

INCIDENCE OF NUTRITIONAL DEFICIENCY DISEASES AMONG THE BANTU AND COLOURED POPULATIONS IN SOUTH AFRICA AS REFLECTED BY THE RESULTS OF A QUESTIONNAIRE SURVEY*

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Although it is today generally conceded by nutritionists that malnutrition is a major problem in the Republic and assumes serious proportions in the younger non-White age-groups, no reliable information is at present available which gives a true picture of the extent of the problem throughout the country.

To obtain detailed and accurate information on the prevalence of nutritional disease in all areas of the country, it would be necessary to conduct field surveys on samples from all sections of the population—a large and unwieldy task. As it was thought that medical practitioners could be of assistance in obtaining a general indication of the prevalence of nutritional diseases in South Africa, a questionnaire relating to the incidence of these diseases was forwarded to all registered doctors. It was hoped that the replies received would reveal the areas in which nutritional diseases were most rampant and would give an indication of the most suitable immediate remedial measures which might be taken. Field surveys could later be carried out by the National Nutrition Research Institute to study these areas more intensively.

FORMULATION OF THE QUESTIONNAIRE

In formulating the questionnaire it was borne in mind that heavy calls are made upon the time of the average doctor. The questionnaire was, therefore, made as concise as possible. The type of data requested was such that it could be accumulated relatively easily. A prototype of the questionnaire was sent to doctors, specialists and professors for criticism, and modifications were made according to suggestions received. The questionnaire was divided into 8 sections.

(i) *Background data.* Information was requested as to the district in which the doctor practised, the name of the institution at which he worked (where applicable), the nature of his practice or appointment, the number of patients under and over 12 years of age seen by him in each racial group, the areas from which these patients were drawn, and the main food items in the diet of his non-White patients.

(ii) *Incidence of specific nutritional deficiency diseases among non-Whites.* Details were requested of the numbers and age range of patients in various racial groups who had been treated for known nutritional diseases.

(iii) *Incidence of non-specific signs and symptoms among non-Whites.* The same arrangement of data was requested as in (ii) above.

(iv) *Incidence among non-Whites of diseases in which malnutrition may be a contributory factor.* This category included such diseases as gastroenteritis, bronchopneumonia and tuberculosis.

(v) *Malnutrition among Whites.* The doctors were asked to state whether there was evidence of malnutrition among their White patients.

(vi) *General remarks.* Here the doctors were asked to give information on the accuracy of their data and the applicability in their areas of the criteria provided under sections (vii) and (viii) (see below).

(vii) *Criteria for the clinical diagnosis of the specific nutritional diseases,* and

(viii) *Descriptions of non-specific signs and symptoms.* Information under (vii) and (viii) was provided in order to facilitate the diagnosis of the various diseases and the recognition of signs and symptoms referred to in the questionnaire. This information was considered necessary as, without it, the criteria adopted by different practitioners and their evaluation of the severity of the diseases might vary considerably.

In an accompanying letter, the doctors were asked to keep records for a 4-week period during May/June and another during November/December 1960. An additional copy of the questionnaire was included for use during the latter period. Data were requested for the 2 periods as it was thought that there might be seasonal differences in the incidence of malnutrition.

The questionnaire was sent to all general practitioners in the Republic and to specialists in the fields of medicine, obstetrics and gynaecology and paediatrics. It was not possible to exclude the following from the list: doctors recently deceased; doctors retired from active practice; doctors employed by research institutions and Government departments; women doctors who were not in practice and doctors who were temporarily out of the country. The questionnaire was thus sent to many who were not in a position to reply. To avoid duplication, it was further requested in the questionnaire that only one doctor should reply on behalf of institutions, provincial hospitals, mission hospitals and joint practices. Unfortunately, it appeared that this request was not always met. Furthermore, the number of doctors on whose behalf a given questionnaire was completed was not always stated as this information had not been clearly requested. It was therefore not possible to express the number of replies received as a percentage of the possible total or to ascertain the number of doctors represented by the returned questionnaires.

Approximately 6,100 pairs of questionnaires were sent out, of which 203 were returned for the first period and 172 for the second.

METHODS OF ANALYSIS

Two methods were used in the evaluation of the questionnaires.

