

NUTRITION IN KENYA: NOTES ON THE STATE OF
NUTRITION OF AFRICAN CHILDREN.

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These notes on the state of nutrition of African children are based on a study of the effects of milk-feeding of African school-children in Nairobi over a period of one year; observations on the state of nutrition of children in South Nyeri Native Reserves; a series of surveys estimating the general health of the Wadigo on the Coast; a survey assessing the general health of the Masai; and observations on the state of nutrition of the in-patients at the Native Hospital, Nairobi. As an introduction, is given a passage from the League of Nations Health Organisation's Report on the Intergovernmental Conference of Far Eastern Countries on Rural Hygiene (Bandoeng, Java, 1937), quoting its first recommendation:—

"The Conference emphasises the importance of diet in relation to health problems in the East. The available evidence suggests that under-nourishment and malnutrition are widespread, and that much impairment of physical development and general health, low vitality and actual disease, result from insufficient and improper diet. While the problem is difficult to attack, being largely bound up with economic conditions, the Conference, nevertheless, feels that there are possibilities of improvement and progress in many directions. It, therefore, hopes that Governments will increasingly support work in the field."

With regard to urban and rural areas in Kenya, there is already evidence to show that under-nourishment and malnutrition are widespread, and that much impairment of physical development and low vitality and actual disease result from insufficient and improper diet.

The following summaries of the results of certain surveys amply bear this out:—

I. SUMMARY OF RESULTS OBTAINED FROM A CONTROLLED MILK-FEEDING EXPERIMENT ON NATIVE SCHOOL-CHILDREN IN NAIROBI.

(a) Preliminary survey on 2,182 children before milk-feeding commenced.

(1) Under-nourishment assessed from weight and height measurements.—Weight for height of young growing African children, compared to the average weight for height standard of European children revealed the following:—

Africans under-nourished—

Boys, 88%. Girls, 81%.

- (2) Graphs of average weight for height, compared for European and African children, show that African children are on the average 10% under weight for their height.

Note.—That this is not entirely due to racial characteristics has been borne out by other methods of estimating the state of nourishment. Certain individuals do conform to the average, and some are actually over the average European weight for height standard. More individuals among the older African boys and girls who have slowed down in height growth, or have attained their maximum height, are found to equal or exceed the European average. This is particularly so for the older Kikuyu girls, some of whom might be classed as too fat.

- (b) *The effect of one year's milk-feeding, ½ pint daily, on the weight and height of growing African children.*

- (1) Gains in weight equal to or greater than the average annual percentage gain attained by European children were made by African children as under:—

Milk Group—

Males, 82%. Females, 76%.

Control Group (not receiving milk)—

Males, 31%. Females, 53%.

While in the Control Group under a third of the male children and just about half of the females succeed in gaining standard weight during the year, 82% of the males and 76% of the females receiving milk attained or exceeded the average annual percentage weight gain of European children.

- (2) Increases in height equal to or greater than the average annual increase in height of growing European children were found in the two groups of African children as under:—

Milk Group—

Males, 80%. Females, 71%.

Control Group—

Males, 51%. Females, 53%.

While only about half of the growing African children not receiving milk attained the standard increase in height, 80% of the boys and 71% of the girls receiving milk for a year were capable of reaching or exceeding that standard.

Note.—During the experiment, periodic weighing of the children was done throughout the year. This revealed the fact that, on the average, there was an actual loss of weight in a batch of Kikuyu children in the Control Group at the end of the dry season before the advent of the short rains. Such was not the case in the Group receiving milk.

The school-children represented various tribes including Wakikuyu, Jalu, Bantu Kavirondo and Wakamba. The Control Group included many Kikuyu children from the Native Reserve in the

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vicinity of Nairobi. It can be said that the large majority of native children in and around Nairobi are under-nourished, and that the addition of milk to their diet is capable of bringing about considerable gains of weight and height. It was found, however, that height-increases in a considerable number of the milk-fed children were out of proportion to the weight gains, indicating that, although their calcium requirements for normal bone growth were being supplied by the milk, their protein requirements for flesh-building to keep pace with height-growth were not up to standard. Their basal home diet consisting mainly of maize was supplying inadequate protein, and that of poor quality, and the good quality protein obtained from the milk was not in sufficient amount to compensate for this.

