Bull. Org. mond. Santé
Bull. Wld Hlth Org. 1960, **22**, 439-467

Health and Morbidity Survey, Seychelles, 1956-57

A. J. W. SPITZ, M.D., D.T.M. & H. [1]

Adequate knowledge of existing health and morbidity conditions is the basis for all planning of future health services. For this reason, a health and morbidity survey of the population of the Seychelles was carried out in 1956-57 under the joint auspices of the Seychelles Government and the World Health Organization. Statistical sampling methods were used and the information was obtained by the household interview method. Health, morbidity and relevant demographic data were thus disclosed for the first time for Seychelles. Basic information was obtained on: general morbidity of the population, including dental and nutritional status, malnutrition, incidence of intestinal diseases and other easily diagnosable conditions; growth and weight curves of children up to the age of 16; haemoglobin levels; erythrocyte sedimentation rates; general living conditions such as housing and overcrowding, social status and latrine arrangements; the connexion of soil pollution with the incidence of amoebiasis and helminthiasis; and lastly, the incidence of the sickle cell trait, eosinophilia and positive serological reactions to the Chediak test (for manifest or latent syphilis). The findings are presented with a minimum of remarks and interpretation.

OBJECTIVES OF THE SURVEY

In 1953, the Seychelles Government approached the World Health Organization for assistance in a project of which one of the principal purposes was to be a reduction in the incidence of intestinal parasitic diseases in the islands. The plan of operation for this project stipulated, among other things, that intensive study of all aspects of the prevalent intestinal diseases should be made. The true incidence of these diseases and the existence, or absence, of possible " pockets of infection " were to be explored.

A population census was taken in 1947, and birth and death registration is now compulsory. However, hardly any information was available on such other factors as the general health and nutritional status of the people, existence or extent of malnutrition, relative prevalence of various fatal or non-fatal diseases, and so forth.

For this reason and in conformity with the stipulated WHO plan of operations, it was decided in the first place to undertake a general health survey of the islands, with special emphasis on determining the morbidity status. More specifically, the objectives of this present survey were to obtain basic information on: general morbidity of the population, including dental and nutritional status, malnutrition, incidence of intestinal diseases and other easily diagnosable conditions: growth and weight curves of children up to the age of 16; haemoglobin levels, erythrocyte sedimentation rates and correlation of these findings with one another and also with general living conditions and sanitation, such as housing, overcrowding, social status and latrine arrangements; the connexion of water and/or soil pollution with the incidence of amoebiasis and helminthiasis; and lastly, the incidence of the sickle cell trait, eosinophilia and positive serological reactions to the Chediak test (i.e., for manifest or latent syphilis).

The survey was the first of its kind ever contemplated and carried out on this scale in the Seychelles Islands.

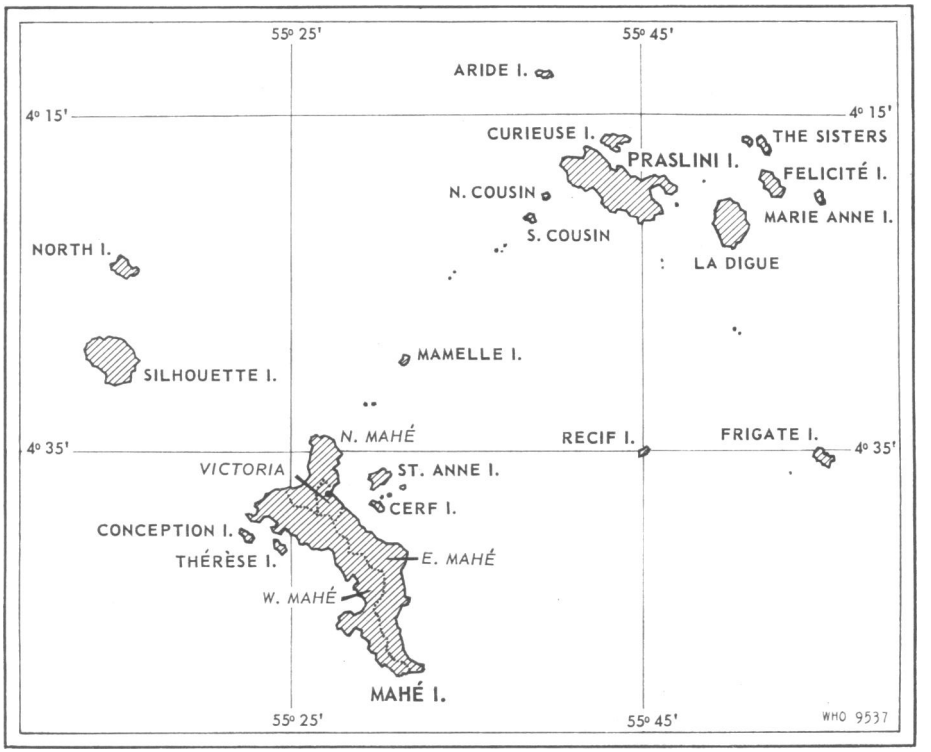
CONDITIONS IN SEYCHELLES

GEOGRAPHICAL DESCRIPTION

The Seychelles (Fig. 1) are a group of 92 islands in the Indian Ocean between the parallels of latitude 4°S and 10°S and separated from the African mainland by roughly 1000 nautical miles. The main islands are granitic and rise rather steeply out of the sea, leaving only a narrow coastal shelf. The outlying islands (Amirantes and Aldabras) are of coral formation and are inhabited only by a more or less

[1] Public Health Administrator, WHO Regional Office for Africa, Brazzaville, Republic of Congo; formerly, Senior Medical Officer, WHO Team, Seychelles

FIG. 1
SEYCHELLES ISLANDS



mobile labour population. Only about 40 out of the 92 islands are inhabited. The total population reached about 40 000 during 1956, with about 34 000 living on Mahé, 3000 on Praslin, 1800 on La Digue and 700 on Silhouette. The other inhabited islands have between a handful of people and about 100. All the islands together cover an area of 405 km², and the population density is 91 per km².

Victoria, the capital, with a population of approximately 12 000, is situated on the eastern side of Mahé, which is the largest island, being about 26 km long and 5-8 km wide with a surface area of 141 km².

The climate is largely influenced by the so-called monsoons (actually trade winds). Continuous south-east winds blow from May to October (dry season) and then change to north-west and become erratic. The period from November to February is considered the rainy season. Rainfall amounts on an average to 2250 mm on the coast, 3000 mm at 200 m altitude, and 3750 mm at 600 m.

In spite of the smallness of the islands, rainfall varies greatly from place to place, and particularly from one side of an island to another (windward or leeward). The temperature range on the coast is 68°F-88°F (20°-31°C). Temperatures over 90°F are rare. Humidity is high, particularly in the rainy season.

HEALTH AND DEMOGRAPHIC CONDITIONS

When the French took possession of the islands in 1756, there was no indigenous population. Soon the settlers brought in African slaves, whose descendants now form the majority of the population. In the nineteenth and twentieth centuries, Indian and Chinese merchants moved in and most of the islands' commerce and trade is now in their hands. A great deal of intermarriage between the various races has taken place, so that differentiation (even by anthropological criteria alone) is difficult.

TABLE 1
SELECTED VITAL STATISTICS FOR SEYCHELLES

	1956	1955	1954
Estimated population at mid-year	40 449	39 722	38 638
Total number of registered births	1 493	1 338	1 255
of which:			
live-births	1 458	1 303	1 205
stillbirths	35	35	50
Live-birth rate per 1000 of population	36.0	32.8	31.2
Total number of registered deaths	468	456	456
Crude death-rate per 1000 of population	11.6	11.5	11.8
Total number of deaths of infants under the age of 1 year	79	99	66
Infantile mortality rate per 1000 live-births	54.2	76.0	54.8
Proportion of deaths at age 50 years and over to total deaths	—	49.1	—

Some vital statistics are given in Table 1 as computed and calculated by the Seychelles Health Department.

The major tropical scourges, such as malaria, leishmaniasis, yellow fever, sleeping sickness, yaws and bilharziasis, are unknown in Seychelles. This may be explained in some cases (malaria, sleeping sickness, leishmaniasis, etc.) by the absence of suitable vectors; but why, for instance, diseases like yaws and even enteric fever (typhoid, paratyphoid) are absent is difficult to understand and will require further study. In 1957 there were 50 cases of leprosy in the colony, 33 of whom were isolated at the leper settlement on Curieuse Island; the remaining 17 were on parole. About 100 cases of pulmonary tuberculosis were on the registers of the Health Department at the beginning of 1957.

Whooping cough and diphtheria are known to have existed for some time past; both epidemics and sporadic outbreaks of these diseases, as well as of measles, chickenpox and influenza, occur occasionally. Of major concern have been the venereal diseases, but they are believed to have been brought reasonably well in check.

The main problems are the intestinal diseases, particularly helminthiasis and various types of protozoal infections (amoebic dysentery, giardiasis and balantidiasis).

SOCIO-ECONOMIC CONDITIONS

The social stratification is rather simple: the so-called " big planters " constitute a relatively small minority as against a vast majority of poor labourers (mostly the descendants of the slaves). There is a very small middle class, formed mainly by the civil servants, a few artisans and some owners of small-holdings.

Nearly all social gatherings take place on religious feast days, about 90% of the population being Roman Catholic. There is little community life in the European sense of the word, or even in accordance with customs of continental Africa. Apart from Victoria, the capital, there are hardly any well-defined agglomerations of population; there are no actual villages and no village elders or headmen. Practically every house is an entity in itself. The Seychellois are friendly people and are able to perform heavy physical work.

The growing of the coconut palm and production of copra is the main occupation and by far the most important source of income and revenue. There is a much smaller production of cinnamon oil, quills, vanilla and patchouli. The staple diet consists of fish and rice; rice is wholly imported. Some potential economic resources—the abundance of fish, intensive growing of food and timber and tourism—will probably be developed in the course of time.

SCOPE OF THE SURVEY

The scope of the survey was limited by the amount of personnel and laboratory equipment available. The field work was carried out largely by two people only—namely: the medical officer, who was responsible for the direction and organization of the work and administrative matters, for examining the surveyees and for gathering all pertinent data on specially designed cards; and the laboratory technologist, who was responsible for collecting and examining the required samples of blood, stools, soils and water.

Auxiliary workers consisted of local sanitary inspectors who were responsible for notifying the surveyees, ensuring their co-operation, and listing

them; and local public health nurses, who acted as interpreters when necessary, gave general aid to the medical officer and the laboratory technologist, and helped to create an " accommodating atmosphere ", especially among the women.

Of the auxiliary workers only one of each group assisted at any given time; that is to say, every sanitary inspector and public health nurse helped in his or her individual district. Thus the complete team at any one place consisted of four people, of whom the doctor and laboratory technologist were the same throughout the survey, which extended over a period of one year (May 1956 to May 1957).

Of the main granitic islands, Mahé, Praslin, La Digue and Silhouette were examined, and D'Arros, Poivre and Alphonse of the outlying coral islands, thus covering about 98% of the total population.

As previously mentioned, one of the objectives of the survey was to find out whether there existed " pockets of infection " with intestinal diseases. For this reason the main, larger islands were divided into sections which, for geographical reasons, varied in size and population. These areas were examined one by one.

Quantitative tests of stools are an important source of information on the severity of intestinal parasitism in a given area, but, unfortunately, they were beyond the scope of the available staff and laboratory equipment. For information of this sort, it is necessary to depend on the " multiple infection index ", which is defined as the average number of different parasites per person in a given area.

A carefully planned propaganda campaign through public film shows, publications in the local press, personal and public talks, by stimulating the interest of the Government, Church and members of the Legislative Council, and through the Health Advisory Board contributed much to the success of the survey. It was necessary to obtain the Government's and private employers' sanction to avoid wage deductions being made for working-hours lost on account of the survey. Another important factor contributing to the success was the offer of free treatment for infectious diseases discovered.

SAMPLING PROCEDURES

In view of the staff and facilities available, it was decided to draw and study a representative sample of between 5000 and 6000 people. A figure of less than 5000 would have been too small, as it would not have produced sufficiently large groups in the various areas; and more than 6000 would have been too unwieldy to handle. This meant that about one-seventh of the total population (40 449 in mid-1956) was surveyed.

