in continuous touch with them and be able to measure whether the problem is on the increase or decrease. If we think of the health problems of the nomadic tribes of the Sudan, who constitute around one third of the country's population, no teacher can succeed in making his students visualize such problems unless he takes them to see the nomads with their own pattern of life, their problems of scarcity of water and grazing pastures for their cattle, their types of houses, their food, etc., of their nomad environmental factors which are the causes encountered amonst them. Medical teachers and their students will end their visit quite convinced that the answer to such health problems is not a purely therapeutic remedy but also an environmental and social remedy in which case we either change the environment to suit man or change man to suit his enironment. The teaching of human anatomy is the same everywhere in the world as the femoral artery will not take a different course in different nations, but health problems differ in their underlying causative factors in different countries of the world and in different places of the same country.

2. Post-graduate Medical Training.

If I have to stress again that most of the health problems of this country are simply those of a semdeveloped tropical country and that any medical training, whether under-graduate or post-graduate, is intended, to qualify the Sudanese doctors to cope with such problems of their country then the post-graduate studies should, at this stage of the country's development, be limited to the following :-

(a)	Public Health	(b)	Bacteriology
(c)	Surgery	(d)	Paediatrics
(e)	Dermatology and Venereology.	(f)	Medical Entomolgy

Those to be trained in Public Health can either take the Diploma of Public Health or the Diploma of Tropical Medicine and Hygiene or both. Such doctors can then receive, according to their individual interest further training in the different health branches e.g. school health, industrial health, epidemiology, vital statistics, rural health and nutrition. Others can be specialized in different disease problems e.g. malaria, kala-azar, trypanosomiasis, tuberculosis, leprosy; Filariasis (including onchocerciasis, Bilharziasis and Ankylostomiasis).

It will be described later where such qualified doctors will play their vital part in the health problems of this country but, it is necessary to stress here, that it is only through such post-graduate public health training that field workers will be made; that we will safeguard against the calamity of commercializing medicine in the country, the result of which will be that the rural areas where most of the problems exist and flourish, will be deprived of the services of the Sudanese doctors and instead we shall end with many Harley Streets in our towns. Such a horrid result in the history of medicine in this country would undoubtedly defeat the objectives for which the Kitchener School of Medicine was founded.

I quite understand that such post-graduate training is not possible in the Faculty of Medicine because of lack of the required facilities but this should not stop us from sending our young doctors abroad for training as early as possible and in reasonably large numbers even if need be to replace their routine hospital services by expatriate doctors

until ours qualify. Equally we should start expanding our Faculty by creating a Department of Paediatrics, a Department of Dermatology and Venerelogy and a Department of Ophthalmology. The department of Public Health should be expanded to include sub-departments of Medcal Entomology, Nutrition, Epidemiology, Vital Statistics and Sanitary Science.

I should like also to draw the attention of those concerned to the excellent opportunity offered to us in the different World Health Organization Field Projects whether already in operation in the country or planned to operate e.g. the Tuberculosis Project in Wad Medani, the Malaria Project in Sennar and the Onchocerciasis Project in Wau. Such disease eradication projects, sponsored by international experts, should be considered as golden chances for counterpart young Sudanese doctors who should quickly be selected and sent to the appropriate operation for field training. Such counterparts, who will eventually end their field training with the required academic qualifications, will be our future experts who will take over the projects and shoulder the responsibilities. I am sure that such a policy will satisfy the W.H.O. aim of training the local doctors to cope with their health problems rather than trying to do it themselves or later leave it to nobody to maintain.

3. Research Work by the Faculty Academic Staff.

There is ample scope for useful research on many of the health problems of this country. A high spirit for research exists amongst the Faculty Staff and many facilities are being offered by the Ministry of Health for research activities. When I think in terms of our health problems with their complex nature, I believe that a high academic research of individual interest or even of individual departmental effort will not hit the required goal. It may be of a simple academic nature suitable for publication interest, but how much will it contribute towards our problem is what I consider most important.

Our health problems need the type of combined effort research which may necessitate not only the participation of many of the Faculty's Departments, but some of the Ministry of Health personnel too. We have to think of any of our main diseases as a disease problem and not simply as a disease entity with its clinical manifestations only, because research on these along

will always miss many other thing needed to complete the story. If we think for example of the problem of Onchocerciasis (the blinding disease) which is an alarming major problem, a profitable research on it should include the clinician, the ophthalmologist, the medical entomologist, the bacteriologist, the epidemiologist, and even the veterinarian as I have seen cases of blindness in cattle due to onchocerciasis. Such a combined research work on a disease problem will contribute a lot towards a suggestive remedy to it and can be of a great educational value to the medical students and even the medical officers of the research area if engaged in it. Similarly there are health problems where more than one University Faculty can participate in it collectively e.g. the Faculties of Medicine and of Veterinary Science can research together on the problem of bovine tuberculosis, or, say the Faculties of Medicine, Veterinary Science, Agriculture and Economics can all participate on one research on nutritional problems; or the Faculties of Medicine and Engineering research on problems of overcrowding etc. At this stage of the country's development the University should aim at the type of research that would contribute towards such a development before it contributes towards outside literature.

For teaching purposes I quite agree to the pure academic type of research for finding out our normal standards, i.e. normal blood pressure, hamoglobin percentage, weights and heights etc. as I believe we still use text-books standards made for other countries.

4. Recommendations in relation to Health Problems of the Sudan.

(a) Public Health Doctors.

I am sure at this stage we are convinced of the importance of preventive medicine to this country, and hence disease prevention should be given the first priority and the greatest attention by the Sudan Ministry of Health. Sudanese doctors trained in Public Health are badly needed for this country and it is a bitter fact that those available in the country are very few and unless some drastic measures are taken, because of the pension age, even the available stock will shortly diminish. I have already stressed the imprtance of post-graduate courses in Public Health on a large scale but this is only half the story as the other half rests on the shoulder of the Ministry of Health. It is my personal view that the

shortage of doctors engaged in Public Health in this country is due to the following reasons :-

1. Public Health posts are underpaid and not made attractive to doctors by every means. Such doctors are, as it should be, excluded from private practice and hence they have to survive on their fixed monthly income.

2. private practice is very paying in this country, especially to those who have specialized in branches other than those I have mentioned under post-graduate courses.

3. the ease with which clinicians execute their duties within the boundaries of the hospitals and the type of sedentary life they live in towns with their families compared with the tough and strenous field life of the public health doctors.

4. young doctors who specialized in branches other than public health were made to overstep their older colleagues who specialized in public health.

5. neither the Diploma of Tropical Medicine nor the Diploma of Public Health is considered a speciality diploma and hence holders of either of them (or may be both of them) are not treated the same as holders of other diplomas, in spite of the obvious fact that they are the type of doctors badly required for the country health problems.

Personal Suggestions.

1. Public Health posts to be made attractive to doctors through incentive salaries, clinical allowances and field allowances. One financially secured their interest in private practice will decline.

2. post-graduate training in Public Health to be encouraged and this can only be achieved by limitation of post-graduate training in other branches.

3. encouragement of public health training to undergraduates with regard to field training of medical students, by offering more facilities in the provinces, as this is intended to mould the future into a good citizen Public Health field doctor.

(b) Departments of Endemic Diseases.

The present administrative set up of the Ministry of Health cannot cope with the health problems of the country, as routine administrative work can be but far

from touching the root of any of the problems to be eradicated. It is high time to create separate specialized departments to deal with the most important disease problems. These departments are:- Malaria Department; Bilharzia and Ankylostoma Department; School Health Department; Nutrition Department; Epidemiology and Vital Statistics Department; Industrial Health Department; Skin and Venereal Diseases Department and Tuberculosis Department. These different departments should have their head-quarters offices within the Ministry of Health in Khartoum and their provincial units within the Provincial Institutes of Hygiene which will be discussed later.

At the Directorate level the structural set up should be changed into a Director General of Health (in place of the present Director), and under him there should be a Director of Curative Medicine, a Director of Preventive and Social Medicine and a Director of Institutes of Hygiene.

Director General

Director of Curative Medicine	Director of Preventive & Social Medicine	Director of Institute of Hygiene.

Institutes of Hygiene.

There must be rapid expansion of the laboratory services in the country. I suggest the creation of Provincial Institutes of Hygiene, one in each Public Health Province. Each should include the public health laboratory services and the sub-departments of the endemic diseases department mentioned above. The laboratory services should include the following units:- bacteriology, parasitology; helminthology; virology, medical entomology; haemotology; chemistry (food and water analysis) and biochemistry.

Department of School Health Services.

This, in my opinion, should not be sponsored by the Ministry of Health but by the Ministry of Education which should have its own school health staff. A Senior Medical Officer, A Senior School Nurse and a Senior School Dental Officer should be attached to the Headquarters of the Ministry of Education with their representative Staff in the provinces, who can

be attached to the Provincial Institutes of Hygiene to utilize the services available in them. A proper school health service is extremely important and essential, and if we accept the bitter fact that many of our grown up people are ailing and deviated from normal health we must try our best to prevent this from happening to our young generations who are the men and women of the future Sudan. School Health should go much further than a simple routine check up for filling forms or writing annual reports. Such valuable human stock should be properly examined by the appropriate doctors and nurses as early as possible in their school career before it is too late to correct the detected defects. Deviations from normal health, whether mental or physical, must receive the utmost attention and this can only be achieved by full-time school medical staff. Handicapped or maladjusted children or those whose ailments constitute an educational problem, school meals, school hygiene, control of infectious diseases in schools etc., cannot be properly managed as a part time job by the Ministry of Health personnel. It is worthwhile to state here that the University of Khartoum should have its own Students Health Service as a full time unit operating for the students and staff.

