

Food and Nutrition in an Independent Papua New Guinea

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One of the principal problems which faces Papua New Guinea in the early years of independence is that of the health and well-being of its people. Nutritionally, Papua New Guinea is vulnerable in that food variety is limited, there is an increased dependence on imported food, and the traditional village support system is under threat through cash cropping and urbanisation. However, a new awareness of the central role of the village in the delivery of health and nutrition services, together with the maintenance of subsistence farming and, to some extent, hunting and gathering, may enable Papua New Guinea to achieve adequate nutritional standards without too great an effect on the national economy.

Papua New Guinea became an independent nation on September 16, 1975. In its Papuan part, the country had been administered by the Australian Government since 1905. With independence, Papua New Guinea became a sovereign state within the (formerly 'British') Commonwealth, and a parliamentary democracy.

The people are of several linguistic groups with a variety of socio-cultural backgrounds; in all, there are about 700-800 languages. Various attempts have been made to unify the languages. The use of 'Police Motu' before World War

II was one such attempt. Neo-Melanesian (formerly known as Pidgin) has tended to supplant Motu in recent years.

The majority of people live as villagers, but few are unaffected by some aspects of industrialised society. The numbers of university graduates, professional people and public servants grow. The estimated indigenous population in 1976 was 2,793,800 (referred to as 'nationals'). The European population increased until 1971, when it was 50,757, but by 1976 had fallen to an estimated 34,812 (Inder, 1978).

The nutrition problem

Since the pioneering study of Hipsley and Clements (1947), considerable information has been collected on the dietary patterns and nutritional status of Papua New Guinea populations. The most significant health problems are malnutrition, infection and the interaction between these two.

The infant mortality rate, although high, has fallen markedly (Gordon, 1976). Malnutrition is the fifth most common diagnosis and cause of death amongst infants in hospital (Korte, 1976).

Reliable data about life expectancy and causes of death are hard to obtain: ages must often be estimated because dates of birth are not known. Life expectancy for males is reckoned to be greater than for females, unlike most other countries. The life expectancy of women in rural areas is 49 years as compared to 59 years in urban areas (Korte, 1976). There are difficulties in identifying causes of death, and those for the 'elderly' are not as well documented as for children.

Papua New Guinea is clearly able to produce food, although it must do so in a sub-tropical climate and at many different altitudes. The nutrition problem is not simply one of production, but also of knowledge about and attitudes to food. Papua New Guineans were formerly hunter-gatherers (Watson, 1965; Bulmer, 1968), although this system may not have allowed them to live at high altitudes. It is difficult to deduce what nutritional status then obtained. One could speculate that although essential nutrients may have been adequate, there may still have been an energy deficit; such a deficit may have stimulated the change towards subsistence agriculture.

Papua New Guineans now suffer from the restricted scope



Markets such as this one at Goroka perform an important function: the distribution of (generally small) surpluses from subsistence gardening.

of their agriculture. Tubers, principally kaukau (sweet potato or *Ipomoea batatas*) are the main crop. In these circumstances there is a risk of protein-energy malnutrition (PEM), principally in children under 5 years of age. In the Western Highlands (Sinnott, 1972; Sinnott and Whyte, 1978), it was found that the single staple, sweet potato, supplied about 90% of the total energy intake and that protein contributed only 3% of the total energy intake.

Undernutrition, defined as body-weight for age between 60 and 80% of the Harvard mean (Stuart and Stevenson, 1959), together with kwashiorkor (weight 60-80% and oedema) constitute the commonest forms of PEM, with a prevalence of 26-42% of children under 5 (Ferro-Luzzi, Norgan and Durnin, 1978; Lambert, 1978). Marasmus (weight less than 60% and oedema) also occurs, with a prevalence of 1% of children under 5 (Ferro-Luzzi *et al.* 1978; National Planning Office, 1978). The overall prevalence of malnutrition varies from 20% in the Islands District to over 60% in the West Sepik (Korte, 1976). PEM is often accompanied by anaemia and occasionally by ocular evidence of vitamin A deficiency. Specific vitamin deficiencies are rarely described.

Appearances can be interpreted in various ways. Many children do have 'pot bellies', which may be due to:

- (a) consumption of large volumes of food of low energy value, such as sweet potato;
- (b) hepatomegaly and ascites of malnutrition;
- (c) intestinal parasitic infestation;
- (d) other intra-abdominal disease.