The first consisted of a general review of doctors' opinions on the applicability of the diagnostic criteria, the value of the data submitted, the probable incidence and causes of malnutrition and the varieties of food eaten by the populations concerned. The findings are presented in the form of a general discussion illustrated by quotations. No attempt is made to discuss the validity of the doctors' impressions.

The second method consisted of an analysis of the detailed information supplied by the doctors. Owing to the poor response to the survey, the results presented and the conclusions drawn have a limited application. Very little information was given on malnutrition among Asiatics and almost none on Whites. Consequently no information on these 2 racial groups has been included in the present report.

The detailed analysis presented many difficulties and a number of decisions, sometimes of an arbitrary nature, had to be taken. Some doctors based the figures they submitted on actual records kept for each patient; others stated that the figures given were merely estimates. Although it had been requested that the survey should cover two 4-week periods, the figures submitted covered periods varying from an afternoon to a year; in a majority of questionnaires, however, the periods covered ranged from 27 to 33 days. It was finally decided to analyse only the questionnaires which covered an interval falling within the periods May - July and November - January, and which ranged in length from 2 weeks to 2 months. If the period covered was shorter than 27 days or longer than 32, the data presented were adjusted so as to be representative of a period of 30 days.

*This report was published by the CSIR in 1962 in the form of a bulletin (CSIR Research Report No. 190, Pretoria, 1962). The number of copies printed was small and the circulation limited; the medical profession of South Africa, which furnished the data presented in the report, is therefore not acquainted as a body with its contents. As it is unlikely that the nutrition situation in South Africa has changed substantially since the report was compiled, and as its contents are deserving of notice, it is presented herewith in an abridged and modified form.

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Only 253 of the returned questionnaires proved suitable for detailed analysis (155 for the first period and 98 for the second). A number of questionnaires which contained very interesting information could not be used as mistakes had been made in completing the questionnaires. For example, in some cases the periods covered by the survey had not been mentioned; in others no distinction had been made between Coloured and Bantu; and there were cases where doctors had listed many more patients as suffering from nutritional disease than they had actually seen during the survey period.

GENERAL REVIEW OF DOCTORS' OPINIONS

A number of very detailed replies were received. Most of these were sent in by doctors who frequently come across malnutrition and nutritional diseases and who are aware of the extent and seriousness of the problem. Many of these replies were received from the Bantu reserve areas, e.g. the Transkei, Zululand and the Northern Transvaal.

Only a small number of doctors commented specifically on the *validity of the criteria* described in sections (vii) and (viii) of the questionnaire. Their judgements varied from 'difficult to apply accurately' to '100% applicable'.

A specialist from Cape Town stated that there were many malnourished patients who had not been classified as such because the points given under section (vii) were too vague and subject to too much individual variation to be of any value. Of the doctors who commented on the criteria, the latter was the only one who specifically stated that the criteria were unsuitable for the diagnosis of nutritional disease. However, when commenting on the accuracy of their data, many doctors remarked that they had found it difficult or even impossible to apply any fixed criteria in a consistent manner (see below).

A doctor from Swaziland reported: 'I am afraid the data are very rough. It has been difficult to record minor degrees of malnutrition.' Many patients regarded by him as underfed (underweight, etc.) could not be classified as suffering from a named deficiency disease.

A doctor from Natal reported: 'A considerable number of patients suffering from probably poor nutrition were seen but with no specific lesions justifying inclusion in this report.' A remark in the same vein was received from the Cape Province: 'Only very obvious malnutrition stigmata have been noted down. With more detailed observation I feel certain that many more would qualify under section (iii) (Incidence of non-specific signs and symptoms among non-Whites).'

The figures submitted by different doctors varied from merely being estimates to those having a 'definite 100% accuracy'. Some doctors stated that the data were not very accurate as not all members of the medical staff concerned had cooperated fully in keeping records. Statements of the following nature were numerous: 'I rather fear we have missed some cases but have recorded most we have seen.' 'I found it very difficult and I had to include some guessing for averages, but I have tried to be honest.' On the other hand there were many who stated that the figures given were substantially correct. Some typical remarks were: 'I think the figures are reasonably correct.' 'These figures should be fairly accurate as the majority were obtained by myself.' 'The particulars are accurate.'

