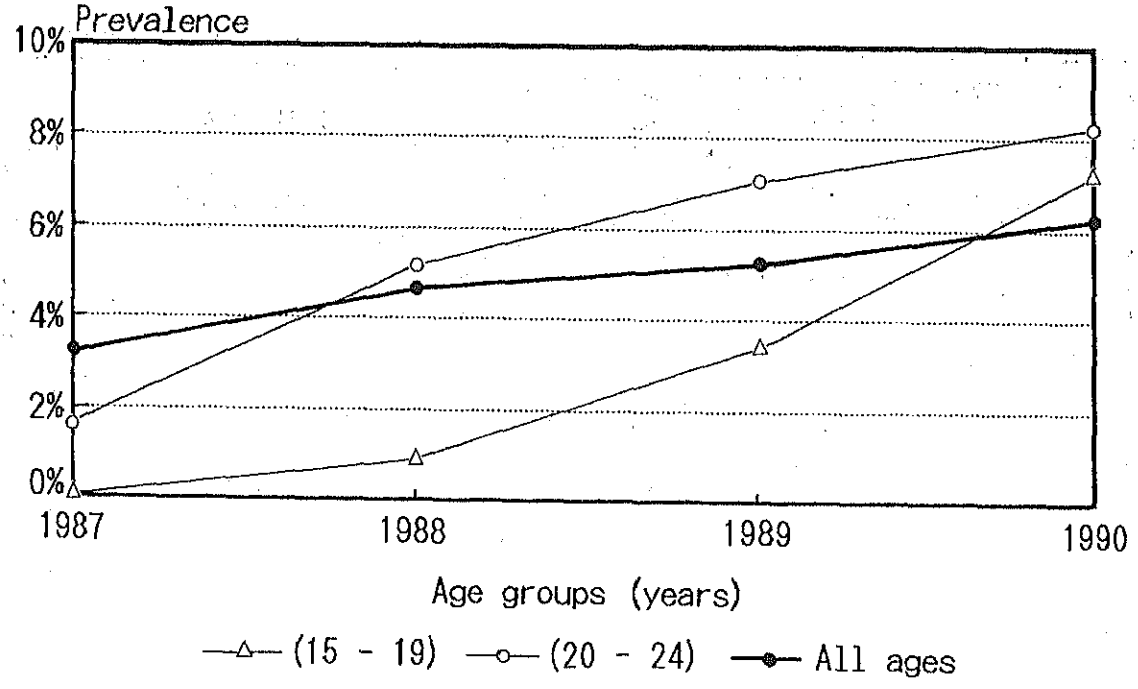
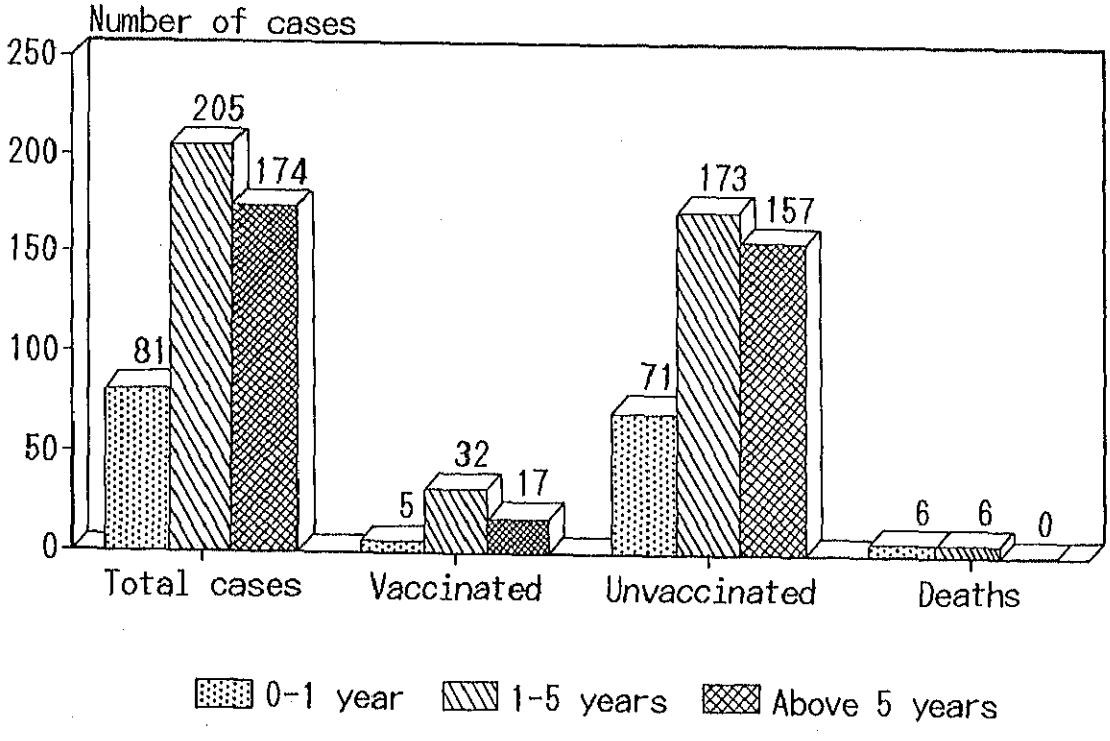
Figure I-4 HIV prevalence in blood donors by age groups, 1987–90



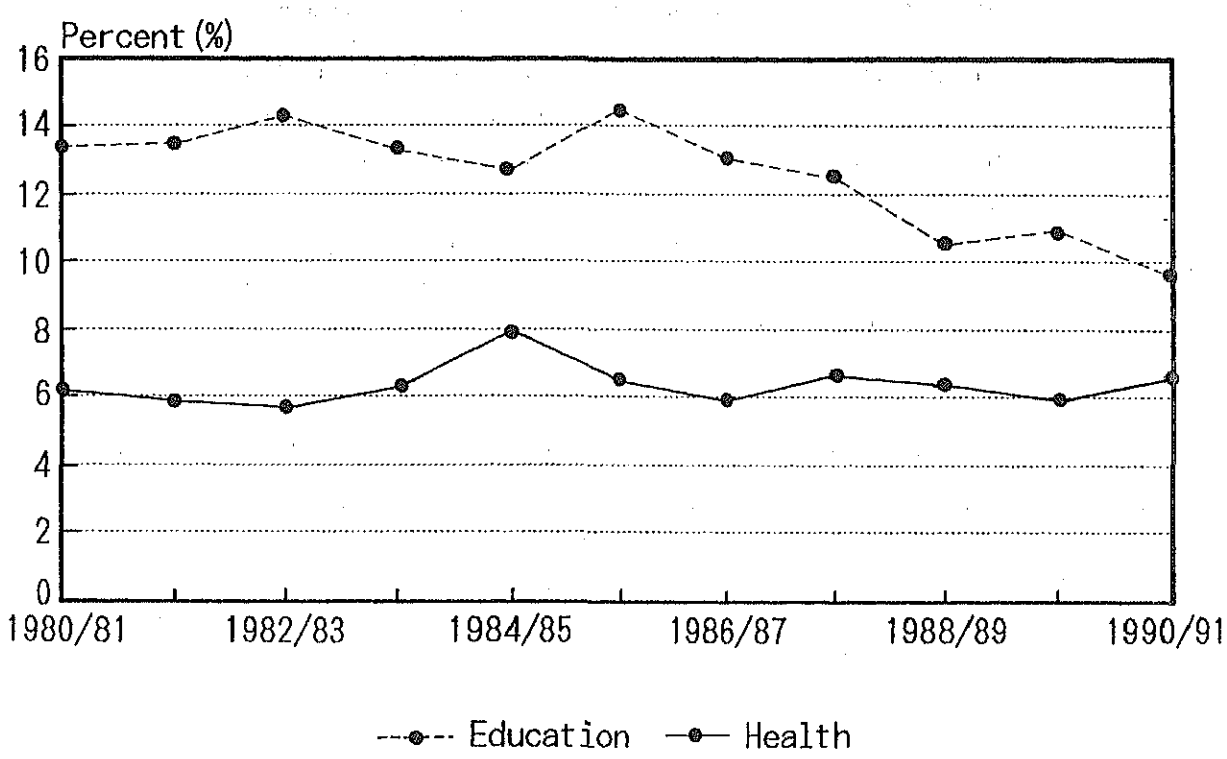
Source: Ministry of Health

Figure I-5 Measles outbreak data — Korogwe district



Sources: Report from District Medical Officer, Korogwe 1990, UNICEF

Figure I-6 Government expenditures on education and health sectors



Source: United Republic of Tanzania, Planning Commission, Economic Survey, Various issues

Table I-1 Health facilities in Tanzania

Health facility	Number	Person in charge
Consultant Hospital	4	Director / Director General
Regional Hospital	17	Regional Medical Officer
District Hospital	129	District Medical Officer
Rural Health Centre	274	Medical Assistant
Dispensary	2,851	Rural Medical Aide

Sources: Ministry of Health, UNICEF

Table I-2 Population served per health facility, by region, mainland Tanzania, 1988

Region	Population 1988	No. of population served per facility		
		Hospitals	Rural health centres	Dispensaries
Tanga	1,283,636	107,000	85,600	6,300
Coast	638,015	106,300	58,000	4,800
Morogoro	1,222,737	111,200	76,400	6,700
Lindi	646,550	92,400	53,900	6,500
Iringa	1,208,914	93,000	75,600	8,600
Ruvuma	783,327	111,900	60,300	6,100
Kilimanjaro	1,108,699	85,300	65,200	8,200
Arusha	1,351,675	112,600	122,900	7,500
Dodoma	1,237,819	206,300	72,800	7,200
Mara	970,942	138,700	88,300	7,900
Rukwa	694,974	231,700	57,900	7,900
Singida	791,814	132,000	66,000	6,500
Tabora	1,036,293	148,000	94,200	9,800
Kigoma	854,817	171,000	85,000	7,100
Mbeya	1,476,199	147,600	86,800	7,900
Mtwara	889,494	177,900	68,400	8,200
Mwanza	1,878,271	170,800	72,200	7,900
Kagera	1,326,183	120,600	110,500	9,000
Shinyanga	1,772,549	295,400	93,300	10,600
Der es Salaam	1,360,850	113,400	226,800	8,800
Totals	22,533,758	132,600	80,800	7,100

Sources: Bureau of Statistics, Ministry of Health, DANIDA

Table I-3 Number of health personnel in mainland Tanzania

Category	1961	1971	1981	1984	1988
Medical Doctor	415	579	950	1,065	1,255
Assistant Medical Officer	32	115	291	482	517
Medical Assistant	200	289	1,589	2,383	3,195
Rural Medical Aide	380	544	2,691	4,601	5,391
Nurse Grade A	388	838	1,717	2,356	2,825
Nurse Grade B	984	2,110	6,070	7,355	8,066
MCH Aide	400	650	2,445	3,432	4,110

Sources: Ministry of Health, UNICEF

Table I-4 Duration of training and current output in health personnel

Category	Duration of training	Current output/Year
Medical Doctor	6 Years	50
Assistant Medical Officer	2	45
Medical Assistant	2～3	312
Rural Medical Aide	2～3	290
Nurse	3	1,205
MCH Aide	2	390

Sources: Ministry of Health, UNICEF

Table I-5 Country disease summary from monitoring stations

Disease	No. of Cases	%
(1) Malaria	420,248	31.4
(2) Upper respiratory infections	152,399	11.4
(3) Diarrhoea diseases	109,674	8.1
(4) Pneumonia	59,141	4.4
(5) Eye diseases	58,882	4.4
(6) Skin diseases	51,939	3.9
(7) Intestinal worms	40,853	3.1

Source: Ministry of Health

Table I-6 Statistics on outpatients at Ismani Rural Health Centre (1990)

Disease	Number of patients
Diarrhoeal diseases	1,021
Malaria	12,694
Measles	18
Acute poliomyelitis	0
Whooping cough	0
Neonatal tetanus	0
Adult tetanus	2
Intestinal worms	481
Skin diseases	732
Nutritional disorders	224
Anaemia	899
Normal pregnancy, minor complex	272
Complex of pregnancy, child birth and puerperium	79
Gonorrhea	194
Upper respiratory infections	3,791
Pneumonias	1,472
Accidents (include burns, fracture)	968
Schistosomiasis	5
Eye diseases	738
Ear diseases	238
Mental disorders	161
All other diagnosed diseases	6,076
Symptoms and ill-defined conditions	6,765
Total new cases	36,859
Reattendances	16,494
Referrals	162

Table I-7 Statistics on inpatients at Iringa Regional Hospital (May, 1990)

Disease	Number of patients	Number of deaths
Typhoid and paratyphoid fever	18	3
Ill-defined intestinal infections	165	2
Tuberculosis	44	1
Measles	120	4
Malaria	501	22
Kwashiorkor disease	24	6
Nutritional marasmus	20	5
AIDS and AIDS-related complex	24	9
Anaemia	149	8
Acute upper respiratory infections	41	0
Pneumonia	87	0
Bronchitis	20	0
Inflammatory diseases of female pelvic organs	21	0
Pregnancy with abortive outcome	67	2
Pregnancy-related condition	42	1
Normal delivery	335	0
Difficult labour	78	1
Disease of the skin and subcutaneous tissue	24	0
Certain conditions originating in the perinated period	20	0
Injury and poisoning	78	0

Table I-8 Statistics on inpatients at Bukumbi Hospital (1989)

Disease	Number of patients	Number of deaths
Typhoid and paratyphoid fever	53	3
Protozoal intestinal disease	65	4
Gastroenteritis	23	2
Tuberculosis	72	3
Measles	14	2
Malaria	767	31
Ancylostomiasis	39	0
Other intestinal helminthiasis	27	1
AIDS and AIDS-related complex	38	21
Burkitt's lymphoma	14	0
Protein-energy malnutrition	31	7
Anaemia	72	6
Sickle cell anaemia	15	3
Heart failure	44	7
Bronchitis / Pneumonia	325	22
Salpingitis	40	0
Spontanous abortion outcome	103	0
Normal delivery	671	0
Injury and poisoning	203	7

Source: Bukumbi Hospital Annual Report (1989)

Table I-9 Infant mortality and under five mortality

Year	Infant mortality (per 1,000 live births)	Under 5 mortality (per 1,000 live births)
1957	190	/
1967	160	260
1978	137	231
1988	104	176

Sources: Ministry of Health, UNICEF

Table I-10 International comparisons of national income and infant and child mortality rates

	GNP per Capita 1988 US $	Infant mortality rate 1988	Under 5 mortality rate 1988
United Republic of Tanzania	160	104	176
Malawi	170	149	262
Bangladesh	170	118	188
Uganda	280	101	169
Nigeria	290	103	174
India	340	97	149
Kenya	370	70	113
Ghana	400	88	146
Sri Lanka	420	21	43
Indonesia	440	68	119
Zimbabwe	650	49	113
Egypt	660	83	125
Colombia	1,180	39	68
Brazil	2,160	61	85
Sweden	19,300	6	7
USA	19,840	10	13
Japan	21,020	5	8

Sources: World Bank, UNICEF

Table I-11 International comparison of life expectancy

	Life expectancy (1987) (Years)
Malawi	48
Bangladesh	52
Nigeria	51
Uganda	52
Ghana	55
United Republic of Tanzania	54
India	59
Kenya	59
Egypt	62
Zimbabwe	59
Indonesia	57

Sources: United Nations, UNICEF

Table 1-12 Coverage surveys 1988 and 1989
Percent immunization coverage

Region	1988 FI	1989 FI	1989 PI	1989 NI
Shinyanga	52	51.9	40.9	7.2
Coast	78	53.4	46.6	0
Arusha	64	54.7	42.8	2.5
Lindi	86	58.8	38.6	2.6
Ruvuma	67	62.3	37.7	0
Mwanza	43	63.9	28.0	8.1
Tabora	55	64.8	35.2	0
Kilimanjaro	82	67.7	32.0	0
Kagera	62	67.8	30.0	2.2
Singida	64	68.6	30.4	1.0
Kigoma	64	68.9	30.2	0.9
Tanga	—	69.6	30.1	0.3
Mtwara	80	74.1	25.9	0
Morogoro	86	75.1	24.9	0
Dodoma	86	79.6	18.4	2.0
Rukwa	57	80.5	19.1	0.4
Iringa	90	82.7	17.3	0
Dar es Salaam	76	84.8	15.1	0.1
Mara	44	88.6	11.0	0.4
Mbeya	88	92.3	7.7	0

Note: FI = fully immunized
PI = partially immunized
NI = not immunized

Sources: EPI-Management Unit, DANIDA

Table I-13 Relative distribution by funding agency per cent

Funding agency	1991	1992	1993	1994	1995
DANIDA	60.0	57.6	56.9	51.6	52.5
UNICEF	16.2	16.1	15.3	16.1	14.9
Government of Tanzania	23.8	26.3	27.8	32.3	32.9
Total	100.0	100.0	100.0	100.0	100.0

Source: DANIDA

Table I–14 Essential drug kit

Analgesics and Antipyretics	Acetylsalicylic Acid Paracetamol
Antacid	Magnesium Trisilicate
Antiasthmatics	Aminophylline Ephedrine Hydrochloride Epinephrine
Anticonvulsant	Phenytoin Sodium Phenobarbitone
Anthelmintic	Mebendazole
Antihistamine	Chlorpheniramine Maleate
Anti-infectives	Benzylpenicillin Sulphamethoxazole and Trimethoprim Metronidazole Procaine Penicillin Phenoxymethyl Penicillin Tetracycline Hydrochloride
Antimalarials	Chloroquine
Antispasmodic (Colic pain)	Belladonna Extract
Eye Preparation	Tetracycline Eye Ointment
Haematenics (Anaemia)	Ferrous Sulphate Folic Acid
Local Anaesthetic	Lignocaine Hydrochloride
Oxytocics (Preparation Action on the Uterus)	Ergometrine and Oxytoxin
Rehydration	Oral Rehydration Salts
Topical Preparation (Skin Diseases)	Acriflavine Powder Benzoic Acid and Salicylic Acid Ointment Benzyl Benzoate Emulsion Chlorinated Lime and Boric Acid Powder
Tranquillizers	Chlorpromazine Diazepam
Vitamin A deficiency	Vitamin A

Table I–15 Total central (mainland) government expenditures for health (1980/81–1988/89)

	75/76	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89
Total Government Health Expenditures (Current TSh million)	406.0	926.7	1,078.2	1,068.1	1,205.5	1,816.2	1,943.7	3,256.2	4,660.6	6,567.5
Total Government Health Expenditures (Constant 75/76 TSh million)	406.0	535.0	529.6	434.7	403.4	473.6	385.5	489.1	541.5	600.9
Total Government Health Expenditures Per Capita (Constant 75/76 TSh)	24.8	29.4	28.4	22.5	20.4	23.2	18.4	22.7	24.5	26.4
Population (Mainland) (million)	16.4	18.2	18.7	19.3	19.8	20.4	21.0	21.5	22.1	22.8

Sources: Ministry of Health, UNICEF

Table I-16 Ministry of Health 88/89 development budget (TSh million)

	Local Funding	Foreign Funding	Total
Preventive Services			
Malaria Control	10.0	—	10.0
Vector Control	8.0	—	8.0
Nat. Inst. for Med. Research	15.0	50.0 (WHO)	65.0
Primary Health Care Prog.	5.5	—	5.5
MCH Programme	23.0	5.0 (FRG)[2]	28.0
EPI Programme	9.0	200.0 (DANIDA)	209.0
Diarrhoeal Control Programme	4.0	200.0 (WHO)	204.0
AIDS Control Programme	5.0	140.0 (WHO)	145.0
Other Diseases	6.0	—	6.0
Housing (KIA)	1.6	—	1.6
	87.1	595.0	682.1
Curative Services			
Rehab. of National Hosp.	6.0	—	6.0
Eval. of Health Services	2.5	—	2.5
Dental Programme	9.5	—	9.5
Muhimbili Medical Centre	35.9	—	35.9
Mental Illness programme	5.0	—	5.0
Essential Drugs Programme	5.0	250.0 (DANIDA)	255.0
Central Chemical Lab.	21.0	—	21.0
TFNC	14.4	4.0 (Sweden)	18.4
Mbeya Referral Hospital	13.3	—	13.3
Mirembe Hospital	10.0	—	10.0
Central Medical Stores	7.2	—	7.2
Zonal Medical Stores	12.5		12.5
	142.3	254.0	396.3
Training	26.5	—	26.5
Subtotal-Health	168.8	849.0	1,017.8
Social Welfare[2]	30.0	—	30.0
Grand Total	285.9	849.0	1,134.9

[1] Including UNICEF contributions for purchase of vaccines
[2] Transferred to Ministry of Labor in March 1988

Source: Ministry of Health Budget, 1988/89

II. Present Status of Infectious Diseases and Their Control

1. General Aspects

Because of its geographical situation, Tanzania is heavily suffered by various infectious diseases which are not only microbial but also parasitic such as malaria, filaria, amoeba, etc. Moreover, the poor sanitation systems of water supply and night soil treatment of this country accelerate the wide and rapid dispersal of water-mediated infectious diseases such as cholera, amoebic dysentery, etc. In recent years, invasion and spread of AIDS has become the most serious concern in terms of not only the health but also the development of the country. The scarcity of budget and manpower is the main constraint in the health management in this country.

Because of deficiency of notice system of birth and death, the available and believable data on the population of this country are very few even in the medical field. According to the tentative statistical information from 1,176 monitoring stations widely distributed in the country, malaria is most abundantly found in about 1/3 of all patients. Upper respiratory infections, diarrhoea, and pneumonia follow it. Beside these infectious diseases, eye and skin infectious diseases are also prevalent. Although the specific identifications are uncertain, intestinal parasites are also widely distributed.

2. EPI Related Diseases and Immunization

As previously stated in the paragraph 7. of 1, vaccination is adopted to the prevention of 6 diseases viz., measles, tuberculosis, poliomyelitis, tetanus, diphtheria, and pertussis. Positive effects are remarkable in almost of these diseases except for tuberculosis which is apparently increasing probably by the opportunistic recurrence in relation to the spreading of AIDS. This increase, however, does not inhibit the positive evaluation of the vaccination.

3. Bacterial Diseases

3.1. Cholera

An epidemic of cholera broke out in Dar es Salaam region from November 1990 through January of this year. Five hundred people

contracted the disease, and about 70 died. Eighty to ninety percent of cholera cases can be treated by Oral Rehydration Salts (ORS) alone. However, in severe cases intravenous infusion is necessary. In recent years tetracycline-resistant *Vibrio cholerae* has repeatedly isolated. Sulfamethoxazole-trimethoprim, erythromycin and chloramphenicol are thought to be effective against these. Thus eradication of *Vibrio cholerae* is not all that difficult. The most important factor in the prevention of the cholera epidemic is improving environmental hygiene, especially the cleanliness of the water supply and sewage.

A research study of a cholera epidemic in Butiama in the Mara region in 1986 (67 cases, including 11 deaths) failed to detect *Vibrio cholerae* in water or fish scales, but nevertheless suggested that the cooking and eating of fish was a major route of infection.

3.2. Plague

Plague was introduced to Tanzania from Uganda and Kenya about a century ago. It was spread by slave and ivory traders and inter-tribal warfare. Epidemics of the plague have broken out in Kagera, Mwanza, Mara, Shinyanga, Arusha, Kilimanjaro, Singida, Iringa, Coast and Zanzibar. In the Lushoto area, plague occurs frequently in recent times, whereas it had never seen until 1980. The disease seems to have been brought by merchants from villages in southern Kenya where it was endemic at the time. It has grown steadily worse since then. No abatement has been observed in spite of the repeated implementation of such countermeasures as DDT disinfection, and it continues to spread to more and more villages (Table II-1). In the first month and a half of this year 33 people died and 727 people were infected. According to a serological survey of the Lushoto area agglutinin titre against *Yersinia pseudotuberculosis* subsp. *pestis* was present in 0.7% of the population and 6.6% of rodents.

The reasons measures to prevent infection have been ineffective are as follows:

1. Measures to exterminate fleas and rodents were not adequate.
2. Cases of plague were not promptly reported since deaths occurred at home.
3. The plague could not be contained and spread to numerous villages.

4. Traditional customs. In Lushoto morbidity was higher among women and children than among men. This is because men customarily sleep in beds while women frequently sleep on the floor and are thus more susceptible to flea bites. Moreover, since the plague is believed to be the work of evil spirits victims often visit the medicine man before undergoing a proper examination by a doctor, and thus treatment is delayed.

5. People believe that measures to prevent infection are the responsibility of the government and do not readily participate in programmes.