The nutritional problem does require further definition. The challenges are to discover, firstly, what levels of 'underweight' and growth retardation constitute a functional problem; secondly, to what extent a low haemoglobin level adversely affects physical performance or leads to insufficient reserve in time of illness; thirdly, whether there are sub-clinical vitamin and trace element deficiencies (zinc, for example).

It could be argued that some features of some Papua New Guineans which from the viewpoint of Western society would denote adverse nutritional status, might actually reflect advantageous adaptation. An example might be the Kukukuku people who, with their small stature, perform better physically in their mountainous homes than bigger people (Malcolm, 1969). Their small size at least partly reflects a limited food supply, since on migration new-generation Kukukuku children grow taller; but these same persons, on return to the ancestral home, are then disadvantaged in performance and require more energy than the limited food supply will allow.

There appear to be at least three especially vulnerable groups. Infants and pre-school children under 5 years of age constitute the first group at risk (Jelliffe and Maddocks, 1964): if weaning foods are not introduced at 4-6 months, nutritional status is precarious. Pregnant and nursing mothers do not necessarily receive any special consideration in the distribution of limited village food supplies. The upper quintile by age would be those over forty years, a rather younger 'elderly' population than that of industrialised societies. It is possible that inadequate nutrition contributes to premature death in the adult population; the progressive loss of body weight with advancing years, in contrast to Western societies, would accord with such a hypothesis (Hipsley and Clements, 1947). It is difficult to know whether the rate of aging is accelerated. There is an impression that many Papua New Guineans at forty years look sixty years old from a European point of view. However, Sinnott and Whyte (1978), adduce some evidence, by the presence of corneal arcus for example, that Papua

- i. Infection.
- ii. Family structure and distribution of food within the family.
- iii. Spacing of childbirths.
- iv. Chewing habit (betel nut, bubble gum).
- v. Climate.
- vi. Cash cropping (coffee, tea, etc.), which reduces the availability of land for subsistence farming.
- vii. Urbanisation.
- viii. Food advertising.

TABLE 1

Some factors affecting malnutrition in Papua New Guinea

New Guinean and European rates of aging are comparable.

In Table 1, some determinants of malnutrition in Papua New Guinea are enumerated. With the exception of climatic misfortunes, each factor could be minimised or avoided, and, for climate, contingency planning would help: an example would be food stored in anticipation of frost which can adversely affect a sweet potato crop.

The foods

Papua New Guineans are generally regarded as subsistence agriculturalists, but there remain elements of hunting for birds, marsupials and crustaceans and gathering for nuts, fruits, mushrooms, ferns and insects. Items so collected may not always be eaten, however, especially when the hunters are children. There is no national cuisine: foods are generally mixed together. There is no traditional alcoholic beverage. Betel nut may well be the mood modifier which substitutes for alcohol (Lapedes, 1977).

The *mu-mu* or feast (Lea and Irwin, 1971) is an important and dramatic change in an otherwise monotonous dietary pattern. Pigs, important as a food on such occasions, do not contribute significantly to the overall protein intake. However, the amount of pig meat eaten can vary considerably (Sorenson and Gajdusek, 1969). The abrupt change in protein intake, with its requirement of trypsin for digestion, is thought to contribute to the prevalence of *pig-bel* or necrotising enteritis (Lawrence and Walker, 1976). This would be because food contaminated with *Clostridium welchii* contributes a glycoprotein toxin, also requiring trypsin (for detoxification), while sweet potato produces a trypsin inhibitor (Lawrence and Walker, 1976; Lawrence, 1979).

As in other societies, the non-nutritional role of food in the family and community is important. The relative importance of the father, mother and children in the family influences the distribution of food.

Our measures of the nutrient composition of local Papua New Guinean foods are mainly presumed from food composition tables from other countries (Platt, 1962), although some local data are available (Bailey, 1968). Analyses have been done at the University of Papua New Guinea in Port Moresby and at the University of Technology, Lae. These include the wing bean, and also tropical fruits for their Vitamin C content.

There are some important trends in food consumption in Papua New Guinea (Table 2). Increasingly, imported foods such as rice and tinned fish (usually mackerel) displace the traditional sweet potato staple. Most of the rice is Australian which has a different appearance to that which can be locally grown. It would appear that the more readily available Australian rice is encouraging a preference for that rice type. It may not be possible to cater for this preference with locally grown rice; as a consequence, even the advent

of a successful national rice venture may not avoid the import of Australian rice and the substantial capital outflow. A large fraction of Australian aid to Papua New Guinea returns to Australia in this way.

