

AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON, D. C. 20523  
**BIBLIOGRAPHIC INPUT SHEET**

FOR AID USE ONLY

Batch 84 ARDA

1. SUBJECT CLASSIFICATION	A. PRIMARY Health	ND00-0000-G146
	B. SECONDARY Health delivery--Sudan	

2. TITLE AND SUBTITLE  
Health sector assessment team, Sudan

3. AUTHOR(S)  
(101) Medical Service Consultants, Inc., Arlington, Va.

4. DOCUMENT DATE 1977	5. NUMBER OF PAGES 386p.	6. ARC NUMBER ARC
--------------------------	-----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS  
Med. Serv.

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)

9. ABSTRACT

The purpose of the A.I.D. health sector assessment team visit to the Sudan was to review the recently formulated National Health Plan, to assess the resources and needs of the program, and to develop a strategy for possible A.I.D. assistance that would help the Government of Sudan (GOS) achieve its goal of strengthening delivery of rural health services over the next seven year development period. This report reviews health resources of the GOS against the backdrop of that country's major health problems and suggests ways in which A.I.D. assistance should serve to strengthen health infrastructure and improve delivery of rural health services. The report is presented in eight parts: introduction, background, national health policies and priorities, health sector resources, major health problems, and programs, program constraints, and recommendations for A.I.D. assistance strategy. The appendices include persons and places visited, a survey report on drugs, medical supplies and equipment, and a bibliography. The assessment team stresses that GOS requirements for successful implementation of its rural health programs are of such magnitude that assistance will be necessary from a number of major international donors. Such multi-donor assistance will require careful coordination to assure maximum impact within the capability of the GOS to absorb external assistance. It is proposed that a three member country health team be established in the A.I.D. Affairs office, Khartoum.

10. CONTROL NUMBER PN-AAF-613	11. PRICE OF DOCUMENT
----------------------------------	-----------------------

12. DESCRIPTORS AID Assessments Health services National planning Project planning	Strategy Resources Sudan Rural areas Sector analysis	13. PROJECT NUMBER 698013500
		14. CONTRACT NUMBER AID/afr-C-1133 GTS
		15. TYPE OF DOCUMENT



# MEDICAL SERVICE CONSULTANTS, INC.

1500 WILSON BOULEVARD, SUITE 1105 • ARLINGTON, VIRGINIA 22209 • 703-525-8310

REPORT  
OF THE  
HEALTH SECTOR ASSESSMENT TEAM  
SUDAN

Prepared for:

Africa Bureau  
Agency for International Development  
Washington, D. C.

MEDICAL SERVICE CONSULTANTS, INC.  
1500 Wilson Boulevard  
Suite 1105  
Arlington, VA 22209  
U.S.A.

September 5, 1977

# MEDICAL SERVICE CONSULTANTS, INC.

1500 WILSON BOULEVARD, SUITE 1105 • ARLINGTON, VIRGINIA 22209 • 703-525-8310

September 5, 1977

## ACKNOWLEDGMENT

The Health Team would like to thank the staff of the Government of Sudan Ministry of Public Health and USAID/Sudan for their help and assistance during the Team's stay in Sudan.

Edward Cross, M.D.  
George Contis, M.D.  
Joseph Hackett  
Norman Holly  
Robert Lennox, Sc.D.  
Harvel Sebastian  
Alton Wilson  
John Wooten

This report was prepared pursuant  
to Contract No. AID/afr C-1133.

SUDAN  
HEALTH SECTOR ASSESSMENT  
CONTENTS

<u>Part</u>		<u>Page</u>
I	INTRODUCTION	I-1
	A. Purpose of Team Visit	I-1
	B. Structure of the Report	I-5
II	BACKGROUND	II-1
	A. Population and Demographic Data	II-1
	B. Economic Development and Social Data	II-31
	C. Social Analysis	II-43
III	NATIONAL HEALTH POLICY, PRIORITIES AND ORGANIZATIONAL STRUCTURE	III-1
	A. National Health Policy and Priorities	III-1
	B. Organization, Operation and Infrastructure of Health System	III-5
IV	RESOURCES FOR THE HEALTH SECTOR	IV-1
	A. Health Manpower and Training Resources	IV-2
	B. Health Facilities	IV-16
	C. Financial and Budgetary Resources	IV-22
	D. Other Donor Support	IV-29
V	MAJOR HEALTH PROBLEMS	V-1
	A. Maternal and Child Health Problems	V-1
	B. Communicable and Infectious Diseases	V-18

C.	Major Endemic Diseases/Environmental Health Problems	V-21
D.	Socio-Cultural and Attitudinal Problems	V-34
E.	Health Manpower Problems	V-50
F.	Facilities and Infrastructure	V-59
VI	MAJOR PROGRAMS OF NATIONAL HEALTH PLAN	VI-1
A.	Primary Health Care Plan	VI-1
B.	Maternal and Child Health Program	VI-5
C.	Endemic Disease Control Programs	VI-10
D.	Rural Water Supply and Environmental Health Programs	VI-24
E.	Nutrition Program	VI-27
F.	Manpower Development Program	VI-31
VII	CONSTRAINTS TO IMPLEMENTATION	VII-1
A.	Overview	VII-1
B.	Manpower Constraints	VII-9
C.	Infrastructure/Absorptive Capability	VII-11
D.	Financial and Economic Constraints	VII-14
E.	Communications and Data Systems Constraints	VII-27
F.	Logistics and Supply Constraints	VII-29
G.	Constraints to Implementation of the MCH/FP Program	VII-32
H.	Environmental Health Constraints	VII-35

VIII	RECOMMENDATIONS FOR AID ASSISTANCE STRATEGY	VIII-1
A.	General Discussion	VIII-1
B.	AID Assistance Strategy	VIII-3
C.	Alternate Strategies	VIII-8
D.	Possible Areas of Program Assistance	VIII-11
E.	Urgency of Donor Assistance	VIII-17
IX	APPENDIX SECTION	
A.	Persons Seen and Places Visited	
B.	Survey Report: Drugs, Medical Supplies, Equipment	
C.	Addendum to Social Analysis, Part II,e.	
D.	Bibliography: Principal References	

## I. INTRODUCTION

AID HEALTH SECTOR ASSESSMENT-SUDAN-1977I. INTRODUCTIONA. Purpose of the Team Visit1. Summary of Purpose

The purpose of the team visit to the Sudan during June 15 - July 10, 1977, was to review with the GOS Ministry of Health its recently formulated National Health Plan, to assess the resources and needs of the program, and to develop a strategy for possible AID assistance that would help the GOS achieve its goal of strengthening delivery of rural health services over the next seven-year development period, 1977 - 1984.

2. Events Preceding the Visit

The GOS Ministry of Health, in cooperation with the World Health Organization, developed the National Health Plan in 1975, followed in 1976 by two companion documents - one a Primary Health Care Program (PHCP) for the four regions of the North, and a second PHCP for the Southern Region.\* It was evident that implementation of the ambitious plans would require resources beyond the capability of the GOS to provide them.

During October 1976, the GOS hosted an International Donors Conference in Khartoum to review the Primary Health Care Plan and to solicit technical and financial support for its implementation.

\* Separate plans for the North and the South were drafted to take into account fundamental political, administrative and socio-economic/cultural differences of the two regions.

AID was represented at that conference, along with representations from a number of international and national donor organizations. Most of the donors expressed interest in and support of the PHCP, but were unable to make specific commitments. On recommendation of the AID representative, a Health Sector Assessment Team was formed to visit the Sudan and develop an AID strategy proposal.

### 3. Team Composition

Team Leader	:Edward Cross, AFR/DR/HN
Maternal and Child Health/ Family Planning Specialist	:George Contis, Medical Service Consultants, Inc.
Health Logistics Specialist	:Joseph Hackett, U.S. Public Health Service
Health Economist	:Norman Holly, PPC/PDA
Epidemiologist	:Robert Lennox, American Public Health Association
Anthropologist	:Harvel Sebastian, AID Consultant
Health Manpower Specialist	:Alton Wilson, Medical Service Consultants, Inc.
Project Design Officer	:John Wooten, AFR/DR/ESAP

### 4. The Schedule

On arrival in Khartoum, the Team\* met as a group with the Under-Secretary of the Ministry of Health, his program directors and other key staff. MOH staff were assigned according

\* Three members of the Team - the Health Economist, Health Logistics Specialist and Project Design officers joined the other five midway in the visit. The Health Logistics specialist remained in Khartoum through July 25 to complete his review of the medical/pharmaceutical supply services. His detailed report is included in this document as Appendix C.

to their program disciplines to work with individual members of the team in the subsequent program review and discussion.

The five members of the Team concerned with review of program activities made two field trips together - the first to Wad Medani, Gezira Province, to see training and service facilities, and the second to Juba, capital of the Southern Region, to discuss the program with the Minister of Health of the Southern Region and his staff. While in Juba, the Team visited a nearby training center for Community Health Workers.

On return to Khartoum, two members of the Team - the anthropologist and health manpower specialist - visited El Obeid, North Kordofan Province, to observe training programs and to discuss socio-cultural aspects of the Region, which includes large areas populated mainly by Nomadic tribes.

Persons seen and places visited are listed in Appendix A.

##### 5. Rationale for Visit

The basic reference for the Team's Task was that objectives and goals of the GOS National Health Plan were

deemed to be consistent with the long-range AID strategy of assisting African governments to implement rural delivery systems of their national health plans. Congressional and Administrative Mandates regarding AID's health sector involvement have placed priority on program assistance designed to help meet health needs of the rural poor.

Thus, the assessment report reviews health resources of the GOS against the backdrop of that country's major health problems and suggests ways in which AID assistance should serve to strengthen health infrastructure and improve delivery of rural health services. The Team can only stress that GOS requirements for successful implementation of its rural health programs are of such magnitude that assistance will be necessary from a number of major international donors. Such multi-donor assistance will require careful coordination to assure maximum impact within the capability of the GOS to absorb external assistance.

Given the broad scope of the project, the size of the proposed AID inputs, and the need for close coordination of the various components, it is proposed that a three-member country health team be established in the AID Affairs office, Khartoum. The team would consist of 1) a senior public health specialist, 2) an MCH/FP nurse/nurse-midwife, and 3) a (health) program officer. Their functions are described in Part VIII - Recommendations.

## B. Structure of the Report

The health sector assessment report is presented in the following parts:

Part I, INTRODUCTION: deals with the general background for the Team review - purpose of the visit, events preceding the visit and the Team's schedule in the Sudan.

Part II, BACKGROUND: describes the demographic, social and economic milieu in which changes in the Sudan's health sector are expected to take place.

Part III, NATIONAL HEALTH POLICIES AND PRIORITIES: reviews the GOS policies and priorities stated in the National Health Plans and its two companion documents - the Primary Health Care Plan for the four northern Regions, and the similar PHCP for the Southern Region.

Part IV, HEALTH SECTOR RESOURCES: deals with GOS manpower, facility and financial resources available for expansion of its rural health delivery system. Information available to the Team on current external donor support is noted.

Part V, MAJOR HEALTH PROBLEMS: includes six subsections dealing with health problems in 1) Maternal and Child Health, 2) communicable and endemic diseases, 3) major endemic diseases and environmental health factors underlying occurrence of those diseases, 4) socio-cultural and attitudinal factors, 5) health manpower, and 6) facilities and infrastructure.

Part VI, MAJOR HEALTH PROGRAMS: deals with the same areas noted in Part V - Major Health Problems.

Part VII, PROGRAM CONSTRAINTS : deals with major obstacles confronting the GOS in the implementation of its proposed Primary Health Care Plan.

Part VIII, RECOMMENDATIONS for AID Assistance Strategy: The Team proposes comprehensive health sector assistance designed to assist the GOS in strengthening its health infrastructure, in developing health manpower, and in expanding an integrated rural health delivery system. The Team also recommends AID participation in a multi-donor program to assist the GOS in control of malaria and other major endemic diseases.

Part IX, APPENDICES

- A. Persons seen and places visited
- B. Survey Report: Drugs, Medical Supplies and Equipment
- C. Addendum to Social Landscape, Part II, C
- D. Bibliography: Principal References

## II. BACKGROUND



## II. BACKGROUND

### A. Population and Demographic Data

#### 1. General Description

##### a. Geography and Climate

The Democratic Republic of Sudan (DRS) is the largest country in Africa, covering more than 2.5 million square kilometers. It is located in the northeastern portion of the African continent, extending between latitude  $4^{\circ}\text{N}$  and  $22\frac{1}{2}^{\circ}\text{N}$ , and shares borders with eight (8) African countries: (Egypt, Libya, Central African Empire, Chad, Zaire, Uganda, Kenya and Ethiopia). Additionally, it has 640 kilometer coastline along the Red Sea.

The terrain is mostly flat, except for some hills in the southeastern, northeastern and westernmost areas of the country. The flat areas of the country consist of clay plains, savannahs and rain forests (Southern Region) and desert areas for the most part. The Nile Rivers (White and Blue) traverse the country, flowing from South to North, with the Blue and White Nile Rivers joining at Khartoum and flowing northward as the single Nile River.

Sudan possesses a tropical climate for the most part, with an equatorial climate in the South and an arid, desert climate in the North. Temperatures are usually high during most of the year, with the highest daily mean temperature of  $109^{\circ}\text{F}$  ( $43^{\circ}\text{C}$ ) occurring in the North during May and June. During the winter months the mean temperature varies from approximately

60°F (16°C) in the North to 86°F (29°C) in the South.

The annual rainfall during normal years averages from as low as 25mm. in the northern desert areas to a high of up to 2,000mm. in the tropical rain-forest areas of the South. With the exception of the equatorial south, the rainy season lasts from one to three months in Sudan, occurring as a rule between July and September.

The DRS may be divided into several horizontal belts, extending from east to west, upon the basis of vegetation patterns. The northernmost zone extends from the Egyptian border south to L. 17°N and is truly desert, without vegetation except in the basin areas. The next (narrow) zone, L. 17°N and 16°N, is a semi-desert area, with Acacia trees and scrubland. The Central Zone, lying between Khartoum (16°N) and L. 10°N, consists of short grass vegetation and low wooded savannahs for the most part. This zone possesses a number of watercourses, including the White and Blue Nile rivers, and is the locus for various irrigated development schemes. As a result of these schemes, agricultural development has made this zone more economically developed than any other part of the country. The southernmost zone, which extends southward from L. 10°N to the southern border of the country, consists of a vast swampland (SUDD), tall swamp grasses and tropical rainforests for the most part.

#### b. Political Structure

Politically and legislatively speaking, the DRS has a type of socialist government and has a president with

the usual cabinet officers. Sudan has only one political party, the Sudan Socialist Union (SSU), with the President being its leader. The People's Assembly is the main legislative body. Administratively and politically the country is divided into five (5) Regions, and is further divided into 18 Provinces (12 in the Northern Regions and 6 in the Southern Regions)\*. The Chief Administrative Officer of the Province is the Provincial Commissioner, who has Assistant Commissioners on his staff for the major sectors.

The Southern Region is different from the other four (4) Regions, in that it functions in many respects as a parallel division of the National Government, or, in essence, as a semi-autonomous division of the National Government. This dual administrative structure was the product of President Nimeri's efforts to reunite the country (Addis Ababa Agreement - 1972) after approximately 17 years of civil strife.

#### c. Socio-Economic Status

From a socio-economic standpoint, the DRS ranks among the twenty-five (25) most severely affected (MSA) developing countries of the world. The Gross Domestic Product (GDP) per capita is estimated to be approximately LS 40/annum (LS1=U.S.\$2.51). The Agricultural sector contributes

\*North: Nile, Shamalia, Khartoum, Blue Nile, White Nile, Gezira, Red Sea, Kassala, North Kordofan, South Kordofan, North Darfur, South Darfur.

South: Upper Nile, Jonglei, Bahr el Ghazal, Boheirat Lakes, East Equatoria, West Equatoria.

more than any other sector (approximately 50%) to the GDP. Other sectors of major contribution are: Commerce and hotels (16%); Government Services (15%); mining and manufacturing (8%); and transport and commerce (8%).

#### d. Health

From a health standpoint, Sudan suffers from the same problems which affect most tropical developing countries in Africa. These are: major endemic diseases and environmental health problems; communicable and infectious diseases; malnutrition and lack of safe water supply; and maternal and child health problems primarily related to fertility factors.

From an infrastructure standpoint, major problems in the health sector are related to shortage and maldistribution of health manpower and facilities; deficiencies in budgetary resources; and lower priority placed on health, in relation to the overall development program.

There are 18 health administrative divisions (provincial), 12 covering the four Northern Regions, under the Ministry of Health, Khartoum, and 6 in the south; coordinated by the Ministry of Health for the Southern Region, Juba.

## 2. Demographic Data

### a. Census

Two censuses have been conducted in Sudan, one in 1956 and the other in 1973. As yet, much of the data from the 1973 census has not been collated. Consequently, statistics on population projections, population density, distribution of population by provinces, urban/rural/nomadic distribution, and

average household size are estimates derived from preliminary results. Further, the distribution of population by age and sex for the whole country is an estimate based on the United Nations model for stable populations.

b. Vital Statistical Registration

There is a great deal of under reporting of births and deaths in Sudan. In 1973, the registration varied from 7% in some provinces to 100% in Khartoum (see Table II-1). Most of the registered births are in urban areas where deliveries and registration are done by trained midwives.

In 1972, the Births and Deaths Registration ordinance was passed but its enforcement is not universal. Only 129,258 births were registered in 1973, and it is estimated that this represents only about 17.7% of total births.

c. Population

According to the 1973 Census, Sudan has a population of 14,902,894. This figure is an estimate based on preliminary 1973 Census results performed by the Department of Statistics in 1975.

The estimated age and sex distribution for Sudan is shown on Table II-2, and the geographic distribution of the total population by province is shown in Table II-3. As will be described below, the population in some provinces may be significantly affected by seasonal migration (e.g. Gezira). It should be noted that in 1973 when the Census was performed, Sudan was divided in 12 provinces.

TABLE II-1

Comparison of Estimated &amp; Registered births 1971.

PROVINCE	Estimated No. of Births	Registered No. of Births	Percentage
Khartoum	377098	27738	73.5%
Blue Nile	1366192	23544	17.0%
Northern	46053	3306	7.0%
Kassala	66939	13395	20.0%
Kordofan	115206	9390	8.0%
Darfur	68847	4588	7.7%

Source: Mcdawi, Osman: Evaluation of Maternal Care in the Sudan;  
 Proceedings of the Third Congress of Obstetrical Gynecology,  
 Khartoum, April, 1973, p. 26.

TABLE II-2

ESTIMATED POPULATION BY SEX AND AGE GROUPS IN 1973,74

AGE GROUP	Total	Males	Females	% of both sexes
0 -- 4 ...	3,135,220	1,587,510	1,547,710	18.6
5 -- 9 ...	2,442,279	1,237,575	1,204,704	14.5
10 -- 14 ...	2,053,556	1,041,270	1,012,286	12.2
15 -- 19 ...	1,732,437	879,105	853,332	10.3
20 -- 24 ...	1,470,556	751,080	719,476	8.7
25 -- 29 ...	1,242,308	631,590	610,718	7.4
30 -- 34 ...	1,030,961	520,635	510,326	6.1
35 -- 39 ...	861,951	435,285	426,666	5.1
40 -- 44 ...	718,377	367,005	351,372	4.2
45 -- 49 ...	591,535	298,725	292,810	3.5
50 -- 54 ...	481,594	238,980	242,614	2.8
55 -- 59 ...	388,554	187,770	200,784	2.3
60 -- 64 ...	295,683	145,095	150,588	1.7
65 -- 69 ...	211,178	102,420	108,758	1.2
70 -- ...	244,811	110,955	133,856	1.4
TOTAL	16,901,000	8,535,000	8,366,000	100.0

Source: Age distribution estimates based on United Nations  
 Model for Stable Population. All total age figures  
 are from the Sudan's Five Year Plan of Economic and  
 Social Development (Amended) 1970/71, 1974/75

TABLE II-3  
GROSS AND ADJUSTED POPULATION DENSITY IN REGIONS AND PROVINCES OF SUDAN OF  
1955/56 and 1973

Region and Province	Population in Thousands		Land Area Thousands of (sq. Km.)		Inhabitants per square Kilometers of Land			
	1955/56	1973	Gross	Adjus- ted	1955/56		1973	
					Gross	Adjus- ted	Gross	Adjus- ted
Sudan .. ..	10,263	14,902	2,506	2,172	4.1	4.8	5.9	6.9
North-East .. ..	3,616	6,569	504	498	7.0	7.1	13.0	13.2
Blue Nile .. ..	2,070	3,813	142	136	14.6	15.2	26.9	28.0
Kassala .. ..	941	1,588	341	341	2.8	2.8	4.7	4.7
Khartoum .. ..	505	1,168	21	21	24.0	24.0	55.6	55.6
North-West .. ..	3,964	5,382	1,354	1,026	2.9	3.9	4.0	5.2
Darfur .. ..	1,329	2,181	596	374	2.7	3.6	4.4	5.8
Kordofan .. ..	1,762	2,202	381	381	4.6	4.6	5.8	5.8
Northern .. ..	873	999	477	271	1.8	3.2	2.1	3.7
South .. ..	2,784	2,951	648	648	4.3	4.3	4.6	4.6
Bahr el Ghazal .. ..	991	1,397	214	214	4.6	4.6	6.5	6.5
Equatoria .. ..	904	798	198	198	4.6	4.6	4.0	4.0
Upper Nile.. ..	889	756	236	236	3.8	3.8	3.2	3.2

-- N.B. Excluding uninhabited areas amounting to 6000 sq. kilometers in Blue Nile Province (game reserve). 122,000 in Darfur Province and 206,000 in Northern Province

Source: Department of Statistics, 1975

With respect to the Southern region, there are several reasons to conclude that the actual population may differ markedly from the estimate provided by the census, including:

- at the time of the census, Southerners were still returning from refuge in neighboring countries; and
- during civil strife, accurate records were not maintained in the South;
- technical problems such as illiteracy and inadequate training of some of the interviewers may have resulted in reporting errors.

#### Demographic Indicators

##### 1) Crude Birth Rate

The MOH Department of Statistics believes that the crude birth rate for 1973 was between 48 to 50 live births per 1,000 population.

The 1975 UN Demographic Yearbook estimates the crude birth rate at 47.8 live births per 1,000 population.

More recent estimates of the crude birth rate calculated by the Department of Statistics in the provinces of Khartoum, El Gezira, Kordofan and Kassala indicate that the crude birth rate may be as low as 40 per 1,000. This is only a preliminary calculation and a more accurate figure will be available in October, 1977.

For planning purposes, however, the Ministry of Health uses the figure of 49 live births per 1,000 population.

## 2) Crude Death Rate

The Department of Statistics estimates the 1973 crude death rate to be between 20 to 25 deaths per 1,000 population.

According to the 1975 U.N. Demographic Yearbook, the crude death rate is 17.5 deaths per 1,000 population

More recent estimates from the Department of Statistics give a crude death rate of 18 per 1,000 for Khartoum, Kassala, El Gezira, and Kordofan Provinces. This is only a preliminary calculation, however, and a final figure is expected in October 1977.

A crude death rate of 24 per 1,000 is used by the Ministry of Health for planning purposes.

### Crude Natural Rate of Increase

Using the Department of Statistics figure, the crude rate of natural increase is 2.5%. This rate is utilized for planning purposes by the Ministry of Health.

The U.N. Demographic Yearbook estimates the natural rate of increase to be 3.03% in 1975.

If the more recent calculations for the four Provinces (Khartoum, Kordofan, Kassala and El Gezira) are used, an even higher crude natural rate of increase is obtained (3.2%).

The accuracy of these figures is limited given the fact that they are derived from estimated birth and death rates. Further, external migration has not entered into the estimates, although this factor is small.

#### 4) Infant Mortality

The Department of Statistics estimates the infant mortality rate to be between 135 to 145 infant deaths per 1000 live births for the country as a whole. For Khartoum alone, the rate is estimated to be less than 100.

Estimates for infant mortality also range from 93.6 (U.N. Demographic Yearbook for 1975) to 123.6 (WHO)

For planning purposes, the Ministry of Health uses a figure of 140 per 1,000 live births.

#### 5) Life Expectancy at Birth

For males, life expectancy at birth is 47.3 years and for females it is 49.9 years (U.N. Demographic Yearbook for 1975).

#### 6) Life Expectancy at One Year

For a child that has survived to the first year of age, life expectancy is 59 years. This figure was calculated using Model Life tables from Ansley J. Coale and Paul Demeny's Regional Model Life Tables and Stable Populations, Princeton, N.J., Princeton University Press, 1966.

#### e. Population Density

By comparing the two censuses (1956 and 1973), it can be seen that the population density increased from 4.1 to 5.9 persons per square kilometer during a 17 year period.

These figures, however, include large uninhabited desert areas in the Darfur and Northern Provinces (328,000 square Kilometers), and the considerable smaller game reserve area in the Blue Nile (6,000 square kilometers). If

these uninhabited regions are excluded from the calculations, the population density was 4.8 and 6.9 persons per square kilometer for the years 1956 and 1973 respectively. (See Table II-3).

Although the Sudan is, overall, one of the least densely populated countries in the world, the regional variations lead to heavy density in some areas. Approximately 44% of the population lives on 23% of the land (Blue Nile, Kassala and Khartoum Provinces).

The most extensive areas of high density, centering on the confluence of the Nile, extends southeastward to the Ethiopian border and southwestward into the Nuba mountains, and the farm areas around El Obeid and into the middle of Kordofan Province. The areas of lesser population density are in the swampy (SUDD) region of the south, and the barren desert and arid savanna of the west.

#### f. Population Projections

The Department of Statistics has made population projections to the year 1984 for the Northern and Southern regions of Sudan, using the previously described 2.5% crude rate of natural increase. These projections are shown on Table II-4.

Using the 2.5% rate of natural increase, it is estimated that Sudan's population will rise from an estimated 16 million in 1977 to almost 19 million by 1984. As noted previously, the 2.5% growth rate may be low.

TABLE II-4

TENTATIVE POPULATION PROJECTIONS IN SUDAN BY REGIONS AND FOR  
THE YEARS 1974-1985 IN THOUSANDS

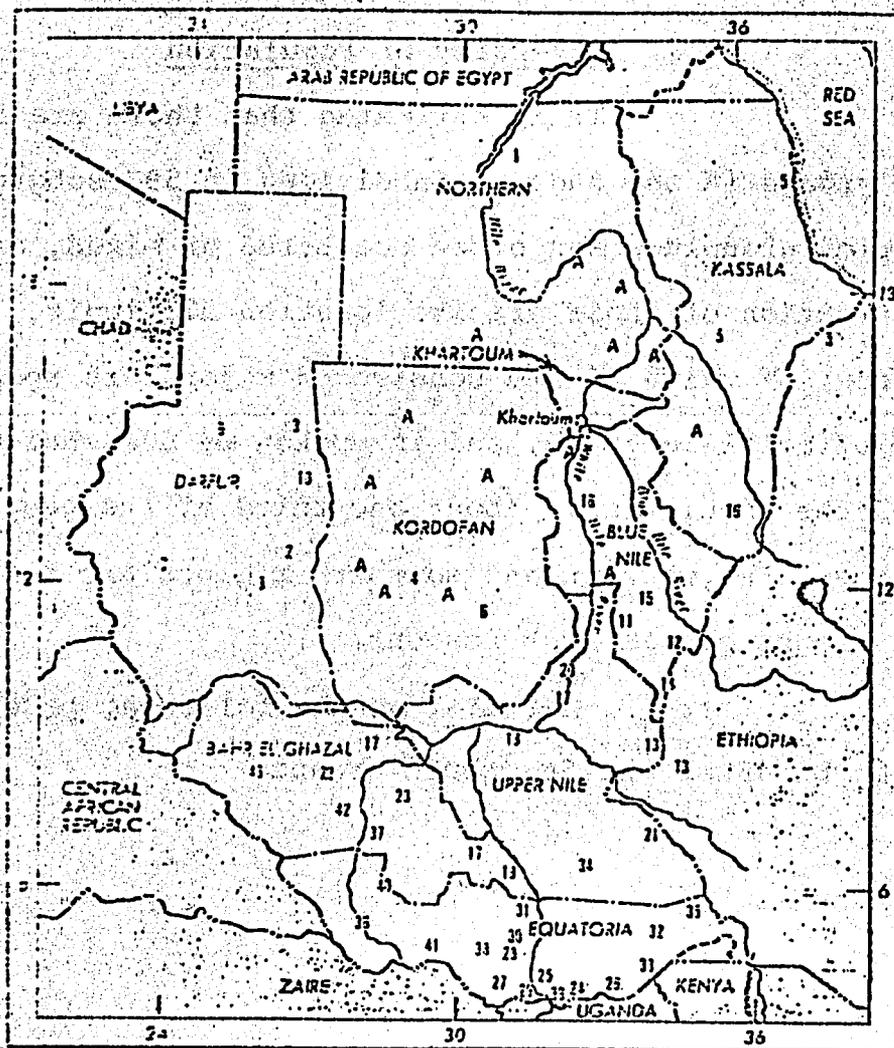
YEAR (1)	NORTH (2)	SOUTH (3)	SUDAN (TOTAL)
1974	12258	2969	15 227
1975	12569	2981	15 550
1976	12888	2994	15 882
1977	13216	3008	16 224
1978	13551	3023	16 574
1979	13895	3040	16 935
1980	14248	3061	17 309
1981	14610	3087	17 697
1982	14981	3120	18 101
1983	15362	3161	18 523
1984	15752	3211	18 963

- (1) Fiscal Year starting 1st July
- (2) At the rate of 2.5% growth each year. North includes 9 out of the 12 Provinces. The remaining three Provinces are Equatoria, Upper Nile and Bahr el Ghazal. (Since these estimates were calculated in 1975, the Sudan has been redivided into 12 provinces for the North and 6 for the South.)
- (3) At the rate of growth not exceeding 0.554 till 1979 and not exceeding 2% till the end of the period 1984.

g. Diversity of Population

It is estimated that there are 56 separate ethnic groups in the Sudan. Subdivided in 597 subgroups, these population groupings are often scattered or mixed, making the identification of their precise location difficult. 115 different languages, of which 26 are considered major, are spoken. Arabic is the official language, and is spoken by somewhat more than half of the population. About one-third of the people of Sudan are Arabs. The western and southern regions are dominated by tribal groups of non-Arab descent.

Map II-1 on the following page shows the location of 43 of the 56 ethnic groups.



A	Arabs	15	Gule	30	Nyangbara
1	Nubians	16	West Africans	31	Mandari
2	Berkid	17	Dinka	32	Toposa
3	Midob	18	Nuer	33	Didinga
4	Hill Nubians	19	Atuot	34	Beir
5	Baja	20	Shilluk	35	Murle
6	Nuba	21	Anuak	36	Azande
7	Fur	22	Thuri	37	Belanda
8	Daju	23	JoLuo	38	Moru
9	Zaghawa	24	Acholi	39	Madi
10	Berti	25	Bari	40	Bongo
11	Ingassana	26	Lotuko	41	Baka
12	Berta	27	Kakwa	42	Ndogo
13	Koma	28	Pojulu	43	Feroge
14	Uduk	29	Kuku		

Figure 7. Principal Ethnic Concentrations in Sudan, 1972

(from Nelson, Area Handbook, p. 72).

#### h. Distribution of the Population

The distribution of the population is shown in Table II-5. It should be noted that this table is based on preliminary 1973 census data. Also, the figures are apportioned to 12 provinces, the number that were designated when the estimates were calculated in 1975.

TABLE II-5

#### DISTRIBUTION OF THE TOTAL POPULATION BY PROVINCE IN 1973

<u>Province</u>	<u>Population</u>	<u>%</u>
Khartoum	1,168,169	7.8
Blue Nile	969,474	6.5
White Nile	978,018	6.6
Gezira	1,865,499	12.5
Northern	998,883	6.7
Red Sea	465,043	3.1
Kassala	1,123,387	7.5
Kordofan	2,202,346	14.8
Darfur	2,181,161	14.6
Bahr El Ghazal	1,396,913	9.4
Upper Nile	798,251	5.4
Equatoria	755,750	5.1
<b>TOTAL</b>	<b>14,902,894</b>	<b>100.0</b>

Source: Department of Statistics, 1975. Estimates based on Preliminary 1973 Census results.

i. Distribution of Population by Age and Sex Group

The age and sex distribution of the total population has not yet become available from the 1973 census. However, distribution by age group alone is available for four provinces (Khartoum, Red Sea, Equatoria and Northern). This distribution is shown in Table II-6. The data from the four provinces are affected significantly by internal migration between provinces, and are not representative of the whole of Sudan

TABLE II-6

## PERCENTAGE DISTRIBUTION OF POPULATION BY AGE FOR FOUR PROVINCES IN 1973

<u>Age Group</u>	<u>Red Sea</u>	<u>Equatoria</u>	<u>Northern</u>	<u>Khartoum</u>
Under 1	2.17	3.13	2.92	3.17
1 - 4	12.56	13.03	13.80	3.15
5 - 9	16.68	15.07	16.74	14.82
10 - 14	10.49	9.97	14.04	11.19
15 - 19	7.80	8.95	9.58	10.60
20 - 24	7.39	7.37	5.90	10.24
25 - 29	8.83	9.37	6.37	9.82
30 - 34	7.38	6.88	4.96	6.38
35 - 39	7.06	7.51	5.53	5.96
40 - 44	5.42	4.77	4.10	3.95
45 - 49	3.85	4.77	3.28	3.00
50 - 54	1.70	1.98	1.72	1.36
55 - 59	1.81	1.57	2.18	1.44
60 - 64	0.86	1.09	1.20	.78
65 - 69	1.30	.59	2.15	.83
70 - 74	1.40	(75-79) .37	(75-79) .95	.88
75 -		.20	.51	
80 - 84		.39	.72	
85 -		.04	.01	
Not stated	.01			0.08

Source: Department of Statistics, 1975. Estimates based on preliminary 1973 Census results.

j. Urban Rural and Nomadic Distribution of  
Population by Province

The Population Census Technical Committee of the Department of Statistics uses the following definitions for urban, rural and nomadic population:

Urban - "The urban population includes all towns with a population of 5,000 or more, together with localities of certain administrative and commercial importance."

Rural - "The rural population includes all people leading a settled life throughout the year who do not live in urban areas defined above."

Nomadic - "The nomadic population includes all people who lead a continuous, traditional nomadic life, that is, they have no permanent home and move from place to place living in tents or other temporary housing which they often carry with them. They keep animals and usually move to find grass and water for them."

However, some tribes are semi-nomadic, maintaining a fixed settlement where the old and some of the tribe remain year-round, while the rest migrate with their cattle.

Preliminary data regarding the urban, rural or nomadic distribution of the population by province is shown in Table II-7.

Khartoum Province has the highest urban population (72.8%), Upper Nile Province has the highest rural population (95.3%) and Red Sea Province has the largest nomadic population (35.7%).

In terms of urban-rural differences, approximately 18% of the Sudan's population lives in towns of

TABLE II - 7

## URBAN, RURAL, NOMADIC DISTRIBUTION OF POPULATION BY PROVINCE IN 1973

PROVINCE	URBAN		RURAL		NOMADIC	
	No.	%	No.	%	No.	%
Khartoum	850,395	72.8	262,778	22.5	54,996	4.7
Blue Nile	141,020	14.5	7,8348	74.1	110,106	11.4
White Nile	154,669	15.8	692,101	70.7	131,248	13.4
Gezira	213,430	11.4	1,644,984	88.2	7,085	0.4
Northern	169,199	16.9	736,519	73.7	93,165	9.7
Red Sea	169,083	36.4	129,722	27.9	166,238	35.7
Kassala	235,319	20.9	639,050	56.9	249,018	22.2
Kordofan	262,005	11.9	1,534,067	69.7	406,274	18.4
Darfur	210,420	9.6	1,566,174	71.8	404,567	18.5
Bahr El Ghazal	106,341	7.6	1,290,572	92.4	—	—
Upper Nile	37,147	4.7	761,104	95.3	—	—
Equatoria	148,631	19.7	607,119	80.3	—	—
TOTAL	2,697,659	18.1	10,582,538	71.0	1,622,697	10.9

Source: Department of Statistics, 1975. Estimates based on Preliminary 1973 Census results.

5,000 or more persons (1973 census data). This compares to 11% five years earlier in 1968 (U.N. Demographic Yearbook for 1975). Based on U.N. data, approximately 42% of this urban population is concentrated in 4 cities, Khartoum, Khartoum North, Omdurman, and Port Sudan. Table II-8 shows this relationship for 1971, the most recent data available:

TABLE II-8

## Population of Major Urban Areas

City	Population	% of Total 1973 Pop.	% of Total 1973 Urban Pop.
Khartoum	321,666	1.9	14.8
Khartoum North	305,308	1.8	14.1
Omdurman	161,278	1.0	7.4
Port Sudan	123,000	.7	5.7
Total		5.4	42.0

Source: The Middle East and North Africa. London: Eurppa Publications, 1977, p. 636.

Although an accurate count is not available, it is estimated that more than 40% of the Sudan's population is on the move at least part of the year\*. 7% of that population is nomadic; the remaining 33% are pastoralists whose movement is dictated by the availability of water and pastures. These populations tend to be most dispersed in the dry season, seeking any available water.

\* Nelson, Harold D. ed. Area Handbook for the Democratic Republic of the Sudan. Washington, D.C.: American University Press, 1973

Sedentary, pastoral, and nomadic populations interact, particularly in the central areas of the country, leading to the exchange of complementary goods and services. Nomads and farmers often terminate herding contracts due to the prevalence of the tsetse fly during the rainy season. "The former entrusts his cattle to the nomad who drives them North to avoid the tsetse, getting the milk but bringing back the calves that might be born during migration."\*\* Although often leading to disputes, such an arrangement is an example of the mobility of the population and its possessions.

k. Average Size of Household by Province  
and Place of Residence

Generally, households in urban areas of Sudan are larger than those in rural areas. The notable exception is Bahr El Ghazal Province where the household structure was probably significantly affected by the civil disturbances in the South.

The urban area household size ranges from 4.7 (Red Sea Province) to 6.7 (Upper Nile Province). The household size in rural areas ranges from 2.6 in Red Sea Province to 6.3 in Bahr El Ghazal. For nomads, household size ranges from 5.3 in Gezira, White Nile and Blue Nile Provinces to 7.5 in Kordofan (see Table II-9).

\*\* Ibid.

TABLE II-9

## AVERAGE SIZE OF HOUSEHOLD ACCORDING TO PLACE OF RESIDENCE

Population Estimates 1973

PROVINCE	<u>Total</u>	<u>Urban</u>	<u>Rural</u>	<u>Nomadic</u>
Red Sea	4.132	4.657	2.642	5.480
Kassala	5.104	5.303	4.805	5.743
Northern	4.937	6.183	4.878	5.508
Khartoum	5.872	6.023	5.176	6.673
Gezira	5.454	6.219	5.358	5.260
Blue Nile	4.954	4.953	4.236	5.260
White Nile	4.881	5.467	4.734	5.260
Kordofan	4.738	5.230	4.664	7.451
Darfur	4.220	5.008	4.131	5.262
Bahr El Ghazal	6.245	5.311	6.342	--
Upper Nile	5.673	6.732	5.629	--
Equatoria	4.762	5.085	4.685	--
<b>TOTAL</b>	<b>5.060</b>	<b>5.537</b>	<b>4.860</b>	<b>5.675</b>

Source: Department of Statistics, 1973 Population Census, Population Census Technical Committee

Several reasons are given for the differences in size observed in urban/rural/nomadic households. These include:

- urban households frequently include resident servants
- the proportion of nuclear to extended families differs among rural and urban households.
- nobility and fertility may differ among urban/rural/nomadic households.

### 1 Internal Migration

Sudan like many other developed and developing countries is experiencing internal migration from rural to urban areas. The increase in population density of 131% observed in Khartoum Province between 1955 and 1977, and in Blue Nile Province of 84.2% during the same period, is partly due to the high degree of industrialization which took place in these areas (see Table II-10).

At the same time, Equatorial and Upper Nile Provinces showed a decrease in population density between 1955 and 1973. While some of this drop can be explained by changing fertility patterns, it is thought that these areas provided the migrants who moved to the more urban provinces.

TABLE II-10

#### Changes in Population Density 1955/56 to 1973

<u>Region and Province</u>	<u>1955/56</u>	<u>1973</u>	<u>Change</u> %
Sudan	4.1	5.9	+43.9
North-East	7.0	13.0	+85.7
Blue Nile	14.6	26.9	+84.2
Kassala	2.8	4.7	+67.9
Khartoum	24.0	55.6	+131.7
North-West	2.9	4.0	+37.0
Darfur	2.7	4.4	+63.0
Kordofan	4.0	5.8	+26.1
Northern	1.8	2.1	+16.7
South	4.3	4.6	+7.0
Bahr El Ghazal	4.6	4.0	+41.8
Equatorial	4.6	4.0	-13.0
Upper Nile	3.8	3.2	-15.8

Source: Annual Statistical Report. Ministry of Health Vital and Health Statistical Division 1974 (p. 70).

m. Fertility Pattern

The fertility pattern varies in different parts of Sudan. It is thought that diseases such as filariasis and gonorrhoea are causes of infertility in some tribes in Upper Nile and Equatoria. A differential fertility rate is also seen among females living in large and small urban areas (see Table II-11). Settled populations show a higher mean live birth rate than do nomads (Gezira population 5.19, Baggara nomads 3.8).

TABLE II-11

Vital Statistics in Urban Areas 1964/66. Age specified Fertility.

	Females 13-47 Years	Average size of Family	Gross Re- production Rate	Children under 5 years per1000 Females 13-47 Years
Large Urban Sector	176120	4.5	2.3	672.6
Small Urban Sector	174200	4.4	2.2	723.2
<b>TOTAL</b>	<b>350320</b>	<b>4.5</b>	<b>2.2</b>	<b>697.0</b>

Source: Modawi, Osman "Evaluation of Maternal Care in the Sudan", Proceedings of the Third Congress of Obstetrics and Gynecology, p. 18-45, Khartoum, 1974.

A field study of five tribal groups (Henin, 1966) showed that fertility was dependent on a number of factors including:

- age of marriage in settled populations tended to be earlier than the age of marriage among nomads;
- prevalence of marriage varied from 56% in Baggara to 61% in Gezira;

- Polygamy was related to a lower fertility rate;
- frequency of divorce was greater among nomads;
- early widowhood was higher among nomads.

Divorce and early widowhood was found to be a factor in 0.9% of marriages among Gezira settlers and 3.2% of Beggara nomads;

- prolonged separation was a factor among the nomads where the husband follows the cattle for grazing while his wife or wives remain in another area;

- Prolonged lactation for two years and a taboo against sexual intercourse during that time was a factor among Murle nomads;

- medical causes such as malnutrition and ill health were believed to play a role in decreasing fecundity or increased fetal loss;

### 3. Population Policy

Sudan does not have a stated population policy.

In 1964, the Sudan Government and United Nations joint study group concluded that:

"Its (the population) smallness in such a vast country makes for high percent transportation costs and severely discourages major investments in the development of an efficient network of transport and communications, though that is indispensable for social and economic advancement. The country can therefore benefit from an increase in the size of population."

Since 1964, however, this approach has been changing. The Sudan Family Planning Association (SFPA) was founded in 1965. It obtained the official support of the Ministries of Health and Social Affairs, and opened its first clinic in 1966. Subsequently, the government permitted the SFPA to provide family planning services in government health centers and MCH centers. The government now allows some government personnel to work in these clinics and has even given some very modest financial support to the SFPA.

A change in the government's thinking regarding population growth appeared in a government prepared report for the 1970 Conference of the UNECA. The report stated:

"The country cannot afford the rise in fertility which might follow economic development. It is necessary to emphasize that unless measures are initiated at this stage to control ... the rate of population growth, a continuously increasing amount of effort ... will have to be used to maintain

existing standards of consumption ... In these circumstances it is necessary to stress the need for population policy as part of economic development planning."

The 1970-75 Development Plan indicated that family planning should be incorporated into the maternal child health care services of the country.

In 1976, UNFPA and WHO began funding a Maternity-Centered Family Planning Project. This effort was initiated in Omdurman Maternity Hospital where a building for a training and service center will be constructed on a site provided by the government. Services have now been expanded to Khartoum city and will eventually be provided throughout the province.

While family planning services are being introduced in Sudan, the government's approach is cautious. In the National Health Programme for 1977/78 - 1983/84 published in 1975, eight program priorities are identified. One of these is primary health care, an important component of which is maternal and child health (MCH). Family planning, which MOH officials consider a part of MCH, however, is not mentioned in the National Health Programme plans.

A year after the National Health Programme was published, a workshop was held in Khartoum on "The Implementation and Integration of Maternal and Child Health and Family Planning in the National Health and WHO." In the draft report of the workshop, it is clearly stated that family planning services are to be an integral part of the MCH program.

Discussions with MOH officials at the central and regional level indicate that there are a number of sensitivities still associated with family planning. Population control is not an acceptable national goal, but child spacing is. For the South specifically, emphasis will be placed on the correction of infertility problems. Finally, abortion and sterilization as methods of contraception are still considered as prohibited by religion, and the Sudan Law, except on strict medical grounds.

#### 4. Population Dynamics

Historically, Sudan has been subject to large changes in its population size. Prior to 1870, it was estimated that Sudan had a population of about nine million. Disease, warfare and the slave trade are said to have reduced the population to approximately two million at the turn of this century (Moorehead, 1960). The population gradually increased up to the mid 1960s, at which time internal warfare and out-migration again decreased the population.

Since the Addis Ababa Agreement in 1972, the population has begun to stabilize once more.

Current demographic data on Sudan is far from adequate. Vital statistics registration is low, even in urban areas. The most recent census in 1973 has produced preliminary estimates for many demographic indicators. The methodology and implementation of the census, however, have been criticized so that the results must be interpreted cautiously.

It has also been reported that attempts to verify the findings in specific areas of the country through sample surveys have produced significantly different population indicators than the census reported. Finally, few demographic studies have been done at the regional and district level, thus further limiting the data available for planning and analysis.

Using what data is available, and bearing in mind the limitations of this information, the following appear to be important characteristics related to the population dynamics of the Sudan:

- high birth rate
- high death rate
- high infant mortality rate
- high population growth rate
- high percentage of children below 5 years of age
- relatively low density of population, particularly in the South
- male sex dominance up to the age of 50,

Significant regional demographic differences exist in Sudan. This is particularly true between the North and the South. These differences are partly related to geographic, social and economic factors.

Migration is another important population variable in Sudan. This is in the form of:

- rural to urban migration of men from subsistence farms in the west to more industrial cities of the east.

- seasonal migration of tribes which follow their cattle from one grazing area to another.

- seasonal migration of agricultural workers.

- intrarural shifts of tribes dispersed and displaced by the internal strife of the late 1960s now returning to their former lands.

Polygamy is another distinguishing demographic characteristic of Sudan. There is some evidence that this practice has a tendency to produce smaller family unit, but there is insufficient data to make any generalizations at this time.

Ethnic composition of the country shows a large number of separate and distinct groups. The customs, manners, taboos, and socio-economic status of these ethnic groups play an important role in determining the demographic variable for each.

#### 5. Political Aspects of Population Dynamics

As in many other countries, population size has vital political implications. In 1973, President Numeiry announced that Sudan's population was upwards of 20 million. It has been reported that preliminary census results released shortly thereafter indicated that the population was only 13 million. Subsequent revision and analysis of the 1973 census data put the total population at almost 15 million.

The ethnic composition of the country is approximately two-thirds Moslem Arabs living in the North, and one-third Nilotic animistic peoples in the South. This has caused political tensions and sensitivities between these two regions.

The regional distribution of state revenues is partially related to population size. It is not surprising, therefore, that there is dissatisfaction in the South because of presumed under reporting in the 1973 census.

In addition, there appears to be no clear cut agreement among the development planners and economists in Sudan regarding the relationship between population growth and overall economic development. In some circles, it is felt that Sudan has unlimited agricultural potential and requires manpower for this sector. Others argue that economic development will be hindered by population growth rate that is too high.

As a result of these factors -- regional difference, ethnic composition, distribution of state revenues, and differing interpretations of the relationship between economic development and population growth -- Sudan has no stated population policy. Family planning services are permitted, but only in the context of maternal and child health, and only as a means for child spacing. Further, with its emphasis on family planning as a vehicle for dealing with problems of infertility in the South, a somewhat pronatalist regional policy is implied.

## B. Economic, Development and Social Data

### 1. Population Distribution

The population of Sudan, estimated to number about 16 million, is distributed approximately in:

- Rural areas and villages = 71%
- Urban area = 18%
- Pastoral areas = 11%

About 55%-60% of the population are considered to be "economically employed." Gross Domestic Product was estimated to be LS 1,422 million in 1974, or about US \$230 per capita.

### 2. Income from Industry

Industrial production contributes 8% to 9% of the national income. Transport is a small but growing sector, most rapidly in motor transport and aviation. (Railways still account for two-thirds the long-haul freight and one-half the passenger transport, but disproportionate shares of traffic shift to roads and aircraft as they become available). Expansion of transport as envisioned in the current development plan includes qualitative improvements in rail stock and the addition of 400 to 600 kilometers of road surface annually toward a targeted 5000 km of paved roads and 2000 km of gravel roads between important producing and consuming centers by 1985.

### 3. Income from Agriculture

Agriculture dominates Sudan's economy. It provides 38% of the gross domestic product, over 95% of exports,

over 50% of government revenues, and employment to the majority of the population. Its growth potential is considerable -- less than 10% of Sudan's arable land is under crops, and Sudan enjoys comparative advantage in exportable agricultural products. Out of approximately 2,200 thousand feddans under irrigation, long staple cotton accounts for 825; sorghum for 450; groundnuts for 271 and wheat for 250. Owing to soft export markets for long staple cotton, the GOS plans to shift cotton production to medium staple and to decrease the cultivation of wheat, sugar and groundnuts relative to cotton. Agriculture Sector development has been characterized by marked dualism between high-income, mechanized, irrigated or rainfed cultivation (about one-third) and low-income, traditional agriculture and livestock raising (about two-thirds). This dualism is reflected in maldistribution of development investment, infrastructure, and income. The central and eastern regions of the country, having most of the irrigated and mechanized rainfed agriculture, also enjoy a disproportionate share of industry, income, transport, power generation, schools and health facilities. The southern and western regions, on the other hand, are characterized more by traditional, low-productivity farming and rangelands and considerable migration.