6. The existence of other sources of infection. It is possible that other wild or domesticated animals carry *Yersinia pestis*, or that the strains in Lushoto have survived in the soil over a long period.

In conclusion, a plague surveillance and research system needs to be established.

3.3. Meningococcal Meningitis

The annual incidence of meningococcal meningitis is given in Tables II-1 and II-2. The most recent outbreaks of meningococcal meningitis were those in the Arusha, Kilimanjaro and Tabora regions between June and November of last year. 1216 people were infected and of those 97 died.

The chief factors behind the outbreak of meningococcal meningitis are:

1. The movement of people.

The spread of the disease is related to the movement of people for travel or commerce.

2. The climate.

It is a peculiarity of the epidemic that it disappears from November through June and breaks out again once the dry season begins.

3. Low immunity.

The epidemic strains mutate every year, and it is apparently difficult to develop immunity.

4. The infection rates of different villages.

Infection rates differ from village to village, which suggests the existence of different routes of infection in different areas.

5. Fatality.

Unfortunately no decrease can be observed in the fatality rate (Table II-3).

6. Age distribution.

Infection among infants is noticeable (Table II-4). This is related to the pyramid shape of the country's population structure.

7. Superstition.

Normally penicillin G or chloramphenicol is used in curing the disease. Antibiotics are essential to treatment, but there are usually delays in undergoing medical examinations by a doctor because of lack of awareness and poor transportation facilities. Hence many people die before receiving treatment. In spite of the high literacy rate many Tanzanians believe that this disease is the work of evil spirits.

8. Antibiotics.

Stocks of antibiotics tend to run out because they are used up rapidly in epidemic areas.

The following recommendations can be made:

1. Awareness of this disease throughout society needs to be increased. With this end in mind the government should confront the belief in evil spirits on the radio and in the classroom.

2. Efforts should be made to improve living conditions by putting in enough windows and preventing overcrowding of rooms.

3.4. STD

Between 1976 and 1978 a survey was made of 85,747 outpatients at four facilities in Tanzania to find how many were infected with STD. The rate of infection was 15 per 1000, and the ratio of males to females was 5:1. Over 75% of those infected were 30 or under. The peak age among females was 15-19 and among males 20-24. The major sources of infection were for males barmaids and for females their husbands (Tables II-1, 2, 3 and 4).

The proportion of genital ulcer diseases such as soft chancre and syphilis is on the increase in Mbeya, Dar es Salaam and Bukoba regions. According to a 1986 report the syphilis morbidity rate among pregnant women in Mbeya was 16.4% (5.2% in Dar es Salaam) and that among outpatients was 13.2% (3.7% in Dar es

Salaam), giving an overall rate of 15.1%. Congenital syphilis morbidity also reportedly remains high.

According to a report from a dispensary in the outskirts of Dar es Salaam 52% of *Neisseria gonorrhoea* are resistant to penicillin. These strains are still said to be susceptible to sulfamethoxazole-trimethoprim.

3.5. Childhood Diarrhoea

According to a report by Changalucha, when the faeces of 249 infants five and under (130 with and 119 without diarrhoeal symptoms) were cultured and the isolation rate of *Campylobacter* examined, *Campylobacter* was detected in the case of 15 out of the 130 patients who showed diarrhoeal symptoms (11.5%) and 9 out of 119 patients who did not (7.6%). This suggests that *Campylobacter* is an important causative organism of infant diarrhoea.

3.6. Diphtheria, Tetanus and Pertussis

The incidence of these diseases has been reduced as a result of the EPI.

3.7. Tuberculosis

There were 19,516 new tuberculosis patients in 1989 (7.2% more than in the previous year). An increase in the cases of tuberculosis (of all types including non-pulmonary tuberculosis) has been observed since 1982. This appears to be due to the influence of AIDS, judging from the fact that tuberculosis morbidity is rising in areas where the HIV (human immunodeficiency virus) infection rate is high. A rise in tuberculosis morbidity is also to be seen among young females and slightly older males, and this too coincides with high rates of HIV infection among these groups.

Diagnosis: Most established diagnoses of tuberculosis through sputum culture etc. are made at hospitals (94%), and only a few are made at other medical facilities (4% at health centres and 1% at dispensaries).

Therapy: Combined use of streptomycin and isoniazid is effective in over 90% of cases, and instances where rifampicin is required are rare.

In urban areas and some outlying regions streptomycin and pyrazinamide are in short supply because they can be obtained only through donations.

Hospitalization: All tuberculosis patients undergoing short-term chemotherapy are hospitalized for free.

In urban areas such as Dar es Salaam there is a shortage of hospital facilities for tuberculosis patients. The only place in Dar es Salaam where tuberculosis patients can be hospitalized is Muhimbili Medical Centre (120 beds). However, there are 3050 cases of tuberculosis in the Dar es Salaam area, of which the majority are critical ones involving patients who are also infected with HIV.

After patients have been released from hospital follow-up treatment is provided by health centres and dispensaries.

3.8. Leprosy

The total number of leprosy cases in 1989 was 5840. Of these 3066 (53%) were multibacillary. The number of new patients in 1989 was 3319, and the morbidity rate was 13.6 per 100,000. No upward trend is to be observed in the number of leprosy cases. In 5296 cases (91%) MDT (multiple drug therapy) was provided. Therapy was effective in 65% of the cases. There were 339 instances of recrudescence in 1989.

A total of thirteen hospitals throughout Tanzania are able to provide in-hospital treatment to leprosy patients.

There is no shortage of drugs for treating leprosy.

Early diagnosis and treatment are important to the prevention of physical impairment (visual impairment etc).

At present there is no trend toward occurrences of leprosy in conjunction with HIV infection.

3.9. Other Bacterial Diseases

The table summarizes the main characteristics of isolates as observed in Muhimbili Medical Centre.

Urinary tract infection: The main clinical isolates are *Escherichia coli* and *K. pneumoniae*, and ampicillin, sulfamethoxazole-trimethoprim and gentamycin are used in treatment.

Respiratory tract infection: The major isolates are *S. pneumoniae* and *S. pyogenes*; *H. influenziae* is rare. The drugs used in treatment are penicillin G, ampicillin and amoxicillin.

3.10. Outstanding Problems in Bacterial Diseases

(i) The clinical laboratory system is poor (especially in rural areas), so rapid diagnosis before symptoms worsen is difficult.

(ii) Since there are virtually no resistant bacteria other than *Vibrio cholerae* and *Neisseria gonorrhoeae*, treatment should not be that difficult as long as enough antibiotics are made available. Therefore the problem is with the transportation of patients and supply of drugs.

4. Viral Diseases

4.1. Rabies

Sporadic outbreaks of rabies are observed in the Iringa and Kilimanjaro regions. Other animals as well as dogs are the source of the disease. A pilot study is underway at Ukerewe Island in Mwanza on the possibility of exterminating rabies by administering human rabies vaccine to dogs, but this has run into problems of funding for the supply of vaccine.

4.2. Poliomyelitis and Measles

The incidence of these diseases has been reduced as a result of the EPI (Figure II-4). It is reported however that measles infection, like herpes simplex, is a major cause of infant corneal ulcers (which may result in loss of sight).

4.3. Childhood Diarrhoea

According to a report by Elisifa, when the human rotavirus (HRV) infection rate among 99 infant diarrhoea patients in Dar es Salaam was tested 43.4% tested positive, indicating a correlation between the presence of HRV in the faeces and the severity of diarrhoea. There was furthermore a significant increase in serum anti-HRV IgG in those patients whose faeces tested positive. Breast milk had no recognizable preventative effect against HRV infection. Nor was HRV infection related to the weaning period or baby food.

4.4. Yellow Fever and Lassa Fever

There have been no reported cases of these diseases in recent years.

4.5. AIDS

People who have tested positive for HIV antibodies and AIDS patients are both increasing noticeably each year.

A National AIDS Control Programme (NACP) is being implemented by the Ministry of Health.

Phase 1 of the programme (April 1988-December 1989) has been completed, and Phase 2 started in January of 1990. The 1990 budget for the NACP was $3.75 million (although $7.47 million was requested). The 1991 budget is $4.58 million.

AIDS Patients: The major symptoms of AIDS are chronic diarrhoea, fever and weight loss. Tuberculosis is a common complication, but in Tanzania *Pneumocystis carinii* pneumonia and Kaposi's sarcoma are rare. The main route of infection is heterosexual intercourse (over 90%), although there are also cases of vertical infection and infection through blood transfusions. There are virtually no cases of infection through homosexual intercourse. Generally AIDS develops about seven years after seroconversion, and death occurs about two years later.

The cumulative number of cases since 1983 is 16,250. Patients between 15 and 44 account for 87.7% of the cases (this age group comprises 39% of the population). Moreover, 3.7% of patients are infants up to age four (19.9% of the total population); these cases are probably due to vertical infection. Females show a slightly lower age distribution than males.

HIV Infection: The charts and figures give the HIV infection rate among blood donors and pregnant women.

Epidemiologically two groups are of particular interest, pregnant women and young people.

The proportion of pregnant women receiving obstetrical examinations who tested positive for HIV increased from 10% to 16% in the Mbeya region and 8% to 14% in the Mwanza region. Because 30% of the children born to HIV-positive mothers die within two to three years of birth this has a considerable effect on the infant mortality rate. It is forecast that up to 5% of newborn

children in Mwanza and Mbeya will die of AIDS. And of those children who escape HIV infection approximately 11% will lose at least one parent within ten years. The situation is believed to be largely the same in other regions.

In the case of young people, there were no positive tests for HIV in the 15 to 19 age group in 1987, but this had changed to 7.2% by 1990. The proportion of positive tests in the 20 to 24 age group increased from 1.6% in 1987 to 8.2% in 1990. Even if the spread of HIV ceases, it is believed that virtually all the estimated 800,000 people who carry the virus will develop AIDS within ten years.

Problems with HIV Testing: Only blood donors are regularly tested for HIV, although occasionally the test is administered to pregnant women and people in good health for research purposes. Those who test negative for HIV antibodies may be informed of the results, but notification is difficult if the test is positive. This is because:

1. A corroborative test is required using Western blotting, but this is extremely expensive and is not performed except in research.
2. There is no counselling system to deal with the psychological effects on the patient.

As shown in Table II-6, awareness of AIDS is high. The fact that the rate of HIV infection has not dropped in spite of this appears to be due to the failure to modify sexual behaviour.

Orphans of AIDS in Kagera Region: Kagera region is located on the border with Uganda and has a population of 1.33 million. The first case of AIDS in Tanzania was discovered here in 1983, and since then the number of cases has increased rapidly. Deaths from AIDS have orphaned a large number of children, resulting in a major problem. In 1990 11,500 children were orphaned, and at the present rate the total figure may reach 300,000 by 1995. For this reason the Kagera Orphans Trust Fund has been set up to solicit aid from the world. Its address is as follows:

The Kagera Orphans Trust Fund,
P.O. Box 299,
Bukoba, Tanzania

5. Parasitic Diseases

5.1. Malaria

This disease is very common in the tropical and temperate zones of the world, and about 8 million people suffer from this disease (Table II-23). Among the four *Plasmodium* Species attacking humans, *P. falciparum* is the most malignant and dominant (90%) pathogen in Tanzania with a little coexistence of *P. malariae.* The other two, *P. vivax* and *P. ovale* are almost absent.

The Ministry of Health of Tanzania is energetically endeavoring to control this severe disease by progressing the Malaria Control Programme. As a control strategy, in cooperation with Japan since 1988, a mosquito control project has been performed at Dar es Salaam and Tanga. Phase II has been completed and continued by Phase III which was recently signed between Tanzania and Japan. An official report has been published on this project in 1990. The control of mosquitoes is, however, very difficult in rural area where various and many water sources are distributed and many of them are used for the life water by the inhabitants nearby. Moreover, the appearance of insecticide-resistant strains decreases the effect of the control. Although the use of mosquito nets is recommended for individual protection from the mosquito bite, it is not so widely distributed because of the fragility of Tanzanian-made nets and the expensiveness of imported ones.

Referring to the 1990 official report, the present status of malaria in Tanzania mainland is as follows.

The percentages of malaria patients are about 10-15% of outpatients and 10% of inpatients in city hospitals and are 28-30% of the total outpatients in rural health centres and/or dispensaries. About 5% of inpatient deaths were due to malaria. Ninety per cent of the patients are infected by *Plasmodium falciparum* and the rest by *P. malariae*.. Mixed infection of these two is also abundant. The other two human malarial pathogenetic species, *P. vivax* and *P. ovale* are almost absent in Tanzania. In Figure II-15 are demonstrated the annual fluctuations of death rate of malaria patients (A), percentages of malaria patients in the total inpatients (B), in the total deaths (C), and in the total outpatients (D).

The principal vectors of malaria in Tanzania are *Anopheles gambiae* and *A. funestus*. Both species are not easily amenable to control. Since the endemicity for malaria is a key factor for consideration in the malaria control, the classification is elaborated hereunder: (a) Hypoendemic area with less than 3 months transmission. There are areas where there is little transmission and the effects of malaria on the general public are unimportant. These include areas at higher altitude about 2000m above sea level where temperatures do not exceed 20°C. Usually there are no malaria cases in the general population. However, malaria may occur in epidemic forms when there are environmental and climatic changes. Areas under this category include some parts of Mbeya, Iringa, Usambara mountain areas of Tanga and Kilimanjaro regions. (b) Mesoendemic ones with up to 3 months transmission. There are areas at higher altitudes along the East African Rift Valley or mountain areas with temperatures of 10°-20°C and mean annual vapour pressures of 13 - 15 millibars. They include some parts of the Arusha region such as lake Manyara. Mto wa Mbu (the "river" of mosquitoes), Ngorongoro, Loliondo, Serengeti in the Mara region, some parts of Kagera and Kilimanjaro regions. (c) Hyperendemic ones with 3 to 6 months of transmission in a year. These are areas with intense but seasonal transmission and where the immunity is insufficient to prevent the effects of malaria on all age groups. They are plains at a higher altitude than the coastal areas explained above, with temperatures above 15°C and mean annual vapour pressures of 10-20 millibars. Transmission is intense but seasonal, producing ill effects in all age groups during the transmission season. Regions under this category are Dodoma, Singida, Ruvuma, Mbeya, Tabora, Shinyanga, Mwanza, Kigoma, Rukwa, and some areas of the Arusha region. (d) Holoendemic ones with 6 to 12 months transmission. Perennial transmission of high degree, resulting in a considerable degree of immune response in all age groups, but particularly in adults. All regions along the coast extending to as far as 160-240km inland, temperatures of 24-32°C year around and mean annual vapour pressures of 26-29 millibars fall in this category. They include Tanga, Coast, Lindi, Mtwara, Dar es Salaam, and Morogoro regions. Other parts of some regions may fall in this category. At least 75% of children aged 2-9 years have malaria parasites at any one time in

these areas. Although the range of age is not clear, the percentages of malaria incidence surveyed in children of 6 towns in Tanzania are shown in Table II-24.

As a reference, malaria morbidity of JOCV members is shown in Table II-25 as an example of such persons who came from a non-endemic country inhabiting endemic areas for a certain duration.

5.2. Sleeping Sickness

This is also an important disease of a high mortality. Its pathogenic organism are two subspecies of the *Trypanosoma brucei* complex, *T. b. rhodesiense* and *T .b. gambiense*. The former giving rise to more severe symptoms is distributed in Tanzania and other neighbouring East African countries. The role and importance of tsetse fly (the genus *glossina*) as the vector of this disease have been well known since the 19th century. The tsetse flies distributed in Tanzania and neighboring countries are summarized in Table II-26. As is clearly seen in the Table, not all the flies participate equally as the vectors of the disease. In Tanzania, five species including *G. palpalis*, *G. fuscipes*, *G. morsitans*, *G. pallidipes* and *G. swynnertoni* are known to be the vectors. The first four are considerably widely distributed in Africa, whereas *G. swynnertoni* alone is the exception and restrictedly inhabits only the northeastern part of Tanzania and the neighbouring area of Kenya. The number of patients, however, is not regarded to be as significant according to our impression. The disease is known to be distributed mainly in Kigoma and Rukwa regions and also in the western part of Kagera, Mwanza, Shinyanga, Tabora and the northern part of Mbeya. Some other endemic foci are known in certain localities in Morogoro and Ruvuma. and border areas in Lindi, Mtwara and Ruvuma regions. Some countermeasures will be necessary against this disease in the future.

5.3. Leishmaniasis

This disease is caused by *Leishmania* spp. and *L. aethiopica*, *L. donovani*, *L. major*, and *L. tropica* are known to be distributing in the tropical and temperate zones of the Old World. In Tanzania, however, only one human case supposed to be infected by *L. major* had been reported from the central area in 1964 and then no record has been added. Therefore, this disease is considered not to occur.

In the neighbouring countries, many visceral (by *L. donovani*) and cutaneous (by *L. aethiopica*) leishmaniases have been reported from Kenya which seems to be an endemic area. From other countries such as Uganda, Rwanda, Zaire, Malawi, Zambia, and Mozambique, only a few cases were sporadically reported.

5.4. Amoebiasis

Prevalence of an injurious amoeba, *Entamoeba histolytica*, is not rare, but no special attention is paid to this and the disease, amoebic dysentery, caused by it.

5.5 Other Protozoan Diseases

Although *Giardia lamblia* is said to be seen rather commonly, apparently no special treatment is performed probably due to its mild pathogenicity and absence of troublesome symptoms. As shown in Table II-16 giving the results of tests in Muhimbili Medical Centre, *Trichomonas vaginalis* was found in swab specimens from the urogenital system together with other coexisting bacteria. Its positivity rate is highest in vaginal and cervical swabs (199/1594= 12.5%) as expected, but rather low in samples from urethral swabs (14/729 =1.9%), and even lower in urine by microscopy and culture (118/16793=0.7%). These results appear reasonable since the main aim of the study was directed to the search for bacterial pathogens.

Because there was no reliable data on the general prevalence of intestinal protozoa in inhabitants of Tanzania, results of fecal examinations on JOCV members who stayed in Africa etc. are shown in Table II-27. The three items on the left (A, B, and C) are not the protozoan, but the helminthes.

5.6. Schistosomiasis

Among the human blood flukes, *Schistosoma haematobium*, mainly infesting the veins of the urinary system, is known to be widely distributed in Tanzania (Figure II-16), along with coexisting *S. mansoni* infestation of the portal vein (Figure II-17) in some areas. In neighboring Zaire, located across Lake Tanganyika, the occurrence of another congeneric related species, *S. intercalatum* (Figure II-17), is also known (Table II-28). *S. haematobium* prefers the cone-shaped snails of the genus *Bulinus*, *B. nasutus*, *B.*

globosus and *B. africanus*, whereas *S. mansoni* prefers the flat disc-shaped snails of the genus *Biomphalaria, B. sundaica, B. pfeifferi* and *B. choanomphala* as their intermediate hosts. The cercariae swim out from these snails and *per cutan* invade mammals entering the water and establish the infection. Scarcely any danger for infection therefore exists in large cities and areas equipped with water treatment facilities. In the suburban and rural areas where water from natural ponds and rivers is used untreated for daily life or where people swim in it, the infection occurs frequently. In the coastal regions, *S. haematobium* is virtually the sole pathogen. In the inland areas, especially those adjacent to large masses of water such as Lake Victoria like Mwanza region, *S. mansoni* infests a considerably larger number of patients than in other regions because numerous vector snails of both genera are distributed not only in the lake itself, but also in rivers flowing into it. In the branch of NIMR in Mwanza, a laboratory for *Schistosoma* conducts surveys on the infestations of the snails and experimental infections of mice. In the near future, a Schistosomiasis Control Programme is said to be planned by the Ministry of Health, Government of Tanzania. Procurement of Praziquantel, a drug once found to have pronounced effects as a therapeutic agent, is strongly desired.

Though it is said that eradication of these intermediate host snails is the best method to eliminate the blood flukes, attempts to eradicate all snails in a wide area which is the source of water for daily life may lead to environmental disaster. Since these snails are distributed throughout almost all of Tanzania, the budget required for river improvement and destruction of the snail habitat is large and makes success in a short period impossible. In the present circumstances, as the first step for the prevention of schistosomiasis, the danger of natural fresh water in these areas should be taught to the inhabitants and attempts should be made to emphasize preventive measures centring on individual hygiene.

5.7. Lymphatic Filariasis

One of the pathogenic species of human lymphatic filariasis, *Brugia malayi*, does not occur in this country. Only *Wuchereria bancrofti* is distributed throughout the eastern coastal areas facing the Indian Ocean, accounting for up to 50-80% of the prevalence.

Patients suffering from severe elephantiasis seem to be scarce. Utilising the residual spray of insecticides, attempts are in progress to control *Culex* and *Aedes* which mainly transmit the filariae together with *Anopheles* which is the important vector of malaria.

McMahon *et al.* (1981) revealed that *Culex pipiens quinquefasciatus*, *Anopheles gambiae*, and *A. funestus* are the vectors of *Wuchereria bancrofti* in four villages (Moa, Tawalani, Kwale, and Machui) in Tanga region. They also reported the prevalence rates of hydrocele, and scrotal and leg elephantiases as shown in Table II-29.

Although it is, of course, impossible to give the entire picture of the prevalence of the Bancroftian filariasis in Tanzania from these data, it is considered to be inevitable that promotion of the control programme has been belated because of its low fatality and low percentages of elephantiasis.

5.8. Onchocerciasis

It is very difficult to eliminate the vector gnats (*Simulium* spp.) from their habitats, various rivers which are used for the water source by the inhabitants. The vectors of the onchocerciasis in Africa belong to two species complexes, the *S. damnosum* complex and *S. neavei* group. Both of them are composed of very closely related sibling species.

In Tanzania, there are many foci of infection at altitudes between 500 and 1500m along a line from the Usambara mountains in the northeast to Lake Nyasa in the south. Blindness prevalence rates range from 0.7% to 1.0% in villages with medium and low endemicity; these rates do not differ from those observed in villages without this disease. Hyperendemic foci probably do not exist in this country.

In several countries surrounding Tanzania, there are seen various degrees of endemicity as follows.

Kenya. The last remaining focus of this disease was on the slopes of Mt. Elgon (4321m), but no cases were found during a small survey carried out in 1975. The possibility of recrudescence of transmission still exists.

Uganda. There is still widespread infection at the Mt. Elgon focus. Other probable foci of infection include Budongo, Bugoma, West Nile, Ruwenzori, Kigezi, and Kabarega National Park. It is not

known whether infection has returned to the area around the Nile below the dam where the transmission was eliminated in 1973.

Rwanda. No patients have as yet been recorded.

Burundi. The disease is confined to the southern, less-populated parts in the Ruzizi valley and along the shores of Lake Tanganyika. New foci have been discovered in Bururi and Bubanga provinces.

Zaire. Infection is widespread over most of the country except for the Shaba region in the south and the north of the Bandundu region. High prevalence rates are found in the east and west Kasai, central and southern Equateur, Bas-Zaire, and along the rivers of Haut-Zaire. A high prevalence of blindness (6.5-8%) is found in some hyperendemic areas such as the diamond mining region of Sankuru.

Zambia. A single, apparently autochthonous, case has been recorded in a child from southern region (if confirmed, this would represent the southernmost focus of this disease).

Malawi. The principal focus is in the Thyolo district in the south; satellite foci probably also occur.

Mozambique. This country is wholly outside of the distribution of this disease.

Populations of these countries are summarised in Table II-30.

In addition to the above findings, the distribution of onchocerciasis in Africa is summarized in Figure II-18.

Information on the vector gnats may be outlined as follows.

In Africa and the Arabian Peninsula, only one species, *Simulium damnosum*, was thought to the vector of the onchocerciasis. At present, however, many closely related species which are collectively called *damnosum* complex, discernible from each other based only on chromosomal characteristics and isozome constituents, are known to participate in the vector insects. Figure II-19 summarizes the data on the African Continent. In eastern and central Africa, the *S. neavei* group also take part as vectors. The classification of these gnats, however, is still incomplete and requires further study. Table II-31 summarizes the species of *S. damnosum* complex found in Tanzania and surrounding countries. As to *S. neavei* group, several sibling species are found to be distributed over the eastern African Continent from Ethiopia in the north to Malawi in the South and Cameroon and Liberia in the west. In the western part of Africa,

however, no vector species is found in the *neavei* group (Figure II-20).