The fish is mainly supplied by Japanese entrepreneurs. In some of the urban areas there is poor availability of fresh fruit and vegetables and an increased popularity for snack foods and aerated drinks (Wookey, 1973). More and more highly refined carbohydrate foods are consumed, such as 'cheese pops' and 'lolly water'. There is increased consumption of animal protein from chicken, goats and cattle, although the overall effect on protein intake must be minimal at this stage. In 1978, Papua New Guinea became self sufficient in chicken production; chickens can be reared on locally grown sorghum. The dietary pattern in rural and urban areas is clearly changing (Jeffries, 1979).

The Government strives to counter the introduction of formula milk as a weaning food for, at least, economic and hygienic reasons. It has restricted the purchase of babies'



Hunting and gathering survive and make some contribution to food supplies, though not a dominant one. Above: hunting in the highlands near Kundiawa. Below: Village children show the products of a few hours' gathering — mainly mushrooms — to professor Wahlqvist.



- i. Tubers — sweet potato appeared as recently as 16th century.
- ii. Green leafy vegetables — aibika.
- iii. Animals — fish, wallaby, eel, birds, poultry, pigs, snakes, snails, insects, spiders, caterpillars, bugs.
- iv. Nuts — peanuts, coconuts.
- v. Legumes — wingbean.
- vi. Fruit — poor utilisation despite availability.

TABLE 2

Examples of foods available in Papua New Guinea (Mansfield *et al.*, 1973; Paijmans, 1976; Inder, 1978; Bailey, 1968)

bottles to prescription only. Unfortunately, other bottles will substitute. In any case, the problem of lactase deficiency, with a frequency of almost 100% amongst Papua New Guinean adults, may limit the use of milk (Cook, 1979). In a nutrition rehabilitation setting a lactose free preparation like Digestalac^R or Glucose Nutramigen^R can be used by lactase-deficient people.

Western vegetables such as french beans and tomatoes are now more available. These are not necessarily nutritionally superior to local produce, but by adding variety to a simple diet they may improve eating patterns.

The use of wheat flour, again not produced locally, is increasing; it is used in bread, 'scones' and a kind of damper. Eating patterns tend to be morning and evening with snacks, though a three-meal-a-day pattern is promoted for children as a safeguard against inadequacies due to the high bulk of the traditional staples and a young child's inability to consume large volumes.

Salt appetite seems to respond to greater availability of salt. Initially, iodised oil injections and, later, iodised salt have largely solved the problem of iodine deficiency, but the consequences in terms of hypertension remain to be evaluated.

The increased availability of cooking utensils where formerly there were none other than leaves and bamboo, or little more than clay pots, will exert pressures for change in eating habits (Oomen, 1971).

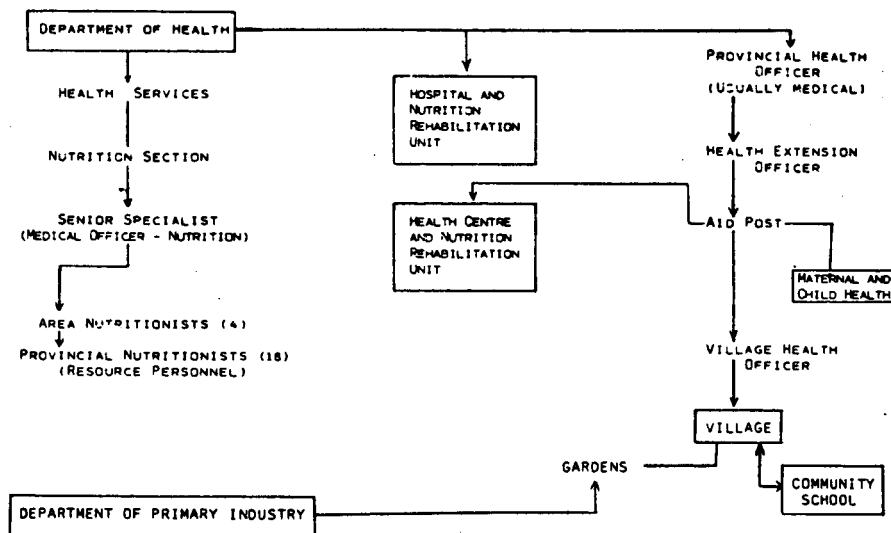
The nutrition effort

There is now an extensive network of nutrition personnel in Papua New Guinea having connections with village affairs, agriculture, food science, education and health (Figure 1). This arrangement provides an excellent opportunity to bring the many ecological advantages of village life to bear on the problem and maximise self-sufficiency. Papua New Guinea will be especially vulnerable if its present trading posture, with a heavy dependence on imported food, is developed further (Borgstrom, 1973 and 1978).