It was obvious from the answers received that an error of unknown magnitude was present in the figures given. It is probable that only obvious signs were recorded and

that a good deal of subclinical malnutrition was overlooked, as inability to identify the early stages of malnutrition seemed to be a general problem. The conclusion may thus be drawn that as estimates of the incidence of malnutrition the figures presented in the questionnaires are too conservative.

With regard to the *over-all incidence of malnutrition*, the general opinion was that the vast majority of non-Whites in the rural as well as in the urban areas was probably malnourished.

In the opinion of a general practitioner from Natal, most of the Bantu in the small reserves and on some of the small farms were on the verge of starvation. Another doctor from Natal observed that the Bantu diet was often distressingly inadequate.

A representative of a health centre in Johannesburg stated: '... marked malnutrition in children up to 5 years is seen in about 25% of cases. Many more cases ... could be classed as malnourished or starving, being underweight, etc. ...'

Two doctors from Cape Town² who subsequently reported their findings in the *South African Medical Journal* in 1961, ascertained the following facts about the weights of 964 non-White child patients examined by them in the outpatient and casualty departments; of the children between the ages of 6 months and 12 years, 10.9% were of textbook average normal weight or heavier, 48% were up to 24.9% below the average normal weight and 41.1% were 25% or more below normal weight.

It was often held that the incidence of malnutrition was greatest in children between 9 and 18 months of age. This was ascribed to the fact that babies are usually weaned at about 9 months, thereafter receiving an adult diet (mainly of soft porridge); at this stage the child is liable to develop kwashiorkor and other nutritional diseases.

A few doctors gave their personal views on the question of *seasonal differences* in the prevalence of nutritional diseases. According to most, the incidence of nutritional diseases was higher during the summer than during the winter. These views were expressed by doctors practising in different parts of the country, viz. Zululand, Eastern Transvaal, Hammanskraal (a Bantu reserve area in the Northern Transvaal), Durban, Mount Fletcher and Flagstaff (Transkei). One doctor practising in the Eastern Transvaal disagreed with the others. He stated that according to his experience the incidence of nutritional deficiency diseases was considerably higher during the months of July, August and September.

Two doctors, one from Hammanskraal and the other from Flagstaff, stated that, owing to the cold, patients tended to stay away during the winter; as a result, the figures given for this period were lower than might otherwise have been observed in these areas. This socio-psychological phenomenon should be taken into account when comparing figures for the 2 periods. It should be noted, however, that while fewer patients may be seen in winter, the proportion treated for nutritional diseases may nevertheless be greater than in the summer.

In addition to supplying the information requested, some doctors gave their personal views on various aspects of malnutrition. A doctor from Natal, for instance, as-

serted that the social aspects in the causation of malnutrition should not be overlooked. He stated that of a group of 86 children suffering from some form of nutritional deficiency disease, 52 (60%) proved to be illegitimate. Of the 40 serious cases admitted to hospital, 34 (85%) were illegitimate. Among the urban Bantu, illegitimacy (with its accompanying financial problems for the mother) was in his opinion the major cause of nutritional diseases, and any programme to combat these diseases should take this aspect into account. The problem of illegitimacy among the urban Bantu was also emphasized by a medical research worker in Durban.

A doctor practising in a Northern Transvaal reserve stated that owing to the emancipation of Bantu women, mothers were seeking employment in the cities and leaving their children to be brought up in the reserves by their grandparents. Money was sent to the grandparents to support the children, but instead of being used to buy food, it was saved to pay the doctor in case of illness. In the meantime the children might be on the verge of starvation.

Three doctors made special mention of the fees charged at municipal clinics. Since 9 May 1960, when charges (25c) were introduced, the general attendance was stated to have dropped by about two-thirds, probably because milder cases no longer attended for treatment. It is acceptable that the introduction of fees might influence the attendance rate at clinics and that the authorities concerned may have taken a backward step in their effort to combat malnutrition.