In the absence of population registers, the unit of sampling was the house, and a systematic sample was drawn of every seventh house. In the capital, Victoria, all houses are consecutively numbered and bear the number on a small metal plate. In order to obtain the fullest possible co-operation of the people, all surveyees were examined in their homes.

Outside Victoria, the houses are not numbered and no records exist as to their total number. The sanitary inspector was instructed first to count all houses in a given well-defined sector (corresponding to a survey area) and to classify them as good, fair or poor. Such a stratification was no doubt subjective but it helped to study the various features in relation to environmental conditions. In each stratum, one-seventh of the houses were then taken. Any shop, church, office or vacant house found in the selected sample was omitted. If, however, the inhabitants of a house were unwilling to be examined (a relatively rare occurrence) a similar house nearby was substituted but the counting was carried on as if the proper house had been surveyed.

If certain people were not present on examination day (usually for professional reasons) every effort was made to trace them somehow. For instance, if any person had been taken ill and had been admitted to hospital since the sanitary inspector had listed them, they were examined in the hospital.

In all, 984 houses were selected in the sample. Of the 5766 inhabitants of the houses, examinations were carried out on 5587. If this figure of 5766 is multiplied by 7 (the sampling rate) we get a figure of 40 362, which agrees well with the Health Department's mid-year estimate of population for 1956 (40 499). As is shown later, other figures obtained by the sampling method are also well in accord with the figures published by the Civil Status Officer.

ORGANIZATION OF FIELD WORK

Field work was organized along the following lines. As mentioned before, a sanitary inspector was sent out a week ahead to inform and list the surveyees. Each Monday the sanitary inspector recorded in a book the people who were to be examined the following Monday, on Tuesday for the following Tuesday, and so forth. At the same time, every person was handed a waxed cardboard container (ice-cream cup) and instructed to submit a fresh stool specimen on the day of the examination; this was collected by the actual survey team. The collection of stools presented no great difficulty and the people co-operated readily. The excellent co-operation is illustrated by the fact that out of a total of 5589 surveyees, only two stools remained uncollected. If a person had been unable to produce a stool on the particular morning on which it was required, it was collected on one of the following days. In only a few cases was it necessary to send out sanitary inspectors or public health nurses to urge the submission of the faecal specimen. The number of persons examined daily was between 30 and 35.

RESPONSIBILITIES OF THE MEDICAL OFFICER

The doctor of the survey team examined every person for the following:

Age

This was recorded for children in months up to 24 months; in half years up to the age of under 15 years; thereafter in groups of 15-19, 20-29, 30-39, etc., and over 80, always taking the age at the last birthday. As registration of births and deaths is compulsory in Seychelles, the determination of the exact age of children presented no difficulties. In cases of doubt, registration certificates were consulted. For some old people who had forgotten their age, comparison of outstanding events in their lives with special historical ones allowed the determination within a limit of error of $\pm$ 5 years.

Height

This was taken to the nearest inch for adults, and to the nearest eighth of an inch for children up to 16 years. All recordings were made without shoes. A special height recorder with a wooden platform was used.

Weight

This was taken to the nearest pound for adults or half pound for children. A spring-type weighing machine (bathroom scale) was used, which was checked for accuracy daily over its whole range. Only the minimum of clothing was allowed when recording the weight of a person.

Nutritional status

A rough estimate was made of the amount of subcutaneous fat by pinching between fingers and thumb a fold of skin over the middle ribs in the mid-axillary line. A fold of about one finger's thickness was considered " normal nutrition ", a thicker fold was classed as " obese "; a fold less than one finger's thickness was called " thin "; total absence of fat with the ribs plainly visible was regarded as " emaciated ". The thickness of the fold was calculated according to the fingers of the examiner for adults and the fingers of the examinee for children. This rough method had to be used because of the lack of a skin caliper. The latter would certainly have given more accurate results. This instrument should be used whenever possible, as quite obviously our method has its defects, being not objective enough for an accurate estimation of the subcutaneous fat.

Malnutrition

This was considered to imply an imbalance of dietary constituents without regard to quantities consumed. Thus subnutrition and malnutrition may exist independently of each other. It was decided to note only the easily recognized and least equivocal signs at first, as defined by the Joint FAO/WHO Expert Committee on Nutrition.[1]

As malnutrition in Seychelles was found to be limited to borderline cases rather than to frank cases of vitamin deficiency, it soon became desirable in the course of the survey to note also less unequivocal and less well-defined signs, such as crackled skin, early indications of mosaic skin, etc. These were found to be quite common and hardly attributable to atmospheric conditions or sea water.

The general degree of malnutrition was then classified into two grades of severity—grade I,

[1] Joint FAO/WHO Expert Committee on Nutrition (1951) *Wld Hlth Org. techn. Rep. Ser.*, **44**

showing ill-defined signs only; and grade II, showing well-defined signs and ill-defined signs, if any). In this survey, only a few cases were observed showing more than one sign.

Teeth

The dental status was classified into four groups:

Grade I: perfect teeth
Grade II: 1-2 teeth carious
Grade III: 3-5 teeth carious
Grade IV: 6 or more teeth carious.

Missing teeth were assumed to be lost through caries; these and filled teeth were counted as carious. This did not apply, of course, to milk teeth lost naturally.

Clinical examination

All easily diagnosable conditions were recorded; but a particular record was made in respect of the following, which presented themselves in relatively large numbers:

(1) all abnormal findings in the lungs, including tuberculosis, but excluding bronchial asthma;

(2) bronchial asthma;

(3) all abnormal findings of the heart (murmurs bruits, enlargements, irregular pulse, etc.);

(4) all inflammatory conditions of the eyes, particularly a condition widely encountered which was diagnosed as folliculosis (follicular conjunctivitis of the lower lids); [1]

(5) all degenerative conditions of the eyes (pterygium, pinguecula, arcus senilis, cataract, etc.);

(6) all hernias (umbilical, inguinal, etc.);

(7) uterine fibroids (as far as diagnosable by abdominal palpation);

(8) all infectious conditions of the skin and subcutaneous tissues (furunculosis, acne vulgaris, scabies, impetigo contagiosa, other pyodermias, etc.);

(9) all mycotic infections of the skin (ringworm, pityriases, epidermophytoses, erythrasma, etc.);

(10) diarrhoea;

(11) pregnancy (from about the third month onward).

Ethnic group

The following distinctions according to anthropological appearance were recorded:

(1) predominantly African;
(2) predominantly Caucasian (European);
(3) predominantly Indian;
(4) predominantly Chinese;
(5) ill-defined.

It is necessary to emphasize that classification depended on the physical appearance of a person, not on his actual descendancy. In cases of doubt the individual was included in the category "ill-defined".

Fertility

All women over 15 years were asked the following questions (husbands and other relatives assisting with the answers, if possible supported by birth and death registration certificates):

(*a*) How many male and female children were born ?
(*b*) When were they born ?
(*c*) Which ones are alive, and which ones have died ?
(*d*) When did they die and what was their age at death ?
(*e*) How many miscarriages and stillbirths ?
(*f*) Present pregnancy—if any ?

Eliciting the necessary information was complicated in old people by forgetfulness, and in some cases by deliberate misrepresentation and other factors; and it required a good deal of patience and ingenuity to ascertain the correct ages of deceased children, the dates of their birth and death, etc.

Social and environmental sanitation status of household

Social status. This was classified as good, fair, or poor, the classification being made rather arbitrarily, as straightforward questions as to a person's or family's income would have antagonized the people. However, by taking note of the general appearance, clothes, amount of furniture, type of house, profession, and by asking a few concealed questions woven into the conversation (such as, how the work or business was proceeding, whether wages or salaries were sufficient to feed and clothe the children satisfactorily, etc), judgement was usually quite easy. In some cases of doubt the sanitary inspectors or public health nurses knew the answers.

[1] This follicular conjunctivitis of the lower lids has recently been suggested to be a sign of malnutrition (vitamin deficiency).

Housing. The following classification was adopted:

Good: well constructed and maintained; good wooden or concrete floor; good stone foundations, good walls, good ventilation, good roof of tiles or perfect thatch;

Fair: as above, but poorly maintained, or less well constructed but well maintained;

Poor: below above standards (poorly constructed and poorly maintained; poor wooden floors, mostly rotten, and incomplete; poor walls of palm leaves; poor roof, maintenance almost lacking).

Density (overcrowding). The criteria in respect of density were:

Good: floor area more than 50 square feet (approx. 4.5 m^2) per person living in house;

Fair: floor area less than 50 square feet per person living in house but not less than 25 square feet (2.3 m^2);

Poor: floor area less than 25 square feet per person.

Latrines. These were judged as follows:

Good: well constructed and maintained; good concrete or wooden floor, sufficient depth; sited according to existing legislation and hygienic principles; fly-proof; no smell; no nuisance;

Fair: as above, but less well constructed or maintained; or one criterion not fulfilled;

Poor: more criteria not fulfilled.

RESPONSIBILITIES OF LABORATORY TECHNOLOGIST

The laboratory technologist was responsible for the following examinations:

Blood

Examinations for:

(*a*) haemoglobin (by Sahli method):

(*b*) erythrocyte sedimentation rate (determined with Hawksley micro-sedimentometers);

(*c*) parasites and eosinophilia (by thick smear);

(*d*) sickle cell trait (Williams & Mackey technique, using sodium hydrosulfate as reductor agent);

(*e*) serological reaction to the Chediak slide test (performed on thick smears using Meinicke antigen).

In connexion with this last point, the original idea was to check all positive or doubtful positive Chediak tests by the Kahn, Meinicke and VDRL tests. However, it soon proved impossible to persuade all people to submit to a blood test where the blood was drawn with a syringe from a vein. They all knew it had something to do with "syphilis" and therefore did not want to have anything to do with it. In order to maintain good public co-operation, the idea had to be dropped; and in this report only clearly positive Chediaks are recorded.

Stools

Examinations for the presence of:
Endamoeba histolytica (trophozoites);
Endamoeba histolytica (cysts);
Giardia lamblia;
Balantidium coli;
Hookworm eggs or larvae (*Ancylostoma duodenale, Necator americanus*);
Roundworm eggs (*Ascaris lumbricoides*);
Strongyloides stercoralis larvae;
Whipworm eggs (*Trichuris trichiura*);
Pus and/or red blood cells.

All stools were examined after concentrations had been made by Willis's flotation method, except in cases where direct examination alone had already revealed the presence of the parasites being sought.

Soil samples

These were examined for the presence of worms' eggs or larvae and/or amoebic cysts. (Here a method was used as described by Hadler, which is an adaptation of the Caldwell & Caldwell technique modified by Spindler.)

The soil samples were taken from the ground in the immediate vicinity of the house and only one sample could be taken from each house.

Water samples

Similar examinations were made for water samples as for soil samples. No bacteriological examinations were done.

The water samples were taken from the source from which a house was supplied (tap, bamboo pipe, stream or spring). The technique used was a special one developed by the laboratory technologist and described elsewhere. Unfortunately, the examination of water samples had to be stopped outside Victoria owing to lack of staff.

RECORDING

In order to facilitate subsequent processing of the data, the original record of all findings was transferred to separate marginal punch cards (Copechat), one for each person, and specially designed and printed for this survey.

RESULTS OF THE SURVEY

The primary object of the survey was fact-finding in respect of the state of health and factors influencing the health of the people. In the case of the latter, there is considerable scope for the formulation of theories or hypotheses on the basis of various differences observed among population groups. However, in this report, an attempt is made first of all to set out the main findings of the survey with the minimum of remarks.

The detailed nature of the data collected no doubt permits a more elaborate discussion of some specific aspects. This will be the subject of later studies.

DEMOGRAPHY

Age and sex distribution

Age of population. The age distribution of the sample is in fairly good agreement with the figures obtained by the 1947 census. The oldest person found in the survey was a man reported to be 104 years of age. Fourteen years earlier, on his 90th birthday, he had been honoured by an award from the Governor. This event helped to ascertain his age. The youngest surveyee was a female baby born a few hours before the survey team's arrival.