#### 4. Labor Force Earnings

Open unemployment is low: somewhere between 2%-5% over the country and about 5%-6% in larger towns, according to 1960 estimates. Partly, this reflects the very large labor force migration in the Sudan. In addition to nomadic herdsman,

an estimated one million men and women -- out of a labor force numbering about seven million -- move around the Sudan in response to geographic disparities in employment opportunities. (The nomadic tribes number about another million persons) However, the low rate of open unemployment, mostly seasonal, affects the incomes of most rural families. Most of the agricultural workforce, which comprises three-fourths of the total Sudanese labor force, are substantially underemployed, live at or near subsistence level, and cannot earn enough to lift themselves out of poverty. For example, earnings for cotton pickers in the Gezira average 35 to 50 piastres daily, paid partly in cash and partly in kind. Savings over a ten-week picking season under this arrangement approximate LS 14-15. Processing plant workers do better, probably netting about LS 100 for a six-month season.

#### Wages in the non-agricultural

sectors are protected by a minimum-wage requirement of LS 16.50 per month, with the GOS acting as employer of the last resort for many occupations. Average annual earnings in greater Khartoum are LS 475 per worker. No reliable earnings estimates exist in urban areas of other provinces, but regional and urban/rural differentials appear to be considerable. A majority of villages responding to an ILO Socio-Economic survey in 1974 reported household incomes of less than LS 50 per annum for more than half. Ten out of twelve southern villages reported all household income to be under LS 50 per annum, while LS 100 per annum was more characteristic of northern and central provinces.

Three out of eight villages in Kordofan province showed a majority of household incomes over LS 100.

1973 weekly earnings among wage earners varied from LS 3 in smaller manufacturing industries to LS 7 in power generating industries. Salaried employees averaged LS 7 weekly in power generation to LS 18 in wood products manufacture.

(Source: GOS Statistical Abstract, Department of Labour Survey of Employment, 1973.)

#### 5. Women in Work Force

The participation of women in the work force is rather low - about 9% in urban areas, and probably about 10% in rural areas. (Official statistics on employed women vary from 2% to 56%, according to varying definitions of "productive activities.")

#### 6. Educational Objectives

Education receives greater emphasis in the Sudan than in most African countries. Primary level enrollment approximates 90% of the 7 to 12 age group in urban areas, and about 30%-35% of that group in rural areas. Lower secondary level enrollment is over 40% in urban areas, and about 3% in rural areas. A principal educational objective of the GOS is to achieve a 60% primary enrollment ratio throughout Sudan this year, and "universal" primary education at the "earliest possible date" (realistically, probably within this century in view of current education sector investment and expansion).

### 7. Third Development Plan goals

The current (third) development plan stresses rapid mechanization of agriculture toward a goal of self-sufficiency in most products, and net exports of wheat, sugar and groundnuts, by 1985; significant increases in industrial production, especially in processing of raw products and import-substitutes; and increased social sector development with particular attention to education and health.

### 8. Economic Indices

Latest available economic indices are shown in the following tables:

Table II-12:	SUDAN KEY ECONOMIC INDICATORS
Table II-13:	COST OF LIVING INDEX, 1970-76
Table II-14:	POPULATION BY LEVEL OF EDUCATION SEX AND AGE
Table II-15:	POPULATION AGED 12 YEARS AND OVER BY LABOR FORCE STATUS, SEX AND AGE
Table II-16:	EMPLOYMENT BY SECTOR AND OCCU- PATION
Table II-17:	ORIGIN AND USE OF RESOURCES, 1975 - 1985
Table II-18:	FORECAST EXPORT AND IMPORT TRAFFIC VOLUMES, PORT SUDAN

TABLE II - 12

## SUDAN KEY ECONOMIC INDICATORS

(All values in U.S. million and represent period averages unless otherwise indicated)

Exchange Rate: LS 1 = US\$2.50 a/	1975	1976	Percent Change	Estimate 1977
<b>INCOME, PRODUCTION, EMPLOYMENT</b>				
GDP at current prices FY b/	3555	3925	10.4	4285
Per Capita GDP current prices FY	248	265	7.0	283
Gross fixed capital formation FY	535	620	15.9	708
Indices: (FY 69/70=100)				
Industrial Production	121	127	7.3	132
Agricultural Production	158	166	12.6	175
Labor Force (,000)	7761	8006	3.1	8251
Production				
Raw Cotton (,000 bales)	1160	572	(50.7)	800
Peanuts (,000MT) FY	875	931	6.4	827
Sesame (,000 MT) FY	282	238	(15.6)	235
<b>MONEY AND PRICES</b>				
Money Supply (end of CY)	1044	1300	24.5	NA
Interest Rates (%)				
Bank of Sudan Rediscount	11	11	0.0	NA
Commercial Bank Prime	11	11	0.0	NA
Treasury Bills	3	3	0.0	NA
Indices: (1970=100)				
Wholesale Price FY	170	195	14.7	220
Consumer Price FY	192	222	15.6	250
<b>BALANCE OF PAYMENTS AND TRADE (end of CY)</b>				
Gold and For. Exch. Reserves	36	24	(33.3)	NA
External Public Debt (long term)	636	929	46.0	987
External Public Debt (short term)	435	525	18.4	NA
External Debt Service Ratio	28.1	20.7	(28.6)	NA
Balance of Payments	(416)	(156)	(62.5)	NA
Balance of Trade (payments)	(345)	(74)	(81.4)	NA
Balance of Trade (customs data)	(519)	(371)	(28.5)	NA
Exports (FOB)	381	483	26.8	600
US Share	8	19	138.0	NA
Imports (CIF)	900	853	(5.1)	NA
US Share	77	80	3.9	NA
Main Imports from US (1976): Machinery and Equipment, 34.5; Wheat, 27; Transport Equipment, 7.5; Manufactured Goods, 5.3				

NA = Not Available

a/ = Exchange rate of LS 1 = US\$2.87 used only for cotton exports

b/ = FY begins on July 1 of preceding year and ends June 30.

SOURCES: Bank of Sudan, IMF, Statistics Dept., US Embassy estimates

TABLE II - 13

COST OF LIVING INDEX; 1970 - 1976

(January 1970 = 100)

Year Average	Lower Salaries (Under LS 500)	Higher Salaries (Over LS 500)
1970	106.7	105.5
1971	108.2	106.8
1972	120.9	115.5
1973	141.6	133.7
1974	178.6	165.9
1975	221.4	200.9
1976	225.1	204.1
December 1976	232.3	213.3
February 1977	239.8	221.1

Source: Bank of Sudan

TABLE II-14: POPULATION BY LEVEL OF EDUCATION, SEX AND AGE (PERCENTAGE DISTRIBUTION)

Age Group	Base		Level of education and sex																
	Number	%	No formal Education		Primary Not Completed		Primary Completed		Secondary Not Completed		Secondary Completed		Higher Technical Institutes		Other Higher Institutes		University Completed		Education Not Elsewhere Classified
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Total	766 950	100.0	20.6	27.0	7.9	5.6	13.1	9.3	6.1	3.0	4.0	1.7	0.2	X	0.1	X	1.0	0.2	0.1
0-4	102 850	100.0	52.0	48.0	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
5-11	158 700	100.0	21.4	24.6	22.0	19.7	6.6	5.5	X	0.1	-	-	-	-	-	-	-	-	-
12-14	55 400	100.0	1.6	5.4	5.1	6.2	40.6	35.6	2.6	2.5	0.2	0.1	-	-	-	-	-	-	-
15-19	87 850	100.0	5.9	8.7	2.6	1.8	21.6	16.7	21.1	12.9	5.0	3.8	-	-	-	-	-	-	-
20-24	74 400	100.0	7.6	17.7	3.3	2.4	14.8	12.9	11.5	6.4	14.6	6.4	0.2	0.3	0.1	-	1.2	0.6	0.1
25-44	195 650	100.0	17.1	28.9	6.4	2.1	14.3	8.2	7.3	2.8	6.0	2.1	0.5	X	0.4	0.1	3.1	0.8	0.2
45-54	45 100	100.0	22.7	40.7	6.9	0.6	14.1	3.5	6.0	0.2	3.5	0.9	0.1	-	-	0.1	0.5	-	0.1
55-64	25 800	100.0	33.1	39.9	4.5	0.6	8.3	1.7	3.9	0.6	4.5	0.8	0.6	-	-	-	1.3	-	0.2
65 +	21 200	100.0	33.7	45.0	7.3	0.7	6.6	0.9	2.1	0.2	3.3	-	-	-	-	-	-	-	-

Note: X = less than 0.1 percent; dash = none.

Source: ILO Socio-Economic Survey, 1974

TABLE II-15: POPULATION AGED 12 YEARS AND OVER BY LABOR FORCE STATUS, SEX AND AGE

Age Group	Total	Civilian Labor Force								Not in Labour Force					
		Total	Employed			Unemployed		Total	Active	Passive	Total	Students	Others		
			At Work	Working less than 35 Hrs	Working less than 35 Hrs Economic Reasons	Not at work	Usually Working More than 35 Hrs	Usually Working Less than 35 Hrs Economic Reasons							
<b>ALL PERSONS</b>															
Total	505 400	215 000	202 400	191 200	4 050	2 600	3 650	700	200	12 600	11 350	1 250	290 400	114 150	176 250
12-14	55 400	2 050	1 250	1 150	50	50	-	-	-	800	550	250	53 350	47 200	6 150
15-19	87 850	16 950	13 300	12 650	250	200	150	50	-	3 650	3 450	200	70 900	52 750	18 150
20-24	74 400	35 250	31 250	30 050	400	250	450	100	-	4 050	3 650	400	39 100	12 250	26 850
25-44	195 650	116 450	113 250	107 900	1 600	1 100	2 100	400	150	3 200	2 800	400	79 200	1 950	77 250
45-64	70 900	39 000	38 100	34 700	1 550	850	850	150	-	900	900	-	31 900	-	31 900
65 +	21 200	5 250	5 250	4 750	200	150	100	-	50	-	-	-	15 950	-	15 950
<b>MALES</b>															
Total	275 050	193 650	183 550	174 600	2 850	1 900	3 400	700	100	10 100	9 400	700	81 400	67 950	13 450
12-14	27 650	1 850	1 200	1 100	50	50	-	-	-	650	550	100	25 800	24 750	1 050
15-19	49 350	15 200	12 100	11 600	200	150	100	50	-	3 100	2 900	200	34 150	33 200	950
20-24	39 650	30 350	26 950	25 900	300	200	450	100	-	3 400	3 100	300	9 300	8 800	500
25-44	108 250	105 450	103 350	99 000	1 100	800	2 000	400	50	2 100	2 000	100	2 800	1 200	1 600
45-64	38 900	35 950	35 100	32 600	1 000	600	750	150	-	850	850	-	2 950	-	2 950
65 +	11 250	4 850	4 850	4 400	200	100	100	-	50	-	-	-	6 400	-	6 400
<b>FEMALES</b>															
Total	230 350	21 350	18 850	16 600	1 200	700	250	-	100	2 500	1 950	550	209 000	46 200	162 800
12-14	27 750	200	50	50	-	-	-	-	-	150	-	150	27 550	22 450	5 100
15-19	38 500	1 750	1 200	1 050	50	50	50	-	-	550	550	-	36 750	19 550	17 200
20-24	34 750	4 950	4 300	4 150	100	50	-	-	-	650	550	100	29 800	3 450	26 350
25-44	87 400	11 000	9 900	8 900	500	300	100	-	100	1 100	800	300	76 400	750	75 650
45-64	32 000	3 050	3 000	2 100	550	250	100	-	-	50	50	-	28 950	-	28 950
65 +	9 950	400	400	350	-	50	-	-	-	-	-	-	9 550	-	9 550

Source: ILO Socio-Economic Survey, 1974

TABLE II-16

EMPLOYMENT BY SECTOR AND OCCUPATION (percentages)

<u>SECTOR</u>	
Agriculture	72.7
Manufacturing	3.7
Electrical power	1.0
Construction	1.9
Commerce & Finance	5.2
Transport	3.6
Services	11.9
	<hr/>
	100.0
 <u>OCCUPATION</u>	
Professional	1.9
Administrative	0.4
Clerical	1.4
Sales	4.5
Service	7.6
Farming	71.6
Production, n.e.c.	12.6
	<hr/>
	100.0

Source: 1973 Population Census

TABLE II - 17

ORIGIN AND USE OF RESOURCES, 1975 - 1985

	<u>Value(Ls. million, 1975 prices)</u>			<u>Growth Rates</u> (% per annum)	
	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1975-80</u>	<u>1980-85</u>
<u>Gross value added</u>					
Agriculture	438	545	750	4.5	6.6
Manufacturing	108	144	232	6.0	10.0
Construction	45	66	105	8.0	9.7
Transport	82	107	150	5.5	7.1
Government services	179	240	320	6.0	6.0
Other services	293	363	533	4.4	8.0
<u>Gross domestic product</u>					
At factor cost	1145	1465	2090	5.1	7.3
At market prices	1340	1715	2440	5.1	7.3
<u>Imports of goods and services</u>	300	485	810	10.1	10.8
<u>Total supply of goods and services</u>					
	1640	2200	3250	6.0	8.2
Consumption(public and private)	1210	1495	2065	4.2	6.8
Gross capital formation	190	355	520	13.3	8.0
Exports of goods & services	240	350	665	7.9	13.7
<u>Gross domestic savings</u>	130	220	375	11.1	11.3
<u>Gross domestic savings as percentage of GDP at market prices</u>	9.7	12.8	15.4	-	-
<u>Gross Capital formation as percentage of GDP at market prices</u>	14.2	20.7	21.3	-	-

Source: ILO projections, 1975

TABLE II - 18

FORECAST EXPORT AND IMPORT TRAFFIC VOLUMES, PORT SUDAN  
( THOUSAND TONS )

<u>EXPORTS</u>	<u>1973</u>	<u>1980</u>	<u>1985</u>
Cotton	212	280	325
Cottonseed	98	130	150
Groundnuts	165	500	1200
Sesame seeds	122	150	250
Coarse grains	110	350	1200
Wheat	-	-	280
Sugar	-	-	400
Gum arabic	36	40	40
Meat or animals	24	50	120
Others	50	90	200
	<u>817</u>	<u>1590</u>	<u>4165</u>
 <u>IMPORTS</u>			
Wheat	216	-	-
Sugar	211	50	-
Fertilizers	148	530	1070
Petroleum products	911	*	*
Others	400	800	1350
	<u>1886</u>	<u>1380</u>	<u>2420</u>

\* By pipeline after 1978: 2 Million tons in 1980 and and 3.5 million tons in 1985 (estimated).

Source: ILO Socio-economic Survey, 1974.

## C. Social Analysis\*: Summary

### 1. Social Setting

#### a. Ethnic Groups and Languages

The social matrix of Sudan is marked by ethnic and cultural variety. The four major ethnic and language elements, in varying degrees of mixture, represents semitic, hemitic, nilotic, and Sudanic stocks. (See Map II-1, p. II-14.)

Many languages are spoken in the Sudan, with Arabic predominating in the Northern and Central provinces. Nubian dialects are spoken from Egypt south along the Nile, as well as in the Nuba mountains of Southern Kordofan, and in Darfur to the west. In the east Bedawie languages and Tigre are spoken by Beja hamites and other mixed tribes. Languages of southern Sudan fall into the Nilo-Saharan language family. Geographical distribution of languages and dialects by province is shown in Appendix C, Table A-3:2.

For most Sudanese, personal identity is closely related to tribal affiliation. It is only the present generation of Sudanese who do not bear tribal facial scarifications that proclaim membership in tribes as the Kababish,

\* See Appendix C for complete in-depth social analysis report.

a. Northern Concepts and Classification

In Sudan, as in most traditional societies, ideas of sickness and health, of cause and effect, of religion and the Moral Universe, form one complex system. Within this system, ideally, virtue should lead to well-being, and sin to death, or at any rate illness. To elucidate the Path of Right Action, the Muslim Shari'a (Revealed Law) spells out the spheres of relationship: Self to God, Self to Created Universe, Self to Self; and Islam divides all behavior into five basic categories, "Required", "Recommended", "Neutral", "Disapproved", and "Forbidden." Some things are incumbent (Wajib = Duty) upon all Believers, (the so-called Pillars of Islam), but many acts and relationships have their limits and obligations spelled out in detail, both for the worldly, and for the mystic spheres of reality. Individual, social and community virtue are enjoined upon the Muslim. He is to be upright in commerce; honest in his dealings with the widow and the orphan, fair and generous with his servant or slave, correct and firm but generous with his wife and children, equable with the stranger, rigorous in pursuit of prayer, fasting and attendance at Mosque: He must give Alms; and he should seek learning "even as far as China!" In Sudan, one can add to these Muslim ideal values those values of sturdiness, independence, and self-reliance developed by life in the harsh desert environ-

ment, as well as the tribal necessities of extensive social support within the narrow limits of the kin-group. Within this ideal system, women should be chaste, modest, pious, obedient, infinitely attractive to their lawful husbands and bear uncounted numbers of children.

But there are, nevertheless, untidy areas in this Moral Universe where amoral things lurk, from which powers and creatures of another order act upon human beings, sometimes in moral judgement, sometimes in sheer caprice or spite. These things affect the haal, the whole condition which includes physical, material, moral, social, emotional and spiritual facets. For this reason, traditional medicine is "a sort of total social medicine:, in which " . . . all aspects of (the patient's) life were considered as relevant background."\*

In traditional northern Sudanese thought, disease is classified as:

1) Mystically caused. (This is broken down into three sorts)

- a) Illness sent by God.
- b) Illness inflicted by other people.
- c) Illness inflicted by spirits.

or

2) Non-mystically caused and rational

Example: Headache from standing in the hot sun.

P. Constantinides: 1972 unpub. Doctoral Dissertation,  
LSE, Univ. of London. Fac. of Arts.

Non-mystical illness would be subject to treatment by a Feki (religious man, and usually an amulet-writer), by a Basir (bonesetter, herbalist, masseur, leech . . .), or by an M.D. Sometimes the services of all of these practitioners are tried, either together or in tandem.

The first category of mystical illness is thought to be merited by the victim, and is sent either to punish sin, or to test faith. It includes general misfortune and physical ills. One would look to Feki, Basir or M.D. for treatment.

The second category, unmerited, usually emphasizes bodily ills, though sometimes other sorts of misfortune may be the declarative symptoms. This is caused either by Evil Eye (El Ayn Harra), or Sorcery (Sahir, 'Amal, or in Nubia 'Irug.) This should be treated by the Feki.

The third category, unmerited, is caused by Zar spirit (sometimes called "The Red Wind"), or by different Djinn or Shaitan ("the Black Wind"). These group psychological and social ills, and would be treated by either Feki, or Zar-Master (Sheikh or Sheikha.) Zar disorders are usually mild, and Zar spirits are treated by accommodation. Djinn or Shaitan (Genies and Devils) are associated with severe disorders and madness, and their victims are usually dirty, unkempt and socially unacceptable, sometimes violent and destructive. These spirits must be exorcised from their victim, and classically the prophylactic beatings often left the patient dead.

There are several minor classifications of illness which should be mentioned in passing. Djinn or Devil Touch (as contrasted to possession), is conceived to cause deformity, paralysis, cleft palate, etc.

Problems such as nervousness, anxiety, irritability malaise are said to be Waham, and these are "Diseases of the Blood", caused when the blood suddenly changes its direction of flow.

How do traditional professionals treat the maladies they are called upon to cure? They use religion, ritual, magic, materia magica, and materia medica. They also use a lot of psychology, and know how (ritually) to mobilize social support, public opinion and social pressure. As in western medicine we are beginning to employ group-processes therapeutically for psychiatric treatment, the Zar\* parties provide individual outlets in fantasy, and mobilize social support both as emotional backstopping, and to adjust social problems and imbalances.

The Feki has long been a dispenser of both preventive and curative medicine. He immunizes with amulets, diagnoses with oracles and by divination. He employs sand-divining and other forms of cabbala based on numerical

---

\* Group sessions (usually of women) which involve a spiritualist seance in which recognized stock-character-spirits animate their "victims" to the ritual accompaniment of drums, songs, and incense. These sessions often provide social satire and drama in a ladies tea-party setting, as well as social therapy.

association, dualism, and types of astrology. He cures with Aziima (recitations of holy texts) and with Mihaia, Bakhurat and Warakat. These are religious texts which are drunk, smoked or inhaled into the body. Most potent is Surat 113, Verse 5 of the Koran: "I take Refuge with the Lord of the Daybreak..."

The Bashir is a pragmatist, who treats hepatitis with the contents of an animal's intestine, arthritis with the bite of a red scorpion and cancer with red powder made from roots. He sells you bitter twigs to chew for malaria and brews an herbal tea for snake-bite, at the same time that he incises the bite to suck the poison out. For high-blood pressure and headache, he will apply leeches from the swamps of the Sudd to the back of your neck, or do cupping with tips of rhinoceros horn. Often he treats by cauterization, and will tie an herb-dipped string around the forehead for the headache of trypanosomiasis. He is often very successful in treating tropical ulcers with his herbs; and knows very effective doses for parasites, including garlic to chase amoeba.

b. Southern Concepts and Classification

In the folk classifications, the following types of sickness and causation are recognized in the South:

1) Witchcraft and Sorcery. Witchcraft is something - a substance - inborn in some people, and often in certain families. While his witchcraft can affect other people harmfully the "witch" him/herself does not necessarily direct this quality through malice. Contrarily, the sorcerer works to learn the skills of medicine/divination/magic, and deliberately uses them for destruction.

2) Evil Eye. The Muslim quotes the Koran saying "Let the Lord of the Day-Break guard me from the mischief of the envious when he envies . ..". (Surah 113, v. 1-5). Evil eye is conceived to have a real and tangible power to destroy or wreak harm, and it is widely feared. While all people may be envious, and this in itself is slightly damaging, only some will actually have the "hot eye", the "eye that eats" others.

3) Spirit Possession. While concepts of possessing agencies differ slightly from group to group, and area to area, these are to be found among Dinka, Nuer, Atwor, Mandari, Muru etc.: Celestial Spirits, conceived as cosmic spirits-of-the-above, as contrasted with spirits-of-earth and below. These are "refractions" of a holistic "Creator" God.

4) God's Power. The power of the Creator is conceived as "falling" upon people.

5) Jok. These are dangerous and ambivalent powers which wander free in the universe. They are the powers of what is unuseful to man, untamed, the antithesis of man-and-society. They inhabit the bush, the night, the spaces between habitations. Unpredictable, they must be managed cautiously.

6) Ghost Sickness. The wrath of ancestors will cause illness if people breach the norms of social and/or mystical obligation.

7) Sin, Taboo, and Consequent Pollution. Sin is defined as a breach in a social or spiritual obligation. Taboo is, in its simplest definition, the requirement to "respect", or to behave appropriately toward every person, place, object, and institution, whether this be a mother-in-law, a shrine, a fetish-object, or a mortuary ceremony. Called Thek in Dinka, this concept gives a framework for all behavior, and failure to observe the requirements will bring misfortune or death to people, their relatives, children and cattle. A breach of thek behaviour places the contravenor in a state of ritual pollution which is seen as contaminating and contagious to the community, and exceedingly dangerous.

f. Treatment and Specific Symptoms\*

Diagnosis is complex. Traditional doctors assemble evidence on the basis of physical symptoms determined through

\*

E. Evans-Pritchard: Nuer Religion 1956.

J. Buxton: Religion and Healing in Mandari. 1973

external examination, and through divination practices which may employ sand-casting, rattles, poison oracles or other impedimenta. Divination and questioning elicit the patient's socio-medical and religious state and history, which are considered the essential elements, symptoms being secondary. The layman, lacking mystical and scientific knowledge, is not able to diagnose beyond the level of minor indispositions attributed to natural causes, such as stomach-ache, cuts and bruises, colds, minor diarrhea and constipation, tropical ulcer and guinea-worm infestation.

Evil-eye and sorcery may cause the symptoms we would associate with heavy worm infestations, or rheumatism, yaws, chronic fever, dysentery, and enteritis.

The bewitched are often listless and become wasted or go mad. Barrenness, milk-drying-up, death in childbirth are all ascribed to witchcraft, and the witch-caused death is long and slow.

God's power and celestial spirits cause severe headaches, infected eyes, nervous disorders, convulsions, delirium, sore throats, coughs and pain in back and chest. Onset is sudden, violent, and death may result from such attacks.

Feverish swellings and feverish diseases, usually of sudden onset, violent, often fatal, are caused by Jok, while angry ancestral ghosts attack female fertility, the health of children, and cause unhealing wounds.

Sin and pollution bring barrenness, male sterility, death to children. Thek-breach has the nature of a public-health problem because of its contagious quality. Epidemics (measles, meningitis) are thought to be the visitation of God's power.

Psycho-social and physical illness are not clearly differentiated in this schema; all are treated by shaman doctors who acquire medical skill through surviving serious misfortune, disease or emotional disorder themselves. Thereafter they may receive training from practicing professionals who will sell them the medicines and control or mediumship of spirits and Jok. Control of a spirit-ally enables the doctor to diagnose and treat other people for all of the above mentioned diseases.

There are other categories of practicants such as bone-setters, midwives, and "owners" of specific herbs. Bone-setters splint and poultice breaks, sprains and swellings, and often use massage as well. Midwives usually are older women who assist the mothers within their own lineages. Medicine owners will know one or a few herbs, or roots and fruit and bark that can be used to treat colds, wounds, snake-bite, or sore-eyes.

Southerners see their form of medicine as peculiarly suited to their way of life and to their relationship with the moral universe, and generally prefer to treat illness by their own methods; but they recognize different modes of therapeutic practice as valid. Just as they may borrow cer-

tain ritual practices from other near-by groups, ideas of modern medicine gradually make their entry into their universe, and some are slowly assimilated. They see a common human element between the two healing systems, and areas of overlap where folk medicine and scientific medicine may exist side-by-side without conflict, at some points complementing each other. A radical alteration of this assessment involves "in the Jungian frame of reference, the equivalent to a changing of cultural archetypes."\*

It follows that results of a health program in the South will only appear gradually, and will require lengthy and persistent effort.

In depth social profiles for Northern and Southern Sudan, to be found in Appendix C, discuss:

1. Socio-economic system.
2. Cities and urbanization.
3. Migrant workers and squatter villages
4. Stratification and change agents.
5. Role and situation of women.

---

\* J. Buston: op. cit. p. 326

**III. NATIONAL HEALTH POLICY, PRIORITIES, AND ORGANIZATIONAL STRUCTURE**

III. NATIONAL HEALTH POLICY, PRIORITIES AND ORGANIZATIONAL  
STRUCTURE

A. National Health Policy and Priorities

1. Policy

The Democratic Republic of Sudan has announced a national health policy in the form of the following objectives for the period 1977/78 - 1983/84:

a. Provide preventive and social medical services as a top priority and lay stress on the following areas:

1) Control of common endemic and epidemic diseases which cause great morbidity and mortality, e.g. malaria, schistosomiasis, tuberculosis, gastroenteritis of children, Kala Azar, communicable eye diseases, malnutrition and anemia;

2) Maternal and child welfare services to cover the largest portion of the population;

3) Complete health coverage of school children through school health service units;

4) Immunization of children against common infectious diseases, e.g., TB, Smallpox, Triple Antigen (DPT), and Poliomyelitis;

5) Health education; and

6) Improvement of environmental health services, especially in the areas of refuse and excreta disposal, water supply and pest control.

b. Cover the population with primary health care, especially in rural areas, through rural health units (rural hospitals, health centers, dispensaries, primary health care units)

c. Train health manpower, with greater stress being laid on technical and auxiliary groups required to carry out preventive and social medicine activities and satisfy the needs for primary health care in rural areas.

d. In the field of curative health services, consolidate the existing institutions by the provision of efficient and modern ancillary services such as x-ray, blood banks, laboratory services, operating theatres and modern equipment. New hospitals are to be built only in places where such services are deficient, or to meet an urgent need for specialized services which do not exist.

## 2. Priorities

The GOS has articulated its national health priorities in the form of a National Health Plan for the period of 1977/78 - 1983/84. These priorities, which are in the form of "Programs", are the following:

- a. Program No. 1. - Malaria Nation-wide
- b. Program No. 2. - Malaria "man-made"
- c. Program No. 3. - Primary Health Care (PHC)
  - 1) Health Information and Hygienic Habits  
(Health Education)
  - 2) Childhood Immunization
  - 3) Services to reduce Protein-Calorie Malnutrition

- 4) Services to reduce Gastro-enteritis
  - 5) Tuberculosis Control/Prevention
  - 6) Sleeping Sickness (Trypanosomiasis)  
Control - Southern Region
  - 7) Kala Azar (Visceral Leishmaniasis)  
Control/Prevention
- d. Program No. 4. - Control of Bilharzia (Schistosomiasis) in Irrigated Areas
  - e. Program No. 5 - Safe Water Supply
  - f. Program No. 6 - Environmental Health
  - g. Program No. 7 - Food (Dura) Production in  
Certain Regions of the Sudan
  - h. Program No. 8 - Onchocerciasis ("River Blindness")  
Control/Prevention

### 3. Plan

In 1975, prior to completion of its existing five (5) year National Health Plan, the GOS, with the assistance of the World Health Organization and donor agencies, developed a new National Health Plan for the period 1977/78 - 1983/84. This was an in-depth interdisciplinary and interministerial planning effort, which consisted of detailed analyses and assessments of the health sector, and which was developed within the context of the National Socio-economic Development Plan. Upon the basis of analyses, problems were identified, priorities were established and programs were formulated for resolution of priority problems. It should be noted that the beneficiaries of the health services to be provided in the plan, i.e., the

rural poor who do not have any or adequate access to these services, participated in this planning effort.

Finally, it should be noted that the health planning effort by Sudan has been considered internationally as a stellar accomplishment. The plan, as envisioned, is considered to be basically technically and financially feasible, provided that adequate support of the development cost components will be forthcoming from external donor agencies. The Primary Health Care Program, the major element of the National Health Plan, is both technically and financially feasible (affordable), particularly in regards to magnitudes of and financing arrangements pertaining to recurrent operating costs.

The National Health Plan, including its Primary Health Care Program, is a rather ambitious undertaking considering the fact that Sudan, similar to other developing African countries, presently provides health care services to a minority of its rural population. To expand practically full coverage to the entire population in seven (7) years will be a tremendous undertaking. It is in the realm of possibility, however, even considering the constraints and problems contemplated.

From a number of discussions at various levels within the GOS, the Sudanese appear to be both enthusiastic and confident in the undertaking. In addition, several international organizations and external donor agencies are hopeful, with the Government of Sudan, for successful implementation of its National Health Plan.

## B. Organization, Operation and Infrastructure of Health

### System

#### 1. Responsibilities

The Ministry of Health is the agency responsible for all health affairs of the Government of Sudan. The MOH is headed up by a non-technical, politically appointed cabinet-level Minister. The MOH has six (6) major operating departments: 1) Health Planning and Budgeting; 2) Rural Health Services; 3) Curative Health Services; 4) Social and Community Health Services; 5) International Health and Training; and 6) Central Laboratories (See Chart III-1).

The Chief Medical Officer and the individual responsible for day-to-day operation/administration of the MOH is a civil servant physician with the title of "Undersecretary of MOH".

#### 2. Functions

Many of the functions of the MOH are decentralized or delegated to the provinces, particularly the administration of health services programs. (See Chart III-2) Activities which have not been delegated to the provinces are functions such as: National Health Planning; National Manpower Training Programs; National Medical Stores, Central Laboratories; Health and Vital Statistics Data System; International Health; and Capital Construction and Health Program Development.

The Chief Medical Officer at the Provincial level is the Assistant Commissioner of Health. This individual is responsible for administering all health activities/programs

Chart III-1

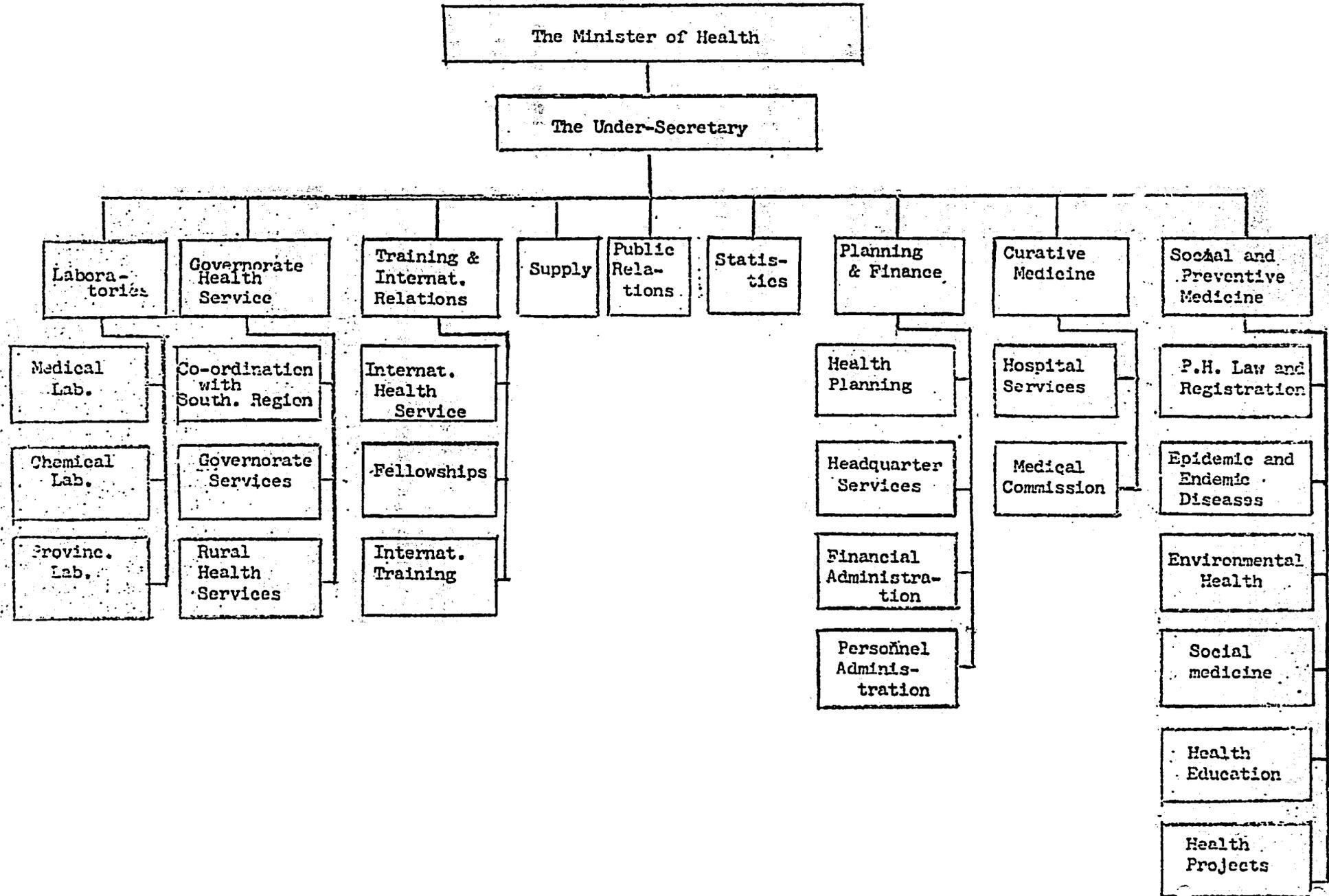
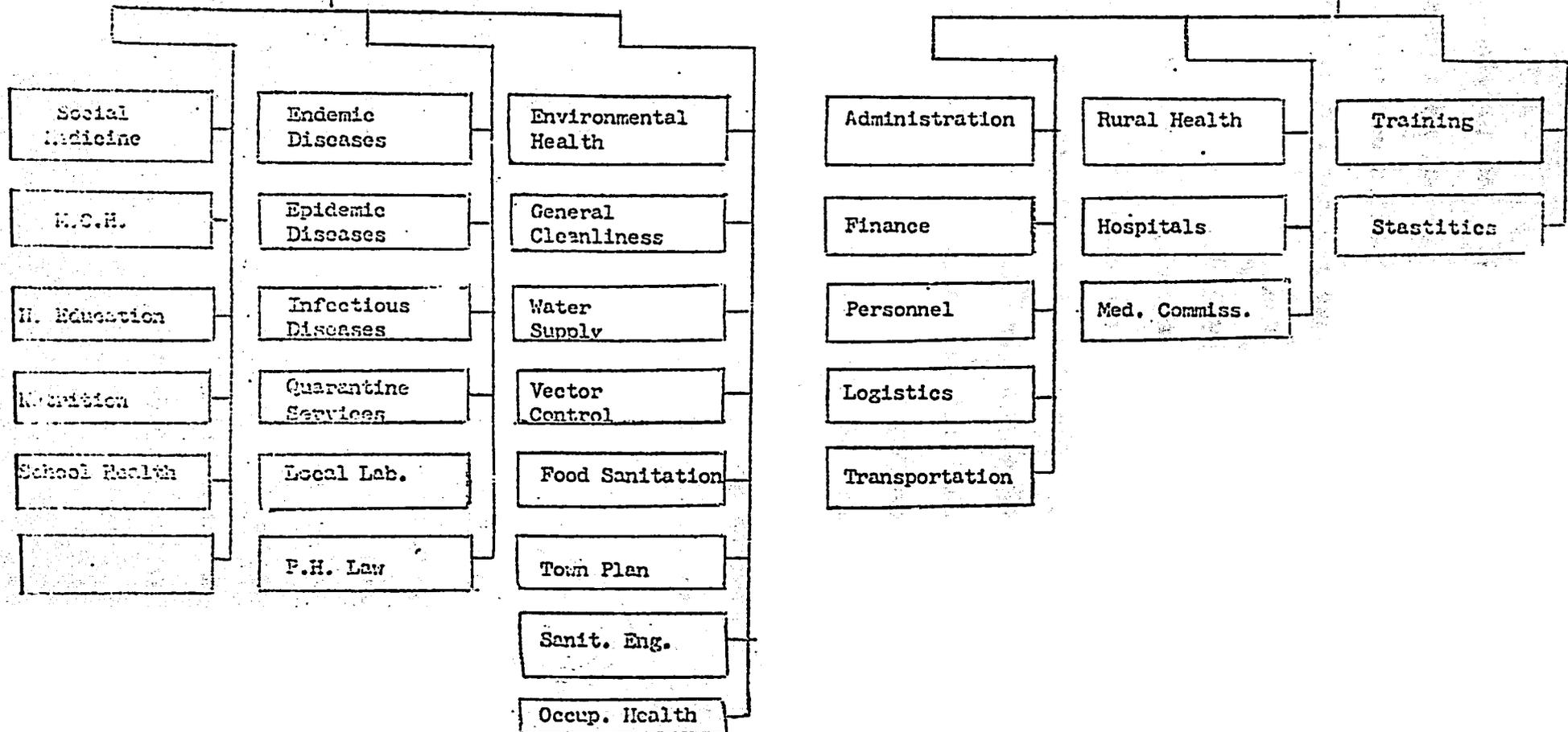


Chart III-2

Deputy Governor  
for Health Services

Assistant Governor for  
Health  
Prevent. & Social Med.

Assistant Governor for  
Health  
Curative Services



in each of the provinces. The provinces are further divided into Districts, the latter having a Chief Medical Inspector serving as the head of health services in each of the districts. These individuals are responsible to their respective Assistant Commissioners for Health.

### 3. Southern Region

The Southern Regional Ministry of Health is responsible for all health activities in the Region, except for those functions not delegated by the central MOH. The Southern Region, consisting of 6 provinces, is headed up by a physician Minister of Health. The Minister of Health for the Southern Region is not subservient to the Minister of Health. (Khartoum and Northern Regions), but occupies a horizontal relationship, for the most part, to the latter. The provincial set-up and operations in the Southern Region are similar to that found in the Northern Regions.

### 4. Planning Mechanism

#### a. Health Development

The machinery for planning and implementation of health development policy are varied. At the national level, proposals are prepared by the Planning Directorate in the MOH and, following review and approval within the Ministry, submitted to the National Planning Commission for study, budgeting and approval. The development plan then goes to the Peoples National Assembly for approval, prior to approval and signing by the President.

Development proposals may also be initiated or proposed by the District Councils for each province and then submitted to the Provincial Councils for approval. If the proposals are limited to a single province, they are submitted directly to the National Planning Commission. If the proposal is of a national nature, it is submitted to the Ministry of Health, which, in turn, submits the proposal to the National Planning Commission. All development programs and plans are implemented by units concerned at the provincial level.

b. Health Services

Planning for health services differs somewhat from that for health development planning. Planning for health services starts at the provincial level, i.e. a "bottom-up" approach. In each province the Assistant Commissioner for Health and his staff receive proposals for health services from the districts. These proposals are reviewed and discussed at the provincial level and after approval are presented to the Provincial Council. Following approval by the latter, the proposals are submitted to the Director of Planning in the MOH.

The Ministerial Advisory Committee meets regularly to discuss and review all health service proposals. After review, priority setting, and approval of the proposals by categories, the final form of the proposals are submitted by the Planning Directorate of the MOH to the National Planning Commission for review and approval. As stated previously, the

responsibilities for implementation of all health service programs rests with the provincial level.

5. Medical and Paramedical Training

Although the MOH provides significant Faculty of Medicine staff for educational programs, the prime responsibility for undergraduate and post-graduate degree granting professional medical education rests with the University of Khartoum.

Paramedical and non-degree (clinical) training, however, is the responsibility of the MOH.

#### IV. RESOURCES FOR THE HEALTH SECTOR.



#### IV. RESOURCES FOR THE HEALTH SECTOR

In reviewing health sector resources, the Assessment Team noted the distinct differences and contrasts between the North and the South - in health manpower, health facilities and financial resources. The GOS, in its National Health Program, developed separate plans for the North and the South for implementation of Primary Health Care Programs (rural health delivery systems), taking into account fundamental political, administrative and socio-economic/cultural differences of the two regions.

Whereas the Ministry of Health at the National level in Khartoum, serving the 12 provinces of the four northern regions, is staffed in depth in the major program units, the Ministry of Health in Juba, serving the six provinces of the Southern Region, has only a handful of ministry staff. Health facilities in the North, except for the Western Region, although not adequate, are much more substantial than those in the South, where 17 years of civil/political strife devastated that region's social and administrative infrastructure.

In contrast to the North, which has the highly productive Gezira agricultural scheme and other economic resources, the Southern Region has a paucity of resources, so is unable to generate budgetary funds to cover the high costs of reconstruction and

development. At least through the Third Development Period, 1977-1984, the South must rely heavily on financial assistance from the national budget and from international donors.

A. Health Manpower and Training Resources

1. Health Manpower Resources

Assessment of health manpower is primarily concerned with the manpower needs of the proposed Primary Health Care Programs, North and South. The numbers of health personnel, by discipline, required to staff the PHC facilities, and the training needs to prepare PHC staff to perform efficiently in delivery of rural health services are noted for North and South.

In the implementation of the National Health Plan over the next seven years, the Ministry of Health has placed top priority on extension of rural health services to all parts of the Sudan in its socio-political commitment to improve rural conditions, especially for the rural poor. The program will also undergo extensive operational changes as greater stress is placed on preventive services, and on health education to achieve better understanding by the public and acceptance of services as they become available. All this bears directly on the kinds of health personnel selected for assignment to the PHC Programs and the training necessary for them to perform effectively on the job.

a. Health Manpower - January, 1975

TABLE IV-1

DISTRIBUTION OF HEALTH MANPOWER - JANUARY 1975

1. DOCTORS

(a) Headquarters	...	18	
(b) Public Health	...	36	
(c) Research	...	14	68
(d) <u>Specialists:-</u>			
1. Gynaecological	...	39	
2. Paediatric	...	16	
3. Physician	...	29	
4. Surgery	...	48	
5. Physical Medicine	...	1	
6. Eye	...	23	
7. Chest	...	16	
8. Psychiatry	...	11	
9. Skin	...	7	
10. Anaesthesia	...	10	
11. X-ray	...	14	214
			282
12. Fellowship	...		113
			395
(e) Registrars	...	76	
(f) General Doctors	...	506	
(g) Housemen	...	161	
(h) University	...	102	
(i) Armed Forces	...	47	892
			1287*

2. DENTISTS

(a) Specialists	...	4
(b) Dentists	...	50
		54

\* Of the 1287 doctors listed by the MOH, 957 were in active practice. Distribution was quantitatively and qualitatively very uneven, with 50% of all generalists and specialists concentrated in the two Northern provinces of Khartoum and Gezira. The MOH notes that there should be at least three medical assistants per doctor, i.e., at least 2871 M.A.'s to the 957 practicing physicians.

Distribution of Health Manpower (continued)

3. MEDICAL ASSISTANTS

(a) General	...	1049
(b) Lab assistants	...	212
(c) Theatre assistants	...	153
(d) Dental "	...	66
(e) Eye "	...	75
(f) Anasth. "	...	67
(g) Psych. "	...	9
(h) A/Pharmacists	...	15

TOTAL 1645

4. TECHNICIANS

(a) Radiographers	...	107
(b) Lab. Technicians	...	88
(c) Refractionists	...	84
(d) Sisters	...	195
(e) EKG Technicians	...	7
(f) Physiotherapists	...	3
(g) Other technicians	...	30

TOTAL 514

5. PHARMACISTS

... 42

6. HEALTH VISITORS

... 307

7. HEALTH STATISTICIANS

... 23

8. DENTAL TECHNICIANS

... 50

9. SOCIAL WORKERS

... 27

10. DENTAL MECHANICS

... 4

11. NUTRITIONISTS

... 3

12. S.P.H.I.

... 19

13. P.H.I.

... 62

14. PUBLIC HEALTH OFFICERS

... 151

15. SANITARY OVERSEERS

... 271

16. NURSES

... 11,120

17. VILLAGE MIDWIVES

... 4,438

Source: National Health Programme, 1977/78-1983/84 (Blue Book)

Table IV-2 shows the distribution of health manpower, including hospital staff, but not listing physicians, for the North and South, as of January 1975, prior to implementation of the Primary Health Care Programs.

TABLE IV-2  
MANPOWER IN SERVICE, INCLUDING HOSPITAL STAFF,  
NORTH AND SOUTH, JANUARY 1975.\*

Category	Northern Regions	Southern Region	Total
Dresser	1200	123	1323
Village Midwife	3200	167	3367
Nurse Midwife	800	NA**	800
Nurse	9300	1594	11,894
Health Visitor	350	18	368
Sanitary Overseer	250	40	290
Medical Assistant	1460	185	1,645

\* Projections for future manpower requirements to staff PHC facilities are given in Part VI, E-p.

\*\* Nurse-midwife is not separated from general category of nurse.

Prior to initiation of the Primary Health Care Program in 1975, rural health services were provided out of 1505 dressing stations, 634 dispensaries, 144 health centers and 171 hospitals. Table IV-3 lists them by location, North and South

TABLE IV-3

## HEALTH SERVICE FACILITIES, BY CATEGORY, NORTH AND SOUTH, 1975

Facility	Northern Four Regions	Southern Region	Total
Dressing Stations	1316	189	1505
Dispensaries	554	80	634
Health Centers	138	6	144
Hospitals	147	24	171

The 1505 dressing stations, located in villages, were staffed by one nurse each, rendering first aid and simple treatment services. These facilities were unevenly distributed, with the more developed provinces having the best qualified personnel. Some areas, remote or depressed, especially in the Southern Region, either had no facilities or the existing units were in disrepair and inadequately staffed, if at all.

The 634 dispensaries, located in towns, were more evenly distributed, but not uniformly well staffed. Medical assistants and nurses (one of each per dispensary) were attracted to hospitals or health centers in larger towns, not to dispensaries.

A health center, serving two or more dispensaries and their satellite dressing stations, is staffed by one senior medical assistant, one or more nurses and one health visitor, the latter a female nurse with one additional year of training. Because her duties were mainly to supervise nurse-

midwives (hospital and village), the health visitor may be located at the district hospital or in the hospital's nursing school.

A rural or district hospital is staffed by one or more medical officers, with specialists in the larger hospitals; several medical assistants and nurses. About three-fourths of the nurses in the Sudan are male.

Although not identified directly with the dispensary, village midwives and nurse-midwives live and work in rural communities. The nurse midwife and an increasing number of village midwives (often illiterate) have completed MOH training. However, an undetermined number of "granny" midwives, untrained and usually illiterate, deliver a large percentage of babies, especially in remote areas.

Also locally employed by districts and not directly attached to MOH facilities, a sanitary overseer provides environmental health services, assisting rural areas in developing water supplies, with waste disposal and various other community projects. Assistant sanitary overseers are recruited in villages and trained on-the-job by the sanitary overseer.

b. Administrative Management and Supervision

Above the District Health Center/Hospital level, manpower serves a supporting and supervisory/management role.

The senior medical assistant in the health center, who supervises the medical assistant in the dispensary,

is accountable to a regional medical assistant and he, in turn, to a Provincial medical assistant. The provincial M.A. is directly responsible to the provincial health officer - the Assistant Commissioner for Health, who has line responsibility for all health services in his province and is accountable to the Minister of Health in Khartoum for the Northern provinces and in Juba in the Southern Region.

For environmental health services, the sanitary overseer, stationed either at a dispensary or in a larger rural town, is back-stopped by a public health officer (non-medical) at the District.

Administrative supervision of both environmental and preventive/curative services is provided at the regional and provincial levels by senior public health inspectors, who are required to visit each facility at least once a year. Because of the opportunity of upward mobility for medical assistants, positions in the higher echelons are traditionally better staffed than the lower service units.

C. Manpower Resources Generated by the Primary Health Care Program - the CHW

To carry out its new policy of extending delivery of basic health services to all rural areas, the GOS has introduced a new category of health worker, called a community health worker. The CHW is being recruited by the village, trained by the MOH for nine months, and then returned to his village to

man a Primary Health Care Unit. (Dressing stations under the old system are being upgraded to PHCUs. Nurses now in dressing stations may serve temporarily as CHWs until they can be replaced by trained CHWs, but will eventually be reassigned to other service levels.

By 1984, the MOH expects to have trained 1980 CHWs for assignment to PHCUs in the North, 837 CHWs to work with nomad tribes in the North, and 763 CHWs for PHCUs in the Southern Region.

## 2. Training Resources

### a. MOH Training Programs

National resources for the training of health personnel are being sharply augmented to provide basic training, retraining or reorientation for manpower involved in delivery of rural health services under the PHC programs. In 1975 health personnel were being trained in 54 nursing schools, 18 village midwifery schools, three health visitor (post-nursing) schools, three medical assistant schools. The Ministry of Health trains some 21 categories of auxiliary medical/health personnel, including a course for tutors to train community health workers. The MOH institutes follow the Royal Society of Health (London) pattern, granting certificates or diplomas equivalent to those granted by the Royal Society.

