Pilot Survey of Food Consumption and Expenditure Patterns — Two Settlements in Port Moresby.

G. R. SPINKS.

Agricultural Economist, D.A.S.F., Port Moresby.

ONE of the main features of economic development is the rapid growth of urban centres. This growth creates a number of economic and social problems which plague the administering authority and the migrant and permanent settlers. One of these problems which has definite implications on policies relating to economic development is changing food consumption and expenditure patterns.

It has been estimated that the total indigenous population of the Port Moresby area, the largest urban centre in the Territory of Papua and New Guinea, was approximately 22,500 in 1962.(1) Although no complete survey of the rate of annual increase in population has been conducted, it is estimated to be about 2,000 per annum over the last few years.

With these figures in mind, a pilot survey was started to gain some insight into the food consumption and expenditure patterns of three settlements in the Port Moresby area. Samples of households were selected randomly from these. They were drawn from the squatter canoe settlement at Koke ; one village in the group of four which makes up the Hanuabada complex (the traditional home of these Papuans) and another squatter settlement of Gulf District people in the Konedobu area of Port Moresby.(2) Unfortunately the last sample had to be disbanded in the midst of the survey period.

The data covering two settlements, one of migrants and the other of permanent settlers, are not representative of the food consumption and expenditure patterns of the whole Port Moresby area. The samples are small and the survey period of one week was limited. However, the findings of the survey do give some factual backing to certain assumptions about these problems in this urban centre.

(1) The figure for total population is tentative and is derived from a census conducted in 1962 by the New Guinea Research Unit of the Australian National University.

(2) Fuller details of these settlements in Appendix A.

The pilot survey provides a lead to where future research into the food consumption and expenditure patterns of urban dwellers should be directed.

PRINCIPAL FACTORS INFLUENCING FOOD CONSUMPTION PATTERNS.

A number of factors operate to influence food consumption patterns in any community and the following are the main ones responsible for shaping these patterns in the urban centres :

1. Traditional foods ;
2. The supply or availability of traditional and other foods ;
3. The income levels of the settlers ;
4. The price relationship between traditional foodstuffs and others ; and
5. A vague but powerful influence which for want of a better word is usually referred to as "demonstration effect" whereby another culture, usually stronger, is copied.

The newly arrived migrant and to a lesser extent the permanent settler is faced with limited supplies of traditional foodstuffs in the Port Moresby area. The many different groups of migrants have their own traditional foods which range from sweet potato, taro, yam, banana and sago or a combination of two or more of these. The agricultural potential in the immediate Port Moresby area is limited by soil and climatic factors. Furthermore, even for those foods which can be produced, the traditional agriculutural system is not orientated to commercial production but to subsistence needs. Even with very strong price incentives, assuming that the farmers are part of the cash economy, supply is particularly inelastic. The bulky low value nature of the staple products also places an economic limit to the distance these foods can be transported into Port Moresby.

The general shortage of traditional foodstuffs can be assessed from the first part of a survey of the native market at Koke. During one week representing the seasonal distribution of produce for that time of the year, the total

quantity of all produce offered for sale was about 26 tons. Of this, banana, sweet potato, yam, taro, coconut and tapioca made up 57 per cent. Bananas were the most important single item of these foods and alone made up 39 per cent. of the total quantity. No sago was on sale in the market during that week.(3) With the present population and the rapid annual rate of increase it is apparent that supplies of traditional foodstuffs are inadequate. Income levels, particularly for unskilled labour are generally low and food purchases must be confined to the cheapest source, which is usually imported foodstuffs in the Port Moresby area.

The "demonstration effect" is particularly powerful in influencing food consumption and expenditure patterns in any urban area. The copying of "foreign" consumption patterns rests on many factors such as prestige but is also greatly influenced by the advantages of the imported foodstuffs. Of these, the main ones are convenience and ease of availability, while advertising and health campaigns relating to nutrition play an important part.

All migrants and the permanent settlers are therefore forced to modify traditional food habits. The first stage may be of an exploratory nature even within a limited income range and it is in this period that serious declines in diet can occur. However, this seems to pass as knowledge of different foods is gained.

PERCENTAGE OF EXPENDITURE DEVOTED TO FOODSTUFFS OF THE SURVEY AREA.

Considerable difficulty was experienced in assessing the levels of income of the households, as pooling of wages was common where more than one wage earner resided in the same house or canoe. This practice was most noticeable in the Hanuabada sample. However, because of little or no savings, weekly expenditure presented an adequate measure of income.

The levels of weekly expenditure varied between the two samples and indicated that incomes in the Hanuabada sample were higher than those in the Koke canoe settlement.(4) Only 20 per cent. of the households had weekly expenditures of less than 150 shillings in the Hanuabada sample. The corresponding figure for the Koke settlement was 68 per cent.—Table 1.

Table 1.

Percentage of Sample in Each Expenditure Class. Shillings per Week.

Hanuabada and Koke Settlements.

Expenditure Class Shillings per week.	Hanuabada	Koke
Less than 50	—	6
50 to less than 100	10	31
100 to less than 150	10	31
150 to less than 200	30	25
200 to less than 250	30	7
More than 250	20	—
TOTAL	100	100

The most important single item of expenditure was food, a common feature of expenditure patterns in under-developed countries. The average weekly percentage of expenditure on foodstuffs over the samples was 79 per cent.(5) for the Hanuabada sample and 67 per cent. for the Koke sample—Table 2.

Table 2.

Average Percentage of Expenditure on Food.(6)

Hanuabada and Koke Settlement Samples.

Expenditure Class Shillings per week.	Hanuabada	Koke
Less than 50	—	82
50 to less than 100	90[a]	72
100 to less than 150	78	67
150 to less than 200	78	70
200 to less than 250	78	62
More than 250	74	—
Average[b]	79	67

[a] See footnote 6.

[b] Significant at 5 per cent. level.

(3) This market survey which is in progress is to cover three periods of a year to account for seasonal variation in supplies of produce. Only during the second stage of the survey was a small quantity of sago offered for sale in the market.

(4) Henceforth the sample of households in the Koke canoe settlement will be referred to as the Koke survey.