In Table 2 the percentage distribution by age and sex is calculated including 179 people who were listed by the sanitary inspectors but were absent on the examination day. (The numbers of missing persons by area and their age and sex distribution are given in Appendix Tables 1 and 2.)

From Table 2 and Fig. 2, it can be seen that 52.1 % of the total population sample are below the age of 20 years. The population of Seychelles is very young. Table 3, showing the mean age in various countries, serves to illustrate this point.

FIG. 2
AGE AND SEX DISTRIBUTION IN THE SEYCHELLES

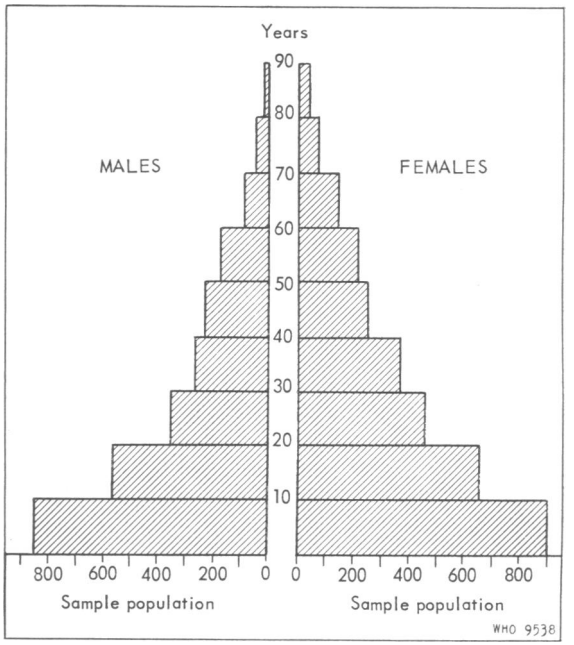


TABLE 2
PERCENTAGE DISTRIBUTION OF TOTAL SAMPLE OF SEYCHELLES POPULATION BY AGE AND SEX

Age-group (years)	Male	Female	Total
0-9	32.8	28.5	30.5
10-19	22.4	21.0	21.6
20-29	13.4	14.8	14.2
30-39	10.5	11.9	11.2
40-49	8.7	8.4	8.5
50-59	7.0	6.9	7.0
60-69	3.2	5.2	4.3
70-79	1.3	2.4	1.9
80 +	0.6	1.0	0.8
All ages	100	100	100

TABLE 3
MEAN AGE IN VARIOUS COUNTRIES

Country	Mean age in years
Seychelles (1956-57)	25
Egypt (1947)	25
Mauritius (1952)	24
England & Wales (1951)	36
France (1954)	35
Netherlands (1947)	30

The same can be demonstrated by comparing the percentage distribution of the population's age in eight selected countries. This is shown in Fig. 3. Of the eight selected countries, there is a striking similarity in the percentage distribution of the population's age between Seychelles, Ceylon, Egypt and Mauritius. Generally speaking, the proportionate size of the main groups of population (15-59 years) is rather similar in all countries; the differences are made up by the young and old age-groups. In Seychelles, the young age-group, 0-15 years, is almost double the size of the same group in England and Wales or France. The same holds true in reverse in the old-age group of 60 years and over.

Sex distribution of the population. The sexes are not evenly distributed in Seychelles. As is the case in most countries, males preponderate in the early age-groups (Table 4).

FIG. 3
PERCENTAGE DISTRIBUTION OF POPULATION BY AGE IN VARIOUS COUNTRIES

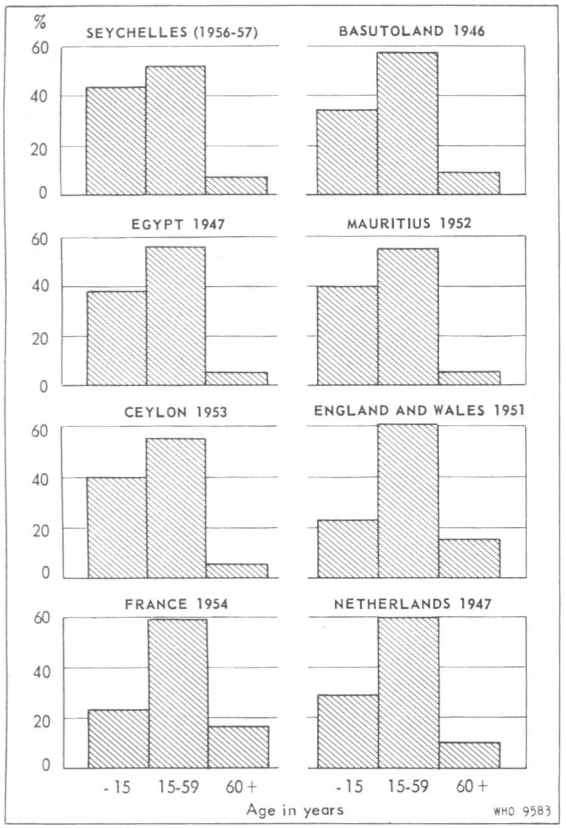


TABLE 4
SEX RATIO (MALES PER 100 FEMALES) IN SEYCHELLES AND VARIOUS OTHER COUNTRIES

Country	All ages	Age-groups (years)		
		-15	15-19	60+
Seychelles (1956-57)	84	100	78	51
Egypt (1947)	98	102	97	84
Mauritius (1952)	101	101	106	66
Basutoland (1946)	78	99	67	70
England & Wales (1951)	92	104	94	72
France (1954)	93	104	98	65
Netherlands (1947)	99	105	98	92

The explanation for the unusual preponderance of females among adults is probably twofold: firstly, a considerable number of young males emigrate to East Africa and other parts of the world; and secondly, a number of young males were lost in the sample on the various smaller islands to which the survey was not extended but which have a marked preponderance of males (labour force).

Age and sex distribution of the population by area. The sex distribution of the total population sample by areas is shown in Table 5.

The higher sex ratio of males to females in West Mahé may be explained by the fact that the large Government and other estates are in this area with a preponderance of male labourers.

TABLE 5
SEX DISTRIBUTION OF TOTAL SEYCHELLES POPULATION SAMPLE BY AREA

Area	Total	Male	Female	Sex ratio (males per 100 females)
North Mahé	1 153	533	620	86
Victoria	2 041	900	1 141	79
East Mahé	1 142	526	616	85
West Mahé	683	329	354	93
Other islands	747	348	399	87
Total	5 766	2 636	3 130	84

TABLE 6
PERCENTAGE DISTRIBUTION OF TOTAL SEYCHELLES POPULATION SAMPLE BY AGE IN EACH AREA

Age-group (years)	North Mahé	Victoria	East Mahé	West Mahé	Other islands	Seychelles
-19	51.3	48.9	53.7	52.3	59.3	52.1
20-39	27.6	25.9	23.6	26.9	22.1	25.4
40-59	14.0	17.1	15.9	15.1	13.3	15.5
60+	7.1	8.1	6.7	5.7	5.4	7.0
All ages	100	100	100	100	100	100

Victoria, on the other hand, shows the higher ratio for females usual for town areas all over the world.

Table 6 shows the age distribution of the total population sample by areas.

This table does not reveal any material variation in the age distribution of the population in different areas, save perhaps in " Other islands ", where there is a slight shift towards the younger age-groups; this means that possible differences in other findings in these areas may not be attributable to differences in age distribution.

Ethnic groups

Table 7 gives an analysis of the surveyed population by ethnic group (in this table the 179 people missing on the examination day are excluded).

TABLE 7
PERCENTAGE OF SURVEYED POPULATION IN EACH ETHNIC GROUP

Area	Caucasian (European)	African	Indian	Chinese	Ill-defined	Total
North Mahé	19.0	57.7	2.2	2.2	18.9	100
Victoria	18.1	65.9	3.7	3.9	8.5	100
East Mahé	22.0	55.1	5.1	0.8	16.9	100
West Mahé	21.2	60.5	6.0	—	12.2	100
Other Islands	24.2	63.0	1.5	0.1	11.2	100
Seychelles	20.2	61.1	3.7	2.0	13.0	100

It is necessary to emphasize again that these figures reflect the physical appearance of a person and not his actual descendancy. In cases of doubt the individual was included in the category " ill-defined ".

Fertility

Each woman above the age of 15 years was examined and interrogated by the medical officer for signs of pregnancy. Early pregnancies, especially before the third month, were no doubt frequently missed, but it is believed that from the fourth month onward the findings are fairly complete.

Table 8 gives the pregnancies found in women aged 15-49 years.

The total number of pregnancies discovered in the survey was 127. This figure represents roughly the number of births (including abortions and stillbirths) to be expected per half-year, because, as mentioned before, many pregnancies before the third month were naturally missed, and those diagnosed are therefore pregnancies that will come to term within the next six months. The double figure (254) would thus represent the number of expected births (including abortions) per whole year. This will give a live-birth and stillbirth rate of about 46 per 1000 population. The live-birth rate alone per 1000 as reported by the Health Department was 36.0 for the year 1956 (Table 1). Taking into account the great probability of non-registration of a number of births of babies who die within a few hours to a few days of birth, and the loss through abortions and stillbirths, the figure obtained in the survey would not appear to be too high.

Table 9 shows the average "family size" per woman with issue in the various age-groups. The

TABLE 8
PREGNANCIES IN WOMEN AGED 15-49 YEARS

Age-group (years)	Female population examined	Number pregnant at survey	Percentage pregnant
15-19	305	17	5.6
20-29	451	69	15.3
30-39	363	35	9.6
40-49	260	6	2.3
15-49	1 379	127	9.3

TABLE 9

NUMBER OF LIVE-BIRTHS PER WOMAN WITH ISSUE

Age-group (years)	Live-births per woman
15-19	1.2
20-29	2.6
30-39	4.7
40-49	5.7
50-59	6.4
60-69	5.1
70-79	6.0
80+	5.5

average number of live children born to women who have reached their child-bearing limit is around 6. A comparison of fertility rates in various countries is given in Table 10.

TABLE 10

FERTILITY RATES [a] IN VARIOUS COUNTRIES

Country	Fertility
Costa Rica (1953-55)	22.3
Egypt (1952-54)	19.5
Seychelles (1956-57)	17.6
Ceylon (1953-55)	15.7
USA (1953-55)	10.2
England and Wales (1953-55)	6.2
Austria (1953-55)	6.0

[a] Average annual number of births per 100 women of the age-group 15-49. For Seychelles the rate is based on the number of pregnancies diagnosed during the survey but has not been adjusted for abortions or stillbirths.

Table 11 shows the distribution of pregnancies as encountered in the survey by ethnic groups.

From this table it would appear that African and Indian women show a slightly higher fertility rate than Caucasian or Chinese women or the "ill-defined". It would further appear that African and Indian women begin bearing children at an earlier age and continue to do so into older age than Caucasian women. However, it must be pointed out that the figures are small in some of the groups and interpretation must be cautious.

TABLE 11

DISTRIBUTION OF PREGNANCIES BY ETHNIC GROUP

Age-group (years)	African	Caucasian (European)	Indian	Chinese	Ill-defined	All races
15-19	12	1	1	—	3	17
20-29	44	13	3	2	7	69
30-39	21	8	1	—	5	35
40-49	4	—	2	—	—	6
Total	81	22	7	2	15	127
No. of pregnancies in ethnic group as percentage of total pregnancies	63.8	17.3	5.5	1.6	11.8	100
Ethnic group as percentage of total population	61.1	20.2	2.7	2.0	13.0	100

Furthermore, the comparison would be affected if the proportion of the female population in the reproductive age varied from one ethnic group to another.

Pregnancies according to social status of the women are given in Table 12.

TABLE 12

PREGNANCIES BY SOCIAL STATUS [a]

Age-group (years)	Good	Fair	Poor	Total
15-19	—	1	16	17
20-29	3	14	52	69
30-39	—	7	28	35
40-49	—	—	6	6
All ages	3	22	102	127
Percentage of total	2.4	17.3	80.3	100.0
Social status group as percentage of total population	4.5	22.2	73.3	100.0

[a] See text (p. 444) for classification of social status.