Department of Industrial Health.

As the country is on the verge of Industrialization it is inevitable that the Ministry of Health should have such a department; but again the Department of Sudan Railways and Steamers of the Ministry of Communications should be encouraged to have its own Department of Industrial Health to look after the health of its workers and to advise on industrial hygiene in its workshops etc. This should have its headquarters in Atbara where most of the workshops exist. Mobile "van" services can operate for the provincial units.

Departments of Malaria, Bilharzia and Ankylostoma and Nutrition.

It is the aim of our present Government to accelarate the development of the country in all spheres of agriculture, industry etc., and such department will necessarily require utilization of the national human power. As doctors we are quite aware of the fact that with the prevalence of diseases like malaria, ankylostoma, bilharzia, or with a malnutritional status of many of our people, there is a great loss of human power through such debilitating conditions. Malaria which

constitutes our most important disease problem does not only cause us wastage of human lives through abortions and stilbirths. The departments mentioned above are extremely essential if eradication of such health problems is to be aimed at.

Department of Vital Statistics.

"Preventive medicine without vital statistics is like a vessel without a compass". To cope with our health problems properly we must have such a department functioning in the Ministry of Health. Proper sickness records must be made and kept. We have to know how many children are borne and how many people of what age and sex die and of what disease. We have to know how many are sick and with which disease. All people deviated from normal decreasing in a community can only be shown by statistical data which will then guide those concerned on what to do and will equally tell them later the results of what they have done.

Labour movement in relation to health problems.

I am not going to discuss fully the effect of labour movement in aggravating health problems in the Sudan, but I would like to state briefly two recent happenings which I view with alarm.

1. Movement of southern Sudanese in the northern Sudan.

The people in the northern Sudan are susceptible to some diseases encountered in the southern Sudan. The insect vectors are present in many places of the northern Sudan. If the southerners coming to the north are disease carriers we expect spread of the disease in the north, e.g. Onchocerciasis.

2. Development Schemes.

The Roseires Dam is going to be constructed in an area Kala-azar is endemic and labourers from different parts of the country are going to run the risk. If infected and not finally cured they can also carry the infection to their home villages if sandflies are present.

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THE VETERINARY OFFICER

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Until the beginning of the present century, the term 'horse doctor' was the qualifiying name of the Veterinary Officer. The name was a reflection of the importance of that noble animal rather than an underlining of its healer. The horse then did most of man's heavy duty and was his principal means of travel. It cultivated soil, drew wagons, entered battles and afforded the pleasure of hunting and other sports. It was a necessity and a luxury not forgetting in either case, according to need and taste, the'use' of its meat. With the advent of mechanisation at the beginning of the present century, the burden was lifted off the horse's back. Thus its economic importance suffered and attention, which was fomerly focussed on it, now shifted to the food animals. With the recession of the horse, the Veterinary Officer now changed title and taste. The horse doctor now became the Veterinary Surgeon. The farming era, which was an inevitable result of civilisation, had by now come to full swing. The accumulation of large numbers of cattle, sheep, pigs and poultry to serve congested city life brought with it plenty but not without a price. Animals which, in the past, led a relatively scattered existence had now to live close 'together' under covered but not very healthy dwellings. This set the stage for the complication of disease. Microbes which previously had a limited chance of spread from one animal to another in wild and semi-wild life did not have to wait long for contact and contagion under the new mode. Diseases which were only sporadic and unimportant became serious scourges, threatening the new set-up and challenging man's most valuable food. Further, certain infectious diseases, which through restricted contact with humans were virtually confined to animals, became conditioned in the new environment for man. The call on Veterinary Science became a loud cry and from now on the Veterinarian had to give his undivided attention to three tasks :-

(1) combatting diseases which threatened animal life and economic production.

(2) tracking and eradicating animal diseases which are transmissible to man.

(3) helping, by scientific methods, to raise the economic and hygienic standards of livestock production, i.e. more and better meat, milk, better, eggs, etc.

How far the Veterinarian has succeeded can best be illustrated by dealing briefly with each of these headings separately, with particular reference to the Sudan.

1. The fight against animal disease.

With its heavy population of livestock (over twenty million cattle, camels, sheep and goats) living in remote areas with frequently poor and often no transport; with shortage of water during the drought season which brought large crowds of animals to watering points, thus helping to disseminate disease; with the traditional ignorance of the nomad of the elements of animal hygiene; with these and more odds pertaining to his health, peace and comfort, the Veterinarian in this country had to start warfare against animal diseases. The field was big and the enemy too numerous; but three killers appeared formidable. Rinderpest (ابو دسيعة — أو الطاعون البقرى), animal trypanosomiasis (مرض الضبانة) and contagious bovine pleuropneumonia (ابو قنيت) established themselves in the majority of herds, sometimes exterminating thousands of animals in one year. In 1929 cattle plague alone caused 795 recorded outbreaks amongst Arab cattle constituting 120 thousand heads of which 12 thousand died. Of these more than half the losses were suffered by Kassala and Fung Provinces. Bearing in mind the inaccessibility of many parts of the south and west, in which many unrecorded outbreaks must have occurred, one can imagine the big annual losses caused by this disease.

In the field of trypanosomiasis, the Veterinary Research Officer at Malakal in 1943 considered that "probably 50% of the local cattle are infected with Trypanosoma congolense". Again in 1946 the Province Veterinary Officer, Upper Nile, reported that "at least 20% of the whole cattle population were infected and that the disease was the most serious problem yet encountered in Upper Nile Province." This is the state in non tse-tse fly areas. In Equatoria and Bahr el Ghazal where fly pockets exist, the disease saw to it that some whole areas were free from cattle.

Contagious bovine pleuropneumonia is an insidious disease, killing slowly but surely. Given time and no check, the disease can eliminate whole herds, but it usually takes years to do it. There is no true recovery and animals which temporarily improve are dangerous carriers. According to the 1943 Report this disease caused 404 outbreaks with 76 thousand infected animals between the years 1939 - 43; the number of recoded deaths being 1153. The figures apparently did not include Bahr el Ghazal and many areas of Upper Nile province. The 1952/53 Report mentioned that "the disease was widespread in the Western and Southern Sudan and was the most serious obstacle to livestock development". Unfortunately no figures were given.

For these and several other diseases curative or immunising products had to be searched for. Before these were found, effective administrative steps like quarantine and isolation measures had to be imposed. But the nomad, as his name suggests, abhors confinement and any measure which did not take his mobility into account was doomed in the end to fail. For some time, life for the Veterinary Officer, the Stockman and the Veterinary Police was chase (on horse and camel back) of the fleeing Baggara and chase meant further infiltration of disease. The increasing preparation of anti-rinderpest serum at Malakal from 1928 onwards gave some relief but the position remained far from satisfactory until 1935 when anti-rinderpest vaccine was made. Effective control now depended on abundance of vaccine and annual vaccination. The figures of doses prepared annually by the laboratories rose from 41, 646 doses in 1935 to 577, 948 doses in 1947. Even this was not enough to meet the ambitious plans of eradicating the disease but it managed to reduce the disease to endemic and sporadic levels. From 1949 onwards an improved product (attenuated goat virus vaccine) was introduced from Kenya. It had the advantage that one dose protected the vaccinated bull for four years as compared with one year given by the earlier product. The total vaccine issues between June 1950 and June 1955 amounted to approximately 6,674,000 doses. Allowing for 25% wastage, the number of cattle receiving one vaccine or another during the five years must have been approximately five million. Today rinderpest, once the greatest horror of the stock-owner, has been reduced to a minor problem confined to young calves in which active immunisation, in the Sudan, has yielded abortive results.

Animal trypanosomisis, another dreaded disease received a big blow by two curative drugs, Antrycide

of I.C.I. and Dumidium bromide of Boots Co., both of which have given excellent results in mass campaigns. It would however, be wishful thinking to assume that final eradication would result from drug treatment alone. Like malaria in the mosquito, trypanosomes, the causal parasites, spend part of their life in the tsetse fly. To eradicate the disease, one must destroy the fly which is a very difficult task indeed. In a pilot scheme in Bahr el Ghazal it took the Department nearly four years of hard labour and vigilance to conquer and reclaim an area of 136 square miles which had, until recently, been an undisputed fly kingdom forbidden to cow and sheep. But the reward was deserving to the Dinka and their cattle. For the first time in history they entered the land to graze the rich pastures and till the virgin soil. More schemes are to follow with more promise of plenty.

These are the brief stories of two diseases which have for a long time challenged our national wealth. The third mass killer i.e. contagious bovine pleuropneumonia is still awaiting its turn. Vaccination has been going on for the last thirty years with lamentably meagre results. But a gleam of hope has come in sight. Recent researches conducted at Khartoum have yielded results pregnant with promise and mass application is awaited with hopeful expectations.

Other diseases like anthrax, blackleg, haemorrhagic septicaemia, Brucellosis, horse sickness, rabies, fowl pest etc. are being fought. It is refreshing to note that against all those mentioned there are now effective vaccines.