The first five MOH institutes listed below, located in Khartoum, offer three-year courses, taught in English. Other MOH courses in the North are taught either in Arabic or in Arabic and English. English is the teaching language in institutes located in Juba and the Southern Region. The Institutes/Schools include:

1. School of Hygiene - grants Diploma of Public Health Inspectors
2. School of Radiology - Diploma of Radiology
3. School of Refraction - Diploma of Refraction
4. Laboratory Technicians Course - Diploma of Laboratory Technician
5. Nursing College - Nursing Certificate
6. The Nursing College also offers a one-year course in English in midwifery, leading to a Certificate in Midwifery. (Institute of Midwifery)
7. Midwives Training School, Omdurman; one-year course in Arabic; - midwifery certificate
8. Health Visitors School, Omdurman; one-year; certificate or diploma
9. Medical Assistant's Schools, Omdurman, El Obeid, Arabic; Juba, English; three years, certificate.
10. Nursing Instructors Course, approximately one and one-half years; Arabic and English; certificate

11. Ophthalmic Medical Assistant; Khartoum Eye Hospital; two years; Arabic and English; certificate
12. Dental Assistant's School, Omdurman; about two years; Arabic and English; certificate
13. Laboratory Assistant's School, Central Lab, Khartoum; about two years; Arabic; certificate
14. Anaesthetic Assistant's Course, Khartoum Hospital, about two years; Arabic; certificate
15. Operating Theatre Attendant's Course, Khartoum Hospital; about two years; Arabic
16. Domiciliary Midwives School (11), Khartoum North, Atbara, Kussala, Port Sudan, Wad Medani, Sennar, El Obeid, El Fasher, Juba, Malakal, and Nyala; one to one and one-half years; for illiterate candidates; Arabic
17. Nursing schools - Inservice Training (54), attached to hospitals in all provinces; three years for certificate; Arabic
18. Midwifery schools, various locations; trains midwives recommended by sheik or medical assistant in district - priority to areas which have no trained midwives; nine months; MOH midwifery certificate; license to practice issued by province medical officers

19. Physical medical assistant's course, Khartoum Hospital; two years (following three years of Nursing School plus three years experience); Arabic; certificate
20. Pharmacy Medical Assistant's Course, Khartoum; two years (with nursing certificate and three years experience); Arabic; certificate
21. Community Health Worker - Tutor's Course, Khartoum; three months; Arabic; certificate.

b. MOH Training Facilities - Community Health Worker

With initiation of the Primary Health Care Program, the government (MOH) has established 37 training centers to train community health workers - 20 to train CHWs for assignment to settled areas of the Northern provinces, 10 to train CHWs for nomad tribes, and seven for the Southern Region. Each center is to train 20-25 CHWs per class (15 for nomad CHWs for nine months until all 3580 CHWs needed to staff Primary Health Care Units are trained (Schedule calls for completion by 1983).

c. Additional Training Facilities

The Ministry of National Planning, in its Six-Year Plan of Economic and Social Development, 1977/78 - 1982/83, Vol. 2, April 1977, has listed a number of training facilities to be established or expanded during the Third Development Period, as follows, at a cost of nearly \$4 million:

TABLE IV-4

Project No.	Project	Total cost in Ls*
40 -	Six medical assistant schools	180,000
41 -	Dental and Anaesthetist schools (augment)	60,000
42 -	Four schools for health supervisors	92,000
43 -	School for physiotherapy	60,000
44 -	Vital health statistics training institution	50,000
45 -	34 nursing schools	272,000
46 -	Four nursing midwifery schools	160,000
47 -	Five village midwifery schools	225,000
48 -	Five health visitors (maternity-childhood) schools	300,000
49 -	Four assistant health visitors schools	<u>160,000</u>
	TOTAL	1,559,000

\*LS = U.S. \$2.51

Further assessment of existing facilities - location, size, intake, output - matched against projected health manpower needs, should precede implementation of any new construction scheme.

d. University of Khartoum

All doctors are trained in a six-year course offered at the Faculty of Medicine. The Faculty admits 180 first-year students and graduates about 160 each year.

### Three departments of the Faculty -

- 1) Social and Preventive Medicine (Community Medicine),
- 2) Pediatrics and Child Health, and
- 3) Obstetrics/Gynecology have integrated their teaching for a curriculum in family health, using the case study method.

The Department of Social and Preventive Medicine has developed a curriculum in community medicine for fourth and fifth year medical students (348 hours/student), which includes individual field projects. This program is being expanded to provide more experience in community health practice.

The Faculty of Medicine has also hosted seminar/workshops such as the one on Teaching Family Health, held in Khartoum January 10 - 15, 1976, under auspices of the African Health Training Institutes Project (AHTIP), University of North Carolina.

The University of Khartoum, Faculty of Medicine, constitutes a major resource for manpower development and training, with potential to participate in professional training of various health personnel other than doctors.

### 3. Training Capability

In effect, the Ministry of Health has assumed the monumental task of training 3580 new health workers, retraining some 2500 directly involved in delivery of rural health services to add new skills needed to render preventive health services as

well as the traditional curative services, and re-orient some 1500 other MOH personnel whose understanding of preventive health concepts is deemed essential.

Goals set by the MOH will be difficult to reach by 1984. With appropriate external assistance, the GOS, in time, can probably produce numbers of health personnel projected for staffing the Primary Health Care Programs. However, if the facilities observed by the Team on field visits are typical, substantial renovation/expansion/relocation will be necessary to bring them up to minimum standards to serve the training needs of the country. Major changes in curriculum and teaching methodology will be required to prepare trainees for their expanded role in health education and preventive health services. (See Part V, E-Health Manpower Problems, and Part VII, B-Constraints)

#### 4. People - A Manpower Resource

An important resource at the village level is the people themselves. Under a concept of community self-help, those villages which can afford it will be expected to provide part of the materials and funds to build the Primary Health Care Unit and to pay the CHW's salary. In the five-year period 1970-1975, no less than 190 dispensaries and 537 dressing stations were built as self-help projects in the northern four regions of Sudan. Self-help contributions are used by the MOH to support activities in communities that cannot afford to help themselves.

Three rural organizations involved in the self-help process include the local unit of the Sudan Socialistic Union (SSU), the village development committee, and the Village Council. These have been slow to develop in many areas and need guidance and support from the government if they are to become viable, especially in the more remote and less densely populated areas.

#### B. Health Facilities

In both the North and Southern Sections of the country, Sudan suffers from a severe shortage and maldistribution of health facilities, particularly for the rural areas.

Inasmuch as the health resources, including additional resources needs for the country are broken down on the basis of Northern Regions and Southern Region, this section will be presented in a similar fashion.

##### 1. Northern Region

The following (Table IV-5) is a breakdown of the facilities as to type, existing and additional facilities needed for the plan period (1977-1984).

TABLE IV-5

<u>Type</u>	<u>Existing</u>	<u>Needed*</u>		<u>Total*</u>
		<u>New</u>	<u>Renovated</u>	
PHCU**	1,195 (DS)	943	1037	1980
Dispensaries	470	47	349	396
Hospitals	103 (70 urban)	--	--	--
Hospital Beds	12,045 (10,839 urban)	--	--	--
Health Centers	152 (93 urban)	--	--	NA***
Blood Banks	18	--	--	NA
Nursing Schools	47	32	--	88
Village Midwives Schools	14	1	--	15
Health Visitor Schools	3	--	--	NA
Medical Assistant Schools	3	--	--	NA
Specialized Hospitals	35	--	--	35
Public Health Labs	4	--	--	NA
Endemic Disease Units	3	--	--	NA

\* Projected only for peripheral facilities - PHCU and Dispensaries

\*\* Primary Health Care Unit (Formerly called a Dressing Station (D.S.))

\*\*\* Ministry of National Planning projects for entire country the following additional facilities to be constructed by 1984: Hospitals, 46; Specialized Hospitals, 25; Health Centers, 123; Blood Banks, 30; P.H. Labs, 5; Endemic Disease Units, 18. Location, North or South, not indicated.

a. Urban facilities

A total of 248 Health facilities exist in the 112 urban areas of the four provinces of the Northern Region. Of this number, more than one-fourth of the facilities are hospitals with an average bed capacity of 155. Of the remainder, approximately half are urban health centers, one-quarter dispensaries and the remaining one-quarter are dressing stations.

b. Rural facilities

For the rural areas it should be noted that the predominant health facilities are the dressing stations (1195), followed in order by dispensaries (470), health centers (59), and rural hospitals (33). The average rural hospital has approximately 37 beds

c. Density/Accessibility

When one examines the average density of health facilities for the entire Northern Region (both urban and rural), it is noted that there is one health facility per 1,815 square kilometers (uninhabited areas excluded). It should be stated, for convenience of interpretation, that this area represents a circular area with a radius of approximately 10 miles. It should be kept in mind, however, that the distribution of delivery points of the health facilities are by no means uniform or regular.

The Central Region provides a much higher level of accessibility to health facilities to the population than the other three regions, from the standpoint of facilities per square area. On the other hand, if one considers accessibility on a population basis, it is noted that the Northern Province leads all in facilities per 10,000 population.

The Eastern and Western Regions suffer the lowest levels of accessibility for the Northern Regions.

## 2. Southern Region

The Southern Region comprises approximately one-fifth of the total population of Sudan (3.0 million versus 15.0 million) and one-third of the total provinces (6 out of 18). For the most part, the Southern Region lags behind the Northern Region in terms of coverage of the population by health facilities. The following is a listing of the various health facilities in the Southern Region.

TABLE IV-6

<u>Type of Facility</u>	<u>Existing</u>	<u>New Const.</u>	<u>Total (in 1984)</u>
PHCU	189	519	708
Dispensaries	80	61	141
Hospitals	30	--	*
Hospital Beds	3,298	--	*
Health Centers	12	--	*
Dressing Stations	229	0	0 (Converted to PHCUs)
Blood Banks	3	--	*

\* See footnote \*\*\* Table IV-5.

TABLE IV-6 (continued)

<u>Type of Facility</u>	<u>Existing</u>	<u>New Const.</u>	<u>Total (in 1984)</u>
Specialized Hospitals	3	--	3
Nursing Schools	11	2	13
Village Midwives Schools	3	3	6
Medical Assist. Schools	1	1	2
Public Health Labs	0	2	2

### 3. Construction Trends

The plan for both the Northern Region and the Southern Region is to provide for major construction of new dispensaries and primary health care units, with construction of hospitals and/or curative facilities being held to levels essential for the coverage of the populations. The construction, renovation and/or conversion of existing dressing stations and construction of dispensaries are planned to support the Primary Health Care Program. The latter program plans to have a Primary Health Care Complex (Dispensary plus 5 satellite Primary Health Care Units) serve 24,000 people.

Distribution of existing health facilities, 1975, by Province for all of Sudan is shown in Table IV-7. Note that the four Northern Regions have been redivided into 12 Provinces, but the Southern Regional Provinces - Equatorial, Bahr el Ghazal and Upper are listed before division into six provinces.

TABLE IV-7

Distribution of Health Facilities 1975  
By Province, All of Sudan, 1975

INDEX	NAME OF ESTABLISHMENT	KHARTOUM PROV.	GEZIRA PROV.	BLUE NILE PROV.	WHITE NILE PROV.	WILE PROV.	NORTH. PROV.	KASSALA PROV.	RED SEA PROV.	NORTH DARFUR PROV.	SOUTH DARFUR PROV.	NORTH KORDOFAN PROV.	SOUTH KORDOFAN PROV.	EQUATORIAL PROV.	BAJR EL GAZAL	UPPER NILE	TOTAL
1	Hospitals	15	16	9	7	10	9	7	4	5	6	7	8	10	10	10	133
	No. of beds	3384	1677	836	667	860	593	1189	606	498	414	1023	569	1279	1050	969	15570
2	Health Centres	33	32	7	4	9	2	12	6	10	3	11	3	4	4	4	144
3	Dispensaries	32	107	24	27	65	63	54	20	16	26	55	28	48	16	33	634
4	Dressing Stations	81	363	126	80	125	115	121	38	38	23	95	66	121	62	46	1505
5	Blood Banks	3	2	2	1	1	3	3	1	1	-	1	1	1	1	1	22
6	Specialist Hospitals	10	5	3	2	2	3	3	1	2	1	2	1	1	1	1	38
7	School Health Services	1	1	1	-	1	-	1	1	1	-	1	-	1	1	1	11
8	Nursing Schools	9	6	4	2	3	4	4	1	2	1	3	4	6	2	3	54
9	Midwives Sch.	2	2	1	1	1	-	2	1	1	1	2	1	1	1	1	18
10	Health Visitors Schools	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	3
11	Med assistants Schools	1	-	-	-	-	1	-	-	-	-	1	-	1	-	-	5
12	P.H. Labs	1	-	1	-	-	-	-	1	-	-	1	-	-	-	-	4
13	P.H. offices	32	25	12	20	13	9	39	20	7	7	10	15	17	7	12	215
14	Endemic Diseases	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	3

#### 4. Medical/Dental/Pharmacy Schools

For the entire country there is one Medical School at the University of Khartoum which graduates an average of 160 physicians per year. There is also a Dental School at the University of Khartoum, and a Faculty of Pharmacy.

#### C. Financial and Budgetary Resources

##### 1. Economic Burden of Disease

##### a. Communicable Diseases

Communicable diseases emanating from poor environmental sanitation comprise the principal health problems of the Sudan and absorb the bulk of public health expenditures. Other avoidable diseases account for the next largest category of health sector burden. The total incidence of these conditions constitutes a serious drain on productivity, output and development.

##### b. Malaria

Malaria is the single most prevalent communicable disease, afflicting upwards of one-quarter of the population. An increasing portion of it is man-made. In the Gezira, Sudan's most capital-intensive agricultural area, the malaria prevalence rate among children increased from 3% in 1962 to 20% in 1974. In addition to mortality among this group, the estimated cost of lost labor among workers due to malaria in the Gezira amounts to over ten percent of the area's total cotton production.

c. Gastro-Enteritis

Gastro-enteritis accounts for over one quarter of the most common non-accident hospital admissions. Its true incidence, both alone and as a complicating factor of other diseases, is several times greater; and the economic cost of treatment and lost productivity from gastro-enteritis, while difficult to determine, is certainly considerable. Man-made bilharzia, a by-product of irrigation and careless sanitation, is spreading rapidly with development -- as is the cost of efforts to control it.

d. Malnutrition and Anemia

Malnutrition and anemia account for one-fifth of the ten most common non-accident admissions to hospitals in 1974. Malnutrition afflicts mainly infants and children. In Khartoum Province, which has the lowest reported rate of malnutrition in the Sudan, one-third to one-half the pre-school children examined in a recent survey suffered observable protein-calorie malnutrition. The indirect economic burden of infant malnutrition is evidenced in irreversible impairment of mental development affecting motor functions and sensory perception, physical retardation, learning difficulties, and complications with normally controllable infections which can render them lethal.

2. Limitation of Health Resources

The health resources available to improve health and nutrition status are qualitatively mixed, most often inadequate,

and in any event maldistributed. While the physician/population ratio for the Sudan is higher than in most African countries, half the physicians reside in Khartoum and Gezira provinces. Southern and Western provinces are disadvantaged in every category of health resource. The South particularly lacks infrastructure, planning and administrative expertise, and logistical support necessary even to absorb enough resources to bring that region to the level of Northern provinces.

### 3. Health Budgeting

The impact of poor health on economic development has not been neglected in the Second and Third Development Plans. The public health share of the GOS budget has remained a fairly constant ten percent. During the past five years health sector capital investment has increased at an average rate of nearly 20 percent, and recurrent expenditure at an average rate of nine percent; which, even allowing for inflation, has increased the availability of health resources relative to population. Over that period the Sudan increased its total numbers of hospitals and health centers by half, the number of hospital beds by 13%, the number of dispensaries by about 20% and the number of dressing stations by nearly 70%. However, the GOS attention during the Second Development Plan was focused on curative services.

The Third Development Plan now underway places major emphasis on preventive health, immunization and promotional activities relating to environmental sanitation and personal hygiene; and attempts to provide more equitable balance to health resource deployment.

Current and proposed public health allocations, and external funding requirements for reaching scheduled growth targets, are shown in the tables below. (Note: the general revenue contribution to provincial health expenditures is about 75%, the remainder being made up from local property taxes, licenses, and taxes on local profits and specific products.)

TABLE IV-8

## SUDAN HEALTH BUDGET, 1970/71 TO 1974/75 (LS)

Year	MOH Development Expenditure	Recurrent Expenditure		TOTAL
		Min. of Health	Min. of Local Government	
1970/71	1,470,000 (9.6%)	7,910,532 (51.4%)	6,000,000 (39.0%)	15,380,532
1971/72	1,650,000 (9.9%)	9,029,902 (54.1%)	6,000,000 (36.0%)	16,679,902
1972/73	2,212,607 (12.4%)	9,631,403 (54.0%)	6,000,000 (33.6%)	17,844,010
1973/74	2,417,461 (12.4%)	11,022,935 (56.7%)	6,000,000 (30.9%)	19,440,416
1974/75	3,052,586 (13.7%)	4,770,860 (21.4%)*	11,521,691 (65.0%)*	22,345,137

\* Represents shift in ministry responsibility

Source: GOS, National Health Programme 1977/78 - 1983/84 (Blue Book) (Khartoum, 1975)

TABLE IV-9

MINISTRY OF HEALTH ESTIMATES OF PROGRAM COSTS FOR THE  
NATIONAL HEALTH PROGRAM, 1976/77 - 1983/84

PROGRAM	ESTIMATED COSTS, LS. 000's (1975 LS.)		
	Development	Training	Recurrent
1. Malaria, endemic	320	-	1,305
2. Malaria, man-made	-	-	2,529
3. Primary Health Care			
a. Services	16,787	207	6,759
b. Health Education	244	124	48
c. Immunization	Unit cost = 20 piasters per immunization		
d. Nutrition	-	-	1,219*
e. Gastro-enteritis	2,532	-	277
f. Tuberculosis	-	-	184
g. Trypanosomiasis	55	-	45
h. Kala-azar (Phase II)	31	-	19
4. Bilharzia, man-made	-	-	874
5. Potable water (pilot project)	7	-	8
6. Environmental Health	Subject to program formulation		
7. Food supplements	31,750	-	-
8. Onchocerciasis	236	-	115

\* Based on local production of parental rehydration fluids.

If fluids imported, nutrition cost becomes LS. 3,359 Thousand.

Source: GOS, National Health Programme 1977/78 - 1983/84,  
 (Khartoum, 1975) (Blue Book)

TABLE IV-10

MINISTRY OF HEALTH ESTIMATES OF DEVELOPMENT AND RECURRING COSTS FOR THE  
PRIMARY HEALTH CARE PROGRAM, 1976/77 - 1983/84, BY REGION (LS. THOUSAND)

REGION	*	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84
Southern	D	911.5	331.8	260.9	299.2	298.0	302.0	298.8	1.2
	R	734.0	789.3	999.9	1,117.4	1,258.8	1,394.9	1,511.2	1,503.7
Western	D	19.8	537.1	463.8	524.1	504.3	291.4	123.3	12.0
	R	73.2	925.2	1,263.3	1,566.4	1,857.1	2,115.7	2,286.9	2,388.6
Eastern	D	5.4	118.7	67.9	98.3	105.4	95.1	6.2	1.4
	R	26.9	314.8	436.3	536.2	626.2	711.5	755.6	765.0
Northern	D	9.0	74.0	-	-	-	-	-	-
	R	19.4	232.4	290.0	339.2	350.6	347.6	347.6	347.6
Central	D	18.0	319.0	207.8	302.6	322.1	313.7	161.3	11.3
	R	38.8	910.1	1,232.2	1,471.3	1,681.4	1,885.5	2,047.1	2,101.6
TOTAL	D	963.7	1,380.6	1,000.4	1,224.2	1,229.8	1,002.2	589.5	25.9
	R	892.3	3,171.8	4,221.7	5,030.5	5,774.1	6,455.2	6,948.4	7,106.5
Compound Inflation Factor @ 6.5% **		1.000	1.065	1.134	1.208	1.286	1.370	1.459	1.554
TOTAL incl. Inflation @ 6.5% **	D	963.7	1,470.3	1,134.4	1,478.8	1,581.5	1,373.0	860.2	40.2
	R	892.3	3,378.0	4,787.4	6,076.3	7,425.5	8,843.6	10,137.7	11,043.5

\* D = Development Costs; R = Recurring Costs

\*\* MOH inflation rate estimate based on Ministry of Finance trend data. Actual inflation rate during 1975 - 77 has been 20% or more.

Sources: GOS, Primary Health Care Programme for the Southern Region of Sudan (Juba, 1976) (Green Book)  
GOS, Primary Health Care Programme for the Eastern, Northern, Central and Western Regions of the Sudan (Khartoum, 1976) (Brown Book).

TABLE IV-11

Allocations of Health Sector Programmes and Projects in the Six-Year Plan  
Ministry of Health

	Total Cost/ Project	Total of 6-Year Plan Appropriations/ Project	Foreign Currency Needed Project
<b>I On-going Projects</b>			
3 health centres	86,000	86,000	52,000
6 health groups	192,000	192,000	137,000
8 hospitals	512,000	512,000	320,500
The Rural Laboratory at Juba	422,000	422,000	290,000
<b>Subtotal</b>	<b>1,212,000</b>	<b>1,212,000</b>	<b>799,500</b>
=====			
<b>II New Projects: preventive medicine</b>			
Health centres	6,624,000*	2,304,000	1,311,000
Social health groups	808,000	808,000	613,000
Groups specialized in endemic & epidemic diseases	1,386,000	1,386,000	991,000
Units specialized in epidemic and endemic diseases			
a) T.B.	198,000	198,000	144,000
b) Malaria	1,608,000	1,608,000	1,407,000
Nutritional units & mobile units			
a) Nutritional	144,000	144,000	114,000
b) Mobile	540,000	540,000	540,000
The combat of Jur Blindness	1,500,000	1,500,000	-
Fridges for vaccines	342,000	342,000	342,000
Occupational health units	140,000	140,000	92,000
Quarantine measures	98,000	98,000	610,000
Extension of manu- factured limbs factory	41,000	41,000	25,000
<b>Subtotal</b>	<b>13,429,000</b>	<b>9,109,000</b>	<b>6,189,000</b>
=====			

\* Out of which 4,320,000 self-help costs.

a) Horizontal Expansion:

The establishment of new hospital beds capacity	3,800,000**	180,000	1,192,860
The establishment of 7 multi-storey wards	1,504,000	1,504,000	1,034,000
The establishment of 190 wards	5,956,000***	5,236,000	2,161,000
The establishment of 25 narrowly specialized units	850,000	850,000	543,000
The establishment of 40 dental units out of which 5 are mobile	827,000	827,000	6,816,000
The establishment of 7 operating theatres	164,000	164,000	108,000
The establishment of 7 pharmacies	28,000	28,000	7,000
The establishment of 22 X-ray theatres	852,000	852,000	771,000
The establishment of medical laboratories	237,000	237,000	109,000
The provision of 30 blood banks, plus machinery & equipment	183,000	183,000	183,000
<u>Vertical Integration:</u>			
Additional hospital machinery & equipment	200,000	200,000	125,000
The extension of the Tropical Medicine Hosp.	180,000	180,000	115,000
The extension of Tigani El Mahi Hospital	30,000	30,000	21,000
The establishment of 10 out-patient units	300,000	300,000	100,000
The establishment of 25 theatre rooms	200,000	200,000	132,000

\*\* Ls 2,000,000 is from self-help.

\*\*\* Ls 72,000 is from self-help.

The procurement of physiotherapy equipment	50,000	50,000	40,000
The renewal of 4 educational hospitals' laundry and kitchen equipment	130,000	130,000	82,000
The establishment of 6 laundries & kitchens	180,000	180,000	114,000
The establishment of 17 hospital enclosures	65,000	65,000	39,000
The establishment of 8 sewerage networks	90,000	90,000	54,000
The establishment of 33 schemes for hospital water & electricity	300,000	300,000	211,000
The establishment of 15 vital statistics offices	55,000	55,000	27,000
The establishment of 18 health commissioners offices	90,000	90,000	49,000
The establishment of 68 statistics offices	30,000	130,000	63,100
<b>Subtotal</b>	<b>16,401,000</b>	<b>12,061,000</b>	<b>14,096,960</b>

#### IV New Projects, Training Centers:

Environmental health service centres	6,049,000	6,049,000	3,487,500
Primary health care services	600,000	600,000	375,000
Medical supplies	1,000,000	1,000,000	682,000
Medical assistant schools	180,000	180,000	133,000
Extension of dental assistant schools	60,000	60,000	39,500
The establishment of 4 health supervisor schools	92,000	92,000	66,445
Physiotherapy school	60,000	60,000	38,570

Vital statistics training centre	50,000	50,000	31,500
The establishment of 34 nursing schools	272,000	272,000	153,000
The establishment of 4 nursing midwifery schools	160,000	160,000	112,000
The establishment of 5 village midwifery schools	225,000	225,000	155,000
The establishment of 5 health visitors schools	300,000	300,000	190,000
The establishment of 4 assistant health visitors schools	160,000	160,000	104,000

---

Subtotal	9,208,000	9,208,000	5,567,515
----------	-----------	-----------	-----------

---

Houses for messes & hostels	730,000	730,000	438,500
Feasibility study for a vaccine factory	2,500,000	50,000	50,000
Allocations for self-help support	1,000,000	1,000,000	625,000

---

Subtotal	4,230,000	4,230,000	1,113,500
----------	-----------	-----------	-----------

---

Total cost and allocations for new projects	43,268,000	34,608,000	26,966,705
---	------------	------------	------------

Total allocations for on-going projects	1,212,000	1,212,007	799,500
---	-----------	-----------	---------

---

Total cost and allocations for new and on-going projects	44,480,000	35,820,000	27,766,205
--	------------	------------	------------

---

D. Other Donor Support for Health Sector

At the time of the Team's visit there was no one place where information on donor support could be obtained. A coordinating mechanism had not been established within the GOS, nor had the function been assumed by any one international donor agency.

Part of the difficulty in obtaining more complete information is that a large number of philanthropic/religious organizations from several countries have small assistance projects in various, scattered areas, especially in the Southern Region. These projects are known to counterpart groups, but the basic information is not channeled to a central point and registered for reference by other interested organizations or agencies.

Thus, the following listing reflects donor assistance from major donor agencies only.

Note Table IV-11 in the previous section, IV-C, Financial and Budgetary Resources, which indicates foreign currency requirements for on-going and new projects in the six-year plan, 1977-1983.

TABLE IV-11. OTHER DONOR SUPPORT FOR HEALTH SECTOR

<u>Project/Activity</u>	<u>Source</u>	<u>Amount</u>	<u>Nature of Assistance</u>
Project support	WHO	\$834,530	Regular budget for malaria, communicable diseases, training, technical assistance, workshops, training equipment for health plan; vital statistics.
Project support	UNICEF	\$680,000	Regular budget for health plan including immunization, instruments, vehicles. (one truck per province)
Special assistance	UNICEF	\$4,109,000	Health plan implementation, including \$309,000 for nutrition and \$2 million for rural water supply.
Technical assistance	UNDP	\$1,180,000	Short term consultants to assist medical and dental schools, and to train six public health nutritionists (1974-78).
Health facilities	UNHCR	\$3,125,400	Rehabilitation and construction of health facilities in Southern Region.
Training	Oxfam	\$105,000	Training of Nomad health assistants in North Kordofan.
Food for work	WFP	\$250,600	Food items for training and self help construction and renovation.
Bilharzia control	U.K.	\$72,000	Airspraying and equipment, 1975-78.
Equipment	U.K.	\$54,000	Equipment for blood transfusion and pediatric department, 1975-78.
Training	West Germany	Unspecified	Personnel training in Southern provinces.
Fellowship	U.K.	\$4,000	Orthopedic surgeon training 1975-78.

<u>Project/Activity</u>	<u>Source</u>	<u>Amount</u>	<u>Nature of Assistance</u>
Rural health	Norway	\$5.5 Million	Construction of rural health facilities; health-related activities in integrated rural development project in Eastern region.
Rural health	Egypt	Unspecified	Technical assistance in rural health care.
Primary health care	Norad and Norwegian Church	\$112,000	Auxiliary health worker training.
Health component of development projects	IBRD	Unspecified	Health facilities construction, potable water, bilharzia and malaria control, as part of IBRD-assisted economic development.
Infrastructure	EEC	Unspecified	Part of \$66 million Indicative Planning Figure for infrastructure development.
Trypanosomiasis control	Belgium	\$2 million	Spraying and equipment.
Pharmaceuticals	Iran	\$1 million	Provision unspecified drugs.
Pharmaceuticals	India	\$10,000	Drugs and primary care equipment.
Pharmaceuticals	Pakistan	\$25,000	Drugs and hospital equipment.
Equipment	Netherlands	D.Fl.2 million	Instruments, equipment, potable water supply.

## V. MAJOR HEALTH PROBLEMS

## V. MAJOR HEALTH PROBLEMS

### A. Maternal and Child Health Problems

#### 1. Maternal Health

The female population of the Sudan in 1972/73 was estimated to be over 8 million. Almost half of these women were in the reproductive age range (14-45). It has been estimated that about 2 million women are pregnant annually in Sudan. Approximately 735,000 deliveries occur each year (based on a crude birth rate of 49/1000 population)

##### a. Health Risks for Women

Besides the usual diseases that affect adults, pregnant women in Sudan are at risk for several additional health problems. These are:

- Malnutrition and anemia
- Hemorrhage
- Toxemia
- Puerperal sepsis
- Obstructed labor
- Infectious hepatitis.

At Omdurman Hospital, there are 186.6 cases of hemorrhage of pregnancy and childbirth per 1000 reported uncomplicated deliveries. Other complications of pregnancy, childbirth, and the puerperium account for 207.1 cases per 1000 uncomplicated deliveries.

These complications occur more often in younger pregnant women (age 15-25 years) than in older pregnant women. Other complications are also more prevalent in younger women.

despite the fact that the ratio of normal deliveries among women below 25 years to those above 25 years was 1.4:1.0.

b. Maternal Mortality/Pregnancy Wastage

Maternal mortality is estimated to be 2/1000 in Sudan, as compared with a rate of 0.03/1000 in developed nations. Pregnancy wastage is also thought to be very high (estimated ratio of stillbirths to livebirths is 1.08%). An additional 14% of all pregnancies end in spontaneous abortions. Both the figures for stillbirths and spontaneous abortions are thought to be low because of gross under reporting.

A number of factors are related to the high maternal mortality and fetal wastage. Health care in the Sudan is primarily aimed at curing disease rather than preventing illness. Thus, there is practically no antenatal care for mothers (see discussion below). Further, there is high illiteracy, lack of safe water, poor housing and limited sanitation.

c. Myths and Magic

In addition to these factors, communications and transportation are difficult, and accessibility to services is sometimes severely restricted. Further, in the absence of more modern medical care, traditional myths, magic, taboos and superstition play an important role in the approach that rural people take towards pregnancy. For example, the prevention of miscarriage is thought to be enhanced by a beaded string tied around the pregnant abdomen. Post maturity is thought to be avoided by having the pregnant woman pass under a camel.

Maternal health is also affected by:

- Short interpregnancy spacing;
- Large family size; and
- Poor nutritional habits during pregnancy.

d. Infertility and Female Circumcision

Two additional conditions affecting pregnancy in women should be mentioned--infertility and female circumcision. Recent studies of two tribes in Western Equatoria, the Makraka and Zande, have confirmed a high incidence of infertility. The most common clinical findings associated with infertility were:

- Pelvic inflammatory disease in 40% of women examined and blockage of the fallopian tubes in 58%. Venereal disease was found to be particularly prevalent among the tribes that were studied, even though the positive identification of specific organisms such as gonococci was low.
- Filariasis. Filariasis was endemic in the tribal area, and evidence was found that suggested filarial obstruction of the fallopian tubes.

Several conditions not associated with infertility were:

- polygyny
- contraceptive usage
- malaria
- sleeping sickness.

With regard to female circumcision, a recent study by Suleman Modawi (1974) showed that this is still a common practice in Sudan. This is a habit intimately associated with tribal customs, superstitions and religious beliefs. Four types of operation are known:

- Sunna circumcision or clitorrectomy is a legal operation recommended by Islam. It involves excision of the glans clitoridis and sometimes a small portion of the clitoridis.
- Pharoanic circumcision or infibulation is the narrowing or closing of the introitus to promote chastity and protect the virginity of girls by making forced intercourse impossible. It consists of amputation of the clitoridis, excision of parts of the labia majora and minora and closure of the wound around a match stick to allow the development of a fistula for urination. This operation is illegal and prohibited by Islam.
- Modified Pharoanic circumcision leaves the labia majora intact. It is illegal, but is thought to be the most common type of female circumcision performed today.
- Recircumcision and reinfibulation is performed on widows, divorcees and women after repeated childbirth.

As a result of these operations, a number of complications can be expected including:

- hemorrhage;
- injuries to the urethra and the perineum;
- infection;
- urinary tract infections and subsequent kidney damage;
- obstruction to labor and complication of normal delivery;
- trauma to the newborn; and
- psychological complications.

In 1946, the Legislative Assembly in Sudan passed a law making Pharoanic circumcision an offense punishable by fine and imprisonment. This law has not been effective in dealing with the problem of female circumcision. This practice appears to be dying out, however, because of better education, more available medical services and social reforms.

## 2. Child Health

### a. Infant Morbidity and Mortality

In Part II of this Health Sector Assessment, it was noted that the Sudan has an estimated infant mortality rate of between 135 and 145 infant deaths per 1000 live births. This figure varies considerably from region to region. Unpublished data from a sample survey conducted in four Northern provinces indicate that the infant mortality rate for Khartoum is less than 100. Sample surveys performed in urban areas during 1964-1966 showed an even lower infant mortality rate of between 59.0 and 78.8 (see Table V-1). These rates are similar to those seen in other developing countries.

TABLE V-1

Vital Statistics in Urban Areas 1964/66  
Births, Deaths and Infant Mortality

	Population	Per 1000 Population			Infant Mortality
		Crude Birth Rate	Crude Death Rate	Excess Birth over Death	
Large Urban Sector	760,430	39.4	8.6	30.8	78.8
Small Urban Sector	721,630	40.7	11.6	29.1	59.0
	1,482,060	40.0	10.1	29.9	69.3

Source: Department of Statistics quoted in Modawi, O., "Evaluation of Maternal Care in Sudan," Proceedings of the Third Congress of Obstetrics and Gynecology, p. 18-45, Khartoum University Press, Khartoum, 1974.

While sufficient data are not available, the morbidity and mortality rates in children under the age of 5 are believed to be high. This is especially so in the second and third year of life, due to malnutrition and infections.

The causes of the high infant and child morbidity and mortality rates in Sudan are believed to be:

- Malnutrition and anemias due to poor weaning and feeding practices (discussed separately in item 3 below);
- Infections, especially diarrhea and chest infections;
- Other communicable diseases (e.g., measles, polio, whooping cough, tetanus, diphtheria);
- Prematurity due to maternal "depletion" and other factors; and
- Rheumatic fever.

Evidence to support this contention is available from hospital morbidity and mortality statistics (see Table V-2). While it is difficult to draw an accurate picture of what is occurring in more rural areas of the country, it is obvious that infectious diseases, communicable diseases and malaria play a significant role. The unavailability of health services also are a major factor.

The distribution of reported cases of gastroenteritis between 1965 and 1974 is shown in Table V-3.

b. Health Problems of Newborn

A recent study on the main health problems among newborns seen at Khartoum Hospital during 1972 showed:

- Low birth weight in 17.9% of newborns;
- Relatively low incidence of Rh isoimmunization; and
- An overall mortality of 7.4% of which 4.8% was in newborn of low birth weight.

The leading causes of death among these newborns who died in Khartoum Hospital were:

- respiratory distress syndrome;
- gastroenteritis;
- congenital abnormalities; and
- cerebral hemorrhage.

TABLE V-2

Incidence of Common Diseases and Death from Hospital Statistics - 1974

DISEASES	0-1				1-4				5-14			
	Cases		Deaths		Cases		Deaths		Cases		Deaths	
	M	F	M	F	M	F	M	F	M	F	M	F
Malnutrition and anemia	1328	1137	679	455	2714	1880	617	605	2714	1880	464	556
Respiratory and Measles	752	745	297	280	6345	5763	465	460	1431	1732	344	354
Gastroenteritis	2582	1916	475	557	3637	3248	545	462	900	828	265	202
Heart and Circulatory	990	874	259	235	979	844	227	221	925	921	224	231
Infectious Hepatitis	49	46	13	14	40	29	18	7	101	71	28	16
Cancer	164	218	16	12	39	42	12	19	49	46	13	13
T.B.	680	542	158	144	571	564	120	108	626	624	102	101
Malaria	1405	1381	137	144	1538	1492	134	108	1727	1686	138	130
C.S.M.	203	326	4	34	628	323	56	32	1146	614	80	16

TABLE V-3

GASTROENTERITIS OF CHILDREN

PROVINCE	65/66	66/67	67/68	68/69	69	70	71	72	73	74
Blue Nile	106,257	101,365	106,768	115,858	118,755	127,150	126,978	127,885	131,082	134,359
Khartoum	32,949	31,403	32,941	35,893	36,791	39,262	39,213	39,619	40,610	41,625
Northern	27,502	26,236	28,061	29,987	30,736	33,310	33,253	33,100	33,927	34,775
Kassala	31,252	29,813	31,900	34,076	34,929	37,878	37,813	37,613	38,554	39,517
Red Sea	13,751	13,118	13,894	14,993	15,368	16,529	16,504	16,550	16,964	17,388
Darfur	60,237	58,036	60,853	66,335	67,993	72,538	72,448	73,221	75,050	76,927
Khartoum	61,671	58,831	63,552	67,243	68,924	75,303	75,156	74,223	76,079	77,982
Upper Nile	22,502	21,465	23,578	24,535	25,148	27,846	27,781	27,082	27,759	28,452
Equatoria	20,835	19,875	22,266	22,717	23,284	26,196	26,122	25,075	25,702	26,345
Bahr El Ghazal	29,169	37,266	39,705	42,709	43,776	47,202	47,128	47,142	48,320	49,528
<b>TOTAL</b>	<b>416,695</b>	<b>397,508</b>	<b>423,518</b>	<b>454,346</b>	<b>465,704</b>	<b>503,213</b>	<b>502,396</b>	<b>501,510</b>	<b>514,047</b>	<b>526,898</b>

While statistics are not available, it can be assumed that several diseases and conditions seen in other developing countries are also a health problem in Sudan. These include:

- Birth trauma which can be expected when traditional birth attendants use methods of delivery which are damaging, toxic or inappropriate.
- Tetanus of the newborn occurs when the mother has had inadequate or no immunization against tetanus, when the infant's umbilical cord is aseptically cut, and when the umbilical care is inadequate. In some developing countries, 20-40 percent of neonatal deaths are due to tetanus.
- Septicemia of the newborn is common in countries where incisions are made on newborns and there is subsequent exposure and infection.
- Prematurity and low birth weight are found where the mother's health is poor, when uncontrolled endemic diseases are present and in the presence of maternal malnutrition and anemia.
- Accidents such as burns, injuries, scalding and poisoning are common causes of morbidity and mortality among infants and children (they are the leading cause of death in the U.S. among children 1-15 years of age).
- Communicable and infectious diseases (see Section V.B.).
- Parasitic diseases (see Section V.C.).

### 3. Malnutrition

Among all pregnant women in Sudan, it has been estimated that between 20-70 percent have a hemoglobin level of less than 8 grams. This indicates a significant level of iron-deficiency anemia. It is felt that the primary cause of the anemia is poor intake of iron, folic acid and vitamins. Thus, the anemia among pregnant Sudanese women can be classified as a form of malnutrition.

#### a. Nutritional Status - Infants and Children

Data on the nutritional status of Sudanese infants and children are limited. In one study reported in 1973, 300 children from 0-5 years of age were studied in several health centers near Khartoum and Omdurman. The results showed that some degree of malnutrition was present in between 33-58% of the children (see Table V-4). The group most affected were 1-3 years of age.

In another study done in the Khartoum pediatric unit (1966), malnutrition was diagnosed in 10% of the total admissions.

TABLE V-4

Age	Number Examined	Normal %	Malnutrition		
			1st grade %	2nd grade %	3rd grade %
0-1 year	82	56	30	12	2
1-3 years	116	42	36	18	4
3-5 years	102	67	24	8	1

Source: Sanouri, N.Y. and GABR, E.H.A., "Nutritional Status and Dietary Pattern of Infants and Pre-School Children in Khartoum." Proceedings of the First National Food and Nutrition Seminar, Tamaddon Press, Khartoum, 1973.

In a third study, again in the Khartoum-Omdurman area, the growth curves of children from economically under-privileged families were compared with those of children from affluent Sudanese families. The data were plotted against the standard Harvard growth curves for children in the Boston, Massachusetts area. (Figure V-1) The results showed that:

- the children from affluent Sudanese families had a slightly higher body weight than the Boston children; and
- the children from under-privileged Sudanese families had a somewhat lower body weight than the other two groups.

Based on the above rather limited information, the National Health Program estimates that 50% of all Sudanese children between the ages of 0-4 in 1973 had some degree of malnutrition. This represents approximately 1.5 million children, of which about 30,000 were estimated to have severe malnutrition.

b. Causes of Malnutrition

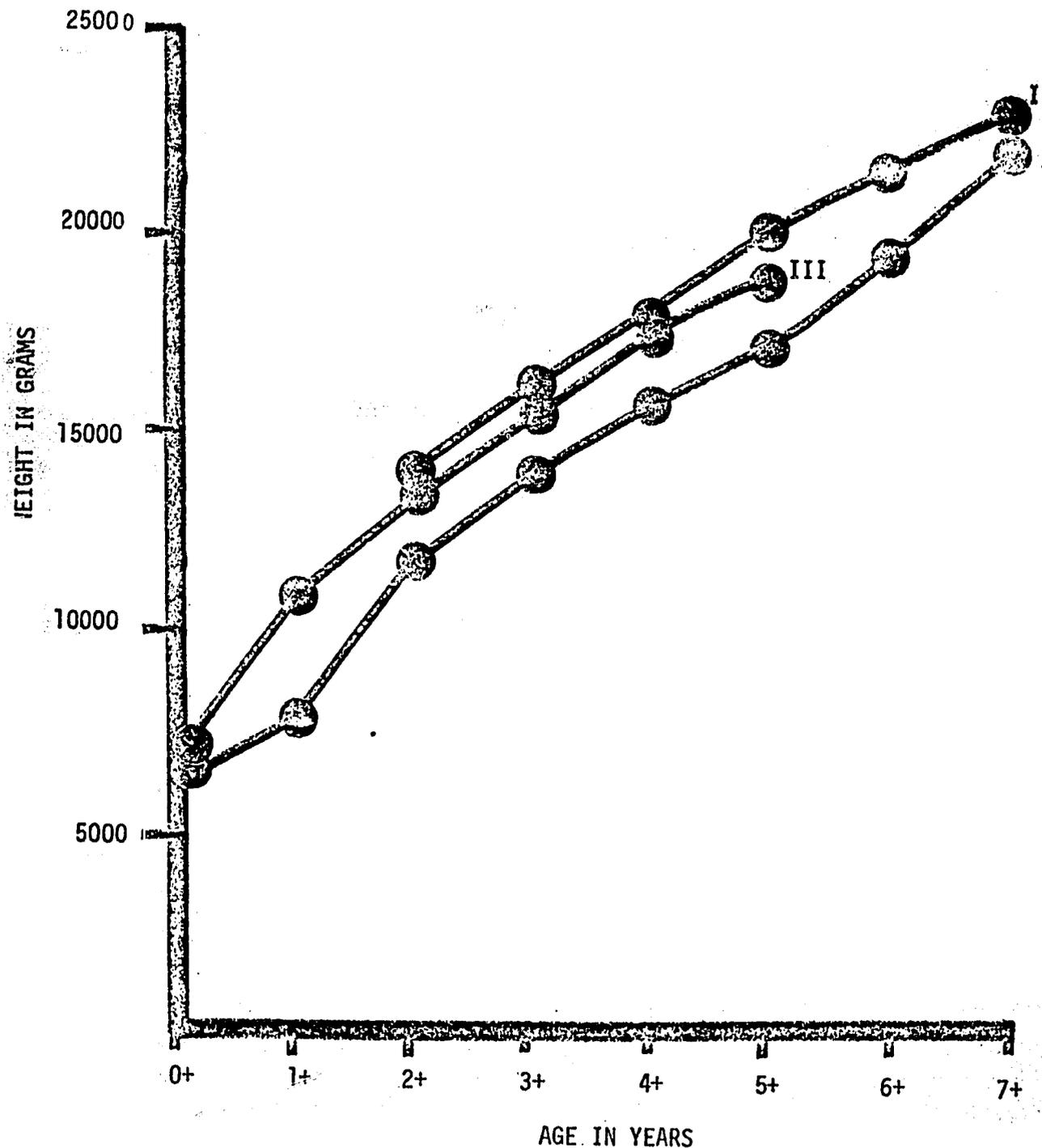
The causes of malnutrition in infants and children have been discussed by several authorities. Jelliffe (1968) reported that prolonged breast feeding for the first two years of life was common in southern Sudan. As the sole source of proteins, calories and vitamins, breast milk is inadequate after the age of 8-9 months.

May (1970) commented on the Sudan's overall self-sufficiency in food. He pointed out, however, that the

Figure V-1

Sudanese Children Growth Curve  
 Compared with Standard Growth Norm Curve

- I. Children from economically under privileged families
- II. Children from affluent families
- III. Normal growth curve based on Harvard Data



Source: Sanouri, N.Y. and GABR, E.H.A., "Nutritional Status and Dietary Pattern of Infants and Pre-School Children in Khartoum". Proceedings of the First National Food and Nutrition Seminar, Temaddon Press, Khartoum, 1973.

distribution and utilization of food was unsatisfactory. Cultural and seasonal factors (especially as related to polyvitamin deficiencies) also contributed to malnutrition among both adults and children.

More recently, Omer (1973) described the following additional factors related to malnutrition:

1) Family size. The first child is at risk because of the mother's inexperience in feeding. Subsequently, after a family has grown to above seven or more, the demand for food outpaces its supply.

2) Maternal deprivation. Death, separation or chronic illness of the mother is of critical importance to the nutrition of the newborn and infant.

3) Repeated infections. These frequently precipitate malnutrition, and are themselves more common in malnourished children.

4) Weaning practices. 60% of lactating mothers in Sudan wean their children suddenly when they discover that they are pregnant. This is because they believe that breast milk is harmful to the baby during pregnancy. In addition, 35% of babies are breast fed until the age of two years. This is about 15-18 months beyond the optimal period when breast milk is sufficient as the sole food source for babies.

5) Social factors. The average height and weight of infants in Khartoum varied directly with the level of education of the parents. Another social factor involves cattle which are such a highly prized status symbol among some tribes that their meat is not used as a source of protein.

6) Lack of knowledge. Taboos about food include withholding of eggs for fear of delayed speech, and withholding of milk and fish to prevent leucodermia. It is also reported that there is often prolonged dietary restriction when a child is ill, especially with diarrheal disease. In addition, it is a common practice to give the best food to the male adults, and to feed children what is left.

#### 4. Family Planning

##### a. GOS Position

Sudan does not have an official population or family planning policy. For the reasons previously discussed in Section II of this Health Sector Assessment, the government's approach to these issues is unclear. On the basis of somewhat limited data, however, it is apparent that there is a need for family planning in Sudan. Some of the key indications are:

- Rapid population growth rate
- High birth and infant mortality rates:
- Apparent high fetal wastage (i.e., stillbirths and spontaneous abortions);
- High percentage of the population under 15 years of age;
- High maternal mortality rate; and
- High levels of infertility in some areas of the South

##### b. KAP Study/Findings

Only one formal Knowledge, Attitudes and Practices (KAP) study has been performed in Sudan. This was done

in 1972 at Arbagi, a large village in the Gezira area. While the sample size for the study was only 295 women, some interesting findings were reported:

- 88% of the women were aware of family planning, even in the absence of any systematic motivational or educational program;
- 43% accepted the concept of family planning because of its positive effect on child care, health and family economics;
- 50.8% of the women rejected family planning for religious reasons, because of their husband's opposition or because of its cost. A third of these rejecting family planning felt that it was a danger to the health of the mother because as long as a woman gave birth, she was considered young; and
- 10% of the married women in the fertile age group practiced family planning.

Obviously, the Arbagi study is too limited in its scope and magnitude to permit any nationwide inferences to be drawn. The absence of other KAP studies is significant, because they serve to guide the planning, implementation and evaluation of family planning programs. This is especially true in countries such as Sudan which have a diversity of ethnic and religious groups with a multiplicity of attitudes towards family planning.

A study of women attending family planning clinics in 1972-73 indicated that 60% were interested in child spacing and 38% wanted termination of reproduction.

c. FP Activities

Despite the absence of more information and any strong directives from the government, some limited family planning activities have begun in Sudan. These include:

1) Formation of the Sudanese Family Planning Association in 1965 as a voluntary social agency. Family planning services are provided in the context of a maternity-centered program. Using government provided facilities and with the participation of government physicians, health visitors and clerks, the number of centers has grown to 31 in Khartoum and the surrounding provinces.

2) The inclusion of family planning as part of MCH services in the DRS's 1970/71 - 1974/75 Five Year Plan. The submission to WHO, UNDP and UNFPA of an official government request for the development and implementation of a family planning project. This project began functioning in 1976. By the end of that year, 5 MCH/FP clinics were providing services, 5 short-term training fellowships were sponsored and six seminars had been conducted. No data were available on the number of patients who had actually received family planning services.

3) The implementation of a study on incomplete abortion. This work is being conducted jointly by the Ministry of Health, the University of Khartoum and the Population Center of the University of North Carolina.

4) The initiation of a training project for nurse midwives. This activity is being funded by the Planned Parenthood Federation of America.

5) The introduction of sterilization into Khartoum North Hospital. During the past 2 years, 40 patients have had vaginal sterilization operations, of whom 50% did so because they had 9 or more living children.

Thus, in the absence of any policy directives from the government, but with its tacit approval and cooperation, family planning services are being introduced into Sudan. Emphasis is on the child and the family, and the services are provided in a maternal-child health context.

Several national agencies are involved in this effort including:

- Ministry of Health
- Ministry of Social Welfare
- Ministry of Information
- The University of Khartoum
- The High Institute of Nursing
- The Medical Research Council.

## B. Communicable and Infectious Diseases

Communicable, infectious and endemic parasite diseases represent the most common health problems in Sudan. These diseases are often related to malnutrition and poor environmental sanitation. These diseases most commonly affect children and account for the majority of morbidity and mortality of infants and children, particularly when associated with malnutrition and anemia in regards to infant mortality.