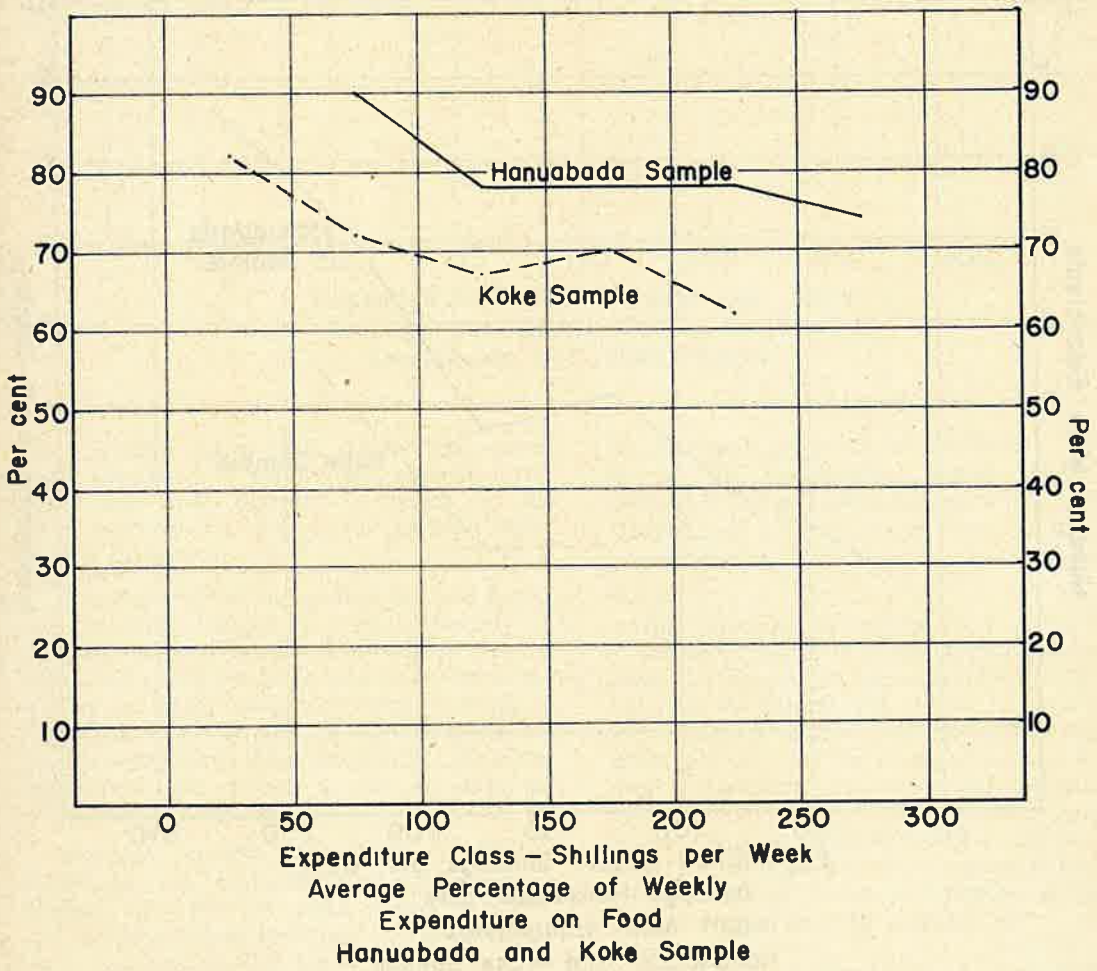
(5) This figure is somewhat higher than it should be as there was only one household in the 50-100 shillings per week expenditure group. The wage earner although working during the survey week had been unemployed up till that time and was not in receipt of his wages. The percentage of his weekly expenditure on food was 90 so that this has tended to raise the average figure for the Hanuabada sample.

(6) In the Hanuabada sample three of the households were issued with rations, but in most cases these were given to friends and relatives.

The evidence suggested that the proportion of expenditure devoted to food purchases declined as expenditure (income) increased. This relationship is shown graphically in Fig. 1. Although the data are limited, it is evident that as income increases, a decrease in expenditure on foodstuffs occurs. However, it is likely that at very low levels of income, this relationship may not hold as any increase in income or expenditure could be all used for food up to the point where immediate food needs are met.

With increased weekly expenditure, the percentage of expenditure on food fell in both samples; the sharpest fall occurring in the Koke sample. In this sample, the percentage decreased from 82 in the lowest expenditure group to 62 in the highest. In the Hanuabada sample, this decline was not as marked and was somewhat misleading because of an unusually high percentage in the lowest income group (50 to 100 shilling) which was represented only by one household. The reason for this

Figure 1



more gradual decline seemed to be linked to the rapid increase in average household size in the Hanuabada sample—Figure 2.

The graphs in Figure 3 showing the average weekly per capita outlay on foodstuffs suggest a high income elasticity of demand for food in both samples. This outlay rose as expenditure increased ; with the steepest rise occurring in the Koke settlement. These figures have been calculated in terms of adult male equivalents[7] and rose from 16 shillings per week at the lowest expenditure group to 26 shillings in the highest. The corresponding figures for the Hanuabada sample ranged from 18 shillings to

(7) Man value coefficients taken from Thomson Betty Preston. *Two Studies in African Nutrition, An Urban and a Rural Community in Northern Rhodesia* : The Rhodes-Livingston Papers, No. 24 Manchester University Press, 1954, p. 57.