2. Tracking and eradicating diseases transmissible to man.

One role of the Veterinary Officer to-day which is assuming progressively greater importance is that of controlling diseases which are transmissible from animals to man or zoonoses as they are technically called. Nearly one hundred such diseases are known and more are being added to the list. Many, like rabies, are transmitted by direct contact of man with animals but some are indirectly transmitted through the agency of insufficiently cooked or boiled animal food e.g. meat or milk. They are caused by representatives of all classes of parasites ranging from filterable viruses to tapeworms

The most effective way of saving humans from these

hazards is by destroying the diseased animal. But to identify the diseased animal is not always an easy matter, particularly, since some diseases which are serious to humans produce only very mild and, sometimes, no obvious symptoms in animals. For these special tests have to be used. Successful control depends to a large extent on an intimate collaboration between the Medical and Veterinary Officers. One example of this is provided by an outbreak of Malta fever among the European population at Barakat in 1953. When diagnosis was confirmed, the Medical Officer of Health passed the information to the Veterinary Officer and the disease was finally traced to a milking herd of cattle which appeared completely healthy. One cannot describe the surprise on the face of the owner on seeing five fat cows, we had generously paid for, destroyed on the spot. "They are mad." he finally said, shaking his head.

The following list gives the names of intertransmissible diseases so far identified by Veterinarians among animals in the Sudan.

Disease	Type of Parasite	Animal Source identified
1. Rabies	Virus	Mainly carnivora but also donkeys, horses, camels, sheep and goats.
2. Cowpox	Virus	Cattle
3. Foot & Mouth Disease	Virus	Cattle (only very rarely transmissible to man).
4. Anthrax	Bacteria	Cattle, sheep, goats and game including elephants.
5. Brucellosis	Bacteria	Cattle, sheep and goats.
6. Tuberculosis	Bacteria	Cattle and dog.
7. Salmonellosis	Bacteria	Cattle and mice.
8. Staphylococcal milk poisoning	Bacteria	Goat (? mastitis).
9. Gas gengrene	Bacteria	Cattle
10. Actinomycosis	Bacteria	Cattle (verbal clinical report).
11. Nocardiosis (N.asteroides)	Bacteria	Goat

Disease	Type of Parasite	Animal Source identified
12. Ringworm	Fungus	Donkeys, horses, cattle cats and dogs.
13. Leishmaniasis (Kala-azar)	Protozoa	Horse.
14. Tape worm (Taenia saginata)	Worm	Cattle
15. Hydatidosis	Worm	Dogs

Finally, one important function of the Veterinary Officer which can logically be inserted in this section is the inspection of meat to ensure its wholesomeness for human consumption. In many countries today, the inspection of all foods of animal origin i.e. milk and meat products prepared in all manners, whether fresh, dried, smoked or tinned, is carried out by Veterinarians specialised in this line.

3. Raising the Standard of Livestock and their Products.

In the past, the overwhelming problem of disease control left little time for the small number of Veterinarians in the world to pay great attention to qualitative improvement of livestock and production. The eradication of major disease from many countries, particularly in Europe and America, has given the Veterinarian time and incentive to enter the field of improvement. Topping the list of his functions are upgrading of livestock and poultry by selction and cross-breeding, techniques of artificial insemination and investigations into problems of sterility and infertility. In this country expression of this form of activity is evident in the establishment of breeding centres in Darfur, Fung and Gezira and in the establishment of the poultry farm in Khartoum North. The object in all cases is to produce breeds which can be most economically reared under Sudan conditions i.e. cattle with best beef or maximum milk under natural grazing, camels with best hair, back yard poultry with maximum egg production and so on. In addition such farms offer the best practical means of teaching the nomad how best to utilise his animal products.

In final conclusion it can be said that the greatest and most important function of the Veterinary Officer is to maintain a good supply adequate in quantity and wholesome in quality for mankind. In addition he collaborates with his medical colleague in protecting humans from the hazards of intertransmissible diseases. In an article written for the last World Veterinary Congress by Professor A.W. Hagan, a well known American Veterinarian, he said :- "the great increase in food production capacity would not have been of any avail, however, had it not been that disease, the enemy of production had been brought under control. In eradicating or controlling the diseases and parasites which prey on the food producing animals, the Veterinary Profession has served and continues to serve mankind. In this work, the destiny of the profession lies."

HEALTH VISITING IN THE SUDAN

By

Helen C. Simpson, S.R.N., R.E.M., S.C.M., H.V.P.

When Professor Butler asked me to write a paper on this subject, I was at a loss to decide what form such a paper should take, and was convinced that any contribution I might make would be inadequate, as this training schme had started some years before I joined the Sudan Government Service. The necessary information was obtained from files in the Ministry of Health, but the following account of the form of training adopted, progress, and the work of the Health Visitor, is, in common with any account of public health activities, factual and rather dull.

The history of Health Visiting in the Sudan is very recent, but the foundations were laid much earlier by those two splendid women, "The Wolves", of the Midwifery School, Omdurman, as, without trained nurse-midwives, there would have been no candidates for such a training schme. Although, following the opening of the Midwives Training School, ante-natal clinics, and, later, child-welfare clinics, had been organised, it was not until 1945 that the training of Health Visitors was seriously condidered. The pioneer of this scheme was Miss P.Dickens, Principal Matron from 1946 to 1955. She was herself a qualified Health Visitor and had recognised the need for such personnel in the expanding field of preventive medicine. One might draw a parallel between Miss Dickens and Miss Nightingale, who urged that a recognised training for Health Visitors should be started in 1891, almost 30 years after Home Visiting had been introduced by the Ladies Sanitary Reform Association, which was a voluntary body. It is not recorded whether the first Health Visitors in the Sudan were instructed, as they were in England, "to visit from house to house, irrespective of creed of circumstance, in such localities as their Superintendants direct; to carry with them carbolic powder, explain its use and leave it where it is accepted". But here, as in England, the Health Visitor has no right of entry into any house, and must take rebuffs as equally as welcomes. Here, also, the emphasis has been from the beginning of maternal and child health, and health education in the home; so far, only two trained Health Visitors are

employed in tuberculosis work, and, as yet, none in the School Health Service.

In 1945 a Board of studies was fomed and a course of lectures arranged, and in 1947 the first two Health Visitors were qualified. From then until 1958 a total of 54 have been trained - not a great number ; the intake of pupils to this course being limited, owing principally to a lack of suitable-qualified candidates. The school building was not available until 1959, so, until then, classroom facilities were shared in the Midwives Training School, and a house nearby was rented as a hostel for the pupils. The candidates for training must have at least a fourth-year elementary education and hold the certificate of Nursing and Midwifery. They are interviewed by a Selection Board before being accepted. The course of training was originally of 8 months' duration, but in 1957 it was decided to combine this training with the already existing course for the training of Staff-Midwives, and extend it to one year, in order more adequately to meet the needs of the country.

The work of the Health Visitor, as already stated, is, in the main, limited to maternal and child health: midwifery schools with clinics attached had been opened in almost every Province, and it had long been decided, that a Superintendent of a Province Midwifery School should be a qualified Health Visitor. During the course, practical experience is gained by working with trained Health Visitors in clinics and in home visiting; with Staff Midwives, with whom they learn, how to teach and train illiterate midwives, the supervisory and administrative work in the Midwifery School, and the supervision, of the work of the domicilary midwives; in the Tuberculosis Service (both hospital and domicilary) and in the Psychiatric, Eye and Paediatric clinics. Lectures and tutorials are given in general hygiene, infectious and tropical diseases, tuberculosis, mental health, social welfare, school health, ante-and post-natal care, welfare of the normal child, diseases of infancy, dietetics and cooking. The final examination takes the form of three written papers, and a viva voce in all subjects is conducted by a Board of four Examiners. To merit a Pass, each candidate must obtain over 50 in each paper and in the Viva, and have an overall percentage of at least 60.

The results obtained are, as a rule, surprisingly

good and, in all humility, considering the educational background, one wonders that these girls even stay the course. They are generally very young, many of them not much over 20, but, on completion of training, shoulder with amazing zeal and confidence a tremendous responsibility. They may be posted either as Health Visitors (usually responsible for two Health Centres), or as Staff Midwives of midwifery schools, and are, in the majority of cases, far away from both family and friends; not an easy situation for a young Sudanese girl. The work of a Health Visitor is to hold one Infant Welfare and one Ante-Natal Clinic per week and, with two centres, this will mean four out of six working days. Clinics are held from 7.30 a.m. until 1.30 p.m.; they are tremendously popular and, in some instances, in urban areas, the average attendance of 150 women would appall the average Health Visitor in Europe. She must visit the hospital and take a report from the Doctor on the number of children and newly-delivered women who have been discharged, and thereafter do a Home Visit in each case; visit all homes where there are special problems connected with young infants; hold Mothercraft Classes in the afternoons, revision classes for domicilary midwives, to whom also the Health Visitor issues drugs, dressings and equipment, and by whom she may be called, day or night, if the Midwife is doubtful about a patient. The list of duties is long, and one from which many highly trained women in other countries would flinch, but I have yet to meet a Health Visitor who grumbles; in fact, many take on extra duties, d.g. giving practical and theoretical instruction to nurses in training, or finding time to visit the Women's Prison.