The major communicable and infectious diseases are measles, tuberculosis, enteric diseases, polio, pertussis, cerebrospinal meningitis and hepatitis. Statistical data on most of these is inaccurate in many instances, due to such factors as under-reporting and use of symptom-diagnoses rather than laboratory-diagnoses.

### 1. Tuberculosis

Through the use of BCG vaccine, it is reported that there has been a 35% decrease in the number of TB cases reporting to hospitals (404,000 to 263,750) during the period 1968-1974. On the other hand, it has been reported that 11,666 cases of very severe TB in children (0-14) were hospitalized in 1974. Due to the prevalence of bovine tuberculosis in parts of Sudan, children ingesting unpasteurized milk are most likely affected with miliary, renal or skeletal form of tuberculosis.

Tuberculosis, in spite of some inroads into the problem, still represents a serious health problem in Sudan. It is the third leading cause of illness in Sudan, being only

exceeded by gastroenteritis/dysentery and malaria. Tuberculosis ranked highest in case fatality rate (17.7%) among female patients hospitalized for the ten most common illnesses. Hospitalized males for TB had an 8.8% case fatality rate for the same period.

Morbidity and mortality data on TB are inaccurate and under-reported in most cases. This is in many cases due to the lack of diagnostic facilities (laboratory and x-ray) in most of the rural areas. Even with x-ray facilities being present, in many cases the patients are checked on an out-patient basis (frequently consisting of microscopic examination of a fresh sputum sample only), and are only admitted if sputum examination is positive. This approach is unreliable as a diagnostic procedure, even in ideal circumstances and with well trained technicians.

Although BCG is available and effective for the prevention of TB, it is not being used on a wide scale and on a regular basis. This is primarily due to transport and logistics problems, as well as some infrastructure problems. With the expansion of health services through the Primary Health Care Program, this situation should markedly improve and result in a decrease in morbidity and mortality from this disease.

## 2. Cerebrospinal Meningitis

In spite of periodic outbreaks of this disease, the reported incidence has remained fairly steady over the past several years. It has been reported to average approximately 5% of all cases reporting to health facilities. It ranks lowest

in all categories admitted to hospitals (5.3%). For hospitalized cases of cerebrospinal meningitis, there was reported a case fatality rate of 10% among females between 0-5 years for 1974.

It must be considered that the reporting for this disease is spotty. This is due to lack of available health facilities, particularly hospitals in rural areas. The case fatality rates are reported on hospital admissions for the most part, with most of the non-hospitalized fatalities being unreported. There is an effective vaccine which should control and/or prevent outbreaks of the disease. With the expansion of health services to rural populations and infrastructure strengthening, the magnitude of this health problem should lessen.

#### Measles

This is a major health problem, which primarily affects infants and children (0-5). When measles is associated with malnutrition, this combination represents a leading cause of infant mortality. The reporting of measles, except when there is an epidemic outbreak, is very poor. The statistical reporting of measles cases hospitalized lumps it with respiratory illness. This makes it difficult to determine whether measles occurred either singly, or was associated with respiratory illnesses in this category. For this combined reporting of hospital admissions for 1974, a case fatality rate of 11.5% (740 deaths out of 6,508 cases) for females 0-5. The rates for males of the same age group (0-5) was reported as being 10.7% (762 deaths out of 7,097 cases).

There is an effective measles vaccine available; however, due to logistics and transport problems, coupled with the cold chain factor, it is essentially not available for the majority of rural children, except in mass campaigns. It is believed that with implementation of the primary health care program, as well as the strengthening and improvement of the capability of the immunization program, this condition should be ameliorated.

#### 4. Infectious Hepatitis

This disease poses as a major health problem, and is most often noted in connection with poor environmental sanitation. Of the ten most commonly hospitalized cases, infectious hepatitis was noted to have the second highest case fatality among females (17.4%) admitted to hospitals during 1974. It occurred most commonly among males between ages 14-45 (1101 out of 1457 males) admitted to hospitals in 1974.

#### 5. Others

The problem relating to those infectious diseases which are related to water supply (enteric diseases) are covered under "Endemic Diseases" section.

#### C. Major Endemic Diseases/Environment Health Problems

As might be expected, the list of endemic and potentially epidemic diseases occurring in Sudan is extensive and imposing. Due to the extreme diversity of environmental, climatological and sociological differences in this vast country, however, few of these diseases are of more than regional significance. The

exceptions include malaria, schistosomiasis and gastroenteritis (dysentery and diarrheal disease), which are sufficiently widespread to qualify as national health problems.

On the basis of severity of impact on large segments of the population, one should also include onchocerciasis and leishmaniasis. With the exception of leishmaniasis, these priority endemic diseases are associated with water either directly as the medium for the dissemination of the etiological agent, or indirectly as the breeding area for the disease vector or intermediate host.

In the case of these, as well as other, important endemic diseases, existing data are not sufficient to calculate their full impact upon the quality of life of the people or upon the nation's socio-economic development, but there is little doubt that it is significant.

Drawing upon available reports, the national health plan and discussions with MOH personnel, an attempt will be made to apprise the reader of the nature and extent of each endemic disease problem, particularly as regards quality of life and socio-economic development.

1. Malaria

With the exception of the Northernmost desert areas and parts of Red Sea Province, malaria in Sudan must be considered to be a country-wide endemic disease. Differences in intensity of transmission, seasonality and public health impact that occur from province to province are closely linked to the

availability of water for Anopheles mosquito breeding and therefore tend to increase, as does the rainfall, from North to South.

a. Prevalence

Most recent country-wide statistics on malaria prevalence are extrapolated from health facility attendance records, rather than from surveys, and consequently few inferences can be drawn with regard to national trends in the incidence and prevalence of this disease. A limited number of regional surveys have been conducted, however, from which a few assumptions and speculations may be formulated. One such study of blood parasite rates in children 2-9 years old living in 16 villages located within the Gezira conducted in 1975 can be compared with a similar study initiated 14 years earlier in 1961-62. Of 1,124 children examined in 1961-62, 37 (2.9%) had blood films positive for malarial parasites. The 1975 survey of 1,293 children from the same villages showed 255 positive blood films (19.7%).

More significant than positivity rate increase was the finding that all but 4 (98%) in the 1975 study were Plasmodium falciparum (malignant tertian) malaria. The earlier survey had shown only 5 (14%) to be P. falciparum. If this trend is accepted as indicative of the whole area, there is good reason for concern as malignant tertian malaria is a significant contributor to morbidity in adults and ranks high among the major causes of infant mortality in Africa.

Within Gezira alone an estimated 2.5 million persons are at risk to infection. This observation gains in significance when one considers that the Gezira irrigated perimeter accounts for 40% of the nation's gross domestic product, generates over 1/2 of its total employment (direct or indirect) and is responsible for 98% of the country's export earnings.

b. Socio-economic Impact

The special socio-economic importance of the Gezira coupled with the enhanced opportunity for mosquito breeding brought about by the area's vast irrigation canal system has led the Sudanese to describe malaria in their country as two separate problems. The first of these is referred to as "Nationwide Malaria." This term is meant to apply to all malaria that is not associated with large scale irrigated agricultural production. It is felt that this latter activity (i.e., irrigated farming) creates special conditions for malaria transmission that are distinctly different from those of the nation at large and use the term "Manmade Malaria" to describe the problem. The amount of irrigated acreage under cultivation has been expanded on an average of 5-6% per year and each new expansion has been accompanied by a rapid increase in the prevalence of malaria.

c. Vectors

The major mosquito vector in Sudan is Anopheles gambiae, a particularly vigorous species with few preferences

for breeding sites. It is extremely aggressive and has a preference for biting humans. A. gambiae is extremely susceptible to malarial infection and as such is an efficient vector. In the South it is suspected that A. funestus may coexist with A. gambiae. A. funestus has a greater ability to survive in the drier months than A. gambiae and may be responsible for extending the malaria season and consequently maintaining transmission at a high rate.

d. Malaria Cases Rise

In 1974 there were 1,000,000 cases of malaria reported in Sudan but due to under reporting and the inadequacy of diagnostic facilities, it is felt by the MOH and supported by WHO that the true nationwide figure is actually triple or more, bringing the estimated incidence rate to 20% of the population per year. While no increase in rate above the present 20% level has been anticipated during the next 6-year plan, it is expected that the absolute numbers will increase by 25% due to natural population increase.

In summary, despite the paucity of hard data there is little doubt that malaria is a serious problem in Sudan. Its apparent increase since the 1960s, its suspected shift from benign to malignant disease, its established serious effect upon infant survival and its expected potential for depressing socio-economic development and production have led the Ministry of Health to give malaria control first priority in the upcoming National Health Program.

## 2. Schistosomiasis

Schistosomiasis (Bilharzia) transmission has been reported to occur in all provinces of Sudan except the Red Sea Province.

### a. Species - Distribution

Both species of schistosomes known to occur in Africa can be found in Sudan. The first of these is Schistosoma haematobium, the etiological agent of urinary schistosomiasis. Considered in Sudan to be primarily a disease of children it, and its snail intermediate host Bulinus truncatus, tend to be distributed along the river courses and locally within the surface water impoundments and streams of the west and north. In spite of its sporadically high prevalence and potential for causing significant urinary system damage and hematuria, it is not considered to be one of Sudan's major endemic disease problems.

The second species, Schistosoma mansoni is the causative agent of intestinal schistosomiasis which is a significant contributor to extensive liver and intestinal damage in adult and child alike. The distribution of S. mansoni as well as its snail host, Biomphalaria pfeiferi, is most intense along the heavily populated areas of the Nile and the Bahr el Ghazal. The presence of the parasite in large numbers within the irrigated areas of the Gezira and other agricultural projects is considered to be a major threat to human health as well as to economic development.

b. Prevalence

The exact prevalence of schistosomiasis in Sudan is not known, but the records of health facilities show that in 1974, 6% of all visits were for bilharziasis. Similarly, the records from health facilities indicate that there has been a net increase of reported cases per 100,000 population amounting to 33% from 1965 to 1974.

c. Economic Impact

In its country profile for Sudan, WHO has estimated the total economic loss to the country from Bilharzia to be LS 52,000,000 (US \$130,000,000) per year.

3. Visceral Leishmaniasis - Kala Azar

Visceral leishmaniasis has been reported in Sudan since 1904 in both endemic and epidemic forms.

a. Species/Reservoir

It is believed that the etiological agent, Leishmania donovani is present in a non-human reservoir as well as in man, but several recent attempts to identify that reservoir by field examination of likely species (rodent, canine and feline) have not been successful.

b. Vector

The usual vector, the sandfly (genus: Phlebotomus or Sergentomyia) is present as thirty-eight species or subspecies, but to this date the numbers of infected flies of any species have not been high enough to explain the prevalence of the disease or, indeed, to incriminate the usual vector

c. Endemic Areas

Endemic in the area bounded by the Ethiopian border and the White Nile (East and West) and by Kassala and Malakal (North and South), Kala Azar appears to occur at all times of the year in men, women and children with about equal frequency. One isolated focus north of Khartoum seems to be confined to children, and other widespread foci are known in the west and as far south as Jongeli and Eastern Equatoria.

Lacking the more sophisticated methods of diagnosis, field hospitals diagnose the disease on clinical grounds. This practice probably results in an inflated prevalence report. Primarily considered to be of relatively low incidence, the disease has approached epidemic proportions about 8 times within the last 70 years. Recent information indicates that a significant number of patients formerly diagnosed as having cutaneous leishmaniasis (Leishmania tropica) may have been exhibiting diffuse cutaneous symptoms due to L. donovani or perhaps to some unique species. If so, the dynamics of transmission of visceral leishmaniasis will become even more obscure.

4. Gastroenteritis and Diarrheal Diseases

a. Prevalence Nationwide

Virtually no part of Sudan is free from enteric disease - including infant diarrhea, acute diarrhea, dysenteries and cholera. This broad category of infection accounted for 8,255 cases per 100,000 population in 1974 based upon hospital

reported figures alone. Considering that the majority of cases are not reported, one can only assume that the true prevalence rate must be staggering. Second only to malnutrition as a cause of significant morbidity, diarrheal disease resulting from poor sanitation and the lack of safe water supply is the third highest cause of hospital death.

b. Rate Increasing

Ministry of Health officials have estimated that the increase in infection amounts to about 10% per year and that by 1984 the rate per 100,000 population may exceed 14,000. Of particular concern is the effect of gastroenteritis on children. Ranking as one of the five most important causes of infant mortality, diarrheal disease of children accounted for 526,898 reported cases from all health facilities in 1974.

5. Onchocerciasis

Onchocerciasis is a filarial infection with vast potential for economic impact as well as for producing human misery.

a. Causative Agent

The causative agent, Onchocerca volvulus, is a nematode worm transmitted to man by the bite of the black fly Simulium damnosum. The resulting infection produces cutaneous nodules in the victim and, in a significant proportion of cases, blindness.

b. Prevalence

In Sudan, estimates of infected individuals, based upon WHO surveys and reports of the Ministry of Health,

number 160,000, with nearly 40,000 categorized as "Economically Blind." The disease distribution closely parallels the location of the fast moving streams which are the breeding places of the insect vector. The severity of pathology (i.e., blindness) is most intense in Bahrel Ghazal Province. But other foci occur around Abu Hamed, below the 5th cataract, along the Atbara River in Kassala Province, and in stretches of the Blue Nile in the vicinity of Rosseries Dam along the Ethiopian border. Another suspected focus is located in the Southeast corner of Eastern Equatoria Province.

In the continued absence of an integrated control program, it has been estimated that the numbers of infected and blind persons will approach 200,000 and 50,000 respectively by the end of the 6-year plan. It should be emphasized, however, that these projections take into account only the natural increases in population and do not anticipate any increase in the rate of transmission.

## 6. Trypanosomiasis

### a. Problem in South

Exclusively a problem of the Southern Region, Trypanosomiasis or sleeping sickness tends to inhibit economic development in at least two ways: firstly, as a chronic progressively fatal disease of man (Trypanosoma gambiense) that is greatly feared; secondly, as a highly fatal disease of cattle (Trypanosoma brucei), called nagana, that makes the grazing of cattle impossible in the highly endemic areas of Equatoria.

b. Tsetse fly - Vector

Both diseases are transmitted by tsetse flies (Genus Glossina) and have greatly influenced the distribution of man and animals in Southern Sudan.

c. Control Efforts

Sleeping sickness has been a problem in this area since early in the century, but periodic efforts to control its spread through prophylactic administration of pentamidine and elimination of tsetse flies and their breeding places has been historically effective. Since the recent civil strife, however, dispersion of the population and interruption of the control program have resulted in a sharp increase in the numbers of reported cases. In the absence of a comprehensive program of active case finding, it is difficult to estimate the severity of the situation, but it is believed to be deteriorating and is described as "epidemic" in the National Health Program.

Recent reports of new foci of Gambian sleeping sickness by WHO at Yei and Torit suggest that the range of the disease has spread in a ring around Juba and a focus of the highly fulminating form caused by Trypanosoma rhodesiense (Rhodesian sleeping sickness) has been reported from Pochal Area in Upper Nile Province along the Ethiopian border.

7. Other Endemic Disease Problems

Although not identified as priority health problems, other endemic and parasitic diseases exist in Sudan that have potential for causing widespread misery if not significant

negative socio-economic impact. No attempt has been made in this report to address these problems in detail, but it would seem appropriate to mention them in passing.

a. Leprosy

Leprosy is endemic in the western and southern regions of Sudan, with infection rates approaching 3% in some areas. A 1966 survey sponsored by WHO gave an estimate of 100,000 cases in Sudan. With the help of several international donors, the MOH has established more than 10 leprosaria that monitor treatment with dapsone and are planning to establish rehabilitation and training centers near Wau.

b. Bancroftian Filariasis

Known to exist in Sudan since 1944, Bancroftian filariasis (Wuchereria bancrofti), with associated hydrocele and elephantiasis, is presently restricted to a relatively small number of people in three areas of Sudan: Zalingi, close to the Chad border in southern Darfur; Kadougli area in Southern Kordofan, and in Southern Blue Nile Province near the Ethiopian border.

c. Guinea Worm

About 3,000 cases of Dracunculiasis are reported annually in Sudan. Most are located in areas of the Nuba Mountains, Blue Nile Province, Bahr el Ghazal and Equatoria, where step wells are in common use.

d. Hookworm

Primarily due to Ancylostoma duodenale, hookworm infection is highly prevalent in Sudan in the regions south of

the Bahr el Ghazal. This rule of thumb also applies to the other common intestinal helminths such as Ascaris, Trichuris and Strongyloides.

e. Hydatid Disease

While very little information could be found on echinococcosis, most authorities questioned agreed that it does occur with some regularity in parts of Equatoria.

f. Cutaneous Leishmaniasis

Although the primary concern for leishmaniasis lies with the various forms of Leishmania donovani infection, some of the drier northern areas such as El Fasher, En Nahud and in the Gezira (Wad Medani) are known to be endemic areas for Leishmania tropica transmission.

In summary, it may be said that while Sudan has a wide variety of potentially serious problems with endemic diseases, the MOH has selected six as priority health problems:

1. Malignant Tertian Malaria - (due to Plasmodium falciparum) in the irrigated areas as well as nationwide.
2. Intestinal Schistosomiasis (due to Schistosoma mansoni), primarily in irrigated areas.
3. Sleeping Sickness (due to Trypanosoma gambiense) in Western Equatoria.
4. Onchocerciasis (due to Onchocerca volvulus) in the Bahr el Ghazal, the Nile Valley and its tributaries.
5. Kala Azar (due to Leishmania donovani) in the middle section of the country east of the White Nile.
6. Gastroenteritis (due to a wide variety of etiological agents) throughout the country.

## D. Socio-Cultural and Attitudinal Problems

### 1. Water

Sudanese exist in a hostile and challenging environment, where heat, lack of water, vast distances, disease and hostile nature test human endurance. The first and greatest problem is that of water, which is, firstly, insufficient, and, secondly, the bearer, or fostering element of disease. According to El Sammani, there is an annual deficit of 246 million cubic meters in the drinking water requirements of rural areas in Sudan. The same author continues:

"We can view the question of water provision from two angles: the angle of present pressing needs in many of the rural areas, ... and that of water provision as a tool to bring about environmental changes ..."\*

Water has determined settlement patterns in Sudan, where the Nile's bounty has permitted settled farming life since antiquity. But Nile riparian lands are limited; and other settlement in the north has tended to cluster around mountain-tops, or circling the foothills where rainfall is more frequent. Where high-lying aquifers permit the sinking of shallow wells, villages exist in the plains; but many villages have no water source at all. Women must often make daily round trips of five kilometers or more to carry water in the heavy local clay jugs. Human resource has learned to grow watermelons as a fluid source, and nomad families camp beside the curious,

\*M. Osman el Sammani: 1976 The Magnitude of the Drinking Water Problem in the Sudan Administration for Soil Conservation, Land Use and Water Programming, Min. of Agriculture, Khartoum.

bulky Tebaldi trees which store rain-water in their trunks, and act as reservoirs. In some places, dry wadi-beds fill with seasonal streams during the rainy season, and along the Red Sea coast and some areas of Kordofan and Darfur, the Khors are the run-off beds which carry flash flood waters into the dry sands until all has sunk in or evaporated. Where soils can retain this spate-water, people plant crops which will make use of the remaining moisture.

Most rural communities and their herds get along with less water than WHO and other experts regard as minimum human requirements. Toposa nomads, for example, will travel with ten to twelve gourds-full of water sufficing seven people for two to four days. Wherever you go in Sudan, hospitality offers you a brimming glass of water - the best gift that can be given.

Where surface water does not exist, and ground water lies at deep levels, or under heavy crystalline stone cover, two modern solutions are sought. The Sudanese government and UNDP are drilling deep bore-hole wells in connection with small development projects. Success is middling, for often the holes are dry, or produce water unusable for its mineral content; and deep water is expensive to find, and expensive, in imported machines and gasoline, to pump. Hafirs, or rain-catchment basins provide the other current approach, where seasonal rainfall is sufficient to form a reservoir.

Typically these connect with a protected well to maintain the water uncontaminated by human or animal use. Hafirs cannot be dug in all soils, and there is loss of water both from ground seepage, and from evaporation, but they form one of the cheapest and most readily available methods of water provision where rainfall is sufficient at some point in the cycle to fill them. Where hafirs are fenced and the fences maintained, the water source is liable to be pure, but this protection does not always exist. Equally, shallow and step-wells are usually contaminated, since both people and animals go down into the waters, often forming living chains to laboriously pass the water out to be poured into a basin from which animals drink, and all supplies are taken.

Availability of water is a major health problem on levels of both nutrition and sanitation. Sammani continues "...no country-wide development, especially in the rainfed areas is possible, without solving this problem."\*

In the South, many areas have sufficient surface water from streams, ponds, swamps, etc. and in some areas (i.e. the Sudd) there is far too much. Here the problems have especially to do with quality of water, often contaminated with filarial larvae causing guinea worm and elephantiasis. White Nile tributaries: the Bahr el Ghazal, the Bahr el Arab, and the Sobat, are respectively breeding places for

---

\*Ibid., Sammani.

the black flies which vector River Blindness (Onchocerciasis - these problems are addressed technically elsewhere in this paper), sand-flies which vector kala azar, and the tsetse and biting-flies which carry Trypanosomiasis. To the north in Gezira and Managil, the lethal burden of the waters is schistosomiasis, malaria, and enteric fevers.

Water, its lack or abundance, is thus a primary health and development problem for the Sudan, and one which must be addressed on all levels, and in each instance.

## 2. Sanitary Conditions

Water problems and sanitary conditions are evidently closely linked. Multiple use of the same waters for drinking, cooking, washing of food, bathing, laundering, and washing away of sewage; as well as contamination of water sources from human and animal wastes and feces is common over most parts of Sudan. Waterborne waste disposal systems are far from universal even in cities, and a frequent sight in Khartoum is the early morning collection of human wastes from the buckets under pit latrines. In most rural communities, no disposal system exists, and people defecate in the nearby fields, along streams or canals, or in sheltered corners of walls inside the village. Even within the cities, men will squat beside a wall in the universal Arab position for urination, despite the signs posted along many walls forbidding this activity. Women are more discreet, in accordance with the general rules governing their behaviors. In some

house-compounds, there is a mirhadth (latrine) built in a corner along the outside wall, equipped with removable bucket underneath, and large jar of water with dipper for washing down. In simpler houses, the arrangement for women may consist of a hole dug in the mud-floor of an inside room, and a fire is built within this hole at least once daily. In other places where there is no inside facility, a nearby bit of brush and scrub-bush will have to serve. It can be remarked in passing, that lack of adequate latrine facilities has its correlate in universal problems of constipation which add their quotient to lowered resistance to disease, especially of the gastroenteric sort.

A systemic approach to the control of schistosomiasis may prove to be best attacked in the human link of the vectoring chain. Uncontrolled defecation and urination by infected humans pollutes the waters of reservoir, pond, stream, canal, enabling reinfection of snail carriers. The use of molluscicides is expensive and unsure, and perhaps carries undesirable environmental side-effects, which should be considered in the preliminary environmental assessment. It is in an all-out effort to:

- build adequate latrines and controlled waste-disposal systems;
- widely extend general public health-education concerning these issues; and

-- treat infected human-beings;  
that the near holo-endemicity of manmade schistosomiasis  
in the irrigated farming areas can most effectively be  
approached.

Food inspection regulations have been legislated in  
Sudan, and inspection and control are practiced to some  
extent in cities. The Ministry of Health desires to extend  
the existing efforts and train further cadres, but lack of  
financing at all levels currently hampers this program.  
Concomitant public education on safe food-practice is a  
major aim of the new health plan.

### 3. Availability of Services

Sudan is vast. "With an area of 967,500  
square miles, the Sudan occupies 1.7% of the world's land  
surface and 8.3% of the African continent. Ten times the  
size of the U.K., 4 1/2 times the size of France, it is the  
largest country in Africa."\* One may add that some of the  
world's least known and least accessible areas are within  
Sudan's boundaries. It is therefore axiomatic that the  
extension of health facilities to all of Sudan's people is  
a major endeavor. In some regions of Darfur, the Nuba Hills,  
and Upper Nile provinces, simply reaching people across  
difficult and roadless terrain poses the initial difficulty.  
Most of the 3,000 square miles of the Sudd swamps region are  
all but unknown, and mountains of Darfur's Jebel Marra chain,

---

\*Sudan Today, Univ. Press of Africa publ. for the  
Ministry of Information and Culture, Khartoum, 1971.

and Equatoria's Immatong range rise over 10,000 feet, and know no roads. In central and northern parts of Sudan, people know of the existence of modern health facilities, and when local measures fail, they will often make the effort to go to the nearest dressing station or hospital. In the more remote areas live many people who have little knowledge of government facilities, when they are available. Small-pox eradication campaign immunization teams went into areas where they say the people had never before seen any government official. Ingenuity was required to convince them to accept the immunization. Ministry of Health officials in Southern Sudan state that they can reach Zande people because of the British Zande Scheme, which, during the Anglo-Egyptian Condominium, required all Zande villages to remove to positions along a British-constructed road: the so-called "Line". Many southern peoples, however, have dispersed settlement patterns, and live in isolated homesteads. In the few regions where villages do exist, it is necessary to send runners to the Chiefs to make arrangements for any health or immunization visit. Some of these groups now begin to desire health facilities, but the basic problem of reaching them will continue to pose barriers.

#### 4. Attitudes and Knowledge

Part II-C of this paper has discussed folk beliefs about health, sickness and causation. Here it should be underlined that most ordinary Sudanese folk, therefore, will

believe that while the western Hakim (M.D.) can cure symptoms of illness, the traditional Feki or Sheika alone can cure the cause. The modern-trained medical specialist, whether village health worker, medical assistant, or medical doctor in the hospital, is seen as only one type of practitioner in a spectrum. Therefore, he is rationally chosen for treatment only when (a) the malady is diagnosed as falling logically within his competence, or (b) other recourse has failed and one has reached the need to try all expedients. In practice, this often means that cases appear in the government facilities when they are already in very acute stage.

There are constraints associated with the paraphernalia accompanying modern medical practice:

In areas where beliefs in sorcery and witchcraft are everyday coin, people are loath to deposit their urine or stools, or blood - items intimately associated with the personality of the individual - in the hands of even the most white-robed and scientific of lab-technicians.

In traditional medicine the exotic accouterments: special clothing to be worn, special drums, perfumes, or foods, or special plants and herbs, vessels in which to prepare them, divining and cabalistic materials; as well as the kalamat - the words which must be said as activating incantation - these are the familiar "medical" apparatus.

Modern medicine has new and unfamiliar apparatus, which is seen as diacritic and powerful, but often frightening,

and people are not comfortable with it and would prefer to avoid it when possible.

In some places people have a decided preference for injections rather than pills. One can conjecture that where there are definite conceptual distinctions made between illness caused by possession (i.e. internalizing the sickness-causing spirit) and influence or external touch of the causative agency (i.e. gaze of the evil-eye, or "devil-touch"), internalizing medicine and the manner of doing so may be considered to have differing degrees of potency for reasons quite different from those a westerner would ascribe.

In other places, (notably Khartoum) mothers fear injections and the vaccines of the immunizing campaigns. Perhaps this is from a history of bad vaccine lots. There is, for whatever historical cause, a general belief that children have been paralyzed from injections, and many women in the better educated elite sector prefer not to immunize their children for this reason, or, if possible, to receive immunizations when abroad.

For reasons of honor and concepts of what constitutes shameful comportment for their sex, many women are loath to enter hospitals, or doctors' examining rooms. For Muslim women, Surat 24, Verses 30-31 is prescriptive:

"...Say to the believing women that they cast down their looks and dominate their senses and display not their charms except those which can be decently displayed; let

them cover their bosoms with a veil and not display their charms save to their husbands, their father, the fathers of their husbands or their sons, the sons of their husbands or their brothers, their brothers' sons or their sisters' sons, or their women friends, their slaves or their male servants deprived of sensuous appetite, or to youths still insensible of women's nakedness, and that they beat not with their feet to make known their hidden jewels..." In a country where religion is the frame of life these circumscriptions weigh heavily.

There are customs which make it difficult for a woman to have her baby in clinic or hospital. Surat 33 of the Koran enjoins the Prophet's Wives (and by extension all believing women) to stay in modesty in their houses. But most specifically, it is considered incumbent that the young mother deliver - at least her first baby - in her own mother's house. She should customarily stay within that house for forty days after the birth, and the baby should not be observed by outsiders until at least the fortieth day. During that period of great vulnerability, he may very well wear the jirtiq, an amulet of special significance, used as well at weddings. In this way, the evil eye can, perhaps, be averted.

5. Nutrition

This problem is addressed in other parts of this paper, but we should like to reiterate its crucial

importance in Sudan. In all regions of Sudan, marasmus and kwashiorkor are to be found, the highest incidence appearing among weanlings and young children and pregnant and nursing mothers. Causative factors range from simple insufficiency of harvests to carry over till the next harvest is in, to destruction and loss of crops by locust, or drought, or animal predation. Where nomad herds move through farmlands, resulting conflict between pastoralists and farmers is edged by the knowledge that there is little margin to cover the foodstuffs destroyed. Another element in the sustenance picture is the inadequacy of the traditional diet in many places. While many fruits, vegetables, legumes etc. are available in markets, the essential diet for many people is merissa, the lightly fermented durra sorghum beer. Readily available, this is consumed at irregular intervals throughout the day, and its carbohydrate content stills the pangs, but does not cover the needs of basic nutrition.

Busy mothers, lacking knowledge of basic nutrition requirements, give a crying child a sweet, or a mouthfull of asida porridge. Often there are no regular meals prepared, and hungry household members eat "what is in the pot". The climate is hot, and food storage facilities are minimal. This adds to the gastro-intestinal disease risks.

In rural kitchens, food is stored in clay jars, leather or gourd containers, and baskets. Samin (clarified butter) and milk are usually kept in large gourds rubbed inside with

charcoal. Water is carried in jugs or whatever tin is available, and usually stored in large pottery amphoras of classic form.

Where adequate dietary knowledge and suitable cooking practice combine, sudanese food is healthy and delicious. Local markets sell okra, tomatoes, peppers, pumpkin, cucumbers, several kinds of spinach and other leafy vegetables, manioc and yams, lentils, various beans, ground-nuts, sorghum, and often rice. Mangos, melons, watermelons, limes, grapefruit and oranges are among the fruits. Many spices: pepper, ginger, cloves, cinnamon, saffron, sugar, as well as numerous herbs (mint, karkade and others) can be found in Omdurman, Juba, and El Obeid markets. Local dishes include asida, sorghum porridge which is served sweetened with milk, or with a sauce of vegetables or meat; gesrah, a large thin sorghum pancake is accompanied by stews of pumpkin, okra and tomatoes, or other vegetables. Meat, or liver may be broiled as shish-kebab, or made into a stew. Fish is variously prepared, and small dried fish are a market trade-item far away from riverine sources. Where salt comes from the Red Sea salt pans, iodine is adequate in the diet. There is, however, an area in the Jebel-Marra region of Darfur where goiter appears in significant proportions, and here the salt is not from sea-sources. Perhaps it comes from desert deposits, or more probably is obtained in the universally available potash.

In the city, a bit of butcher's meat will be used every day or so - cooked in stew or soup or brochette - by most people. In the country protein is much more limited; animals are not often killed, and meat graces the rare celebration or guest meal. Chickens may be kept, but often the eggs are taboo for all, or at least special members of the group (usually women, or young boys.) Milk is an important item of diet among cattle-holders, though the herds are essentially meat rather than milk animals. In the south, people like Nuer, Dinka, Toposa, mix milk with blood taken from the cow's neck-veins, and this is the staple of diet. (This practice, incidentally, is abhorrent to northern "Arab" Muslims, for whom there is a religious prohibition against the eating of uncooked blood.) The cow's milk is, however, a mixed blessing; its nutritional value overshadowed by its disease-bearing potential. Healthier is the camels' milk relished by the more northerly camel-herding tribes.

We have little information about food-taboos, though this is certainly an important part of the nutrition picture in southern Sudan, and probably in parts of Darfur and the Nuba Hills as well.

The month of Ramadan, the great Moslem religious fast, is hard on all Believers, but especially on those who suffer already from poor nutrition. In hot Sudan, the Ramadan prohibition of water-intake from sun-up to sun-down adds

in the heat, and most Muslims are strict observers.

There is a real need for nutrition research to be undertaken at the village level. This should be planned to cover at least the several different major eco-base typical areas. WHO is already sponsoring some limited research in the south, and the MOH would be interested in further surveys.

Some efforts are now being made in pilot areas to teach basic nutrition and correct infant and child feeding to women. This will continue to be a part of the job of the community health worker and/or the nurse-visitor.

Also interested in this vital area, the Ministry of Social Affairs has a pilot center in Soba which teaches nutrition to enrolled neighborhood women. The Ministry plans, with Arab League money, to construct nine further centers around the country, which will include Nutrition information in projected programs for women and youths.

Perhaps an even greater potential lies in the plans and efforts of the Union of Sudanese Women, who are seeking to organize branch groups, within the framework of the Sudanese Socialist Union (the single political party), in all cities and towns of Sudan. These energetic women, fully cognizant of the goals of the international women's movement, reinforce health and self-help efforts at the local levels (wherever they now exist); have begun a weekly magazine for women; encourage and motivate women to establish self-help and learning

programs for literacy, health, formal and non-formal skills-training. AID might productively consider assistance to their programs.

Finally, in as broad an effort as the Sudanese Health Plan, it is difficult but necessary to set criteria for evaluation of progress. Nutritional status is one identifiable variable, which could be employed to this end.

#### 6. Children

"Wealth and children are the adornment of our miserable life...." Surat 18, V. 46.

When asked "How many children is the ideal number to have?" the Nurse answered "People think 'As many as you can have!'".

Population control is not a popular subject in Africa. Many Sudanese are quite willing to consider family-planning reasonable on an individual basis, and developed around a concern with maternal and child-health. They see it as a useful tool to protect the health of women, and attack the problems of high infant mortality. They consider a lowered birth-rate incidental to survival of more children a desirable goal. But Sudanese, north and south, for whom many children are traditionally the greatest value, and who as yet feel no population pressures, are far from ready to think in terms of establishing a population policy.

It is assumed that a woman will nurse her baby till he is about two years old: "...until he walks and talks."; "...until the child refuses the breast!". This is, of

course, the best protection for the infant's health; but by the time that weaning does occur, the breast is already a short diet for him. Weaning is typically accomplished abruptly. The child is often taken to his mother's family and left there. Here he will be coddled and cajoled, but the severance is abrupt. Equally abrupt is his change of status from infant to young child. Now he will begin to run and play with the pack of little ones, looked after by some young girl. This is, however, the most fragile period, when malnutrition is likely to take its toll.

In-depth research of child-rearing practices, with emphasis on child health and nutrition, could usefully be done in Sudan. What is known, essentially, is that children suffer most from gastrointestinal complaints. The greatest killer of children is measles, and malaria runs a close second. In riverine and irrigated farming areas children, especially boys, who play in canal waters, show the highest incidence of bilharzia, and other parasites add to the problems of malnutrition.

E. Health Manpower Problems

1. Training Needs

a. Basic Training - CHWs

The Primary Health Care (PHC) Program, with a goal of providing basic preventive and curative health services to all areas of the country by 1984, will place a heavy load on GOS capability to recruit and train the new category of worker--the community health worker. Some 2,700 CHWs are to be trained.

b. Retraining for PHCP

Equally demanding will be the requirement of retraining more than 2,500 nurses, midwives, medical assistants, sanitary overseers and other health personnel who perform basic health services to redirect their job from principally curative medicine toward emphasis on preventive health services. Added to this will be the demand on training resources to provide refresher courses at one-to-three year intervals, a never ending process.

c. Reorientation of All Health Personnel

Beyond the training of health workers directly involved in delivery of primary health care services, the reorientation of all other health personnel in supporting/management positions at both Provincial and National levels will be essential if the PHCP is to succeed. The problem of creating a common basis for understanding the concepts and goals of

the program requires thorough planning, careful timing and follow-through. Each health worker, directly or indirectly involved at the delivery end of the program, needs to know precisely what his role is and how his job fits into the overall scheme.

#### d. Training Facilities

Acceleration of the training programs to prepare health personnel for the expansion of rural health services has placed an added burden on an already overtaxed training system. For example, temporary facilities were arranged to train community health workers - 30 centers in the north and ten in the south. In most cases, existing facilities, at nursing or midwifery schools, were used; when possible, during periods regular classes were not in session. In El Obeid, a course for community health workers had to be discontinued after three months and the CHWs sent back to their provinces because the elementary school they were using during school vacation became unavailable when school reopened. Some courses had not started for lack of facilities, e.g. the Southern Region, only four of the seven CHW training centers were in operation. Also in El Obeid, 60 village midwifery students were using a classroom only 30 square meters in size. Their housing accommodations were inadequate. Tutors had practically no teaching materials. Their transport needed for field practice had been red-lined for the past year for lack of spare

parts and petrol

Because most training centers are in need of varying degrees of renovation or refurbishing, Phase I of PHC program implementation would be an appropriate time to reassess the entire system. It is probable that some training activities could be consolidated, relocated or otherwise modified to more adequately meet short-term demands and long-term needs. The MOH has indicated that some training programs will produce the required numbers of nurses, midwives, medical assistants and other health personnel for their areas within five years. Basic training for replacements and refresher training for all health personnel will continue indefinitely; the structure and functions of the training centers will need to be adjusted accordingly.

e. Training of Trainers

Traditionally, tutors assigned to the various MOH training institutions have been responsible for general administration/management and teaching duties of their individual institution. The regular tutorial staffs are augmented by MOH personnel. Department heads and their technical staff give lectures regularly and assist in the practical training of students.

Overall direction and coordination of the Ministry's 21 training institutions is vested in the Department of Training. One of the Department's major concerns is the training of trainers. The matter is of particular importance presently

because of the shift in emphasis from curative to preventive services in the expansion of rural health care. A major objective over the Third Development Period is to establish a strong cadre of trainers, prepared in teaching methodology as well as subject content. One of the major AID inputs in manpower development would be technical assistance in the training of trainers.

## 2. Placement

To fully utilize health manpower, once personnel have been generated and properly trained, a number of other problems must be dealt with. Placement of health workers where they are needed most in the rural reaches of the Sudan may be extremely difficult. This may not be a serious obstacle for the CHW because he is to be selected by his own village, trained for nine months, and then returned to his village to work out of the Primary Health Care Unit. However, for the health visitor, (who is a female nurse) the dispensary nurse (usually male), the medical assistant and the sanitary overseer, assignment to a deprived rural area with all its health hazards and poor living accommodations has little attraction compared with larger towns nearer the Provincial headquarters. (The problems of logistics, supplies, transportation and poor communications are noted in the section on constraints.)

### 3. Supervision

Closely associated with the difficulties of placement of primary health care workers is the problem of adequate supervision. Successful delivery of services by the least trained member of the health team, i.e., the CHW, will depend to a great extent on the kind of supervision he receives. It is axiomatic that the lower one goes on the manpower scale, the greater the supervision must be.

The PHC plan does not provide continuous and close technical supervision of the CHW. The CHW's immediate supervisor is the medical assistant in charge of the Dispensary, hub of the PHC complex, whose job description indicates he is to visit each CHW once every two months.

The PHC plan states that the CHW will receive "administrative and political" direction from his 1) village Council, 2) the government party organization (Sudan Socialist Union), and 3) the Village Development Committee. The guidance and support the CHW is expected to receive from these organizations will be vital in achieving community acceptance of the services he has been trained to give, but will not provide the technical supervision he needs.

The Village Council is the administrative body for the village. Its members are elected for four years, providing the substance and continuity in the development process. There is wide variation in the strength of the Councils. Some are

effectively coping with major development problems, although constrained by lack of resources, such as roads, marketable products, communications, schools, etc. In some areas the Councils are not aggressive, and GOS efforts to vitalize them are being stepped up. The Southern Region has a tremendous task to do in rebuilding village organizations shattered by 17 years of civil disturbances.

The Village Council collaborates with the medical assistant in selection of the CHW, thus is probably made familiar with the concepts and objectives of the Primary Health Care Program.

The village cell of the Sudan Socialist Union has the direct link with the National party, and thus can serve to interpret government policies to the people. This process is gaining strength and can achieve a valuable role in promotion of the Primary Health Care Program.

Village Development Committees serve as an "action" group for a gamut of village projects. With proper guidance by "innovative" CHW's, the village development committees can be a major force in improving the environment, in stimulating the people to adopt better personal hygiene and to utilize preventive health services.

#### 4. Health Education Needs

The CHW's carry the front-line job of interpreting to the people the new concepts in delivery of basic health

services. People in the village may have had only traditional and faith healers in the past and thus may be reluctant to adopt scientific or modern preventive health measures. Reasons why health services are underutilized require identification and skillful treatment to gain consumer acceptance. How to deal with this kind of problem becomes a problem in training and supervision.

#### 5. Manpower Utilization - Integrated Services

Integration of health services with allied programs in education, agriculture, social welfare and cultural affairs, and other public or private sectors is a desirable goal, and until achieved, is a factor in manpower utilization. Refresher training or reorientation is needed for workers in such allied programs.

Within the health services, coordination of workers in vertical health programs, such as malaria and bilharzia control, with workers in the rest of the primary health care program will require special attention to make the best use of limited manpower. How to achieve better coordination has direct bearing on how the worker is trained to function on the job.

#### 6. Medical Education for Community Health Practice

Presently, physicians are not available below the service level of the district hospital. Reflecting the growing concern for better delivery of rural health services, the Department of Social Medicine, Faculty of Medicine, is

developing a program to increase involvement of its medical students in community health practice. Fourth-year students spend part of one day each week in this department for lectures and discussions, and travel to villages on the outskirts of Khartoum for observation. Between the fourth and fifth years they gather material in their own villages on a health subject of their choice to use for a major treatise completed during the fifth year. Prior to completing their examinations after the sixth year they are placed in District Hospitals for several weeks, part of which time is spent in community health practice.

The Department of Social Medicine, with its links with other medical departments of the Faculty of Medicine constitutes a major resource for development of medical manpower so urgently needed in the Primary Health Care Program. This department is interested in closer collaboration with the Ministry of Health in developing field training areas in which medical students in their fourth and fifth year would eventually spend a block of time, up to three months, in studying and practicing community medicine. This should serve as a recruiting mechanism for the Primary Health Care Program.

#### 7. Medical "Brain Drain"

Due to internal and external "brain drain", the GOS has not been capable of providing adequate health manpower in some categories. Most critical brain drain is in medical

Manpower. Physicians and well-qualified nurses can quadruple their salaries in other Arab countries such as Kuwait and Saudi Arabia. The University of Khartoum's Faculty of Medicine graduates about 160 physicians annually but the number employed in health services has not increased appreciably.

Measures to alleviate manpower shortages are under consideration by the GOS, but the situation is complex and will not lend itself to easy or early solution. Ways to require medical students to serve in rural areas prior to or immediately following completion of their medical examinations have been proposed, along with suggestions for substantial incentive payments and other fringe benefits to offset the attractions of employment abroad.

Persuading health personnel at all levels to take positions in remote or depressed rural areas has been a major constraint, and will require special incentives if facilities in those areas are to be adequately manned. The approach, however demanding, would involve establishing at least minimal conditions under which the required personnel would be willing to serve.

## F. Facilities and Infrastructure

### 1. GOS Objectives for Health Facilities

In its national health policy to significantly expand the provision of primary health care to the entire population within the period 1977-1983, the GOS states its intention to:

- strengthen rural health care facilities to insure complete and equitable coverage of the entire population with primary health care service;

- establish training facilities for all levels of health manpower;

- consolidate existing curative health facilities to provide better services for the population, and to allow some expansion in curative health care facilities in the lesser developed areas of the country.

### 2. Heart of the Problem - Finances

The main problem in providing adequate health facilities is that the GOS does not have funds to cover development costs of its ambitious Primary Health Care System, but will need massive assistance from external donors.

For the North alone, the national plan calls for:

-construction of 47 new dispensaries @ \$18,000	= \$ 846,000
-renovation of 339 existing dispensaries @ \$1,250	= \$ 423,750
-construction of 943 new PHC units @ \$7,500	= \$7,072,500
-refitting of 1037 existing units @ \$625	= \$ 648,125
<b>TOTAL</b>	<b>\$8,990,325</b>

Precise information is not available for the Southern Region, but the cost of rebuilding or renovating 141 dispensaries and 753 PHC units needed for the program has been estimated conservatively at \$4,000,000.

The GOS indicates that self-help projects by the villages should provide about one-third of the PHC units. Use of inexpensive local materials, where available, should reduce the costs, although inflation may offset this factor.

Some of Sudan's Arab neighbors and European donors have pledged uncommitted funds for national economic development to be used in various program sectors, including health. However, much of the economic development will probably be channelled into agricultural development schemes and industry in an effort to increase Sudan's export potential, and not into health.

It is proposed that AID assist the Ministries of Health, North and South, in identifying priority areas where construction of one or two health complexes, i.e., dispensary and satellite PHC units, would have early impact

on the delivery of rural health services in those areas.

### 3. Organization and Administrative Problems

Organizational structure and management capabilities vary considerably from North to South. The Ministry of Health serving the four northern regions is staffed in some depth in each of the major program areas. In contrast, the Ministry of Health for the Southern Region has only four professional staff at the director's level, so that each director is responsible for more than one major program area. The technical divisions are comparatively well staffed in the north; whereas only a handful of trained technicians exist in the south.

Government agencies in the South have the difficult task of rebuilding organizations shattered by 17 years of civil war. The Ministry of Health has its development plan but not the personnel to make the plan operational. Thus, to alleviate the shortage of trained staff in Juba, the MOH needs technical assistance to fill operational slots until Sudanese staff can be recruited and trained to replace them. It is recommended that AID respond to this special kind of need by assigning consultants who would perform staff functions, help recruit and train local personnel.

Another organizational problem observed by the Team relates to the traditional pattern of strong vertical programs

in which program direction flows downward from Khartoum. This has been the practice for such national programs as maternal and child health, communicable disease control and childhood immunization, development of water supplies, and control of major endemic diseases - malaria, onchocerciasis, and schistosomiasis.

With the introduction of the Primary Health Care Programs, strength of the operational direction will shift from national or regional to provincial and local levels. Many of the preventive health services previously provided in special national programs, such as the smallpox immunization campaign, should become regular services at the PHC complex level of operations, directed routinely by the medical assistant. Even in national programs, such as endemic disease control, many preventive and treatment services can be rendered by PHC units.

#### 4. Supportive services

The lack of infrastructure for supportive services, such as logistics/supplies, and data collection/health statistics, poses a critical problem for expansion of rural health services. Success of the Primary Health Care Program will require appropriate strengthening of these support services. The MOH has discussed with the Team the technical assistance and commodities needed early in Phase I.

#### 5. Coordination

Because the two Ministries of Health function as

semi-autonomous institutions, problems of communication and coordination bear adversely on the development of an integrated national health plan. For political/socio-economic/cultural reasons, the Southern Region will probably continue along the present administrative lines. However, there is a need to develop and implement an integrated management information system, with joint reporting, exchange of health data and with regularly scheduled meetings to share planning and operational experiences, North and South. This is important for all program activities, but especially for those components that are planned and conducted on a national scale, e.g., malaria control.

VI. MAJOR PROGRAMS OF NATIONAL HEALTH PLAN

VI. MAJOR PROGRAMS OF NATIONAL HEALTH PLAN

A. Primary Health Care Plan

One of the key policies expressed by GOS for its new Development Plan was that "Equitable distribution of primary health care to all of the people of Sudan, including its significant nomadic populations, will be number one priority for the Development Plan period (1977-1984)."

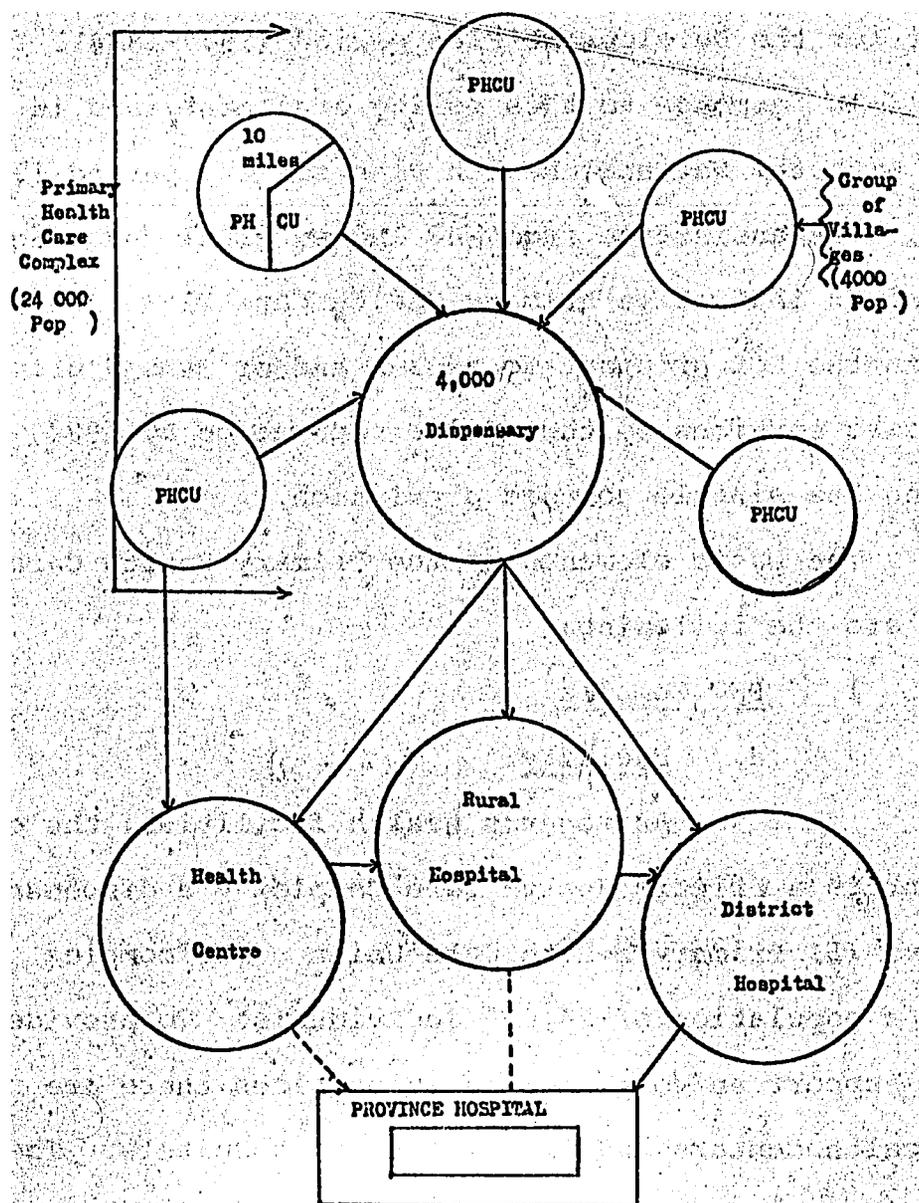
In response to this policy statement, and in keeping with the National Health Plan for the period 1977-1984, the GOS, with assistance from WHO and external donor agencies, developed an innovative Primary Health Care Plan. Under this plan the GOS proposes to expand and/or extend primary health care services to the entire population by 1984, including the sizable nomadic population.