A few doctors stated that malnutrition states were not due to a shortage of food, but rather to the non-White's ignorance of nutritional requirements. A doctor from Zululand, who had practised for 29 years in that area, stated: 'From my experience I can say that . . . any nutritional deficiency diseases which occur are mostly due to indifference, ignorance and superstition on the part of the mothers.' A doctor from Natal was also of the opinion that superstitious beliefs and ignorance were the main cause of malnutrition in his area.

An interesting observation was made by a doctor from the Transkei. In his experience pellagra was an affliction chiefly of Bantu women, while scurvy was more often an affliction of Bantu men, the reason being that men and women subsist on different diets.

With regard to *diseases in which malnutrition may be a contributory factor*, the majority of doctors agreed that gastroenteritis was more prevalent than any other. A few pointed out, however, that gastroenteritis was sometimes caused by unhygienic conditions rather than by malnutrition.

The following question on *milk consumption* was asked in the questionnaire: 'How much milk (cow's/goat's) do your non-White patients generally give daily to their infants and young children up to five years?' The opinion expressed by most of the doctors was that the children of their non-White patients received little or no milk. A few stated that a small proportion of the non-White children received sufficient milk.

RESULTS OF DETAILED ANALYSIS

As has been mentioned, a single questionnaire could contain the findings of up to 10 or more doctors. Out of approximately 12,200 questionnaires sent out, a total of 155 suitable for analysis was returned for the first period and 98 for the second. In 81 cases the same doctors submitted replies for both periods (Table I).

TABLE I. NUMBER OF INSTITUTIONS AND PRIVATE PRACTICES FROM WHICH A REPLY SUITABLE FOR STATISTICAL ANALYSIS WAS RECEIVED

	Total winter period	Total summer period	No. who responded for both periods
Mission hospitals	18	17	14
Health centres	9	4	4
Provincial hospitals	24	13	11
Institutions of the Department of Health (TB etc.)	5	1	1
Mine hospitals	11	6	6
Mental hospitals	2	1	1
Private practice (with and without part-time appointments)	67	43	33
Municipal clinics	13	11	10
Other	6	2	1
Total	155	98	81

It should be borne in mind that all the figures presented relate to the numbers of patients seen. Percentage incidences, when given, are calculated on this basis and bear no relation to the incidence of the disease in the population as a whole.

The country was divided into 7 regional areas for the purpose of analysis (Table II). It was originally intended

TABLE II. NUMBERS OF QUESTIONNAIRES ANALYSED AND NUMBERS OF PATIENTS REPORTED ON FOR EACH REGION*

Region	No. of question- naires	Total no. of patients
Witwatersrand and Pretoria (urban)	62	59,763
Rest of Transvaal (mainly rural)	30	22,373
Total for Transvaal	92	82,136
Cape Town and Peninsula (urban)	11	8,014
Transkei (urban and rural)	38	27,488
Rest of Cape Province (mainly rural)	21	11,866
Total for Cape Province	70	47,368
Natal (urban and rural)	65	52,918
Orange Free State (urban and rural)	26	12,753
Total	253	195,175

*Figures represent totals for both May - June and November - December periods.

to treat the urban and rural areas in each province as separate regions. This was not, however, possible in the cases of Natal and the Orange Free State because of the small number of questionnaires received from these provinces. The numbers of questionnaires analysed for both periods (May to July and November to January) and the numbers of patients reported on (the figures in the questionnaires having been adjusted if necessary to represent a 30-day period) are given for each region and province in Table II. Relative to its total Bantu and Coloured popula-

tions, Natal is much the best represented, followed by the Transvaal, the Orange Free State and the Cape Province, in that order.

The regional incidence of nutritional diseases and diseases in which malnutrition may be a contributing factor is given in Tables III and IV. The figures relating to the incidence of non-specific lesions have been omitted for 2 reasons. In the first instance, they were so low as to appear unrealistic, the total incidence of non-specific signs being lower than the total incidence of fully-fledged nutritional disease. This anomalous situation was due in part to the fact that non-specific signs were not recorded at all among Coloured patients; even among the Bantu, however, the recorded incidence of non-specific lesions was too low in comparison with the incidence of named nutri-

tional diseases to be accepted with any confidence. In the second instance, since 2 or more non-specific lesions may occur together, the figures for the number of occurrences gave no indication of the numbers of patients actually affected.