TABLE 13
LIVE-BIRTHS ACCORDING TO ORDER OF PREGNANCY

Age-group (years)	Order of pregnancy [a]				Total
	1st	2nd +3rd	4th +5th	6th-11th	
15-19	12	5	—	—	17
20-29	18	25	19	7	69
30-39	1	6	9	19	35
40-49	—	1	—	5	6
All ages	31	37	28	31	127

[a] Disregarding previous abortions or stillbirths

This seems in good agreement with what one would expect to find: a higher fertility rate is observed in poor people than in people living in "fair" or "good" social circumstances. Moreover, poor people seem to begin to have children at a younger age and also to continue into older age than their better-off counterparts.

Table 13 shows the order of the pregnancies observed with regard to preceding live-births:

Infant mortality and child mortality

As explained before (see page 444), all women over the age of 15 were asked about their reproductive history—the number of births and the number of children that had died and their ages at death; also whether they had had any miscarriages or stillbirths. From the information obtained it is possible to calculate the infant mortality rate (IMR), the probability of dying before reaching the age of 5 years, which might be called the "child mortality rate" (CMR), and the stillbirth and miscarriage rates, and to observe variations in these rates during the past five or six decades.

TABLE 14
INFANT MORTALITY RATES AND CHILD MORTALITY RATES IN SEYCHELLES FROM BEFORE 1900 TO 1956-57

Decade	Live-births	Deaths under 1 year	Deaths under 5 years	Infant mortality rate [a]	Child mortality rate [a]
Before 1900	60	4	12	66	200
1900-1909	227	26	42	115	185
1910-1919	511	53	82	104	160
1920-1929	794	66	97	83	122
1930-1939	1185	95	140	80	118
1940-1949	1381	104	158	75	114
1950—1956-57	1381	92	123	67	90

[a] Per 1000 live-births

Table 14 shows the gradual drop in the infant mortality rate and child mortality rate over the past six decades.

The low figures for the period before 1900 are certainly inaccurate owing to the small number of women in the survey having given birth to children before 1900 and possibly also to their forgetfulness. The other figures are in excellent agreement with official vital statistics. The average official IMR figure for 1954, 1955 and 1956 is 60.6, but doubtless the survey figures should be expected to be higher because of "natural" omission of registration of deaths of babies occurring within a few days of birth.

In many under-developed countries the child mortality rate is between 400 and 500 per 1000 and is often the double, or at least nearly so, of the infant mortality rate. From a comparison of the figures obtained in the survey it would appear that in Seychelles the diseases of the first year of life are the main killers (infant diarrhoea) whereas the subsequent four years are comparatively less dangerous.

Stillbirths and miscarriages

Normally the stillbirth rate is defined as the number of stillbirths occurring or registered over the total births occurring or registered (usually expressed per 1000).

It would have been extremely difficult, and would have given highly inaccurate results, to attempt to determine the year of occurrence of a stillbirth or a miscarriage. Therefore, it is necessary here to express the stillbirth and miscarriage rates as the number of stillbirths or miscarriages having occurred in all women with children of a given age-group over the total number of live children born by the same women.

Table 15 shows the stillbirth rate and the miscarriage rate of the Seychellois women examined in the survey.

No definite explanation can be offered for the comparatively high wastage of pregnancies in women who at the time of the survey belonged to the age-groups 50-59, 60-69, and 70-79. It may portray a general improvement of health conditions that

TABLE 15
STILLBIRTH RATES AND MISCARRIAGE RATES PER 1000 LIVE-BIRTHS IN SEYCHELLES

Age (years) at time of survey	Total number of:			Stillbirth rate	Abortion rate	Rate of wasted pregnancy
	Live children born	Stillbirths	Abortions			
15-19	27	1	2	33	73	106
20-29	698	26	53	37	76	113
30-39	1354	31	96	23	71	94
40-49	1260	51	99	40	79	119
50-59	1059	50	112	47	106	153
60-69	715	25	80	35	112	147
60-79	384	17	38	44	99	143
80+	(143)	(5)	(2)	(35)	(14)	(49)

has taken place since then. The wastage due to abortions is 7%-8% of all pregnancies in the age-groups 15-49 and 10%-11% thereafter. It is lowest in the age-group 30-39.

Table 16 shows the total number of women with issue and the percentages of them with miscarriages and/or stillbirths.

The gradual increase through the age-groups to a maximum in the age-group 50-59, in which nearly half the women with issue have suffered a wasted pregnancy, has to be explained by the increased chance of miscarriage (and stillbirth) owing to increasing numbers of children born per woman.

It was found interesting to correlate the number of miscarriages and stillbirths to the number of live-births in the same women (i.e., only in women with miscarriages and/or stillbirths) and to determine the average number of wasted pregnancies per woman with issue. This is set out in Table 17.

Whereas the trend in all the columns of this table follows closely the trend in the average number of live children born per woman with issue (Table 9),

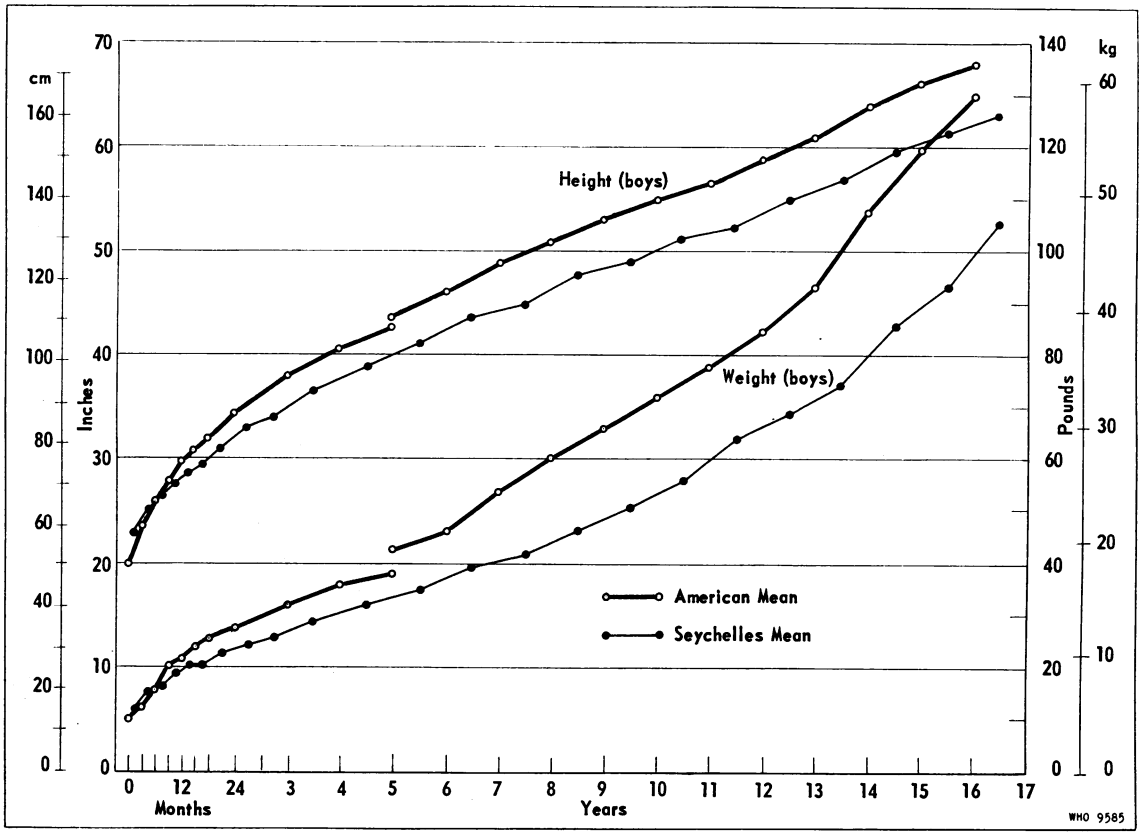
TABLE 16
PERCENTAGE OF WOMEN WITH MISCARRIAGES AND STILLBIRTHS

Age-group (years)	Total number of women with issue	Women with abortions and/or stillbirths	Percentage of women with wasted pregnancies among total women with issue
15-19	22	3	13.9
20-29	265	58	21.9
30-39	286	80	28.0
40-49	222	79	35.6
50-59	166	80	48.2
60-69	139	46	32.4
70-79	64	29	45.3
80 +	(26)	(4)	(15.4)

TABLE 17
STILLBIRTH AND ABORTION RATES OF WOMEN WITH WASTED PREGNANCIES

Age-group (years)	Stillbirths per 100 women with wasted pregnancies	Abortions per 100 women with wasted pregnancies	Stillbirths + abortions per 100 women with wasted pregnancies	Wasted pregnancies per 100 women with issue
15-19	(33.3)	(66.7)	(100.0)	(13.6)
20-29	44.8	91.4	136.2	29.8
30-39	38.8	120.0	158.8	44.4
40-49	64.6	125.3	189.9	67.6
50-59	62.5	140.0	202.5	97.6
60-69	54.3	173.9	228.2	75.5
70-79	58.6	131.0	189.6	85.9
80 +	(125.0)	(50.0)	(175.0)	(26.9)

FIG. 4
MEAN GROWTH CURVES FOR BOYS IN THE SEYCHELLES AND IN THE USA



the figures for stillbirths and abortions per 100 women with wasted pregnancies seem to indicate that wasted pregnancies are rather habitual, that is to say, they seem to occur more readily in the same women repeatedly than to be spread out among all child-bearing women. As a matter of fact, the wastage of pregnancies in these women is quite considerable, as the figures show.

NUTRITIONAL STATUS

Height and weight of children (growth curves) [1]

The Seychelles mean figure has been obtained separately for each age-group. This, plotted against the American mean (as given by Stuart & Stevenson [2]), is shown in Fig. 4 for boys and Fig. 5 for girls.

There would appear to be a slightly higher mean for boys—for height and weight—in comparison with the American mean up to the age of 6 months. Thereafter both curves drop off and lag behind the American value increasingly with increasing age.

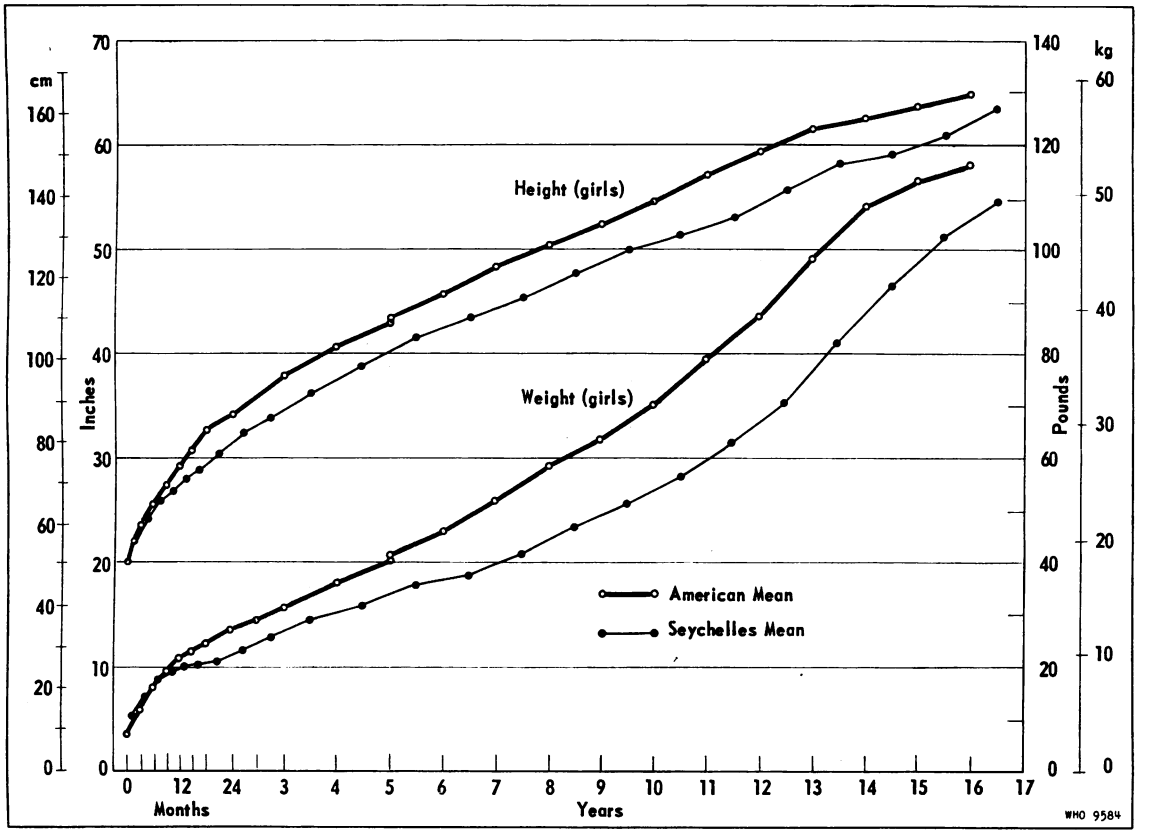
For girls, the values for height and weight appear to be at about the same level as for the American girls up to the age of 6 months, after which they begin to decrease. However, they seem to hold their ground somewhat better than the boys.