Tanzania. The *damnosum* complex has a restricted focal distribution in an arc-like chain of upland areas from the eastern Usambara Mountains (Amani area) near the Kenya border in the north-east to Tukuyu valley near the Malawi and Mozambique borders in the extreme south. Two named species, *S. kilibanum* and *S. mengense*, and 11 unnamed sibling species or cytotypes have been recorded with varied distribution. "Sanje" sibling is comparatively studied. In Usambara and Nguru Mountains, however, *S. neavei* group is dominant for the transmission of this disease. *S. woodi* is the vector in the Usambara Mountains. Elsewhere in the country, man-biting members of the *S. neavei* group may be a form of *S. nyasalandicum* or an undescribed species. *S. neavei* (s. str.) has not been recorded in this country.

Kenya. This is a unique country in having eradicated *S. neavei*, which is believed to have been the sole vector of this disease. Its eradication from 40000km^2 in the western parts by DDT larviciding was completed by 1956. No cases relating to *S. damnosum* group have been known.

Uganda. *S. neavei* (s. str.) has been identified in 7 foci of the disease situated within the periphery of this country. In all 7 areas, except possibly Ruwenzori, it has been found to contribute to transmission. In the Budongo Forest focus near Masindi, *S. neavei* (s.str.) was apparently eradicated by 1962 by a process of attrition. In the Mt. Elgon, Bugoma Forest, Imatong Mountains, and possibly West Nile foci, *S. neavei* (s. str.) in the only known vector.

Burundi. *S. kilibanum* of *damnosum* group is present in rivers south of Bujumbura.

Zaire. *S. damnosum* complex is widespread in all areas of the country. The *S. squamosum* subcomplex has been confirmed both near and 200km to the north-east of Kinshasa. The following 9 putatively new species based solely on morphology have been described: *S. microlepidum, S. maertensi, S. repertum, S. wambanum, S. luadiense, S. nganganum, S. buisseti, S. juxtadamnosum,* and *S. kilibanum.* These premature formal descriptions without cytotaxonomic evidence elucidate nothing and create confusion. *S. neavei* (s. str) is also transmitting the disease.

Some records of *S. neavei* (s. str.) are more or less doubtful on the specific identification. More detailed field and faunal surveys are necessary in this country.

Malawi. *S. damnosum* complex is widespread, but its competed distribution has not yet been studied and mapped. On the Thyolo Highlands endemic area, however, breeding distribution has been mapped and the existence of three cytospecies have been confirmed — a "Ketaketa" group from the Linthip river, and "Nyamagasani" (= *S. kilibanum*) and "Sanje" group from the Nkudzi river. Among the *S. neavei* group, *S. nyasalandicum* and *S. woodi* were originally described from this country but little studied until 1960. The latter species has become uncommon probably as a result of deforestation.

5.9. Echinococcosis (Hyadatidosis)

This is caused by the infection of the liver and/or other organs with the larval *Echinococcus* belonging cestodes. The definitive hosts are carnivores, such as dogs, and herbivores, such as sheep and goats, as well as humans serve as the intermediate hosts. This disease, therefore, tends to occur in tribes which engage in pasturage and mainly eat meat. In the Turkana district of northern Kenya, a considerable number of patients have been discovered even among tribes mainly engaged in agriculture. Based on these facts, a survey was conducted on Maasai by consulting at a hospital in Wasso located in the northwestern part of Arusha Region, Tanzania. Prevalence in humans was reported at a lower level than in dogs and other domestic animals. The service area of this hospital covers approximately 250 km^2, with a population of about 80,000 Maasai. Surgical operation was started at this hospital in 1968 and the operative records preserved from the beginning of the surgical service are summarized in Tables II-32 and II-33. Ultrasonic and serological examinations were subsequently conducted on Maasai inhabitants in the Soit Sambo area, with the results shown in Table II-34. Four dogs kept as domestic animals were autopsied and three of them were found to be infected with the cestode. Administration of anthelminthics in six dogs revealed the infection in two. Moreover, all dogs examined or treated were infected with *Taenia* spp. (specific names uncertain).

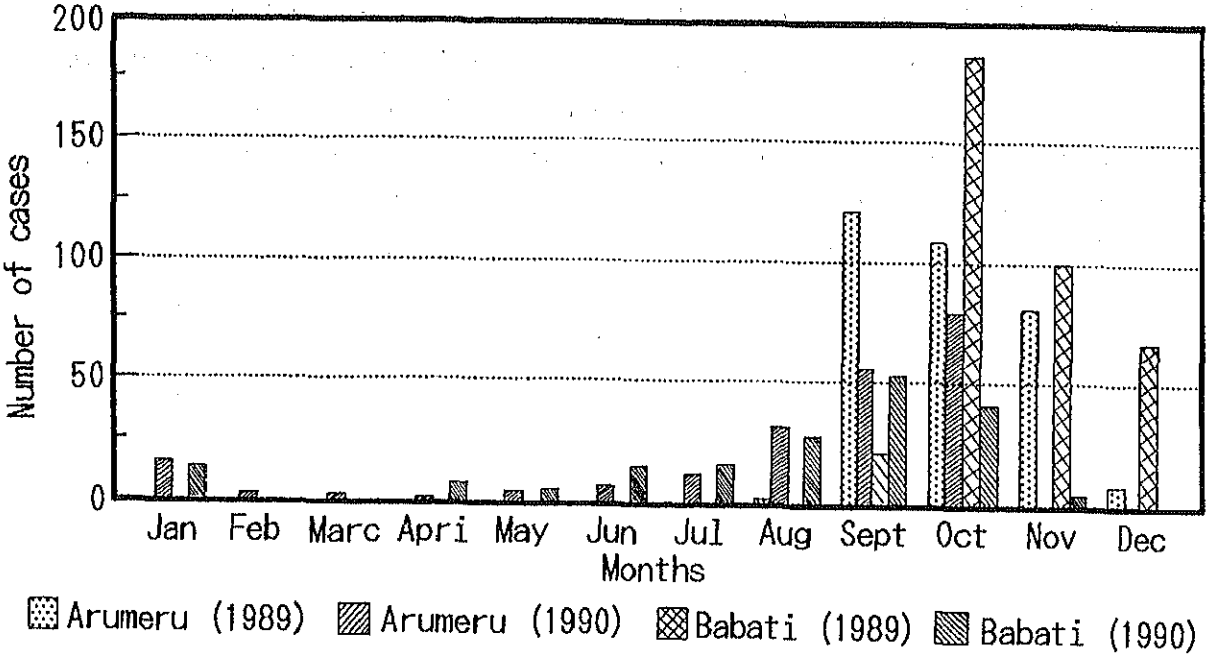
Human infection with *Echinococcus* occurs by oral intake of ova excreted in the faeces of dogs, the definitive host. Then, soil collected from the vicinity of Maasai houses and water from sources such as wells and rain-water were sampled for the detection of the cestode ova. From one of the two wells, 10 ova per 100 ml water were discovered. Eighty ova per 100 ml were recovered from drinking water stored in coverless vessels within the residences (ova of *Echinococcus* and *Taenia* are indiscernible), indicating danger of infection. Since a similar mode of infection is probably prevalent in other areas of Tanzania as well, the necessity of future surveys is indicated. The management of water source not to be contaminated with the worm ova which may be excreted by livestock and pets such as dogs is of fundamental importance.

5.10. Other Helminthic Diseases

Although the prevalences of roundworm (*Ascaris lumbricoides*) and hookworms (*Ancylostoma duodenale* and/or *Necator americanus*) seem to be high in rural areas, no special attention is paid to these intestinal parasites and no reliable data were obtained. The hookworms are not negligible because they cause anaemia. Safe handling of excreta is a prerequisite for prevention. The data on the prevalence of roundworms and hookworms revealed with reference to the nutritional survey in children are summarized in Table II-35. In the survey on the subjects consisting mainly of children, the prevalence rate seems to become higher in the older population according to Vaughan's survey (1973) in Coast region.

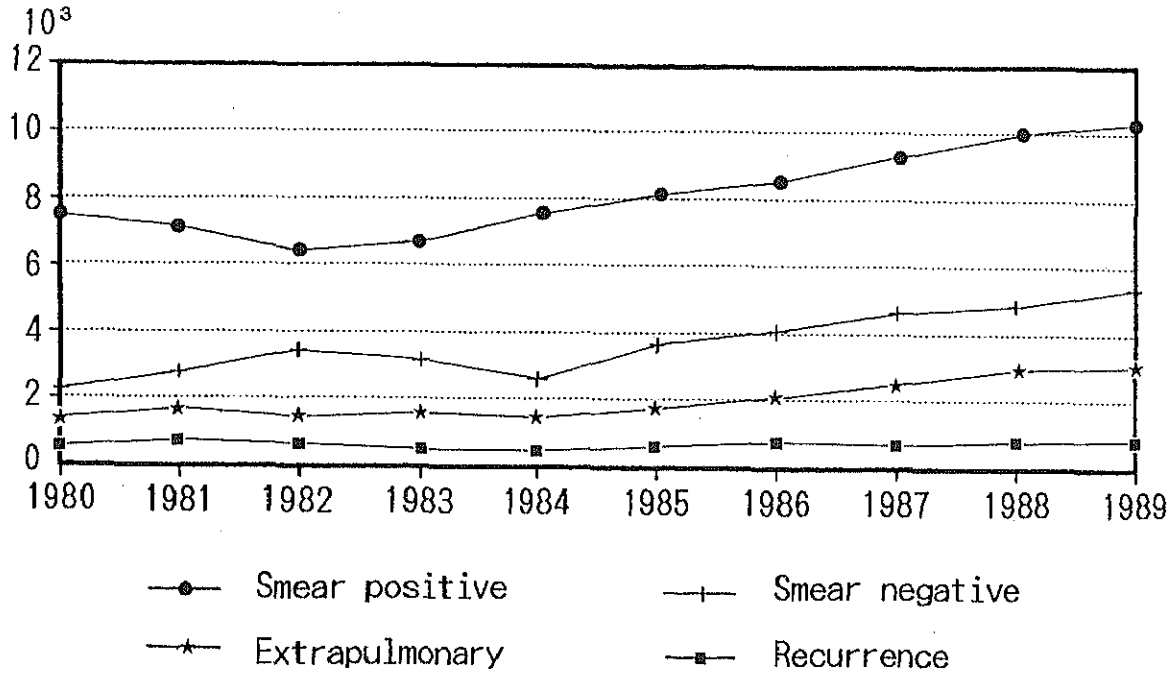
Fishes are also commonly sold as a food source, but it is not eaten raw, therefore infections by flukes and/or tapeworms resulting from these fishes is seldom seen. In Bugando Medical Centre, Mwanza, however, a fully grown specimen of the beef tapeworm (*Taenia saginata*) originating from uncooked or undercooked beef was observed, so it was assumed that some cases of taeniasis saginata may be present. This helminthic disease also seemed to be paid no special attention by doctors and inhabitants since it is never fatal.

Figure II-1 Distribution of cases of meningitis by months for Arumeru and Babati districts in 1989 and 1990



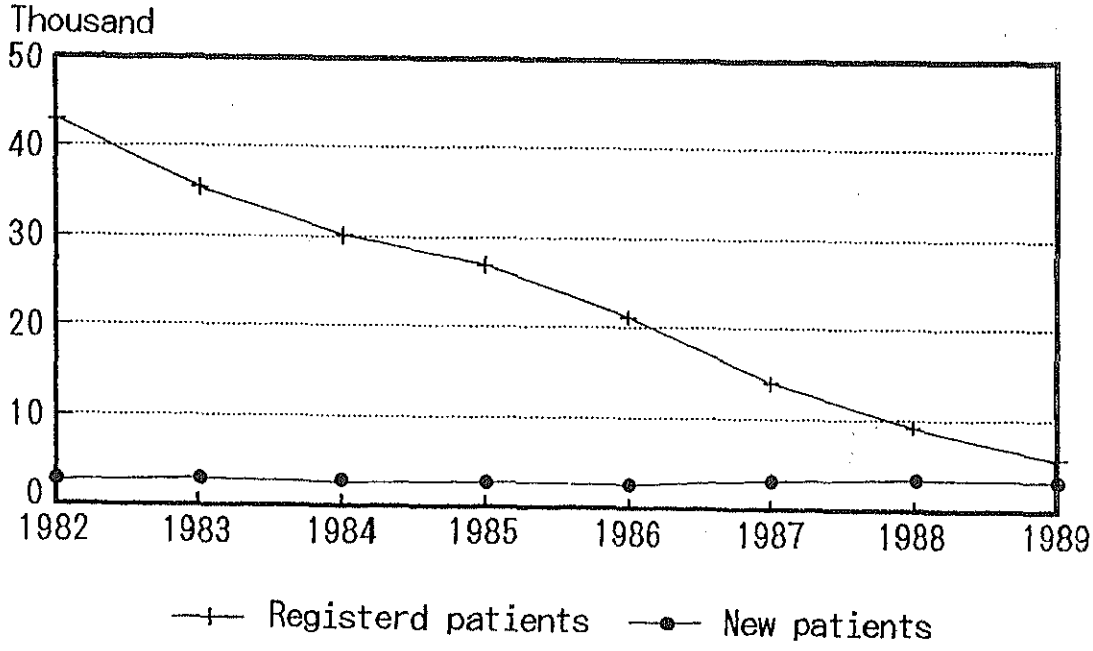
Source: Mtango *et al.* (1991)

Figure II-2 Newly registered tuberculosis patients (Tanzania, 1980–1989)



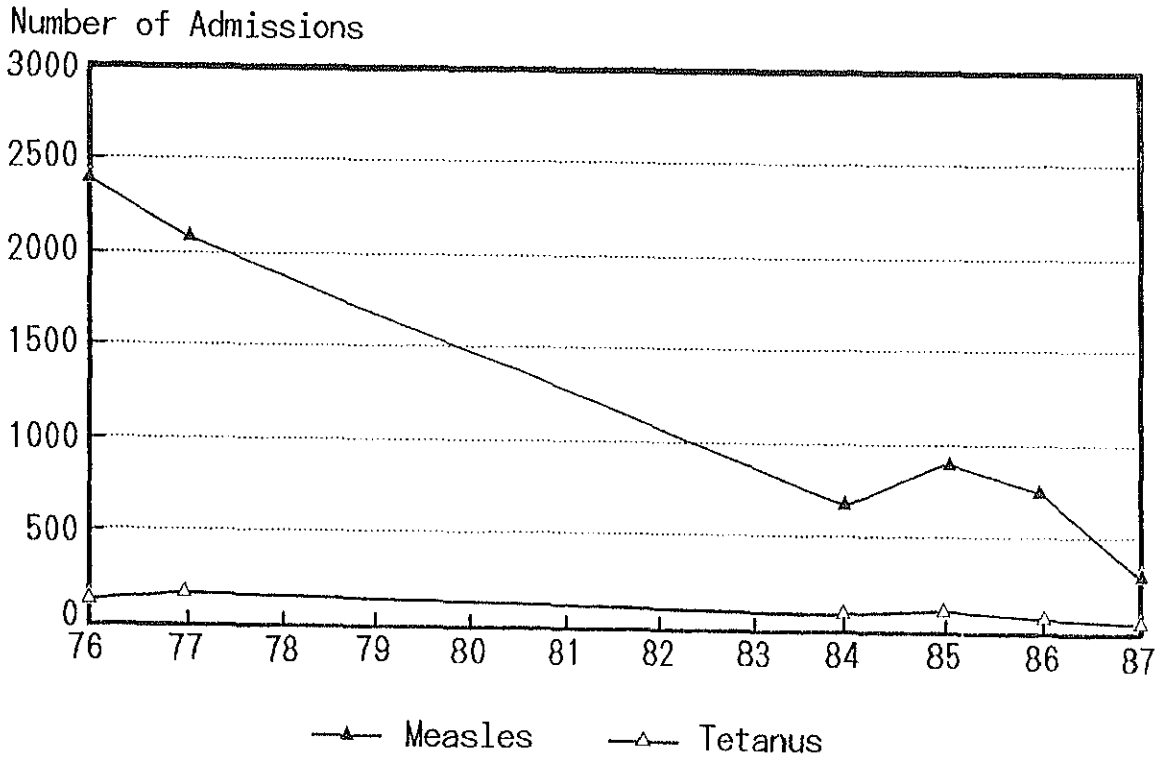
Source: Tuberculosis and Leprosy Control Programme Annual Report (1989)

Figure II-3 New and registered patients with leprosy (Tanzania, 1982-1989)



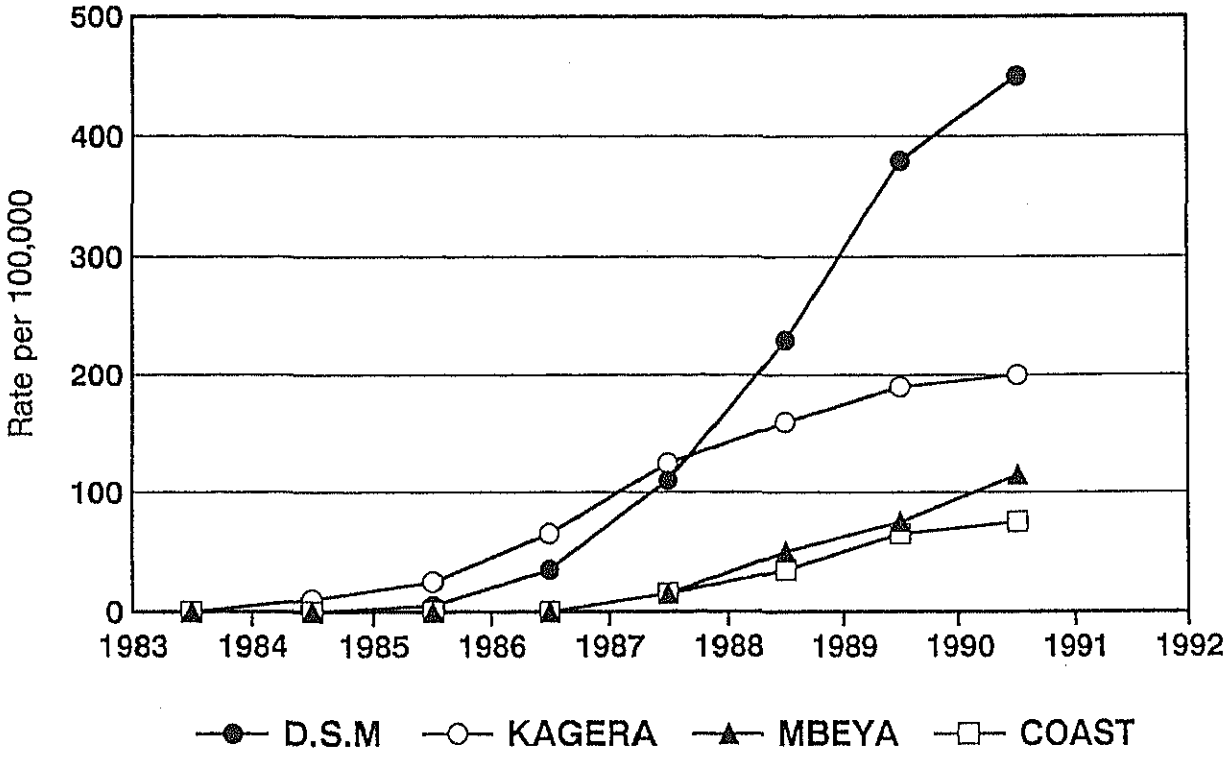
Source: Tuberculosis and Leprosy Control Programme Annual Report (1989)

Figure II-4 Paediatric admissions at Muhimbili Hospital for measles and tetanus



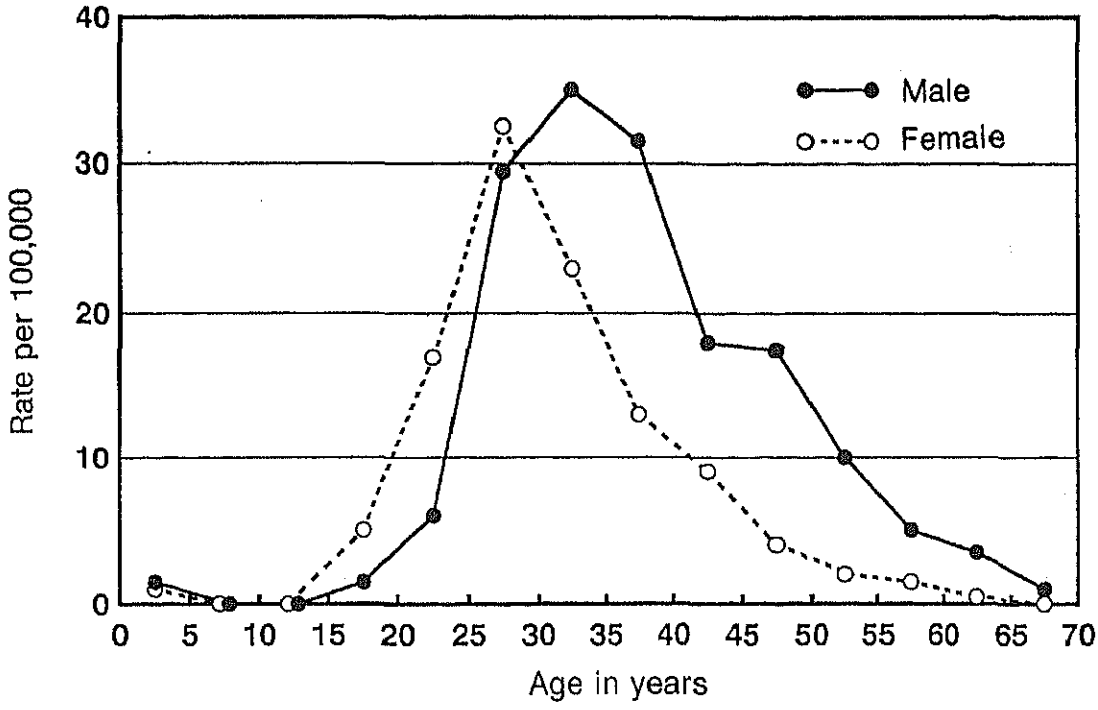
Source: Ann. Rept., Paediatric Dept., Muhimbili Med. Centre

Figure II-5 Cumulative AIDS case rates in 4 regions



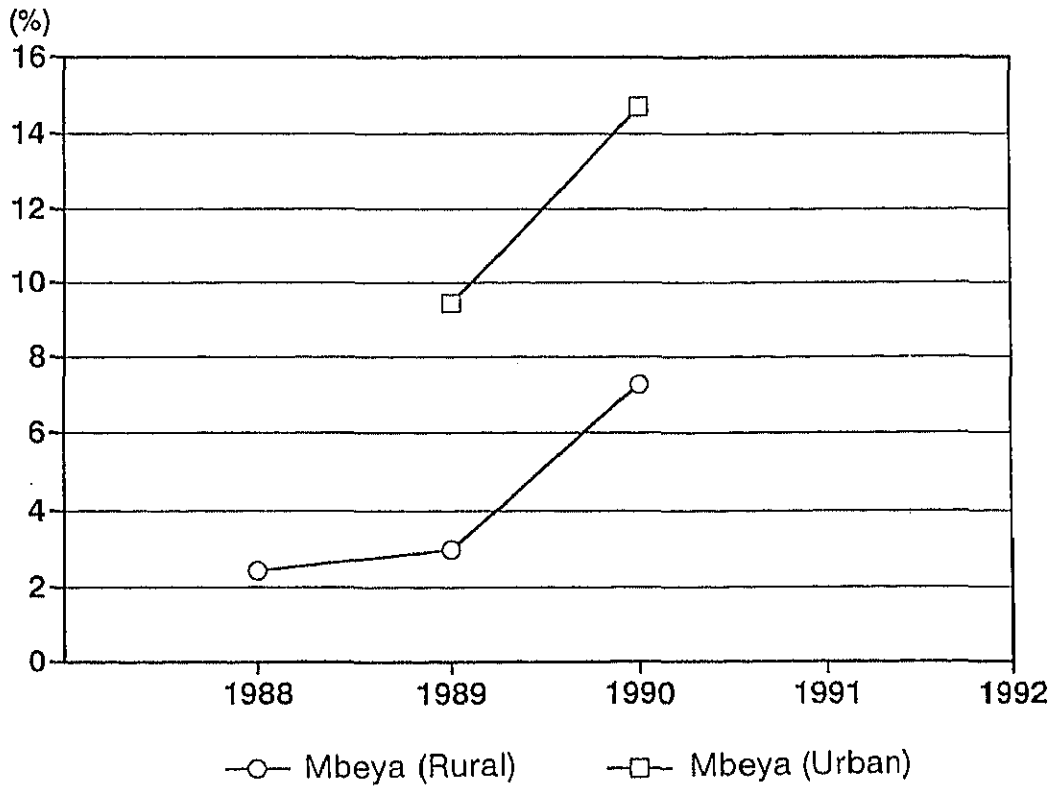
Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Figure II-6 AIDS case rates by age and sex