Figure 2

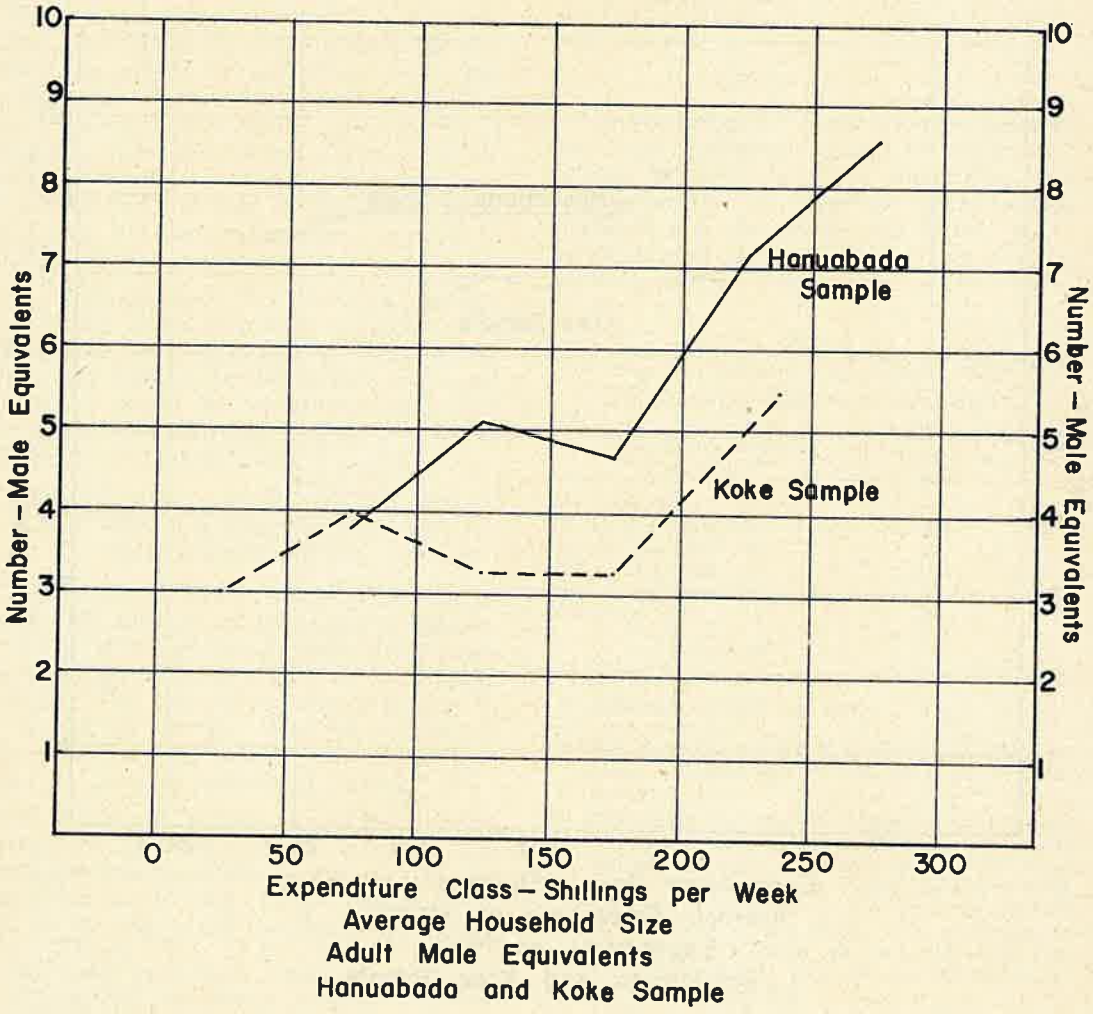
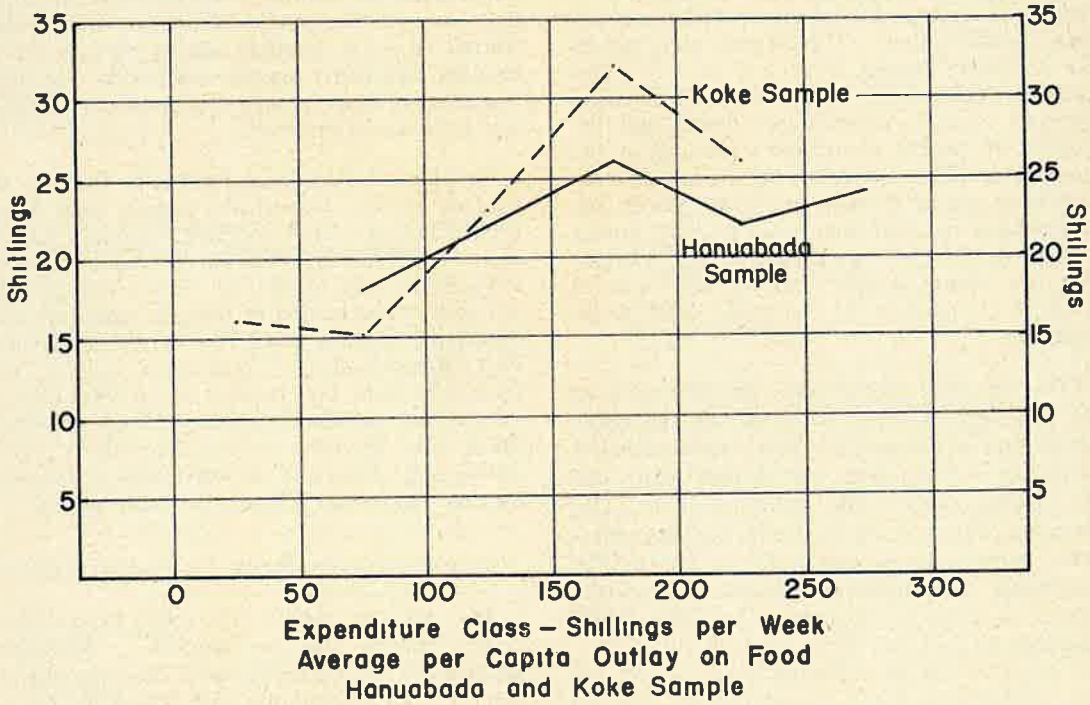


Figure 3



26 shillings. Again these figures were somewhat influenced by the average household size (in adult male equivalents) which in the Hanuabada sample increased steeply with rising weekly expenditure.

Unfortunately the survey data did not permit any statistical analysis of income elasticity of demand for food but the data indicate that the coefficient would be fairly high as in the urban centres or other under-developed countries—Figure 3. This feature of food expenditure and consumption in these countries has important implications on policy as far as economic development is concerned.

Statistical analysis of income elasticity coefficients in underdeveloped countries is limited. However, in urban centres in India, the income elasticity coefficient for all foods has been calculated at 0.79 which means that of an increase in income of ten per cent. slightly less than eight per cent. of this rise will be utilized for increased purchases of foodstuffs. Such figures are considerably higher than the coefficients for all foods in the urban centres of advanced countries. In the U.S.A., the income elasticity coefficient has been estimated at 0.39.[8]

High elasticities of demand for food can lead to serious problems in policy decisions for economic development of underdeveloped countries. Any rise in income will usually be associated with increased demand for foodstuffs. Unless the supply can meet the increased demand, price rises in foodstuffs will occur and inflationary tendencies can develop. This increased demand can be accommodated by further imports of foodstuffs but these will then compete for limited foreign exchange reserves with imports of capital goods for developmental purposes.

(8) The figures for India and U.S.A. were published in *The State of Food and Agriculture* 1959 FAO Rome—Annex, Table 16, p. 195.

The survey indicated a sharply rising average household size with increasing weekly expenditure—Figure 2. In the Hanuabada sample, the average household size increased from 3.7 adult male equivalents in the lowest expenditure group to 8.7 in the highest. The corresponding figures for the Koke survey were 3.1 to 5.6. This suggests that there is a direct relationship between income (expenditure) levels and the number of people permanently residing in the household. This situation of rising incomes and more people residing permanently with the wage earner has also been noted in some similar surveys in African countries. If this relationship is a feature of urban development, it could lead to a number of economic and social problems.