The basic elements of the Primary Health Care Program are the following:

1. PHC Complex
  - a. Facility

As regards health facilities, the central component is a Primary Health Care Complex - a dispensary with five (5) Primary Health Care Units - the complex serving a population of 24,000 individuals. To provide back-up support and/or supervisory services, there are rural health centers and district/rural hospitals. The latter also serve as referral sites for the dispensaries and the PHCU's. (See Table VI-1)

**TABLE VI-1: PRIMARY HEALTH CARE COMPLEX**



**Key:** PHC = Primary Health Care      **Sources:** NHP Document page 65  
 ———> Normal Referral  
 - - - -> Emergency Referral

**NB.** This figure has been further perfected as far as referral from PHCU to Health Centre is concerned.

b. Staff

The staffing of the village level health facility (Primary Health Care Unit) is a Primary health care Worker or Community health Worker (CHW). The dispensaries will be staffed by medical assistants (nurses with two years of specialized training following completion of a program for certified nurses). The medical assistant serves as the senior officer or team leader of other members working at the dispensary level (nurses, sanitary workers, etc.). A health visitor who has had both nurse training and nurse midwifery training, plus a special training course for health visitor. This is usually a female who works in the MCH area and supervises the village midwives. The health visitor is usually based at a rural health center or at the District level, from which she carries out her MCH work, including supervision of midwives in her District. All of the facilities and staff of this rural delivery system are under the overall direction of the Provincial Medical Officer (Assistant Commissioner for Health). A Director of Primary Health Care Program has been appointed to both the Central MOH and the Southern Region MOH.

c. Recurrent Costs

Under the Primary Health Care Program, it is planned that recurrent operating costs will be borne by the Sudanese (GOS, budgeting support and self-help

contributions by communities). A significant amount of support for development costs of the program (construction, training, equipment, medical instruments, transport, etc.) will have to be borne or contributed by external donor agencies.

## 2. Feasibility of PHC Plan

This program is an ambitious one and questions are often raised as to its technical and financial feasibility. The magnitude of this undertaking can be only appreciated when one considers that the GOS, similar to most developing countries, is presently reaching much less than half of its rural population with basic health care services. As stated previously, much of the developmental costs must be supported by external donor agencies, however, there appears to be a good possibility that GOS can support the recurrent operating costs, once the Primary Health Care Program has been developed and is functioning well.

During the early development stages of the program there will be need for good coordination and management of the program at all levels. The GOS will need some technical assistance/consultative services for this aspect of the program, particularly in the Southern Region because of its relative scarcity of trained health manpower.

### 3. PHC Program Activities

The PHC program includes subprograms for the following activities:

- Health education to increase public understanding, improve hygienic habits
- Childhood Immunization
- Protein Calorie Malnutrition
- Gastroenteritis
- Tuberculosis
- Sleeping Sickness (Southern Region)
- Kala Azar

As one can readily discern, this program is both complex and ambitious, however, it appears well within the realm of possible achievement if the matters of coordination, management and external donor support can be addressed and successfully resolved.

#### B. Maternal and Child Health Program

The First National Health Congress passed resolutions emphasizing the importance of comprehensive Maternal-Child Health (MCH) services. Resolutions were adopted to improve MCH services.

##### 1. MCH Committee

The Public Health Act of 1975 established a Central Committee for Mother and Child Care (Chapter X). Its functions are to "Propose the bases and standards and national planning for providing preventive, therapeutic and social services for mothers and children."

Members of the Committee include:

- The Deputy Under-Secretary for Preventive Medicine (Chairman)
- The Assistant Under-Secretary for School Health and Mother and Child Care
- The Assistant Under-Secretary for Health Education
- The Senior Paediatrist
- The Senior Obstetrician and Gynecologist
- The Head of Food Section in Health Ministry
- The Assistant Commissioner, Khartoum Province
- The Principal of Midwifery and Nursing in the Ministry
- A representative of the Social Care Department
- A representative of the Attorney-General's Chambers
- Three Appointees of the Minister

2. MCH in National Plan

The publication of the National Health Programme in April 1975 noted that "Preventive and Social Medicine are given top priority. In this field, stress has been laid on:

- (i) Control of common endemic and epidemic diseases,
- (ii) Maternal and child welfare services to cover the largest portion of the population,
- (iii) Complete coverage of school children through school health service units,
- (iv) Immunization of children against common infectious diseases, mainly TB, smallpox, triple antigen and poliomyelitis."

Within these general guidelines, MCH services are integrated into the overall National Health Programme, as part of priority Programme No. 3 - Primary Health Care. This program, described in the preceding section, includes preventive health services such as midwifery, immunization, and health education. One of the indicators of the program success will be an increase in the "number of deliveries preceded by antenatal care as compared with total live births" and an increase in the percentage of immunized children as indicated by BCG and smallpox scars".

It should be noted, however, that there is no clear identification of MCH within the National Health Programme, and no mention of family planning at all.

### 3. Workshop on Integration of MCH/FP

One year after the publication of the National Health Programme (NHP) a workshop in the Implementation and Integration of Maternal and Child Health and Family Planning in the National Health Programme was sponsored by the MOH

and WHO. Its intent was to stress the need for the formulation of a well defined MCH/FP program based on the NHP and one which was integrated into the health services.

As a result of the workshop, the objectives of MCH and FP within the NHP were more sharply defined:

- To reduce maternal mortality to the lowest possible level in the next seven years, reduce mortality from 3 to 1/100.
- To treat and reduce sterility and infertility
- To improve midwifery services, the indicator being total coverage of not less than 30% of the target population.
- To advise and provide family planning services integrated with MCH services on voluntary request in accordance with the needs of families and practices policy.
- To reduce infant mortality from the present, about 140 to less than 100 in the next 7 years.
- To reduce child mortality, especially in the second and third years of life, by 25% of the present.
- To attain vaccination coverage of 80% in the age group 0-5 years against measles, poliomyelitis, tetanus, whooping cough, diphtheria, tuberculosis and smallpox by 1984.
- To improve the nutritional status of children in the age group 0-5 years by:

- a. Nutrition education
- b. Practical nutrition demonstration
- c. Regular monthly weighing of the age

group 0-5 years and to be registered on growth charts to be issued to cover at least 50% of the target population by 1984.

- To increase fully trained health visitors to twice the 1976 level by 1984.

The workshop recommended that data and information regarding maternal and child health problems and services be improved, preferably as part of general improvement of health statistics and data. It also suggested that an intermediate objective be adopted to organize and improve information and health education in support of MCH services.

In addition to the above, the workshop made several additional recommendations regarding the organization, budgeting, policy and planning analysis, and strategy for improving the MCH and FP services within the NHP and Primary Health Care Programs.

#### 4. Childhood Immunization

One month after the above workshop was convened, a Working Group for Childhood Immunization as part of the PHC Program met. Its purpose was to plan the immunization activities (BCG and DPT) that will be part of the PHC program. In addition, it evaluated two immunization feasibility studies currently ongoing in Sudan.

As a result of this Working Group's meeting, a strategy was developed for immunization with DPT, small-pox and BCG in children, and tetanus toxoid as part of antenatal care during pregnancy.

Polio and measles immunization were excluded from the currently defined program. Measles immunization was omitted from the NHP because it "is technically and operationally not feasible at the present time."

Polio immunization was mentioned in the NHP as a need in the major towns and Gezira Province. The workshop endorsed the NHP plan, but the Working Group on Immunization omitted polio immunization. The reasons given were that there was not a high incidence of polio in the Sudan and that UNICEF would not provide the vaccine in the absence of studies showing a need for polio immunization. According to the Department of Health and Vital Statistics of the MOH, 2864 cases of polio were reported in 1974. It is well known, however, that this figure is low because there is considerable under-reporting of polio in the Sudan.

#### C. Endemic Disease Control Programs

The entire 6-year National Health Plan for Sudan has been set forth in the form of eight programs. Four of these are specifically aimed at the control of major endemic diseases.

- Program No. 1: Malaria-Nationwide
- Program No. 2: Malaria-Man Made
- Program No. 4: Control of Bilharzia in Irrigated Areas
- Program No. 8: Onchocerciasis
- Program No. 3: Primary Health Care, has three sub-elements that deal with control of endemic diseases, namely:

- Gastroenteritis
- Sleeping Sickness (Trypanosomiasis)
- Kala Azar (Visceral Leishmaniasis)

This section will cover the salient features of the seven programs or subprograms set forth by the Ministry of Health to control or contain these priority endemic diseases.

1. Malaria Nationwide: (Program No. 1)

a. Aims and Objectives of Program

The aim of this program is to reduce the transmission of malaria in Sudan to an insignificant level by 1984 and perhaps to set the stage for eventual eradication. The specific objective is to reduce morbidity from its present estimated level of 20% to 5% per year, thus offsetting the expected increase in total cases due to natural population increase during the 6 year plan. The major indicator of program success will be morbidity as reflected in the expected decrease in the number of patients diagnosed as having malaria in each year at the nation's health facilities.

b. Strategy of Program

In fact, the program plan calls for the application of three strategies, one for each of the following problem areas:

1) The Southern Region - The control of malaria in the South will be the responsibility of the Primary Health Care Program. The health workers will emphasize treatment of all cases of malaria with chloroquine. Special emphasis will be given to the treatment of infants, young children and pregnant women. The plan does not call for the use of insecticides in the South except for within urban areas and within agricultural schemes.

2) The remaining Provinces - This problem area excludes agricultural schemes, the Gezira and urban centers. As in the South, the treatment of malaria will be under the control of the Primary Health Care Plan. No attempt will be made to dispense prophylactic antimalarials. The major difference in the strategy from that in the South will be the application of one round of DDT spraying inside houses just prior to the rainy season at the concentration of 2 grams per square meter of surface.

3) Urban areas - Treatment of malaria cases with chloroquine will again be controlled by the Primary Health units and other medical facilities. No DDT or insecticide spraying of houses will be done. Larvacides (i.e. oil or Abate<sup>R</sup>) will be applied to all known mosquito breeding places.

2. Malaria: Man-made-Irrigated Areas: (Program No. 2)

a. Aims and Objectives of Program

Although the aims and objectives are the same as for nationwide malaria control, the problem is considered to be more complex, the socio-economic implications more grave and the opportunities for devising a coordinated, cost effective long-term malaria control strategy more promising. Toward that end, a set of indicators of success have been selected that are more comprehensive.

- 1) The number of cases/year of "clinical malaria" in all age groups reported by hospitals in irrigated areas.
- 2) The proportion of positive blood slides obtained by passive and active case detection combined.
- 3) The parasite rate (point prevalence surveys) among 2-9 year old children.
- 4) Days off work due to sickness with fever/year.
- 5) The total amount of chloroquine and other anti-malarial drugs dispensed in an irrigated area by government and private sources combined.

b. Strategy of Program

The program sets forth two strategies to be employed during the 6 year plan. The first is a short-term, emergency "plan of action."

During the past year a phase one plan of action was undertaken in which 1) two rounds (June and September) of malathion were applied to a significant number of dwellings in the Gezira, 2) mass chemotherapy using presumptive doses of chloroquine and pyrimethamine were given to residents and 3) Abate<sup>R</sup> larvacide was applied to known malaria mosquito breeding places. This exercise was undertaken as an emergency measure in order to avert a mass epidemic that was expected to occur and to create the basis for a continuous malaria control program (long-term strategy).

On 11 October, a resolution was passed to establish: 1) A central board for malaria control, and 2) A technical malaria control committee. These two bodies made up of representatives of the Ministries of Health, Finance, Local Government, Agriculture, Irrigation, Education Planning as well as from the Faculty of Medicine, the Gezira Board Sudan Tenant Union, Labor Union and the Peoples Council as well as a large number of technical experts. This move has provided a mechanism to coordinate activities of the various projects in the irrigated areas and to make policy that should eventually lead to a more expeditious use of malaria control resources in the Gezira as well as throughout Sudan

c. Long-Range Strategy

The strategy for long-term control is comprehensive and has eleven separate elements.

1) Organization and management in Gezira - The Gezira Board is to employ all of the malaria control staff and to fund the malaria control operations. Formulation of the actual control plan, however, will be done with the technical assistance of the MOH. All curative activities will be the administrative and financial responsibility of the Ministry of Local Government and the Provincial Executive Council.

2) Irrigation Water Management - Primarily concerned with drainage of waste water, canal maintenance and weed clearing of canals, this element will provide for environmental control of mosquito breeding places.

3) Geographical Reconnaissance - This activity conducted by "Mosquito Men" under the supervision of sanitary overseers and public health officers will conduct an annual census of all structures and dwellings in order to provide complete coverage in the spraying program.

4) Residual House Spraying - To conduct an annual spraying campaign in which all dwellings are treated with an appropriate residual insecticide.

5) Insecticide Policy - With

representation on the insecticide committee, the malaria entomologist will help to coordinate the use of insecticides to be used for agricultural purposes so as not to increase the risk of developing resistance of malaria mosquitos to residual sprays. His responsibility also includes continuous monitoring of malaria mosquitos for evidence of resistance. So far, no resistance has been observed to the organophosphorous compound malathion, but significant resistance to DDT has made this chemical useless in many parts of the irrigated areas.

6) Mass Chemotherapy - A single

dose of chloroquine-Pyrimethamine will be given to the entire resident and migratory work force population of the Gezira each September timed to capitalize on the persistent effect of the malathion.

7) Legal Requirements - Local

ordinances with appropriate penalties prohibit replastering of inside walls on dwellings between 1 June and 1 November each year. This is to prevent covering up of residual sprays.

8) Anti-Larval Measures - The

larvacide Abate<sup>R</sup> will be applied weekly throughout the dry season (November - June) to all potential breeding places.

## 9) Curative Activities - Two

programs are proposed. At health facilities where diagnosis by laboratory methods is possible, radical cures with some combination of chloroquine, pyrimethimine and primiquine will be administered according to the species of parasite detected. In areas where these facilities are not available, chloroquine and pyrimethamine will be provided through the village councils for a program of self-treatment supervised by specially trained "voluntary collaborators."

## 10) Public Information - Through

the offices of the Gezira Board and the Tenants Association, all avenues of mass media will be employed to inform the public of personal methods of malaria protection and facilitation of the strategy.

## 11) Evaluation - Parasitological

surveys on random samples of 2-9 year old children will be carried out in January and June of each year in 16 indicator villages. Entomological sample surveys to assess vector densities by indoor catches will be conducted continuously in 10 houses per month in each of 32 indicator villages. Susceptibility to insecticides will be monitored.

3. Control of Bilharzia-Schistosomiasis: (Program 4)a. Aims and Objectives of Program

Designed for the control of intestinal schistosomiasis (Schistosoma mansoni) in the 2 million acres of irrigated perimeters of the Gezira and Managil areas, the aim is to reverse the present trend of increasing incidence. The specific program objectives are threefold.

1) To reduce the prevalence rates of infection in the following age groups:

- 3 yrs from 11% to 0%
- 4 yrs from 25% to 0%
- 5 yrs from 35% to 0%
- 6 yrs from 45% to 5%
- 7 yrs from 60% to 10%

2) To reduce the prevalence of diarrhea with blood in 9-12 year old school children from the present level of 40% to 10%

3) To bring vector snail populations down to 1% of the current level.

Indicators of program success will be threefold:

1) The incidence of new infections appearing in children of both sexes aged 3-7 to be measured by the annual examination of stools by the Kato method (S. hemotobium ova in urine collected from children who were examined the previous year and found to be negative (i.e. conversion) will be recorded as well. It is felt that S. hematobium is not a major health problem but the data may be useful in future programs.)

2) The prevalence of diarrhea with blood (annual history survey) of children of both sexes age 9-12. (This is taken as presumptive evidence of S. mansoni infection).

3) Monthly sampling of vector snail population densities.

b. Strategy of Program

The strategy is divided into two parts as follows:

1) Snail control - using a combination of drip feed, back pack sprayers and aerial spraying, it is proposed to deliver into the canals of the irrigation system 5 applications of molluscicide (Frescon<sup>R</sup> or Bayluscide<sup>R</sup>) per year. The decision as to the delivery system and most cost effective chemical is under study.

2) Mass treatment of 5-19 year olds. This age group constitutes 37% of the population, have the heaviest egg loads and are least likely to suffer adverse reactions to anti-schistosomal drugs. It is proposed to treat with an appropriate anti-schistosomal drug at the same time molluscaciding commences in the area of residence. Several areas of research both proposed and in progress, are considered to be vital to the success of the program.

a) Finding of more cost-effective focal control methods of molluscicides.

b) The economic impact of bilharzia in irrigated areas.

c) The natural course of infections, their clinical significance and more sensitive indicators for evaluation.

d) The investigation of snail ecology and bionomics including the course and extent of infection.

4. Onchocerciasis: (Program No. 8)

a. Aim and Objectives of Program

The primary aim of the program is to reduce the incidence of economic blindness due to onchocerciasis chiefly in the area of the Bahr el Ghazal. The objectives during the six year plan are:

1). To reduce the percentage of skin snip positive and nodule positive cases (male - age 5-14) by 25%.

2) To reduce the number of new cases of economic blindness in males age 15-24 by 35%. The indicators of project success will be (a) a reduction in the skin snip and nodule positivity rates in the designated groups as determined by random sampling in a specific geographical area and (b) a reduction in the number of new cases of economic blindness in the designated group within the same sample area.

b. Strategy of Program

The plan calls for identification of persons in imminent danger of becoming economically blind by one or more accepted criteria and instituting treatment with Suramin<sup>R</sup>, Diethylcarbamazin or some combination of

both. It is expected that passive case detection (i.e. affected individuals seeking out the team for evaluation) will be employed. A second strategy to be employed is to seek out breeding sites of the black fly host in areas close to human habitation and treat these sites with larvacides (Abate<sup>R</sup>).

5. Sleeping Sickness-Trypanosomiasis: (Program No. 3)

a. Aims and Objectives of Sub-Program

Covered under the Primary Health Care Program, the objective is to reestablish control of sleeping sickness in the Southern region by 1980. That is, to bring the present epidemic to an end and reduce the possibility of transmission to a negligible limit.

b. Program Strategy

The plan calls for a two phase strategy: Phase 1 (from the present to 1979) to concentrate on a program of active case finding among the 30,000 inhabitants of Yambio District in Western Equatoria using six teams of trained personnel. All positive cases will be treated with Antrypol<sup>R</sup> or Melarsonyl<sup>R</sup> until they are cured, thus reducing the parasite reservoir and obviating the need for extensive tsetse fly control. Phase 2 (from 1980 onwards): In this phase the Primary Health Care Units will be in place and will have personnel especially trained to identify infected cases and will refer them to local hospitals for diagnosis and treatment.

6. Kala Azar-Visceral Leishmaniasis: (Program No. 3)

a. Aims and Objectives of Sub-Program

It is difficult, due to the lack of information about the vector, the reservoir and basic epidemiology of this disease, to propose a comprehensive program for its control. The major thrust of the control effort will be in the diagnosis by personnel of the Primary Health Care Unit and referral to local hospitals for treatment. A second objective will be to conduct surveys to assess the magnitude of Kala Azar present in the affected areas.

b. Strategy of Program

To conduct surveys in the affected area in order to find active cases and put them under treatment. To establish a research and training center at Malakal with support from WHO in which personnel may learn the basic techniques of epidemiological and entomological surveys as well as methods for diagnosis. At the center it is hoped that field and laboratory research may provide much of the basic information needed to launch a more comprehensive program in the future.

7. Gastro-Enteritis: (Program No. 3)

a. Aims and Objectives of Sub-Program

To reduce the incidence of gastro-enteritis (infant diarrhea, acute diarrhea, dysentery and cholera) by 1984 by 70% of the expected level. That is to

reduce the incidence from 2.8 million to just over 800,000 cases per year. The indicator of program success is to be the number of new cases of gastroenteritis reported in a specified population/unit time by the supporting health facilities.

b. Strategy of Program

The program which is to be incorporated into the Primary Health Care Delivery Service has a curative strategy which is divided into three parts depending on the seriousness of the patient's condition.

1) Mild Cases - This category represents about 20% of the cases seen and would be treated by oral rehydration. The oral rehydration fluid would be prepared on the spot by dissolving the contents of a pre-packaged powder in water.

2) Intermediate Cases - Constituting 30% of the total problem, these cases would be treated either in primary health care facilities by oral rehydration or in hospitals by parenteral rehydration depending on severity or duration.

3) Severe cases - All to be treated by parenteral rehydration at the hospital level.

The facilities to produce rehydration fluids for use in this program do not presently exist in Sudan. A program for construction of such a facility has been developed and will be addressed elsewhere in this document.

D. Rural Water Supply and Environmental Health Programs

In the National Health Plan 1977-1984 two of the eight priority programs come under the general heading of rural water supply and environmental health: Program No. 5 - Safe Water Supply; and Program No. 6 - Environmental Health.

It would be difficult to think of a health problem in Sudan that does not impact either directly or indirectly on one or both of these areas. Conversely, it would be equally difficult to find a health problem that would not be reduced by a nationwide comprehensive program to improve potable water supplies and sanitation.

1. Water Supply: (Program No. 5)

With the exception of some of the larger urban areas that have reservoirs and pipe-borne water supplies, the vast majority of the inhabitants of Sudan obtain water for drinking from:

a. Sources

- 1) Deep-bore wells that are occasionally provided with pumps but more often with rope and bucket.
- 2) Haffirs which are man-made or natural depressions in which surface water is stored.
- 3) The Nile or other rivers of Sudan.
- 4) Hand dug wells of varying depths.
- 5) Rain water collection systems from rooftops or cisterns.
- 6) Shallow step wells dug in dry river beds during the dry season.

There are few mechanisms for the protection of stored water from contamination with human and animal waste. It is in regard to this point that Program No. 5 has been designed.

b. Present Level of the Problem

It has been estimated that there are 900 government-owned and 30,000 privately owned wells, 850 haffirs and 30 dams in the country that lack adequate means of protection from human and/or animal waste. It has also been estimated that the number of new shallow wells increases by about 100 per year. Due to administrative, traditional and technical difficulties, it is not feasible to devise a public system for the protection of haffirs and privately owned wells. By 1984, however, it is estimated that the number of public wells requiring protection from contamination will be about 1900. The aim of the program is to provide that protection. Two objectives have been proposed for the program.

c. Long-Term Objective - To provide the needed protection for all 1900 wells.

d. Short-term Objective - To design a pilot project to protect 45 (5%) of the existing shallow wells from contamination.

e. Strategy of the Program

1) To provide 3 buckets and ropes with gallow and pulley system for each well and to enforce that these will be the only vessels used to draw water from the well.

2) To provide each well with a platform made of brick and cement on which to rest the buckets.

3) To provide each platform with a basin and a pipe where water drawn from the well can be poured and then passed down to the cantainers.

It is hoped that this strategy will be a pilot program that will be applicable to the protection of all wells. No long-term objective has been set pending the outcome of the pilot program.

Two areas considered to be priority topics for research are to find cost-effective methods for the protection of haffirs and dams by using sand filters, chlorination and stand pipes.

2. Environmental Health: (Program No. 6)

With the exception of parts of Khartoum City and the industrial section of Khartoum North, the entire nation is devoid of any formal system of sewage disposal. The provision of a plan for the development of sanitary sewage facilities (i.e. pit and water seal latrines, septic tanks and soaking pits) is considered to be a high priority, but, to this date, no comprehensive plan has been put forward to address the problem programmatically.

## E. Nutrition Program

The First National Food and Nutrition Seminar held in March 1972 made several recommendations to strengthen nutrition programs in Sudan. These included specific suggestions in the areas of health, education, agriculture and animal production.

In the National Health Program, activities to combat protein/calorie malnutrition (PCM) are included under Programme No. 3 - Primary Health Care.

### 1. Objective

The objective of this program is a 50% reduction in the number of children in the age group 0-4 years, with first, second and third degree malnutrition by 1984. In absolute numbers, this means a decrease from approximately 2.2 million to 1.1 million cases. To implement this program, the government intends to use a strategy which integrates promotive, preventive and curative activities.

### 2. Strategy

The promotive strategy, aimed at dealing with two-thirds of the PCM problem will involve:

- Teaching nutrition at all levels of general education

- Utilizing agricultural extension workers together with primary health workers to guide communities in the raising of appropriate foods to meet their nutritional needs.

- Development of agricultural cooperation societies to assist in the storage, processing and marketing of agricultural products.

- Strengthening of the Nutrition Section in the MOH.

The preventive strategy will deal with one-third of the PCM problem through the primary health care workers who will advise mothers in:

- Basic nutritional needs
- Content of common foods
- Breast feeding, weaning and weaning foods
- Nutrition during pregnancy and lactation
- Budgeting to meet family nutritional needs

The primary health care workers will also identify children with malnutrition, will refer severe cases to hospitals, and will report on any predominant nutritional problems to higher health authorities.

The collaboration of the Ministry of Education will also be sought with regard to mass media efforts on nutrition.

The curative strategy will deal with the 1% of children with severe PCM. This program will involve hospitalization of children and the therapeutic treatment of the cause of their malnutrition.

A year after the publication of the NHP, a workshop on the implementation and integration of Maternal and Child Health and Family Planning in the National Health Program was held in Wad Medani. As noted in the previous section, the purpose of this workshop was to further develop and expand upon the plan for providing MCH and FP services through the Primary Health Care Program.

The workshop endorsed the outline for the child nutrition plan in the NHP. It also recommended the inclusion in the NHP of activities to deal with maternal nutrition. Specifically, the workshop suggested that:

- The preventive strategy seek to detect anemia in pregnant mothers through routine antenatal care, and include the distribution of iron, folic acid, vitamins and food supplements, if available, to all mothers.

- The curative strategy seek to increase the number of hospital beds for those needing hospital treatment by 10% of the available antenatal beds. The curative strategy should also provide drugs for treatment of maternal anemia and improve the availability of blood for transfusion.

One month after the above workshop was convened, a "Working Group for Childhood Immunization as Part of the PHC Program" met in Khartoum. This group recommended that all children in the PHC area be weighed and charted in order to detect and refer for rehabilitation those with moderate or severe PCM.

The Working Group also noted that the Minister of Health planned to convene a National Formulative Team to focus on nutrition, oral rehydration and promotional materials and curriculum content for the PHC Program. In this regard, the Working Group recommended that the gathering of people for immunization should be used as an opportunity to:

- Screen children for PCM
- Weigh children and chart their growth
- Refer children with PCM to appropriate treatment facilities
- Provide nutrition counselling
- Provide supplemental food, if available.

The Working Group stressed the fact that immunization sessions are very likely to be the occasion when the largest number of children vulnerable to PCM are seen. The Group indicated the advantages of these sessions for screening and referral of patients for nutritional deficiencies.

The Working Group noted that the tally sheets used in the immunization sessions by the primary health care workers could also serve as a nutrition surveillance system for the PHC complex. This could be done by recording the child's weight and indicating the presence or absence of PCM.

F. Manpower Development Program including Health Education for Consumers

To achieve its objective of maximum health coverage by 1984, the Ministry of Health has initiated a six-year manpower development and training schedule of ambitious dimensions. Numbers and categories of personnel required to staff the program are noted separately, 1) for the four regions of the North Sudan - East, North, West and Central, and 2) for the Southern Region. The staffing pattern is the same for all regions, but the needs and resources are different.

With reference to the organizational structure of the health services, staffing of the Primary Health Care Complex serves as a focal point in considering manpower development and training requirements.

1. Staffing Pattern

a. Primary Health Care Unit - Village Health Worker

The first level of service in the PHC complex is the Primary Health Unit, to be manned by a new category of personnel - the community health worker. Each PHC unit will serve a population of 4000, and five such satellite units will constitute the PHC Complex.

The facility, now known as a dressing station and staffed by a nurse, will be converted into a PHC unit. Nurses now in the dressing stations will be retrained to serve as temporary community health workers until trained CHWs are produced. These nurses will be reassigned later to other jobs in the PHC complex.

Projections to 1984 are for 1980 PHC units to be established in the northern four regions and 708 in the Southern Region. Thus, with one CHW in each Unit, this requires the selection, training and placement of 1980 CHWs in the North and 708 in the South, plus an additional 100 for replacement of drop-outs. They will be given nine months training.

In addition, 837 CHWs will be trained to work with the Nomads, at a ratio of one CHW to 1500 Nomads. They will be recruited from the Nomad tribes and assigned back to their own tribe.

b. Primary Health Care Complex (Dispensary)

- Medical Assistant and Nurse.

The PHC complex, with its five satellite PHC units, will also serve a population of 4000, thus being responsible for a population of 24,000. Each dispensary will be staffed by one medical assistant and a nurse. (All medical assistants are male nurses with two additional years of training. Three-quarters of the nurses are male.)

c. Village Midwives

Village midwives, the majority of whom are illiterate, serve a complementary role to the PHC services. Their cooperation is considered essential to the success of the PHC program. There is a serious shortage of village midwives in the Southern Region - only 167 for a population of nearly 3,000,000. An additional 1000 are needed to meet minimal requirements.

The northern regions have 3200 village midwives, and will train about 1800 more by 1984.

A higher category - the nurse-midwife - will be increased from 800 to 1200 in the North. The Southern Region has very few in this category.

d. Sanitary Overseers

Also complementary to the PHC services, the Sanitary Overseer is a civil servant, trained for six months in basic environmental health. He is located at the next level above the PHC complex in a health center or in a larger town. His role is to help the villages improve their water supplies, build latrines, dispose of wastes, improve housing.

In many villages an assistant sanitary overseer has been selected by the village to help in conducting services initiated by the sanitary overseer. This assistant is trained by working alongside the sanitary overseer for several weeks or months.

While not considered a direct employee under the PHC program, the assistant sanitary overseer should be linked with the PHC, complementing the services of the CHW.

The PHC program calls for 396 dispensaries in the Northern Regions and 141 in the South. That number of medical assistants and nurses will receive refresher courses for assignment to the PHC program. There are 1450 medical assistants now in service in the North and 185 in the South, employed in dispensaries, health centers and hospitals. Some are working in special projects such as Onchocerciasis, Kala Azar, and Trypanosomiasis. All will need reorientation/refresher courses.

Nurses, or dressers, constitute the largest category of manpower, but most of them are employed in hospitals. Of the 10,500 currently active in the Northern Regions, 1200 are in dressing stations at the village levels, principally treating common ailments and referring more serious cases to Dispensaries or District Hospitals. About 800 will be given refresher courses and assigned as temporary CHWs, to be reassigned as soon as the regular CHWs are trained.

Table VI-2 shows auxiliary manpower projections through 1984 for the Northern four regions. Table VI-3, also for the North, gives the annual output of health personnel for 1975, indicating an increase only for nurses.

TABLE VI-2  
CURRENT AUXILIARY MANPOWER, AND MANPOWER PROJECTIONS  
FOR 1984 FOR THE SUDAN<sup>1</sup>

TYPE OF MANPOWER	approximate number in service in 1976	anticipated turnover rate for future years	number trained per year at current output	projected number for 1984 <sup>2</sup>
medical assistant	1,450	3 %	143	2,170
health visitor	350	7 %	35	420
nurses (including dressers)	10,500	3 4 %	750	12,790
nurse-midwives	800	7 %	117	1,180
village midwives	3,200	3 %	350	5,030

Source: Figures derived from information provided by the Department of Training, Ministry of Health.

- Notes:
1. Excluding the Southern Region.
  2. It is assumed that the current output of training institutions will be maintained.
  3. As an example of the influence of the turnover rate, the projected number of nurses would increase to 13,640 if the turnover were reduced to 3 %.

TABLE VI-3

ANNUAL OUTPUT OF HEALTH INSTITUTIONS BY THE TYPE  
OF PERSONNEL TRAINED (1975)

REGION	doctors	tech- nicians	medical assist- ants	health visitors	nurses	midwives 1
Eastern	0	0	9	0	82	67
Northern	0	0	20	0	86	91
Central	100	117	60	35	256	194
Western	0	0	54	0	126	115
TOTAL for 1975	100	117	143	35	550	467 <sup>2</sup>
increase for 1976	0	0	0	0	200	0
TOTAL for future years under existing plans	100	117	143	35	750	467

Source: Department of Training,  
Ministry of Health.

Notes: 1. Including both nurse-midwives  
and village midwives.  
2. Composed of 117 nurse-midwives  
and 350 village midwives.

## 2. Training Facilities for CHWs

Twenty training centers have been designated to train the 1980 CHWs required to staff the PHCUs serving settled populations in the Northern Regions. An additional 10 centers will train the 837 Nomad CHWs.

Seven training centers will prepare the 708 CHWs required in the Southern Region. Only four have been activated to date.

Each CHW Training Center has two tutors, selected from medical assistants and trained in teaching methods. Thus, 60 tutors in the North and 14 in the South have completed training. Tutors are assisting Village Councils and the Provincial Health Departments in the selection of CHW candidates.

## 3. Consumer Education

Health education/promotion is considered to be a primary function of every health worker, especially for those who deal directly with the community. Their training needs to be strengthened in basic health education methods - how to work effectively in achieving better community understanding and acceptance of available health services.

In the past, because health services have been either nonexistent or inadequate, villagers have had recourse only to their traditional medicine men and faith healers.

The educational process involved in changing the social milieu so that modern preventive services can become the pathway to a higher quality of life will be a long and difficult one.

As noted in Section VII-E, the collaboration of health workers and the three principal village organizations promises to serve a major role in the health education/promotion process.

Just as critical as the health promotion thrust, will be the parallel provision of the tools health workers need to do the job. Nothing could be more damaging to the program than to have the villages prepared to utilize services, only to find them unavailable due to lack of health worker mobility, lack of drugs and supplies.

## VII. CONSTRAINTS TO IMPLEMENTATION



## VII. CONSTRAINTS TO IMPLEMENTATION

### A. Overview

#### 1. Poverty

Dr. Justin, Southern Sudan's Minister of Health described his concerns as "the problems classic to poverty". Let us here define poverty as a lack of modern structures, which translate into the subsequent set of problems.

a. Lack of facilities: Everything is in too short supply. Example: There are 8 doctors to 100,000 people, and 1 hospital for every 100,000 people in Sudan.\* MOH current goal is one primary health care unit per population of 4000; and 100% rural coverage by 1984.

b. Lack of finances: Example: The onchocerciasis plan is said to be halted for lack of expected funds from the African Development Bank.

c. Self-help: The MOH is counting on local self-help to meet a substantial part of the program costs. While, evidently, rural peoples can respond with labor and production of local building materials, many parts of Sudan, especially in remote areas of the South - Kassala, Dafur, and Kordofan, live outside the money economy and can only generate very limited resources.

d. Lacks in management and coordination: Example: Hospitals visited have indicated to WHO officials that no salaries had been paid for four months, and no drugs received for three months.

---

\* C.V. Olsen: DAI Report.

e. Lack of transport: Example: Endemic disease control program operation is curtailed by lack of vehicles to move the prophylactic teams. Supplies are held up for months - if not forever - by shortage of railroad cars and engines to carry them out of Port Sudan.

f. Lack of education and training: Example: It is not always possible to find sufficient numbers of people with adequate basic education to train for specialized health-sector jobs. This problem is particularly pressing in the South. This will pose some limits to absorptive capability.

g. Lack of information and lack of information-gathering system: Example: No system, and little baseline data exist.

h. Brain Drain: In country assignments, highly trained urban professionals are faced with an isolation in which there is little professional or intellectual stimulation. Distances are great and transportation and communication limited. Sudanese salaries of Ls200-300/Mo. compare unfavorably with the Ls1200 range doctors can expect in Saudia Arabia and Kuwait. Many Sudanese professionals, therefore, now choose to work abroad.

i. Resistance within the system to new ideas and changes, due to fear of threat to personal position. This is more of a problem at provincial and lower-than-planning levels.

j. Problems of phasing: Example: In Juba, and in El Obeid, classes of community health workers were sent home again untrained, because facilities were not ready to receive them when they came. Health officials were unsure of the possibility to retain these candidates (chosen with care and deliberation by local councils) until they might be absorbed.

k. Problems coordinating input from foreign donors: A WHO steering committee technically exists, but is not at this moment very effective.

Foreign observers state that management, and distribution of authority along the system are the weakest links in the health program. They repeatedly state that only projects with a direct pipeline and a straight chain of command, and preferably with a facilitator who holds authority to move up and down the line, can hope to succeed. They further suggest the wisdom of "piggy-backing" smaller programs on the back of large ones from a logistics point of view. Since communication and supply chains are slow at best, and uncertain in a high degree, it is further advised to consider that any project might well supply its own.

1. The above limitations are of such scope as to indicate that the absorptive capacity of the existing system is itself a major constraint.

## 2. Social Change

We have discussed some of the constraints to implementation of the National Health Plan inherent in the Sudanese situation. It now becomes incumbent to ask: What elements make Sudanese social change possible? How can these be constructively reinforced?

We here suggest several with reference to the Primary Health Care Plan, and examine them in the context of what has been/is being accomplished in the village of Kariba in the Gezira.

### a. Self-Help Concept

A theme reiterated in the MOH is the importance of self-help at the local level. The corollary concept is that development is indigenous change, desired and directed by the affected people themselves. In line with this approach, the survey team was told that villages are chosen for assistance which seek help and indicate ability to cooperate without interference from immobilizing local political schisms.

Opinion and willingness to help must be mobilized. In Kariba the team was told: "Everyone in the village has been involved. The teachers, male and female, who come from the village, are very active; and you have to bring in the Elders. The women are involved in all project activities. It takes social preparation, but once it is started, it spreads. We have offered a full package of medical services here, including family-planning; but its objectives are:

- better care for the children;
- spacing of children;
- to spread knowledge and strengthen family ties;
- help for those with no children; and
- general health-education and family-planning education.

The doctor comes regularly once a week and spends the whole day, and it is a very big occasion!"

Local organization is the key, and the following groups are motivating and mobilizing factors:

- village development committee;
- youth group;
- women's union;
- parent-teachers group.

These are modern associations which the SSU, the Ministry of People's Local Government, the Central Women's Union, and the Ministry of Social Affairs are fostering. Ultimate decision rests at the village level, and these groups cross-cut the traditional system of kinship-based alliance, or establish the associative base for action where there was none before (i.e. Women's association and youth groups in northern Sudan.)

While Gezira Villages, e.g. Kariba and Arbaji, are pilot areas, the same structural approach has been observed at work in El Obeid, and reportedly is underway in other areas in the North. The South is discussed separately.

Description of the organization and function of the top planning level (i.e. Ministry of Health) is provided in Part II, C-2b, p. 49 , and Part III, B,p.III-5. The foregoing indicates the elements at work at the local-delivery level of services. At these two levels the imperatives are more immediately discernible. It is at the axial provincial level, where funding and coordination of vertical programs must take place, that locus of responsibility and channels of action present major management problems.

### 3. Constraints to Implementation of the PHCP

#### In the South

Because of the Southern Region's critical deficiencies in national resources, compared with the Northern Regions, several major constraints that bedevil implementation of the Primary Health Care Plan in the South are noted. The first is the scope of existing health problems. The list of major disease categories is impressive. (See Part II, C-4d, p. 65 .)

Next in importance is the almost total lack of base-level infrastructure. Modern skills, transportation, communication, medical supplies and training materials are all in short supply. Cadres from which to develop health personnel of all levels are severely limited; indeed, the Ministry itself consists of just four overworked men.

Difficulty of access to people is a major problem. Scattered homesteads, lack of agglomerates, even a lack of markets in large areas of the south augment difficulties of communication and supply. The terrain is often difficult, and vehicles and maintenance facilities are limited.

The Deputy Minister of Health listed the following constraints:

- Financial. The South is hard-put to generate its own finances. Money is expected to come from Khartoum or from foreign donors, but coordination of donor input leads to problems in phasing facilities construction and manpower training.

- Lack of visible success (due to shortfalls) makes the health issue a political football in the South, and the Ministry is caught in the middle.

Few health facilities exist and what there was has suffered during the civil war. Units of all levels need to be constructed, but commodities are scarce and costly, and need to be shipped in from abroad. Shipping routes are long and poor, and gasoline is expensive.

Lastly, when people are aware of what modern medicine can offer them, they want its benefits. For many, however, the framework of traditional ideas makes modern health plans seem irrelevant.

For the preceding reasons, a separate strategy is needed for the South. Feasibility studies and socio-cultural research should precede major efforts. Extended preliminary investment is needed because developmental pre-conditions are lacking.

### Manpower Constraints

Major constraints involving manpower to implement the Primary Health Care Program within a six-year period include the following:

1. Too many people to recruit, train and place in too short a time. See Part VI-F.
2. Lack of training facilities in locations where training should be conducted. The provinces are using temporary facilities such as elementary schools and nursing centers. In many cases, the training is not close to the area of recruitment and placement. Many facilities are over-crowded and lack simple accommodations.
3. Inadequate number of qualified trainers, both for basic training and for supervision of field practice. Tutors have been selected from among the medical assistants with good job performance records, but they have not been adequately prepared in teaching methodology. At a ratio of only two tutors to 25 to 30 students, there is little opportunity to provide individual attention for the CHW's, especially during field practice.
4. Lack of training materials, such as visual aids, lesson plans, handout materials, art supplies. Some training centers had no training aids at all, and in most

centers the materials were inappropriate.

5. Inadequate transportation and logistical support for: a) the training period, and b) for primary health care services. Tutors and supervisors need mobility if they are to function even at a minimal level. In one training center for village midwives, three vehicles had been red-lined for a year for lack of spare parts and petrol. Most training centers for CHW's have no transport.

6. Inadequate finances to meet projected costs for both training and service. Total training for the six-year period 1977/78 - 1982/83 has been estimated at \$702,000. The PHC plan suggests external assistance will be needed for about two-thirds of this cost (excluding technical assistance).

7. Unrealistic expectations for lower echelon personnel. For example, the medical assistant in the Dispensary is responsible for supervising five CHW's in the PHC Units, in addition to running the dispensary. His job description says he is to visit the PHC Units once every two months.

The CHW's job description would suggest a workload he could not possibly meet.

8. Many health workers do not want to work in rural areas, preferring to be stationed at hospitals or health centers in the larger towns or cities.

9. Higher or more prestigious jobs in the GOS, private enterprise or abroad creates a critical "brain drain".

C. Infrastructure/Absorptive Capability

Constraints noted for each of the program areas and for the support services reflect the magnitude of the problems facing the MOH in the implementation of its National Health Plan. Constraints in the Southern Region are much more critical for reasons stated throughout this report, in terms of manpower, training, health facilities, communications, logistics, accessibility to service areas, and funds available to meet both development and recurring costs of operation.

The Ministry of Health for the Northern Region is in a more favorable position to receive and absorb external assistance than the South because it has a more adequate administrative structure. There still remains, however, the need to strengthen MOH skills in operational planning as a first step in program expansion. The traditional approach to "vertical" planning by directors of the separate national programs will need redirection to focus on "horizontal" planning for the broad spectrum services of the Primary Health Care Program. The shift in emphasis from curative to preventive services will demand greater coordination between hospital and public health program components to assure proper balance in the use of limited resources.

Because the development of the various national health programs is fairly advanced, the MOH in Khartoum does not feel the need for assistance in management/ planning techniques, and this, in itself, serves as a program constraint. However, the MOH needs help in developing detailed working documents, and has requested consultation of long-term advisors in the major technical program areas. This involvement of TA's in operational development will serve to strengthen the overall planning process.

Recognizing its limited absorptive capability, the Ministry of Health for the Southern Region has requested the assistance of health professionals to build its program infrastructure, now depleted in every department. The path to self-sufficiency will be a long and difficult one, because the manpower needed to staff the Ministry does not exist in the South, nor do candidates with adequate prerequisites for training.

Thus, because of the disparity in resources, North and South, program phasing in the use of external assistance will differ considerably. The South is ready for immediate help in building infrastructure. Limited inputs for program operations are identifiable and could be absorbed, but more comprehensive program development must come later. In the North, existing facilities and manpower would permit early expansion of the Primary Health Care Program in some geographic areas.

Deficiencies in support services, such as manpower training, logistics/supplies, and health statistics, existing both North and South, could be addressed early in Phase I. Their development is a prerequisite for meaningful program operations.

#### D. FINANCIAL AND ECONOMIC CONSTRAINTS

Health sector development is indirectly, but seriously constrained by three categories of economic and financial dilemmæ; and consequent anti-equity bias in investment policy. This section attempts to indicate how problems and responses in these areas interact to dampen or frustrate progress toward health sector objectives.

For several years the GOS has pursued a heavily capital intensive development policy designed to overcome the strains and drainage that perpetuate underdevelopment. (See Table VII-1) It aims to achieve self-sufficiency in several basic consumer products, to increase production and export high-value cash crops, and to strengthen infrastructure (especially transport) in ways that will improve absorptive capacity for further investment.

There have been three development plans: 1961/62-1970/71, which was abandoned after five years for lack of funds and civil disturbances; 1970/71-1974/75, extended two years; and 1977/78-1982/83. The present (third) plan allocates 32% of total public sector investments to agriculture, which presently contributes 40% of the GDP and

TABLE V-1: PUBLIC SECTOR INVESTMENT, 1970/71 - 1976

( LS. MILLION )

	<u>1971/71</u>	<u>1971/72</u>	<u>1972/73</u>	<u>1973/74</u>	<u>1974/75</u>	<u>1975/76</u>
Agricultural Irrigation	9.7	10.4	11.1	13.5	13.0	29.0
Industry and Mining	1.6	1.5	1.9	6.5	33.8	30.8
Transportation, Communication & Power	6.7	6.4	9.1	18.0	37.6	46.3
Social Services	3.0	3.8	3.5	4.5	9.0 )	
Local Governments	2.8	1.4	1.0	1.5	5.0 (	27.4
Others	2.8	6.3	3.0	6.7	8.0 )	
TOTAL	26.6	29.8	29.6	50.7	106.4	133.5

supports 80% of the population. The bulk of this investment will be in mechanization and irrigation. Another 23% is allocated to industrial expansion with particular attention to the processing of raw products emanating from agricultural production. Upon completion of the Third Plan, Sudan expects to be a net exporter of wheat, sugar, and textiles, which today account for about one-third of total merchandise imports. To the extent that this expectation is realized, foreign exchange will be generated for the importation of capital goods and intermediate products which presently are in short supply. On the strength of this promise for escape in future from the economic stagnation that characterized the Sudanese economy prior 1970, the GOS has risked an unfavorable debt position.

Table VII-2 depicts the upward trend of external debt position and debt service ratios, due largely to:

.. Budgetary difficulties, including inability of the public sector to achieve net savings. Central government current expenditures have appreciated faster than revenues, reducing government savings from a range of 14% - 22% in the early 1960s to about 5% in the mid 1970s (Table VII-3); which, in turn, has made public investment for development increasingly dependent upon increased debenture financing, both domestic and external.

2. Inflation rates in excess of 20% per annum,

TABLE 2: EXTERNAL SECTOR PERFORMANCE

I. Balance of Payments (LS. Million for Fiscal Year):		71/72	72/73	73/74	74/75	75/76	76/77
		Actual	Actual	Actual	Actual	Actual	Prov. Actual
(A)	The Current Account						
	(1 + 2 + 3)	-30.9	- 1.5	30.5	-160.3	-107.6	-46.0
1.	Exports	102.4	127.6	142.8	157.8	176.8	212.2
	Cotton	55.3	71.7	73.8	63.1	97.3	121.3
	Others	47.1	55.9	69.3	94.7	79.5	90.9
2.	Imports	121.4	113.1	149.6	280.0	262.5	238.0
	Government Purchases	37.3	39.8	48.1	137.7	138.0	123.8
	Private Sector Imports	84.1	73.3	101.5	142.3	124.5	114.2
	Trade Balances (1-2)	-19.0	14.5	- 6.8	-122.2	-85.7	-25.8
3.	Invisible Account (net)	-11.9	-16.0	-23.7	-38.1	-21.9	-20.2
	Receipts	16.4	16.4	17.8	28.9	41.3	51.6
	Payments	28.3	32.4	41.5	67.0	63.2	-71.6
(B)	Capital Account (net)	8.1	2.6	16.8	108.6	36.1	11.0
	Drawings	20.1	17.9	41.3	111.5	76.2	37.1
	Repayments	12.0	15.3	18.2	13.3	39.0	25.9
	Compensations for Nationalized Companies	-	-	6.3	-	2.1	0.2
	External assets of S.D.C.	-	-	-	10.4	-	-
(C)	Errors and Omissions	2.6	- 1.8	- 1.5	0.2	13.0	4.6
(D)	Balance of Payments	-20.2	- 0.7	-15.2	51.9	-33.3	-30.2

Source: Bank of Sudan

II. External Debt (Medium & Long Term)		Average, 70/72	1973	1974	1975	1976	1977
(\$ U.S. Million for C/Y):							
	Total outstanding & disbursed	284.9	305.5	253.9	764.6		
	Debt Service ratio*	11.1	11.2	22.0	28.1	20.7	

\*Ratio of amortization and interest payments on medium and long-term debt to receipts from exports of goods and non-factor services

Source: IBRD

TABLE VII-3: Central Government Savings and Development Effort, 1961/62 to 1974/75

(LS Million)

	61/62	62/63	63/64	64/65	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74	74/75	Average Annual Growth Rates (%)				
															(PA)	(BE)	61/62 to 64/65	65/66 to 69/70	61/62 to 69/70
1. Current revenues	60.3	74.6	78.6	73.7	75.2	85.8	99.0	114.6	149.4	164.5	163.7	173.4	213.9	277.2	7.0	18.7	12.0	9.4	11.1
2. Current expenditure	51.6	58.5	60.8	63.2	74.3	83.2	86.4	107.1	144.0	146.4	153.3	164.8	214.6	268.3	7.0	18.0	13.7	10.5	12.6
3. Current surplus	8.7	16.1	17.8	10.5	0.9	2.6	12.6	7.5	5.4	18.1	10.4	8.6	Neg.	8.9					
4. Development expenditure	23.8	33.8	47.4	29.8	26.0	21.8	24.1	28.2	29.4	23.9	24.9	29.9	44.4	65.0 <sup>1</sup>					
5. Gross domestic product at factor cost <sup>2</sup>	389.4	405.4	414.9	431.5	449.1	470.9	505.9	516.4	516.6	531.7	632.4	705.3 <sup>3</sup>	735.8 <sup>3</sup>	790.7 <sup>3</sup>					
6. Current surplus as percentage of Current revenues	14.4	21.6	22.6	14.2	1.1	3.0	12.7	6.5	3.6	11.0	6.4	5.0	Neg.	3.2					
7. Share of development expenditure financed by current surplus (%)	36.5	47.6	37.6	35.2	3.5	11.9	52.3	26.6	18.4	75.7	41.8	28.8	Neg.	13.7					
8. Development expenditure as percentage of GDP	6.1	8.3	11.4	6.9	5.8	4.6	4.8	5.5	5.7	4.5	3.9	4.2	6.0	8.2					
9. Current expenditure as percentage of GDP	13.3	14.4	14.6	14.6	16.5	17.7	17.1	20.7	27.9	27.5	24.2	23.4	29.2	33.9					
10. Current revenues as percentage of GDP	15.5	18.4	18.9	17.1	16.7	18.2	19.6	22.2	28.9	30.9	25.9	24.6	29.1	35.1					

Note: PA = Provisional Actual; BE = Budget Estimate; Neg. = Negative. <sup>1</sup>This is the "execution budget" (based on resource availability) as compared to an "umbrella budget" or the "commitment budget" of LS195 million for 1974/75. <sup>2</sup>The figures here relate to current prices and have been taken from the Statistical Yearbook, 1973, table XIV.2. The annual data given there have been converted to fiscal year basis through "averaging" procedures. <sup>3</sup>These are preliminary estimates provided by the Dept. of Statistics, National Accounts Section.