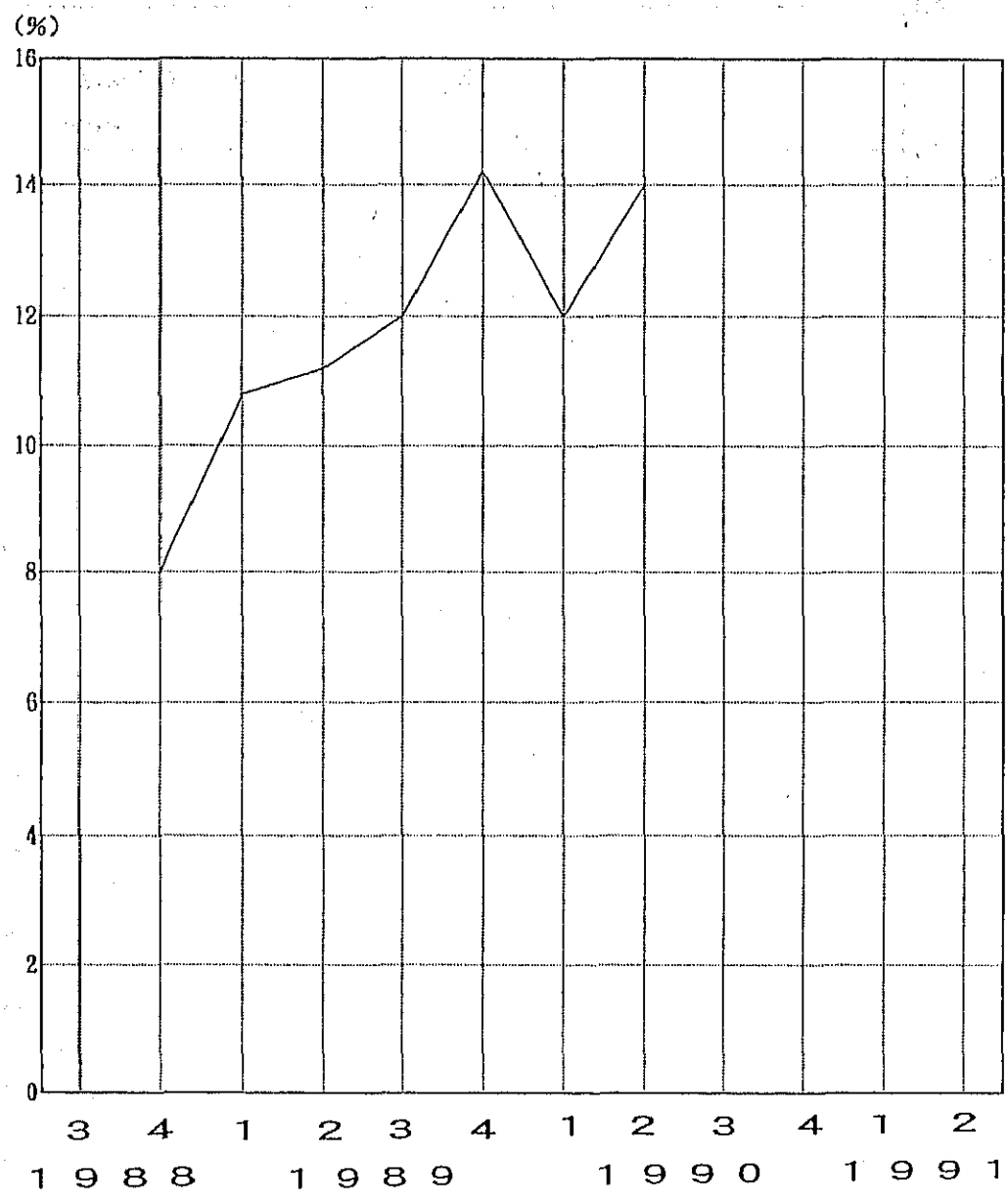
Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Figure II-7 Prevalence of HIV infection in pregnant women (Mbeya, 1988-1990)



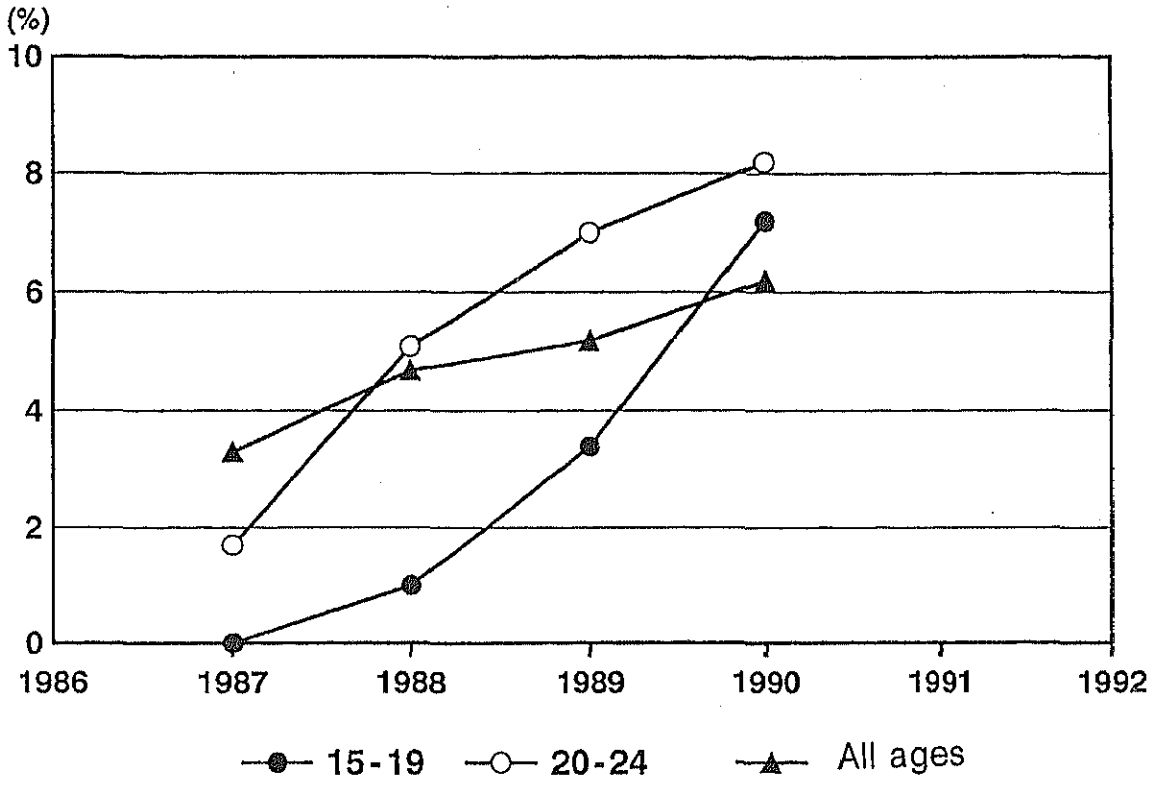
Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Figure II-8 Prevalence of HIV infection in pregnant women (Makongoro Clinic, Mwanza, 1988-1990)



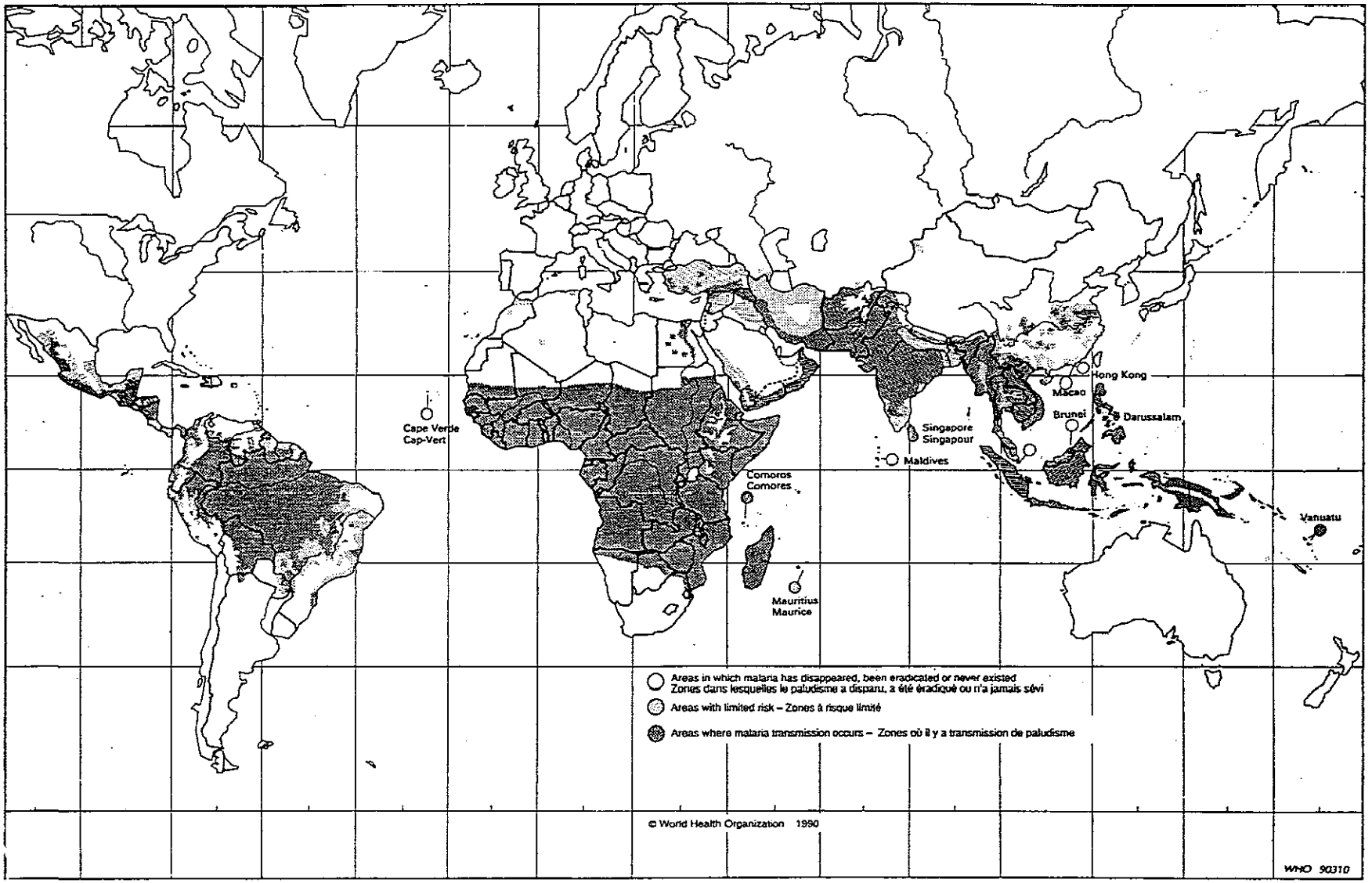
Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Figure II-9 Prevalence of HIV infection in blooddonors (1987–1990)



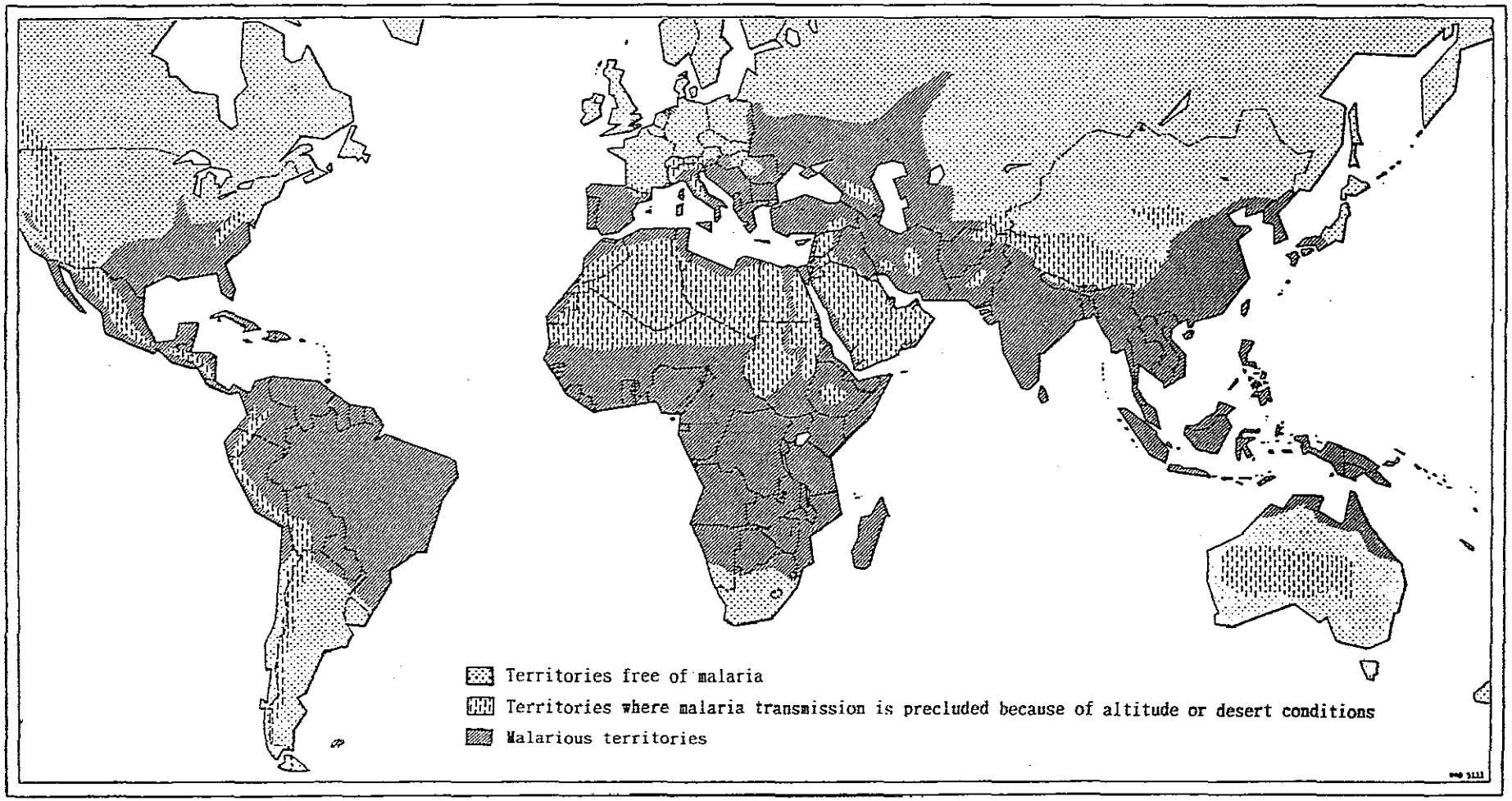
Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Figure II-10 Epidemiological assessment of the status of malaria (1988)



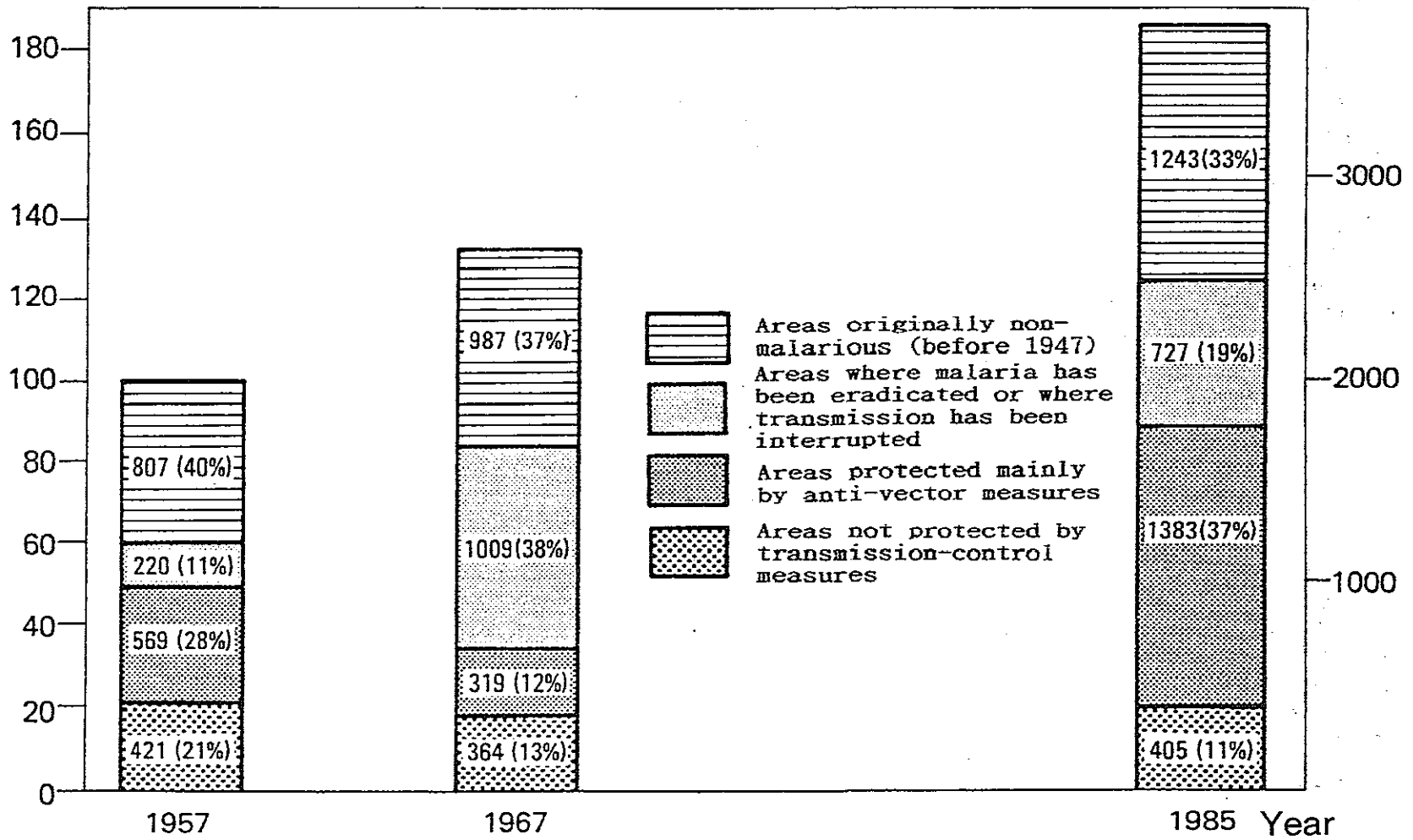
Source: Wld. Hlth. statist. Quart., 43 (1990)

Figure II-11 Geographical distribution of malaria before 1946
(Before residual insecticides were used)



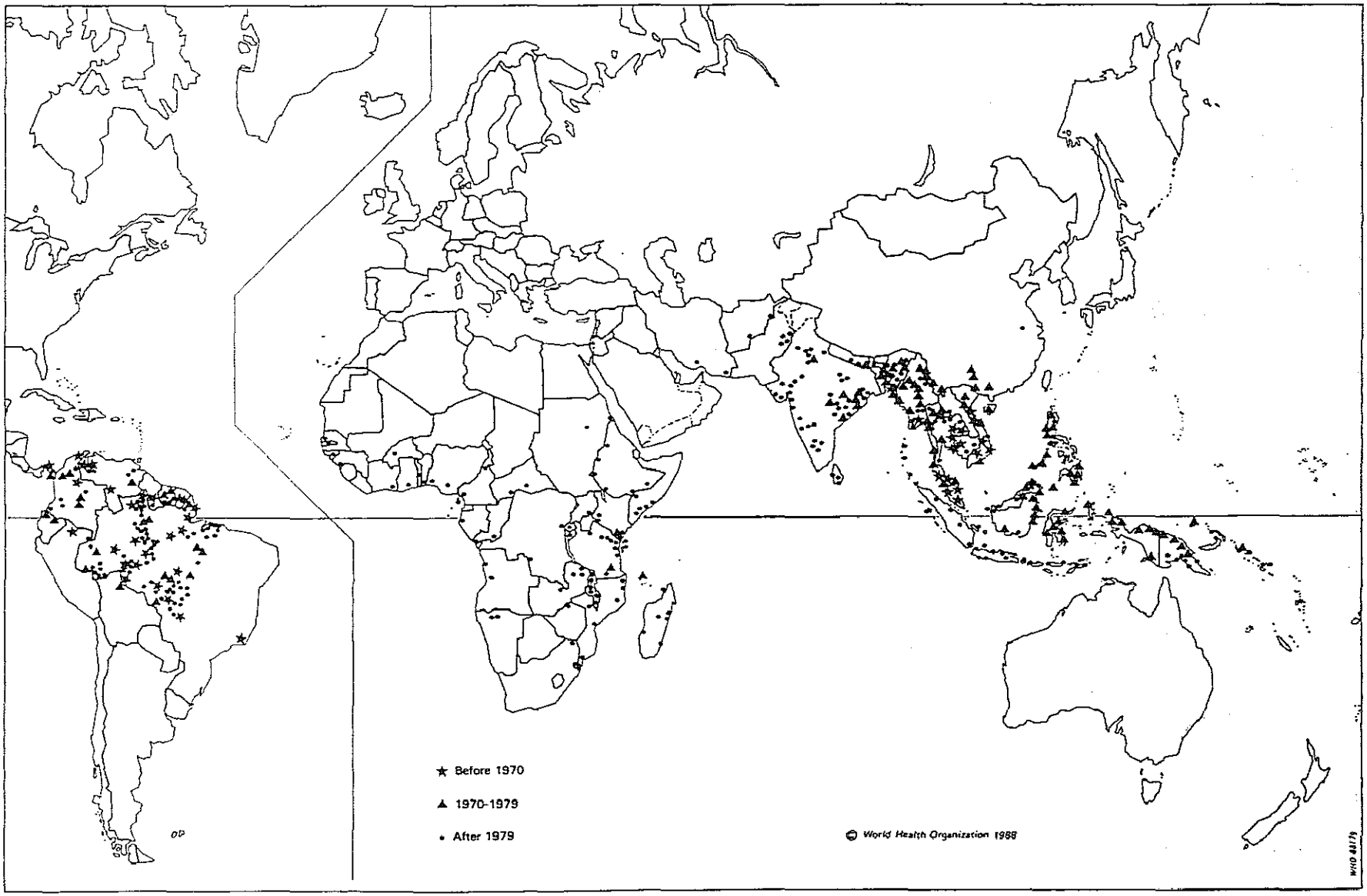
Source: Wld. Hlth. statist. Quart., 41 (1988)

Figure II-12 Global trends of the epidemiological situation of malaria and of anti-malaria measures in terms of the populations concerned (excluding China)



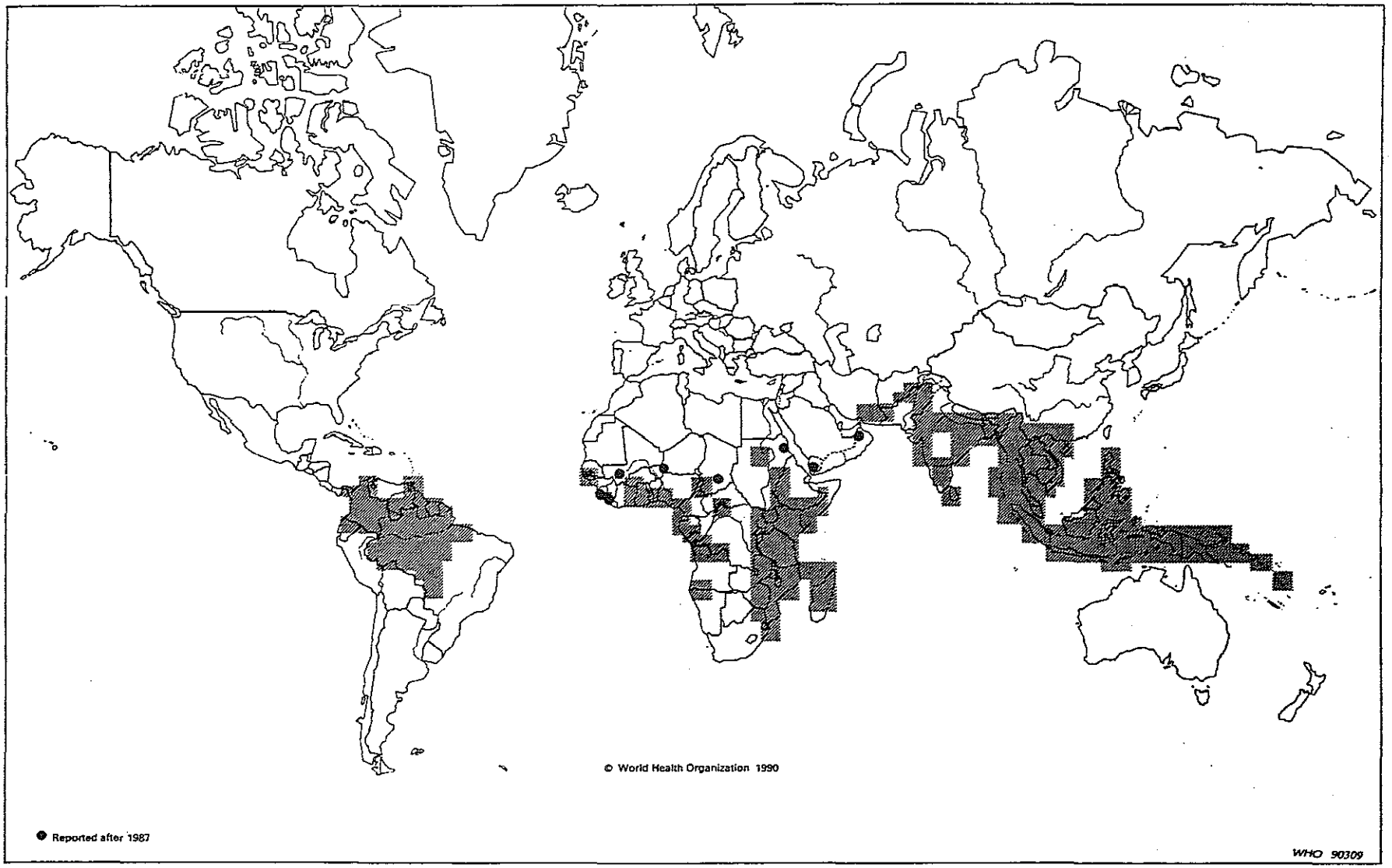
Source: Wld. Hlth. statist. Quart., 41 (1988)