(c) *Malnutrition as evidenced by signs of vitamin deficiency.*

(1) *Vitamin A.*—Fifty-five per cent of the children surveyed were found to have "phrynoderma," a definite skin sign of vitamin A deficiency. Others not having this sign were examined for "night-blindness," the earliest sign of vitamin A deficiency, and practically all were found with this defect in varying degree. It can safely be said that the great majority of the children examined were suffering in some degree from lack of the minimal requirements of this vitamin, which is the anti-infective food factor. Vitamin A deficient individuals are much more liable to infections of the skin and of the respiratory passages.

(2) *Vitamin B₂ complex, pellagra preventive factor.*—Although only a few cases of well-marked pellagra were found, skin signs said to be due to some deficiency of the pellagra preventive factor, were practically universal amongst the growing children. This sign is a mosaic-like scaliness on the front of the legs and sometimes the arms, a condition that appears like an application of lacquer that has cracked on drying. Gross deficiency of the p.p. factor results in severe sun dermatitis, continued diarrhoea, and finally dementia.

(3) *Vitamin C.*—No definite cases of scurvy, which is caused by gross deficiency of this vitamin, were found, but 26% of the children had bleeding gums which might be attributed to some deficiency of vitamin C.

Note.—(a) Sunshine in this country provides sufficient vitamin D and rickets is uncommon.

(b) The inclusion of the pericarp of cereals in the food of natives renders them not liable to beriberi, which is due to B₁ deficiency.

(d) *Results of milk-feeding on vitamin deficiency.*

It cannot be said that the half pint of milk given to the children had any beneficial effect in relieving the malnutrition caused by vitamin deficiency.

Although milk contains vitamins A, C, and the p.p. factor, the amount consumed was insufficient to bring the requirements up to minimal standards. The basal diet of maize, which was of the white variety, contains negligible amounts of carotene, the vitamin A producing element, vitamin C, and the p.p. factor. Green vegetables, which could provide a sufficient amount of all these vitamins, seldom formed part of the diet of the urban Wakikuyu.

(e) Evidence of mineral deficiency.

(1) *Calcium from lime salts.*—It was reckoned that the average basal diet of the Wakikuyu children was providing only about half of the minimal requirements of lime salts for normal growth of bone, and that the milk they received provided the other half. The results of milk-feeding in bringing about such remarkable increases in height suffice to show to what extent growth was being retarded for lack of ample supplies of lime salts. Maize is but a poor provider of calcium, its content being 1/10th of that of wheat and only 1/100th that of mwimbi. Wheat and mwimbi did not enter the basal diet of the school-children, nor did any other rich source of lime.

(2) *Iron.*—Iron salts are required for haemoglobin production in the blood. Iron deficiency in a diet causes microcytic anaemia. Anaemia amongst the Nairobi school-children was not so marked as that found in native children at the Coast. The following is the analysis of the haemoglobin estimations:—

Groups haemoglobin % range.	Percentage children.
50% and under 50% haemoglobin	1%
55% and under 65% haemoglobin	16%
70% and under 80% haemoglobin	74%
Over 80% haemoglobin	10%

It can be said that 17% of the children were definitely anaemic, and probably listless and unfit for active exercise as a result. Those with 70%—80% haemoglobin, comprising 74% of the children, might not have definite symptoms of anaemia, but they probably had never experienced a real sense of well-being for comparison. Only 10% of the children could be called fairly full-blooded. Whatever the causes may have been for any loss or destruction of blood among the children, they were not having enough iron to make good the deficiency of haemoglobin. Their basal diet was comparatively poor in the haemoglobin-producing element. Milk itself, being poor in iron, did nothing to improve matters on being given to the children.

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II. OBSERVATIONS ON THE STATE OF NUTRITION OF KIKUYU CHILDREN IN SOUTH NYERI NATIVE RESERVE.