Comparison of the over-all incidence of the nutritional diseases indicates that kwashiorkor is the most prevalent, followed fairly closely by marasmus and pellagra (Tables III and IV). The incidence of rickets and scurvy is very much lower. The most important nutritional problems in the Republic would therefore appear to be those due to a deficiency of high quality protein (kwashiorkor^{2,3}), a generally inadequate food intake (marasmus^{4,5}), and a diet low in nicotinic acid and tryptophan (pellagra⁷). The latter type of imbalance is characteristic of maize-eating com-

TABLE III. REGIONAL INCIDENCE OF KWASHIORKOR, MARASMUS AND RICKETS, EXPRESSED AS A PERCENTAGE OF ALL PATIENTS UNDER 12 YEARS OF AGE*

Region	Total no. of patients seen	Nutritional diseases						
		Kwashiorkor		Marasmus		Rickets		
		No.	%	No.	%	No.	%	
Witwatersrand and Pretoria area (urban)	Bantu	28,635	713	2.5	594	2.1	68	0.2
	Coloured	1,054	15	1.4	61	5.8	—	—
Rest of Transvaal (mainly rural)	Bantu	8,618	674	7.8	325	3.8	17	0.2
	Coloured	30	3	10.0	—	—	—	—
Cape Town and Peninsula (urban)	Bantu	1,134	35	3.1	109	9.6	24	2.1
	Coloured	4,812	136	2.8	447	9.3	—	—
Transkei (urban and rural)	Bantu	14,574	1,197	8.2	721	4.9	98	0.7
	Coloured	196	9	4.6	3	1.5	—	—
Rest of Cape Province (mainly rural)	Bantu	1,601	16	1.0	42	2.6	—	—
	Coloured	4,412	61	1.4	75	1.7	—	—
Natal (urban and rural)	Bantu	21,966	1,389	6.3	936	4.3	150	0.7
	Coloured	1,076	12	1.1	9	0.8	—	—
Orange Free State (urban and rural)	Bantu	6,077	154	2.5	147	2.4	36	0.6
	Coloured	248	3	1.2	9	3.6	—	—
All areas	Bantu	82,605	4,178	5.1	2,874	3.4	393	0.5
	Coloured	11,828	239	2.0	604	5.1	—	—
Grand total		94,433	4,417	4.7	3,478	3.7	393	0.4

*See footnote to Table II.

TABLE IV. REGIONAL INCIDENCE OF PELLAGRA, SCURVY AND CERTAIN INFECTIOUS DISEASES EXPRESSED AS A PERCENTAGE OF ALL PATIENTS SEEN*

Region	Total no. of patients seen	Nutritional diseases				Diseases in which malnutrition may be a contributory factor						
		Pellagra		Scurvy		Gastro-enteritis		Broncho-pneumonia		Tuberculosis (all forms)		
		No.	%	No.	%	No.	%	No.	%	No.	%	
Witwatersrand and Pretoria area (urban)	Bantu	58,209	812	1.4	39	0.1	4,708	8.1	1,739	3.0	790	1.4
	Coloured	1,554	—	—	—	—	130	8.4	15	1.0	5	0.3
Rest of Transvaal (mainly rural)	Bantu	22,300	764	3.4	51	0.2	1,407	6.3	1,043	4.7	1,025	4.6
	Coloured	73	—	—	—	—	15	20.5	14	19.2	5	6.8
Cape Town and Peninsula (urban)	Bantu	1,622	15	0.9	2	0.1	280	17.3	150	9.2	7	0.4
	Coloured	6,392	—	—	—	—	1,139	17.8	681	10.7	48	0.8
Transkei (urban and rural)	Bantu	26,996	571	2.1	212	0.8	2,076	7.7	1,320	4.9	3,485	12.9
	Coloured	492	—	—	—	—	39	7.9	18	3.7	8	1.6
Rest of Cape Province (mainly rural)	Bantu	3,508	17	0.5	12	0.3	195	5.6	93	2.7	214	6.1
	Coloured	8,358	—	—	—	—	850	10.2	212	2.5	576	6.9
Natal (urban and rural)	Bantu	51,134	797	1.6	185	0.4	3,388	6.6	1,848	3.6	3,032	5.9
	Coloured	1,784	—	—	—	—	76	4.3	48	2.7	37	2.1
Orange Free State (urban and rural)	Bantu	12,333	156	1.3	66	0.5	1,048	8.5	515	4.2	119	0.9
	Coloured	420	—	—	—	—	53	12.6	9	2.1	9	2.1
All areas	Bantu	176,102	3,132	1.8	567	0.3	13,102	7.4	6,708	3.8	8,672	4.9
	Coloured	19,073	—	—	—	—	2,302	12.1	997	5.2	688	3.6
Grand total		195,175	3,132	1.6	567	0.3	15,404	7.9	7,705	3.9	9,360	4.8