Figure II-13 Areas where chloroquine-resistant Plasmodium falciparum has been reported



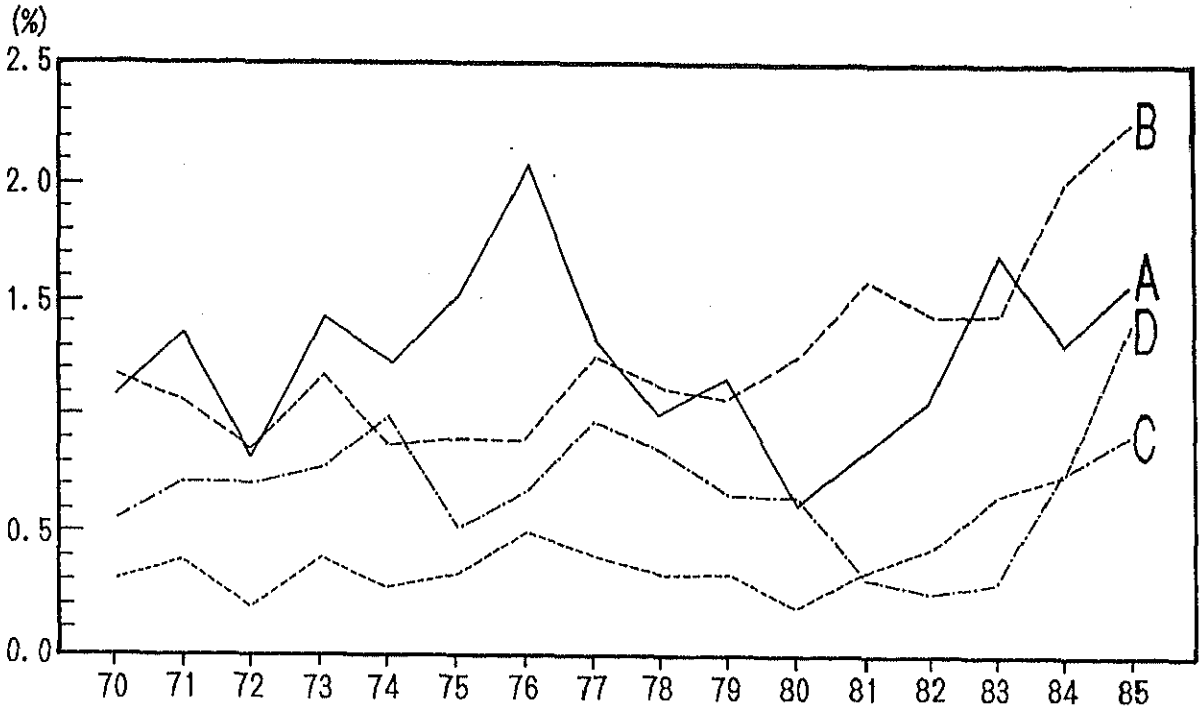
Source: Wld. Hlth. statist. Quart., 41 (1988)

Figure II-14 Areas where chloroquine-resistant *Plasmodium falciparum* has been reported



Source: Wld. Hlth. statist. Quart., 43 (1990)

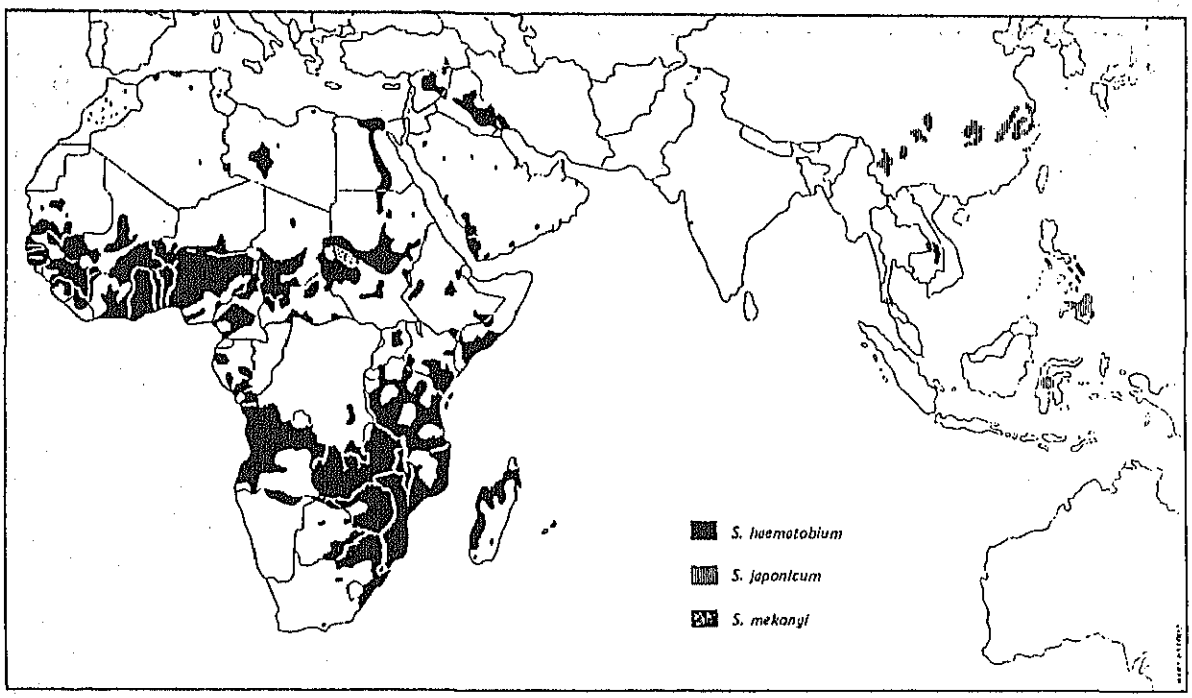
Figure II-15 Rate of malaria patients (1970–1985)



A: Fatality in the total malaria patients
B: Malaria patients in the total admissions
C: Malaria patients in the total deaths
D: Malaria patients in the total outpatients

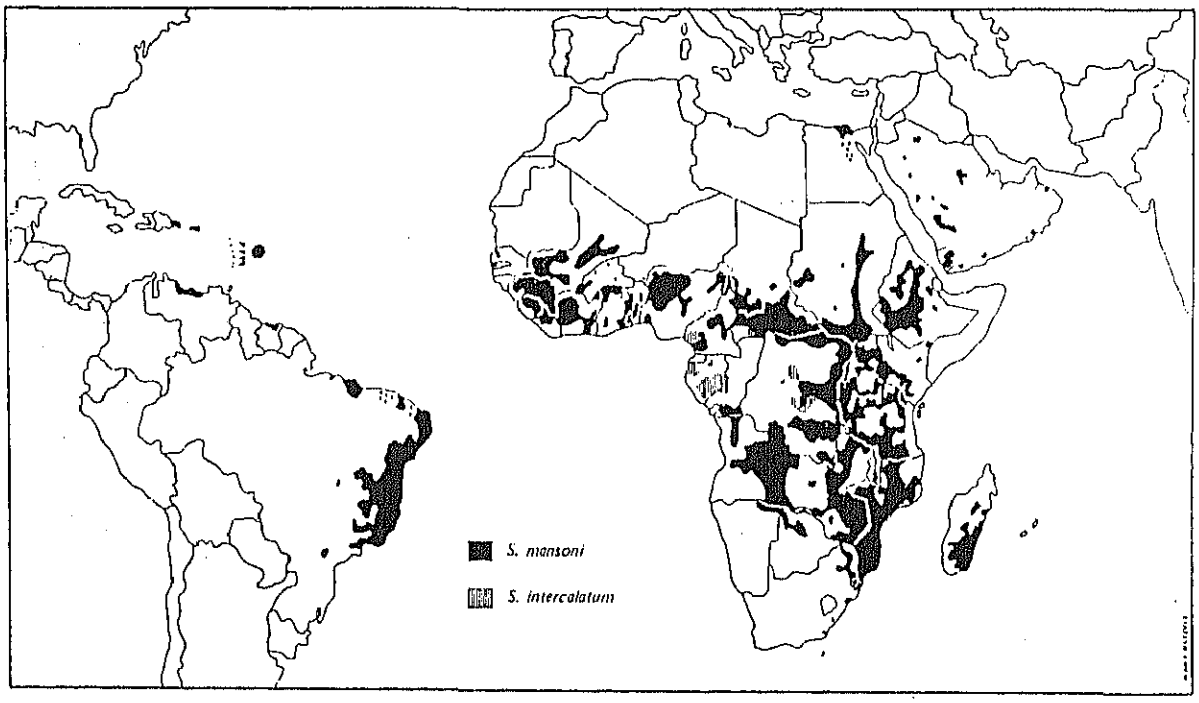
Source: Nat. Malaria Control Progr. Comm. Dis. Contr. Ser. (2) (1990)

Figure II-16 Global distribution of schistosomiasis due to *Schistosoma haematobium* and *S. japonicum* (1983)



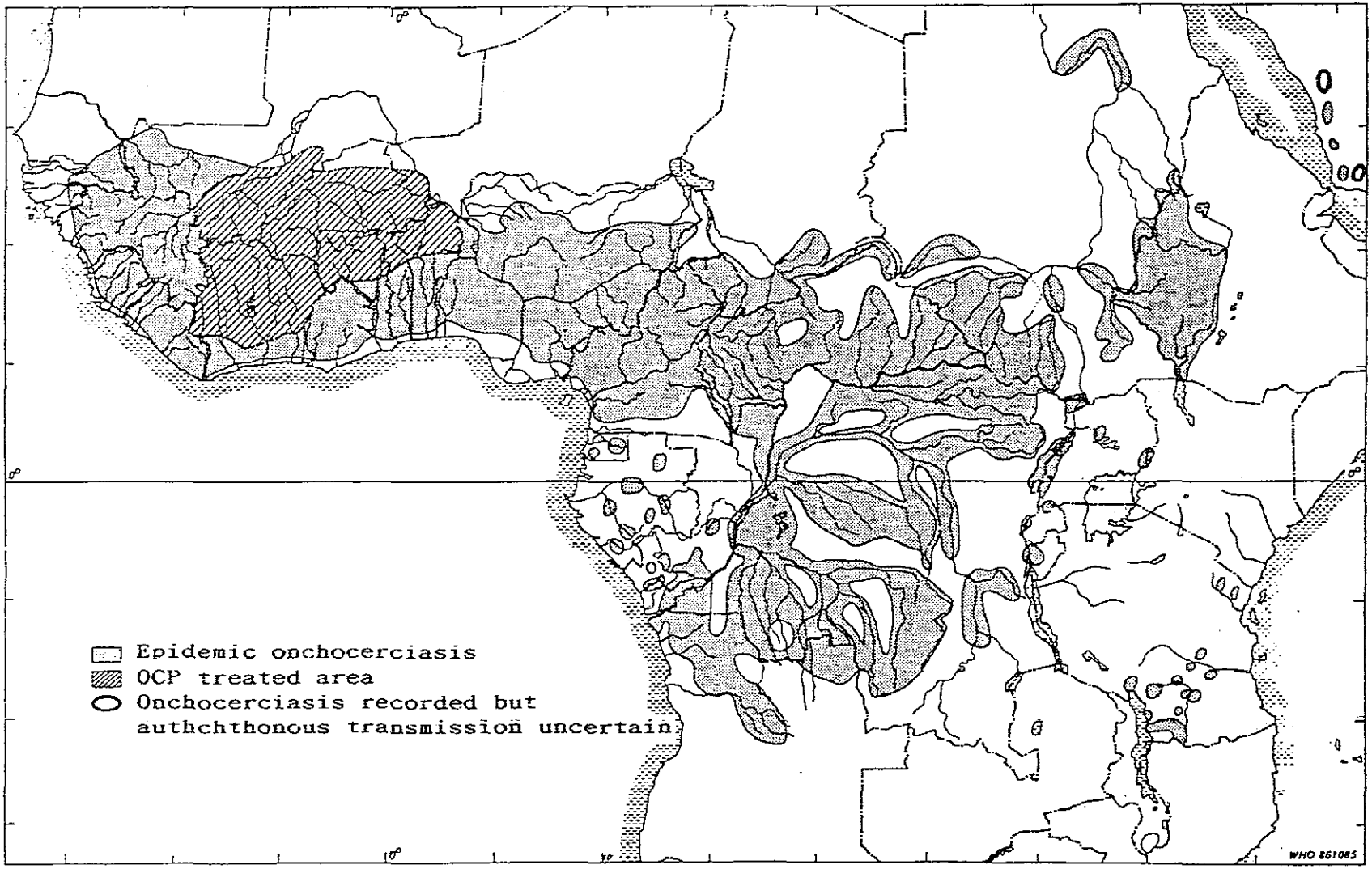
Source: Wld. Hlth. statist. Quart. 39 (1986)

Figure II-17 Global distribution of schistosomiasis due to *Schistosoma mansoni* and *S. intercalatum* (1983)



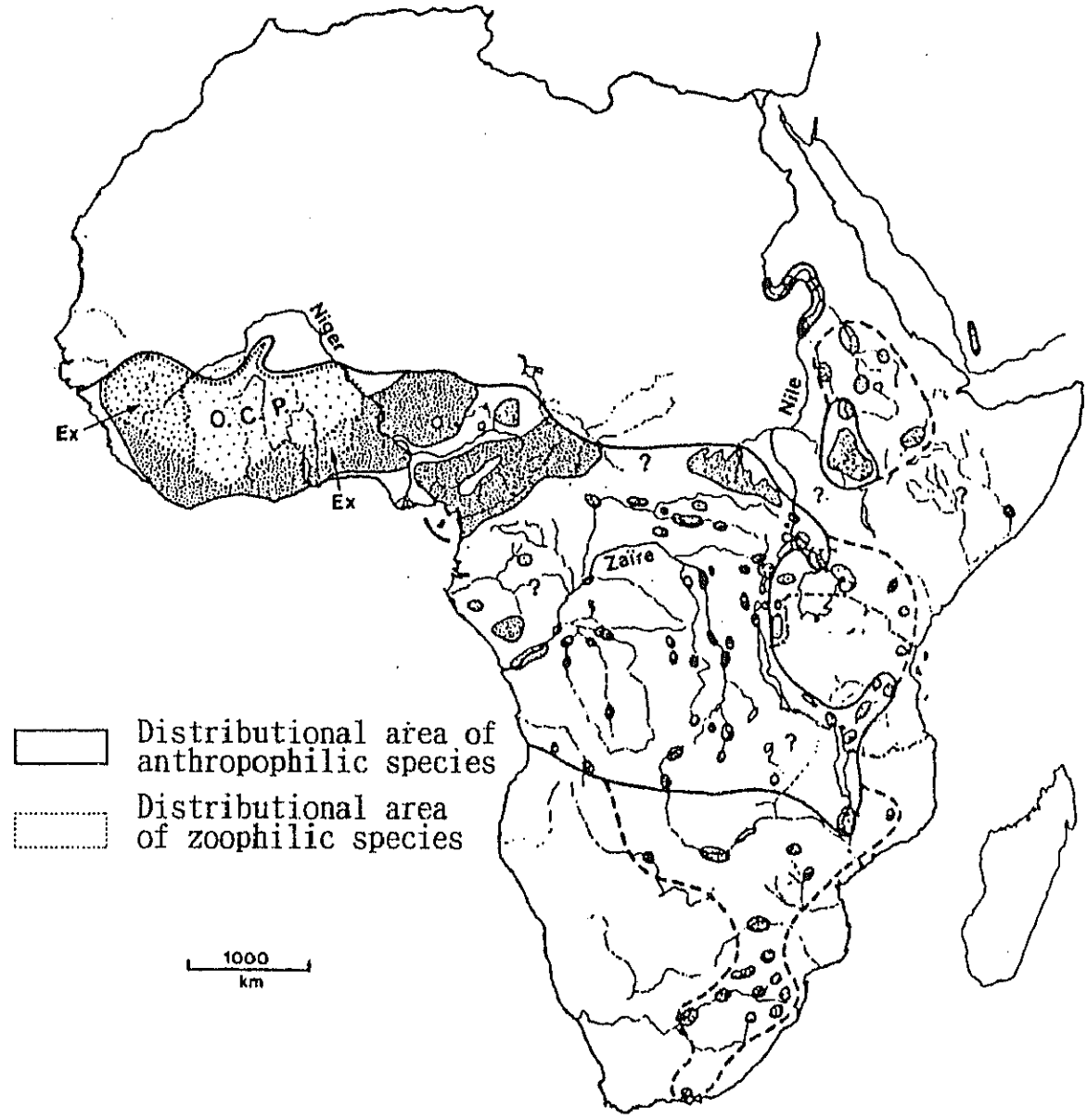
Source: Wid. Hlth. statist. Quart. 39 (1986)

Figure II-18 Geographical distribution of onchocerciasis in Africa and the Arabian Peninsula



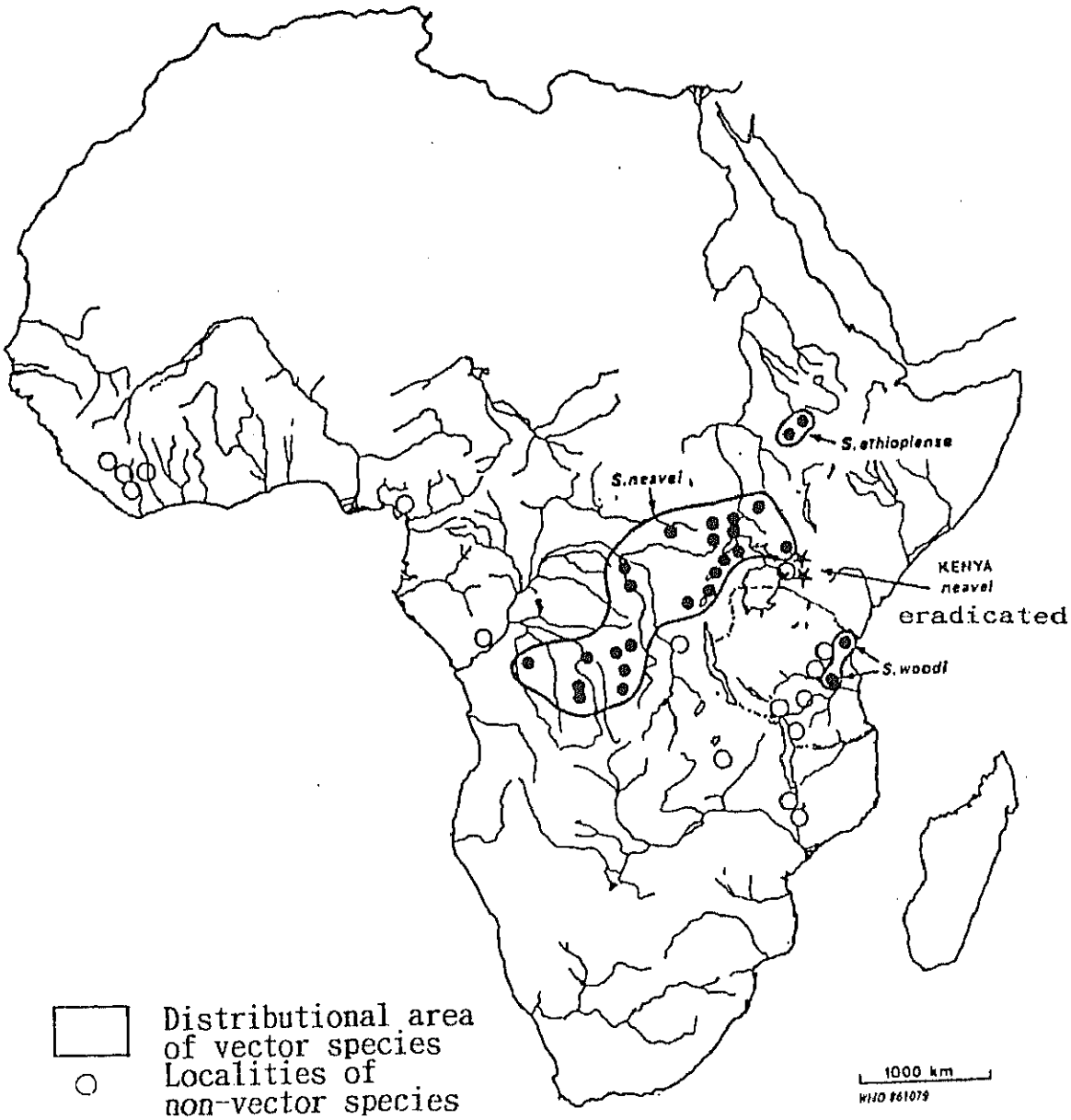
Source: WHO Tech. Rept. Ser. (1987)

Figure II-19 Approximate known distribution of *Simulium damnosum* s.l. (shaded areas)



Source: WHO Tech. Rept. Ser. (1987)

Figure II-20 Geographical distribution of the *Simulium neavei* group



Source: WHO Tech. Rept. Ser. (1987)

Table II-1. Recorded/suspected human plague cases and deaths from April 1980 to August 1988

Period	No. recorded cases	No. recorded deaths	% recorded deaths	No. village
1980	49	11	22.4	1
1981	9	6	66.7	1
1982	76	18	23.7	9
1983	569	49	8.6	2
1984	603	41	6.8	11
1985	129	22	17.1	20
1986	360	57	15.8	23
1987	462	39	10.6	40
1988	548	28	5.1	40
Total	2805	286	10.2	

Source: Kilonzo (1989)

Table II-2 No. of reported cases/no. of died of cerebrospinal meningitis in Tanzania mainland 1970–1975 by regions

Regions	1970	1971	1972	1973	1974	1975	Total	
Arusha	7/2	8/4					21/6	(28.5%)
Dodoma	10/0	29/5	16/0	5/1	7/1	5/2	81/8	(8.0%)
Iringa	8/0			4/2	2/1		17/3	(7.6%)
Kigoma	13/3	12/3	2/1	2/1	1/0	5/5	46/13	(28.3%)
Kilimanjaro	8/2	14/3	4/1	1/0	1/0		34/6	(17.6%)
Lindi			17/3	12/3	10/1	1/0	47/7	(14.9%)
Mara	5/2	5/0	4/0	2/0			18/2	(11.1%)
Mbeya	15/7	6/6	9/1	16/2	32/2	51/6	153/24	(15.7%)
Morogoro	9/0	12/0	16/7	2/2	5/0		53/9	(17.0%)
Mtwara	83/17	70/15	48/18	38/10	25/5	19/7	355/72	(20.3%)
Mwanza	40/8	28/2	10/2	11/2	11/1	28/13	156/28	(17.9%)
Shinyanga	18/4	8/2	13/5	7/3		7/3	69/17	(24.6%)
Singida	17/0	10/2	1/0	6/0			36/2	(5.6%)
Tabora	19/4	28/9	17/1	14/3	1/1		97/18	(18.6%)
Tanga		1/0	49/1		1/1		53/2	(3.8%)
W. Lake	9/1	49/8	28/0	55/3	33/7	43/5	241/24	(10.0%)
Total	261/50	280/59	234/40	175/32	129/20	159/40	1479/241	(16.3%)