SOURCE: International Labour Organization: Growth, Employment and Equity: A Comprehensive Strategy for the Sudan (1976)

attributable to excessive liquidity generation (e.g., expansion of domestic credit to finance nearly two-thirds of the Second Plan investment) as well as to international inflation in imported foods and in other commodities essential to Sudan's growth.

3. Balance of payments deterioration resulting from concurrent inflation in cost of imports, softening export earnings owing to worldwide recession, and the pattern of GOS development financing. Current expenditures have tended to dominate investment, and reflect in their growth non-developmental payments trends for debt service, administration and defense rather than infrastructure goods and services. This has left development finance subject to fluctuations in the availability of external funds, adding to the sequence of debt and liquidity responses described. Unfortunately, revenues are also sensitive to fluctuations in external markets, since they draw more from trade taxes than from direct taxes.

The GOS responded to these trends during the Second Plan by increasing external borrowing under hardening commercial terms (which escalated debt servicing) and by imposing strict fiscal management - specifically, higher taxes (currently about 20% of GDP), elimination of public subsidies and increase in public utility charges. Among other consequences, this has helped to exhaust, simultaneously,

opportunities for further fiscal control and opportunities for further external commercial debenture. (The debt servicing problem is illustrated by the IBRD's calculation that 72% of projected service payments for the 1976-80 period will pertain to foreign borrowing during 1974-75).

Consequently, until such time as net exports materialize from current investments, two main avenues remain for financing the Third Development Plan according to schedule: 1) very substantial concessionary assistance, and 2) reduction in the growth of recurrent expenditure. The latter could be self-defeating, if achievable, and, if effected, would tend to have greater dampening effect in the social service sectors than in productive sectors.

Since health sector development is highly vulnerable to recurrent expenditure, the Third Plan targets for health sector growth would appear to depend upon accommodation almost entirely through concessionary inflows. (In fact, the improvement in debt position and debt service ratio during 1976 reflected the fact that only 16% of new credits were commercial, in contrast to 35% extent overall, new and continuing).

These types of problems have already affected health sector financing directly, in two respects:

1. Foreign exchange shortages have inhibited imports of essential items such as construction materials, motor

vehicles, instruments and equipment; and have interfered with timely supply of essential supplies such as pharmaceutical products. Instances have been cited where external contributions were necessary to finance minor acquisitions involving a few hundred dollars.

2. Budgetary shortages and overdrafts have delayed payment of recurrent obligations such as salaries.

Debt and liquidity problems of this sort persisting over the medium to long-term could generate insidious consequences for equity considerations generally, and for the health sector particularly. The dimension of exogenous capital necessary to sustain the Third Plan's targeted growth rate of 5.5% for GDP, given the debt and liquidity situation described, must average \$600 million annually during the next five years according to IBRD estimates; in other words, an inflow equivalent to that of the peak year 1974-75. The incentives created by a debt structure of that magnitude, even if partly concessional, tend naturally to favor capital-intensive activities at the expense of employment, continued import restrictions on commodities essential to expansion of social sectors, and import substitution as a primary goal of productive enterprise.

Historically, strong import-substitution policies have biased both employment and development benefits inequitably,

leaving large residues of persistent poverty amidst concentrated wealth and steady inflation. Bias of this sort can be avoided in the Sudan, but only if equity considerations are deliberately built into fiscal and developmental operations. The result would likely be slower "growth" in terms of financial indicators, but surely a more substantial footing for meeting the basic needs of the Sudanese people.

This point cannot be emphasized too strongly. The income and social welfare aspects of the Sudanese economy are already highly skewed. Each of the three Southern provinces has an infant mortality rate nearly double that for the rest of the country. Southern Sudan, containing one-fourth the country's population, has 24 out of 122 hospitals; 10 out of 139 health centers; 104 out of 662 dispensaries; 213 out of 1708 dressing stations; 62 out of 751 private health clinics. The percentage of total communications services in this region has declined over the past two decades. There is one health center for 34,000 people in Khartoum, but only one for 455,000 people in Bahr el Ghazal; one primary school for 1,500 students in Northern province against one for 5,300 students in Darfur; one Southern student for every eighteen Sudanese in University. (Table VII-4) Organizational and managerial capability absorptive capacity transport and other infrastructure are inadequate in the South and West for the rate of

TABLE VII-4: Education and Health Facilities by Provinces, Recent Years

Province	Population, 1973 <sup>1</sup>		Primary Schools		General Secondary Schools		Literacy Classes <sup>3</sup>		Health Centres		Dispensaries		Dressing Stations		Population <sup>6</sup> (1973)			
	(Number in million)	% of total	66/67	72/73	66/67	72/73	70/71	73/74	66/67	73/74 <sup>4</sup>	66/67	73/74 <sup>4</sup>	66/67	73/74 <sup>4</sup>	Primary School	Secondary School	Health Centre	Dispensary
1. Blue Nile	3.9	(27.6)	420	1,369	50	143	474	542	13	43	156	158	189	667	2,860	27,370	91,020	24,770
2. Kordofan	2.0	(14.2)	286	517	32	100	160	256	6	12	72	83	83	161	3,890	20,100	167,500	24,220
3. Kasala	1.5	(10.6)	231	456	28	62	251	243	14	16	69	70	90	459	3,230	23,740	92,000	21,030
4. Darfur	1.8	(12.8)	217	344	17	40	183	168	4	13	56	62	40	66	5,340	45,950	141,390	29,650
5. Khartoum	1.1	(7.8)	219	384	36	58	426	391	20	33	35	32	23	81	2,900	19,190	33,730	34,780
6. Northern	0.9	(6.4)	295	589	50	130	148	265	5	11	72	118	107	237	1,530	69,310	81,910	7,630
7. Upper Nile	0.8	(5.7)	-	-	-	-	53	70	1 <sup>5</sup>	3	27	33	39	46	-	-	266,330	24,210
8. Equatoria	0.7	(5.0)	-	-	-	-	38	80	1 <sup>5</sup>	4	23	48	39	111	-	-	181,000	15,080
9. Bahr el Ghazal	1.4	(9.9)	-	-	-	-	57	69	1 <sup>5</sup>	3	13	16	53	61	-	-	455,330	85,370
Total	14.1	100.0	1,668 <sup>2</sup>	3,659 <sup>2</sup>	213 <sup>2</sup>	533 <sup>2</sup>	1790	2084	65	138	523	620	663	1,889	3,070 <sup>2</sup>	21,100 <sup>2</sup>	102,170	22,740

<sup>1</sup>Statistical Yearbook, 1973, table II.1. The figures are only preliminary estimates for 1973 population census. <sup>2</sup>Northern provinces only. The population of six northern provinces for 1973 was 11.2 million. <sup>3</sup>Statistical Yearbook, 1973 table IV.21. <sup>4</sup>Statistical Yearbook, 1973, table V.2. Data here pertain to 1973. <sup>5</sup>These data pertain to 1970. <sup>6</sup>These are rounded figures.

Source: Ministry of Peoples' Local Government except where otherwise stated.

Source: International Labour Org., Growth, Employment and Equity: A Comprehensive Strategy for the Sudan (1976)

development contemplated in the Third Plan. A choice may be necessary between continued differential economic growth according to schedule, or deliberate resource allocation to reduce past neglect at the cost of slower growth overall.

The latter option would seem to promote greater lasting benefit for income, nutrition and health status. Whether it represents a likely choice within the context of other development and equity inconsistencies may be at issue.

Lack of economic development poses no larger threat to the welfare of the rural poor than the direction taken in the process of development. Skewed benefits do not trickle down, but rather create more formidable barriers to social and economic mobility of the poor. While the Third Plan does devote considerable attention to involvement of the rural poor, especially in the distribution of social services, it does nevertheless carry strong non-equity implications in its proposed implementation. For example, it emphasizes investment in high-technology agri-industrial enterprise for food production and processing replicative of the present Gezira Scheme, rather than intermediate technology production with local processing and storage. It promotes capital intensive cultivation of nationalized open space under concessionaire arrangements which provide priority of tenure to concessionaires rather than to present occupants. It is based on assumptions about land abundance, productivity and employment which are controversial. In

any event the Gezira scheme would seem to be a poor choice of models; development benefits there have accrued mainly to vested interests and have not trickled down to low income workers. Furthermore, intensive cultivation of the Gezira and other areas has been accompanied by a steady decline in yields (especially cereals and cotton) owing to fertility depletion and poor conservation practices; and is said to have displaced thousands of subsistence farmers and disrupted the movement of nomads in the process. It is this pattern that is as easily replicable in the South, where hardly any infrastructure exists at present and where most tillers of the soil are unfamiliar with agricultural mechanization.

Development patterns under the Third Plan will have an important bearing on resource utilization for health care as well as on health status. Great numbers of agricultural workers are underemployed and unable to work themselves out of poverty. They could easily become redundant in a vigorous pursuit of high-technology agricultural development and import-substitution goals. The implications for health status in that event are too clear. Even now malnutrition and poverty-related trauma are leading causes of mortality and morbidity throughout the Sudan. If the process of development causes them to become greater burdens upon health resources - in addition to shifting the burden of man-made malaria and schistosomiasis upon the health sector,

as it presently does - then the demand for curative care could easily absorb available health resources to the detriment of preventive and promotive activities.

E. Communications and Data Systems Constraints

The Ministry of Health established a Department of Health Statistics in 1967, with the objective of developing an information system useful in countrywide collection of data, in analysis of health statistics and in the conduct of research and special surveys. At the writing of the National Health Plan in 1975, the MOH noted that its information system was functioning satisfactorily only at the central level.

Constraints in the development of an effective information system are many:

- lack of technically trained statistical manpower
- lack of an effective collection system
- lack of uniformity in the kinds of information required for program planning and analysis
- lack of communications and transmittal facilities to move data from source to central processing points
- lack of equipment to process, record and feed back health information to the field
- lack of funds to print or purchase forms and other materials necessary for uniform collection of health statistics.

The importance of building an efficient health information system cannot be understated. It constitutes a high priority activity in the extension of rural health services country-wide. The constraints listed above should

be addressed at the beginning of Phase I, with the assignment of long-term technicians in the areas of 1) vital statistics, 2) health information data systems, and 3) demography; and procurement of necessary supplies and equipment. Participant training should also be initiated as soon as qualified candidates can be selected.

F. Logistics and Supply Constraints

Success or failure of the Primary Health Care Program will depend to a large degree on the GOS's ability to procure supplies, to warehouse them, to distribute them expeditiously, and to account for their utilization.

In listing major constraints for the logistics and supply program, reference is made to the Appendix B-Drug, Medical Supplies and Equipment Support Services, which describes the program and problems inherent in conducting those support services under present operations.

Major constraints are summarized as follows:

1. Administration and Organization.

Serious gaps occur in the flow of administrative leadership and management from the top level in the Central Medical Stores down through middle management to the lower operational levels to clearly define job functions and procedures for the efficient conduct of the work. Part of the problem appears to be one of communications between top management, trained professionally as physicians, and lower echelon staff.

This constraint can be minimized through use of appropriate participant training.

## 2. Middle Management Positions

The four pharmaceutical positions in the Central Medical Stores are not adequately staffed, and this constitutes a weak link in second level management.

## 3. Storage and Warehouse Facilities

Physical facilities of the GOS Medical Supply Depot in Khartoum were constructed a number of years ago at a time when the supply requirements were a fraction of those at the present time. Supplies are often offloaded from railway cars to remain in open areas unprotected from the weather. Similar problems of storage were observed at Port Sudan after clearance of supplies through customs.

Lack of "cold chain" facilities for the storage and distribution of vaccines and other temperature sensitive materials at all points of the logistics/supply system is a major constraint in the implementation of an effective immunization service for the PHCP.

## 4. Transportation and Delivery Services

Difficulties in getting delivery of goods from Port Sudan to Central Medical Stores in Khartoum and from the central depot out to the Provinces and MOH facilities - hospitals, health centers, dispensaries and Primary Health Care Units (dressing stations), are described in detail in Appendix B. Part of the problem lies in organization and management, part in the inadequacy of shipping space and transport vehicles, and part in the lack of storage facilities noted above.

Problems of procurement, storage and distribution of supplies by the MOH are typical of those experienced by all other sectors of the government. The GOS places roadbuilding and other measures to improve transportation and communications high on its list of priorities for the Third Development Period.

5. Financial Constraints

Not only is there a lack of funds for renovation or expansion of facilities, financial constraints affect the conduct of ordinary depot functions. For example, as of July 25, 1977, when the review of the logistics and supply program was completed, there seemed little chance that the MOH would be able to initiate an approved project to construct a warehouse for drugs and supplies needed by the Primary Health Care Program.

6. Other Constraints

The logistics and supply report, Appendix B, lists constraints affecting other GOS programs reviewed, but not directly related to the PHC program, including:

- Pharmaceutical Department, MOH
- Training of pharmacists and allied personnel
- National Formulary
- Drug analysis Laboratory
- Private Sector

G. Constraints to Implementation of the MCH/FP Program

The GOS has identified a number of political, social, institutional and physical constraints on the PHC Program. In addition, the workshop on the Implementation and Integration of Maternal Child Health and Family Planning in the National Health Program listed the following constraints to the implementation of the MCH/FP services:

- Deficient data
- Predominant rural population, scattered population and poor communications
- Poor coverage of health services infrastructure including maldistribution of health facilities and personnel.
- Poorly organized midwifery services due to inadequate numbers, training, distribution and supervision of related personnel.
- Low levels of literacy and lack of information and health education of the people.
- High proportion of poverty stricken population.
- Socio-cultural patterns which interfere with health promotion among women and children.

- Organizational difficulties such as:

a. No clear recognition of MCH/FP program in the National Health Program (1977-1985), although an MCH committee has been established in the Ministry of Health recently.

b. The general problems of committee functions and coordination.

- Lack of funds to meet the needed countrywide MCH/FP services partly because the health services receive a lesser share of National Budget than justifiable.

Besides the constraints already recognized by the Sudanese themselves, the following might be added:

- Need for more detailed work plans for the implementation of the MCH/FP aspects of the program.

- Need for improved data and management systems for the administration, monitoring and evaluation of the program.

- Need for improved logistics and supply systems to support the program activities.

- Need for equipment and supplies (e.g. audiovisual equipment and contraceptives).

- Availability of qualified and trained personnel to fill the middle and upper level MOH technical and administrative positions for the PHC program.

- Availability of support from foreign donors.

It should be noted that there are regional differences in the way in which these constraints will be manifested. By and large, the constraints will be greater in the South than in the North.

The absence of an explicit national policy on family planning should not be considered a constraint. This is because the government has already expressed its tacit approval of such activities and is actually giving support to the delivery of family planning services. The extent to which abortion and sterilization services might be introduced into the MCH/FP activities, however, must be studied further.

## H. Environmental Health Constraints

### 1. Introduction

In this broad category of health problems, the National Health Program has six of its eight priority programs.

- Program 1, Malaria-Nationwide
- Program 2, Malaria-Man Made
- Program 4, Bilharzia in irrigated areas
- Program 5, Safe water supplies
- Program 6, Environmental health
- Program 8, Onchocerciasis

Because many of the programs have common constraints, an outline for identification of several categories is proposed in which examples have been recognized.

a. Those constraints inherent in the plan of the program.

1) Lack of correlation between plan and objective (i.e., plan if successfully implemented will not have good chance of achieving the objective).

2) Indicators that are not sufficiently sensitive to measure success.

3) Plan that is not comprehensive enough to reach a large segment of the population.

4) Plan that lacks coordination with other programs.

b. Those constraints associated with quantitative or qualitative deficiencies of personnel.

- 1) Lack of manpower
- 2) Lack of training
- 3) Lack of financial support for salaries and incentives.

c. Those constraints associated with deficiencies in commodities and logistics.

- 1) Shortage of raw materials, i.e., insecticides, larvacides, drugs, molluscicides.
- 2) Shortage of logistical support, i.e., transport, storage, fuel, spraying equipment.

The input necessary to overcome these constraints is in essence the aim of the AID program.

The corresponding inputs to remedy the constraints in category a are technological assistance/ planning; for category b, training and subsidy; for category c, commodity supply.

What follows is an attempt to identify in a horizontal fashion the major constraints to the implementation of six Environmental Health related programs by the categories outlined above.

## 2. Major Constraints by Category

### a. Constraints inherent in the plan.

#### 1) Lack of correlation between plan and objective

Each of the six national plans related to Environmental Health/Endemic Disease Control has some degree of deficiency in this regard.

The Malaria Nation-Wide Program, for example, hopes to reduce morbidity from 20% to 5% by the end of the 6-year plan in the South using only treatment of identified cases. Mosquito control will be attempted only in municipalities. In the North and West DDT spraying is to be used to accomplish the objective without drug distribution (DDT resistance on the part of Malaria vector mosquitos is already wide-spread in parts of the Sudan). It has long been considered by most malaria control experts that a control program based upon a single control method has a limited chance of success.

Considering that fulfilling the stated program objective would require eliminating morbidity due to malaria by more than 2 million cases per year, it would appear that a much more comprehensive, multifaceted approach is required.

Similar deficiencies can be found in the bilharzia program, where the objective is to reduce age specific prevalence rates among children, but as of now no effective, safe drug has been identified for treatment and the delivery system for molluscicides is capable of treating less than 10% of the total irrigated area of the Gezira and Managil areas.

The safe water supply program has a reasonable chance of achieving its objective only because it is so limited (to provide buckets, ropes and cement covers for 1900 wells).

The environmental health (sanitation) program is admittedly an important area, but at present, lacks both objective and plan.

The plan for onchocerciasis control hopes to reduce the percentages of skin-snip positive males in certain age groups by 25% using, primarily, treatment of infected individuals with diethylcarbamizine. A very limited vector control program is planned. Only the malaria control program for the Gezira (man-made malaria) has any reasonable chance of accomplishing a worthwhile objective - this mainly because a comprehensive, multifaceted approach is planned.

In summary, at present it is doubtful if the plans set forth in the National Health Program can fulfill more than a token number of the stated objectives.

2) Insufficiently sensitive indicators.

The majority of indicators on which program success is to be determined are related to passive case identification in Primary Health Care Units. For instance, success in reduction of malaria morbidity will be achieved when there is a reduction in the number of cases reported by the Primary Health Care Units. It is more likely that an effective drug distribution program will record an increase rather than a decrease in cases initially. A true indicator of reduced morbidity should be based upon sample survey, rather than on clinic visits.

3) Plan not comprehensive enough to reach a large segment of population

In this respect, all of the endemic disease/environmental health programs are deficient. To cite a few examples:

- Bilharzia program does not deal with populations outside of Gerzira.

- Malaria program does not serve the nomad populations.

- Onchocerciasis program only serves those in imminent danger of blindness.

- Safe water supply program is designed to protect only 1900 wells. No protection of water from hafirs, the rivers or privately owned wells.

These are only illustrative examples. Many additional unserved populations could be listed.

4) Lack of coordination with other programs.

Due to the vertical organization of the elements of the National Health Care Program, there is very little evidence of intra-program coordination. To cite a few examples:

- DDT spraying for insect control is stated as a program function for the malaria program, the sanitation program and various agricultural programs.

- Abate<sup>R</sup> larvacide will be distributed by persons involved in both malaria and onchocerciasis control.

- Each of the endemic disease control programs maintains its own training program for field workers, in spite of the similarity of their functions (specimen collection, spraying, water testing).

- Those involved in insect vector control hold the agricultural planners responsible for having induced insecticide resistance in vector population by indiscriminate use of DDT and other chemicals

- Each of the programs has its own infrastructure, supervisory personnel and vehicles.

In spite of many possibilities for coordination between programs there is little evidence that it exists or has been planned for in the future.

b. Constraints Associated with Quantitative or Qualitative Deficiencies of Personnel.

1) Lack of manpower

Each of the program representatives interviewed expressed little concern about finding a sufficient number of individuals to carry out the activities in the programs. The only reservations they had were in finding the funds to support their salaries. It should be considered, however, that most of their projections on available manpower, like the programs themselves, are vertical. It is questionable whether sufficient manpower exists to fill all of the needs of all programs unless intra-program coordination is forthcoming. This is particularly true in the South, where secondary school graduates are in limited supply and will be competed for not only by the Primary Health Care Program, but by various agricultural programs as well. It is clearly a potential problem worthy of more study.

2) Lack of training

All of the endemic disease control/ environmental health programs maintain their own training program which is administratively and physically separated from the others. In some cases, the programs observed were reasonably sophisticated and functional. One case in point was the malaria field training center at Sennar that has been giving field and classroom training in all aspects of malaria work to a variety of health workers for more than 10 years. There is a similar program for

bilharzia (schistosomiasis) at the University of Khartoum, with a field station at Abu Ushar in the Gezira. Onchocerciasis training is centered at Wau in Bahr el Ghazal province.

In short, it appears that each of the programs has a corresponding training element which is functioning at present. Some are apparently more functional than others, and it is unknown whether the existing facilities can produce all of the individuals in all categories to carry out the proposed programs. It would be anticipated that problems will arise in this area.

3) Lack of financial support for salaries and incentives.

It is in this area that the program personnel were most vocal. They expressed concern that recent budget allocations were not sufficient to meet the needs for salaries of workers involved in current programs. In fact, they stated that some workers in the field have been working without compensation for several months. This was said to be particularly true of the lower level field staff.

The program personnel have had problems in the past in keeping workers in more rural control areas. Traditionally, incentives (money, bicycles, donkeys) had been given to keep them in the place where they were needed. However, this incentive program was terminated

due to lack of funds. The anticipated resistance to maintaining personnel in the more remote areas in the absence of incentives is regarded as a serious constraint to program success.

c. Constraints Associated with Deficiencies in Commodities and Logistics.

Expectedly, lack of commodities and transport vehicles was viewed as the most important obstacle to achieving program goals by all of the program personnel.

1) Shortage of raw materials

Most of the endemic disease control programs have some requirement for consumable raw materials such as:

- insecticides: DDT for nation-wide malaria
- larvacides: Abate<sup>R</sup> for malaria and onchocerciasis
- molluscacides: bayluscide and frescon for bilharzia
- drugs
- chloroquine and pyramethamine for malaria
- diethylcarmanazin for onchocerciasis
- ambilhar or hycanthon for bilharzia

The total requirement for commodities in this category for all programs could be estimated to be in excess of 4 million dollars per year. It is expected that more than 60% of the funding will have to be from external donors. Current pledges from OPEC countries and from WHO (the two most important outside sources to date) are expected to amount to less than 1 million next year. Sudanese program personnel stated categorically that if the AID program did not provide funds for their chemicals that it was doubtful if their assistance would have much relevance.

2) Shortage of Logistical support

This category was identified as a second major area of need for foreign donor support by program officials. Some of the major requirements were:

- vehicles (Landrover station wagons and pick ups for personnel, 5 ton trucks for equipment)
- spraying equipment for delivery of insecticides, molluscicides and larvacides
- storage facilities for insecticides and chemicals
- water testing equipment
- teaching materials (films, projectors and classroom materials for use in training programs
- field and laboratory equipment for research programs on control

In summary, the major expressed constraints on the part of Sudanese program officials were in the areas of commodities. Following discussions, however, it was conceded that constraints existed in the areas of planning, coordination and manpower development as well. In the section on recommendations, an attempt will be made to realistically address the major constraints and provide alternatives for AID assistance to overcome them.

**VIII. RECOMMENDATIONS FOR AID ASSISTANCE STRATEGY**

## VIII. RECOMMENDATIONS FOR AID ASSISTANCE STRATEGY

### A. General Discussion

In the previous sections of this report, the Health Assessment Team has described the goals and strategies of the GOS for the implementation of its National Health Plan. It has also reviewed the problems and constraints facing Sudan in the health sector, and the kinds of resources required for the program to become operational on a scale that would lead to an acceptable level of success.

It was apparent to the Team from the beginning of the visit that the health needs of the Sudan are great. Furthermore, local resources are so limited that massive long-term external assistance will be needed from many donors for all program components. This will be true especially for expensive endemic disease control activities. Also, the Southern Region, recovering from 17 years of civil disturbances, has severe problems of resource depletion.

External assistance to date has been too limited and too diffused to have much impact for implementing the National Health Program. Assistance pledged by several donors attending the October 1976 international donors conference in Khartoum has been slow in coming and, in total, does not carry much hope for meeting the entire GOS need. Also, much of the other external assistance will be channeled into the agricultural and industrial sectors to stimulate Sudan's economy and export potential, not into the health sector.

To the extent time permitted, the Team discussed each program in some depth with Ministry of Health officials, both in Khartoum and in Juba. Present status of program implementation was documented. Priority needs as seen by MOH staff in their respective program areas were listed.

The discussions covered priority needs as seen by MOH program staff for:

- technical assistance, both long and short term;
- participant training;
- commodities and supplies for
  - a. delivery of rural health services,
  - b. endemic disease control, and
  - c. strengthening program support services;
- grant funds to cover certain development costs of the program, such as construction of health facilities and procurement of vehicles and other equipment.

Out of the discussions, which included all of the eight national health programs, it was obvious that the Ministries of Health (North and South) hold high expectations of substantial AID assistance. They expressed the view that many donors in the past have promised assistance that hasn't materialized. The Team was careful to explain its role of assessment and not commitment, but assured the MOH officials that Sudan's needs would receive prompt and serious consideration by AID.

On returning to Washington, the Team compiled a PID outlining a proposed AID strategy and describing various approaches for health sector assistance to Sudan. Further

review and discussion within AID/Washington has clarified major issues related to health sector assistance and led to agreement on how AID might proceed in developing its project proposal.

B. AID Assistance Strategy

1. Assistance Strategy

As a result of discussions held at AID/W, the major assistance strategy would include the following:

- a. provision of a country health team consisting of:
  1. a senior public health specialist,
  2. an MCH/FP nurse or nurse/mid-wife,
  3. a health program officer.
- b. program assistance for the development and implementation of a primary health care rural health services program.
- c. AID would assist the MOH in strengthening its health infrastructure at the National and local levels in the specific areas of:
  1. logistics and supply services,
  2. health information and data collection/analysis,
  3. manpower training.
- d. AID would be prepared to consider supporting any GOS proposal for endemic disease control on a multi-donor basis if WHO or another international donor agency is prepared to take the lead in organizing the program.

## 2. Implementation Approaches

### a. Formation of Country Health Team

The team should be formed as soon as possible after negotiations have been completed with the GOS. This team should be assigned to the AID Affairs Office in Khartoum in early 1978.

This team would be responsible for day-to-day monitoring of the various project components and would maintain liaison with officials at all levels of the Ministries of Health and with the AID funded contract staff. This team would organize and participate in routine, regular and special evaluations of the project. It would be responsible for continued updating/revision of the AID strategy in the health sector, including modifications in the present project and designing or coordinating the design of new AID funded interventions in the health sector.

## 3. Project Phasing

### a. General Recommendations

The Team recommends a six-year project, to be carried out in two phases. Phase I, for two years, would place emphasis on planning, manpower training, and strengthening of infrastructure for program support services. Also, as early as possible in Phase I, the project would assist the MOH in initiating program operations that are "administratively" tangible and ready to implement.

Phase II, for the remaining four years, would assist the MOH in shifting emphasis to full-scale operational activities and program evaluation in the implementation of rural health services.

Other options in phasing have been discussed. Feasibility of a three-year project was raised in AID/W discussions, with specific objectives to be achieved in that time frame. This would lead to a new PP and further long-term AID assistance based on the realities and needs at that time. In any event, it was agreed that AID project staff would need flexibility in the first three to six months of Phase I to work with the MOH, North and South, to lay out a detailed project design. This is essential because of the complexity and magnitude of Sudan's National Health Program, with many questions yet to be explored.

b. Geographical Considerations

In effect, two project designs must be developed - one for the Northern Regions with the MOH, Khartoum, and one for the Southern Region, MOH, Juba. This is necessary because of their different stages of readiness to absorb external assistance.

The MOH in Khartoum, with its depth in qualified staff, can move into an operational phase for the Primary Health Care Program almost immediately. However, in the Southern Region the Ministry of Health has practically no manpower base for initiating operational programs. Therefore, AID

technical advisors assigned to Juba will have to assume staff functions along with the thin line of Sudanese health officials and continue in that role until Sudanese can be recruited and trained to replace them.

Complicating the picture in the South is the almost total lack of facility infrastructure at all levels of the program. Financial constraints are formidable, compared with the North. Phase I in the South would probably entail something on the order of 90 percent infrastructure building and 10 percent operations, whereas in the North the ratio might be closer to 50-50.

#### 4. Project Inputs

The USAID Country Health Team would constitute the key link in AID strategy to assure maximum outputs for the AID inputs of technical assistance, commodity support and project grants. Phase I programming should give the Country Health Team flexibility to amend and modify the project to fit particular situations as those situations arise.

To assure the GOS of AID's intentions to provide an effective level of support, it is important that tangible assistance be delivered at the earliest date possible. The Team recommends that a PP be negotiated with the GOS no later

than the end of October, 1977, followed by recruitment and assignment of the USAID Country Health Team early in 1978.

Other AID inputs should include:

Technical assistance for the MOH-PHCP:

a. In the North

1. MCH/FP physician (also available to South),
2. Manpower development/training specialist,
3. MCH/FP nurse/nurse-midwife advisor/educator,
4. Health information/statistical systems expert,
5. Logistics/supply specialist,
6. Health education specialist (North and South),
7. Communicable disease/environmental health, specialist (North and South),

b. In the South

1. Health program planner/administrator (public health medical officer),
2. MCH/FP physician,
3. Manpower development/training specialist,
4. MCH/FP nurse/nurse midwife educator,
5. Health information/statistical systems expert,
6. Logistics/supply specialist,

An architect and engineer should be made available, possibly on TDY from REDSO, to work with the MOH, North and South, on facility design, and a technician to conduct an environmental impact study, as necessary. As the project design takes shape, various short-term consultants will be required. They will be identified as needed by the long-term consultants.

Commodity support should be provided as early in the program as required to initiate operational activities. Grant funds should be allocated to the MOH/ Khartoum to use in construction of project defined facilities; procurement of vehicles, cold storage equipment, training aids and materials; calculators, and adding machines, for the statistical division.

Initial commodities should be procured as required in the "start up" phase of MOH/Juba project activities: vehicles; statistical and office equipment; audio-visual/training, equipment and materials; and building hardware for construction of facilities, e.g., training/service center complex.

#### C. ALTERNATE STRATEGIES FOR AID ASSISTANCE

In the assessment/evaluation process, the team considered several approaches to program development. These approaches, described below, represent a broad spectrum of intervention, from a highly complex, comprehensive health sector approach to a less complex, highly specific categorical approach. The alternatives are presented here for the record, noting that the strategy stated as the beginning of this section meets with the Teams full concurrence.

1. Comprehensive approach - This broad-spectrum approach would identify and address the priority health needs of the Sudan. AID would strategically support all eight priority components of the National Health Program, and thus move the program at an accelerated pace toward health goals established by the GOS for its third development period, 1977-1984. Thus, the MOH would be in a much better position by 1984 to maintain and operate the

infrastructure required to meet the continuing rural health needs of the Sudan.

Program components of a comprehensive approach would include:

- a. The Primary Health Care Programs, North and South,
- b. Endemic disease control programs with administrative and operational direction from the national level for control of malaria, bilharzia onchocerciasis.
- c. Communicable disease control campaigns directed from the National level for diseases preventable through immunization - measles, polio, diphtheria, whooping cough.
- d. Maternal Child Health/Nutrition/Family Planning services directed by the MOH as a national program - malnutrition in mothers and children, pre-natal care and family planning.
- e. Development of national and regional health infrastructure, and supportive services, e.g., manpower training; logistics/supply procurement, storage and distribution; health information/data systems.

2. Primary Health Care Approach - The PHC Programs (North and South) are designed to expand basic promotive (educational) preventive and curative health services to rural areas of the Sudan, as described in Part III of this report. The PHCP would require essential infrastructure and supportive services, described for the comprehensive approach. It excludes categorical, nationally directed programs, e.g., malaria, bilharzia and

onchocerciasis control. However, basic elements of communicable disease control, MCH/Nutrition/FP, and environmental health/water supply activities should be viewed as part of the PHCP. These and certain endemic disease control activities are services the PHC complex should be able to render routinely in a village - based health delivery system.

3. Geographical/Pilot area approach - In this approach, AID would support one or two health delivery service areas of limited size, such as one Province in the North and one in the Southern Region, for the planning and implementation of comprehensive rural health services - a micro-scaled version of a nation-wide comprehensive health program.

The pilot area approach could be implemented as a health sector activity alone, or in a broader integrated rural development scheme with agriculture, education and other sector programs.

The main weakness in this approach might be lack of adequate support services at the National/regional levels.

D. Categorical (Vertical) Approach - In this approach, AID would assist in the planning/implementation/evaluation of one or two of the categorical (vertical) programs that are national in scope - malaria control, bilharzia control, MCH/nutrition/FP services, environmental health/water supply program.

This approach would develop better technology/methodology for conducting the programs chosen, but would not have much impact on MOH capabilities to deliver rural health services in the PHCP or other unassisted program components.

4. Functional(Horizontal) approach - In this approach, AID would limit its assistance to development of one or two selective support services, such as:

- administrative planning/management,
- manpower training,
- transportation/logistics/supplies - procurement, storage, distribution,
- health information/vital statistics/program data base,
- facilities construction, i.e., training/service centers, PHC complex dispensaries and satellite units in villages.

This approach would have distinctive outputs for components selected, and would benefit each of the categorical programs, but runs the risk of making one component viable while other components essential for success would remain weak.

#### E. Possible Areas of Program Assistance

In reviewing the various program components of the MOH, the Team compiled an extensive list of program areas for AID assistance. Following are excerpts from those reports that serve to amplify and reinforce the more general recommendations noted above.

##### 1. Maternal Child Health and Family Planning

So far, the various working committees of the MOH have done an excellent job in developing preliminary plans for the MCH/FP component of the Primary Health Care Program. However, the MOH does not have the in-house capability to

prepare detailed work plans and evaluation methodologies for MCH/FP activities over a six-year period. This problem is even more acute in the MOH at Juba, where the needs of the South will require special attention.

a. Long or short term technical assistance is recommended in:

1) Health education to assist in development of educational and nutritional components for patients, parents and the community.

2) Training of professional, auxilliary and support staff; assistance in curriculum development, preparation of training materials, and development of audio-visual aids.

3) Program management and administration to strengthen a management information system, personnel administration systems, and logistic and supply procedures.

4) Special areas, such as:

- immunization methods in rural areas;
- preparation and implementation of special studies in demography;
- development and implementation of nutrition sample surveys;
- the role of sterilization and abortion in MCH/FP programs; and
- methods for improving vital statistics registration.

b. Participant training, both short and long-term, is recommended in the areas of:

- health care planning
- health care administration
- data systems
- logistics and supply
- family planning
- maternal and child health
- midwifery
- health care economics
- communicable disease control
- nutrition

2. Manpower Development and Training

a. Long or short-term technical assistance is advisable:

1) one full-time training advisor for assignment to the Department of Training, MOH, Khartoum, and one full-time training advisor for assignments to the MOH, Southern Region, Juba. These advisors should have wide experience in designing training programs, in training methodology, and in program management and evaluation. International experience in the training of paramedical personnel would be an asset.

2) a full-time health education advisor in the North and one in the South, to complement the input of the training advisors in strengthening health education skills of all workers in the Primary Health Care Program.

3) two full-time nurse or nurse/midwife educators, one to be assigned to the North, one to the South. The one in the North would function principally with bilingual Arabic/English training staff in the various MOH nursing schools to assist in curriculum development, in upgrading teaching methodology, and in planning field training experiences for nurses and nurse midwives.

The nurse educator in the South, where English is the teaching medium, would also participate directly in teaching.

4) all technical consultants assigned to the various programs would have training functions.

b. Technical assistance for the University.

The Department of Social Medicine has requested teacher/advisors in:

- 1) statistics and demography
- 2) epidemiology
- 3) maternal and child health/family planning
- 4) sociology
- 5) health education
- 6) other disciplines as program needs arise.

3. Other Considerations

It is suggested that the program proposal:

a. Specify that water be provided at each facility AID agrees to assist.

b. Either underwrite some nutrition-research at village levels, and/or utilize reports of WHO village-level nutrition research experts to develop and produce educational materials for the population on adequate nutrition and foods preparation. This should be aimed at women and might incorporate materials especially prepared for a newly literate audience. Such materials could be channeled through the Women's Union and Social Affairs Ministry Programs. With agricultural expert assistance, develop training and information programs and materials on better gardening practice for women, including access to improved variety seeds, to complement the nutrition program. Consideration should be given to training teachers for these programs as well. This could be a basic intervention point in the preventive health care system.

c. Further course materials could be developed for the above specified audience and channels, on basic infant and child care, and detailed courses for women on the practices of safe and healthy pregnancy, child-birth, and neo-natal and new-mother care.

d. Develop a project component to be successively implemented in different parts of the country that would integrate the following three activities through one effort:

- 1) A social survey;
- 2) A medical-geography survey; and
- 3) The collection of base-line demographic health data.

e. Consider underwriting training of a specialized primary health care worker (CHW) for Nomadic groups, who would offer health services to the nomads and some veterinary services to their animals. The Ministry of Health has already indicated it is thinking in this direction.

f. Consider suggesting to the MOH that some of the self-help facilities AID will offer might usefully be directed at the large and desperately needy populations of the squatter-villages of Khartoum and Port Sudan, and the refugee squatter-villages of Juba.

#### 4. Endemic Disease Control

AID recognizes the need for program assistance for endemic disease control activities in the Sudan and would be willing to consider separately GOS proposals for endemic disease control programs on multi-donor basis. AID assistance in this area could consist of specific support for individual program components such as manpower training or programs which would strengthen primary health care activities.

E. Urgency of Donor Assistance

The GOS has a socio-political commitment to its people to expand its rural health delivery services to alleviate the heavy burden of disease on the rural poor. The U.S. has an unique opportunity to assist the GOS in fulfilling that commitment.

The Assessment Team reemphasizes that the GOS requirements for its health sector are of such magnitude that external assistance is needed from several major donors.

A USAID Country Health Team could encourage the GOS to commit a larger percentage of its own finances to the health sector. At the same time the GOS should aggressively seek international assistance from all major donors for its health sector.

The Assessment Team reiterates its recommendation that the GOS create a coordinating committee to review all donor inputs. This is essential to avoid overlapping or duplication of projects and to encourage inputs into areas of need.

**APPENDIX SECTION**

APPENDIX A:

PERSONS SEEN AND PLACES VISITED

The Team was greeted to the Sudan by His Excellency Major General Khalid Hassan Abbas, Minister of Health, Khartoum. General sessions with staff of the Ministry of Health were chaired by Dr. Abbas Mukhtar, Under-Secretary. Dr. Mukhtar and Dr. Abdar-Rahman Kabbashi, Director-General, Rural Health and Provincial Affairs (PHCP), arranged appointments and itinerary for the Team during the four-week assessment period, June 15-July 10.

In Juba, the Team was welcomed to the Southern Region by Dr. Justin Y. Arop, Regional Minister of Health and Social Affairs. Dr. N.L. Warille, Director General, MOH, Southern Region, and Dr. Pacifico Lolick, Director, Primary Health Care Program, MOH, Southern Region, handled arrangements for the Team while in Juba.

1. Persons Seen

(Unless otherwise noted, all MOH designations are Ministry of Health, Khartoum)

- H.E. Major General Khalid Hassan Abbas, Minister of Health, Northern Regions
- Dr. Rasheed El Amin Abdalla, Kala Azar Program, MOH
- Mis Kaltoum El Agab, Chief of Nursing, Soba University Hospital
- Mr. Abdul Abu Albasher, Tutor, CHW Training Center, El Obeid
- Dr. Ahmed El Shell Ali, Director, Department of Environmental Health & Quarantine, and Ports, MOH

- Dr. Sharaf Ahmed-Ali, Head, Department of Health Education, MOH
- Mr. Abdel Hameed Ahmed, Sudanese Chemical Company
- Dr. Amad Ahmed; MOH
- Dr. Awad Mohamed Ahmed, Medical Director, Medani Hospital, and head of Provincial Health Program.
- Miss Rogia Ahmed, Chief of Nursing, Khartoum Hospital
- Mr. Taha Sayid Ahmed, Public Health Inspector, Epidemiology, North Kordofan Province, El Obeid.
- Mohammad Akam, Shenabla Tribe Nathir, El Obeid
- Dr. Mutamid Ahmed El Amin, Bilharzia Control Program, MOH
- Dr. Justin Yak Arop, Minister of Health, Southern Region, Juba
- Mr. Daoud Kirolos Atalla, Assistant Director, Central Medical Stores
- Ms. Khadum Awat, Directoress, Women's Union, El Obeid.
- Farouk Azhori, Inspector of Services, Ministry of National Planning
- Mr. Dalil Babiker, Tutor, CHW Training Center, El Obeid
- Mr. M.A. Baroudi, Training Department, Primary Health Care Program, MOH
- Halima Bashit, El Obeid
- Hafiz Hag Abu Behr, El Obeid
- Dr. Ali Ismail Biely, Director, Department of Social Medicine, MOH
- Mr. M.I. Bushara, Training Department, MOH, and Head of Training School for Medical Assistants, Khartoum
- Mr. Osman Ali Cubara, Chief of Pharmacy, Khartoum North Hospital
- Dr. El Sayed Hassan Daoud, Director, National Laboratories

- Mr. Lual Deng, Department of Statistics, MOH, Juba
- Dr. Imam Doleib, Medical Director of Training, MOH
- Said Eissa, Editor, El Alam
- Mr. Ismail Elzir, Tutor, CHW Training Center, El Obeid
- Sister El Haggi Khamis Faltina, Epidemiology Unit Nurse, El Obeid
- M. Farouq, Minister of Planning
- Mr. Omer Gabbani, Director General, Pharmaceutical Department, MOH
- Dr. Gaddal, Malaria Control Program, MOH
- Mr. El Hag Ibrahim A/Gadir, Pharmacist, MOH
- Dr. M.S. Gassouma, Onchocerciasis Program, MOH
- Abdula Gorshi, Medical Assistant, Health Center at Arbagi, Wad Medani
- El Hadj, Medical Assistant & Teacher of Community Health Workers
- Dr. Sobhi el Hakeem, Manpower/Training, PHCP, MOH
- Mr. Hussein Abdalla Hamadein, Representative, Bayer Scientific Office
- Dr. Taha Abud el Hamid, Deputy Assistant Commissioner of Health, North Kordofan Province, El Obeid
- Mr. F. Hamilton, Assistant Director, UNICEF
- Dr. Abdel Aziz Mohd. Haridi, Malaria Control Program, MOH
- Shadia Hassan, Associate Director, Soba Social Training Center
- Mr. Sadig Hassan, Pharmacy Medical Assistant, Khartoum Hospital
- Mr. Michael Highland, Assistant Country Representative, UNDP

- El Asir Ibrahim, Public Health Inspector, Smallpox Campaign, El Obeid
- Mr. A.H. Ibrahim, Government Analyst & Director of Chemistry Department, National Laboratories
- Dr. I. el Imam, Director, Environmental Health, MOH
- Mr. Ismail Sayed Imam, Pharmacist, Technical Manager, Sudanese Chemical Company
- Dr. Abdar-Rahman Kabbashi, Director General, Rural Health and Provincial Affairs, (PHCP, MOH)
- Mr. Hizabr H. El Kamali, Drug Control Section, Central Medical Stores
- Abd el Karim, Deputy Commissioner of Health, El Obeid
- Mr. Mukhtar Hassan Abdel Karim, Pharmacist, Central Medical Stores, MOH
- Dr. David R. Kersten, Surgical Resident, Khartoum North Hospital
- Dr. Rafique-Khan, Chief of Mission & WHO Representative to the Sudan
- Dr. Awad Sirel Khatim, Primary Health Program, MOH
- Ahmed Kheir, Deputy Under Secretary for Social Development, Ministry of Social Affairs
- Sister Nadina el Lali, Senior Health Visitor Tutor, El Obeid
- Dr. Pacifico Lolick, Director, Primary Health Care Programme, MOH, Southern Region, Juba
- Dr. Haidar Abu Ahmed Mohd., Leprosy Program, MOH
- Jelac Makkani, Chief Public Health Inspector, Kordofan Province, El Obeid
- Dr. Kamal Medani, Director, Central Medical Stores, MOH
- Mr. Jalal Makkawi, Sanitary Engineer, North Kordofan Province, El Obeid
- Miss Niemat Malik, Chief of Nursing, Khartoum North Hospital

- Atayat Marghani, Directress, Soba Social Training Center
- Dr. H. Mashaal, WHO, Khartoum
- Dr. Gasim Mukhayer, Acting Head, Department of Pharmaceutics, Faculty of Pharmacy
- Dr. Osman Modawi, Director, Maternal and Child Health/ Family Planning, MOH
- Khalaf Alla Ismael Moh, Associate Director, Ministry of Social Affairs
- Dr. Abbas Mukhtar, Under-Secretary, MOH
- Dr. Hassnein Fadel Mula, Hospital Director, El Obeid
- Dr. Ali Ibrahim Mustafa, Senior Occupational Health Specialist, Khartoum North Hospital
- Dr. Daoud Mustafa, Prof. of Medicine & Chairman of National Formulary Committee for Sudan Medical Council
- Osman Mustapha, Deputy Under Secretary, Ministry of National Planning
- Hagga Nafisa, Sudanese Women's Union
- David Noursi, IMF Representative to Bank of Sudan
- Dr. Zuhaib Ali Nur, MOH
- Dr. Oliver, Director General, Hospital Program, MOH, Juba
- Sister Nafisa Omar, Director, Health Visitors School, Gibaga Health Center & Training Center, Wad Medani
- Dr. Mohamed Ibrahim Ali Omer, Head, Dept. of Pediatrics and Child Health, Faculty of Medicine, University of Khartoum
- Dr. Abdel Hamid El Sayed Osman, Chief, Smallpox Eradication and Immunization program MOH
- Dr. Osman Hassan Osman, Head of Dept. of Pharmacology and Acting Dean, Faculty of Pharmacy
- Mr. el Hag Mohamed Osman, Tutor, CHW training Center, El Obeid

- Dr. Mohammed Ibrahim A. Omer, Department of Pediatrics and Child Health, Faculty of Medicine, University of Khartoum
- Dr. Yahya Ownalla, Department of Community Medicine Faculty of Medicine, University of Khartoum
- Dr. Sadig Rasheed, Director, Development Studies & Research, University of Khartoum
- Mr. Rashid, Resident Director Training Center Sennar (malaria control)
- Dr. Hassan Saleh, Deputy Chairman, Department of Anthropology, University of Khartoum
- Dr. Omar Al-Baghir-Saleh, Director General, Health and Vital Statistics, MOH
- Thoraya Osman Saleh, Sudanese Women's Union
- Mr. Kamal Salih, Chief Pharmacist, Khartoum Hospital Pharmacy
- Sheikha Sakina, Zar-Leader
- Sister Sakina, Soba Hospital
- Mr. Said el Sharif, Pharmacist, Khartoum North Hospital
- Dr. Khalil Sherif, Gastroenteritis Program, MOH
- Faiza Shankal, Journalist, writer on women's affairs
- Mr. Ali Shibaika, President Syndicate of Pharmacists and Member, Sudan Chamber of Commerce.
- Dr. S. Singh, WHO, Juba
- Mrs. Suhayr, Director of Public Relations & Social Anthropologist, Ministry of Social Affairs
- Ensaf Suleiman, El Obeid
- Miss Suad Mohamed Suleiman, Bilharzia Section, National Laboratory,
- Dr. Mohy El Din El Tayeb, Deputy Director, Central Medical Stores, MOH

- Mr. Gabriel Timar, WOH, Juba
- Dr. El Rayah El Tireify, Tuberculosis Program, MOH
- Dr. A.R. el Tom, Head, Department of Community Medicine, Faculty of Medicine, University of Khartoum
- Jan Wahlberg, Program Officer, UN Development Program
- Dr. Noel Logo Warille, Director General, MOH, Southern Region, Juba
- Sett Katira Yasin, Directress & Editor, "The New Woman", Sudanese Women's Union
- Dr. Abdel Hafiz Abu Yousif, Director, Onchocerciasis Control Program
- Mr.A.B. Zaroug, Registrar, Faculty of Pharmacy

2. Places Visited

- Bank of Sudan
- Community Health Worker Training Center, South Region, Juba
- Central Medical Stores Supply Depot, MOH
- Department of Community Medicine, Faculty of Medicine, University of Khartoum
- Department of Training, MOH, Khartoum
- Epidemiological and Endemic Diseases Center, Abu Ushar
- Faculty of Pharmacy, University of Khartoum
- Health Center, Arbagi, Wad Medani, Gezira Province
- Health Visitor Training Center, Gibaza, Gezira Province
- International Labor Organization, Khartoum Office
- Khartoum Civil Hospital Pharmacy
- Khartoum North Civil Hospitals Pharmacy
- Malaria Training Center, Sennar
- Medani Hospital, Gezira Province
- Ministry of Health and its several departments, Khartoum
- Ministry of Health, Southern Region, Juba
- Ministry of National Planning, Khartoum
- Ministry of Social Affairs, Khartoum
- Ministry of Transportation and Telecommunications, Khartoum
- National Laboratories Drug Analysis, Central Medical Research Laboratories, MOH
- National Public Health Laboratories, Khartoum
- Omdurman Civil Hospital & Pharmacy

- Organization of Drug Wholesalers & Importers, Khartoum
- Pharmacy, Medical Assistants Training School, MOH
- Provincial Health Department, North Kordofan Province, El Obeid
- Soba University Hospital, Khartoum
- Soba Social Training Center, Khartoum
- Sudan Medical Council, Khartoum
- Sudan Reference Collection, University of Khartoum Library
- Sudanese Army Medical Supply Depot, Khartoum
- Sudanese Chemical Industries Ltd., Khartoum
- Sudanese Women's Union, Khartoum
- Syndicate of Pharmacists Headquarters, Khartoum
- Training Center for Village Mid-wives, El Obeid
- UN Development Program, Khartoum
- UNICEF Office for Sudan, Khartoum
- University of Khartoum Soba Hospital Pharmacy
- World Health Organization, offices in Khartoum and Juba

## APPENDIX B

### Drugs, Medical Supplies and Equipment Support Services

#### Survey Topics Covered

- I. Government Medical Supply Depot
- II. Pharmaceutical Department - Ministry of Health
- III. Training of Pharmacists, Pharmacy Medical Assistants and Allied Health Personnel
- IV. The Sudan National Formulary
- V. Drug Assay and Control Section - National Laboratories
- VI. Vaccine, Serum and Rehydration Fluid Production Plant
- VII. The Private Sector - Survey of the Sale, Purchase, Prescribing and Use of Pharmaceutical Preparations and Medical Supplies
- VIII. Constraints
- IX. Places Visited and Persons Contacted
- X. Lists of Supplies and Equipment

## DRUGS, MEDICAL SUPPLIES AND EQUIPMENT SUPPORT SERVICES

### A. Purpose of Assessment

The basic object of this part of the health sector assessment concerns medical supply facilities and the ability of the Government of Sudan to properly carry out the procurement, storage and distribution of pharmaceutical preparations, and medical supplies and equipment. This assessment is intended for the benefit of a large number of various types and sizes of health facilities which provide care to the people of Sudan. These facilities operate under an extensive program whereby all goods and services are provided without charge to the patients.