The difference in the range of the figures in the two samples seems to be mainly the result of the type of housing in each. Accommodation in canoes at Koke limits the number which can be housed under the same roof.(9) The European style housing in the Hanuabada settlement permits greater numbers to live in the one house. Overcrowding in houses is a normal feature of urban development in underdeveloped countries.

Effect of Supplies of Staple Foodstuffs from Villages and Gardens.

Supplies of traditional foods from home villages have a marked influence on the expenditure pattern of those migrant families who have come from areas close to Port Moresby. Fairly regular supplies of traditional foods were shipped to the canoe settlement by means of the canoe traffic between the home villages, mainly in the Abau Subdistrict, and Koke. Of the 16 households surveyed, 11 reported fairly regular supplies of traditional food, and one occasional supplies. The regularity of the supplies seemed to vary somewhat but most interviewers indicated weekly shipments. In the majority of cases the food came from the householder's own garden in the village.

The supplies received into the Koke settlement during the survey week may have been atypical. The survey coincided with the preparation for an exhibition of traditional dancing by some of the people from the Abau Subdistrict. It is possible that some of these brought additional supplies of foods. In the lower expenditure groups, this source of supply was particularly important.

Supplies of traditional foodstuffs from local gardens in the Hanuabada sample were very limited ; being mainly confined to tapioca tubers and a few bananas. The survey was conducted towards the end of the dry season and garden activities at that period of the year were severely limited by climatic conditions in the immediate Port Moresby area. The limited supplies of foodstuffs from the gardens of the Hanuabada sample had no influence on expenditure patterns. There may be some influence on the pattern during and at the end of wet season when production from the gardens is much greater.

PATTERN OF FOOD EXPENDITURE.

The general pattern of food expenditure varied between the two samples. Although expenditure on imported foods was the major part of total expenditure, this source of foodstuffs was more important in the Hanuabada sample than at Koke. In the former, an average of four per cent. over the whole sample was used for the purchase of traditional foods. The corresponding figure for the Koke survey was 17 per cent.—Table 3.

Starchy Foods.

The most significant figure from the survey was the importance of purchases of imported starchy foods such as rice, flour and bread.(10) Within the Hanuabada sample this group of foodstuffs accounted for an average of 29 per cent. of total expenditure. The figures for the expenditure classes showed no real variation between the classes—Table 3. The corresponding average percentage for the Koke survey was 18 per cent.—Table 3.

(9) The type of canoe used for accommodation can be seen from the photographs, particularly Plate I, in the article, Jefford, A. W., Dugout Canoes of Papua and New Guinea, in *The Papua and New Guinea Agric. J.* 14 . 167-176.

(10) It was interesting to note that sliced wrapped bread was particularly popular although selling at a premium.

Purchases of all types of starchy foods averaged 33 per cent. of total expenditure in the Hanuabada sample and 35 per cent. in the Koke sample. Of these figures, the percentage of expenditure on the traditional starchy foods, bananas, sweet potato, yams, taro was four per cent. for the Hanuabada sample and 17 per cent. for that of Koke.

Table 3.

Percentage of Expenditure on Starchy Foodstuffs.[a] Hanuabada and Koke Settlements.

Expenditure Class Shillings per week.	Hanuabada			Koke		
	Trad.	Imp.	Total	Trad.	Imp.	Total
Less than 50	—	—	—	4	18	22
50 to less than 100	—	22	22	19	16	35
100 to less than 150	12	23	35	17	16	33
150 to less than 200	4	33	37	19	25	44
200 to less than 250	2	27	39	6	10	16
More than 250	6	26	32	—	—	—
Average[b]	4	29	33	17	18	35

[a] Classified as "traditional" and "imported".

[b] Significant at 5 per cent. level.

The reasons for the importance of the imported starchy foods rest upon a number of factors. Firstly, the availability of this group of foodstuffs is the main reason for their widespread adoption. Secondly, the Hanuabadan people have had long contact with the European culture and have, because of the demonstration effect, tended to copy the consumption habits of this group. Thirdly the people at Hanuabada have more knowledge of nutrition. The Koke group has not had such lengthy contact with the "foreign" sector although many of the occupants of these canoes have been in Port Moresby for many years—Appendix A.

However, an important reason for the high proportion of expenditure on imported starchy foods seems to be economic. The number of calories which can be purchased per unit of money is much greater for the imported starchy foods than the traditional foods most commonly available—Table 4.

Table 4.

Edible Calories per Shilling.[a] Traditional and Imported Starchy Foods.

Food	Calories per Shilling
Traditional	
Sago[b]	2,165
Taro	1,138
Tapioca—fresh tuber	1,412
Sweet potato	886
Yams	603
Banana	509
Imported	
Flour	2,465
Rice—polished—vitamin enriched	1,725
Bread	1,396

[a] Prices for traditional starchy foods were those ruling in the native market at Koke. Prices for the imported foods were the averages of retail prices for the various stores about Koke and the main shopping centre of Port Moresby. The number of edible calories was calculated from Platt. B.S. *Tables of Representative Values of Foods Commonly Used in Tropical Countries*—Special Report, Series No. 253, HMSO London 1945. Reprinted 1960.

b. Supplies of sago are limited in the native market at Koke.

In addition to the prices per unit of calories, the people of Hanuabada are not prepared to pay the bus fare to the Koke market which is located about three miles from their village.

Marine and Animal Protein Foods.

Considerable differences in expenditure patterns emerged from the survey for this broad group of foodstuffs—Table 5. All households in the survey purchased tinned fish. Although both samples averaged about the same percentage of total expenditure on protein foods, the manner in which the figures were made up differed. In the Hanuabada sample, the source of protein was mainly from purchases of tinned goods, particularly fish, while the buying of fresh fish was limited—Table 5.

The reverse situation applied in the Koke settlement as purchases of fresh fish were the main source of protein. However, the purchases of the lowest expenditure group were confined to one household which utilized 44 per cent. of total weekly expenditure on fresh fish. In fact, this particular household bought very little other traditional foodstuffs, as large quantities of starchy foods were shipped from home villages—Fig. 4.

The range of protein foods varied considerably between the two samples. Protein intake from purchased sources was limited to tinned and fresh fish. Unfortunately total intake of protein could not be assessed.

In the Hanuabada sample, purchases of protein foods ranged from tinned fish, tinned meat, fresh meat, cheese, and bacon, although the wider range was only among the highest expenditure groups. In the lower expenditure groups, imported protein was the major source of supply.

Table 5.

Percentage of Expenditure on Protein Foods. Hanuabada and Koke Settlements.