Source: Mwakalukwa (1976)

Table II-3 No. of reported cases/no. of died of cerebrospinal meningitis in Tanzania mainland in 1987 and 1988 by regions

Regions	1987	1988	Total
Dodoma	53/2	54/4	107/6
Kagera	229/33	74/5	303/38
Iringa	15/9	6/1	21/10
Morogoro	12/0	6/2	18/2
Tanga		6/1	6/1
Mwanza	25/6	20/2	45/8
Pwani	4/1		4/1
Mara	4/0	4/2	8/2
Kigoma	19/0	4/1	23/1
Tabora	59/9	8/0	67/9
Arusha		1/1	1/1
Singida			
Ruvuma	17/3	25/9	42/12
Rukwa	5/0		
Shinyanga	27/3	29/1	56/4
Mtwara	37/11	50/5	87/16
Mbeya	76/1	112/18	188/19
Lindi	3/1		3/1
Kilimanjaro	16/0		16/0
Total	607/77 (12.7%)	427/52 (12.2%)	1034/129 (12.5%)

Source: Mkerenga (1989)

Table II-4 Monthly fluctuations of patients/died no. of epidemic meningitis in 3 regions in 1990

Region	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Arusha	0/0	79/10	123/12	186/15	160/6	87/3	12/0	647/46
Tabora	0/0	0/0	0/0	12/3	36/12	47/8	27/5	122/28
Kilimanjaro	25/0	79/15	209/1	69/2	38/2	27/3	0/0	447/23
Total	25/0	158/25	332/13	267/20	234/20	161/14	39/5	1216/97

Source: Pers. Comm. from Dr. G.P. Temu (1991)

Table II-5 Case fatality rates pf cerebrospinal meningitis epidemic in Arumeru, Babati and Mpwapwa districts in 1989 and 1990

	Arumeru (1989)	Arumeru (1990)	Babati (1989)	Babati (1990)	Mpwapwa (1990)
Recovered	301 (93.5%)	198 (92.5%)	358 (96.0%)	178 (94.1%)	451 (93.4%)
Died	21 (6.5%)	16 (7.5%)	15 (4.0%)	11 (5.9%)	22 (4.6%)
Total	322	214	373	187	473

Source: Mtango *et al.* (1991)

Table II-6 Age group distribution of meningitis cases in Arumeru, Babati and Mpwapwa districts in 1989 and 1990

	Arumeru		Babati		Mpwapwa
Age Groups	1989	1990	1989	1990	1990
1- 4 yrs	63 (19.6%)	45 (21.0%)	91 (24.4%)	57 (30.5%)	53 (11.0%)
5-14 yrs	95 (29.5%)	77 (36.0%)	79 (21.2%)	45 (24.1%)	116 (24.0%)
15-24 yrs	65 (20.2%)	53 (24.8%)	71 (19.0%)	21 (11.2%)	123 (25.5%)
25-34 yrs	28 (8.7%)	28 (13.1%)	39 (10.5%)	16 (8.6%)	84 (17.4%)
35-44 yrs	20 (6.2%)	6 (2.8%)	39 (10.5%)	16 (8.6%)	48 (9.9%)
45-54 yrs	8 (2.5%)	3 (1.4%)	11 (2.9%)	7 (3.7%)	18 (3.7%)
55-75 yrs	1 (0.3%)	2 (0.9%)	17 (4.6%)	7 (3.7%)	9 (1.9%)
Adult	34 (10.6%)		24 (6.4%)	15 (8.0%)	29 (6.0%)
Child	8 (2.5%)				2 (6.0%)
Missing			2 (0.5%)	3 (1.6%)	

Source: Mtango *et al.* (1991)

Table II-7 Prevalence of STDs in patients attending treatment four health facilities in Tanzania (1976 and 1977)

Place of study	No. of outpatients screened	No. of STD diagnosed positive	Rate per 1000 cases
Mawenzi Hospital (1977)	52,692	274	5.2
Mbeya Hospital (1976)	5,987	349	58.3
Mbeya Hospital (1977)	13,856	500	36.1
Friendship Hospital			
Dar es Salaam (1976)	647	69	10.7
Tabora Hospital (1976)	12,565	61	4.9
Total	85,747	1,253	14.6

Source: Msamanga *et al.* (1987)

Table II-8 The age and sex distribution of STDs patients at Mawenzi and Mbeya Hospitals (1977)

Age	Males		Females		Total	
(Years)	No.	%	No.	%	No.	%
10–14	0	0	5	2.3	5	0.65
15–19	91	16.3	70	32.7	161	20.8
20–24	191	34.1	61	28.5	252	32.6
25–29	152	27.1	39	18.2	191	24.7
30–34	61	10.9	21	9.8	82	10.6
35–39	36	6.4	11	5.2	47	6.1
40–44	11	2.0	4	1.9	15	1.9
45+	18	3.2	3	1.4	21	2.7
Total	560	100	214	100	774	100

Source: Msamanga *et al.* (1987)

Table II-9 The occupations of STDs patients screened at Mawenzi and Mbeya Hospitals

Type of occupation	Mawenzi Hospital		Mbeya Hospital		Total	
	No.	%	No.	%	No.	%
Civil servants	39	14.2	288	57.6	327	42.2
Peasant farmer	31	11.3	135	27.0	166	21.4
Housewife	94	34.3	40	8.0	134	17.3
Self-employed	19	6.9	45	11.1	64	8.3
Students	15	5.1	31	6.2	46	16.8
Labourers	3	1.1	34	6.8	37	4.8
Transport worker	8	7.9	61	12.2	69	8.9
Bar man/maid	6	2.2	0	0	6	0.8
Unemployed	22	8.0	40	8.0	62	8.0
Others	7	2.6	26	5.2	33	4.3
Total	274	100	500	100	774	100

Source: Msamanga *et al.* (1987)

Table II-10 Source of infection according to sex (n=274)

Source of infection	Male		Female	
	No.	%	No.	%
Barmaid	41	32.8	—	—
Casual unknown contact	43	34.4	10	6.7
Friend/Over/Acquaintance	24	19.2	42	28.2
Own spouse	8	6.4	80	53.7
Some else's wife	2	1.6	—	—
Visitor to household	1	0.8	—	—
Source undetermined	2	1.6	14	9.4
Multiple contacts	3	2.4	—	—
Relative	1	0.8	—	—
Total	125	100.0	149	100.0

Source: Msamanga *et al.* (1987)

Table II-11 New cases with tuberculosis

	Pulmonary tuberculosis			Extra-pulmonary	Total
	Smear positive	Recurrence	Smear negative		
1983	6680(57%)	441(3%)	3144(27%)	1547(13%)	11812
1984	7523(62%)	474(4%)	2636(22%)	1456(12%)	12809
1985	8207(58%)	598(4%)	3660(26%)	1744(12%)	14209
1986	8562(55%)	735(5%)	4088(27%)	2069(13%)	15454
1987	9279(55%)	646(4%)	4547(27%)	2455(14%)	16927
1988	9943(54%)	712(4%)	4767(26%)	2831(16%)	18206
1989	10479(54%)	762(4%)	5318(27%)	2957(15%)	19516

Source: Tuberculosis and Leprosy Programme Annual Report (1989)

Table II-12 Newly registered patients with smear-positive pulmonary tuberculosis

	1983	1984	1985	1986	1987	1988	1989
Population(10^6)	19.59	20.14	20.72	21.31	21.91	22.53	23.83
Incidence($/10^5$)	34.1	37.4	39.6	40.2	42.4	44.1	44.0

Source: Tuberculosis and Leprosy Programme Annual Report (1989)

Table II-13 Incidence of smear-positive patients by age (10^5)

	0-14	15-24	25-34	35-44	45-54	55-64	65<	Total
1985	2.6	32.5	79.9	98.2	121.8	106.2	53.9	39.9
1986	2.1	34.2	84.6	102.8	113.2	101.3	53.2	40.2
1987	2.5	38.8	91.4	106.2	117.2	101.0	46.8	42.3
1988	2.1	40.8	98.6	105.8	118.7	114.4	48.7	44.1
1989	2.3	42.3	100.8	110.8	109.8	95.8	50.2	44.0

Source: Tuberculosis and Leprosy Programme Annual Report (1989)

Table II-14 Results of treatment for new cases with smear-positive pulmonary tuberculosis

	Total	Cured	Completed	Died	Interrupted	Transferred	Continued
1979	5418	31%	13%	5%	23%	10%	18%
1980	5867	39%	16%	7%	15%	13%	10%
1981	5527	39%	14%	7%	18%	12%	10%
1982	5497	37%	15%	6%	14%	15%	13%
1983	5825	43%	15%	7%	15%	10%	10%
1984	7172	49%	18%	7%	14%	7%	5%
1985	8034	61%	11%	6%	12%	7%	2%
1986	8415	67%	9%	7%	9%	8%	1%
1987	8813	72%	7%	7%	7%	6%	1%
1988	9318	74%	5%	7%	7%	6%	1%

Source: Tuberculosis and Leprosy Programme Annual Report (1989)

Table II-15 Newly registered leprosy patients

	1984	1985	1986	1987	1988	1989
Number	3124	3303	3183	3591	3610	3319
Incidence ($/10^5$)	16.6	17.4	15.1	16.4	16.0	13.6

Source: Tuberculosis and Leprosy Programme Annual Report (1989)

Table II-16 Details of specimens examined at the Service Wing of the Department of Microbiology/Immunology, Muhimbili Medical Centre (July 1988–June 1989)

1. Pus and wound swabs:	
Total number examined	**1688**
Staphylococcus aureus	759
Klebsiella sp.	348
Escherichia coli	160
Proteus sp.	136
Pseudomonas aeruginosa	150
Streptococcus pyogenes	48
Alcaligenes faecalis	23
Streptococcus pneumoniae	13
Streptococcus faecalis	11
Achromobacter sp.	11
Chromobacter sp.	3
Streptococcus agalactiae	2
Bacteroides melaninogenicus	2
Unidentified Coliform	1
Candida albicans	1
2. Urethral swabs:	
Total number examined	**729**
Neisseria gonorrhoeae (Gram only)	58
Neisseria gonorrhoeae (Gram and Culture)	70
Neisseria gonorrhoeae (Culture only)	72
Penicillinase producing *N. gonorrhoeae*	91
Trichomonas vaginalis	14
Candida albicans	41
Pythillus pubis	1
3. Vaginal and cervical swabs:	
Total number examined	**1594**
Neisseria gonorrhoeae (Gram only)	4
Neisseria gonorrhoeae (Gram and Culture)	6
Neisseria gonorrhoeae (Culture only)	10
Penicillinase producing *N. gonorrhoeae*	9
Trichomonas vaginalis	199
Candida albicans	562
4. Ear swabs:	
Total number examined	**451**
P. aeruginosa	138
Proteus sp.	96
S. aureus	92
Klebsiella sp.	76
E. coli	13
S. pyogenes	7
S. faecalis	5
S. pneumoniae	2
C. albicans	2
Aspergillus niger	1
Streptococcus sp.	1
Achromobacter sp.	1
5. Eye swabs:	
Total number examined	**83**
S. aureus	10
Klebsiella sp.	11
P. aeruginosa	4
S. pneumoniae	2
E. coli	3
A. faecalis	4
S. pyogenes	1
Proteus sp.	1
C. albicans	1
Achromobacter sp.	1

6. Throat swabs:

Total number examined	**93**
S. pneumoniae	6
S. pyogenes	6
Klebsiella sp.	3
C. albicans	3

7. Sputum pyogenic culture:

Total number examined	**911**
S. pneumoniae	100
S. pyogenes	32
Klebsiella sp.	15
H. influenzae	2
Pasteurella multocide	1
C. albicans	1

8. Urine — microscopy and culture:

Total number examined	**16793**
E. coli	997
Klebsiella sp.	909
Proteus sp.	288
S. aureus	160
Unident. coliforms	100
Enterococci	70
P. aeruginosa	69
C. albicans	27
T. vaginalis	118
Schistosoma haematobium	5
Salmonella sp.	1
Serratia sp.	1
Achromobacter sp.	1

9. Blood culture:

Total number examined	**3254**
S. aureus	496
S. typhimurium	96
Unident. coliform	51
S. faecalis	43
E. coli	20
Klebsiella sp.	31
S. enteriridis	12
S. typhi	8
S. pneumoniae	9
P. aeruginosa	10
A. anitratus	5
P. mirabilis	4
Salmonella group D	3
Anaerobic cocci	1
Yeast	2
E. hermani	1
A. var. *Lwoffi*	1
S. albus	40
K. pneumoniae	25
A. faecalis	22
Chromobacter sp.	5
Haemolytic *Streptococcus*	5
Flavobacterium odoratum	3
H. influenzae	3
Steptococcus sp.	4
S. marcescens	1
C. albicans	1
others	9

10. Cerebral spinal fluid

Total number examined	**846**
S. pneumoniae	32
C. neoformans	6
H. influenzae type b	5

N. meningococcus	1	**11. Stools (excl. for *V. cholerae*)**	
E. coli	3	Total number examined	**1739**
P. aeruginosa	5	*S. flexneri*	42
Klebsiella sp.	3	*S. dysenteriae* 1	2
S. aureus	2	*S. dysenteriae* 2	5
S. agalactiae	1	*S. bodyii*	3
F. menigosepiticum	1	*S. sonnei*	2
Salmonella sp.	1	*S. typhimurium*	19
Yeast	1	*S. typhi*	4
		Salmonella group C1	5
		Salmonella group B	6
		Salmonella group G	2
		Salmonella enteritidis	1

Source: A Report from Muhimbili Med. Centre (1989)

Table II-17 NACP/Tanzania: Cumulative AIDS cass by region (1983–1990)

Region\Yr	1983	1984	1985	1986	1987	1988	1989	1990	1991	Population	Rate	Rank
Arusha	0	0	0	10	47	217	429	464		1,351,675	34.3	10
Coast	0	0	1	4	79	224	411	472		638,015	74.0	4
Dodoma	0	0	0	7	47	105	247	248		1,360,850	18.2	16
DSM	0	0	51	471	1,470	3,093	5,186	6,063		1,237,819	489.8	1
Iringa	0	0	1	3	68	305	374	375		1,208,914	31.0	12
Kagera	3	106	322	847	1,665	2,141	2,535	2,658		1,326,183	200.4	2
Kigoma	0	0	0	3	50	109	243	307		854,817	35.9	8
Kili'jaro	0	1	8	36	207	455	570	634		1,108,695	57.2	5
Lindi	0	0	0	1	9	45	109	177		646,550	27.4	13
Mara	0	0	0	3	30	99	139	157		970,942	16.2	17
Mbeya	0	0	0	16	208	747	1,039	1,716		1,476,199	116.2	3
Morogoro	0	0	0	11	88	225	308	311		1,222,737	25.4	14
Mtwara	0	0	1	4	19	91	138	139		889,494	15.6	18
Mwanza	0	0	15	54	171	448	644	720		1,878,271	38.3	7
Rukwa	0	0	0	1	5	90	94	94		694,374	13.5	20
Ruvuma	0	0	0	20	44	71	166	166		783,327	23.7	15
Shinyanga	0	0	0	8	31	144	227	272		791,814	34.4	19
Singida	0	0	0	6	74	197	284	284		1,772,549	16.0	9
Tabora	0	2	5	6	59	232	509	560		1,036,293	54.0	6
Tanga	0	0	0	13	60	210	292	413		1,283,636	32.2	11
TANZANIA	3	109	404	1,524	4,451	9,248	13,944	16,250		22,533,754	72.1	

Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Table II-18 Distribution of new AIDS cases by age and sex (1990)

Age	Male				Female				Total			
	Number	%	Population	Rate	Number	%	Population	Rate	Number	%	Population	Rate
0– 4	39	4.2	2,501,834	1.6	28	3.2	2,474,728	1.1	67	3.7	4,976,562	1.3
5– 9	4	0.4	2,066,764	0.2	3	0.3	2,055,045	0.1	7	0.4	4,121,809	0.2
10–14	1	0.1	1,588,241	0.1	3	0.3	1,593,470	0.2	4	0.2	3,181,711	0.1
15–19	19	2.0	1,288,892	1.5	63	7.2	1,285,902	4.9	82	4.5	2,574,794	3.2
20–24	67	7.1	1,067,910	6.3	194	22.2	1,119,240	17.3	261	14.4	2,187,150	11.9
25–29	219	23.3	745,321	29.4	255	29.1	785,896	32.4	474	26.1	1,531,217	31.0
30–34	231	24.6	655,392	35.2	172	19.7	742,984	23.1	403	22.2	1,398,376	28.8
35–39	152	16.2	490,636	31.0	78	8.9	590,806	13.2	230	12.7	1,081,442	21.3
40–44	88	9.4	486,976	18.1	52	5.9	567,344	9.2	140	7.7	1,054,320	13.3
45–49	65	6.9	372,713	17.4	17	1.9	404,581	4.2	82	4.5	777,294	10.5
50–54	33	3.5	316,552	10.4	6	0.7	338,841	1.8	39	2.1	655,393	6.0
55–59	11	1.2	209,008	5.3	3	0.3	217,725	1.4	14	0.8	426,733	3.3
60–64	7	0.7	182,928	3.8	1	0.1	190,796	0.5	8	0.4	373,724	2.1
65+	3	0.3	278,020	1.1	0	0.0	353,710	0.0	3	0.2	631,730	0.5
Total	939	100.0	12,251,187	7.7	875	100.0	12,721,068	6.9	1,814	100.0	24,972,255	7.3

Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Table II-19 Seroprevalence in blooddonors by region (1986-1990)

Region	Adult Population	Total	Positive	%	Rank	Expected
Arusha	716,388	177	0	0.00	20	0
Coast	338,148	1,063	44	4.14	14	13,997
DSM	656,044	28,533	2,031	7.12	8	46,698
Dodoma	721,251	128	2	1.56	18	11,270
Iringa	640,724	90	18	20.00	1	128,145
Kagera	702,877	137	18	13.14	5	92,349
Kigoma	453,053	356	3	0.84	19	3,818
Kili'jaro	587,610	273	7	2.56	16	15,067
Lindi	342,672	172	5	2.84	15	9,735
Mara	514,599	2,238	111	4.96	12	25,523
Mbeya	782,385	3,593	221	6.15	10	48,123
Morogoro	648,051	3,578	297	8.30	6	53,793
Mtwara	471,432	119	6	5.04	11	23,770
Mwanza	995,484	1,620	114	7.04	9	70,053
Rukwa	368,336	98	14	14.29	3	52,619
Ruvuma	415,163	194	26	13.40	4	55,640
Shinyanga	939,451	60	9	15.00	2	140,918
Singida	419,661	115	5	4.35	13	18,246
Tabora	549,235	928	22	2.37	17	13,021
Tanga	680,327	4,668	341	7.31	7	49,698
TANZANIA	11,942,892	48,144	3,294	6.84		872,482

Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Table II-20 Seroprevalence in blooddonors by region (1986–1990)

Region	1986	1987	1988	1989	1990
Arusha				0.00	0.00
Coast		2.22	5.43	3.81	
DSM		4.65	7.11	7.46	9.43
Dodoma				1.56	
Iringa				20.00	
Kagera				13.14	
Kigoma				0.84	
Kili'jaro				3.16	2.25
Lindi				2.84	
Mara				6.01	3.51
Mbeya		4.36	4.68	4.68	11.11
Morogoro			10.37	6.66	
Mtwara				5.04	
Mwanza			5.06	7.55	
Rukwa				14.29	
Ruvuma				13.40	
Singida				4.35	
Shinyanga				15.00	
Tabora				2.46	0.00
Tanga				6.67	9.41
TANZANIA		4.55	7.23	6.77	8.13

Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Table II-21 Expected number of seropositives by age (1987–1990)

Age	Population	1987	1988	1989	1990
10–14					
15–19	2,574,794	0	24,434	87,741	185,591
20–24	2,187,150	35,896	111,943	152,699	179,935
25–29	1,531,217	125,700	150,787	115,549	125,463
30–34	1,398,376	137,775	161,987	91,601	157,288
35–39	1,081,442	38,331	46,656	66,527	19,704
40–44	1,054,320	34,784	53,125	95,563	36,523
45–49	777,294	37,271	25,183	38,499	17,136
50–54	655,393	0	16,661	13,966	35,172
55+	1,429,187	0	0	0	33,348
Total	12,689,173	409,758	590,775	662,145	790,161

Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Table II-22 Percentage of awareness of AIDS by background characteristics of respondents

1. Sex	Male	99.4	4. Religion	Catholic	98.5
	Female	98.8		Protestant	89.2
2. Age	<20	98.8		Islam	90.5
	21–25	99.8		Other	98.3
	26–30	99.7	5. Region	Dar es Salaam	99.5
	31–35	99.2		Puwani	100.0
	36–40	99.1		Morogoro	100.0
	41–45	98.3		Tanga	98.3
	46–50	96.8		Kilimanjaro	100.0
	51–55	95.7		Arusha	100.0
	56–60	91.9		Dodoma	93.2
	61–65	100.0		Ruvuma	92.5
3. Education	None	97.9		Iringa	100.0
	Primary	99.5		Mbeya	97.7
	Secondary	96.6		Rukwa	93.6
	Higher	100.0			
	Other	100.0			

Source: NACP/AIDS Surveillance Report, No. 3 (1990)

Table II-23 Number of malaria cases reported, by WHO region (1981-1988)

(thousands)

WHO Region	1981	1982	1983	1984	1985	1986	1987	1988
Africa	6,754	6,042	2,726	4,420	3,373	3,046	3,309	3,285
Americas	638	718	831	931	911	951	1,019	1,100
South-East Asia	3,566	2,964	2,731	3,004	2,521	2,689	2,823	2,645
Europe	60	66	71	60	32	45	27	8
Eastern Mediterranean	207	308	305	335	391	610	564	602
Western Pacific	3,464	2,487	1,839	1,361	1,066	786	758	704
Total (excl. Africa)	7,935	6,543	5,777	5,691	4,921	5,081	5,191	5,059

Source: Wld. Hlth. statist. Quart. 43 (1990)

Table II-24 Prevalence of malaria in children

Observer	Place (region)	No. of children	% with malaria
Maletnlema (1967)	Tabora	463	45
Kreysler (1970)	Lushoto (Tanga)		2
Kreysler (1975)	Kilosa (Morogoro)	334	21
Kimati (1977)	Morogoro	2,811	25
Kimati (1977)	Mwanza	917	10
Ljungqvist (1979/80)	Iringa	3,278	11
JNSP (1984)	Iringa	1,154	27
JNSP (1984)	Iringa	584	19

Source: UNICEF (1985)

Table II-25 Incidence of malaria among the Japan *Overseas Cooperation Volunteers*

Country	Number of persons infected/examined	(%)
Tanzania	10/16	(62.5)
Kenya	17/34	(50.0)
Zambia	8/21	(38.1)
Malawi	32/48	(66.7)
Ghana	9/20	(45.0)
Philippines	3/26	(11.5)

Source: Ohara *et al.* (1984)

Table II-26 Distribution of *Glossina* spp. and subspp. in Tanzania and its neibouring countries

Species/Subspecies \ Countries	Tanzania	Kenya	Uganda	Rwanda	Burundi	Zaire	Zambia	Malawi	Mozambique
Subgenus *Nemorhina*									
palpalis palpalis						●			
pallicera pallicera						○			
pallicera newsteadi						○			
fuscipes fuscipes	●	●	●			●			
fuscipes quanzensis						●			
fuscipes martinii	○			●	●	●	●		
Subgenus *Glossina*									
morsitans submorsitans		○	○			○			
morsitans centralis	●		●	●	●	●	●		
morsitans morsitans	●						●	●	●
longipalpis						○			
pallidipes	●	●	●	●	●	●	●	●	●
swynnertoni	●	●							
austeni	○	○							○
Subgenus *Austenina*									
fusca congolensis			○			○			
nigrofusca hopkinsi			○			○			
tabaniformis						○			
haningtoni						○			
schwetzi						○			
severini						○			
vanhoofi						○			
fuscipleuris	○	○	○			○			
brevipalpis	○	○	○		○	○	○	○	○
longipennis	○	○	○						
Total ●	5	3	3	3	3	6	4	2	2
Total ○	5	5	6		1	13	1	1	2
Grand total	10	8	9	3	4	19	5	3	4

● Species or subspecies incriminated in the transmission of sleeping sickness.