*See footnote to Table II.

munities, and can therefore be expected to be prevalent among the Bantu.

The data for Bantu and Coloureds are given separately in Tables III and IV, and a comparison of the findings for the 2 races reveals the interesting fact that in none of the regions was a single case of rickets, pellagra or scurvy recorded in a Coloured patient. Weight is lent to this observation by the fact that in those regions where Coloured patients preponderated (Cape Town and Peninsula and the 'rest of the Cape Province') these diseases were, with the single exception of rickets in the 'rest of the Cape Province', all recorded in the far less numerous Bantu patients. These findings suggest that rickets, pellagra and scurvy occur rarely, if at all, among Coloureds in the Republic. Of the named nutritional diseases, kwashiorkor and marasmus were the only ones recorded in Coloured patients, the occurrence of frank nutritional disease being therefore apparently restricted to children in this racial group. In addition, non-specific clinical signs (angular stomatitis, cheilosis, bleeding gums, smooth magenta tongue and follicular hyperkeratosis), which were recorded in Bantu patients in every region, including those where Coloureds preponderate, were apparently not seen at all in Coloured patients. It is difficult to see how differences so consistently present in questionnaires from different regions could be an artefact, and the conclusion would therefore appear to be warranted that in the older age-groups more severe malnutrition exists among the Bantu than among the Coloureds.

Comparison of the percentage incidence of kwashiorkor in Bantu children with that in Coloured children (Table III) shows a considerably higher over-all incidence in the former (5.1%) than in the latter (2.0%). This finding would appear to indicate that malnutrition is also more prevalent among Bantu children. The over-all incidence of marasmus, on the other hand, is higher in Coloured children (5.1%) than in Bantu children (3.4%). Scrutiny of the individual figures reveals that this difference is due to a much higher percentage incidence of marasmus in Cape Town and the Peninsula, where Coloureds preponderate, than in any of the other regions. The most likely explanation for this difference is that the criteria employed for the diagnosis of marasmus are less strict in Cape Town than elsewhere.⁵

Little can be said about the total incidence of nutritional disease in the Republic from the results of this survey except to point out that, in view of the small numbers of questionnaires returned, the figures recorded are surprisingly high. It is impossible to estimate what proportion of the total population in each region was represented by the returned questionnaires, but it is certain that representation was far from complete, especially in the Orange Free State and the Cape Province. When it is further considered that the figures in Tables III and IV relate to a maximum period of 2 months, the number of cases seen in this short period by a limited number of observers is seen to be substantial. If the figures are adjusted to represent a period of 1 year by multiplying by $6 \times \frac{253 + 91}{253}$,*

*Calculation based on figures in Table I.

it is seen that the total numbers of cases of kwashiorkor, marasmus and pellagra seen annually by the observers represented by the questionnaires are probably in the order of 36,000, 29,000 and 26,000 respectively. If these figures represented the total annual incidence of these diseases they would be disturbingly high. Since, however, they probably represent only a proportion of the cases seen annually by doctors, it is evident that the true incidence of these diseases must reach alarming proportions. The figure for kwashiorkor is of especial interest because, since kwashiorkor was declared a notifiable disease in 1962, the number of cases notified has averaged only about 1,200 per month, the total notified in any one year being therefore only about 40% of the total estimated from the questionnaires. It is highly probable, therefore, that the notified cases of kwashiorkor represent only a fraction of those actually seen by doctors.