Similar comparisons made on the continent of Africa show that the crossing of the African value

[1] Additional studies will be made at a later date on children of different ethnic groups and of different social status, etc.

[2] Stuart, H. C. & Stevenson, S. S. (1950) *Physical growth and development.* In: Nelson, W. E., ed., *Mitchell-Nelson. Textbook of pediatrics*, 5th ed., Philadelphia & London, Saunders, p. 14.

FIG. 5
MEAN GROWTH CURVES FOR GIRLS IN THE SEYCHELLES AND IN THE USA



curve under the European (American) mean value curve takes place after the time of weaning, when, indeed, a drastic deterioration occurs in the value of the food factors. In Seychelles, as reported by the public health nurses, babies are usually weaned at 6-12 months of age.

Height of adult population

The average height of men (above 17 years of age) was found to be 66.0 inches (1.67 m) with a standard deviation of 2.6; of women (above 17 years of age) 61.6 inches (1.55 m) with a standard deviation of 2.4.

Nutrition and malnutrition

The classification of the examined population into four groups—obese, normal, thin and emaciated [1]—according to the judgement of the medical officer is shown in Table 18.

[1] These terms do not necessarily correspond to the meaning of the words in everyday parlance (see page 443).

If " obese " and " normal " are combined into a single " well-fed " group and the " thin " and " emaciated " into a " poorly-fed " group, they balance almost exactly 50 : 50, save for West Mahé

TABLE 18
PERCENTAGE DISTRIBUTION OF EXAMINED POPULATION BY AREA ACCORDING TO NUTRITIONAL STATUS

Area	Obese	Normal	Thin	Emaciated	Total
North Mahé	10.8	42.3	36.8	10.1	100
Victoria	7.9	40.7	45.4	5.9	100
East Mahé	10.5	40.2	38.9	10.4	100
West Mahé	7.2	40.4	42.3	10.1	100
Other islands	9.6	36.9	43.2	10.5	100
Seychelles	9.1	40.4	41.8	8.8	100

and " Other islands ", where the " poorly-fed " group is slightly larger. A noteworthy fact is the balancing of the " obese " and " emaciated " groups in North Mahé and East Mahé (practically 1 : 1) against West Mahé and " Other islands ", where the " emaciated " group preponderates, and Victoria, where the " obese " group preponderates. In Victoria both these groups are relatively small.

Table 19 shows the distribution of malnutrition by area.

The lowest proportion of malnutrition (disregarding grade I) is found in Victoria, the highest in West Mahé and " Other islands ". The correlation of these findings with the proportion of " thin " and " emaciated " people, as shown in Table 18, is noteworthy.

If nutritional status and malnutrition grades are further classified by age some interesting comparisons are brought out.

As can be seen from Fig. 6, the line for malnutrition follows the same pattern as the line for " thin " and " emaciated " in the age-groups 0-19. This correspondence is not so marked at higher ages: a striking observation is the very low percentage of " well-fed " children in the age-group 5-9 (Fig. 7). As is mentioned later, the highest infection rate (and multiple infection rate) occurs in that same age-group, 5-9, where we find the greatest proportion of ill-fed and malnourished children (see Table 38 and Fig. 8). In fact, the line for malnutrition resembles remarkably, up to the age-group 20-39, the line for ascariasis, or in all age-groups the line of multiple parasite load (all lines in Fig. 8 combined).

A general observation is that the degree of malnutrition in Seychelles is not of a severe kind. About 85%-90% of the people surveyed presented themselves only with crazy-pavement skin and, as illus-

TABLE 19

PERCENTAGE DISTRIBUTION OF SURVEYED POPULATION BY AREA ACCORDING TO GRADE OF MALNUTRITION

Area	Grade of malnutrition [a]		No sign of malnutrition	Total
	I	II		
North Mahé	12.8	14.3	72.8	100
Victoria [b]	(0.4)	6.4	(93.2)	100
East Mahé	21.5	18.8	59.7	100
West Mahé	27.3	24.3	48.5	100
Other islands	22.3	23.1	54.6	100
Seychelles	13.1	14.7	72.1	100

[a] See text (p. 443) for criteria of grades of malnutrition.

[b] The very low figure in Victoria under grade I and the corresponding high figure for no sign of malnutrition is explained by the fact that the survey was started there and, as mentioned before, ill-defined (equivocal) signs were not recorded at first.

FIG. 6

PERCENTAGE OF TOTAL SEYCHELLES POPULATION CLASSIFIED AS THIN OR EMACIATED AND SHOWING MALNUTRITION

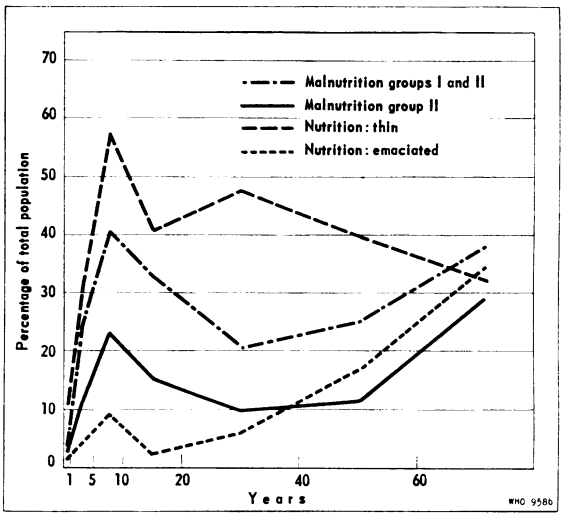


FIG. 7

PERCENTAGE OF TOTAL SEYCHELLES POPULATION CLASSIFIED AS NORMAL OR OBESE

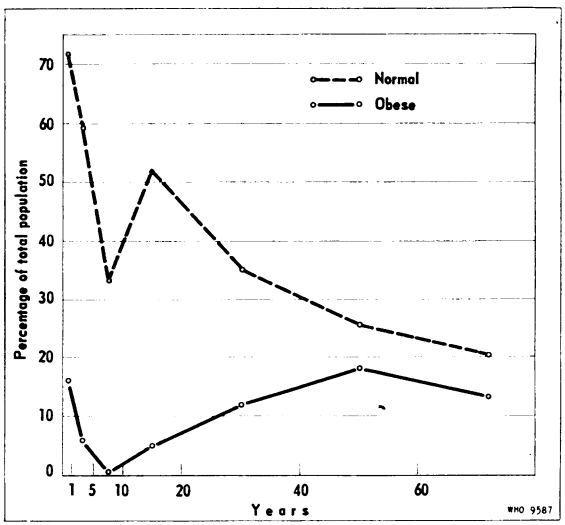


TABLE 20
PERCENTAGE DISTRIBUTION OF NUTRITIONAL STATUS BY AGE AND SEX

Age-group (years)	Obese			Normal			Thin			Emaciated		
	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
-1	14.5	17.5	15.9	70.1	73.8	71.8	14.5	5.8	10.5	0.9	2.9	1.8
1-4	5.1	6.3	5.7	60.8	57.4	59.0	30.2	32.9	31.7	3.9	3.4	3.6
5-9	—	0.7	0.4	23.0	43.3	33.1	65.9	48.8	57.4	11.0	7.2	9.1
10-19	0.3	9.4	5.1	35.9	66.0	51.8	59.8	23.7	40.7	4.0	1.0	2.4
20-39	3.5	17.6	11.8	24.2	42.4	34.9	66.8	34.3	47.6	5.5	5.8	5.7
40-59	7.1	26.7	17.9	21.7	28.4	25.4	50.5	31.1	39.8	20.7	13.8	16.9
60+	7.0	16.4	13.3	10.1	25.2	20.2	41.1	27.9	32.2	41.9	30.5	34.3
All ages	3.7	13.6	9.1	32.6	46.7	40.4	53.9	31.8	41.8	9.8	7.9	8.8

trated by Table 19, cases with more than one sure sign of malnutrition are comparatively rare. Although no dietetic studies have been made as yet in Seychelles, one can nevertheless say that the Seychelles diet is not to any great extent deficient in important food factors. Fish and rice form an essential part of nearly all meals; however, the quantities consumed may only be just on the borderline of actual requirements.

Thus it may be concluded that, in much of Seychelles, malnutrition and rather poor nutritional status are caused by intestinal parasitism, and that if that could be eradicated in all probability the clinical signs of malnutrition would largely disappear. This is at least so in the age-groups up to 39; after that, other factors also come into play and malnutrition in old age may have various causes.

The nutritional status by age and sex is classified in Table 20. It is clear from this table that women in Seychelles generally appear to be better fed than men. In very young age, the differences are small, but the discrepancy becomes well marked as early as the 5-9 age-group and reaches its maximum in the age-group 10-19 for the groups "obese", "normal" and "thin". In the "emaciated" group, the variation according to age is relatively slight.

For the age-groups 5-9 and 10-19, which are of particular interest, the sex differences among the four categories of nutritional status have been shown by the χ^2 test to be highly significant.

The fact that women are better fed than men in Seychelles is also illustrated by a study of their weights in relation to their heights. Tables showing the standard weights for different heights for male and female adults in the USA have been prepared by the Metropolitan Life Insurance Company.[1]

TABLE 21
COMPARISON OF WEIGHT OF ADULTS IN SEYCHELLES WITH AMERICAN STANDARD CORRESPONDING TO THE SAME HEIGHT, IN PERCENTAGES BY AGE-GROUP AND SEX

Weight group	20-39 years		40-59 years		60 years and over	
	M	F	M	F	M	F
Smaller than American standard by more than 5%	77.4	64.5	86.9	69.7	91.5	82.8
Within ± 5% of American standard	12.9	12.8	5.2	7.8	3.1	3.8
Greater than American standard by more than 5%	9.7	22.7	7.9	22.5	5.4	13.4
Total	100	100	100	100	100	100

The actual weight of each adult examined in Seychelles was compared with the standard weight for the height as given in the American tables. This comparison has led to the results shown in Table 21,

[1] Given in: Cooper, L. F., Barber, E. M., Mitchell, H. S. & Rynbergen, H. J., ed. (1953) *Nutrition in health and disease*, 12th ed., Philadelphia, London & Montreal, Lippincott

TABLE 22

PERCENTAGE DISTRIBUTION OF MALNUTRITION BY AGE AND SEX

Age-group (years)	Grade I			Grade II		
	M	F	M + F	M	F	M + F
-1	0.9	2.9	1.8	2.6	2.9	2.7
1-4	12.3	8.4	10.2	13.0	15.1	13.6
5-9	19.9	19.2	19.5	25.0	21.9	23.4
10-19	16.0	17.5	16.8	15.9	15.5	15.6
20-39	6.0	13.3	10.3	3.5	13.6	9.5
40-59	8.4	17.4	13.3	8.4	14.0	11.5
60 +	7.0	11.1	9.7	31.8	26.3	28.2
All ages	11.6	14.4	13.1	13.1	16.1	14.7

TABLE 24

PERCENTAGE DISTRIBUTION OF SURVEYED PERSONS BY AGE-GROUP ACCORDING TO HAEMOGLOBIN LEVEL (% SAHLI)

Age-group (years)	Haemoglobin level (% Sahli)							Total
	Less than 50	50-59	60-69	70-79	80-89	90-99	100+	
-1	—	0.5	3.2	21.4	60.0	14.5	0.5	100
1-4	—	0.3	2.2	22.6	56.3	18.5	—	100
5-9	0.1	0.2	1.4	17.4	59.4	21.5	—	100
10-19	—	0.1	0.5	12.7	57.4	29.4	—	100
20-39	—	0.1	1.3	11.4	51.6	35.4	0.2	100
40-59	—	0.1	0.6	14.5	49.5	34.8	0.5	100
60 +	0.3	1.0	3.3	20.5	52.4	22.3	0.3	100
All ages	0.0	0.2	1.4	15.5	54.7	28.1	0.2	100

in which the difference between males and females as regards their nutritional status is strikingly brought out.