○ Species or subspecies generally considered not to be vectors of sleeping sickness.

Source: WHO Tech. Rept. Ser. (1986)

Table II-27 Prevalence of intestinal parasites in Japan Overseas Cooperation Volunteers who returned from African developing countries (1981-82)

Country	Number of persons examined	Number of persons positive (%)	Number of cases infected with intestinal parasites									
			A*	B	C	D	E	F	G	H	I	J
Tanzania	41	14 (34.1)		1		1	2	2	1			11
Kenya	105	10 (10.0)		1	1	1	2	2				4
Zambia	26	3 (11.5)					1					2
Malawi	101	9 (8.9)	1			1	2	1				6
Ethiopia	9	4					1			1		3
Botswana	2											
Tunisia	16	3				1	1					2
Morocco	30	1 (3.3)										1
Senegal	1											
Ghana	34	9 (26.5)				5		1			1	4
Liberia	6	1										1

* A: *Trichuris trichiura*; B: Heterophyid trematodes; C: *Taenia*; D: *Entamoeba histolytica*; E: *E. coli*; F: *Endolimax nana*; G: *Iodamoeba buetschlii*; H: *Isospora hominis*; I: *I. belli*; J: *Giardia lamblia*.

Source: Yamaura *et al.* (1983)

Table II-28 Distribution of human schistosomes (*Schistosoma*) in Tanzania and its neibouring countries

Country	*S. haematobium*	*S. mansoni*	*S. intercalatum*
Tanzania	+	+	
Kenya	+	+	
Uganda	+	+	
Ruwanda		+	
Burundi		+	
Zaire	+	+	+
Zambia	+	+	
Malawi	+	+	
Mozambique	+	+	

Source: WHO Tech. Rept. Ser. (1985)

Table II-29 Rate of lymphatic filariasis patients in 4 villages in Tanga region

Village	No. of inhabitants examined			Percentage to the total population	Hydrocele	Scrotal elephantiasis	Leg elephantiasis		
	Male	Female	Total				Male	Female	Total (%)
Moa	229	317	346	76	77 (33.6)	10 (4.4)	8	5	13 (2.4)
Tawalani	183	184	367	94	76 (41.5)	8 (4.4)	6	6	12 (3.3)
Kwale	187	261	448	92	61 (32.6)	3 (1.6)	7	2	9 (2.0)
Machui	306	336	642	80	102 (33.3)	4 (1.3)	1	2	3 (0.5)

Source: McMahon *et al.* (1981)

Table II-30 Estimated number of persons at risk, infected, and blind in Tanzania and its neibouring countries

Country (Assessment date)	Total population (UN Year Book 1983)	Number at risk in onchocerciasis endemic areas	Number infected with *O. volvulus*	Number blind as result of onchocerciasis
Tanzania (1985)	20,380,000*	1,300,000	325,000	7,500
Uganda	14,630,000	200,000	30,000	800
Burundi (1980)	4,420,000	60,000	12,000	400
Zaire (1980)	31,150,000	12,000,000	3,394,000	27,900
Malawi (1985)	6,430,000	458,000	120,000	1,000

* 23,174,336 (1988)

Source: WHO Tech. Rept. Ser. (1987)

Table II-31 *Simulium damnosum* complex: List of taxa and their distribution in Tanzania and its neibouring countries

Taxa	Distribution
S. damnosum s.s. (syn.: *S. cinqulatum*; "Nile")	● Uganda and Sudan (Nile basin), Senegal to Central African Republic (mainly savanna)
S. juxtadamnosum (syn.: "Bubumu"; "Lutumgulu")	□ E. Zaire
S. kilibanum (syn.: "Nyamagasani"; "Kiliba")	● Tanzania, Uganda, Burundi, Malawi, E. Zaire
S. mengense	■ Tanzania, N. W. Central African Republic, N. and S. Cameroon
"Hammerkopi"	□ Tanzania (Ruaha)
"Jovi"	□ Tanzania
"Kagera"	□ Tanzania, Uganda
"Kaku"	□ Ugnada (Kigezi)
"Kapere"	■ E. Zaire (forest)
"Ketaketa"	■ Tanzania (Ruaha, Kilosa)
"Kibwezi"	□ Tanzania (E. Usambara), Kenya
"Kipengere"	□ Tanzania (Ruaha)
"Kisiwani"	○ Tanzania, Kenya, Ethiopia
"Mutonga"	○ Kenya (Mt. Kenya area)
"Nkusi"	■ Tanzania, ○ W. Kenya, Uganda
"Sanje"	● Tanzania (incl. E. Usambara), Malawi
"Sebwe"	□ Tanzania, Uganda
"Turiani"	□ Tanzania

●: Vector, ○: Non-vector: occurring in onchocerciasis-free areas.
■: Anthropophilic data is absent but some involvement in transmission appears possible.
□: Zoophilic or virtually so.

Source: WHO Tech. Rept. Ser. (1987)

Table II-32 Number of hydatid patients seen and total operations performed at Wasso Hospital from 1968 to December 1986.

Year	Number of hydatid patients				Total No. operations performed	No. hydatid	(%)
	Male		Female				
	Adult	Child	Adult	Child			
1982-1986	9	20	22	14	994	56	(5.6)
1977-1981	6	10	8	17	686	35	(5.1)
1972-1976	2	7	10	4	564	19	(3.4)
1968-1971	6	5	4	2	505	12	(2.4)
Total	23	42	44	37	2749	122	(4.4)

Source: Macpherson *et al.* (1989)

Table II-33 Location of hydatid cysts in 159 patients seen at Wasso Hospital between January 1968 and December 1986

Location	No. of cases	(%)
Hepatic only	88	(55.3)
Pulmonary only	28	(17.6)
Abdominal	17	(17.0)
Thigh	4	(2.5)
Spleen	3	(1.9)
Hepatic and abdomen	2	(1.3)
Chest wall	1	(0.6)
Elbow and abdomen	1	(0.6)
Pancreas	1	(0.6)
Pelvis	1	(0.6)
Uterus	1	(0.6)
Not recorded	2	(1.3)

Source: Macpherson *et al.* (1989)

Table II-34 Ultrasound and serological age and sex prevalence results obtained in people surveyed in the Loliondo area of northern Tanzania between October and November, 1985

	Ultrasonically screened						Serological screened					
	No. screened		Cystic mass detected		% positive		No. screened		ELISA positive		% positive	
Age/sex	M	F	M	F	M	F	M	F	M	F	M	F
0-5	105	114	0	0	0.0	0.0	0	0	0	0	0.0	0.0
6-15	152	152	1	2	0.7	1.3	109	56	1	1	0.9	1.8
16-25	23	79	0	1	0.0	1.3	13	25	0	0	0.0	0.0
26-50	51	236	1	3	2.0	1.3	23	30	0	0	0.0	0.0
>50	12	35	0	2	0.0	5.7	5	12	0	0	0.0	0.0
Total	343	616	2	8	0.6	1.3	150	123	1	1	0.7	0.8
Total	959		10		1.0		273		2		0.7	

Source: Macpherson *et al.* (1989)

III. Maternal and Child Health Care

1. Present Status of Maternal Health Care

1.1. Maternal Mortality Rate

Figure III-1 gives the maternal mortality rate as estimated based on reports from hospitals and rural health centres.

There were 450 deaths per 100,000 births in 1960, but this had declined to 250 by 1974. No estimate can be made for the period 1975 through 1984 since no data is available, but the estimated figures for 1985, 1986 and 1987 were at approximately the same level as for 1974, and it appears that the mortality rate remained virtually unchanged over the decade. The main reason is that many pregnant women with serious conditions were delayed in reaching referral hospitals because the referral system deteriorated during the 1970's and 1980's. The other is that the referral hospitals themselves have suffered from a critical shortage of essential equipment and supplies, including facilities for safe blood transfusion.

1.2. Causes of Maternal Death

In 1986 M. Murru conducted a survey on the causes of maternal deaths. He found that the most common cause of death was sepsis, followed by haemorrhage and the rupture of the uterus (see Figure III-2).

According to a study conducted in the southern highlands, 20% of maternal deaths could have been saved if they had received a blood transfusion.

In addition to such poor medical care systems, other more basic reasons for maternal deaths include malnutrition in pregnant women, the high frequency of childbirths, and the high prevalence of malaria, which may cause anaemia in them.

1.3. Intrapartum Care

Table III-1 summarizes intrapartum care. Delivery at home constituted 21% of the total in Dar es Salaam, but reached 42% in Iringa, Morogoro and Arusha. 38% of deliveries were conducted by untrained TBAs (Traditional Birth Attendants) and family members in Iringa, Morogoro and Arusha, and 19.5% in Dar es Salaam.

2. Pregnant Women and HIV Infection

HIV infection and AIDS are increasingly important problems in Tanzania. The HIV-positive rate of pregnant women is given in Table III-3.

The HIV-positive rate of pregnant women was over 10% in urban areas. The National AIDS Control Programme estimates that 68,500 women carriers of HIV became pregnant in 1989. However, no survey has been conducted on the actual number of children with vertical HIV infection each year, and at present no such data is available.

3. Infant and Child Mortality

3.1. Geographical Distribution of the Infant and Child Mortality Rate

As stated above, Tanzania's infant mortality rate was 104 (per 1,000 births), and the under-five mortality rate was 176. Surveyed by region, the under-five mortality rate in the southwest was relatively high, while that along the coast and in the area of Kilimanjaro was lower (see Figure III-4).

3.2. Infant Mortality and Socioeconomic Factors

Figures III-5 and III-6 give the infant mortality rate by the educational level and occupation of the mother. The infant mortality rate had a negative relationship to the mother's level of education in both rural and urban areas. Also, children of mothers who are cultivators have higher mortality rates than children of those who are professional managers. Thus the infant mortality rate is affected considerably by socioeconomic factors, and it is clear that raising the educational level of females is of particular importance.

3.3. Causes of Infant Deaths

Table III-2 lists reasons for hospitalization and causes of deaths in the pediatric ward of Muhimbili Hospital. Among the reasons for hospitalization, malaria constituted 40.8%, diarrhoea diseases 23.4%, nutritional disorders 14.1% and respiratory infections 7.7%. Among causes of death, nutritional disorders accounted for 24.6%,

malaria 23.0%, respiratory infections 16.4%, and diarrhoea diseases 16.0%.

4. Malnutrition

4.1. Frequency of Malnutrition

In Tanzania infants who weigh less than 60% of the international standard are classified as severe malnutrition, while those who weigh 60-80% of the international standard are classified as mild malnutrition.

The overall frequency of both severe and mild malnutrition is estimated to be approximately 50% in rural and 27% in urban areas (see Figure III-7).

Table III-3 gives the frequency of hospitalization and fatality rate in the case of severe protein energy malnutrition in the pediatric wards of Muhimbili, Bugando and Kilimanjaro Christian Medical Centres. Patients of severe protein energy malnutrition comprised 3-11% of all hospitalized patients, and the fatality rate among them was 12.0-17.1%. Furthermore, it is said that 75-80% of infant deaths are due to a combination of malnutrition and malaria, diarrhoea disease or respiratory infection. These data show that malnutrition among children in Tanzania is a serious problem.

4.2. Causes of Malnutrition

The common cause of malnutrition is nutritional imbalance rather than absolute lack of food. It is said that malnutrition of infants in Tanzania is comparatively rare during breastfeeding but increases after weaning, and one of the reasons given for this is that children cannot ingest sufficient nutrition since they generally get only two meals a day. This is because women are busy doing housework or working in the fields and are unable to increase the number of meals.

4.3. Prevention of Malnutrition

In Tanzania the problem of infant malnutrition is being viewed with considerable concern. Health checkups of infants at MCH (mother and child health) clinics are being actively promoted, while efforts are underway to ensure early detection and treatment of malnutrition and provide immediate guidance. Child Growth Cards

based on international standard body weights have been distributed to virtually all dispensaries in order to assist in detecting cases of malnutrition.

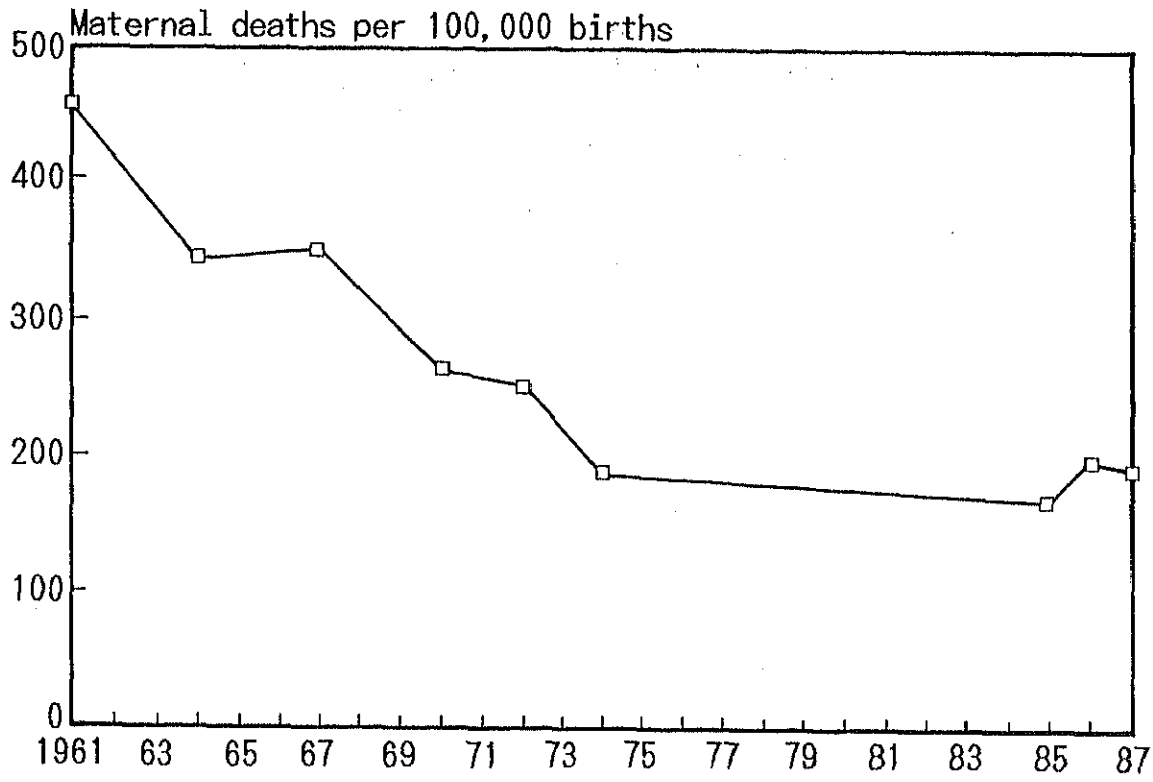
UNICEF and Switzerland have for many years been conducting research on malnutrition in Iringa, and it is said that the frequency of severe malnutrition is gradually decreasing.

5. Family Planning

The average interval between childbirths in Tanzania is less than two years, and while there are no accurate statistics on the average number of pregnancies, it is said to be eight or more. The average annual growth rate in population between 1978-88 was a very high 2.8%.

National Family Planning is working to spread contraception techniques. Table III-4 lists the different methods of contraception. About half of all women of childbearing age had tried some form of contraception. However, National Family Planning has not been an unqualified success due to a deep-seated belief in Tanzania that it is a woman's mission to bear many children.

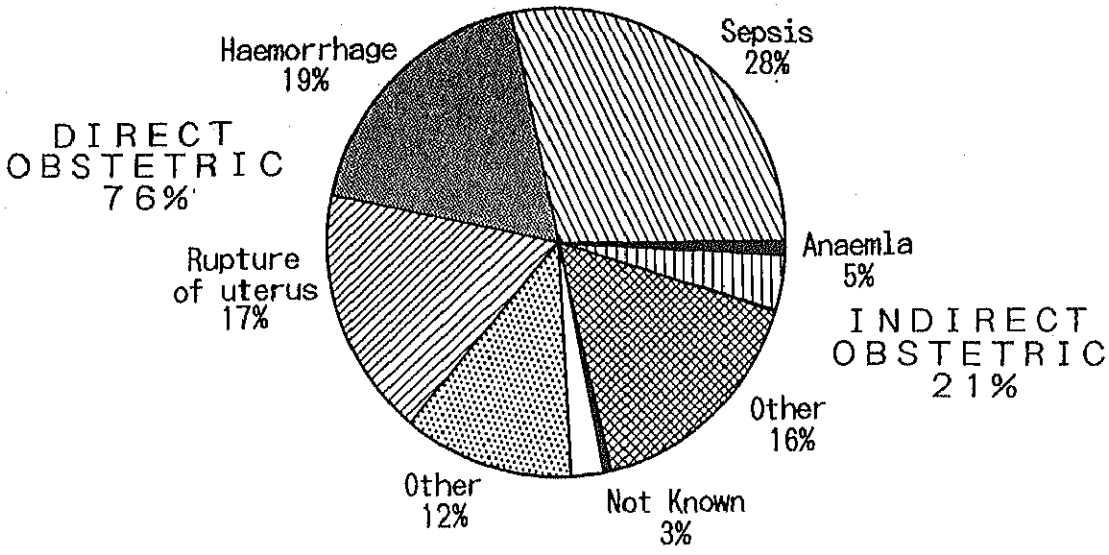
Figure III-1 Maternal mortality in mainland Tanzania



Note: Date for the period 1975-1984 are not available

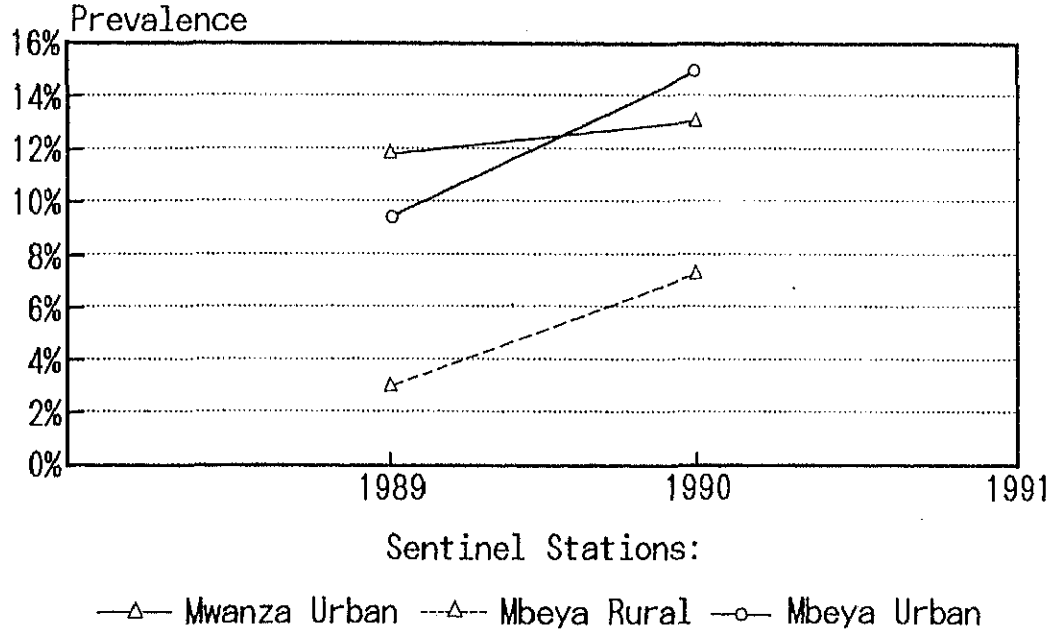
Sources: M. Mandara & G. Msamanga "Maternal Mortality Estimates and the Trend in Mainland Tanzania". Faculty of Medicine, University of Dar es Salaam, UNICEF

Figure III-2 Main causes of maternal Deaths in hospitals in mainland Tanzania (1986)



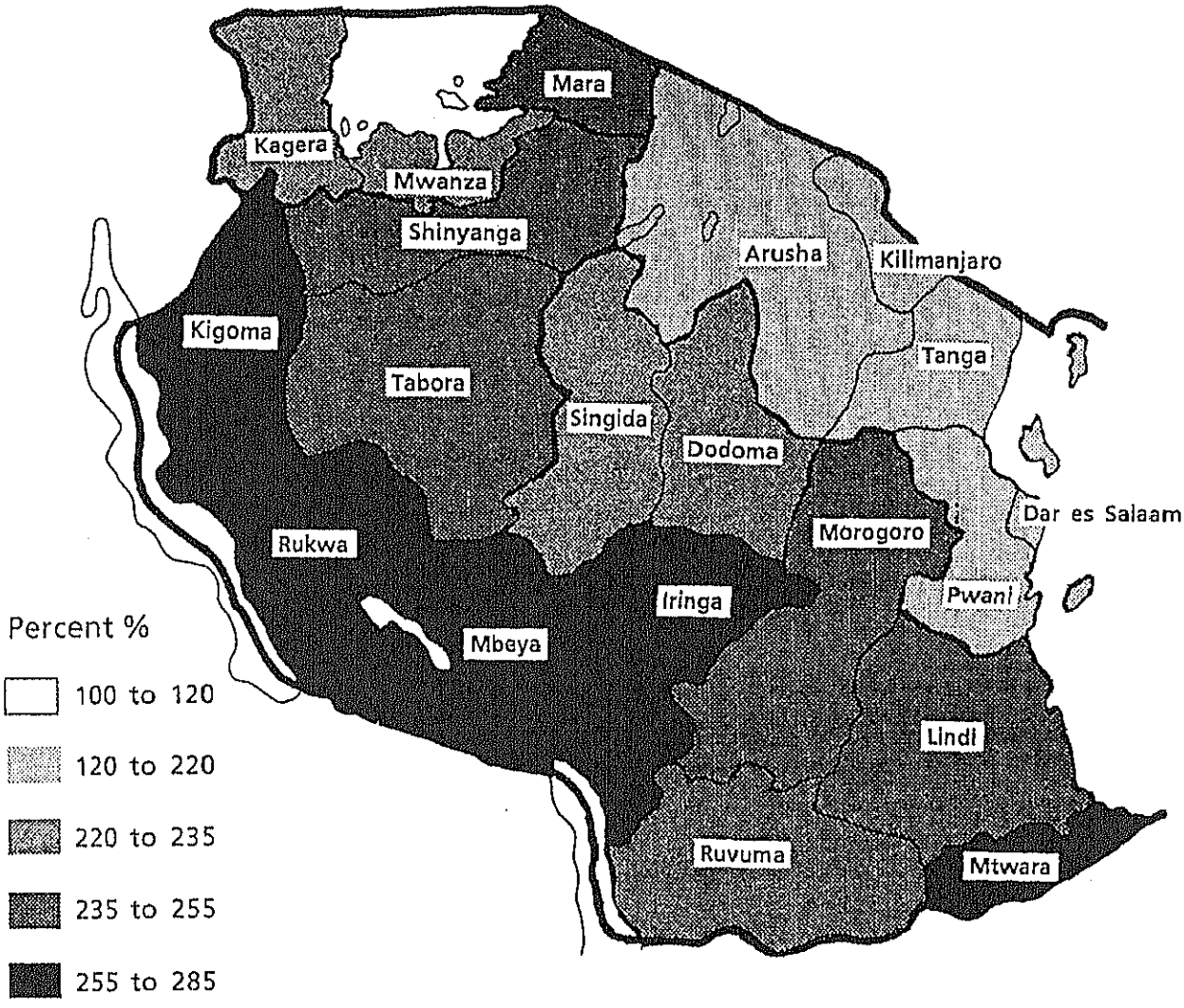
Sources: M. Murru, Maternal mortality: How much is known about it?, UNICEF

Figure III-3 Prevalence of HIV in Ante-natal clinic attenders (1989-90)