Expenditure Class Shillings per week.	Hanuabada			Koke		
	Trad.	Imp.	Total	Trad.	Imp.	Total
Less than 50	—	—	—	44	9	53
50 to less than 100	7	25	32	13	9	22
100 to less than 150	10	9	19	12	8	20
150 to less than 200	3	20	23	9	9	18
200 to less than 250	4	18	22	19	16	35
More than 250	3	18	21	—	—	—
Average[a]	4	18	22	14	9	23

[a] Significant at 5 per cent. level.

As with the starchy foodstuffs the imported products are the cheapest source of protein and of these tinned fish is the cheapest—Table 6.

Table 6.

Grams of Protein per Shilling. [a]

Traditional and Imported Preserved Foodstuffs.

Food	Grams of protein per shilling
Fresh fish[b]	22
Tinned fish[c]	44
Tinned beef—corned	20

[a] Calculated from the figures used in an unpublished paper J. Whiteman. *Hohola Dietary Survey, July-August* 1962, Department of Public Health, Konedobu, Papua, December, 1962.

[b] Prices based on the average price per lb. at the Koke market during July-August.

c. Average price per tinned fish in "trade" stores about Koke and the main stores in the shopping centre of Port Moresby.

EXPENDITURE ON IMPORTED FOODS.

The proportion of total expenditure on all foodstuffs and beverages varied considerably between the two samples. In each expenditure group, more money was spent on imported foodstuff in the Hanuabada sample than in the Koke sample—Table 7. The average percentage of weekly expenditure over the samples was 70 per cent. for the Hanuabada survey and 37 per cent. for that at Koke.

These figures suggest that as the urban centres grow and migrants settle for longer periods, the consumption pattern will tend to move more towards the imported foods. The percentage figure for the Koke sample was influenced by the regular supplies of traditional food from village gardens.

Table 7.

Average Percentage of Expenditure on all Imported Foods—Hanuabada and Koke Settlements.

Expenditure Class Shillings per week.	Hanuabada	Koke
Less than 50	—	34
50 to less than 100	83	34
100 to less than 150	56	37
150 to less than 200	71	42
200 to less than 250	72	37
More than 250	66	—
Average[a]	70	37

[a] Significant at 5 per cent level.

Every household in the survey purchased bread and butter during the survey week.[11] The range of products varied between the samples. A religious sect in the Koke settlement forbids its followers to consume stimulants and therefore tea and coffee are not listed in purchases. In addition, practically all wage earners consumed bread or scones, soft drink, etc., for lunches or snacks at their midday meal whilst at work. Therefore these percentages of expenditure on imported foods are understated.

A comparison between the average percentage of expenditure on traditional and imported foodstuffs can be examined in Table 8. There is no clear indication that the percentage of expenditure on imported foodstuffs increases with higher expenditure but an examination of the source of

[11] Only one household bought margarine.

calories suggests that this is so. However, it should be remembered that in the Hanuabada sample the expenditure pattern of the lowest expenditure group only covers one household, the wage earner of which had been unemployed the week prior to the survey. This high figure may not be representative of this expenditure class, in fact if he had been in receipt of wages, no household would have fallen into this expenditure group. Similarly in the second lowest expenditure class, 100 to 150 shillings per week, the wage earner was not a Hanuabadan and the only one in the sample who did not have an occupation requiring some degree of skill.

Table 8.

Average[12] Percentage of Expenditure on all Foods Imported and Staple.

Hanuabada and Koke Settlements.

Expenditure Class Shillings per week.	Hanuabada			Koke		
	Staple	Imp.	Total	Staple	Imp.	Total
Less than 50	—	—	—	48	34	82
50 to less than 100	7	83	90	38	34	72
100 to less than 150	22	56	78	33	34	67
150 to less than 200	7	71	78	28	42	70
200 to less than 250	6	72	78	25	37	62
250 and over	8	66	74	—	—	—
Average[a]	9	70	79	31	36	67

[a] Significant 5 per cent. level.

AVAILABILITY AND SOURCE OF CALORIES.

An assessment of the total and number and principal source of calories for each adult male equivalent in the expenditure classes was attempted from the survey data. As would be expected from the previous findings, the main source of calories was derived from imported foodstuffs of which sugar was particularly important.

(12) The reliability of the averages was calculated and the following table shows the range in which the average will fall—

Reliability of Averages—Per cent.
Probability of 95 per cent.

Hanuabada		
Staple.	Imp.	Total.
3.2-14.0	61.4-72.2	74.2-83.4
Koke		
Staple.	Imp.	Total.
24.8-37.0	31.4-32.4	62.4-72.0

In the Hanuabada sample, the average number of calories available to each adult male equivalent from staple foodstuffs was limited. Calories from purchases of imported foodstuffs averaged about 94 per cent. over the sample. The main sources were rice, sugar[13], flour and bread, and there appeared to be some degree of substitution between the last two products.

The situation in the Koke survey was different as starchy staple foods provided an important source of calories. However, as expenditure increased the percentage of calories from this type of food declined—Fig. 4. During the survey week, an average of about 25 per cent. of the total calories available in adult male equivalents came from produce shipped into the settlement from home villages. Those from purchased staple foodstuffs provided an average of 18 per cent. The remaining 57 per cent. of calories came from purchases of imported foods.

Among the purchased staple foodstuffs, bananas were the most important single source of calories. Sweet potatoes provided the most important source from the village supplies.

Average number of Calories available per day to each adult.

Figures 4a and 4b show the estimated number of calories available per adult male in each expenditure group. Those for the Koke survey were considerably higher than for the Hanuabada sample. It would be expected that the reverse would apply as the levels of income at Hanuabada were higher than those at Koke. However, there is a number of problems which must be considered some of which will be important in future surveys of this type.

1. The survey week for the Koke settlement could be atypical as increased supplies of staple foodstuffs came from village sources to feed visiting dancers for an exhibition of traditional dancing.

2. In these calculations it has been assumed that supplies from villages were consumed during the survey period ; as a result the number of calories could be overstated. However, these supplies have been described as " regular ".

(13) Sugar was the cheapest source of calories at 3,121 per shilling.