To carry out a proper assessment for this purpose and to obtain the necessary information that would lead to sound and practical recommendations for assistance, it has been essential to examine in detail all types of activities that concern pharmaceuticals, medical supplies and related matters, both in the public and private sectors. In a study of this type, it is often found that many factors are tied together and exert influence over the desired result of proper drug therapy and delivery services.

### B. Areas of Interest

The several areas of interest that were examined are explained in detail in the following pages. At all times the study has been guided by the purposes and planning of the National Health Program and two of its major parts 1) The Primary Health Care Program for the Eastern, Northern, Western and Central Regions of The Sudan, and 2) the same type of program for the Southern Region.

Since the subject of supplies and services affect programs throughout the country, the conclusions, recommendations and constraints reached as a result of the study will be more on the National level. There will, however, be remarks about specific locations, particularly in connection with transportation and distribution of stocks for the Primary Health Care Programs, requirements of the individual disease control, training and information priorities of the National Health Program where assistance will be projected.

Briefly, the four major areas reviewed are: 1) The Medical Supply Depot of the Ministry of Health, known as Central Medical Supply Stores and referred to in this study as "the depot", 2) The Pharmaceutical Department of the Ministry of Health, 3) Government facilities for the training of pharmacists and allied health personnel, and 4) the private sector, which would include retail pharmacies, importers and the local pharmaceutical industry. Each of these areas is subdivided into several sections for convenience of explanation and understanding how the activities relate to one another.

#### I. THE GOVERNMENT MEDICAL SUPPLY DEPOT

Officially this depot is known as "The Central Medical Stores." It is operated under and by the Ministry of Health and serves as the agent for the procurement, storage and distribution of all medical commodities utilized in the public health sector, including those required by the military and other parts of the

Government of Sudan. The depot is located in the light industrial area on the southern side of Khartoum.

a. Physical Facilities

The physical facilities were constructed a number of years ago at a time when the supply requirements were a fraction of those at the present time. There are several warehouses, a two story small office building and a number of small buildings for specialized administrative and support activities. There is space for additional warehouses. The railroad has a spur line into the depot, thus a considerable quantity of containers can be brought into an area where they can be off-loaded into trucks for movement to the warehouses.

As will be mentioned later under the discussion of procurement procedures, there is not enough covered space to accept the normal two-year requirements, so the orders have to be sent in sections spaced over the year by the overseas suppliers. At the time of this study there were a large number of crates containing equipment of various types in the open spaces, with no hope of protection from the elements. Some remained as they were when pushed off the railroad flat cars.

Most medical commodities are imported into the country. The present ports of entry are Port Sudan for sea freight and Khartoum for air freight. Cargo received at Port Sudan is sent by Sudan Railways to the depot in Khartoum. Commercial importers having their own trucks are able to bypass the railroad and bring a cargo by road.

The subject of Port Sudan is a key part of this study and will be covered later. Due to high shipping costs, air freight is reserved for perishable items as vaccines, serums, other biologicals and antibiotics. Also included would be certain urgently needed drugs and surgical instruments. There is need for a cold room at the airport to hold shipments of vaccines and serums until they can be cleared by MOH and depot staff.

b. Depot Staff

In regard to the depot staff, the director and his deputy are both doctors of medicine. This is a very interesting point and one can see advantages and disadvantages to this arrangement. However, it seems to be in line with MOH policy of having MD's in key positions. They are assisted by four pharmacists and a number of administrative personnel. Many of the employees have been at the depot for a number of years. As is frequently and fortunately found in this type of operation in developing countries, there are a few highly qualified and dedicated middle management people who carry the main burden of keeping the entire program functioning year in and year out. There exists a need for certain training programs and these will be covered in the recommendations.

c. Cold Chain

In all discussions about supply, one constantly hears about the "cold chain." This subject will reappear from time to time in this study as it is an essential factor in storage all along the line. In this regard it was interesting to note that the depot had three large walk-in cold rooms, but these seemed to be

not well functioning due to mechanical problems in maintaining proper temperature. Also there are extended periods of time when the electricity is off in the part of the city where the depot is located. There exists definite need of stand-by generators. It was also noted that there was lack of simple shelving within the rooms, which would thus lead to mix ups in old and new stocks. The depot has a well organized basic carpenter shop. One would expect that somehow over the years enough wood could be salvaged to prepare shelving. This is where proper depot management comes in. (Yellow Fever vaccine is kept in WHO-provided freezers in the depot's vaccine section).

In line with the above remarks about shelving, this same condition exists in other parts of the warehouse when certain vital items are spread about. Among the many ways of doing things differently than we might do in U.S.A. was the manner of assembling orders. This was done within large marked spaces on the sandy warehouse floor. One wonders why a series of long, wide tables could not be used. When a visit was made to the instrument and small equipment warehouse, it was noted that well organized shelving was present, plus a long table to assemble orders. These simple things are mentioned at this point to demonstrate that top management has to understand what should be done in each department to get the most efficient operation per five-hour, unkind weather day. The best way to get the ideas across is for several of the depot staff, starting with the two MD's, to go to the U.S.A. for short term (2 months) participant training.

We have almost at our command the very best facilities possible to meet the needs. These are the U.S. Public Health Service Medical Supply Depot at Perry Point, Maryland, and Veterans Administration Medical Supply Depots on the east coast.

d. Repair Facilities

Another section of the depot which was very interesting to find was a large warehouse devoted to the care and repair of instruments, small medical equipment and certain larger pieces like refrigerators and blood banks. The total area was subdivided into small wire enclosed rooms, according to the kind of work performed. A welding unit existed to make and repair small metal tables, intravenous solution stands and the like. There is need, of course, for a reasonable amount of assistance for equipment, certain simple machines, supplies like copper tubing and, of course, basic training of technicians. In some skill areas, like refrigeration and air conditioning, training is available at Sudan's Technical Institutes.

There is need to develop ways and means of doing repairs at the hospitals within the Khartoum area and, of course, out in the provinces. The most important point here, however, is that the basic organization and facilities exist.

e. Training Needs

All that is needed is technical assistance in simple matters, skills, including training skills. The U.S. Army Medical Equipment Repair Schools could help by suggesting training courses to be used in Sudan. It would appear, however, considering the

educational background of the technicians and workers, that much more could be accomplished by bringing to the Sudan for a two-year assignment an advisor who could concentrate in this field. The advisor would thus be concerned with training and upgrading each department of the government medical depot, eventually moving into the mobile unit idea and developing means to get repair services to the provinces. Certain highly qualified people would be sent outside for training in very technical subjects, such as X-Ray and electronics. The Ministry of Public Works has a man who makes daily rounds to the CMS to check and repair the machinery in the cold room and freezers.

There is attached to the repair unit a small tailor shop which makes hospital gowns, doctors coats, aprons, etc. There is also a small 3-4 man carpenter shop which makes tables, chairs and small pieces of hospital equipment that can be made of wood. Both of these units need some simple machinery and tools of the trade - no training probably required.

f. Vehicles and Rail Facilities

The rolling stock of vehicles of the depot consists of two ancient trucks of light weight capacity and three old vehicles for passenger use. There is no equipment for loading or unloading cargo or even simple manually operated wagons or carts to pull boxes about the warehouses. There is however, a good supply of laborers. There is a need of four large 5-7 ton trucks, one of which is a refrigerated type and a flat bed trailer, several fork lifts, other simple moving about items, and small compact cars to

get the procurement and finance people about Khartoum on depot business. Two trucks would be used to take goods back and forth from the railroad yards and airport to the depot.

Although there is a spur line, freight cars are not brought in unless fully loaded or unless the cargo is too big and is on flat cars. We were informed that if the depot had its own heavy trucks it would then be possible to bypass some of the railroad problems in Port Sudan. Reasonable amounts of cargo could be loaded onto depot trucks there and brought to Khartoum - now by an old road and later by a new road now under construction. With new trucks, vast improvements could be made in getting supplies out into some of the provinces close to Khartoum. Certain vehicles will also be required in the primary health care program to transport supplies from the provincial or regional supply warehouse to the primary health care units, but these are covered in a separate program.

g. Transportation/Communication Problems

The subject of trucks now leads to a discussion of certain major problems of transportation. First, there is Port Sudan, where the total volume of cargos is so great there there is no room for storage. Shipping space on the railroad is limited. Thus, boxes just sit in some spot off the docks where they are out of the way. Apparently, from all reports, there is a certain amount of calculated disorganization. There is a depot expeditor at the port who has an office in the nearby hospital and he does what he can to push things along.

One of the most urgent needs is a Telex communication system between the expeditor and the depot. The reason for this is self evident. There seems also to be a problem of identifying priority items such as antibiotics etc., but other sources inform us that thieves have no difficulty in locating what they need.

Theft is a particular problem for the private importers, as their containers are apt to be small and thus are more easily carried away. There have been suggestions to have an agreed marking system (for example a triangular white patch bearing a superimposed red cross on each carton or crate). This could be supplemented by a code number for each item in the tender. This method would help in locating priority containers and at the same time confuse the people who are not authorized to remove the containers. This marking could be made part of the conditions in the tender and in the final purchasing order to the supplier. The use of trucks, as mentioned above, may help relieve the problems - goods stay 2, 3 or 4 months before going on the train.

#### h. Shipments from Port

At the present time the depot has a warehouse\* under construction at Port Sudan, but, in reality, it is an open-sided

\* At the time of final typing (July 25, 1977) additional and clearer information was obtained about the MOH warehouse in Port Sudan. As of July 25, 1977, the warehouse has been completed by the contractor and will be turned over to the MOH via the Ministry of Public Works. The warehouse was made to hold certain cargos that are shipped "CIF Port Sudan". These do not involve an importer or his agents, and are expected to consist of items sent by WHO, UNICEF, plus charitable donations from friendly countries, such as drums of insecticides and large

shed with a fence around it for some protection. This will help storage to some extent. From time to time there have been recommendations to establish a permanent depot at this port and thus facilitate transfer of stocks to hospitals and clinics between the port and the capital. This would also enable supplies to get into the north and south parts of the railroad line, or to the major road linking the port with the capital.

Since it is extremely difficult to get to Juba by land, it has been proposed that supplies could be airfreighted to Juba from Port Sudan. One wonders why this could not be done now by making certain improvements to the shed now under construction. Part of the difficulty now is that goods are ordered "CIF Khartoum" and really are the responsibility of the exporters agent until they actually reach the depot in Khartoum. Thus, any interference by opening up boxes would nullify contracts, insurance, and cause other business problems. However, this could be changed in the next tender if a mini-depot could be organized. Items needed by the hospital at the port could be within 200 yards, yet have to go to the capital, to be sent back again two months later, according to the established system.

equipment for hospitals. Presumably this would be the location where AID commodities to be used in the several programs could be stored until transport to Khartoum or elsewhere was arranged. Depot officials emphasized that they did not want to change the present methods of bringing in most supplies CIF Khartoum. They claimed the trucks requested would be for the special items that come directly to this new warehouse. They will need certain handling equipment at the new location.

Discussions have been held with officials of the pharmaceutical and medical supply section of the Union of Importers and also with officials of the Chamber of Commerce for the Sudan. The main topic was the methods used by the importers to operate in Port Sudan, and then in shipping from Khartoum to their customers in the provinces. Naturally, it must be kept in mind that the importers views may differ from those of government officials. However, they have had a lot of experience dealing with the same problems of transport as the depot and consideration needs to be given to their opinions.

The importers claim that their methods of doing business at the Port and the fact that by contract they are required to deliver the goods into the compound of the depot (Central Medical Stores) leads to the most rapid clearance, transport and delivery. They claim - and this point was verified at the depot - that some years past a change in clearing and transport responsibility was made. Government agents tried to do the job, but failed to accomplish things any better than had been done by the importers. So in the next tender the depot went back to the previous system. The depot expeditor at the port apparently is a kind of trouble shooter to solve special problems, but the importers do most of the work. As for the mini-depot, the importers claim the cargos are so large that it would require considerable staff and equipment to break down shipments to sort out requirements of the nearby eastern, northern and southern areas and then send the remainder on to Khartoum. Also, they felt that

because of climate and isolation reasons it would be difficult to keep trained people at the port as a permanent assignment. Apparently the importers get their commissions based on a delivery at Port Sudan, and the depot pays the rest of the clearance and transport charges separately. Thus, there would be no money loss to them if the depot did establish a unit at the port, or if it used its own trucks to supplement those of the importer in hauling goods to Khartoum. In fact, depot trucks daily are carrying goods, which is really the importers responsibility for movement from the railroad yards to the depot.

The discussions still did not pinpoint the reasons why goods remain so long at the port. One reason is that rail and truck space is inadequate, as is well known. Another reason is that the vessels often have to remain at anchorage two or three weeks awaiting space at one of the five docks. There may be some attempt to unload part of the cargo onto lighters while still in the harbor. Then when the vessels do come to dock, the cargo is unloaded as quickly as possible, one side on to the dock, the other side on to lighters. The dockside cargo is then moved some distance away to make room for the next vessel. The lighters in the meantime disappear into several possible places. Thus, many days are lost before the importer's agent finds and pulls together all of the boxes and crates he is responsible for. It would appear that one of the first things to be done before AID becomes heavily involved in bringing in materials, for

the health and other programs, would be to have a team of people who are knowledgeable in port administration and cargo handling to make a complete study of Port Sudan. One person should be designated to look into the needs of the Ministry of Health for getting supplies directly to its facilities in the regions near the port. The team should also make a feasibility study of the idea of a mini-depot. Regardless of the negative comments we have received thus far, it seems entirely reasonable that such a study could lead to a vast improvement in the management and logistics of MOH interests.

i. Distribution from Depot to Hospitals

There are several additional bottlenecks that the depot encounters that interfere with the passage of supplies between the depot and the present provincial hospitals. This problem will be increased as additional large quantities are sent as a build up for the Primary Health Care Program. The twice-yearly shipments now encounter the same delay in certain locations. Basically, the cargo is sent by rail to the end of the line, which is known as the railhead. At this point it is off loaded into the yards and often just left there until some agent, the police or a sympathetic truck driver helps to get part of the load to its destination. Depot officials suggest that one depot expeditor with ample authority and reasonable funds should ride the train to the railhead, supervise the off loading, and arrange for proper storage, if a long time will pass until the next method of transport arrives. This could be a Nile steamer running 13 days

against the current from Kosti to Juba in the far south, or it could be Landrovers, trucks or under some conditions even a camel caravan.

To conclude these paragraphs about transportation, it is essential to mention a WHO Report dated 9 April 1976, by Norman S. Lane, WHO Pharmaceutical Services Advisor. His report includes considerable information about a drug product inventory study done in the Southern Region, and considers the development of a medical commodities distribution system based in Juba and radiating into all the southern provinces to support the Primary Health Care Program.

#### j. Warehouse Requirements

In order to service the various units of the Primary Health Care Program, it will be necessary to have constructed a new warehouse within the compound of the Central Medical Stores. The units to be served - provincial medical store rooms, dispensaries and final end care units now known as dressing stations, are described elsewhere in the AID health sector assessment. The main purpose of this warehouse, its staffing pattern with job descriptions, responsibilities, training of storekeepers for the provinces, and a hint about local manufacturing and prepackaging, are all covered in the National Health Program and the two Primary Health Care Plans, one for the North and one for the South. Although, the general plans has been approved by MOH and a sum of 35,000 Sudanese pounds was placed in the National PHC program budget, it is doubtful the money will become available. As this

is an essential starting point for the entire PHC supply program, funds may have to come from other sources, e.g. direct AID grant for this purpose in connection with the proposed plans to build small storehouses in the Southern Provinces, or from block grant money that might be offered for the Northern Provinces.

This is a tremendous opportunity to set up a properly organized, well functioning mini-supply depot that could include prepackaging facilities and a certain amount of bulk compounding of liquids, ointments, powders and other simple-to-make pharmaceutical preparations. In the beginning, the bulk compounding unit would serve the PHC program. However, room should be reserved for some expansion so that it could service other medical facilities in later years. Here is a place for training, particularly for students from the Faculty of Pharmacy, University of Khartoum. In fact, this entire facility could serve as a training location, as in this country simple medical supply storekeeping is just as essential as a knowledge of organic chemistry. Even the students who go into the private section after a government financed education, would carry off certain sound principles of management and "know how". The mini-depot could also serve as a training unit for the Pharmacy Medical Assistants described later in this study. More investigation and discussion is required on this subject. It would seem entirely logical that some better qualified pharmacy medical assistants could be used in certain key storekeeping positions at the mini-depot and in the provincial medical store rooms.

k. Procurement Procedures

The next major event at the depot is the preparation of "the tender". This is a complicated and time consuming procedure of pharmaceutical product and hospital supply product selection, determination of quantities needed for a two-year period, assembly of all information and notification to interested international suppliers. Then follows processing of the bids received, awarding of contracts - processing of proforma invoices, establishing letters of credit and a multitude of other administrative and financial details. Many people and ministries are involved. This entire process takes a minimum of 12 months and some parts stretch out to 15 months. At that point the supplier in the overseas country is assembling his order to go to Port Sudan in six lots - one lot every two months. We believe that this procedure could be shortened by improvements in the kind of information made available to the selection committees; improvement in communications; better inventory control, including knowing what stocks are in the hospitals throughout the country; expanded use of the National Formulary which is now under preparation; and other management techniques to be developed. On the material side, people doing the huge physical task of pulling all the data together need hand operated adding machines, long-carriage typewriters, and certain other standard office equipment. The procurement of medical equipment and surgical instruments is a much simpler process. This involves special items available from only one source or, if it is a standard item, bids can be secured through local agents. Shipping is often by airfreight, except for bulky or heavy items.

One final remark about procurement. This concerns the manufacture of certain pharmaceutical products and supplies in Khartoum. The depot has awarded contracts to two firms for certain groups of items, such as tablets, syrups and intravenous solutions. One firm, due to lack of money to purchase raw materials is behind in filling part of its contract.

Another point to mention is that there are contributions of supplies and hospital equipment from other neighboring countries in the Arab Group and from China.

#### RECOMMENDATIONS

There is much that can be recommended to improve the physical facilities and operation of Central Medical Stores. However, the topics listed below actually cover a wide area and in themselves will lead to many of the desired changes. These are believed to be consistent with AID policy and the objectives of the National Health Program.

##### 1. Training

- a. The priority would be to have the two doctors of medicine who are functioning as director and deputy director of Central Medical Stores each to come to the USA for two months of training in supply depot management and related subjects. These are the key people in the whole supply system and, having been trained as physicians, need the additional skills of depot management, small scale manufacturing and prepackaging, training of paraprofessionals, etc.

Excellent facilities exist for these requirements at the USPHS Medical Supply Depot at Perry Point, Maryland, and Veterans Administration depot at Hines, Illinois, or Sommerville, New Jersey.

- b. One pharmacist should be sent to the above locations for a four-month, on-the-job training program. This would be the key person to manage the entire Primary Care Program mini-depot. This should follow the two MD programs.

## 2. Facilities and Equipment

### a. Warehouse for Primary Care Drugs and Supplies.

The Ministry of Health should be urged to start construction of this building, as soon as funds can be made available. AID assistance could help in planning of the facility and provide necessary furnishings and equipment in line with the topics mentioned previously in this study. (A list of supplies and equipment has been submitted.)

- b. Medical Equipment Repair Unit. Certain basic pieces of equipment and tools and supplies should be furnished primarily to start to upgrade the facilities and to enable essential minor repairs to be made on a sizable number of units that ought to be put back into use in the hospitals and clinics in Khartoum.

Consideration should be given to the furnishing

of a medical repair technician for a 60-day period to do on-the-job training and to make a further survey of needs.

- c. Essential Office Equipment should be made available for preparation of the next tender. Other help in this area would have to come later as management ideas developed and people become available to participate during the first six months of the selection process. (See later remarks on the subject of the "National Formulary".)

A "Telex" communication system is needed for contact with Port Sudan, also a simple arrangement or telephone within the depot for internal contacts.

- d. Vehicles. The needs have already been described. Four trucks, one of which is a refrigerated type and one long flatbed trailer are required. Truck capacity 5 to 7 tons. Rather than passenger compact cars, it may be better to recommend one medium-weight and two light-weight trucks. These could serve for deliveries in the Khartoum area and for administrative trips about town.

- e. Fork Lifts and heavy weight moving equipment are needed for use at depot compound in Port Sudan.

f. Generators and upgrading of cold rooms. It is recommended that three standby generators be provided if the depot makes the necessary repairs to existing refrigeration units within these rooms. Furthermore, the depot should install suitable shelving and inventory controls for cold room items.

### 3. Port Management Study

A study by a US team in port management and cargo handling should be considered as described previously in remarks about Port Sudan.

## II. THE PHARMACEUTICAL DEPARTMENT OF THE MINISTRY OF HEALTH

A Director General, with a B.S. degree in Pharmacy from Cairo University, is in charge of this department. He is assisted by several young pharmacists, all of whom have degrees from Khartoum, Beirut or the eastern countries (Yugoslavia and Bulgaria). There is also one non-professional who exerts considerable influence over personnel management, including assignment and transfers in the provincial hospitals.

The department, on paper, is responsible for a wide range of activities. Each of the pharmacists heads one section, except for personnel. The procurement and distribution of supplies and pharmaceuticals is handled on the National level by Central Medical Stores. However, once the materials are delivered to the

hospital or clinic then the pharmaceutical department takes over responsibility. The chief of pharmacy service is the person responsible in most cases, but it could be a pharmacy-medical assistant in smaller hospitals and clinics.

Thus the department is responsible for the establishment of policies concerning proper conduct of the hospital pharmacies, management of inventory and stock control and a variety of other matters.

In summary the department is responsible for: assignment of pharmacy personnel to MOH facilities (it is anticipated that there will be a role played at a later time in the assignment of people to the provincial medical storerooms in the Primary Health Care system); management of budgets for each pharmacy; supervision of pharmacy laws and those pertaining to narcotics and poisons; annual reporting to WHO on estimated narcotic requirements for the next year; registration and licensing of pharmacies in the private sector; same for wholesale drug sources and pharmaceutical manufacturing practices; conduct of a small school for training pharmacy medical assistants and follow up on their activities in provincial hospitals; registration of all drug products sold on the market, with attempts to keep out dangerous or useless products; other duties as assigned from time to time. There is, of necessity, close liaison with the Central Medical Stores and other MOH departments. (Note: The registration and licensing of pharmacists, physicians, surgeons, specialists and dentists is done by the Sudan Medical Council.)

From detailed observation and conversations with each of the section leaders, it is evident that these responsibilities are not being performed in the best manner. However, it is of importance to realize that management concepts exist, and certain principles of management and law are accepted. Thus, it is only a matter of encouragement and training by someone who should spend considerable time within this department.

There is low morale in the department and lack of leadership. There was much interest expressed over the activities of the US Health Sector Assessment Team and in particular the hope that the difficulties of this department could be recognized. There cannot be much done out in the hospitals to get proper pharmacy and supply management until the basic management problems of this department are solved.

#### RECOMMENDATIONS

The single important recommendation at this time would be to have the director general in charge of the department come to the USA under a two-month participant training program. The exact program would be difficult to give a title to, but he needs to have a thorough understanding of how a pharmacy department ought to be managed, also an ideal of hospital pharmacy management, drug plant inspection, supervision of pharmacy and narcotic laws, possibly observation of paramedical training etc. This is a complicated case and would require intensive attention. The facilities of several US Government departments and state boards

of pharmacy could be utilized. In particular, the USPHS and VA both have departments whose basic responsibilities are close to those of the department in Khartoum.

III. TRAINING OF PHARMACISTS, PHARMACY-MEDICAL ASSISTANTS AND ALLIED MEDICAL PERSONNEL.

In Khartoum there exist several facilities which can be utilized in training of personnel for the type of programs described in the logistics-medical supply part of the AID Health Sector Assessment. The first is the Pharmacy-Medical Assistants School, the second is the Faculty of Pharmacy of the University of Khartoum, the third would be the Advanced School for Nurses Training, and the fourth would be the Central Medical Stores plan already described.

A. The Pharmacy Medical Assistants School

The established primary purpose of this two-year school is to train people who can carry on the operation of a pharmacy in provincial hospitals and other facilities where a fully qualified pharmacist is not available for permanent assignment. They would provide essential pharmaceutical services and care for minor equipment and supplies. Everything that was done would be in accordance with definite clear cut policies and procedures developed and supervised by the Pharmaceutical Department in the Ministry of Health. A secondary purpose is to provide trained helpers to the pharmacists in the larger hospitals.

The students for the school are selected from male nurses who have completed three years of hospital training beyond the normal three years of nursing school. (The school also has students under the MOH programs for training dental, anaesthesia, ophthalmic physiotherapy and x ray medical assistants. The Primary Health Care Program will also have a special kind of medical assistant as described elsewhere in the AID assessment documents). As these nurses are already government employees, their salaries and allowances continue. This, in theory, would tend to maintain some discipline and control over their activities. Further, it would encourage the students in knowing that a place would be found for them somewhere in the system when their training was completed.

The number in each class is about fifty. Forty-seven graduated in June 1977. There are five places in each class for students who are sent by the police and army medical services. Graduates receive a certificate. There has in the past been considerable pressure exerted on the government to grant an improved status and greater recognition to this group of people. Their wish in this case would be to find work in the private business sector. In fact, it seems as though they are referred to as "assistant pharmacists" rather than by their correct title. There is a two-month training period in Khartoum hospitals during the vacation months. Little supervision is given.

The physical facilities of this school consist of two low buildings. One is for the principal's office and a storeroom for

teaching aids and laboratory supplies. The second has a laboratory in the center and classrooms at each end. The second building is in the need of much repair and renovation. At the time of the visit, ceiling fans were being installed. There was only reasonably good seating facilities in the classrooms, some old tables, no blackboards, etc. The laboratory consisted of a few benches and some scattered pieces of student-type equipment. We were told that the MOH had intentions and funds for some renovation, but only for what absolutely had to be done to hold the buildings together. Discussions with the principal and with the head of the MOH's Pharmaceutical Department, who accompanied us on the visit, indicated that there was not too much of a practical nature taught to the students. There was a lot of theory and going deeper into subjects than was actually needed. Instruction in some subjects is given by members of the staff of the Faculty of Pharmacy, some of whom attempt to get down to the level of the students, others who cannot change their methods. Additional day-by-day instruction is given by previous graduates who have had neither teacher training nor a good knowledge of the subject.

Much could be done with this school to train people not only to meet the primary purpose, but also to act as key storekeepers in the proposed medical storerooms in the provinces in the Primary Health Care Program. This would require additional subjects in the curriculum, which really needs a major overhauling anyway. To do this will require an amount of quiet diplomacy,

as there is certain to be opposition from the established supervisory staff and the pharmaceutical department, and even students. However, if the right approaches were made through the higher levels of the Ministry, and if the Faculty of Pharmacy could participate in the recommendations, appropriate changes could be made. Recall that these changes will be important parts of the care program out in the provinces; proper training has to be provided.

#### RECOMMENDATIONS

1. Assistance should be provided for complete renovation of the buildings so that they are in proper condition for conducting classes and a small 8-man laboratory, with space for staff, principal's office and storage and appropriate washroom facilities.
2. Assistance should be provided in equipping these rooms with appropriate furniture, laboratory benches, basic lab equipment, supplies, teaching manuals, textbooks and a small reference library for staff and student use.
3. On advice from the Faculty of Pharmacy, major changes in curriculum should take place to develop program.
4. Two full-time pharmacists with abilities to teach, and who have had a reasonable amount of field experience, should be employed to assist the existing principal in conducting the classes and supervising laboratory instruction. There should also be continuation of

teaching from the Faculty of Pharmacy in certain subjects.

5. The size of the classes should be reduced so that there is not more than twenty-five students per class.
6. Any recommended changes must be done so that persons involved do not "lose face".

B. Faculty of Pharmacy of The University of Khartoum.

Preliminary discussions with the acting dean, a former dean and several members of the staff of this institution indicate a firm interest to participate in and to give help to various programs that may be developed as a result of USAID assistance to the Ministry of Health. Part of this desire is to improve the image of the pharmacy profession in Sudan, which is relatively young in comparison to the fifty years of domination by the medical profession. However, the faculty is sincere in its wish to work closely with USAID, and could render valuable assistance, particularly in the kind of training programs already described in this study. In particular, the Faculty could carry out refresher courses for hospital pharmacists and nurses in pharmacology and related hospital subjects. Faculty members could assist in the development of the necessary policies and procedures for the hospital pharmacy, Pharmaceutical Department, Ministry of Health.

Once this is done, refresher courses in the essential subject of hospital pharmacy management could be presented. In time some

of the management concepts could be absorbed into the teaching of the pharmacy students. Actually, one of the reasons for the establishment of this Faculty ten years ago was to furnish pharmacists for government medical services throughout the country.

In recent years the Faculty has taken a leading role in advising and coordinating the work of the many subcommittees involved in the selection of drugs for the Central Medical Stores tenders. Further, it has played a major part in the preparation of the proposed National Formulary, in cooperation with the Sudan Medical Council and the Faculty of Medicine. Staff members would be interested in training some students at the proposed Central Medical Store's mini-depot in supply management, bulk compounding and simple drug analysis techniques.

#### RECOMMENDATIONS

No specific recommendation can be made at this time except to say that:

1. The head of any future health team on temporary or permanent duty should pay a courtesy call on the Dean of this Faculty and keep him informed of what could be going on in proposed health programs.
2. We should keep in mind at a later date of the eventual desirability of sending one Faculty

member to the USA to possibly obtain an MS degree in Hospital Pharmacy so that in years to come an appropriate department in this subject can be organized.

3. Consideration should be given to the methods of reimburiing the Faculty for specific tasks, such as teaching in programs not specifically under jurisdiction of the Faculty.

C. Advanced School for Nurses Training.

It would appear entirely possible that, given the right set of circumstances consistant with established policies to teaching at this school, an improved program in the teaching of pharmacology, pharmacy for nurses, and related subjects could be organized and conducted by the Faculty of Pharmacy. Hopefully, this could lead to a better understanding of drug therapy and management of the handling of pharmaceutical preparations and record keeping on the hospital wards. Better training may help to get the right drug to the right patient at the right time. There could be a spinoff for the benefit of the Primary Health Care Program, as some of these nurses might end up in dispensaries in the provinces where care of drugs and their proper use would be one of their many responsibilities. This program could also lead to the training of nurse teachers in this subject in the several three-year nursing schools.

RECOMMENDATIONS:

That this area be explored by nursing education advisors when a definite Health advisory program is set up.

IV. THE NATIONAL FORMULARY

The Sudan Medical Council, in cooperation with the Faculties of Medicine and Pharmacy, has been preparing the Sudan National Formulary. In essence, this will be a manual of information on drugs of choice and, if properly used, could greatly influence rational drug therapy in both the government and private sectors. Selection of drugs and pharmaceutical preparations has been done by subcommittees of specialists in various fields. The technical information has been furnished by the Faculty of Pharmacy, which has also coordinated the work of the subcommittees.

Use of this Formulary by CMS committees will save a lot of time in preparation of the next tender. Discussions have been held with the chairman of the drafting committee and the acting dean of the Faculty about the document. Examination of several chapters indicate that each consists of a general paragraph about the particular therapeutic class, followed by a list of the selected drugs with dosage information. There will be some 25 chapters. From the observation of one who has had considerable experience in

preparing a manual of this type, the chapters seen were good, but not enough information per drug was presented. More details could have been given on nomenclature, description in action, indications, adverse reactions, cautions, dosage, and dosage forms available in the Sudan. This kind of information is what the prescribers really need. Further, this is what is needed in addition to general information per therapeutic class in training programs in pharmacology and related matters. The subject of including or making references to trade names in a manual of this type, which is sponsored by such a highly professional group as the Sudan Medical Council, is probably considered unethical. Yet, this is the only way a large number of private practitioners can be influenced to make use of this valuable document. There are ways to get around this difficulty by having separate lists and cross references printed.

At the time of the assessment this National Formulary had been hand-carried by a member of the Council to the British Medical Council in London, where it was proofread and set up in final draft. The Council requested, and had obtained, funds for this task from WHO, since no other finances were available.

While it would be highly desirable that AID have some

input into this very essential manual, it seems likely that the matter has gone too far and too many sensitivities would be aroused if AID tried to turn the work around a bit to get additional material into each chapter. Probably we ought to let the idea rest a while and keep in mind the possibility of helping with final printing if this was within AID policy at that time.

The one definite thing that could be done at this time, which could not be interpreted as interference, would be to prepare in AID/Washington a draft of a small manual devoted to information about the drugs and products to be used in the Primary Health Care Units and send it to the Council via the MOH for opinions and suggestions. This is something that has to be done sometime anyway, and it might have some influence on the committee members. Another area where help could be given would be to use the resources of the Bureau of Drugs, Food and Drug Administration, on an informal basis to pull together essential information about each drug in the proposed Formulary and at least have this available for use in courses in pharmacology and drug therapy which might be part of a project of a future health program sponsored by AID.

#### RECOMMENDATIONS

1. It is recommended that AID obligate funds for the printing and distribution of the National

Formulary, with actual use of the money pending what the final document looks like and how it can fit into proposed programs. Our sources of information indicate that there is still the possibility of AID being allowed to have some input if the proper approaches were made to the Council by AID officials, and if the Council could count on AID for printing costs.

2. Pending the above, AID should proceed with a draft of the pharmaceutical preparation manual for the Primary Health Care Units and send to the Council.
3. Pending the above, AID/W should arrange with the Bureau of Drugs, Food and Drug Administration, for assistance on an informal basis through a project officer to collect data on each product in the National Formulary for future use, according to developments during the next several months.

V. DRUG ASSAY AND CONTROL SECTION OF NATIONAL LABORATORIES

This section is part of the chemistry department of the National Laboratories. Previous discussions had been held with the director of the department during his visit to the Food and Drug Administration Headquarters in Washington.

Additional discussion was held upon his return to the department. Preliminary impression was that he had obtained a reasonable amount of "seeing how things are done" and techniques, all of which might be put to use gradually.

The section is responsible for analysis of new products which are introduced to the market in the private sector. It also assays questionable items which are offered to Central Medical Stores in response to the tender. One procedure that appears good on paper is their requirement of each new product to show a certificate of analysis in home country before being cleared for registration. Assays are done of some items made in local plants.

Particular attention during the visit was paid to the physical facilities and available instruments. Not too exciting, but adequate to get the routine jobs done. Another point of interest concerned the studies being done by various manufacturers, locally and abroad, on intravenous solutions in "plastic" bags. Rate of evaporation is a big factor in Sudan and this leads to concentration of the fluids after long storage. This study had led to the conclusion that only one type of hard "plastic" container can be used. (Bottles are too heavy - breakage etc. to import.) (Refer to remarks on Rehydration plant below). As to the question of having pharmacy students come into the labs for on-the-job training,

there was the usual expressions of delight and cooperation, but one suspects this is not the real case. As to assays to be done on products made in bulk compounding as part of the PHC program, this is the most logical place and will have to do, although it would be preferable to do some simple controls in the mini-depot.

#### RECOMMENDATIONS

None at this time. This entire set up is more or less under the influence of WHO. Cooperation could be given to WHO in arranging for one or two bench chemists to be trained in drug analysis over a 4 - 6 months period in FDA labs.

#### VI. VACCINE, SERUMS AND REHYDRATION FLUIDS PLANT.

This project is sponsored by the Central Medical Research Laboratories of the Ministry of Health. (National Laboratories) Details of this proposed plant are included in the assessment study because the end products are essential supply items, in addition to being essentials in disease control and patient treatment. The fluids normally would be called intravenous solutions of several types. However, in the Sudan, because of the dehydration problems caused in children and adults as a result of certain diseases and conditions, these fluids are extensively required. The total yearly requirements and the cost of obtaining such are beyond the purchasing and storage capacity of the government. Local manufacture is done, but is not adequate in quality

and quantity. Thus the need for production in Khartoum in a government controlled plant.

In summary, this calls for the establishment of a plant for the production, dispensing and packing of rehydration fluids, ACD solutions in bottles for blood transfusions, vaccines, serums, and later injections in ampules. The plant would also make a suitable type of hard container and the necessary administration sets. As mentioned previously, evaporation from presently used imported and locally produced bags of fluids is great. It is expected this can be eliminated by using the proper type of container and by constant production rates to eliminate prolonged storage even in the provinces.

The overall plan involving this plant and its products is part of the National Health Program. The financing of the project is being done through the United Nations Development Program. The money actually is funneled into the program from Kuwait. WHO is doing the consulting and advising. Present plans include the bringing in by WHO in September, 1977, a survey team composed of an architect-construction engineer, a bacteriologist and an intravenous solution manufacture technician. A site for the plant has been selected in the Soba area of Khartoum.

#### COMMENTS AND RECOMMENDATIONS

None at this time. This is entirely a UNDP-WHO-MOH

project and would require no held from AID. The end products would be part of AID supported programs.

VII. PRIVATE SECTOR SURVEY OF THE SALE, PURCHASE, PRESCRIBING AND USE OF PHARMACEUTICAL PREPARATIONS AND MEDICAL SUPPLIES.

A survey was made of the private sector of Khartoum, concentrating in the main area where there was an abundance of private medical clinics and retail pharmacies. It is our understanding that the practices observed are more or less the same in all other cities and large towns of the country.

The following topics were used as a guide in attempting to get some order to the information that was sought. The term "drug products" will be used to cover the words drugs, pharmaceutical preparations and medical supplies.

- A. Inventory of types and quantities of drug products used in the sector.
- B. Study of prices and influence of prices and other factors on the purchase and utilization of drug products.
- C. Study of probable effects of alternative policies to influence the purchase of drug products.
- D. Study of purchasing, storage distribution and inventory systems of private sector institutions.

To accomplish this survey, contacts were made with the following: Officers of the Syndicate of Retail Pharmacists at their club; the head official of the pharmaceutical section of the Union of Importers, who also is a member of the Sudan Chamber of Commerce; the director and staff of one of the larger wholesale drug firms in the city; pharmacists (not same as above) in three retail pharmacies in the main area; finally, three specialists

three retail pharmacies in the main area; finally, three specialists who were MOH employees and who had their own private clinics at night. Several hours of observation over four nights was spent in the pharmacies.

Prior to proceeding to the four topics, a few general remarks are in order as they might not fit in elsewhere. Of most importance is the fact that in Sudan, in government facilities, medical care and drug supplies are provided free to everyone. Persons who, for a variety of reasons, do not wish to take advantage of this service may, at their own expense, obtain medical care at offices of private practitioners, specialists and at some small clinics and small maternity hospitals. Throughout certain sections of the city there are signs, large signs in Arabic and English, on the walls and over courtyard entrances announcing the doctor's name, his speciality, his degrees and where obtained. In the evening from 6 through 10 small groups of patients and relatives gather outside the walls and into the waiting areas. Following the consultation, the patient or relative is given a sheet of paper listing at least two or three (never just one) drug products which are speciality items by trade names with directions. The list is then taken to a nearby pharmacy and the items purchased. Usually at this time of night a pharmacist is present and he or clerks under his direction select the items from available stock, write the directions on the carton or label and collect payment.

There is no dispensing or compounding as we know in the USA unless there is some unusual request of the doctor. Plain water is added to any product that may require rehydration, like some antibiotics or eye drops. Prescriptions are written in government hospitals for semi-private patients and, if not available in the hospital pharmacy, are purchased by the patient outside. It would be of interest to the Health Sector Assessment Team to learn that medical assistants in government clinics and health centers are allowed to prescribe items not obtainable in the particular units drug supply and these requests are honored by the private pharmacies. The more conscientious pharmacists are not very happy with this procedure as they claim that often the product prescribed has no relationship to the patient's illness. A visit to three health centers on the edge of the city indicated claimed shortages in the unit, plus social visits by detail men often led the medical assistants to prescribe certain speciality items.

A. Inventory:

Fortunately in the Sudan there are regulations which require that a drug product be registered by the Pharmaceutical Department of the Ministry of Health before being allowed to be sold on the market. Thus, at the MOH can be found a vast number of cards for some three thousand products which give general details of each item. A large number of manufacturers and countries are represented. However, the vast majority of stocks seen in the retail pharmacies came from well known firms of the United Kingdom or from American firms which had plants there

and sold under slightly different trade names. Thus almost all items have labeling and package inserts in the English language, which is well known in the Sudan.

There have been recent attempts of the eastern countries to get more of their products on the market, particularly because of lower prices. For the most part, the MOH has been able to overcome these efforts by finding the items of poor quality or the firms not being able to furnish certificates of analysis. There are restrictions from sale on certain items; however, it could be said that a large number of items regarded in the US and England as "by prescription only" can be easily purchased. Nearly all items stocked are in containers of small quantities for convenience of selling and to have a reasonable amount of the product that the patient could pay for. Prices are mentioned below. As already mentioned, the physicians prescribe under a trade name and can be influenced by detail men representing a large number of known and few unknown overseas firms.

B. Prices:

In general, the importers claim that prices charged to patients in the retail pharmacies are reasonable and those in The Sudan are far lower than in surrounding countries. In fact, they claim there is a fair amount of smuggling into these countries. The sources are through legitimate purchases in Khartoum, or by theft of cargo at Port Sudan.

The government has price regulations which are enforced from time to time by the MOH. These cover the percentage of profit of the importer. The pharmacists state that the patients

seem to be able to find the money one way or another. They may shop around a bit during the evening or may take half the prescribed quantity if it is conveniently packaged, but they do attempt to get the drug. In Khartoum there is heavy competition among importers and this tends to keep prices lower.

C. Alternative Policies:

The major policy that would influence drug usage types and varieties of drug products and prescribing habits of the physicians is the forthcoming National Formulary. This should be the basis for rational drug therapy and should have far reaching effects to the ultimate benefit of the sick patient, if, by proper educational methods, the private practitioners can be taught to pay attention to it. This should be the task of the Ministry of Health. There may be some spinoff through its use in government hospitals, as many people in private practice are government employees by day. The MOH would have to persuade the private people that they can use drugs of choice and still use trade names. There would be need of close cooperation between the MOH and the importers to see that ample supplies of the products are available. There should be little difficulty with importers as they can quickly adjust their methods if they can benefit financially.

Another alternative that was explored but led to little good information was the idea of certain over-the-counter drug products being available out in small towns in the provinces that might not be large enough to support a regular pharmacy. The

reply from several sources was that this had been done at one time but was not needed because there were 600 pharmacists in the country and 500 had to work in retail business to survive; thus, there were bound to be enough pharmacies where needed. However, there are some simple remedies sold in small grocery type shops.

D. Purchasing, Storage, Distribution Inventory:

As Khartoum is the capital and largest city in the Sudan, it would be expected that the importers of drug products would have their main offices there. There are several firms of moderate size each, of which many represent a number of well known American, English or European firms. A number of others are small and represent only a few not-so-well known firms. Within the city are three firms, two of which are in operation producing some products for private sale and certain items under contract for the government. One firm is being organized, with no plant yet. As in most countries, the importers carry other items in addition to drug products. Each firm has its representatives who detail to physicians and carry on certain administrative activities in the firm. Incidentally, these positions pay about four times the salary a capable individual could obtain from government employment. The retail pharmacies obtain their needs in small quantities, almost daily from the wholesalers on a cash and carry basis.

As prices are supposed to be controlled by the MOH, and because there appears to be heavy competition on the same products made by several firms, the importers claim to be able to keep prices as low as possible. As previously noted there is heavy competition for bidding on items in the Central Medical Stores tenders by the importers. This is not only a source of revenue, but also provides advertising for their products, as within the hospitals and clinics the item is issued in the standard firms' packaging.

The purchasing procedures from the overseas suppliers are more or less standard. Drug products have some priority but there is the usual hassle about establishing letters of credit and the obtaining of foreign exchange. The problems of importation through Port Sudan have already been mentioned. The importers try to bring as much as is practical in by airfreight. As to storage and inventory systems, this is business and the importers are alert and know proper management of stocks. As to distribution outside of Khartoum, this usually involves relatively easy-to-handle boxes and crates. Some have to go by rail, but most go by a trucking agent who sees to it that the goods reach their final destination.

VIVI. CONSTRAINTS

A. Government Medical Supply Depot - Central Medical Stores

1. The major constraint in this area is that the top two persons in management are doctors of medicine and, while quite capable, appear to lack the kind of know-how to get down through middle management and the lower workers to show them what should be done for efficient functioning of the depot. Some of this can be overcome through the proposed participant training. On the other hand, there is an advantage to this system, as excellent relations can be worked out with other members of the medical profession in key administrative and decision making positions all for the benefit of the depot.

2. A second constraint is lack of leadership and personnel in pharmaceutical parts of middle management. There are supposed to be four pharmacist positions. One is filled by a highly-talented, hard working individual. The second by a chap who seems never on the job and was preparing to go abroad for higher training. The last two are delicate young ladies who do not fit into this kind of operation. A lot of these highly-talented, hard working, enthusiastic men need to be found.

3. Third constraint is lack of space for proper storage and inadequate facilities for handling goods within the warehouses.

4. Fourth constraint is difficulties in getting delivery of goods from Port Sudan and inadequate methods of transportation from Khartoum to MOH facilities requiring supplies. Inadequate facilities for handling heavy loads within depot compound.

5. Fifth constraint is, generally, plain shortage of money for most ordinary depot functions. In particular there appears now (July 25, 1977) little change of the MOH coming up with funds for construction of the proposed warehouse for Primary Health Care Unit drugs and supplies.

B. Pharmaceutical Department of the Ministry of Health

The major constraint in this area is lack of strong aggressive leadership and knowledge of how to get things done. This can only be circumvented by quiet diplomacy and encouragement of section heads to slowly take more action in their respective work. There will be some help by the proposed participant training of the department head. Progress in this department will develop slowly over the next few years. There should be considerable improvement.

C. Training of Pharmacists, Pharmacy Medical Assistants, Others in Allied Health Fields

1. Pharmacy Medical Assistants School

- a. Inadequate facilities for proper conduct of present program, much less any that would be proposed.
- b. Inadequate understanding of role this type of personnel should play within the existing MOH system. Little guidance from MOH in development of policies and procedures for graduates to follow.
- c. Impractical instruction for primary purpose of school.
- d. Inadequate teaching staff in numbers, abilities.
- e. Poor use of available well-qualified persons who could advise on proper management and teaching methods.

2. Faculty of Pharmacy - University of Khartoum

No constraints that would affect any AID programs during the first two years.

3. Pharmacology Teaching at Advanced Nursing Schools

Possibility of treading on toes of established nurse educators now in firm control of their programs. Require careful negotiations by top level officials of MOH at the appropriate time.

D. National Formulary

This is a case of quiet diplomacy, as we are dealing with a highly sensitive super professional group. Low key aid might be accepted, particularly if printing costs can be taken over.

E. Drug Analysis Laboratories

Difficult to pinpoint constraints, but reasonable cooperation could be expected with parts of and AID assistance to MOH facilities that would concern this laboratory.

F. Private Sector

There is no strong leadership within the MOH in enforcing regulations, which should control elements of the private pharmaceutical sector. Need of improved communication between MOH and the sector.

## APPENDIX C: SOCIAL ANALYSIS

### 1. Social setting.

Because the Sahara Desert has throughout history been a corridor for the flux of peoples, ethnic and cultural variety mark the social landscape of Sudan. Population is thin in steppe and desert areas where marginal resources of water and land arable to neolithic tools dictate a nomadic culture based on cattle or camel husbandry. The river systems of the Blue and White Niles, with their tributaries-the Atbara and Sobat, and the Bahr el Ghazal, Bahr el Arab and Bahr ez Zeraf-have permitted eco-modes of settled farming culture, and/or mixed farming and animal raising, including limited transhumant pastoralism. Whether settled or nomad, people are closely aware of the boundaries of tribal land; and transgression, competition for the scarce water resources and differential land use (i.e. nomad-herding corridors through areas of settled farming) are historic sources of conflict that serve to narrowly define group limits.