This state of affairs is also noticeable quite clearly from the height and weight curves for boys and girls up to the age of 16, and it can be seen that this peculiar difference in favour of women persists even into old age.

Even though the females appear "better fed" than males, malnutrition is found to be evenly distributed in males and females in the age-groups below 20. After that, however, there is a sharp deterioration in the female rate, i.e., more malnutrition is encountered in women than in men. This may be due to the strain on nutritional reserves in pregnancy and lactation periods in the child-bearing age-groups. After the age of 60, the sex difference in malnutrition is not so clearly marked (Table 22).

HAEMOGLOBIN

Haemoglobin levels are shown in Table 23 for each area and in Table 24 for each age-group.

TABLE 23

PERCENTAGE DISTRIBUTION OF SURVEYED PERSONS BY AREA ACCORDING TO HAEMOGLOBIN LEVEL (% SAHLI)

Area	Haemoglobin level (% Sahli)							Total
	Less than 50	50-59	60-69	70-79	80-89	90-99	100+	
North Mahé	—	0.2	0.4	14.9	54.4	30.0	0.1	100
Victoria	0.1	0.2	2.1	15.1	55.8	26.7	0.1	100
East Mahé	—	0.1	0.3	13.9	54.7	31.0	0.1	100
West Mahé	—	0.2	—	18.5	54.8	26.6	0.3	100
Other islands	0.1	0.7	3.7	17.2	51.9	26.0	0.4	100
Seychelles	0.0	0.2	1.4	15.5	54.7	28.1	0.2	100

TABLE 25
PERCENTAGE DISTRIBUTION BY AGE-GROUP OF PERSONS WITH HAEMOGLOBIN LEVELS BELOW AND OVER 80%

Age-group (years)	Less than 80% Hb	80% Hb and over	Total
-1	25.0	75.0	100
1-4	25.1	74.9	100
5-9	19.1	80.9	100
10-19	13.3	86.7	100
20-39	12.8	87.2	100
40-59	15.2	84.8	100
60+	25.1	74.9	100
All ages	17.1	82.9	100

TABLE 26
PERCENTAGE DISTRIBUTION BY AREA OF PERSONS WITH HAEMOGLOBIN LEVELS BELOW AND OVER 80%

Area	Below 80%	80% and over	Total
North Mahé	15.5	84.5	100
Victoria	17.4	82.6	100
East Mahé	14.3	85.7	100
West Mahé	18.7	81.3	100
Other islands	21.7	78.3	100
Seychelles	17.1	82.9	100

TABLE 27
PERCENTAGE DISTRIBUTION OF ERYTHROCYTE SEDIMENTATION RATES BY AREA

Area	Erythrocyte sedimentation rate				Total
	1-8	9-15	16-25	26+	
North Mahé	56.1	40.6	3.3	—	100
Victoria	47.5	45.9	5.8	0.8	100
East Mahé	67.8	30.2	2.1	—	100
West Mahé	69.4	28.0	2.6	—	100
Other islands	71.6	26.0	2.5	—	100
Seychelles	59.0	37.0	3.8	0.3	100

Table 25 shows the percentage distribution by age-group of the persons examined with haemoglobin levels below and over 80% Sahli.

Haemoglobin levels tend to increase up to the age-group 20-39, when they decrease to reach practically the same levels in old age as in infancy.

This is neither in line with the increasing incidence of ankylostomiasis with increasing age (see Table 41), nor with nutrition and malnutrition. This question is too complex to answer here and requires a separate study.

If the percentage distribution is studied for individual areas, West Mahé and particularly " Other islands " top the list (Table 26). This, however, coincides with the high ankylostomiasis rate in both places (West Mahé, 40.7%; Other islands, 35.0%; see Table 39).

ERYTHROCYTE SEDIMENTATION RATE

Erythrocyte sedimentation rates, determined by the Hawksley microsedimentation method, are shown in Tables 27 and 28. It is difficult to offer any reasonable explanation for the variation in the different groups. The comparatively high figures in the second and third groups (9-15, 16-25) for the age-groups 1-4 and 5-9 years are noteworthy, as is the rather steep increase of the " abnormal " sedimentation rate in old age.

DENTAL STATUS

As can be seen from Table 29, the dental status in West Mahé and " Other islands " is considerably

TABLE 28
PERCENTAGE DISTRIBUTION OF ERYTHROCYTE SEDIMENTATION RATES BY AGE-GROUP

Age-group (years)	Erythrocyte sedimentation rate				Total
	1-8	9-15	16-25	25+	
-1	61.4	35.9	2.7	—	100
1-4	48.1	47.0	4.7	0.1	100
5-9	48.5	46.9	4.3	0.2	100
10-19	65.3	33.2	1.4	0.1	100
20-39	67.5	29.0	3.3	0.2	100
40-59	62.1	33.8	3.7	0.4	100
60+	42.7	45.5	10.5	1.3	100
All ages	59.0	37.0	3.8	0.3	100

TABLE 29
PERCENTAGE DISTRIBUTION OF DENTAL STATUS GRADE [a] BY AREA

Area	Grade I	Grade II	Grade III	Grade IV	Total
North Mahé	20.3	17.1	23.5	39.1	100
Victoria	23.2	16.2	20.1	40.6	100
East Mahé	26.5	17.6	19.0	37.0	100
West Mahé	31.9	19.3	20.2	28.6	100
Other islands	39.9	19.9	17.6	22.5	100
Seychelles	26.5	17.5	20.2	35.8	100

[a] See text (p. 444) for criteria of dental status grades.

better than in other places. If one groups grades I + II together (good teeth) and compares this group in West Mahé with that in North Mahé (where the dental status appears to be the poorest) the difference between 51.2% (West Mahé) and 37.4% (North Mahé) is found to be statistically highly significant.

The age distribution in these two places, particularly under 20 years, does not differ sufficiently to explain the discrepancy. What the underlying cause of such a remarkable difference in dental status is has yet to be studied ; in particular, the influence of ethnic factors will have to be investigated, although the discrepancy may well prove not to be explicable on racial grounds alone.

TABLE 30
PERCENTAGE DISTRIBUTION OF DENTAL STATUS GRADE BY AGE-GROUP

Age-group (years)	Grade I	Grade II	Grade III	Grade IV	Total
-1	100.0	—	—	—	100
1-4	65.1	14.8	10.7	9.3	100
5-9	27.5	25.8	29.5	17.2	100
10-19	33.3	30.8	27.0	9.0	100
20-39	10.2	16.8	25.7	47.2	100
40-59	2.6	6.4	13.9	77.0	100
60+	0.8	0.5	3.1	95.7	100
All ages	26.5	17.5	20.2	35.8	100

Comparison of the age distribution of "Other islands" with that of North Mahé shows a fairly considerable difference (North Mahé 51.3%; Other islands 59.3%), and the difference in dental status here therefore must be considered rather less significant. More detailed studies are necessary.

It has been pointed out already that West Mahé has the lowest proportion of well-fed people and the highest incidence of malnutrition and anaemia. As will be shown in the subsequent paragraphs, West Mahé is also that part of Seychelles with the highest multiple infection rate of intestinal parasites and the highest rates of infestation with hookworm and *Endamoeba histolytica*. It is the poorest area as regards social status, housing and density (overcrowding). Thus the remarkable fact is that in West Mahé the population with the poorest living and nutritional conditions shows the best dental status in Seychelles. However, similar correlations between dental status and nutritional and social status have also been made in other parts of the world.

The relatively low proportion of bad teeth (grades III and IV) shown in Table 30 for the age-group 10-19 is explained by the replacement of milk teeth by permanent teeth in this age-group.

ENVIRONMENTAL SANITATION AND SOCIAL STATUS

Latrines

The figures in Table 31 give the percentage of people in the survey who made use of good, fair or poor latrines. The differences in the various areas are highly interesting. They reflect partly

TABLE 31
PERCENTAGE DISTRIBUTION OF POPULATION BY QUALITY OF LATRINES USED

Quality of latrines used	North Mahé	Victoria	East Mahé	West Mahé	Other islands	Seychelles
Good	16.5	15.9	13.6	2.1	37.4	16.7
Fair	38.5	32.4	22.4	9.2	19.7	27.2
Poor	45.0	51.8	64.0	88.7	42.9	56.1
Total	100	100	100	100	100	100

TABLE 32
PERCENTAGE DISTRIBUTION BY AREA ACCORDING TO SOCIAL STATUS

Social status	North Mahé	Victoria	East Mahé	West Mahé	Other islands	Seychelles
Good	1.9	4.1	6.9	0.8	9.6	5.4
Fair	26.3	25.6	21.4	14.9	15.2	22.2
Poor	71.8	70.4	71.7	84.3	75.3	73.2
Total	100	100	100	100	100	100

the sanitary inspector's work and keenness. At the same time they also presumably indicate that there is a tendency in a given area for both good latrines and poor ones to set the standard for that area—that is to say, if many people have good latrines, those who do not have them would like to improve theirs, and similarly if the majority in an area have only poor latrines there is no incentive for the people to improve them.

Social status

Table 32 illustrates the social stratification of Seychelles (see page 444 for an explanation of the classification of social status). Only 4.5% could be classed as "good", and nearly three-quarters of the total population had to be termed "poor". The greatest contrast between the well-to-do and the poor (as pointed out before) is to be found in West Mahé—namely, 0.8% as against 84.3%. Whereas Tables 31 to 34 show a broad general resemblance—as one would expect—closer scrutiny brings to light subtle but characteristic differences which may be revealing to those who know the local situation.

Housing

The figures in Table 33 show the percentage of people living in good, fair or poor houses in the area. Here also the differences in the various areas are interesting to note. West Mahé consists largely of big estates with a fairly large labour population, whose houses are often poorly constructed and very poorly maintained.

Density (overcrowding)

In all, 984 houses were examined, which gives an average density of 5.9 persons per house $\left(\frac{5587+179}{984}\right)$. Table 34 gives the percentage distribution of the population by density.

MORBIDITY

It is necessary to mention that during the period of the survey, different islands or areas were covered at different times of the year. One effect of this procedure has been that the variations noted from place to place may be partly due to seasonal variations, although the seasons are known not to differ markedly in Seychelles.

TABLE 33
PERCENTAGE DISTRIBUTION OF SURVEYED POPULATION BY AREA ACCORDING TO CONDITION OF HOUSE

Condition of house	North Mahé	Victoria	East Mahé	West Mahé	Other islands	Seychelles
Good	17.7	14.7	20.6	7.1	18.2	16.0
Fair	29.8	27.3	22.3	20.9	34.8	27.1
Poor	52.4	57.9	57.1	72.0	47.0	56.9
Total	100	100	100	100	100	100

TABLE 34
PERCENTAGE DISTRIBUTION OF SURVEYED POPULATION BY AREA ACCORDING TO DEGREE OF OVERCROWDING

Floor area per person (square feet)	North Mahé	Victoria	East Mahé	West Mahé	Other islands	Seychelles
50 and over	8.0	11.1	19.3	6.6	17.9	12.5
25-49	24.7	23.5	27.1	26.7	29.5	25.6
Under 25	67.3	65.4	53.6	66.7	52.6	61.9
Total	100	100	100	100	100	100

TABLE 35
POSITIVITY RATE OF STOOLS BY AGE-GROUP

Age-group (years)	Positivity rate of stools (%)
-1	21.8
1-9	95.3
10-19	97.0
20-39	95.7
40-59	93.0
60+	92.8
All ages	92.3

TABLE 36
POSITIVITY RATE OF STOOLS BY AREA AMONG INFANTS AND OTHERS

Area	Positivity rate of stools (%)		
	At age under 1 year	At age 1 year and over	All ages
North Mahé	11.6	95.7	92.5
Victoria	33.7	94.0	91.4
East Mahé	15.4	96.2	93.3
West Mahé	18.3	95.3	92.2
Other islands	21.4	96.2	93.3
Seychelles	21.8	95.2	92.3

Intestinal parasitism

Intestinal parasitism figures are shown in Tables 35 to 40.