Recently, the general situation was reviewed in an effort to assess the requirements in this field of work, using Khartoum Province, which has more Health Visitors than any other, as a yard-stick (the ration is 6,000 families per Health Visitor). The Sudan requires something like 340 additional Health Visitors, and with the present rate of training at 10 per year, the problem is indded formidable.

I can find no more hopeful conclusion, than to quote, as Sir George Newman quoted in "English Social Services", Sir John Seeley in "Ecce Homo", "The Enthusiasm of Humanity is that respect for Human Beings which is a reverence for Human Beings as such, and not for the good qualities they may exhibit ..... It desires not the apparent, but the real and highest

welfare of each, and differs as much as possible from selfishness, being associated with self-respect, humility and independence ..... It is handed on like the torch from runner to runner in the race of life.'.

DISCUSSION OF WRITTEN CONTRIBUTIONS

Dr. Abdel Halim Mohamed. I would ask Dr. Anis if we are training the right kind of doctor for the Sudan? The man who goes to a district hospital has to practise all branches of clinical medicine. Post graduate studies are mentioned in bacteriology etc. but what of medicine and surgery?. There must be close association between the clinician and public health worker as pointed out by Professor Morgan. How can the young doctor learn public health during his one year's housemanship.

Dr. Anis Mohd. El Shamie. Dr. Halim's major experie- has been in Khartoum which is atypical of the mass of the Sudan with its endemic and epidemic diseases. In the out-districts diseases are most often diagnosed by the patient. We don't need advanced clinical knowledge but public health measures to prevent recurrence and spread.

Dr. Abdel Halim Mohd. Should the Stack Laboratories only perform pure research and all routine work should be done in province hospitals?

Dr. Mansour Ali Haseeb. The Stack Laboratories should be a research centre but has been flooded out by the routine requirements of the clinicians. Its future policy will largely depend upon finance.

Dr. Abdel Halim Mohamed. Should the general duty doctor be trained to act as the local psychiatrist?

Dr. Taha Baashar. The time has come when the student should be taught human relationships and not diseases. The great epidemic and endemic diseases will disappear and we will be left with psychosomatic disorders which now provide 45%. of the bed cases in countries like England. Handicapped people, like mental defectives are now looked after at home but this will form a future problem. During his training the students' interest depends upon his professor and the examination at the end of his course. Without these they tend to neglect psychological medicine, important as it is. The teaching of psychological medicine is of increasing importance every where and mental illness is as physical. Even in treating physical disease the whole personality of the patient must be condidered. There must be co-operation between all Departments in the Faculty of Medicine and the Medical Service.

Students must be taught methodology in looking into the whole patient and his environment.

Awad El Sid Mustafa. What is the role of native medicine? There is possible competition between the Minstry of Health and "native medicine", whether herbal, Koranic etc., in which a great number of people have a strong belief. This leads to lack of confidence in modern medicine. How can we get people to give up these native medical beliefs and turn more to the health services?

Dr. Taha Bashar. By making use of traditional medicines and practise. The Ingessana use roots which may have useful constituents like Rauwolfia. There should be special research into native remedies. Many faith healers are good psychologists and appeal to the needs of the people, particularly incurables. If the psychology of the people is understood there will be no problems.

Sayed Barodi. Should not health education be devoted to removing bad habits rather than ill health? The health educator should be wholetime and be aware of the psychology and pattern of living of the people in the immediate locality.

Dr. Mohi El Din. The Ministry of Health consists mostly of public health experts and they may embarass the clinician for those who think more of mass treatment than of the individual ignore the small family unit and the families who pay more attention to the individual than the community. In many diseases treatment of the individual is the best prevention. If in tubercule you treat one patient you prevent the disease in nine. For this reason I appeal for the better training of clinicians.

Miss Matheson. It was originally intended to emphasize the "auxillary" but what is the "auxillary"? Does this mean that all others are auxillary to the doctor? What contribution is it wished that the nurse should make, as an "auxillary" or a professional worker?.

Dr. Abdel Halim Mohamed. The "auxillaries" are components of one whole. It is the task of Miss Matheson's trainees to convince everyone that nursing is a suitable profession for young ladies in the Sudan.

A SURVEY OF THE FUTURE REQUIREMENTS IN MAINTAINING AND IMPROVING THE HEALTH OF THE SUDAN

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INTRODUCTION

In the previous talk on the "Health Problems" it has been pointed out that the country is very large and sparseley populated with an average density of 10 inhabitants per square mile and that almost two thirds of its populace live in rural areas and the majority of them lead an unstable nomadic life. Moreover, the climatic, geographical and topographical feature vary distinctly within its precincts. If the foregoing points are taken together with the difficulties of communications especially in the wet season, scarcity of potable water supplies in places away from perennial rivers and the different social and cultural backgrounds of its mutiple tribes in rural areas, it goes without emphasis that health and disease in this country present many unique problems.

But, when one recapitulates the health problems in terms of illness, acquaints oneself with the high infant death rate and peruses the Annual Reports of the Ministry of Health for figures of new cases of sickness it appears that the major causes of invalidism are preventable and can be largely controlled by public health measures and that scientific weapons are available and can be ably handled.

A fair amount of success has been hitherto achieved, but nevertheless the results are far below the optimum standard and there is planty of room for future develoments should the Health Services future policy be given its due priority and share in development budgets on the cogent understanding that it is not only part and parcel of any economic and other development schemes but is emphatically a fore-runner in their implementation and in the creation of a healthier environment and healthier nation for a maximum output. It is true that health services are not revenue producing schemes for the cost of treatment and prevention of illness has to be paid by the nation in one way or another, either in terms of money, incapacitation or loss of lives and family and community disasters. These services are rewarding schemes and there is no wealth without health.

The Ministry of Health first intiated a long-term health development plan in 1945 for the period 1946 to 1950. In the middle of 1949 planning work started for another ten year health plan covering the period 1951 to 1960 with the object of expanding all existing health services to meet the then growing needs of the country and higher standards in medical care. But during 1956 it was discovered thay the health planner in 1949 could not forecast the following important events in the history and social development of the country:-

a) the country attained its full independence in 1956 and, as a normal consequence, the public became deeply interested and more health conscious in assessing the quality and quantity of the existing health services and in demanding additional services in the curative, preventive and social fields.

b) the recent published provisional census revealed an overall total of 10,209,559 as compared to the previous arbitrary figure of 8,784,000 with a resultant increase of 1,425,559 persons without previously catering health services for them.

c) the census has also disclosed that the excess of birth-rate over death-rate per 1000 persons is on the average 29.0 and that the fertility rate of women of child-bearing age is high. These are genuine examples of the rapid growth of a nation where a reasonably healthy environment should be maintained.

d) in 1956 the Sudan Republic assumed full membership of the World Health Organization and adopted the International Sanitary Regulations. Its association with the World Health Organization as well as with the Technical Assistance Board and the United Nations Children Fund has resulted in additional responsibilties in the various fields of public health with the object of raising their standards to international levels.

It was therefore evident that the health services so far available were short of the requirements which were contemplated for the second half period (1956/60) of the Ten-Year Plan. In consequence a revised health plan was worked out in 1957 for the period 1957/63 but, owing to financial limitations, it has been frozen since 1957/58 and a year to year review has been considered but with a drastic cut amounting to over 75% of the actual requirements. It is therefore, implicit that any proposals for future developments in this talk should be considered as of informal nature and not as a

commitment on the part of the Govenment.

FUTURE HEALTH DEVELOPMENTS

Before formulating views on the future policy of health services the health planner is well aware that his first task should be to consider certain guiding principles and specific objectives such as :-

a) the limiting factors; for example, the financial resources of the country, the feasibility of recruitment and training of professional, technical and auxiliary personnel and the building potential.

b) the desirability of long-term planning for consolidation and expansion of decentralized, but co-ordinated, health services which fit into the future overall social and economic schemes of the country and aims at community development.

c) a full study of the present demographic structure of the country and its future consequences with particular stress on vital and health statistics and the prevalance of epidemic, endemic diseases and other invaliding sickness.

d) in assessing the present situation and discovering the main prohlems and difficulties connected with the health services throughout the country and basing future programmes on them. It is essential to obtain the views and constructive suggestions of central and local governments as well as informed public circles.

e) the training programme for local professional, technical and auxiliary personnel should be planned to increase the annual enrolment into schools to keep pace with future expansions. Moreover, to take into consideration any means by which better use can be made of the available manpower.

f) that the provision of future services should be based on the unniversal conception of the interpretation of health which is a state of complete physical, social and mental well-being and not merely the absence of disease or infirmity.

With the above general principles and specific objectives in mid one can proceed to draw up schemes for

health services in the form of a working plan for the future. For the convenience of this paper it will be relevant to divide the topic into four main headings, mentioning the salient points for future approach and leaving detailed explanations for reference to the main body of the 1957/63 Development Programme.

EXPANSION OF EXISTING SERVICES.

The existing tuberculosis services are :-

a) Division of Tuberculosis services under the auspices of Chief Division.

b) three Hospitals, the new Thawra Chest Hospital and the River Hospital at Khartoum and Abu Anga Chest Hospital in Omdurman.

c) tuberculosis wards in other hospitals in the country.

d) Tuberculosis Control Demonstration and Training Centre at Wad Medani which, in addition to treatment, prevention and training is carrying out prevalence surveys in rural areas. The total number of tuberculosis in-patient beds is 966.

e. B.C.G. vaccination project for protection against tuberculosis.

f. all the above are manned by 7 doctors assisted by tuberculosis health visitors and other technical and auxiliary staff. The diagnosed incidence of tuberculosis per 1000 of population is on the average 0.165.