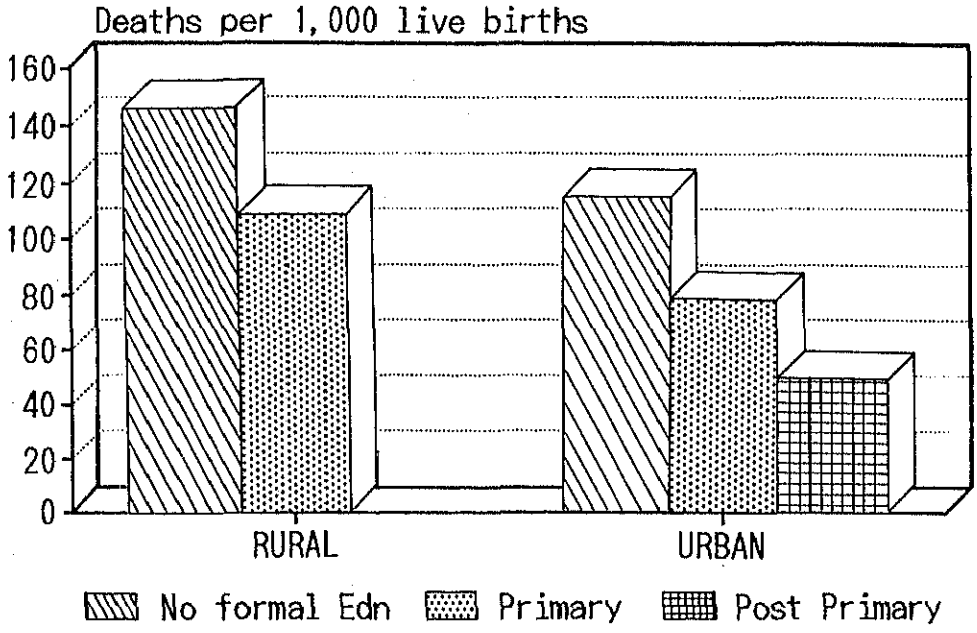
Sources: United Republic of Tanzania, Ministry of Health,
National Aids Control Programme, UNICEF

Figure III-4 Under five mortality in Tanzania (1978) (child deaths per 1,000 lives births)



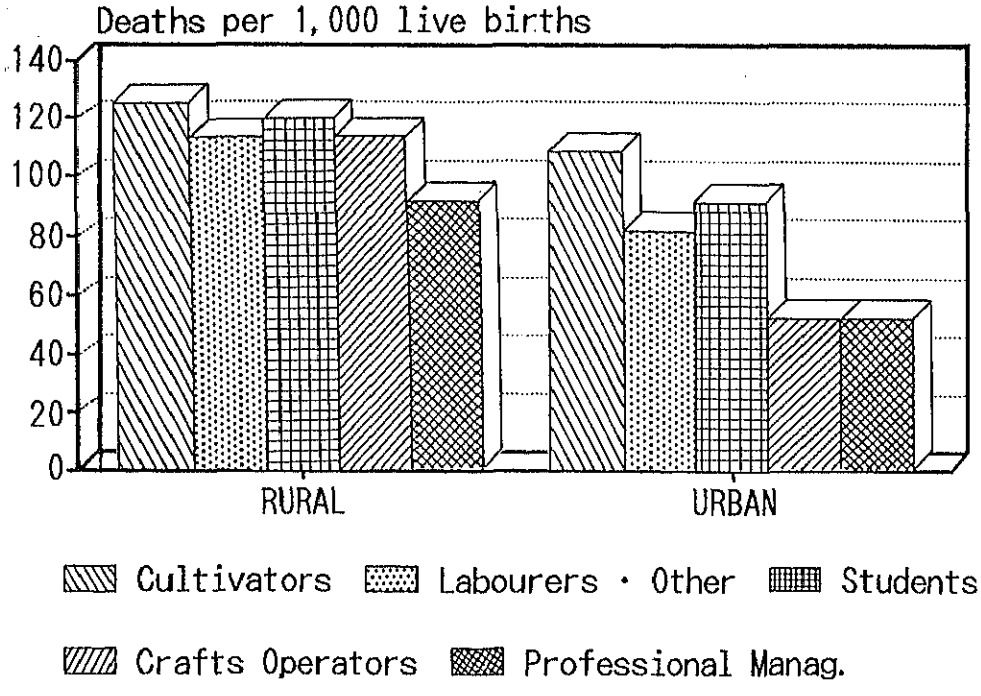
Sources: United Republic of Tanzania, Bureau of Statistics.
"1978 Population Census Volume VIII," 1983, UNICEF

Figure III-5 Infant mortality by education of women



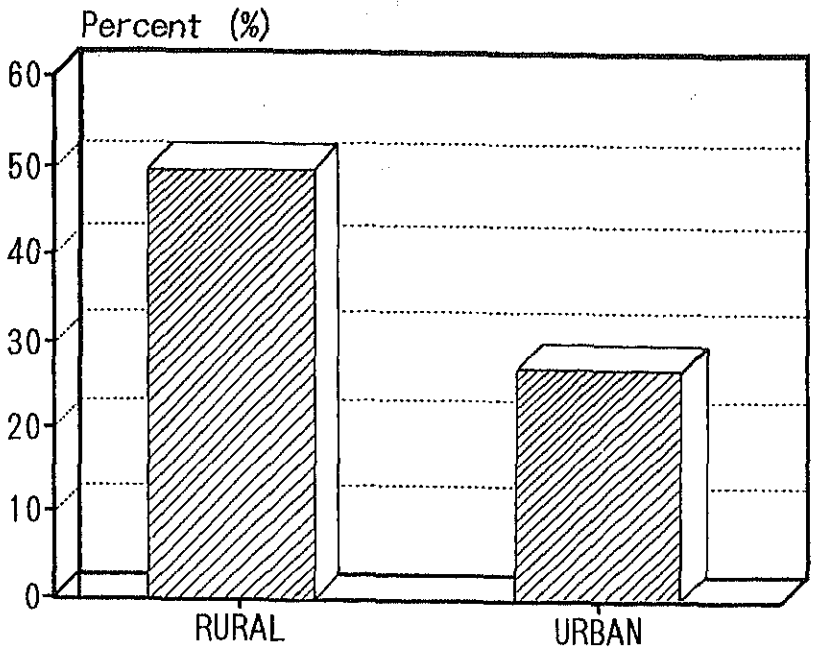
Sources: United Republic of Tanzania, Bureau of Statistics.
"1978 Population Census Volume VIII," 1983, UNICEF

Figure III-6 Infant mortality by occupation of women



Sources: United Republic of Tanzania, Bureau of Statistics.
"1978 Population Census Volume VIII," 1983, UNICEF

Figure III-7 Infant and child malnutrition rates in urban and rural Tanzania



Note: Malnutrition rate is % of u5s under 80% of standard weight for age

Sources: Data from CSD Programme; M. C. Y. Mbago, H. R. K. Bamwebuga and P. P. Namlua, "Survey of Socio-economic conditions in urban areas in Tanzania," 1989, UNICEF

Table III-1 Prenatal and intrapartum care

	Iringa Morogoro Arusha	Lindi Rukwa Shinyanga	Dar es Salaam
Delivery was conducted			
in a govt. institution	31%	12%	74%
in a private institution	27%	12%	5%
at home	42%	39%	21%
Delivery was conducted by			
trained TBA	4%	3%	5.5%
other trained worker	58%	55%	75%
other[1)]	38%	42%	19.5%

Note: [1)] includes both untrained TBAs and relatives

Source: Ministry of Health

Table III-2 Reasons for admission and deaths in general paediatric wards at Muhimbili Medical Centre (1987/1988)

Disease	Admissions	Deaths
Malaria	40.8%	23.0%
Diarrhoea and vomiting	23.4%	16.0%
Malnutrition: severe protein energy undernutrition and anaemia	14.1%	24.6%
Respiratory tract infections	7.7%	16.4%
Immunicable diseases (mainly measles, TB and tetanus)	3.1%	6.6%
Others	10.9%	13.4%
Total	100.0%	100.0%
Number of Cases	6,925	888

Sources: V. P. Kimati "Healthy Children of Today are the Healthy Children of Tomorrow", Public Lecture, Tanzania Public Health Association, September, 1989, UNICEF

Table III-3 Severe protein-energy malnutrition in the pediatric wards of three main hospitals in Tanzania

Hospital	Year	Severe PEM as % of all Admissions	No. of Deaths from Severe PEM	Fatality Rate of Severe PEM (%)
Muhimbili	1973/75	3	13	17.1
Bugando	1973/75	7	14	12.0
KCMC	1973/75	11	15	15.3

Sources: Ministry of Health, UNICEF

Table III-4 Contraceptive methods

Method	Number	Percentage
Using nothing	1,296	54
Prolonged breastfeeding	264	11
Abstension until child walks	481	20
Abstension for 2 years	175	7
Pills	111	5
"Pigi" (local method)	36	1
Loop	4	—
Condom	5	—
Others	47	2
Total	2,419	100

Source: UNICEF

IV. Environmental Hygiene

1. Water Supply

As mentioned above, digestive infections, intestinal parasites and schistosomiasis are widespread in Tanzania. The most common source of such diseases is human excreta, and they are often spread through unclean water. Many Tanzanians do not have a sanitary latrine and still habitually relieve their excreta outdoors, thus there is considerable risk of pollution to drinking water in the vicinity. Sanitary latrines and improved water supply are essential to reducing digestive infections, intestinal parasites and schistosomiasis. Eye and skin diseases are also common in Tanzania, and it is anticipated that improved water supply would result in the reduction of these diseases as well.

1.1. Development of Water Supply

Until 1971 there was no special national water supply plan in Tanzania, and most people, especially those in rural areas, depended for their water on rivers, springs or wells (with no protection against pollution).

Water was affirmed as a basic public service and to be provided free of charge. In 1971 the government initiated a twenty-year project to supply everyone with adequate and safe water. This project was designed to guarantee that every household would have improved water supply within 400m by 1990 and has resulted in the increase of the proportion of households with access to improved water supply from 13.5% in 1970 to 47% at present.

In the early phases of the twenty-year project, heavily equipped water supply facilities outfitted with diesel engines were constructed with aid from abroad. However, the supply of water was frequently interrupted due to equipment breakdowns and shortages of diesel fuel by the middle of the 1970's. It appears that water supply facilities requiring such a relatively high level of technology were not well suited to conditions in Tanzania.

Recently the government has encouraged the construction of low-cost shallow wells and other less expensive types.

Figure IV-1 gives the proportion of rural population receiving improved water supply by region. The percentage of the population

receiving improved water supply in Kilimanjaro, Dar es Salaam, Mtwara and Dodoma was high, while in the arid central regions it was low.

1.2. Women and Water Supply

In Tanzania it is generally a woman's work to fetch water, and this requires the outlay of considerable time and effort. For example, fetching water for two to three hours a day is said to consume about 600 cal, which is 1/3-1/4 of the total energy consumed in a day. Such labour reduces the amount of time women can spend caring for children and thus contributes indirectly to an increase in infant diseases and deaths. It is also a common cause of complications in pregnant women. Therefore it is to be anticipated that the development of improved water supply will not only result directly in the reduction of infant deaths from digestive infections and intestinal parasites, but also lighten the burden on woman and thus lead indirectly to a reduction in infant or maternal deaths.

1.3. Constraints in the Water Supply

The twenty-year water supply project begun in 1971 was meant to ensure adequate and safe water supply to all Tanzanians by 1991. However, at present only about half of all households have access to a water supply facility, and of those half are said to be not in fact receiving any water because of equipment breakdowns.

The most important reason for the failure of the water supply project is the lack of funding. Only about 2% of the total budget is allocated to water supply. A second reason is the lack of expertise. Because of the shortage of technicians even relatively simple breakdowns cannot be fixed, and the water supply is frequently cut off.

1.4. Water Supply in Mwanza

The study team toured a water supply facility in Mwanza. Water was taken from Lake Victoria. There was no sedimentation or filtering equipment, and although there was chlorination equipment, it was not functioning because the pump for inserting chlorine had broken down. Thus water from Lake Victoria was being supplied to households without undergoing any treatment.

2. Sanitation

2.1. Development of Improved Latrines

The government has not embarked on any substantial nationwide investment in improved rural sanitation, but it began to promote a policy of "one latrine for each household" after an epidemic of cholera in the mid-1970's. As a result, 79% of households now have a latrine according to a Ministry of Health survey. However, surveys conducted in Iringa, Mbeya and Ruvuma revealed that 80% of people used the bush when working in the field and the latrines were not used at night unless they were constructed very close to the main house. This appears to be due to the low awareness of the importance of sanitation.

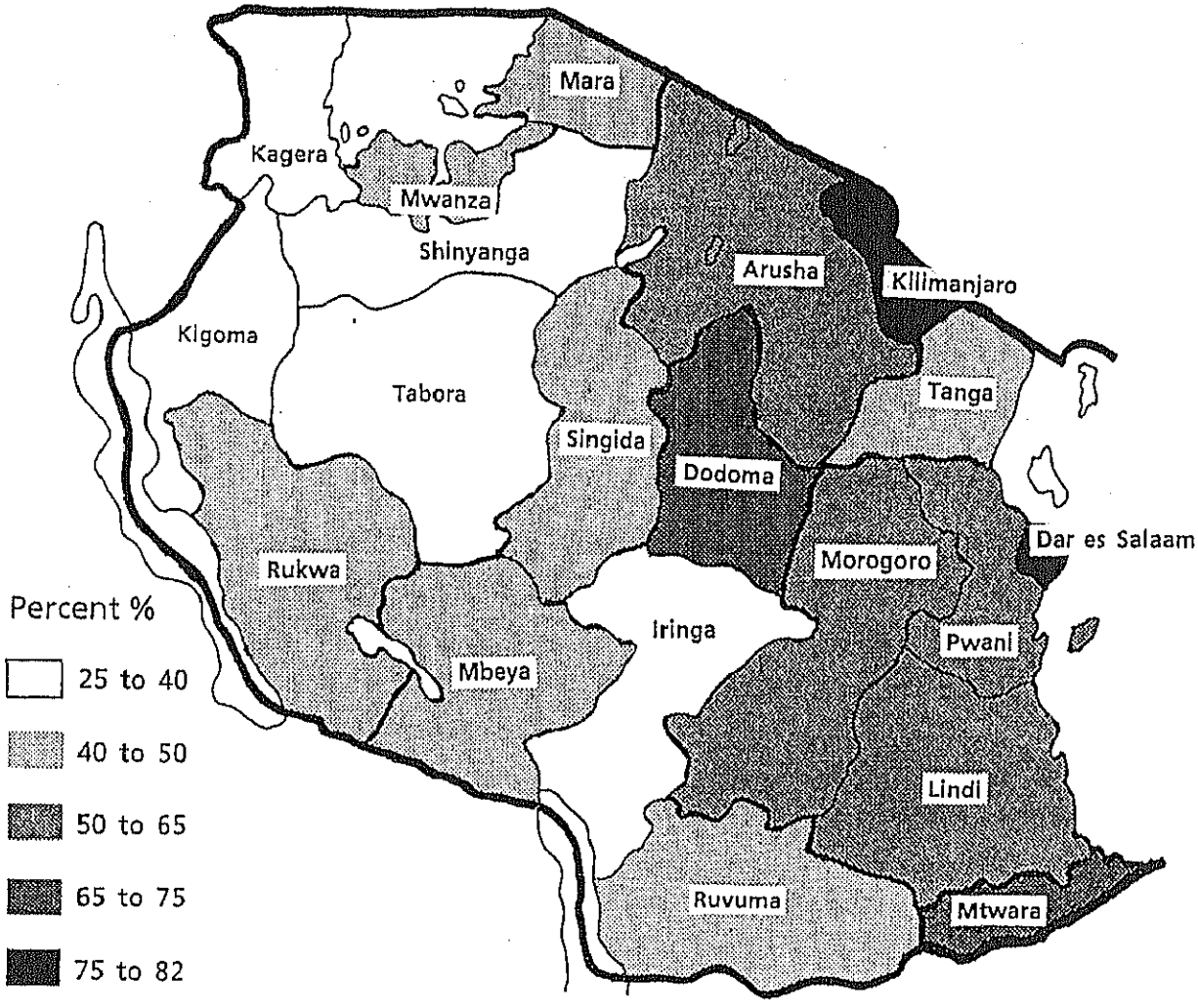
2.2. Sewage Facility in Mwanza

The study team inspected a sewage facility in Mwanza. Sewage is treated by storing it for three weeks, after which it is released into Lake Victoria. The activated sludge process and subsequent chlorination used in Japan was not employed.

2.3. Dump of Solid Waste in Mwanza

The study team inspected a dump of solid waste in Mwanza. The solid waste, which had not been treated at all, was simply left out in the open. The dump was somewhat separated from the urban area, but there were numerous houses in the vicinity, and it seemed to present serious problems to environmental hygiene.

Figure IV-1 Rural population served with improved water supply (1988)



Sources: United Republic of Tanzania, Ministry of Water, "Evaluation of IWSSD in Tanzania," 1989, UNICEF

References

Bushrod, F.M. (1981) The *Anopheles gambiae* Giles complex and Bancroftian filariasis transmission in a Tanzanian coastal village. Ann. trop. Med. Parasit., 75 (1): 93–100.

Cooper-Poole, B. (1986) Preventive of syphilis in Mbeya, Tanzania — The validity of the VDRL as a screening test. East Afr. med. J., 646–650.

Foster, A., & A. Sommer (1987) Corneal ulceration, measles and childhood blindness in Tanzania. Brit. J. Ophthalmol., 71: 331–343.

Gottlich. M.S., D.J. Jeffries, D. Mildvan, A.J. Pinching, T.C, Quinn, & R.A. Weiss (eds.) (1987) Current Topics in AIDS. John Wiley & Sons. 313pp.

Keja, K., C. Chan, E. Brenner. & R. Henderson (1986) Effectiveness of the expanded programme on immunization. Wld. Hlth. statist. Quart., 39(2): 161–170.

Killewo, J.Z.J., D.M.D. Amsi, & F.S. Mhalu (1989) An investigation of a cholera in Butiama village of the Mara region, Tanzania. J. diarrh. Dis. Res., 7: 13–17.

Kilonzo, B.S. (1989) The fate of plague control in Tanzania with special reference to the Lushoto focus. 1989 Proceeding of Annual Conference/Tanzania Public Health Association.

Lwambo, N.J.S. (1988) Transmission of urinary schistosomiasis in Sukumaland, Tanzania. 1. Snail infection rates and incidence of infection in school children. J. Helminth., 62(3): 213–217.

Macpherson, C.N.L., P.S. Craig, T. Romig, E. Zeyhle, & H. Watschinger (1989) Observations on human echinococcosis (hydatidosis) and evaluation of transmission factors in the Maasai of northern Tanzania. Ann. trop. Med. Parasit., 83(5): 489–497.

McMahon, J.E., S.A. Magayuka, N. Kolstrup, F.W. Mosha, F.M. Bushrod, D.E. Abaru, & J.H. Bryan (1981) Studies on the transmission and prevalence of Bancroftian filariasis in four costal villages of Tanzania. Ann. trop. Med. Parasit., 75(4): 415–431.

Msamanga, G.I., & K.J. Pallangyo (1987) Characterization of Tanzanian outpatient presenting with sexually transmitted diseases. East Afr. med. J., 31–36.

Nakabayashi, T., D. Katamine, F. Murakami, O. Suenaga, I. Motomura, A. Miyata, & H. Noda (1967) Examination on malaria in African residents at Kigoma and Ilaagala in the westernmost district of Tanzania (East Africa). End. Dis. Bull. Nagasaki Univ., 8(4): 210–218. (In Japanese with English summary)

Neuvians, D., F.D.E. Mtango, & A.A. Kielmann (1988) The burden of disease

among preschool children from rural Tanzania. Trop. Med. Parasit., 39(1): 9–13.

Nkya, W.M.M.M., D.G. Shija, & A.P.G. Mayala (1986) *Schistosoma haematobium*: effect of non-schistosomicidal drugs (tetracycline and sulphadimidine) on schoolchildren. Trans. R. soc. trop. Med. Hyg., 80(1): 25–28.

Ohara, H., S. Tani, M. Owri, & I. Ebisawa (1984) Diseases and laboratory findings of Japanese staying long periods in tropical and subtropical countries — Three year study on the Japan Overseas Cooperation Volunteers. Japan. J. trop. Med. Hyg., 12(2): 75–87.

Pedersen, E.M., & N. Kolstrup (1986) The epidemiology of onchocerciasis in the Tukuyu Valley, South West Tanzania. Trop. Med. Parasit., 37(1): 35–38.

Pedersen, E.M., & B.T.A. Maegga (1985) Quantitative studies on the transmission of *Onchocerca volvulus* by *Simulium damnosum* s. l. in the Tukuyu Valley, South West Tanzania. Trop. Med. Parasit., 36(4): 249–252.

Procunier, W.S., A.I.S. Muro, A.J. Shelley, J.N. Raybould, & B.T.A. Maegga (1988) Cytological identification of members of the *Simulium neavei* group (Diptera: Simuliidae): vector(s) of human onchocerciasis in the eastern Usambara Mountains of Tanzania. Trop. Med. Parasit., 39(1): 80.

Procunier, W.S., B.T.A. Maegga, J.N. Raybould, A.I.S. Muro, & A.J. Shelley (1987) Cytological identification of anthropophilic *Simulium damnosum* kibwezi form (Diptera: Simuliidae): a potential vector of onchocerciasis in north eastern Tanzania. Trop. Med. Parasit., 38(1): 70.

Rugemalila, J.B., J. Asila, & A. Chimbe (1984) Randomized comparative trials of single doses of the newer antischistosomal drugs at Mwanza, Tanzania. I. Praziquantel and oxamniquine for the treatment of schistosomiasis mansoni. J. trop. Med. Hyg., 87(6): 231–235.

Sarde, R.K., C.M. Kihamia, J.N. Minjas, & L.F. Mahikwano (1987) Haematuria and proteinuria in urinary schistosomiasis: Response to therapy with praziquantel in Tanzanian children. Trop. Med. Parasit., 38(1): 31–33.

WHO, Division of Control of Tropical Diseases (1990) World malaria situation, 1988. Wld. Hlth. statist. Quart., 43(1): 68–79.

WHO Expert Committee (1984) The leishmaniases. WHO techn. Rept. Ser., (701), 140 pp.

WHO Expert Committee (1984) Lymphatic Filariasis. WHO techn. Rept. Ser., (702), 112 pp.

WHO Expert Committee (1985) The Control of Schistosomiasis. WHO techn. Rept. Ser., (728), 113 pp.

WHO Expert Committee (1986) Resistance of Vectors and Reservoirs of Disease to

Pesticides. WHO techn. Rept. Ser., (737), 87 pp.
WHO Expert Committee (1986) Epidemiology and Control of African Trypanpsomiasis. WHO techn. Rept. Ser., (739), 127 pp.
WHO Expert Committee (1987) WHO Expert Committee on Onchocerciasis. WHO techn. Rept. Ser., (752), 167 pp.
WHO Malaria Action Programme (1986) World malaria situation 1984. Wld. Hlth. statist. Quart., 39 (2): 171–205.
WHO Malaria Action Programme (1987) World malaria situation 1985. Wld. Hlth. statist. Quart., 40 (2): 142–170.
WHO Malaria Action Programme (1988) Malaria control activities in the last 40 years. Wld. Hlth. statist. Quart., 41 (1): 64–73.
WHO Parasitic Diseases Programme (1986) Major parasitic infections: a global review. Wld. Hlth. statist. Quart., 39 (2): 145–160.
WHO Scientific Group (1990) Practical Chemotherapy of Malaria. WHO techn. Rept. Ser., (805), 141 pp.

Bukumbi Hospital (1989) Bukumbi Hospital Annual Report.
Bureau of Statistics, Ministry of Finance, Economic Affairs and Planning (1989) Tanzania Sensa 1988–1988 Population Census Preliminary Report. United Republic of Tanzania.
DANIDA (1990) Primary Health Care Support: Expanded Programme on Immunization (EPI) Mainland Tanzania.
DANIDA (1990) Primary Health Care Support Programme. Strengthening and Decentralization of Health Education Activities.
The Economist Intelligence Unit (1990) Tanzania, Mozambique/Country Report, No. 4, 38 pp.
Epidemiology and Communicable Diseases Control Unit, Ministry of Health, Tanzania Mainland (1990) National Malaria Control Programme, Plan of Operation 1990–1995. Communicable Diseases Control Series No. 2, United Republic of Tanzania, 122 pp.
Government of the United Republic of Tanzania and United Nations Children's Fund (UNICEF) (1985) Analysis of the Situation of Children and Women. 265 pp.
Government of the United Republic of Tanzania and United Nations Children's Fund (UNICEF) (1990) Women and Children in Tanzania. A Situation Analysis. 169 pp.
Government of the United Republic of Tanzania and United Nations Children's Fund (UNICEF) (1990) EDP.

Ministry of Health (1990) Overview of AIDS Control Activities up to September 1990, Workplan and Budget, 1st January-31st December 1991.

Ministry of Health (1989) Tuberculosis and Leprosy Programme Annual Report.

Muhimbili Medical Center (1987) Handbook.

NIMR, 9th Annual Joint Scientific Conference and Workshop, Programme & Abstracts, 1–5 October 1990.

A Report of the Activities of the Department of Microbiology/Immunology, Muhimbili Medical Centre, for the period 1st July 1988–30 June 1989.