Figure 4. a.
Calories – Availability source
Adult Male Equivalents per day
Hanuabada Sample

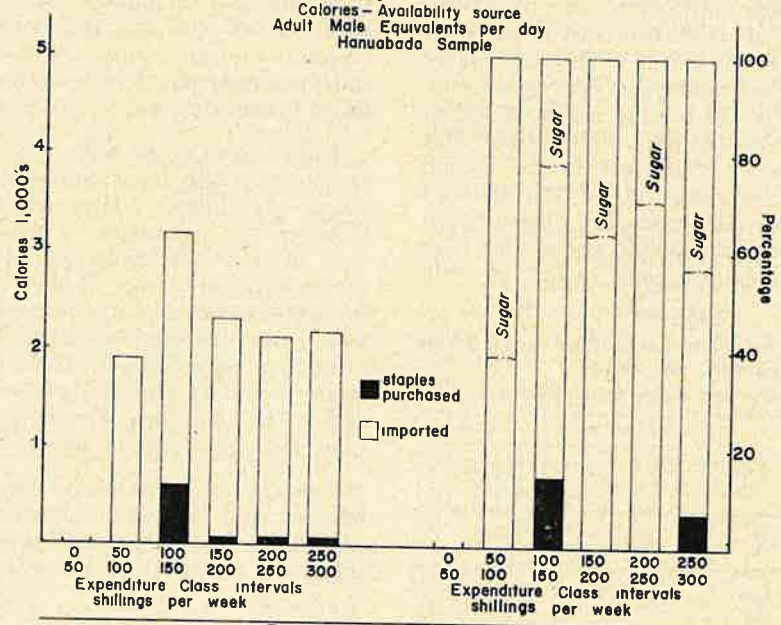
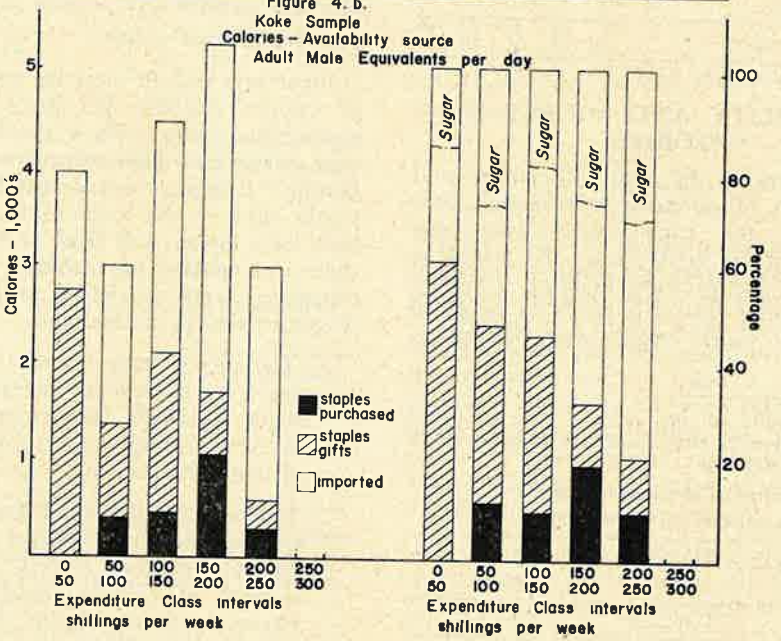


Figure 4. b.
Koke Sample
Calories – Availability source
Adult Male Equivalents per day



3. When the frequency of visitors is considered, the number of calories per adult will be reduced. Households were asked the number of visitors, irrespective of sex or age, who had at least one meal for each day in the survey. The number at Koke was considerably higher than at Hanuabada. In the former settlement, only one of the 16 householders reported no visitors for at least one meal. The number of visitors per household ranged from two households with one visitor to four with five visitors and four households with more than ten (the highest figure was 18). In some instances visitors brought small quantities of food with them.

4. These figures do not allow for calorie intake from meals taken at the place of employment. These meals usually consist of bread, scones or biscuits and soft drink.

One of the main problems facing this type of survey is the assessment of the total quantity of foodstuffs entering households from villages close to Port Moresby. It is of interest to note that considerable produce from a village which recently built an airstrip was not entering the native market at Koke but being given to friends and relatives living in Port Moresby. The cost of air freight was considerable. Those practices can result in serious errors in assessing calorie intakes from this type of survey.

Protein Intake.

As was shown previously, the major source of protein in the samples came from purchases of imported foods. An attempt to assess the protein availability proved unsatisfactory.

The proportion of the catch consumed by fishermen in the Koke settlement could not be calculated. In addition a number of households reported that shell fish were gathered occasionally although the religious group in that settlement did not consume this type of food.

In the Hanuabada sample, collection of shell fish and occasional fishing trips were common but attempts to assess the size of the catch proved difficult. In some cases, where small quantities were caught or gathered these were given to the children.

EXPENDITURE OTHER THAN FOOD.

Cigarettes and Tobacco.

These items were kept separate from purchases of foodstuffs but they accounted for a sizeable proportion of expenditure. In the Hanuabada survey, every household except one bought cigarettes or tobacco and preference was clearly for the former. Spending on "trade" tobacco was limited. Over the two samples the average weekly percentage of expenditure on cigarettes and tobacco was seven per cent. for the Hanuabada survey and eight per cent. for the canoe settlement at Koke. The figure for the latter sample was calculated on all the households included in the survey. This includes the religious sect which forbids smoking by its followers. Recorded purchases were undoubtedly understated as many isolated purchases would escape recording.

Betel Nut.

The relationship of betel nut to eating habits is somewhat obscure. However, apart from the religious sect in the Koke survey, all households purchased betel nut. In the Hanuabada survey, an average of nine per cent. of total weekly expenditure was utilized for betel nut and the corresponding figure for the Koke survey was ten per cent. In this sample, betel nut chewing is forbidden by the religious sect of which mention has previously been made.

Unfortunately, there appears to be little evidence on the relationship between the consumption of betel nut and dietary patterns, but the chewing of this nut is closely connected with social customs of this island.[14] It is also possible that irregular purchases of betel nut were not recorded.

Fuel.

The principal sources of fuel are wood and kerosene. Not all households in the week of the survey bought fuel. Only five of the ten households in Hanuabada sample reported purchases of any type of fuel while 14 of the 16 households in the canoe settlement made some purchases. In some cases fuel was purchased

(14) Langley, Doreen "Food Consumption and Dietary Levels"—*Report of the New Guinea Nutrition Survey Expedition* 947. Department of External Territories, Canberra. P. 104.

in small lots at a few days interval and considerable economy was practised in its use. In a number of households cooking only occurs once a day. The average weekly percentage of total expenditure devoted to purchase of fuel by the households was four per cent. in the Hanuabada sample and seven per cent. in the Koke sample. Purchases of kerosene are usually made in bottles of about 1.25 pints.

Clothing.

No conclusion can be drawn from the expenditure patterns on clothing although two of the ten households in Hanuabada and five of the 16 in Koke reported purchases of clothing or material.

Electricity.