The future approach for improvements crystallizes into the establishment of the following services :-

a) tuberculosis clinics in some of the province headquarters hospitals which should be equipped with radiological plants and full diagnostic facilities including efficient laboratory services and staffed with T.B. officers, health visitors, almoners, clerks, and B.C.G. units. It is the objective to establish such clinics at the rate of 2 per year.

b) to render possible early diagnosis and prompt systematized treatment of individual cases by expanding the number of beds in existing hospitals and catering for some in newly established hospitals.

c) the creation of an instrument of notification and providing facilities for the examination of contacts as a valuable contribution to case-findings, search for early cases and the tracing of source of infection and the establi shment of organized domiciliary services.

d) the institution of a research and epidemiologi cal work and mass miniature radiography survey units.

e) the encouragement of the efforts of the national government and local anti-tuberculosis societies by striving in every possible way to improve the social and economic conditions of the poor.

f) establishment of settlements and rehabilitatio services for the cured or arrested cases.

Malaria

Infection with Malaria still remains a major caus of invalidism. About 6% of the total recorded out-pa tient attendance suffered from malaria and 10% of the total recorded in-patients. While the wide use of res idual imagocidal spraying reduced the incidence of mal aria in some places, explosive epidemics occurred in others as a result of heavy rains and high floods. In ternational experts on malaria have invariably shown t danger of potential resistence of the mosquite carrier to modern insecticides and have stressed the policy of eradication of malaria with-in the shortest possible time and have warned against the policy of delayed act ion and of piece-meal control schemes. In consequence and with the technical assistance of the World Health Organization and the United Nations Chidren Fund, a Control Pilot Project was intiated in the Southern Fung of Blue Nile Province in 1956 under the leadershi of an international expert. This project will remain until the end of 1960 and its objectives are to carry out investigations in order to solve problems connecte with a future mass anti-malarial compaign and to train national personnel in methods of intercepting malaria transmission.

Proposal for the future include: -

a) the objective is to extend the scope of the Pilot Project into a Pre-eradication Survey Project to cover the whole country, starting in mid-July 1960 and continuting until the

end of 1961, to obtain all the necessary data for a comprehensive Malaria Eradication Project which is scheduled to commence in early 1962.

b) in anticipation of the magnitude of duties and responsibilities that will inevitably occur in the foreseable future as the result of expansion of the eradication scheme throughout the country a Division of Malaria, with the appropriate qualified staff, should be established as as separate contingent of the Ministry of Health under a Chief of Division who will be responsible for alll technical and administrative procedure relevant to malaria eradication, courses of training, epidemiological surveys and entomological research, advice on specific treatment, collection and analysis of statistical data, stores, supplies, transport and promulgation of legislations enacted to stamp out breeding haunts of the mosquitoes etc.

Metal Health Services

There is one clinic for nervous disorders at Khartoum North under the auspices of a Senior Psychiatrist who is assisted by one Psychiatric Registrar and a second post has been approved and will be filled soon. There are on the auxiliary staff 3 Medical Assistants who received their practical training in mental nursing at Asforia Hospital, Lebanon and 2 female and 2 males nurses. There is also a Criminal Lunatic Asylum at Khartoum North. It is run and supervised by the Penal Authorities while the share of the Ministry of Health is restricted to the provision of medical care within the framework of the penal system.

In the past, lunatics and mental defectives were indiscriminately viewed with superstitions, dread and reverence and were considered as possessed by spirits. They were exclusively cared for by religious healers as medical men were not considered to be competent to deal with problems of spiritual nature. But, with the spread of education and the impact of general culture, such ideas pertaining to the nature of mental illness have undergone change and the majority of the public began to look upon them as problems of medical rather than spiritual nature. Taking into consideration the importance of ecological factors in psychiatry, it is of paramount importance that the health worker in the mental field should possess the intimate knowledge of the sociocultural back-ground of the community he is

serving and that a programme for mental health services should be basically founded on the specific needs of such communities.

It is the target to qualify more Sudanese doctors in psychiatry to enable the establishment of three psychiatric Centres for extra-mural services and provide beds for intra-mural services in Medani, El Obeid and Port Sudan hospitals within a period of five years. The system of sending mental nurses for practical training at Asforia Hospital, Lebanon should continue and social workers training should be initated locally and integrated with the training of health visitors.

Midwifery. There are 8 Midwives Training Schools distributed at Omdurman, El Obeid, Juba Malakal, Wad - Medani, Atbara, Kassala and El Fasher which cater for the training of 87 pupils annually. So far 929 Midwives were trained, 858 for domiciliary work in rural villages and 71 for hospital services.

Mother and Child Health Centre. 36 maternal and child welfare centres exist mainly in H.Q. of provinces and larger towns. An additional centre is approved in 1959/60.

Twenty-six Health Visitors supervise the work in these centres, and in addition two women doctors are engaged in welfare services in Khartoum. There is a School and Hostel in Omdurman for training of Health visitors which accommodates 25 pupils.

The recent provisional census for the country revealed that the infant mortality rate (deaths under one year of age per thousand births) varied from 54.I to 141.8 in rural areas and the maternal mortality is roughly estimated at 2.97 per thousand lives and stillbirths. Both these mortality rates are high compared to most countries. Infant and maternal mortality trends are looked upon as a fair index of standards of living and are mainly determined by social and economical influence in addition to health environment. Therefore, much will remain to be done in order to achieve comparable standards of living in this country and accordingly the provision of future services will be approached on the following lines :-

a) in order to provide an effective service and future developments, it is proposed to separate the maternal and child health from the nursing services by the appointment of a full time

specialist who possesses the requisite qualifications as Chief of Division of Maternal and Chield Health Services.

b) the establishment of additional mother and child welfare centres for medical and preventive supervision for antenatal and post-natal care, treatment of dental, ophthalmic and other minor ailments, advice about feeding and child care, health education, supply of vitamins and dried milk, immunization, expert obstetric, paediatric and orthopaedic advice and keeping of records. A total of 36 such centres are to be established during a five year period, subject to the availability of Health Visitors.

c) establishment of domiciliary services to deal with home nursing and home help services for the care and after-care of normal child birth, the convalescent mothers and for personal and domestic hygiene.

d) making available the necessary servifes for inpatient accommodation for a proportion of confinements in a well equipped hospital and for the treatment of mothers and babies needing special care.

e) provision of an efficient emergency blood transfusion service and a "flying squad" for women in their homes, and adequate ambulance services.

f) building of 3 Maternity Hospitals in Medani, El Obeid and Atbara and increasing the number of beds in Omdurman Maternity Hospital.

g) the policy of decentralization of Midwives Schools for the training of illiterate midwives at province Headquarters hospitals should containue and be extended to other big towns. It is the future aim to build 10 new schools. This procedure will leave more room in Omdurmal Midwives Training Schools to train a bigger number of literate midwives for hospital services and staff midwives for teaching in Midwives Schools. It is also intended to cater for 3 additional schools for training of Health Visitors in Medani, Atbara and El Obeid. It is also the intention to establish a College of Midwifery to be affiliated to Omdurman Maternity Hospital to turn out Midwives of higher professional standards.

Province Health Services.

The country is divided geographically into 9 provinces, but for the sake of public health administration, the Blue Nile Province, is split into Blue Nile proper and the Gezira Irrigated Area and Kassala Province into Kassala South and North. The latter includes the old Red Sea District. This makes a total of 11 Health Administration Regions in the country and each unit is in charge of a Province Medical Officer of Health (P.M.O.H.). The P.M.O.H. is also responsible for the general medical administration of the province under his charge and is assisted by :-

a) an Assistant Medical Officer of Health(A/P.M.O.H.) who deputises for him and conducts social services.

b) a Province Medical Assistant (P.M.A.) for administrative work and welfare of the staff in rural dispensaries and dressing stations.

c) a Senior Public Health Inspector for the control of epidemic diseases and environmental sanitation.

d) Superintendant Nursing Officer. She should have the nursing, midwifery and health visitors certificates and is responsible for welfare centres nursing and midwifery wervices in the province.

Within the provinces the public health services develop at district level through a Medical Inspector working in a district hospital and a Public Health Inspector or officer who usually works under the district supervision of the Medical Inspector and for Local Government Councils. The further breakdown of the Public Health Services in districts occur through sanitary overseers and assistant sanitary overseers who take care of simple village sanitation in the main rural centres of the district.