A national nutrition policy has already been formulated for Papua New Guinea (National Planning Office, 1978a). The principal concerns are:

- (a) the nature of the food supply;
- (b) the selection of a nutritious diet;
- (c) the provision of medical services for the nutritionally vulnerable.

FIGURE 1
The network of nutrition personnel in Papua New Guinea



It is based on evidence so far to hand from national nutrition surveys (Bailey and Whiteman, 1963; Bailey, 1963; Hipsley and Clements, 1947; Ferro-Luzzi *et al.*, 1978; Hipsley and Kirk, 1965; Lambert, 1975; National Planning Office, 1978b; Venkatachalam, 1962).

These are basically anthropometric surveys. Weight for age and mid-upper-arm circumference (MUAC) are widely used. The surveys are not without sampling problems so that regional comparisons and secular trends must be viewed as tentative. Geographic differences with physiological consequences, especially altitude and its effects on haemoglobin, also make regional comparisons difficult (Walsh *et al.*, 1959). Dietary intake data are not plentiful, and again suffer from an incomplete anthropological understanding of food and the problem of language.

There are food and nutrition training programs in the following places:

Port Moresby

- (i) Allied Health Sciences
 - (a) Diploma of Nutrition Education
- (ii) Medical School

Lae

- (i) Papua New Guinea University of Technology
 - (a) Food Science and Technology

On location

- (i) Maternal and Child Health
- (ii) Aid Posts

What more can be done?

One of the requirements of nutrition research in Papua New Guinea is to relate food patterns to a greater extent to anthropometric findings.

The relationship between village organisation and nutritional status is of particular importance. At the village level, the role of gardens, availability of water to gardens, and food hygiene must be considered. Access to food markets is important.

Some specific nutrients may not be adequate, but any such deficiencies should be rectified once protein energy malnutrition is solved. In order to define the significance of under-weight, longitudinal studies with end points of morbidity and life expectancy are required.

National health professionals in Papua New Guinea often appear not to respond to a lack of physical well being in the way their Western counterparts would. Nationals, too, do not seek health care as early as in the West. There is a general acceptance of haemoglobin levels as low as 7g/100ml. A characteristic of chronic ill health is that it is difficult to appreciate how much better one could feel with treatment.

Endemic chronic illness can lead to much social inertia. The perception of health and disease by Papua New Guineans requires more lucid analysis than is currently available.

Nutrition education

Nutrition education gathers momentum in Papua New Guinea, but much remains to be done. School lunch programs are one vehicle already in use. School children are involved in gardening – many school gardens are exemplary. The pregnant mother receives some instruction. Mothers cling to the baby books which record anthropometric data, but it is difficult to know what actually motivates them to do this. Does the information educate at all? Basically mothers should be aware of the need to introduce solid foods at about five months to avert PEM.

Anthropological studies could clarify modes of acquisition of information at the village level. For example, villagers do not read and therefore posters may be inappropriate, yet they are extensively used. It is likely that a direct approach is required, based on facts known to the village people. For example, 'introduce solid foods when the first tooth appears', 'eat food three times a day – when the sun rises, when it is high in the sky and when it sets'.

Village leaders or village nutrition spokesmen must be involved in any nutrition education effort so that the program to improve nutritional status is relevant and effective at the village level.

If experts were to live with villagers, good garden practice might be stimulated. At present, even when reticulated water and manpower are available, negligible garden effort may be seen.

Urban problems loom increasingly large, but even in the town the village connections of individuals, by way of the 'wantok' system, could be used to advantage.

There is one national radio network and no television. This would seem an excellent chance to send reliable nutrition messages; but yet vested commercial interests have been introduced into the media because of problems in funding for the network.

Consequences of improved nutritional status

As the PEM problems are solved, every effort must be made to avoid the overnutrition of the West. Already, in certain coastal villages, where there is ready access to imported highly-refined non-traditional foods, obesity and diabetes

mellitus are emerging as problems (Price and Tulloch, 1966). When life expectancy extends beyond 45 years to 50 years and more, diseases related to cigarette consumption – actively promoted by the tobacco industry – for example lung cancer and coronary heart disease, may appear. An increase in the availability of processed food is likely to lead to a reduction in dietary fibre, with its attendant problems. The desirable middle ground for fibre consumption, as for other nutrient intakes, urgently requires definition.

Nevertheless, Papua New Guinea may still be advantaged with regard to its nutritional support system by retention of as much village life, subsistence farming and elements of hunting and gathering as possible.

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