Expenditure on electricity was confined to Hanuabada and seven of the ten households in the survey had electricity connected. The average percentage weekly expenditure over the sample was six per cent. Expenditure on this item was limited to the upper-middle and highest expenditure classes and the percentage declined ; falling from seven per cent. in the 150-200 shilling per week group to 2 per cent. in the 250 shilling or more group.

CONCLUSION.

It is almost universally accepted among students of economic development that food production must keep ahead of population growth if economic development is to proceed.

The growing food requirements for the urban areas must be met to ensure that their development is orderly. The rate of growth in the total demand for foodstuffs will be determined principally by the rate of population growth in the urban areas and the extent to which any additional income is utilized for food purchases. Furthermore the pattern of food expenditure and food consumption can be expected to change considerably under the influence of rising incomes and the effect of " urbanization "

This pilot survey although of limited value has thrown some light onto the likely pattern of food consumption in the Port Moresby area. The importance of the imported foods in the diet of the permanent and migratory settler has been demonstrated and there seems little doubt that this trend will continue. Although the survey does not permit any statistical analysis of the income elasticity of demand for all foods, the graphs in Figure 1 suggests that there is a high elasticity of demand for food. If this figure is in the order of those of other underdeveloped countries any increase in income can immediately be expected to result in increased demand for food.

Under the present traditional system of agriculture, supply is particularly inelastic so that any response to increased prices because of increased demand will be very slow. This increased demand can therefore be met by increased imports of foodstuffs, however these will compete with imports of capital equipment for development plans for the scarce supplies of foreign exchange.

In addition, the low income workers will be squeezed by any increase in food prices as they cannot substitute cheaper sources of food. Any reduction in food intake could result in serious health problems.

At the present level, assuming no dependence on or access to subsistence, the migratory consumer, once he passes through the exploratory period, soon realises that imported foods are often the cheapest sources of energy and protein. The survey suggests that consumers in the Port Moresby area are purchasing rationally under existing price relationships.

There seems little doubt that in the immediate future food expenditures will continue to be the largest single item of expenditure and that there will be an increasing tendency for imported foods to take the major share of this expenditure. With existing population increase in the Port Moresby area and the inelastic supply of native staple foodstuffs, imported foods must supply the largest part of energy and protein needs.

Some knowledge of consumption patterns in the urban areas is essential for sound economic planning. In the Port Moresby area, increased attention must be given to the possibility of increasing the supply of native staple foodstuffs or those which can be grown in the area. This will mean that existing marketing and distribution channels will need re-organizing.

Note.—This survey was conducted prior to the passing of the *Liquor (Licensing) Ordinance* 1963.

The success of this survey rested on the field work of Mr. Sinaka Goava of the Department of Information and Extension Services and Miss Mary English of the Department of Native Affairs. In addition, both gave valuable assistance in the tabulation and preparation of the report.

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APPENDIX A.

Budgetary surveys of one week's duration were conducted in randomly selected households in three native settlements in the Port Moresby area during September-October, 1962. The random samples consisted of 20 per cent. of the housing units in the settlements. The three settlements were the canoe squatters at Koke, one village of the four which make up the Hanuabada complex sited on the foreshores of Port Moresby, and a squatter settlement of Gulf District people in the vicinity of Konedobu.

The interviewing was conducted by two Papuans, both of whom were well known to the leaders of these settlements. The selected households were visited prior to the week of recording and general data on each were collected. During the survey week the households were visited daily for one week and purchases of foodstuffs, etc., recorded.

The original intention was for the survey to cover two weeks but it was obvious that some interviewee resistance was developing towards the end of the first week, so the period was then reduced to one week. It seemed that more accurate data would be obtained in this way.

BASIC CHARACTERISTICS OF THE SETTLEMENTS.

1. *The Canoe Settlement at Koke.*

This settlement is located midway between the commercial centre and the main residential area of Port Moresby. The canoes are moored close to the principal native market in the Port Moresby area.

The settlement consists of a migratory and permanent section. The sample was drawn from the total number of canoes moored permanently. Permanence was determined on the basis that the canoes had been in the area for at least six months and intended to remain for at least another three months.

Fifteen of the sixteen canoes in the sample housed people of the Marshall Lagoon Census Division of the Abau Subdistrict of the Central District. The area is to the east of Port Moresby. The other canoe came from the Rigo Subdistrict also of the Central District. Slightly less than half the people came from one village of the Marshall Lagoon Census Division. Seven of the 16 canoes in the sample accommodated people belonging to a religious sect which prohibits its followers from smoking, drinking stimulants such as tea and coffee, the chewing of betel nut and the consumption of shell fish.

Occupations of Principal Wage Earners.

The wage earners were mainly skilled and semi-skilled although it seems that there is a tendency to inflate the occupation in that some maintain they are "carpenters" when in fact they may be assistants to a skilled tradesman.

Occupation.

Occupation.	Number in Sample.
Painter	5
Foreman-painter	1
Fisherman	4
Carpenter	2
Drainer	2
Driver	1
Storeman-clerk	1
TOTAL	16

Length of Residence in Port Moresby.

The length of the principal wage earner's residence in Port Moresby was recorded and half those in the sample had been in the urban area for less than three years.

Length of Residence—Principal Wage Earner.

Period.	Number in Sample.
Less than 3 years	8
3 years to less than 6	—
6 years to less than 9	1
9 years to less than 12	2
12 years to less than 15	2
More than 15 years	3
TOTAL	16

Of those who have been residing in the Port Moresby area for less than three years, two had been here for less than one year.

Household Size.

An adult male equivalent coefficient was used to measure household size as in most cases close relatives and friends reside permanently with the principal wage earner. Permanency was defined as applying to anyone who had been in

the household for the previous six months and intended to remain for at least another three months or the date of their departure was uncertain.

Household Size—Adult Male Equivalents.

Adult Male Equivalents.	Number in Sample.
2 to less than 3	6
3 to less than 4	5
4 to less than 5	2
5 to less than 6	2
6 to less than 7	1
TOTAL	16

Income.

Considerable difficulty was experienced in attempting to estimate actual cash income. The practice of pooling incomes is fairly widespread and also there is some reluctance to disclose the actual amount. However, the following table gives some indication. Gambling also complicated this assessment.

Weekly Income—Shillings.

Shillings per week.	Number in Sample.
60 to less than 80	1
80 to less than 100	4
100 to less than 120	6
120 to less than 140	2
140 to less than 160	—
160 to less than 180	3
TOTAL	16

Savings Bank Accounts.

Only residents in two of the 16 canoes in the sample did not have savings bank accounts. The following table shows the ownership of the accounts.

Savings Bank Accounts—Classification of Ownership.