Of the diseases in which malnutrition may be a contributing factor, gastroenteritis as usual ranks first numerically. It is of interest to note, however, that the total number of cases (15,404) of this extremely prevalent disease does not greatly exceed the total number of cases of nutritional disease (11,987). The incidence of tuberculosis is seen to be about twice as high as the incidence of kwashiorkor—a disquieting reminder of the gravity of the tuberculosis problem in South Africa.

Seasonal Variation in the Incidence of Disease

An attempt was made to see whether the number of reported cases of a given disease varied significantly from winter to summer. In order to investigate this aspect, the 81 pairs of questionnaires submitted by the same doctors for both periods (Table I) were analysed statistically. For each pair of questionnaires submitted, the increase or decrease in the number of cases seen from the first period to the second was computed for a given illness. The symmetry test of Wilcoxon⁶ was then applied to test whether the incidence of a given disease differed significantly for the 2 periods, the level of significance being taken as 5% (two-tailed). The test was also carried out on the percentage of patients suffering from a given disease.

It was found that the numbers of both Coloured and Bantu children seen differed significantly for the 2 periods. This result was obtained with both test procedures. Highly significant differences were found for Bantu pellagra patients and for Coloured and Bantu gastroenteritis patients. Since two-tailed tests were applied, the direction of the difference could not be determined. In those categories in which significant differences were found, however, more patients (both Coloured and Bantu) were seen during the summer than during the winter period.

Main Food Items in Diet of non-White Patients

The question asked here was 'What are the main food items in the diets of your non-White patients?' Answers were based on opinions and no actual figures were given. These answers differed so greatly that it was decided to combine certain food items. Three food categories, viz. maize, vegetables and meat, were taken and the answers were classified in frequency tables under the following headings: maize; maize and vegetables; maize, vegetables and meat; vegetables; vegetables and meat; meat. The

results showed that maize was the staple diet and was more often mentioned alone than in combination with other foods. The commonest combinations during the winter and summer periods were respectively maize and vegetables and maize and meat.

GENERAL CONCLUSIONS

Although the proportion of doctors who cooperated in the present survey was very small, valuable information has nevertheless been obtained about the incidence of malnutrition in South Africa's Bantu and Coloured populations. If it is assumed, however (and there is good reason to do so), that many early and subclinical cases of malnutrition are not seen by a doctor, it follows that the actual incidence of the various diseases is considerably higher than is suggested by the figures reported.

The value of the survey should not be judged merely in terms of the information provided with regard to the incidence of malnutrition in South Africa. The response to the questionnaires was so small that very little definite information applicable to the country as a whole can be said to have been obtained. It must be emphasized that the percentages given in the tables of patients suffering from specific diseases do not represent the incidence in the total population, but only the incidence among patients who sought medical attention.

The real importance of the present survey lies in its value as a pilot study, the first of its kind to be attempted on a nation-wide basis. As such it has revealed the many pitfalls that await the research worker. It has also served to make our doctors more 'nutrition conscious'. A number remarked that they would give special attention to nutritional diseases in the future. The fact that information was volunteered which had not been specifically sought

may be looked upon as evidence of a real interest in the problem and a desire to cooperate in its investigation.

SUMMARY

A questionnaire on the incidence of malnutrition was sent out in 1960 to all registered medical practitioners in South Africa. From the 375 replies received it was evident that malnutrition is extremely prevalent among the Bantu and Coloured populations, and that their access to milk and other protective foods is often very restricted.

Detailed analysis of the figures submitted by the doctors indicated that the most important nutritional diseases in South Africa are kwashiorkor, marasmus and pellagra. Rickets, pellagra and scurvy are apparently found only in the Bantu, and the incidence of kwashiorkor is higher among Bantu than among Coloured children. The incidence of kwashiorkor as estimated from the questionnaires is very much higher than the incidence according to cases notified, suggesting that only a fraction of all kwashiorkor cases are notified.

The total incidence of nutritional diseases (kwashiorkor, marasmus, pellagra, rickets and scurvy) is not much lower than the incidence of gastroenteritis, but the incidence of tuberculosis is nearly twice as high as that of kwashiorkor.

It is concluded that the survey has contributed valuable information on the incidence of malnutrition in South Africa, but that its real importance lies in its value as a pilot study.

Sincere thanks are due to the doctors who collected the information on which this report is based.

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