During the short time at my disposal in this reserve, opportunities were taken to examine school-children and children in the villages, and of studying their diet:—

- (a) The picture of the state of nutrition was a reflection of that found amongst Kikuyu children in Nairobi, somewhat dimmed by dirt, especially in the case of the children in the villages. The great majority of the children from about 7 to 13 years of age appeared spindly and under weight. Girls for some reason, possibly fattening for the marriage market, after reaching puberty fill out and become rather buxom. Boys on reaching puberty fill out much more slowly. During the years of active height-growth, it is evident that there is that same shortage of the flesh-forming protein in the diet.
- (b) *Vitamin deficiency.*—
 - (1) Vitamin A deficiency as evidenced by the presence of phrynoderma was found to be very common, and many streaming noses, coughs and colds, and skin sores, proclaimed shortage of the anti-infective food-factor.
 - (2) The prevalent mosaic-like pattern on the skin of the legs branded the younger children as being deficient in the pellagra preventive factor in some mild degree.
- (c) The diet in this Kikuyu Reserve is little better in quality than that of the Urban Wakikuyu, though it may have a little more variety. White maize, unripe bananas, potatoes, and some beans, cooked and eaten as a mixture, form the mainstay of their principal meal of the day. Some gruel in the morning, most often made with maize, has to sustain them until evening. Millet sometimes takes the place of maize in the gruel, but the use of this millet is going out of fashion. Meat is so infrequently eaten by the masses that the intake is considered negligible.

Indigenous green vegetables, formerly so popular, and when in season always in the past added to the above mixture, are being used less and less. The amounts of indigenous greens available have steadily diminished as more intensive cultivation has taken place. European vegetables are being planted up more and more in certain areas, but unfortunately in most cases are looked on only as a cash crop. They have certainly not so far been used by the masses to take the place of the indigenous varieties when these are out of season, or in short supply. The sad lack of green vegetables in the diet has brought about a grave lowering of the intake of vitamins A, B, and C, and of the minerals, calcium, phosphorus, and iron. White maize has taken the place of coloured varieties, again

diminishing the vitamin A intake. Protein has to be struggled for from a poor selection of the vegetable proteins in maize, some beans, and potatoes. More variety with the addition of millets or wheat or rye and most certainly animal protein in the form of meat, pork, milk, chicken or eggs would solve many of the difficulties.

It was hoped that the pig industry in South Nyeri Native Reserve would solve that problem, but the demands of war and shortage of feeding stuffs have dealt it a blow. The common mixture of maize, beans, potatoes and bananas, yields fat in much less quantity than that considered necessary in a good balanced diet. The addition of such food-stuffs as ground-nuts, soya-beans or oyster-nuts would provide the fat requirement, and certainly animal fat would be greatly beneficial. Here again the native pig industry seemed about to solve the problem with adequate amounts of cheap lard. Calcium deficiency appears to be stunting the Wakikuyu as a tribe. Looking back to the results of milk-feeding, it is seen that raising the calcium intake to minimal requirements had a marked effect on height-growth. Nature has to do its best with the calcium available. It produces good bones, but they have to be shorter and thinner.

Wakikuyu women, from time immemorial have selected, without quite knowing why, the calcium-rich beans and mwimbi as being essential for providing pregnant women with the wherewithal to build "bonnie babies" (in utero) and to sustain them with good milk during the lactation period. They have not thought of carrying it further. The growing of mwimbi and beans has practically ceased, most probably because of soil impoverishment, and a part from buying these for use in pregnancy and lactation, their use is not extended to the raising of strapping boys and girls.

III. THE GENERAL NUTRITION STATE OF THE WADIGO.

At the Coast the Wadigo were found to be generally under-nourished, nutrition by visual assessment giving the following results:—

Nutrition.	% adults.	% children.
Good	63%	56%
Fair	33%	40%
Poor	4%	4%

or shortly; under-nourishment was evident in 37% of the adults and 44% of the children. The greatest factor contributing to ill-health was found to be anaemia with its attendant physical disability and lassitude.

The Wadigo have three main diseases to contend with, namely hookworm, malaria and bilharzia (urinary schistosomiasis), all diseases in which there is blood-destruction or blood-loss. The latter two diseases particularly affect children until, in the case of malaria, they

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have gained immunity, and, in the case of bilharzia, they have given up their frolic in infected pools or become immune, if that is possible. The resulting anaemia was found to vary in degree, being proportional to the iron intake; deficiency of the haemoglobin-forming mineral in the diet preventing adequate regeneration of blood.