Positivity rate of stools. In view of the general very high infection rate it was considered interesting to study the positivity rate of stools according to age-groups and area.

As seen from Table 35 the over-all infection rate, including the age-group under 1 year, is 92.3%. As expected, the percentage of positive stools rises steeply after 1 year of age and reaches its peak in the age-group 10-19, decreasing thereafter towards old age.

The positivity rates of stools by area are shown separately for infants and others in Table 36. It will be seen that, except for infants, there is only a slight variation between areas. There is no correlation between the positivity rates in the two age-groups.

Multiple infection index. If the multiple infection index (i.e., the average number of different parasites per infected person) is calculated for each of the five areas (Table 37), it will be seen that West Mahé heads the list.

In Table 38 the values of the multiple infection index an shown in various age-groups. It is noteworthy that the highest index is recorded at the age of 7 years; this is also the age at which the highest incidence of malnutrition is found, as has been pointed out above (page 454).

Intestinal parasitism according to type of parasite. Table 39 shows the distribution of the various types

TABLE 37
MULTIPLE INFECTION INDEX BY AREA

Area	Persons examined	Persons with negative stools	Persons with positive stools	Total number of different infections	Multiple infection index
North Mahé	1 116	84	1 032	2 376	2.30
Victoria	1 968	169	1 799	3 864	2.15
East Mahé	1 107	74	1 033	2 346	2.27
West Mahé	664	52	612	1 468	2.40
Other islands	732	49	683	1 619	2.27
Seychelles	5 587	428	5 159	11 673	2.26

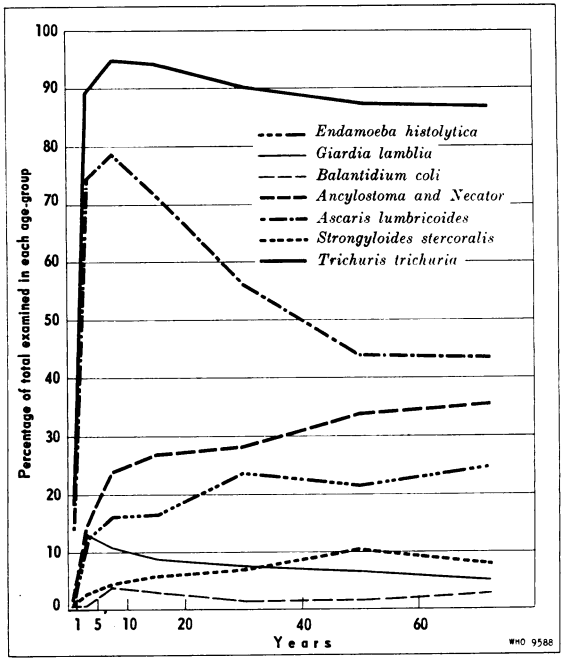
TABLE 38

MULTIPLE INFECTION INDEX BY AGE-GROUP

Age-group (years)	Multiple infection index
0-	1.75
1-	2.01
2-	2.23
3-	2.26
4-	2.43
5-	2.38
6-	2.41
7-	2.47
8-	2.27
9-	2.31
10-14	2.33
15-19	2.29
20-39	2.33
40-59	2.19
60 +	2.22

FIG. 8

PERCENTAGE DISTRIBUTION OF INTESTINAL PARASITES BY AGE-GROUP



of intestinal parasite according to area. In this table, two facts are particularly striking. The highest infection rate with *Endamoeba histolytica*, hookworm *(Ancylostoma* or *Necator)* and *Strongyloides stercoralis* is to be found in West Mahé. Strangely enough West Mahé has at the same time a lower rate of infection with *Ascaris* than anywhere else, and also all other rates are below the Seychelles mean rate. It may be noted in this connexion that hookworm and *Strongyloides stercoralis* have a similar mode of transmission.

From a comparison made between stool results obtained from people living in clearly defined plateau land and those from people living in hill areas, it can be shown that there is a distinct difference only in the incidence of hookworm (Table 40).

Table 41 and Fig. 8 show the distribution of the various types of intestinal parasite according to

TABLE 39

INFECTION RATE (%) WITH INTESTINAL PARASITES BY AREA

Area	*Endamoeba histolytica* (trophozoites)	*Endamoeba histolytica* (cysts)	*Giardia lamblia*	*Balantidium coli*	*Ancylostoma* and *Necator*	*Ascaris lumbricoides*	*Strongyloides stercoralis*	*Trichuris trichiura*
North Mahé	0.2	19.3	8.2	2.4	25.1	62.9	6.3	88.5
Victoria	0.6	16.0	9.0	1.1	16.1	59.9	5.9	87.8
East Mahé	0.4	20.4	6.2	3.1	28.1	60.3	5.4	88.1
West Mahé	0.2	25.2	7.8	2.0	40.7	52.3	7.5	85.5
Other islands	1.6	8.6	11.5	3.3	35.0	66.3	6.3	88.7
Seychelles	0.6	17.6	8.5	2.1	25.7	60.5	6.1	87.8

TABLE 40
DISTRIBUTION OF INTESTINAL PARASITISM IN HILL AREAS AND PLATEAU LANDS

Area	*Endamoeba histolytica*	*Giardia lamblia*	*Balantidium coli*	*Ancylostoma* and *Necator*	*Ascaris lumbricoides*	*Strongyloides stercoralis*	*Trichuris trichuria*	Negative	Persons examined
Hills									
Persons examined	259	82	27	293	614	67	901	76	1 052
% of persons examined	24.6	7.8	2.6	27.9	58.4	6.4	85.6	7.2	
Plateaux									
Persons examined	108	70	20	262	322	47	495	33	569
% of persons examined	19.0	12.3	3.5	46.0	56.6	8.3	87.0	5.8	

age-group. In the age-group under 1 year, 78.2% of all stools examined were negative for parasites. The percentage negative then drops almost instantaneously and reaches its lowest point in the age-group 5-9 (2.1%); even in old age, the infection rate is still 92.8%.

Trichuriasis and ascariasis reach their peak in the age-group 5-9; while ascariasis then drops rather steeply from 78.4% to 43.2% in old age, the incidence of trichuriasis, although decreasing slightly, remains at over 86% in old age. Ankylostomiasis increases steadily from childhood to old age (1.8%-35.3%). Strongyloidiasis follows much the same curve, although with a considerably lower incidence and decreasing slightly after the age-group 40-59.

Rather astonishing is the similarity to ankylostomiasis of the behaviour of the curve for amoebiasis (*histolytica*); it also has a rising trend throughout increasing age. The behaviour of giardiasis is dissimilar; it reaches its peak in the age-group 1-4, and then decreases quite evenly as the age goes up. At first sight there does not seem to be any great difference as regards intestinal parasitism between the two sexes (Table 42). There is a slightly higher infection rate in females than in males for amoebiasis *(histolytica)*, ascariasis and trichuriasis, whereas the opposite is the case for ankylostomiasis and strongyloidiasis. However, if one takes into consideration the fact that the sex distribution is somewhat low on the male side in the age-groups 20-39 and 40-59

TABLE 41
INFECTION RATE (%) WITH INTESTINAL PARASITES BY AGE-GROUP

Age group (years)	*Endamoeba histolytica*	*Giardia lamblia*	*Balantidium coli*	*Ancylostoma* and *Necator*	*Ascaris lumbricoides*	*Strongyloides stercoralis*	*Trichuris trichiura*	Negative
-1	0.5	3.2	0.5	1.8	14.1	0.5	17.7	78.2
1-4	12.3	13.0	0.8	14.9	74.5	2.6	89.1	7.7
5-9	15.9	10.9	4.0	23.7	78.4	4.4	94.6	2.1
10-19	16.2	8.8	3.0	26.5	71.3	5.8	93.9	3.0
20-39	23.3	7.4	1.4	28.0	55.9	7.0	90.0	4.3
40-59	21.4	6.7	1.6	33.6	43.7	10.4	86.8	7.0
60 +	24.6	5.1	2.8	35.3	43.2	7.7	86.7	7.2
All ages	18.2	8.5	2.1	25.7	60.5	6.1	87.8	7.7

TABLE 42
INFECTION RATE (%) WITH INTESTINAL PARASITES BY SEX

Parasite	Males	Females	Both sexes
Endamoeba histolytica	16.2	19.8	18.2
Giardia lamblia	8.4	8.5	8.5
Balantidium coli	2.0	2.3	2.1
Ancylostoma and *Necator*	28.6	23.4	25.7
Ascaris lumbricoides	56.4	63.8	60.5
Strongyloides stercoralis	7.8	4.7	6.1
Trichuris trichiura	86.1	89.2	87.8
Negative	8.7	6.8	7.7

(partly on account of a sampling error, there being higher absenteeism among males in these age-groups), the differences for ankylostomiasis (and stronglyloidiasis) may be assumed to be more pronounced in reality than these figures show.

Soil pollution. Table 43 shows the number of people on whose ground parasites were found and the proportion to the total number of people examined in each area. The variation in the areas may be due to the rather haphazard fashion in which these soil samples were collected and possibly to the season in which collection was made. West Mahé, for example, was examined in March at a time when it was raining and a number of parasites near the surface (where the soil samples were taken from) may have been washed away. This may be one reason why the degree of soil pollution found in this survey did not show clear correlation with the rate of infestation in stools. Even so, soil pollution was present in the vicinity of nearly one quarter of the people surveyed, which gives a very good hint at the mode of transmission of helminthiasis in Seychelles.

TABLE 43
PERCENTAGE DISTRIBUTION OF SURVEYED POPULATION LIVING IN VICINITY OF POLLUTED SOIL

Area	Population	
	No.	%
North Mahé	407	36.5
Victoria	385	19.6
East Mahé	266	24.0
West Mahé	107	16.1
Other islands	150	20.5
Seychelles	1 315	23.5

Altogether 984 houses were examined. In 133 soil samples roundworm eggs, in 42 whipworm eggs, in 50 strongyloides larvae and in 7 hookworm larvae were discovered, representing a total of 232 houses with polluted soil.

In this context, it is worth while mentioning that the cause of the high soil pollution was discovered to be the widespread use of chamber pots. Although these vessels of nocturnal convenience are emptied into the latrine, they are washed out near the house and the swillings poured into the yard.

Other pathological conditions

Tables 44 and 45 show the prevalence rates of various pathological conditions by area and by age-group.

Diarrhoea. The presence of diarrhoea was judged from the appearance of the stool sample submitted. No bacteriological examinations were carried out.

The highest incidence of diarrhoea is noted in West Mahé and in the age-group 5-9. West Mahé also has the highest infection with amoebiasis. This may seem suggestive, but if one compares the other figures with the amoebiasis rate, no correlation is apparent.

Bronchial asthma. This allergic trouble seems fairly equally spread over the various areas, but it is perhaps interesting to note that the highest incidence occurs in the age-group 5-9, which is also the age-group where ascariasis is at its peak. A connexion between bronchial asthma and helminthiasis (particularly with those species of worm whose larval stages pass through the lungs) seems suggestive. The age-group 5-9 is also the one in which the multiple infection index for intestinal parasites is highest.

Pathological conditions of the heart. The very steady and even increase in these conditions with increasing age—which is not surprising—is to be noted. The difference in the incidence by areas is not easily explained, but there is no great variation from the Seychelles mean.