At present the Public Health Services are manned by the following : -

Provision Medical Officers of Health	11
Asst./Province Medical Officers of Health	9
Chief Public Health Inspectors	1
Senior Public Health Inspectors	12
Public Health Officers	58
Sanitary Overseers	160

Future development includes :-

a) the old theme of division of Public Health Services and clinical medicine at province level is no longer consistent with current experience. It is deemed essential that full integration of the curative, preventive and social services should be the adopted policy. The general trend at National Headquarters should be a policy of decentralization and devolution on provincial authorities an ever increasing degree of responsiblity for the health of the people in order to foster regional and community health programmes. The P.M.O.H., must be looked upon as the top co-ordinator of preventive, social and curative aspects of medicine and be assigned the duties of ex-officie Chairman of Hospital Management Committees.

b) Full and maintained supervision at a high technical level should be an essential factor in health services. With the widening responsibilities of P.M.O.H., at province Headquarters, increasing number of district hospitals, dispensaries, dressing stations health centres, nurses and midwives training schools, local and international projects, control of epidemics and routine visits throughout the province, it has become unreasonable to claim perfection of continuity and uniformity of supervision. It is therefore implicit that some larger Health Administration Regions should be split up into Public Health Divisions. Each division should be in charge of Divisional Medical Officer of Health (D/ P.M.O.H.) and on his staff there should be a Public Health Inspector and a Senior Medical Assistant. It is envisaged that this expansion programme needs the appointment of 10 D/M.O.Hs., and it is regarded as good policy to attract young doctors at an early stage of their career to gain experience in health work in order to secure continutity and allow for a wide choice for selection for future promotions to senior posts. However, this development is a tentative one and is dependent to a large extent on the attraction which will be offered to workers in the public health field.

c) It is evident that two-thirds of the population in the country live in a rural environment. In the majority they form the primitive class, are

influenced by superstitions and lack the concept of disease, acquire their own habits and social problems, are economically unproductive and live under poor housing conditions and in an insanitary environment. In order to provide the basic health needs for such a rural community stress should be laid on the preventive aspect, promotion of health and health education. It is , therefore, clear that the organization of the existing dispensaries with a staff of medical assistants and dressing stations in charge of dressers are no longer competent to provide the basic requirements of the rural population. It should be the future policy, as soon as an increased output of public health officers and sanitary overseers, health visitors and midwives become available, to gradually convert as many as possible of the existing dispensaries into health centres and dressing stations into sub-health centres. The hospital, whether at district H.Q. or in a sub-district with its satellite health centres and sub-centres, should form the base for a Rural Health Unit and the medical officer in the base hospital could, in this way, be made responsible to take charge and supervise the work in rural units.

d) at present there are 496 Dispensaries and 395 Dressing Stations and the ratio of one dispensary to population ranges between 25,000 to 50,000. It is determined to expand the Dispensary services by increasing the number of Medical Assistants by accelerating the number of intake into the Medical Assistants School up to maximum potential limit of training with the future target to establish about 250 rural dispensaries and, within a five year period, bring the ratio of one dispensary to 15,000 of rural population.

e) to initiate a pilot project in the field for the treatment and control of endemic and other preventable diseases, the collection of vital and health statistics and local research work by establishing 5 Mobile Medical Field Units which will act in epidemic outbreaks and work in close collaboration with P.M.O.G's and the Research Laboratories in Khartoum. Unlike the rural ambulances, these units will be more static and in charge of medical officers and other auxiliary staff.

f) the existing 65 rural mobile ambulances in rural areas will be increased shortly by 20 ambulances granted through American Aid. Moreover, it is the future aim to increase this number according to exigencies of the service and let them be in sole charge of Medical Assistants or Senior qualified nurses.

Environmental Sanitation.

a) To expand the Environmental Sanitary Services by:-

(1) The creation of Division of Enverionmental Sanitation. (2) The appointment of Assistant Chief to this Division. (3) Changing gradually over during the five year period, the title of Senior Public Health Inspectors in Province Headquarters to province Public Health Inspetors (4); creation of 10 posts of Senior Public Health Inspectors to be posted to big Municipalities and Townships Councils (5); increasing the establishment of Public Health Inspectors from 12 to 28 (including II posts of Public Health Divisions in Provinces) and the Public Health Officers from 58 to 83 in order to meet additional requirements of Local Councils. The training of more sanitary overseers will be expanded gradually according to growth of village sanitation. They will continue to be employed by Local Government to Rural Units. The future of this cadre is subject to year to year revision.

(b) to increase the intake into the School of Hygiene from 10 to 20 candidates annually and raise the present curriculum of the school, both in duration and introduction of new subjects.

(c) water supplies are a major problem in many parts of the country, particularly in rural areas. It is now dealt with by the Rural Water Development Board and a representative from the Ministry of Health sits as a member in this Board. The Ministry of Health maintains its responsibility for the technical standards, protection of water supplies and bacteriological and chemical analysis of water samples. The World Health Organization has raised a special fund for the improvements of water supplies and it is the strong desire to make use of it technically and financially.

(d) similarly, the disposal of human excreta is a major health problem, particularly in rural areas. The recruitment of night soil porters,

who are essential to the working of the bucket system, is becoming progressively more difficult. It seems likely that within the foreseable future it will not be possible to continue this type of service in many places. It should be the future aim to provide some type of water borne sewage system in all the main townships and resort to the use of the Aqua type of latrine like the ones used in other countries or another simpler device for rural areas.

(e) it is also the trend in the Ministry of Health to revise existing Public Health Legislation and keep them to a standard consistent with the development of the country, including standards of food and drugs of accepted international levels. Building Regulations under the control of Local Government Councils have recently been revised in consulation with the Ministry of Health.

Specialist Services :

Sepecialist services have been hitherto confined to Khartoum, Omdurman and some Province Headquarters Hospitals. The approved establishment is 55 and is distributed as follows :-

10	Physicians	11	Surgeons
10	Gynaecologists	9	Ophthalmologists
3	Chest Physicians	2	Psychiatrists
2	Anaesthetists	3	Radiologists
1	E.N.T. Specialist	3	Pathologists
1	Bacteriologist		

It is the aim, within the foreseable future, to make available the services of specialists in all province Headquarters Hospitals.

(a) concurrently, it is foreseen that the team work concept in specialist services should be gradually introduced to cater, in addition to Khartoum Hospital, for all province Headquarter Hospitals. This specialist services team should consist of the following :-

Physician	Anaesthetist
Surgeon	Clinical Pathologist

Gynaecologist	Psychiatrist
Radiologist	Pharmacist
Dental Surgeon	Ophthalmologist

(b) it is equally essential that, in the future, the number of certain specialist appointments in province hospitals should be adequate to make possible touring visits to district and rural hospitals to maintain clinical standards and to benefit the local medical staff by discussions in current and emergency problems.

(c) it is foreseen that the best use of specialist services can only be obtained if it is characterized by the existence in hospitals of well equipped departments and provision of the adequate numbers of beds and the requisite number of medical officers to do the routine medical work.

(d) in some provinces it is projected to make available, on a touring basis, some specialist services such as opthalmology and dental surgery.

(e) it is also recognised that for geographical reasons and for exigencies of the service that it would be valuable to build up specialist services (particularly in surgery, obstetrics and eyes diseases) in some selected district hospitals.

(f) it is forecasted that the expansion of the clinical specialist services to all Province Headquarters and some District Head quarters will depend upon the gradual recruitment within a five years period of the following : -

11 Physicians	11 Surgeons	10 Gynaecologists
16 Ophthalmologists	1 Orthoptist	
8 Chest Physicians	3 Psychiatrists	
8 Anaesthetists	10 Radiologists	
9 Ear, Nose and Throat Specialists	1 Dermatologist	

(g) Dental Services. There are 8 Dental Clinics operating in the Country. It is visualised within a five years period to expand the Dental Services by the appointment of 7 Dental Surgeons and to establish a Central Dental Laboratory for stepping up the training of Sudanese Dental Mechanics to be attached to Dental Out-patients.

The future proposals for mobile dental services were mentioned earlier.

(h) the expansion of pharmacist services will keep pace with the future developments by the appointment of 5 pharmacists to Province Headquarter hospitals as well as the establishment of School of Pharmacy affiliated to the University of Khartoum.

Hospital Services

The approved establishment of General Duty Doctors is 167. The number of hospitals is at present 58 and, in addition, there are 5 under construction and 2 approved for the current financial year making a total of 65 hospitals. The total number of in-patient beds in these hospitals is 7240 including 960 for T.B. patients and excluding 2,124 in dispensaries. The present ratio of inpatient beds per thousand of population, with the exception of the Three Towns which is 2.8, varies from 0.3 to 0.9 and the ratio of doctor to population is approximately one doctor to 35,000 of population.

Unlike many places, the doctor in this country has a wide range of administrative duties, excessive amount of night duty and medicolegal and police work in addition to his outpatient and inpatient duties. Taking the factor of personal physical edurance, it becomes imperative that one should agree to a working formula in respect of the possible number of beds the doctor can cope with and within the official time imposed on him. It is proposed that the optimium number of inpatient beds in hospitals per one doctor should be 50. As far as future developments of hospitals is concerned it is concerned it is the objective to build them at the annual rate of 6 hospitals of 150 inpatient beds strength in populous places or 60 inpatient beds in semi-urban areas. It is the aim to provide inpatient beds during a five year period to reach the target figure of 2 inpatients beds per one thousand of rural population. In Province Headquarters hospitals expansions in inpatient beds will keep pace with the progress in specialist services. Accordingly it is forecast that the total requirements of about 150 general duty doctors for hospital services will be required to be recruited during a five years period if the objective of allocating 50 beds per doctor and providing 2 inpatients beds per 1,000 of rural population is projected. It is hoped that the output of Sudanese doctors from the University of Khartoum, the U.A.R. and other countries will,in future, cope with the situation.

It is also intended to increase the number of Hospital Managers to be gradually appointed to every hospital as well as expansion of the nursing services and other auxiliary services like Radiography, Dispensing, Physiotherapy, nursing instructors and to maintain a reasonable standard for existing hospital services and cater for future developments.