Classification.	Number in Sample.
Husband	7
Accounts for both husband and wife	2
One account for both	2
Child and one parent—husband	1
Child and one account for each parent	1
No accounts	2
TOTAL	16

Utilization of Savings Bank Accounts.

Interviewees were asked the principal use of these accounts.

Principal Use of Savings Bank Accounts.

Purpose.	Number in Sample.
Saving for specific item	6
Used mainly for food purchases	6
No specific item but used for food purchases	2
No accounts	2
TOTAL	16

2. *Village of the Hanuabada Group.*

One village of this group was selected randomly and 20 per cent. of the houses was chosen. This group of villages is the traditional home of these people although one migrant family fell in the sample.

Occupations.

The bulk of the wage earners is occupied in skilled employment.

Occupation	Number in Sample.
Clerks—2 government	3
Carpenters	2
Drivers [a]	2
Foreman-sign writer	1
Mechanic-motor	1
Labourer [b]	1
TOTAL	10

[a] Of the drivers, one had been unemployed until the week of the survey.

[b] Migrant.

Length of Residence in Port Moresby.

Apart from the migrant the people were still residing in their traditional village area.

Household Size.

As mentioned previously the method of assessing household size was based upon an adult male equivalent system. Household size was considerably larger than in the Koke canoe settlement.

Household Size—Adult Male Equivalents.

Adult Males	Number in Sample.
2 to less than 3	—
3 to less than 4	3
4 to less than 5	1
5 to less than 6	2
6 to less than 7	1
7 to less than 8	1
8 to less than 9	—
9 to less than 10	—
10 to less than 11	—
11 and over	2
TOTAL	10

Income.

Difficulties were again experienced in assessing individual incomes as the practice of pooling was more pronounced in the Hanuabada survey than in that at Koke. In some instances it was impossible to separate the individual wage earners' cash income but the following table shows the pooled income for the households.

Income—Shillings per week.

Range.	Number in Sample.
80 to less than 100	1
100 to less than 120	1
120 to less than 140	2
140 to less than 160	2
250 to less than 300	2
300 to less than 450	1
TOTAL	9

One wage earner had just commenced work as driver and his income was unknown at that stage. Of these in the sample four of the top five had pooled incomes.

Subsistence foods from Village Gardens.

Eight of the ten households in the sample possessed gardens. One family, although a member of the Hanuabada community, had no garden, while the migrant was also landless in this district. The principal crops were yam, banana, tapioca, taro and sugar cane. During the week of the survey these gardens produced a total of 130 lb. of staple foodstuffs of which tapioca made up 70 per cent. and yams 19 per cent.

Number of visitors partaking of meals.

Only three of the households in the sample provided meals for visitors during the survey week; the number ranging from 2 to 5. In a number of instances visitors brought small quantities of food, mostly rice and tinned fish.

Savings Accounts.

In all the survey households, savings accounts were operated by either the parents or children or a combination of these two.

Savings Accounts—Classification of Account Holders.

Classification.	Number in Sample.
Husband	1
Children and one account for both parents	5
Children and one parent with account	3
Children and an account for each parent	1
TOTAL	10

Each survey household was asked if savings were being directed towards a specific item or for what the account was primarily used. The following table gives the break-up.

Principal Utilization of Savings Accounts.

Main Purpose.	Number in Sample.
Savings for specific purpose	5
Used when food is needed	4
No specific item but used for food purchases	1
TOTAL	10

3. *Squatter Settlement of Gulf District People.*

Unfortunately the survey of this settlement was not finalized because of insufficient interviewers. Some data were collected but were insufficient for any analysis. However some trends are evident and this area in particular deserves further study.

Six households were interviewed out of the sample of 15. The settlement is located in the Konedobu area of Port Moresby.

Occupations.

Most of the main household wage earners were employed in skilled and semi-skilled occupations.

Occupation.

Type.	Number in Sample.
Foreman	1
Carpenter	1
Painter	1
Driver	1
Shop Assistant	1
Labourer	1
TOTAL	6

Length of Residence in Port Moresby.

The wage earners had all resided in the Port Moresby district for many years, none being less than six years.

Length of Residence in Port Moresby.
Major Wage Earner—Male

Period.	Number in Sample.
Less than 6 years	—
6 to less than 9	2
9 to less than 12	1
12 to less than 15	2
Over 15 years	1
TOTAL	6

Household Size.

Some difficulty was experienced in gauging the degree to which individuals residing under the one roof co-operated in food expenditure. Sharing of accommodation was more widespread than in the other survey areas. These have been reduced to adult male equivalents. In the six houses in the survey the numbers living under the one roof ranged from 5.35 to 17.10, including the family unit of the owner.

Income.

The incomes in this survey are for the owner of the house as it seems that pooling of income is pronounced and sharing of food is a common practice.

Income—Shillings per week.

Wage.	Number in Sample.
60 to less than 80	4
80 to less than 100	1
100 to less than 120	—
120 to less than 140	—
140 to less than 160	1
TOTAL	6

Subsistence Foods from Villages.

Only one family in the survey group had a garden in the Port Moresby area. The remainder purchase sago which is sent from the villages of their district. During the week of the survey no family received any food from home villages in the Gulf District.

Visitors.

None of the survey households reported any visitors for meals during the week. One family was assisted with food by one of the groups sharing the house.

Savings Bank Accounts.

No parents reported savings bank accounts and four of the group maintained that one of their children had school savings bank accounts.

APPENDIX B.

SHORTCOMINGS OF THE SURVEY AND SUGGESTED AVENUES OF RESEARCH.

The pilot survey clearly showed that considerable additional research will be needed to analyse adequately the consumption pattern of urban dwellers in the Territory of Papua and New Guinea.

This survey has only looked briefly at the consumption patterns of the middle income group and does not profess to show that pattern for the large proportion of unskilled labourers. A glimpse has been obtained from the part survey of the Gulf people and it suggests that the range of foodstuffs was particularly limited. These people come from a sago staple area and supplies of this are limited in the Port Moresby area. The consumption patterns of the unskilled migrant labourer should be examined.

This type of study raises a number of problems which are often overlooked. Home produced foodstuffs do not offer much of a difficulty but the percentage of food coming from home villages and brought in by visitors is a major problem.

The urban areas such as that of Port Moresby are constantly changing in that different groups of people are entering and leaving at the same time. Thus any survey of this nature will only represent the position at a particular point of time. Each new group of people will arrive with traditional consumption patterns and must face the problem of adapting themselves to new dietary levels. This raises the problem of finding a "representative sample" in a rapidly changing situation.

Additional research should be conducted into the relationship between expenditure incurred and household size. The survey indicated that there is a relationship between these two.