A diet of muhogo (cassava) and, or maize, or rice with perhaps some fish, and occasionally meat, does not contribute much in the way of iron. Indigenous green vegetables, of which 4 ozs. a day would supply the minimal requirements, are mostly very seasonal, and the favoured varieties are becoming more difficult to come by. Young muhogo leaves and sweet potato leaves are rich in iron, edible, and in good supply at all seasons, but unfortunately have not become popular as items in the diet. It might be necessary to present iron in some form to the general population, such as medicated salt (cooking salt) if that were possible, in order to build up the iron reserves so badly depleted that it is doubtful whether natural sources, such as green vegetables, would meet the requirements.

Evidence of vitamin A deficiency was found, but in much less degree than that prevailing amongst the Wakikuyu. The maize of the Coast is the quick cropping yellow variety which contains carotene the precursor of vitamin A, and this probably accounts for the difference.

IV. MASAI NUTRITION AND DIET.

The assessment of the general nourishment of the Masai in the survey of 1930-31, revealed that on the whole they are a lean type of people.

VISUAL ASSESSMENT OF NOURISHMENT.

	% adult males, excluding moran.	% moran.	% all adult males.	% adult females.	% children male.	% children female.	% children babies.
Good	50%	84.5%	63%	61%	49%	73%	86%
Fair	46%	13%	34%	35%	48%	25%	13%
Poor	4%	2.5%	3%	4%	3%	2%	1%

The Masai, it is commonly believed, live wholly on meat, blood and milk. Actually, blood is consumed now and again, and probably only by the moran. Milk and meat would appear to be the main items, and nowadays it is revealed that there is much more maize consumed in the Masai Province than formerly. At the time the Medical Survey was made, a certain amount of maize was used by the women during the last three months of pregnancy, when their ordinary diet was drastically cut with a view to providing a small child for ease in parturition through a scarred narrowed vagina, the result of female circumcision. It is probable that, as the proportion of Bantu

wives* of the Masai and their progeny is steadily increasing, more and more maize is taking a place in the dietary of the population. Such is all to the good, and should the eating of indigenous or cultivated vegetables be introduced as well, it would bring about a great improvement in a diet that in the past consisted, and probably still consists, of too great a proportion of protein and not enough carbohydrate and roughage. The absence of roughage in the form of vegetable fibre is probably responsible for much intestinal stasis and resulting ill-health, particularly in the older people when they become less active.

V. OBSERVATIONS ON THE STATE OF NUTRITION OF IN-PATIENTS AT THE NATIVE HOSPITAL, NAIROBI.

Here the general picture of under-nourishment and malnourishment was noted to be much the same as that found in the Town and the surrounding Reserve. Outstanding amongst the deficiencies treated is the condition called by various names such as infantile oedema, Kikuyu disease, infantile pellagra, or nutritional oedema. It affects Kikuyu babies mostly, and just after weaning before they have sufficient teeth to deal with a mixed diet. In ignorance mothers feed them on the ready to hand semi-liquid food, maize water gruel, and very little else, with disastrous results. The condition is believed to be brought about by the multiple deficiencies of vitamins A and C, and of the B₂ complex with the pellagra preventive factor, and of protein. Lack of good protein brings about the marked puffiness of the whole body, or oedema. Anaemia is usually also severe. Unless treated early with large doses of all the factors thought to be deficient, liver damage becomes so extensive that cure is impossible. Better feeding of babies after weaning would prevent all these catastrophies. The essential cow's or goat's milk is unfortunately generally not available in any great quantity in the Kikuyu Reserves.

To SUM UP.

Under-nourishment and malnutrition as found amongst the native school-children in Nairobi and in the Kikuyu and other Reserves is almost certainly widespread throughout the Colony. Stockbreeders would quickly go out of business if they took no heed of the balanced diet necessary for the proper feeding of their animals. Human beings, however, are not bought and sold.

What can be done for the future workers of Kenya? How can we give the children a chance to obtain the stature, strength and well-being in body and mind that surely ought to be their heritage? Nurtured and educated properly, they should provide men and women capable of taking their proper place in their country, working efficiently for a reasonable return that will give them the wherewithal to maintain a good standard of living and continued health and strength and prosperity.

*Sterility in many Masai wives through venereal disease has brought about the custom of marrying wives of surrounding tribes who can bear children.

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