Laboratory Services, Research and field investigations :

The three main branches of the Laboratory Services, bacteriological and pathological, chemical and entomological remain co-ordinated under the administration of the Assistant Director (Research) who is also responsible for the training of laboratory technicians and assistants for hospital laboratory services. He also maintains a close liaison with the Department of Pathology of the Faculty of Medicine of the University of Khartoum and is the Consultant in Forensic Medicine.

Proposals for the future include :

a) Bacteriological and Pathological Laboratories.
   - i) It is proposed to double the present establishment of one bacteriologist and two pathologists in the Central Laboratories.
   - ii) establishment of Vaccine Lymph Institute.
   - iii) a Forensic Medicine Department
   - iv) a Medical Zoology Department
   - v) expansion of Laboratory Libraries

b) Expansion of Bacteriologists Services in Hospitals

c) Expansion of Laboratory Technician and Laboratory Assistant Services to Province Hospitals.

d) Expansion of Chemical and Entemological Laboratory Services.

e) It is proposed to establish a Clinical Research Department as a separate unit under the Director of Research, and the number of hospital beds required shall be provided by Khartoum Hospital.

National Health Administration :

The present establishment of the National Administration of Health Personnel at H.Q. level is as follows : -

Director	Deputy Director
A/ Director (Public Health)	A/ Director(Hospitals)
Chief Division of Tuberculosis	Chief Public Health Inspector
Chief Division of Medical Supplies	A / Principal Matron
Principal Matron.	

In the previous pages the genuine need for expansions of the social services like Tuberculosis, Maternal and Child Health, Health Education, School Health Services, Assessment of Health Status and Industrial Health services as well expansions in specialists, hospitals and Rural Health Units Services and the natural consequence in increasing of training schools of all types of auxiliary personnel, make it necessary to strengthen the headquarters staff. The same could be said for the increase of the volume of work in respect of consolidation of existing services which are inevitable. Moreover, the ever increasing association of the Ministry of Health with other National Ministries and also with the World Health Organization since 1954, the Technical Board and the United Nations Children Fund has significantly added to the duties of the staff in the H.Q. of the Ministry of Health. At the present time there are four well established major international projects in the country viz :- Malaria, Tuberculosis, B.C.G. vaccination and Nursing College, and all will continue to expand during the next five years. In addition there will be an appreciable number of new projects which have already been approved for the years 1960 and 1961 and others which will be provided for in the years to follow. The amount of preparatory statistical and epidemiological work, returns, reports, visits and conferences are excessive and time-absorbing. In view of the forgoing explanations which, in fact, only focus on side-lights of the wide field of duties thrust upon members of staff of the H.Q., it is impossible for any one of them to find a reasonable space of time to concentrate on formulation of policy of the different aspects of the Health Services and allow touring visits which are fundamental to the success of a National Administration. It is therefore increasingly evident that a revision of the present organization of the National Administration should be seriously considered in order to meet present needs and future expansions. These are :-

i) establishment of a Department of Social Hygiene which will deal with the following services :- Tuberculosis, Maternal and Child Service,Health Education, Venereal Disease, Industrial health, School health, Nutrition, Nutritional diseases and Leprosy.

ii) the creation of a post of Chief Division of International Health.

iii) the creation of a Construction Division in the Ministry of Health to keep standard plans of the various items required in development programmes and supervise future expansions in hospitals and other institutes.

iv) The stablishment of other Divisions for Malaria, Environmental Sanitation, Maternal and Child Health Education have been already mentioned.

4. NEW DEVELOPMENTS OF HEALTH SERVICES:

Health Education

The propagation of health education, in addition to the medium of personal contacts by health staff and talks delivered on current health problems by weekly broadcasts from Radio Omdurman, is purssued by means of exhibition in the Public Health Graphic Museum of Khartoum and at tribal gatherings which are always taken as an opportunity for exhibiting various posters on local diseases and their prevention, care of the infant and other subject as nutrition, housing, simple elementary hygiene etc.

As to the question of training, a number of Public Health Officers went to U.K. and U.S.A for health education courses. In training schools for auxiliary staff health education forms an important topic in the curriculum. There is no organized Health Education Department.

It is the strong wish to establish a Division of Health Education under the aegis of a Chief of Division with the following duties :-

a) to improve the social environment by develoopint health education services generally, to train all types of staff in the methods of imparting health education to the population and to act as a co-ordinator with other Ministries concerned.

b) to study the methods and facilities for health education in the various sectors of public health, such as the prevention of social diseases and accidents, mother and child welfare, mental hygiene, nutrition and enivronment sanitation and to draw a clear policy for future development.

c) to assess the particular needs of his community by studying the existing health services practice and comparing them with public knowledge and misgivings.

d) to try and find out where and among which classes of people there are the greatest opportunities of work, and to discover professional and voluntary groups who are willing to help.

e) to adapt methods and media according to people's interest, background and circumstances.

f) to assess the resources and equipment for health education and make good the deficiencies.

g) to look constantly for new opportunities, new ideas and new material and to associate himself very closely with international bodies working in the same sphere.

h) to make the best use of the media of the radio, press reports, articles, advertisements, leaflets, posters, exhibitions and displays in public museums, clinema slides and short documentary films.

i) last, but not least, to introduce a system of health teaching and practice in all schools including the specific training of teachers in order to inculcate in them the incentive and interest to persevere with health education.

School Health Services.

The School Health Service are the responsibility of the Ministry of Health. There are no special provision for health services for schools except for the appointment of Assistant Province Medical Officer for school health services in Khartoum. Medical Officers in towns carry out periodical visits for general medical examinations, for referring cases for hospital treatment and for compilation of records for Annual Reports. In rural areas similar procedure is adopted by medical assistants. Occasional lectures on health subjects may be given by various members of the Ministry. First-aid boxes have been issued to some schools. (There is a School Dental Service only in Khartoum Province).

Bearing in mind that the future rate of opening schools will be more accelerated than hitherto anticipated, it goes without saying that serious attention must be paid to school health services. It should be emphasised that medical officers who are busy with the ever increasing hospital duties are no longer able to participate actively in school health services. It should be pointed out that the influence of the school begins to work while the child is still tender and unformed, and it offers the first opportunity for a systematic attempt to build a healthy future generation. It is therefore incumbent that School Medical Officers should be appointed with each Province Medical Officer of Health to carry out initially this service in the province and advise on future plans for development. Eleven such medical officers will be required within a period of five years. At the same it is essential that these medical officers should work in school clinics staffed by the nursing cadre. The functions of the school clinic shall be as treatment centres, for special examinations, vaccinations and immunization and follow up of defects found in course of inspections.

Industrial Health:

The working population is not hitherto precisely figured and an appreciable number of them are drawn from adjoining countries and there is considerable individual migration from rural areas into towns. Some of these emigrants return to their own districts but many settle down in their adopted areas and give rise to public health problems. There are no reliable data of the occupational industrial hazards in the country.

It has long been recognised that certain occupations carry special risks, for example, cancer of the lung among heavy smokers, special hazards of certain occupations like poisoning by lead, etc. The association of occupation and disease in these conditions is fairly direct and obvious and could be mitigated in the majority of instances. Moreover, it is by no means easy to separate the influence of industrial circumstances on one hand, and the social environment usually associated with an occupation on the other. The wives and children of an employed man are not subject to his industrial hazards, but nevertheless, they could hardly escape the consequence. The Republic is embarking on expansions in industry and is attracting foreign capital to industrial interprises with the result that, within the foreseeable future, multiple industrial

occupations may step up unexpectedly and give rise to public health danger to an important group of the nation and its wealth. In consequence time is now opportune for the permanent appointment of Medical Officers in the field of Industrial Health in big cities, particularly in Khartoum and Atbara.

Nutrition.

The country is too wide and its sectors differ from one another in topographical and physico-geographical features which must inevitably be associated with seasonal fluctuations in food supplies. One area cannot be representative of another. Limited nutritional surveys carried out in the past in some confined localities described the main defficiencies that would likely arise from dietary pattern as of two kinds, caloric and vitamins, the latter particularly in respect of vitamin A,C and B. complex. In bad years outbreaks of scurvy, pellagra and polyhpovitaminosis syndromes are likely to occur. Generally speaking it would be fair to describe the nutritional status of the people as in every way marginal. In an appreciable number of epidemic and endemic diseases in this country it is by no means easy to exclude the etiological factor of malnutrition. The Kala-Azar epidemic in the Southern Fung could be offered as a practical example.

The most basic factor in personal hygiene is nutriton. It is wrong to think of food in terms of calories only but it is essential to understand the multitude of complex chemical and biochemical actions which together determine a healthy body and mind. The creative aim should, therefore, be directed towards what food to grow, what steps to take to improve their quality, to prepare and store them, how to distributed food according to bioligical needs and how to add valuable ingredients in special circumstances. It is therefore proposed to take inital steps to carry out a comprehensive nutritional survey throughout the country. Its functions will be the collection of data on the nutritional status of the people, their food habits and to examine the quality and nutritional value of food available. This survey will be the spearhead for the establishment of a Nutritional Institute which will work in close collaboration with other Ministries concerned in order to correlate and adapt the results of the survey to improve the quantity and quality of the food locally produced.

Milk is an essential nutrient to the bulk of the

populace and milk-borne disease not infrequently constitute serious and explosive outbreaks. Modern methods of securing safe and clean milk and making use of its by-products should be introduced. Industries are growing in the country and measures for food preservations and legislations again food adulteration and poisoning have to be established on technical grounds and protected by law.