TABLE 44

PREVALENCE RATE (PER 100 SURVEYED POPULATION) OF VARIOUS PATHOLOGICAL CONDITIONS BY AREA

Condition	Seychelles	North Mahé	Victoria	East Mahé	West Mahé	Other islands
Diarrhoea	13.2	13.9	14.0	11.2	19.0	7.7
Bronchial asthma	3.3	2.8	3.0	4.4	3.0	3.6
Pathological conditions of heart	5.0	3.8	4.8	6.5	5.6	7.1
Pathological conditions of lungs	3.6	2.9	4.0	3.2	3.0	4.9
Infectious conditions of skin, excluding mycotic infections	5.5	4.9	4.4	6.0	6.6	7.9
Mycotic infections of skin	13.0	14.2	10.2	13.2	18.1	14.3
Hernias (including operated cases)	4.1	4.6	3.0	4.0	4.2	6.1
Inflammatory conditions of eye [a]	39.4	24.9	(2.3)	43.9	50.8	44.7
Degenerative conditions of eye	12.3	15.5	6.9	14.9	16.4	14.2
Uterine fibroids [b] (including operated cases)	3.0	3.5	4.2	2.1	1.7	0.6
Syphilis [c]	2.1	2.7	2.9	1.4	0.8	1.2

[a] Excluding Victoria [b] For females of 20 years and over [c] Percentage of Chediak positive cases

Pathological conditions of the lungs (including tuberculosis but excluding bronchial asthma). Differences in the distribution according to areas is probably due to seasonal differences. It should be remembered that it took a year, including a four-months rainy spell, to complete the survey. Nevertheless the higher incidence in the 5-9 age-group and the increase towards old age are noteworthy.

Infectious conditions of the skin and subcutaneous tissues (excluding mycotic infections). The high incidence in " Other islands " is explained by a high rate of scabies (often impetiginized) encountered on

TABLE 45

PREVALENCE RATE (PER 100 SURVEYED POPULATION) OF VARIOUS PATHOLOGICAL CONDITIONS BY AGE-GROUPS (IN YEARS)

Condition	Under 1	1-4	5-9	10-19	20-39	40-59	60 & over	All ages
Diarrhoea	12.7	12.8	15.9	12.1	12.5	14.5	11.5	13.2
Bronchial asthma	0.1	5.3	7.9	3.3	0.7	2.3	3.3	3.3
Pathological conditions of heart	0.9	1.0	1.9	2.6	4.9	10.1	22.5	5.0
Pathological conditions of lungs	0.9	2.6	5.6	2.2	2.8	5.5	5.9	3.6
Infectious conditions of skin, excluding mycotic infections	4.5	17.0	10.5	3.5	1.9	1.9	2.3	5.5
Mycotic infections of skin	0.9	4.3	7.4	17.7	18.7	13.8	11.5	13.0
Hernias (including operated cases)	5.5	7.3	3.8	2.4	2.0	4.9	8.4	4.1
Inflammatory conditions of eye [a]	3.0	36.2	61.1	52.4	34.4	26.4	18.7	39.4
Degenerative conditions of eye	—	—	0.1	0.3	10.9	35.2	58.3	12.3
Uterine fibroids [b] (including operated cases)	—	—	—	—	0.1	6.1	1.9	3.0
Syphilis [c]	—	—	1.0	1.1	2.4	4.7	5.9	2.1

[a] Excluding Victoria [b] For females of 20 years and over [c] Percentage of Chediak positive cases

Praslin. Young children are, not surprisingly, very much more frequently attacked than adults.

Mycotic infections of the skin. The steady increase from 0.9% among infants to 18.7% in the age-group 20-39 is interesting. The relatively high incidence is perhaps not surprising, as some workers have suggested that mycotic skin infections and poor nutrition often go hand in hand. Also in this context it is noteworthy that West Mahé heads the list.

Hernias (including operated cases). As operated cases are included the higher proportion of cases in "Other islands" is not easily explained. The high incidence in the youngest age-groups is largely due to umbilical hernias.

Inflammatory conditions of the eye. In this group of pathological conditions of the eye the lion's share goes to a peculiar condition—folliculosis—a condition which was not recorded at first during the survey and was later looked for because earlier work at Victoria indicated high prevalence. This explains the very low incidence in Victoria, where the survey was started. Therefore, the calculation of the percentages in the various age-groups was done from the total population in the age-group minus the population of Victoria for the same group.

This condition, which actually can hardly be described as a disease and which most people are completely ignorant of having, appears to occur in a latent (trouble-free) stage and a more acute stage when other signs and symptoms of conjunctivitis also appear.

It has been recorded mainly because it is so common. Its incidence is at its highest in the age-group 5-9, after which it decreases steadily towards old age. Further studies on this condition may prove interesting.[1]

Degenerative conditions of the eye. As was to be expected, this is a group of conditions whose incidence rises with increasing age. It is perhaps noteworthy that in Seychelles degenerative changes seem to set in at a relatively early age. Pronounced pinguecula and particularly pterygium were noticed quite frequently even in relatively young persons. Many of these conditions seem to be associated with extensive glare and exposure to wind and were particularly often encountered in fishermen. This may help to explain the lower incidence in Victoria.

Uterine fibroids (including operated cases). In some cases the figures are too small to permit of any conclusions on inter-area variations. Nevertheless, the Seychelles rate of 3.0% appears to be rather high.

Syphilis. Only clearly positive Chediak tests have been recorded.

As was to be expected, the rate is highest in the urban area of Victoria followed by North Mahé, of which the rather populous parts are practically suburbs of Victoria.

Sickle cell trait.

This was found to be present in 82 cases in the whole of Seychelles, giving a percentage for the total population of 1.5. Calculated for the predominantly African portion only, the percentage is 2.4. The condition was observed in 70 predominantly African people, 7 predominantly Caucasian (European) people, 2 predominantly Indian people, and 3 people of the ill-defined ethnic group.

ACKNOWLEDGEMENTS

My thanks are due to Mr K. J. Knaggs, Secretary to the Government, Seychelles, who actively supported this survey. Grateful acknowledgement is also due to the members of the Medical and Health Departments in Seychelles, who helped in collecting all the material, and to Mr Stravens, Government Printer, Seychelles, for his ever-ready help to print all the necessary forms.

RÉSUMÉ

La situation sanitaire et la morbidité dans les îles Seychelles ont fait l'objet d'une enquête en 1956-1957.

L'objet principal était de réunir des renseignements sur les points suivants: morbidité générale dans la population, y compris les troubles dentaires et nutritionnels; malnutrition; fréquence des maladies intestinales et autres affections faciles à diagnostiquer; courbes de croissance et de poids des enfants jusqu'à l'âge de 16 ans; taux d'hémoglobine; vitesse de sédimentation sanguine; corrélation de ces données entre elles et avec les condi-

[1] It has been suggested that this eye condition may be a sign of malnutrition.

tions générales de vie et d'hygiène (logement, surpeuplement, niveau social, installations sanitaires); rapports entre la pollution de l'eau ou du sol et la fréquence de l'amibiase et de l'helminthiase; fréquence de la drépanocytose, de l'éosinophilie et des réactions sérologiques positives au test de Chediak (pour la recherche de la syphilis manifeste ou latente). Tous les examens ont été faits par les deux mêmes enquêteurs: un médecin et un technicien de laboratoire.

En l'absence de registres d'état civil, il a fallu recourir à des techniques d'échantillonnage. L'échantillon de base a été la maison et l'on a retenu systématiquement une maison sur sept. Dans ces conditions, 5587 personnes ont été examinées sur une population totale estimée à 40 000 environ.

Les données démographiques, présentées dans divers tableaux et diagrammes, portent sur la distribution par âge et par sexe, la sex ratio, les groupes ethniques, les taux de fécondité, de mortalité infantile et de mortalité intra-utérine.

Les courbes de croissance des enfants des Seychelles sont comparées à celles d'enfants américains. Le poids et la taille des enfants de ces deux groupes ne présentent pas de différence jusqu'à l'âge de 6 mois, mais, ensuite, un retard se manifeste, qui ne cesse de croître avec l'âge, chez les enfants des Seychelles.

La malnutrition est particulièrement répandue chez les enfants de 5-9 ans. Dans les groupes d'âges supérieurs, la courbe de malnutrition suit de près celle des parasitoses. Les symptômes de la malnutrition ne sont pas très graves. On peut admettre que le poisson et le riz qui constituent les bases de l'alimentation sont qualitativement satisfaisants, mais que la quantité ingérée est à la limite des exigences minimums. La médiocrité de l'état nutritionnel et la malnutrition semblent dues en partie au parasitisme intestinal, au moins dans les groupes d'âge jusqu'à 39 ans. Bien que les femmes paraissent mieux nourries que les hommes, on observe chez elles — à l'âge de la maternité — une plus forte proportion de malnutrition, en rapport probablement avec les grossesses et l'allaitement.

Le taux d'hémoglobine est faible chez les jeunes et les vieillards. Il atteint son niveau le plus élevé dans le groupe d'âge de 20-39 ans. Il ne semble pas y avoir de corrélation entre le faible taux d'hémoglobine et l'ankylostomiase. Le meilleur état dentaire a été observé surtout dans la partie des îles (Mahé occidental) où la proportion des gens bien nourris est la plus faible et où la malnutrition, l'anémie et le parasitisme intestinal sévissent le plus. La situation sociale et la salubrité générale, soit le logement, le surpeuplement et les installations sanitaires ont fait l'objet d'une étude comparée.

Le parasitisme intestinal est l'un des principaux problèmes des Seychelles. On a constaté en moyenne 92,3% de selles positives (97% dans le groupe d'âge de 10-19 ans).

Faute de pouvoir effectuer des analyses qualitatives de selles en laboratoire, on a estimé utile de calculer l'« indice d'infection multiple » (c'est-à-dire le nombre moyen de parasites divers par personne infectée) dans le dessein d'obtenir des renseignements au sujet de la gravité de l'infection dans une zone donnée ou dans un groupe d'âge donné. La région du Mahé occidental vient en tête de liste et c'est à l'âge de 7 ans que l'indice est le plus élevé. C'était cet âge aussi qui accusait la malnutrition la plus fréquente.

Les taux d'infection et la distribution de chaque type de parasite intestinal par groupe d'âge et par zone ont également été examinés. La forte pollution du sol paraît être responsable dans une large mesure de la très grande fréquence du parasitisme intestinal. Malgré le caractère quelque peu arbitraire du prélèvement des spécimens de sol, on estime que le terrain d'un quart environ des zones englobées dans l'enquête est pollué.

Enfin, certains états pathologiques faciles à diagnostiquer, tels que diarrhée, asthme bronchique, anomalies cardiaques et pulmonaires, dermatoses, hernies, troubles inflammatoires et dégénératifs des yeux, sont présentés dans des tableaux qui montrent leur répartition par âge et par zone.

Des échantillons de sang de toutes les personnes examinées ont été soumis à des tests de Chediak pour mise en évidence des cas de syphilis manifeste ou latente. Le taux global des tests positifs a été de 2,1%.

La drépanocytose a été constatée dans 1,5% du total de la population.

APPENDIX TABLE 1

PERSONS EXAMINED AND PERSONS MISSED IN SEYCHELLES SURVEY BY AREA

Area	Number of persons		
	Examined	Missed	Total
North Mahé	1 116	37	1 153
Victoria	1 968	73	2 041
East Mahé	1 107	35	1 142
West Mahé	664	19	683
Other islands	732	15	747
Seychelles	5 587	179	5 766

APPENDIX TABLE 2

PERSONS EXAMINED AND PERSONS MISSED IN SEYCHELLES SURVEY BY AGE AND SEX

Age-group (years)	Males			Females			Both sexes		
	Examined	Missed	Total	Examined	Missed	Total	Examined	Missed	Total
-1	117	—	117	103	—	103	220	—	220
1-4	334	1	335	383	2	385	717	3	720
5-9	408	5	413	402	3	405	810	8	818
10-14	360	7	367	336	6	342	696	13	709
15-19	214	9	223	305	9	314	519	18	537
20-29	310	44	354	451	12	463	761	56	817
30-39	256	21	277	363	8	371	619	29	648
40-49	207	22	229	260	3	263	467	25	492
50-59	175	10	185	212	4	216	387	14	401
60-69	79	6	85	160	2	162	239	8	247
70-79	34	1	35	73	1	74	107	2	109
80 +	16	—	16	29	3	32	45	3	48
All ages	2 510	126	2 636	3 077	53	3 130	5 587	179	5 766