### 2. Ethnic Groups and Languages.

The Sudan has four major ethnic groups. (See Table A-3:1) In the North, early migration brought hamitic Nubian and Semitic Arab. On the eastern littoral, the camel-breeding Beja tribes prefigure hamitic Somali and Afar peoples of the African Horn. In the South, Nilo-Hamitic people such as Toposa (to the east) give way to strikingly tall nilotic Dinka, Shilluk and

TABLE A-3:1

## MAJOR ETHNIC GROUPS IN SUDAN, 1955/56 CENSUS

Ethnic Group	Principal Location (by province)	Number of Persons	Percentage of Total Population
<b>Northern Region</b>			
Arabs.....	Blue Nile Northern Khartoum Kordofan Darfur	3,990,000	38.8
Nubians.....	Northern		
Beja.....	Kassala	646,000	6.3
Nuba.....	Kordofan	573,000	5.5
Fur.....	Darfur	170,000	1.6
Zaghawa.....	do.	60,000	0.6
Darfung peoples.....	Blue Nile	173,000	1.6
West Africans <sup>1</sup> .....	Kassala	602,000	5.8
Other.....	Blue Nile Various	936,000	9.0
<b>Southern Region</b>			
Dinka.....	Bahr el Ghazal	1,152,000	11.2
Nuer.....	Upper Nile	460,000	4.5
Shilluk.....	do.	100,000	1.0
Bari <sup>2</sup> .....	Equatoria	211,000	2.0
Lotuko.....	do.	116,000	1.0
Tojosa <sup>2</sup> .....	do.	120,000	1.2
Didinga.....	do.	51,000	0.5
Azande.....	do.	212,000	2.0
Moru <sup>2</sup> .....	do.	110,000	1.1
Bongo and Baka.....	Bahr el Ghazal- Equatoria	47,000	0.5
Ndlogo <sup>2</sup> .....	Bahr el Ghazal	71,000	0.7
Other.....	Various	133,000	0.1
<b>Total.....</b>		<b>10,263,000</b>	<b>98.2<sup>3</sup></b>

<sup>1</sup> Africans originating in countries west of Sudan.

<sup>2</sup> And related peoples.

<sup>3</sup> Does not total 100 because of rounding.

Source: Adapted from Sudan, Ministry of Social Affairs, Department of Statistics, *First Population Census of the Sudan, 1955-56*, Khartoum, 1957.

Source: Area Handbook for the Democratic Republic of Sudan - 1973.

Nuer. Passing to the west, one reaches western Sudanic cultural and linguistic groups such as Azande, and the "Fellata" immigrants from the far western Sudanic regions of Mali, Niger, and Volta. To the south there is intermarriage with Bantu peoples, and a gradual blurring toward more southerly cultures. Occasional rare reports (i.e. 1930's series of Sudan Notes and Records) indicate there may be small and very isolated groups of pygmies in inaccessible areas of the Sudd swamps along the Bahr el Arab and the Bahr el Ghazal.

There are many languages in Sudan. (See Table A-3:2) Nubian dialects are spoken from Egypt south along the Nile, though often now displaced by Arabic. Other Nubian dialects are to be found in the Nuba Mountains of Southern Kordofan, and in Darfur to the west. Nubian was the written language of the classic Nile civilizations of Meroe, 'Alwa and Nabata. In the east, Bedawie languages, and Tigre are spoken by Beja hamites and the mixed tribes of the Beni Amir. Arabic is generally used throughout the northern, central and western portions of the country as lingua franca, if not first language.

Languages of southern Sudan fall into the Nilo-Saharan language family, in the Chari-Nile subgroup. Dinka, Shilluk, Nuer form one branch, with Bari, Anuak and Lotuko closely related. Acholi is a widespread language of the Luo group found in the Bahr el Ghazal area, and Didinga, Beir and Murle, form another branch as one moves toward the south and east.

TABLE A-3:2

## PROVINCIAL DISTRIBUTION OF PRINCIPAL LANGUAGES OF SUDAN, 1955/56 CENSUS

(IN PERCENT)

Language	Bahr al Ghazal	Blue Nile	Darfur	Equatoria	Kassala	Khartoum	Kordofan	Northern	Upper Nile
Arabic.....	0.9	86.4	51.5	0.6	36.3	96.9	68.0	81.0	1.7
Beja.....	.....	.....	.....	.....	59.2	.....	.....	.....	.....
Nuba.....	.....	0.2	0.1	.....	0.4	0.4	26.8	.....	.....
Darfurian.....	0.1	0.1	41.7	.....	0.5	.....	0.4	.....	.....
West African <sup>1</sup> .....	.....	7.9	2.5	.....	11.1	0.8	2.7	0.1	0.1
Nubian.....	.....	.....	.....	.....	0.2	0.2	.....	18.9	.....
Gurg.....	.....	4.8	.....	.....	0.6	.....	.....	.....	1.6
Zande.....	0.4	.....	.....	23.8	.....	.....	.....	.....	.....
Bongo-Daka.....	1.5	.....	0.6	3.0	.....	.....	.....	.....	.....
Ndogo-Sere.....	2.9	.....	.....	2.5	.....	.....	.....	.....	.....
Moru-Madi.....	.....	.....	0.6	10.2	.....	.....	0.1	.....	0.1
Dinka.....	87.4	.....	.....	0.3	.....	0.1	1.8	.....	25.4
Nuer.....	.....	.....	.....	.....	.....	.....	.....	.....	52.2
Luo.....	4.8	0.4	.....	1.9	.....	.....	0.1	.....	13.8
Lango <sup>2</sup> .....	0.1	.....	.....	31.3	.....	.....	.....	.....	.....

<sup>1</sup> Includes a variety of related languages of countries west of Sudan.<sup>2</sup> Includes Bari, Lotuko, and Toposa.Source: Adapted from Sudan, Ministry of Social Affairs, *First Population Census of the Sudan, 1955-56*, Khartoum, 1958, 8-15.

Source: Area Handbook for the Democratic Republic of the Sudan - 1973

In the extreme southwest, Zande belongs to a branch of the Niger-Congo language family. Trimmingham says "South of the curved Baggara migrational strip live the great Negro pagan tribes, living in no ordered world, having no common language, and no conception of political and cultural unity."\* At the time he wrote in 1955, that undoubtedly was true, and cultural diversity is still the hallmark of the region. However, the great suffering of the civil war period seems to have forged a definite sense of nationalism and political centrality, and Arabic is now becoming something of a lingua-franca at least in urban and accessible areas, as the south seeks to accommodate its political destiny within the framework of Sudanese Unity.

For most Sudanese, tribal affiliation is a meaningful concept, and forms part of the paraphernalia of personal identity. It is only the latest generation of Sudanese who do not bear the tribal facial scarifications that proclaim membership in Kababish, Shukriyya, Ja'ali'in or other tribes. The number of tribes and sub-tribes is legion, but they can be essentially reduced to the major ethnic groups shown in Map II-1, page Part II-14.

---

\* Trimmingham, 1965, p.

### 3. Northern Sudan Profile

#### a. Socio-Economic Systems

Among the fractions of one tribal group, there may be considerable variation in basic economic mode; e.g. Dar Hamid in the region of Northern Kordofan lives by settled farming, save for one "household" (minor lineage) whose productive mode is still based on migrant camel-herding.

#### 1) Pastoralists:

##### a) Camel-Herders

The classic Bedouin of the desert, living in the black goat-hair tent, carrying his life and chattels slung on the ligotted rack across his camel's back, exists among the Arabic speaking tribes of Juhaina, in the scrub and acacia desert of Kordofan, parts of Darfur and Northern Provinces and Beja regions of Kassala and Red Sea Provinces. He will be of such tribes as Kababish, Shukriyyah and Shenabla or Bisharin. His herds must move constantly, because if they stay in one place the cattle sicken and die. Pasturage is degraded around water holes, or is dirtied by overuse. There is transmission of diseases among animals. By constant moving, the fragile lands are protected, and the herds stay healthy. These people gather in summer around the Dika, or permanent encampment of their Nathir (paramount sheikh). From there the family-heads go out in different directions, and their camps shift every few

days, depending on where the scouts have found good pasturage. In the winter season, between November and February, boys go out alone with the herds; women and the old remain around the Dika. Contact is maintained, with messages coming in every 12 to 15 days from the camps; and the Chief and the (male) nurse - if there is one - will circulate to the camps. Diet is based on durra (sorghum) porridge, camel's milk, samin (clarified butter), cheese, dates and ever-present sugared tea.

Health problems will involve accidents - camel-bite is very serious, and can amputate; and malaria is the number one problem. Measles is a big killer of children. Women have little help for female-systemic problems as trained midwives are in scarce supply. Bonesetters set bones for sheep, goats and people, but cauterize fractures in camels, as they feel the contracting skin serves to splint the bone. Camel's milk (sometimes mixed with camel-urine) is considered medicinal, and is sovereign for diabetes and cirrhosis of the liver. Patients with serious fevers, aches and pains are generally sent to hospital, but distance and transport are always limiting factors. If available, a car is used; if not, a camel-sling will serve.

The same modes of camel-breeding nomad-life characterize the Red Sea Littoral, and parts of Kassala, where the Beja tribes breed elegant and racy camels; but the Beja tribe add to the meager nomad-resources by planting adventitious

gardens in the delta pans where seasonal flash-floods have left enough soil-water to raise a crop. New development schemes are now raising high-quality cotton in these same pans, adding the possibility of some paid-labor for the herders. The Beja of today probably closely resemble the pre-dynastic Egyptians, and are divided into four main tribes, the Bisharin, the Ammar'ar, the Hadendiwa and the Beni-Amir.

b) Cattle Nomads

Also of Juhaina "blood" (affiliation) are the Baggara cattle nomads of the south, tracing their geneology to southern Arabia, and grouping tribes like Ta'aisha, Messiriyah and Hamer. Baggara long ago replaced their camels with the cattle from whom they now take their name (Baggara in Arabic means cow), and indeed ride their bulls for transport as their northern neighbors ride the camel. They range from the White Nile to the Bahr el Arab in the heavier rainfall areas of savannah grassland of southern Kordofan, Darfur and Bahr el Ghazal provinces, and often compete with Dinka herders for water, pasture and passage. Aside from the above mentioned health hazards for nomads, Baggara are at risk for tuberculosis, brucellosis, relapsing-fever and gastro-enteritis, diseases transmitted through unpasteurized cow's milk. Baggara lands and trajectories also carry them into onchocerciasis and tsetse fly zones, where livestock watering needs subject them to augmented danger. Additionally, the Baggara live a less hygienic life than their camel-herding brothers, with accompanying risks.

2) Sedentary Farming

a) Rainfall Farming

Environment is a basic determinant of nomad or sedentary life, and there is sometimes transition from one to the other occupational category. When war or drought destroy their herds, tribal sections may be forced to settle. Equally, government policy for water development may encourage settlement by sinking deep-bore wells that will provide a steady source, or by digging hafirs (reservoirs) to catch and store rain-water. Arabic-speaking northern groups which have settled among riverain Nubian or negroid tribes have tended to become absorbed, often acquiring somatic characteristics of the aboriginal group, but adding a quantum of Arab/nomad culture and values.

Largely settled farmers, sometimes breeding cattle in addition, the negroid Muslims of the northern Sudan fall into three groups: the Kordofan Nuba, the Dajo-Masalit-Fur peoples of Darfur and the Fellata colonies of western Sudanic people originally from Niger, Mali, Nigeria, etc. The latter came in successive waves in the Pilgrim train to Mecca, and stopped along the way either coming or going. Some have "stopped" for at least two hundred years already, but are still classified as Hausa, Fulbe or Kanure.

(1) People of the Nuba Hills "are not a homogeneous group for they are the backwash of many African

tribes who have sought refuge in the hills, so they differ profoundly in physical type, language and culture."\* They are strong and vigorous agricultural groups, whose millet, sesame and sorghum crops grow on rain-fed hill slopes. They are pagans, with differing languages and cultures. Their region is noted medically for having an excessively high incidence of leprosy, one of the few such areas of Sudan. Nutrition and enteric diseases are also particular problems of this section.

(2) Masalit, Dajo and a group of assorted Fur tribes are all essentially sedentary agriculturists, living on rain-fed plains in essentially low-but seasonal rainfall savannah and woodlands terrains. In central Darfur, the Jebel Marra range offers montane vegetation, higher rainfall and extremely inaccessible country. The economy is based on durra production, with a variable admix of cattle. Many of these people live very far from any governmental facility, in an area where roads don't exist, and tracks are few. In general, women's lives here are excessively hard, as they

---

\* Trimmingham, op.cit., p. 34

perform most of the productive work. Men only build houses, or trade a bit in the markets, according to report. Seasonal endemics of measles and meningitis hit hard; and malnutrition is here an important factor, with marasmus often seen among young children. In many of these areas people live largely on merissa, the slightly fermented durra beer, which is drunk throughout the day when people are together.

(3) Fellata colonies exist in Sennar, Kassala and Omdurman regions, and these offer candidates for casual labor, as well as settled farming groups. Some are on Rainfall lands, but others meet the unskilled labor needs of the Gezira and other irrigation schemes. There are, as well, Fellata who specialize in harvesting the hashab (gum-arabic) crop of the Kordofan gum-acacia belt. These people are famous for producing and using the Fekis, or magico-religious healers found throughout African Islam. They write amulets and know charms to protect from assorted health and social problems.

b) Riverine Farming

Peoples living along the Niles, whether the danagla to the north, or villagers along the Blue and White Niles to the south of Khartoum (a mixture of Ja'ali'in and Butana from the north and west, and others), follow similar lifestyles. The Niles flood their lands seasonally, or water is raised to the man-made canals by ancient methods such as

saqiya, water-wheels turned by bulls, or man-powered shaduf (water-bucket wheels), now mostly replaced (when there is gasoline available) by pumps. The pumps are fragile, and often break down. The new series of dams at Sennar, Roseires and Jebel Awlia now control the immemorial floods, generate electricity for Khartoum and irrigate development schemes of mechanized farms producing cotton (Gezira), sugar (Kenana) and other crops. But both traditional and modern agriculture schemes share the Nile largesse. Because of the frequent amalgamation of different tribal groups, social organization in these villages is communal rather than tribal, and the authority figure traditionally is the Umda (corresponding to Mayor), rather than the pastoral Nathir (paramount sheikh). The social group is the extended family, and while four wives are technically possible in Islam, most men will find that one wife's children are all he can successfully keep in shoes and Qesra (sorghum pancake/bread).

Cultivation cycles of clearing, sowing, hoeing, harvesting and caring for the canals keep the cultivator busy, and he often makes three harvests a year. Local industries supply most household goods, and the weekly suqs (markets) or daily markets in larger towns provide imported goods and are the exchange point with the ambient nomad tribes.

Malnutrition, based more on ignorance of good diet than on shortage of foods, attacks not only the vulnerable weanling, but older children and pregnant women as well. Major health problems are malaria and schistosomiasis, the scourges of the canals.

### 3) Cities and Urban Impact

Bechtold points out the dichotomy between rural and urban lifeways in Sudan\*, and Abdel Ghafer Ahmed points up the cities' role in developing rural elites into urban stratified classes.\*\* There are about a dozen cities or major towns in Sudan\*\*, but the largest three, together at the confluence of the Niles, can typify the kinds of city in Sudan. Of the "Three Towns", Omdurman is the classic traditional Arab-Muslim City. Although a settlement from Neolithic times, as of 1891 it became a city in the time of Mahdist hegemony under the Khalifa Abdellahi. Its wards are dominated by different cohesive clan and family groups, which maintain close personal ties to original tribal groups throughout Sudan. It is not the 'cut-off city', it is the 'tied-in-city' which maintains traditional values, extended family connections, and traditional organization.

Khartoum began as the central military camp for the invading Egyptian Army of the Khedive Mohammed Ali in the 1820's. It expanded into a major commercial center for the trade in slaves and ivory. In 1854, the public slave-market was closed, but the slave-based economy persisted until the social upheaval of the Mahdist period terminated Ottoman rule. In subsequent years Khartoum developed its

---

\* Bechtold, P.K.: 1976 Politics in the Sudan

\*\* Abdel Ghafer Ahmed: 1976 Tribal Elite: A Base for Social Stratification.

\*\*\* Khartoum, Omdurman, Khartoum North, Port Sudan, Suakin, Kassala, Wad Midani, El Obeid, Atbarah, Juba, Wau, Fasher

character as a central government seat. Its population includes many foreigners and professional people, and the University focuses Sudanese intellectual and artistic life. Politics, modern education, foreign ideas and articles, and young Sudanese with a sense of urgency about the need for social and economic change: this is the modern city, distinctively different from the forms of traditional life.

Khartoum North, a residential area for Khartoum, has also the character of the manufacturing city. A major part of the light industry of the country is centered there. Its factories draw the adventurous or the destitute from all over the country, and real economic stratification is visible in the differences between the modern villas of wealthy Khartoum families, and the squatter villages which house the refugees from rural drought who may have lost everything except the need to live. These people feed the factories and perform menial service in the Three-Towns. Their squatter villages are something of a waste-land as far as urban services are concerned. As the poorest of the poor, their health needs should fall within the scope of AID's concern.

Khartoum North's squatter villages are repeated, in fact, in areas around both Khartoum and Omdurman. But in the unionized town of Port Sudan, these disadvantaged squatter-residents are more liable to be political tinder.

Cost of living is high in the cities.\* Most people have to spend at least two-thirds of income for food and drink. In 1971, the minimum monthly wage was L14 (Sudanese pounds), and the daily minimum not more than 50 piasters. (\$1.00 = approx. 34 piasters.) In the cities differences in economic level throw have and have-not into stark relief. In rural areas, life-style for leader and led are much the same, whereas in the cities, access (for the privileged) to foreign ways and things leads to breakdown in traditional modes and values, the contrasts leading to a devaluation of traditional ways. For similiar reasons, development activities which import large numbers of high-paid and (relative to a Sudanese base-line) high-living foreign technicians are to be questioned in their repercussions on the Sudanese social fabric.

---

\* In 1969, residential land cost 25 piasters/sq. meter.  
Now, in 1977, it is closer to LS5/sq. meter

4) Migrant Workers and Squatter Villagers

Two kinds of migrant labor must be considered in Sudan. One group of workers participate in dual economies. They make a circulatory migration between the differing production modes of their homeland and the commercial schemes of Gezira, Kenana, and the Tawkar Delta, where modern farms grow cotton or sugar. Sudani cultivators, coming from the sands regions and central clay-plains, or nomads of the slave-lineages coming from the semi-desert regions flow to the large, modern, mechanized-agriculture schemes. They are joined by the Fellata, western migrants from outside Sudan who come from predominantly agricultural societies, and are a very productive element in the wage-labor market. Sudanese workers from outside the cash-economy in this way meet their needs for money for tax and other purposes (dowry, etc.). They look for wage-labor in drought-years, and in years of locust blight, when their own herds and crops have yielded little. They return from the modern commercial sector to their own traditional agricultural or pastoral life-styles in good years. The Fellata are most often pilgrims who earn the slow journey to Mecca by performing wage-labor along the way. These workers thus make part-time use of their surplus labor. They bridge the gap between the "primitive" and "modern" sectors of the economy. To an extent, these people control their own destinies, in that they make purposive economic choices. (One must here

add mention of the gum-arabic (hashab) pickers: specialists from Darfur who come seasonally to gather the wild-crop of the central Qoz sands belt.)

There is, however, a second category of migrant workers, those whose margins and losses from blight or drought have carried them beyond thresholds of rational economic choice, and who - having lost the means of narrow subsistence - gravitate to the fringes of urban areas such as Khartoum, Omdurman, and Port Sudan.\* Around Juba, these waifs of fortune are the remaining refugees of war-time dislocation. These destitute people form the squatter-villages which now encircle the above mentioned urban areas. They enter the urban labor force at its lowest levels, and without skills. In Port Sudan, they service the labor needs of the Port. They are, without a doubt, the poorest of the poor.

For all these labor migrants, there are the risks of non-immune exposure to whatever the new eco-disease-frame may hold. Made vulnerable by their needy state, they are, as well, the purveyors of the maladies of their path, whether those be (as in the past) cholera, typhus, meningitis, or even viruses like the recent devastating "Green Monkey Disease" which was most virulent in congested places.

Efforts are made to control the immigrants to the Gezira and other schemes, because this labor force is brought in on plan and schedule. The squatter villagers have seen little help or service to date.

---

\* Khartoum North's "Hadj Yussof" area; Omdurman's "Um Badda" section.

b. Stratification

1) Administrative Structure and Problems

At the central level, the Ministry of Health depends on a 3-class Civil Service. The Ministry is fortunate in the number, educational levels, and quality of the professionals who direct its programs. Consistent with the general policy of devolution of the socialist government, Sudan now locates much responsibility for administration, implementation, and funding at the provincial level, and is committed to the exercise of self-help and political decision-making at the local level.

Translated into health-oriented action, this means that village councils (and the proposed nomad councils) are expected to generate the resources of money and materials to build health-centers and dispensaries. They can appeal to provincial, MOH, or People's Local Government Ministries for help, but "...there are no line items in any development budget submissions of any of the ministries....for support to self-help projects". \*

---

\* DAI: Strategies for the Reintroduction of Development Assistance to the Sudan.

There is, therefore, diffuse responsibility, and ambiguity regarding point of origin of resources for the maintenance, equipping, and staffing of self-help generated facilities. When local level initiative has been mobilized to creative action, people are often deceived in their expectations for official follow-through. The facilities they have provided in the past have sometimes been sub-standard, and the MOH is now trying to address itself to control this deficiency. A greater problem exists in that the facilities created are sometimes neither used, staffed, nor maintained.

This problem is illustrative of two roots, which generate a whole series of administrative problems of timing, coordination and interaction in Sudanese government activities. The first root is quite simply the poverty of total resources: the cloth cannot stretch to cover what is required, the essential problem of underdevelopment. The second root is structural: In the Sudan of times past, flow of authority and decision within the state administration was from top to bottom. The inheritor of Ottoman, Egyptian, and British Governmental systems, Sudan knew channels where taxes (taken under duress) flowed up, and decision and power flowed down. Reversal of this centuries-cemented system by the socialist political philosophy of the May Revolution (1969) initiates a degree of social change that pragmatically leaves voids and ambiguity in areas of operation.

Add to this a lack of channels and mechanisms for lateral communication.

The administrator in charge of the school for Health Visitors at Wad Medani must let his students from the next province go home for 3 to 4 days at least once a month in order to collect their pay checks, disbursed from the consolidated budget of their own province. There is no way for their checks to be transferred and paid to them at the school, and they prefer not to trust the mails.

Development projects that establish straight vertical channels for administration and logistics, with clearly defined levels and areas of authority, seem to operate well in Sudan. Illustrative of this would be the operation of the "Attack-Phase" of the WHO-sponsored Smallpox Eradication Campaign, or the logistics operation mounted for the Kenana Sugar Production Scheme. Programs developed without awareness of this caveat tend to mire hopelessly in the morass of vagueness, delay, and infrastructure insufficiency.

2) Social Structure, Class-Membership  
& Change-Agents.

Traditionally, in rural Northern Sudan, among nomads, the structuring element of social organization and grouping is kinship. People live and move with, and expect social support from, those who are, in fact or fiction, descended from the same recognized ancestors. Authority figures, on

lineal patriarchal model, are recruited from the strongest, perhaps wealthiest, or senior, or land-owning lineage within this hyper-extended family group. The father of a family is responsible for his house-folk to the head of his major lineage, and this one to the Sheikh who heads a maximal lineage. Head man for a tribal group is the Nathir, both symbolically and administratively the father for his tribe.

In the Ottoman and subsequently maintained administrative system, local governance in settled villages was practiced by the Umda; and people interacted in residential groups, which might be based on kinship, but might equally link several different kin-groups as well as heterogeneous elements. Wealth or ownership of land gave access to favored high-status positions. Among both nomad and settled groups, certain families (as elsewhere in Islam) have specialized in religious studies, teaching, and other activities. Among them are those whose family vocation is acquired through virtue of descent from the Prophet Mohammed, or from other recognized holy men and saintly teachers. Across the Muslim world these families (and sometimes whole tribes) are given special high status, and they are considered to act in their society as a sort of leaven-of-virtue, whose presence alone confers blessing, and can facilitate or improve human efforts.

These, then, are amongst the elements in Sudanese society which give rise to differences in status, and often concomittantly to wealth. In the Cities, the accumulation of high-status individuals and families gives rise to class differences usually based on birth; but wealth judiciously managed can achieve the same ends. This is the basis of the old class-structure in Sudan, modified by regional origin, and membership in different ethnic categories. Modern Sudanese experience has ingrafted other qualities and attributes of western education, and military, or bureauratic, or professional status, these latter being attributes that can be acquired by anyone with lucky stars.

These old high-status groups are the elements in the population whose children have for the most part provided, in the North, the "technicians", the modern, educated elite - themselves another class - who are now the movers and doers, the change-agents in their own society who are struggling to rework the old forms; but it must be emphasized that the majority of the population still lives in the traditional folkways and subscribes to the time-worn beliefs and practices, remote from roads, modern tools and goods.

c. Women in Sudan and Social Change

The Koran and Hadith (the Traditions of the Prophet), basis of Muslim Shari'a Law, have much to say about the rights and duties of women in Islam that is sometimes ignored in common practice. Thus, the burden of Koranic Law, while it does not address woman as the legal (jural) equivalent of a man, nevertheless protects her social position with regard to marriage and divorce, inheritance; the right to work, the right not to have her labor exploited, the right to own and dispose of property, and to contract.

Women are seldom left without support, and a girl's first protector is her father, secondly her husband. If these should fail, her brother, or men of her father's family, or the mother's brother, or her son would have the obligation. Failing all of these, she would have the right to the support of the State. In fact, distressed or destitute women in Sudan would be offered assistance by various Wagf(s) (charitable foundations), private charity, or the Ministry of Social Affairs. The Koran specifies and required the provision and handling of the "portion of the widow and the orphan". In practice, there are abuses in custom, and modern law and efforts are seeking to improve opportunities and offer greater freedom to women. Life for most Sudanese women is home-centered, and orthodox families do not permit their girls to frequent public places. Thus it is

rare to find a Sudanese shop-girl, and rarely does one see a woman in the streets full of men. Uneducated women who must work sell eggs and vegetables in the food-markets, do embroidery, basketry, or dressmaking, serve as house to house peddlers of dresses and small kitchen items. There are women who specialize in preparing and painting the henna-designs on ladies hands and feet. These delicate tracteries in the purplish-blue henna stain are made especially to adorn brides, but other women make them to be beautiful. Still other working-women will come to the home to plait the infinitely complicated coiffures that some traditional Sudanese women wear.

Women have begun to take factory jobs in cities, and of course they work beside men in the cotton fields of the Gezira, or, with their men and children, help to collect gum-arabic in the Kordofan plains. In the cities, high-school graduates begin to fill clerical jobs, but many girls now study religion and law, home-economics, sociology, or any other subject of choice. There are women doctors in medicine, in biology, and other "hard" sciences. Articles in the permanent Constitution of the Sudan now guarantee women equality before the Law, the right to work, equal pay for equal work, the right to study, and twelve of the ILO protective conventions for women workers have been ratified by Sudan.

Health services offer perhaps the largest opportunity for women to enter the modern-sector job market. Auxiliary nurse, nurse, and midwife jobs, according to Women's Union information, offer the major opportunities for employment to women. (Full information on health-manpower training is given elsewhere in this survey.)

In the admittedly small sample of Nurses, Health-Visitors and Village Midwives encountered during the survey, this investigator has encountered only warm, lively, workmanlike and committed women. Health Visitors in Arbaji Village and El Obeid, Nursing Sisters of Soba Hospital outside Khartoum, Nurse-Midwife teachers in Wad Medani and El Obeid, and the Nurse counterparts assigned while in Kordofan - all seemed universally gracious and devoted women. Further, while observation opportunity was limited, all indications pointed to continued and fruitful interaction between health personnel and those whom they served and taught. Nurses evidently enjoy high status in their communities, with accompanying authority; and they willingly offer to other women assistance in areas of seriously felt need. Well and sick baby examination, demonstration-teaching of appropriate baby-food and its preparation, and formal teaching were among activities observed.

The Ministry of Health has made efforts to incorporate traditional midwives into its program for training Village Midwives, and now believes this to be an unproductive

effort. The current effort is to recruit daughters of traditional practitioners for modern training. Legal efforts are made to prohibit traditional midwives from practicing, among other reasons in an effort to control the ancient practice of female circumcision and infibulation. It is, however, unrealistic to believe that traditional midwives will wither away as an occupational group in the near future. It will be some years before enough trained practitioners will be available to replace them. It might, therefore, be more realistic to offer classes to all possible women in correct birthing procedures, thereby initiating general social control over incorrect practice.

Thus the Modern Law prefigures social action, and paves the way for equitable full integration into the modern sector, but this, in fact, is the lot of a minimum number of Sudanese women.

Most women marry early, work hard, and bear many children. They care for household, husband, children, garden and often the animals.\* They deeply fear divorce, and are, of course, terribly vulnerable to it, since a woman has no formal recourse when the triple rejection is made. Polygamy is ratified in the Koran, but it specifies "...you may marry two, three, or four wives, but not more, but if you cannot deal equitably and justly with all, you shall marry only one".\*\*

---

\* Nomad women weave the tents and make the leather bags in which their chattels travel.

\*\* Holy Koran: Sura "Women"

Men are inclined to interpret this according to their own desires and economic status.

A serious health problem is posed to Sudanese women by the custom of female circumcision, which is practiced by Hamites, and most of the Arab populations of the north. Essentially there are three different kinds of circumcision, the most radical of which is the Pharaonic. This aims to narrow or close the introitus, is supposed to protect virginity and promote chastity by making intercourse impossible. Without anesthetic, the child of five to eight is seized and held by relatives, while the midwife operates. "With a sharp razor, the clitoris is amputated and slices of the labia majora and labia minora are pared away. The amount of tissue removed and the damage done depends on the experience of the midwife. Bleeding is always profuse and is controlled by digital pressure. The wounds on the two sides are brought into opposition by tying the legs together for forty days . . . A match stick is inserted in the centre of the wound to allow the development of a fistula for urination . . . This type of operation was the commonest type. It is illegal and prohibited by Islam".\*

The Sunna circumcision is sometimes practiced, and consists of excision of the glans clitoris and sometimes part of the clitoris itself. This one is recommended by Islam. The third type, though illegal, is most often performed now. It consists of excision of the clitoris with slices of the upper part of the labia minora. The labia majora is preserved leaving a slightly narrowed introitus. The mid-wife now uses local

---

\* Suliman Modawa: The Impact of Social and Economic Changes in Female Circumcision.

anesthesia, and sutures with gut.

Modawi refers to thousands of cases he has seen, and bases his study on the records of 3,000 cases. He lists the following complications: hemorrhage, shock, injuries to urethra, Bartholin gland and duct and perineum, infection may immediately attend or follow the operation. Urinary complications such as retention of urine with accompanying infection spreading upward occur. Madura. Psychological complications and trauma. To this list a nurse/midwife adds fistula, and, later, dangerously slow childbirth.

Difficulties in marital relations range from impossibility to consummate, to damage to the woman, or "unnatural acts", infertility and psycho-sexual aberration.

Childbirth becomes a more fearful experience, as the woman cannot deliver until the scar has been incised. Sometimes a woman is recircumcised after each childbirth, to reclose the wide introitus.

Modawi concludes his study with the comment that outlawing the practice did nothing to stop it, but that education, better medical services and social reforms should soon terminate a practice known since at least 200 B.C. along the Nile.

Women have other ills as well, and it is said of village and city women that they don't know when they should see a doctor. As for many rural women, especially nomads,

medical services are often so far away as to be unavailable at time of need. A preventive approach to health problems, antenatal surveillance, health-visitor care and, above all, education in hygiene, nutrition and basic health care should vastly improve the lot of Sudan's women.

4. Southern Profile

a. Scope and Setting

Beyond the Sudd swamps, in Upper Nile, Bahr-el-Ghazal, and Equatoria provinces, Southerners have maintained traditional lifestyles, historically linked to the North only by the Nile, and a relationship of exploitation.

Southern terrains range from the undulating wooded savannah of Bahr-el-Ghazal, through the bog-grasslands of the Sudd to the foothills and rolling plateaus of central Equatoria. In low-lying areas of Equatoria's southwest rain-forest, rainfall may exceed 50 inches a year, but most of this region lies on the "Ironstone Plateau", and presents the familiar African red-laterite soils. Toward the Kenya and Uganda borders in the south and southeast, the Dongatona and Didinga Hills, and the high Immatong and Acholi mountains presage the peaks and snows of the Ruwenzori. In the far southeast, the Ethiopian escarpment drops to form bamboo-forest terraces in Sudan, which in turn drop to rolling elephant-grass plains, and ultimately to the clay-pan swamps of Lotogipi in Equatoria, and Kenanuke in Upper Nile province: These are the eastern reaches of the Sudd, fed by the Pibor and other streams from the Ethiopian highlands. Parts of this region are the preserve of game and the tsetse fly, and very difficult of access. The majority

of Upper Nile can only really be seen from the air, most of the region being without roads, and existing tracks becoming impassible through the six-month rainy season. Bahr-el-Ghazal, with the multiple Nile tributaries, also floods into endless swamp during the rains, and is inaccessible. Only Equatoria has some network of roads, but here harsh terrain ranges from high mountains, to the barren desert stretching to the tip of Lake Rudolph.

Innumerable tribes and tribal fractions live in the South. They are of Nilotic<sup>\*</sup>, Nilo-Hamitic<sup>\*\*</sup>, or Sudanic<sup>\*\*\*</sup> ethnic groups, and their homelands are not bounded by the international borders. Consanguinous and affinal relations unite Sudanese with Ethiopian, Ugandan, Kenyan and Zaireois neighbors. Nilotic Nuer and Shilluk of the Upper Nile, and Dinka of Bahr-el-Ghazal together form the largest ethnic group in the South.

b. Economies and Life Styles

The South participates little in the modern economic sector. Communications are a serious problem, and even inter-tribal barter is limited. Most communication is by river, but Juba is a week away from Khartoum by steamer and rail. Major towns are Juba, Malakal, and Wau.

---

\* These are clusters of related groups living near the Nile.

\*\* People such as Latuko and Bari who inhabit the southern Nile Valley.

\*\*\* Dinka, Shilluk, Nuer, Anuak and related peoples. See Bechtold, P.K.: 1976 Politics in the Sudan

1) Nilotic Culture

Malakal, provincial capital of Upper Nile province, is a local trading center for the Shilluk. It has about 30,000 population, and a good airfield. A veterinary research center and pilot dairy farm are here. Pilot agricultural cooperatives are an attempt to interest cattle-oriented Nuer and Shilluk in increased agricultural land-use, since two-thirds of Upper Nile should be arable, with sufficient rain-fall. These Nilotics traditionally live in small shelter-villages centered around their cattle-byres, and raise only minimum crops of maize and durra. Fish & milk-and-blood from their cattle form the basis of their diet. Of central interest are their cattle, which are used to establish and cement all social ties: They move seasonally with their animals between the dry-season river-bank pasturage, and the hummock-islands, where they camp above the rising swamp-waters in the season of floods. Central state administration has touched them minimally, and even less during the recent decades of civil war. Nuer and Shilluk, like their cattle-raising Dinka neighbors of Bahr-el-Ghazal province, live their traditional lives governed by the rights and obligations of lineage and clan relationship, modified by patterns of cattle-raiding and feud with their neighbors. For men, activities and responsibilities are determined by position within the age-set: each man in his lifetime passing through each grade in company with his age-peers. These two principles of lineage(vertical) and age-set (horizontal) responsibilities combine to set the style of social control in these essentially

acephalous societies. Although the Shilluk have a "divine" king, his role is largely ceremonial and symbolic. In a day not long past, his people ritually killed him when he became old or ill, since his vitality represented and was mystically associated with the health and survival of his people. Actual administration is the province of chiefs and sub-chiefs \*\*

Dinka tribes are headed by chiefs drawn from the ritually powerful clans. Chiefs and "Masters of the Fishing Spear" have intercessory and conciliatory power rather than authority.

## 2) Nilo-Hamitic Cultures

Lotuko of E. Central Equatoria, and Bari-Speakers such as Nyangwara and Mandari, who live not far from Juba, resemble Dinka in social organization and economy. Villages are permanent, but herds and herders must move continuously to obtain a balanced cattle diet.

Throughout most of Equatoria and much of Upper Nile, the settlement pattern is one of solitary homesteads, or hamlets which, clustering, form strung-out villages. A man, his brothers and paternal cousins, and their wives and children occupy a hamlet. Homesteads belong to and are occupied by respective wives and their children.

Where access roads exist, it is possible to bring services to village-dwellers of Central Equatoria. But Luo, Beir, Didinga and Murle toward the east tend to live in isolated homesteads. Medical and administrative services are

---

\* E. Evans Priteward: Nuer Religion 1956

\*\* G. Leinhardt: The Shilluk of the Upper Nile, in African Worlds, ed. D. Forde, 1954

difficult to provide in these areas of remote subsistence-agriculture societies.

Azande of southwest Equatoria are a homestead society organized into a congeries of petty rival kingdoms. Their land is heavily infested with tsetse-fly, and during the Condominium, British administration began the "Azande Scheme" whereby all homesteads and villages were resettled in an attempt to control trypanosomiasis infestation. The Azande project developed cotton plantations and some industry: sawmills, furniture and soap factories, spinning and weaving mills. Largely dismantled during the Civil War, the Azande Scheme is only now getting underway again. Zande are the most numerous single group in Southern Sudan.

c. Health Problems

Death rate in the South is twice as high as in the northern provinces, and due to parasites and poor nutrition, resistance to disease is generally low. Common diseases include:

- Filariasis, both Loa-Loa and Onchocerciasis;
- Malaria, the greatest killer;
- Sleeping Sickness (Trypanosomiasis), both Gambiensis and Rhodesiensis;
- Kala Azar, especially prevalent in the southeast;
- Leprosy, especially prevalent in the Nuba Hills and the southwest;
- Meningitis, appears in the yearly dry-season epidemic.
- Hookworm, particularly serious in Bahr el Ghazal where infestations are very heavy.

- Dysentery, both amoeba and Shigella are present;
- Oriental Sore (cutaneous leishmaniasis), prevalent in Bahr el Ghazal and Equatoria.
- Pneumonia, everywhere prevalent;
- Sandfly fever, is widely endemic;
- Tuberculosis, on the increase in the south;
- Enteric fevers, typhoid and paratyphoid are both prevalent;
- Venereal diseases, both gonorrhoea and syphilis are widespread;
- Yaws, prevalent in Bahr el Ghazal and Equatoria.
- Yellow Fever, while endemic, is currently controlled.\*

It is thus apparent that southern Sudanese are at high risk for many serious tropical and endemic diseases. Their current health facilities are extremely limited and touch only a minimal percentage of the scattered rural population.

d. Constraints to Implementation of the Health Plan in the South.

Several major constraints bedevil implementation of the Health Plan in the South. The first is the scope of existing health problems. As indicated heretofore, the list of major disease categories is impressive.

Next in importance is the quasi-total lack of base-level infrastructure. Modern skills, transportation, communication, medical supplies and training materials are all in short supply. Cadres from which to develop health personnel of all

levels are severely limited. Indeed, the Ministry itself consists of just four overworked men.

Difficulty of access to people is a major problem. Scattered homesteads, lack of agglomerates, even a lack of markets in large areas of the south augment difficulties of communication and supply. The terrain is often difficult, and vehicles and maintenance facilities are limited.

The Deputy Minister of Health listed the following constraints:

- Financial. The South is hard-put to generate its own finances. Money is expected to come from Khartoum or from foreign donors, but coordination of donor input leads to problems in phasing facilities construction and manpower training.
- Lack of visible success (due to shortfalls) makes the health issue a political football in the South, and the Ministry is caught in the middle.

Few health facilities exist and what there was has suffered during the civil war. Units of all levels need to be constructed, but commodities are scarce and costly, and need to be shipped in from abroad. Shipping routes are long and poor, and gasoline is expensive.

Lastly, when people are aware of what modern medicine can offer them, they want its benefits. For many, however, the framework of traditional ideas makes modern health plans seem irrelevant.

For the preceding reasons, a separate strategy is needed for the South. Feasibility studies and socio-cultural research should precede major efforts. Extended preliminary investment is needed because developmental pre-conditions are lacking.

**APPENDIX D**

**BIBLIOGRAPHY**

Appendix D:

BIBLIOGRAPHY

1. Ahmed, Abdel Ghafer. Tribal Elite - A Base for Social Stratification. 1976.
2. Atlas de l'Afrique.
3. American Embassy, Khartoum. Sudan Post Report. January, 1976.
4. Bagchi, Kalyan & Babiker, Yousif. Nutrition Rehabilitation Centres. Proceedings of the First National Food and Nutrition Seminar - March, 72. Tamaddon Press, Khartoum, Sudan, 1973, 139-142.
5. Baroudi, M.A., and Nelson, C. Community Participation in Rural/Nomadic Villages within the Primary Health Program. 1976.
6. Bechtold, P. K. Politics in the Sudan. 1976.
7. Benenson, Abram S. (Ed.) Control of Communicable Diseases of Man (12th Edition). Washington, 1975.
8. Bushara, Yousif Mohamed. Child Malnutrition in the Sudan; Studies in Khartoum North. Proceedings of the First National Food and Nutrition Seminar - March, 1972. Tamaddon Press, Khartoum, Sudan, 1973, 160-163.
9. Buxton, J. Religion and Healing in Mandari. 1973.
10. Chesterton, G. K. Lepanto.
11. Coale, Ansley J. and Demeny, Paul. Regional Model Life Tables and Stable Populations. Princeton University Press. 1966
12. Constantinides, P. Unpublished Doctoral Dissertation, L.S.E. University of London, Fac. of Arts. 1972.
13. Cross, Edward B. Health Sector Report on Sudan. 1976.
14. Development Alternatives, Inc. Strategies for the Reintroduction of Development Assistance to the Sudan. Seminar Held Under the Auspices of the Officer of Eastern and Southern African Affairs, Bureau for Africa, Agency for International Development Washington, D.C., October, 1976.

15. Demographic Yearbook. United Nations, 1975.
16. Downing, Lance. The Population Policy of the Sudan. Arlington, Virginia, 1975.
17. Edwards, Cecile H. Home Science at the University of Khartoum - Review and Recommendations. Khartoum, Sudan, March, 1977.
18. El Badawi, Zeinab El Fatih. The Muslim Woman to Commemorate International Women's Year 1975.
19. El Tom, Mahdi Amin. The Rains of the Sudan. "Mechanism and Distribution". Khartoum University Press. 1975.
20. Evans-Pritchard, E. Nuer Religion. 1956
21. Faculty of Medicine, Depts.: Social & Preventive Medicine, Paediatrics & Child Health, Obstetrics & Gynaecology. Family Health Curriculum. (Integrated Teaching: Case Study Prob. No. 1).
22. Faculty of Medicine, University of Khartoum Sponsored by African Health Training Institutions Project (AHTIP) University of North Carolina. Seminar/Workshop on Teaching 1976.
23. Faculty of Medicine, University of Khartoum. Summary of Curriculum.
24. Gleave, M. B. and White, H. P. Agricultural Systems and Pastoralism in Tropical Africa. Trentham, 1972.
25. Gleave, M. B. Population and Settlement in Tropical Africa. Trentham, 1971.
26. Government of Sudan, Ministry of Finance, Planning and National Economy. Economic Survey 1975-76. Khartoum, 1976.
27. Government of Sudan. Legislative Supplement to the Democratic Republic of the Sudan. Gazette No. 1179, Supplement No. 1: General Legislations. 1975, 57-99.
28. Hull, Richard W. Munyakare: African Civilization Before the Batauree. John Wiley & Sons, Inc. New York, 1972.

29. Hummeida, Ahmed Khalid. Nutrition Rehabilitation Centres in the Sudan - An Experiment. Proceedings of the First National Food and Nutrition Seminar - March, 1972. Tamaddon Press, Khartoum, Sudan, 1973, 143-146.
30. Idris, A. A., Lolik, P., Khan, R. A., Benyoussef, A. et al. The Primary Health Care Programme in Sudan. 1976.
31. IBRD: Economic Memorandum on Sudan. Washington, 1976
32. I. L. O. Labour Organization: Growth, Employment and Equity. Geneva, 1976.
33. Jelliffe, D.B. Infant Nutrition in the Subtropics and Tropics. Geneva, 1968.
34. Kasfir, Nelson. Still Keeping the Peace. Northeast Africa Series - Fieldstaff Reports, Vol. 4. U.S.A., 1976.
35. Kornfeld, Leonard; Freeman, Peter; Hunter, Robert; Lennox, Robert; Sharry, David; and Huntington, Richard. Sudan - AID Involvement in Traditional Agriculture, Report CR-A-183. McLean, Virginia, 1977
36. Leinhardt, G. The Shilluk of the Upper Nile in African Worlds, ed. D. Forde. 1954.
37. May, Jacques M. and McLean, Donna L. The Ecology of Malnutrition in Eastern Africa and Four Countries of Western Africa. Hafner Publishing Co., New York, 1970.
38. Ministry of Health, Sudan. Manual for Community Health Workers, 1977/78 - 1983/84. Khartoum, 1976.
39. Ministry of Health, Sudan. Health Training Course.
40. Ministry of Health, Sudan. Health Visitors Training.
41. Ministry of Health, Sudan. Institutes and Schools for Auxiliary Medical Training in the Democratic Republic of the Sudan. Khartoum, 1973.
42. Ministry of Health, Sudan. Manual for the Community Health Worker. Primary Health Care Programme 77/78 - 83/84. Khartoum University Press. 1976.

43. Ministry of Health, Sudan. National Health Programme 1977/78 - 1983/84. Khartoum University Press, Sudan. April, 1975.
44. Ministry of Health, Sudan. Plan of the Immunization Component of the Primary Health Care Programme of the Democratic Republic of the Sudan. Khartoum, Sudan, June, 1976.
45. Ministry of Health and Social Welfare, Southern Sudan. Primary Health Care Programme Southern Region - Sudan, 1977/78 - 1983/84. Khartoum, Sudan, 1976.
46. Ministry of National Planning. Six-Year Plan of Economic and Social Development - 1977/78 - 1982/83. Vol. 2, Khartoum, Sudan, April, 1977.
47. Ministry of Health - Sudan. Summary Statement, Primary Health Care Programme, Sudan, 1977/78 - 1983/84. Khartoum University Press. 1976.
48. Ministry of Health, Sudan. Syllabus of Training for Sanitary Overseers.
49. Ministry of Health, Sudan/WHO. Training Component Project Primary Health Care Programme. Khartoum, 1977.
50. Ministry of Health, Sudan. Vital & Health Statistics Division Annual Statistical Report, 1974. Khartoum, Sudan, 1974.
51. Ministry of Health, Sudan. Vital and Health Statistics Division Annual Statistical Report. Khartoum, Sudan, 1975.
52. Ministry of Health, Sudan. Workshop on the Implementation and Integration of Maternal and Child Health and Family Planning in the National Health Programme, 1977/78 - 1983/84. May, 1976.
53. Modawi, Osman. Infertility in the Subsaharan Africa with Special Reference to Sudan. 1976.
54. Modawi, Suliman. The Impact of Social and Economic Changes in Female Circumcision.
55. Modawi, Osman, M.D. Maternity Centred Family Planning in Sudan. Proceedings of the Third Congress of Obstetrics & Gynaecology, Sudan. Khartoum University Press. April, 1973.

56. Moorehead, Alan. The Blue Nile. New English Library. Great Britain, 1972.
57. Moorehead, Alan. The White Nile. Penguin Books. Great Britain, 1963.
58. Mustafa, Mutasim Abubakr, MB., BS., MRCOG, Ph.D. Hospital Family Planning Service in Khartoum, Sudan. September, 1974.
59. National Council for Research, Sudan. Food and Nutrition in the Sudan. Proceedings of the First National Food and Nutrition Seminar - March, 1972. Tamaddon Press, Khartoum, Sudan, 1973, 127-31, 132-138, 139-142, 143-146, 147-153, 160-163, 181-205.
60. Nelson, Harold., ed. Area Handbook for the Demographic Republic of Sudan. American University Press, Washington, D.C., 1973.
61. Omer, Mohamed Ibrahim Ali. Infant Malnutrition and Weaning Practices in the Sudan. Proceedings of the First National Food & Nutrition Seminar - March 1972. Tamaddon Press, Khartoum, Sudan, 1973, 181-191.
62. Sanhoury, Naima Yousif, and Gabr, El Hag Abu. Nutritional Status & Dietary Pattern of Infants and Pre-School Children in Khartoum. Proceedings of the First National Food and Nutrition Seminar - March, 1972. Tamaddon Press, Khartoum, Sudan, 1973.
63. Shazali, Hafiz. Home-Made Weaning Foods for Sudanese Children. Proceedings of the First National Food and Nutrition Seminar - March, 1972. Tamaddon Press, Khartoum, Sudan, 1973, 147-153.
64. Sudanese Association of Obstetricians & Gynaecologists. Proceedings of the Third Congress of Obstetrics & Gynaecology. Khartoum University Press. Khartoum, Sudan, 1974.
65. Sudanese Association of Obstetricians & Gynaecologists. Proceedings of Fourth Congress of Obstetrics & Gynaecology. Khartoum University Press. Khartoum, Sudan, 1977.
66. Sudan Family Planning Association. A Family Planning Survey of Arbaji Village in Gezira Area, Sudan.

67. Sudan Gezira Board, The Information and Publication Section. The Gezira Scheme Past and Present. Khartoum, Sudan, 1977.
68. Sudan Gezira Board, The Information & Publication Section. El Gezira Scheme Past & Present (In Arabic). Khartoum, Sudan, 1977.
69. Taha, Salah Ali. The Multi-Disciplinary Approach to the Prevention of Protein-Calorie Malnutrition (With Particular Emphasis on the Gezira Irrigated Area). Proceedings of the First National Food and Nutrition Seminar - March, 1972. Tamaddon Press, Khartoum, Sudan, 1973, 192-205.
70. Trimmingham. 1965.
71. U. S. Department of State Publication. Sudan. 1975.
72. Waterbury, John. The Sudan in Quest of a Surplus Part I: Dreams and Realities. Northeast Africa Series - Fieldstaff Reports, Vol. XXI, No. 8. 1976.
73. Waterbury, John. The Sudan in Quest of a Surplus Part II: Domestic and Regional Politics. Northeast Africa Series - Fieldstaff Reports, Vol. XXI, No. 9. 1976.
74. Waterbury, John. The Sudan in Quest of a Surplus Part III: Capital Packages and Regional Prospects Northeast Africa Series - Fieldstaff Reports, Vol. XXI, No. 10. 1976.
75. Wilcocks & Manson-Bahr. Manson's Tropical Disease. London, 1972.
76. Williams, Cicely D. and Jelliffe, Derrick B. Mother and Child Health Delivering the Services. Oxford University Press. 1972.
77. World Bank, Eastern Africa Country Programs I. Sudan: Development Strategy and Issues in the Next Decade. 1975.
78. World Health Organization, Eastern Mediterranean Region. Seminar on Development of Field Training Areas - Their Needs and Advantages for the Teaching of MCH and Family Planning to Health Personnel. Isfahan 25-30, May, 1975.

79. Yousif, Yousif Babiker & Bagchi, Kalyan. Current Activities in Nutrition Through Health Services in the Sudan. Proceedings of the First National Food and Nutrition Seminar - March, 1972. Tamaddon Press, Khartoum, Sudan, 1973, 132-138.