Assessment of Health Status:

The present method of registration of birth and death is entrusted to Registrars of Births and Deaths who work in mother and child welfare centres situated in some, but not all, capitals of provinces. In a rural community it is carried out by medical assistants in dispensaries. Almost all notifications of births are reported by licenced midwives at localities where registration services are available. The notifications of deaths are erratic and unreliable and are recorded to a limited degree of accuracy in hospitals. Registration of births and deaths in required by law throughout the Republic. For the first time in the history of the country a proper population census was officially published in 1957 but there is need for more detailed information on vital and health statistics.

Vital statistics means statistics connected with the health and well-being of a community. It comprises more than the distribution and rate of occurrence of births, marriage, and deaths which deal with the size, structure, and forecasting of human population. The public health worker and the clinician need to know something about the incidence of different diseases in the different age groups and occupational groups, their etiology and behaviour in relation to social and economic and natural environments as well as the incidence of non-fatal illness, injuries and disabilities arising therefrom. It is an indirect measure of the health of the community and its component groups should be assessed against an international agreed scale or defined categories.

In the field of public health statistics are instrument of great value and an indispensable method in assessing the following :-

(a) to indentify improvements or deterioration of mortality rates over a period of time and to relate them to possible causes.

(b) to relate the incidence of deaths and diseases to social conditions, occupation and ways of living.

(c) to compare, in certain circumstances, the healthiness of one environment with another or the efficiency of one health service with another.

(d) to measure in a convincing way the level of achievements of any health services and the provision of knowledge upon which protective measures to safeguard the community are based and the consequent effective planning and developments in health and social services.

(e) to narrow the field of enquiry into specific causes of disease and thus to point the way to lines of research.

With the above objectives in view, a nucleus for a Vital and Health Statistical section is being created in the Headquarters of the Ministry of Health under the direct supervision of the Assistant Director, Public Health who has received an academic course in U.K. in the methods and organization on the subject. One statistical clerk was trained in the Internal Statistical Centre in Beirut. In addition two other statistical candidates have been sent to the same centre in Beirut. As regards provinces it is proposed to implement the following :-

(a) a statistical clerk shall be appointed with every Province Medical Officer of Health and

(b) a Hospital Record Officer with training in statistics should be appointed in every type "A" Hospital.

RELATIONS WITH THE WORLD HEALTH ORGANIZATION (W.H.O.) AND OTHER INTERNATIONAL AGENCIES:

W.H.O. was created in 1946 and its health activities are global in nature with about 88 independant states as full members besides associate members and observers from non-independant countries. For the sake of administration it has its H.Q. in Geneva and the rest of the world is divided into Regions and the Sudan comes under the Eastern Mediterranean Region whose H.Q. is at Alexandria.

W.H.O. relation with the Ministry of Health go back as far as 1948 when the Sudan representative sat as an observer in the meetings. In 1955 the Sudan

became an Associate Member and in 1956 attained full Membership. The Sudan is now a Member of the Executive Board of W.H.O. Since the establishment of such a link, W.H.O. has provided numerious fellowships for postgraduates and observational studies in various public health fields as well as for conferences abroad. Moreover, the following health projects which are operating at present in the country are being executed by the Ministry of Health in collaboration with W.H.O. and other International Agencies like the Technical Assistant Board (T.A.B.) and United Nations Children Fund (UNICEF) :-

a) Malaria Control Pilot Project.

b) Tuberculosis Control Demonstration and Training Centre.

c) B.C.G. Innoculation Projects for prophylactic measures against the spread of tuberculosis.

d) Nursing College.

e) Control of Sleeping Sickness.

The following future health projects are catered for in W.H.O. budgetary provisions for the calender years 1960 and 1961 :-

a) treatment and control of syphilis, gonorrhoea and yaws.

b) Onchocerciasis (Jur River Blindness) in the South.

c) treatment and control of communicable eye diseases.

d) treatment and control of leprosy.

e) eradication of small-pox.

f) establishment of a Cancer Institute with complete surgical, radiological and laboratory services for diagnosis and treatment.

g) a Rural Health Demonstration Centre at El Huda village in the Managil Extension of the Gezira Irrigated Area. This is to be part of a pilot scheme for community development and is projected to contain, in addition to health services, agriculture and horticulture centres and training place for social workers and village craftsmen, model housing for workers and schools.

h) It is planned to secure the services of a social paediatrician to advise on the development for health services.

i) Physiotherapy School in Khartoum Hospital for the the training of Sudanese Physiotherapists to be employed in province hospitals.

j) Dental Health Services. The construction of new buildings will start shortly adjacent to Omdurman Hospital for the training of dental assistants who will be attached to dental clinics and school health services.

k) Blood Bank, provision of buildings has been already catered for in Khartoum Hospital and the project will function soon.

l) Fellowships. A sum of £ 26,000 to be spent in the grant of fellowships.

RELATIONS WITH THE UNITED STATES MEDICAL RESEARCH UNIT.

The Ministry of Health and (NAMRU-3) have reached an agreement for establishing a laboratory at Malakal with the object of conducting research work into Kala-Azar in the endemic zones in Upper Nile Province. It is the hope to find out the vectors that transmit the disease and the best drugs for field treatment. The work will be initiated shortly and will continue for a period of at least three years.

Generally speaking this paper does not claim perfection in tackling all required future developments of Health Services. But it is aimed to pick out the most needed and urgent services and expand them within a future target of 5 years.

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Concluding Discussion

)r. Abdel Halim Mohamed stressed the difficulties of planning for long periods ahead. Are we to have a National Health Service?

)r. Ibrahim Ahmed Hussein: It is for the Director and Minister to convince all concerned to give and accept health education. How are we to get enough doctors and how will the Ministry of Health attempt the necessary increase. We should use the money available to consolidate the most urgent immediate problems before embarking on such an ambitious plan for which sufficient money may not be available. This failed in 1957.

)r. Mamoun Sherif : In respect of the Tuberculosis Services there should be :-

1. establishment of specialist laboratories.
2. more emphasis on T.B. clinics. These are the centres for all T.B. activities.
3. health education of school children should include prevention of T.B.

)r. Zein El Nail: The proportion of antenatal clinics is not in proportion to the number of antenatal beds. There should be increase in hospital maternity services rather than antenatal clinics.

)r. Abdulla Hidayatalla. There is a chronic scarcity of doctors and the total is about 180. Production will not rise above 50 a year and this rate will take 100 years to reach standards of Europe. Should we increase non-medical personnel ?

)ayed Abdel Hamid Ibrahim. What is the role of the private practitioner ? Is it within the scope of the Ministry's plan to encourage private practise and stimulate the influence of the private practitioner on public health ? I would have liked to have heard of any such plans.

:. Mamoun Yousif : Referring to Dr. Hadi's table of health expenditure, the change in value of money does not invalidate the ratio of total revenue to health expenditure. Also, we do not need such a high standard of medical qualification.

)del Rahman Mohamed Musa : The standard of qualification is not too high and the Sudan Medical Council should soon be appointed to guard the standard.

:. Ahmed Ali Zaki in reply : Are we to consolidate or expand. I would expect to see a normal development since we are only striving to get the maximum basic needs. The research laboratories are to be developed. Maternity beds to be increased in Omdurman and special hospitals in Wad Medani, El Obeid and El Fasher. Medical manpower must be supported by medical assistants for a long time to come. The Ministry of Health is responsible for private practitioners throughout the country. Sudan Medical Council was approved some 4 years ago and hope it will materialise soon.

The President, Professor J.H.G. Lebon then expressed his thanks and those of the Society to all concerned in producing such a successful conference.

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APPENDIX 1.

THE EXPENDITURE ON HEALTH AS RELATED TO THE REVENUE OF THE WHOLE COUNTRY

YEAR	REVENUE OF THE COUNTRY	EXPENDITURE APPROVED FOR HEALTH SERVICES.
1924	Ls. 4,298,856	Ls. 99,186
1925	4,866,883	108,143
1926	5,857,889	134,998
1927	5,929,944	159,795
1928	6,646,833	182,391
1929	6,981,590	231,294
1930	4,693,623	257,473
1931	4,398,618	315,543
1932	3,853,798	253,701
1933	3,631,552	236,821
1934	3,774,911	230,204
1935	4,098,413	242,502
1936	4,462,309	267,598
1937	4,748,302	272,703
1938	5,131,635	286,612
1939	5,053,765	296,026
1940	4,632,351	308,639
1941	5,379,277	294,292
1942	5,814,165	320,598
1943	5,861,944	375,835
1944	6,578,769	399,631
1945	7,763,078	481,886
1946	8,288,985	577,595
1947	10,141,495	767,331
1948	12,697,809	827,140
1949	19,172,548	928,352
1950-51	41,867,359	1,776,865
1951-52	46,299,658	1,575,573
1952-53	30,295,657	2,213,751
1953-54	35,436,422	2,416,911
1954-55	38,110,530	2,663,846
1955-56	36,000,000	2,607,560
1956-57	38,000,000	2,789,065
1957-58	46,000,000	3,346,605
1958-59	39,000,000	3,455,630
1959-60	43,000,000	3,881,060

APPENDIX 2

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From data supplied by Dr. Mansour Ali Haseeb, Director, Stack Laboratory

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