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FOOD CONSUMPTION RESPONSE PATTERN IN WESTERN SAMOA

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1. INTRODUCTION

The Western Samoan economy displays two inter-related basic economic features; a weak balance of payments and a deterioration of nutritional status. Import bills are leaping ahead of foreign exchange earnings and weakening the balance of payments, while an imbalanced nutritional intake has led to a decline in the health status of the population. In a way, these are closely related problems because both relate to food imports. Hence it is appropriate that these problems are examined simultaneously the issue of food imports.

The Sixth Development Plan (1987) stated that the solution for a weak balance of payments lies within the agriculture sector. Three economic realities supportive of this statement are; first, agriculture continues to be the mainstay of the country; secondly, agricultural production is concentrated on a few primary agricultural commodities; and, thirdly, the an inspection of the composition of the balance of trade reveals that food amounts to one fourth of the total import bill. Given the uncertainties with respect to the export sector performance and its ability to address the balance of payment imbalance suggests that the development strategy has to depend heavily on import substitution to conserve foreign exchange, which is needed to sustain economic growth (Fairbairn,1985). Diversification of agriculture has been recommended as an appropriate strategy to meet this purpose.

Health statistics demonstrate an increase in nutrition-related health problems among the people of Western Samoa. A recent Pacific Regional meeting

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on "Integrating nutrition into agriculture training in South Pacific" (1986) identified the commercialisation of agriculture, the westernisation of food habits and a corresponding increase in food imports as the proximate causes of an unbalanced nutritional intake. Over time such an imbalance could impair the productivity of the population(workforce) via its impact on health status. The meeting proposed that the nutritional imbalance be effectively and economically corrected by improving the domestic food supply.

To overcome these two problems simultaneously, changes in farm production (ie., diversification) is required to integrate/reflect nutritional considerations, to ensure an adequate food, and to generate sufficient to the local producers. What appears to be important, in the long run, is a change in household eating habits and that farmers to alter the existing production systems in order to supply the requirements of a balanced diet.

Despite the fact that Western Samoa has a narrow resource base, the agroclimatic condition makes it possible to efficiently produce a significant proportion of the food commodities currently being imported. Observations of other developing countries suggest that a sound food policy is necessary for the successful introduction of innovative changes in agricultural production programs(Tweeten, 1989). In general, food policy should: provide an incentive to producers while preserving the consumers' interest; ensure a fair distribution of food commodities, and to make an appropriate correction to the nutritional intake of the population(Timmer.C.P, et al, 1983). The immediate necessity for a food policy in Western Samoa stems from the first and last objectives.

Formulation of a food policy is a sensitive issue because it simultaneously impacts upon production and consumption (Timmer,1980). Consumption and production activities are interfaced with price factors in an open economy, and, in this way interests of the producers conflict with those of consumers. This dilemma is often faced by governments of developing countries, that is, how to ensure affordable prices for consumers without

decreasing price to disincentive levels to producers. Food policies play the role of balancing these counterweighting economic considerations. Such policies are embodied in price measures and marketing measures.

The formulation of an effective food policy requires knowledge of household food consumption behaviour (micro input), domestic and international food market perspective (trade input), and likelihood impact of the policy at the national level (macro input). Of these, the household level is the primary importance and it aims to provide answers why the consumers behave the way they do and how the behaviour could be altered, so that the food policy can be designed in such a way that supply targets reconcile with the demand objectives. Analyses of food consumption expenditure and consumption responses (ie; elasticities) jointly yield the information for the micro input. Hence a need exists to examine and understand food consumption expenditure and responses prior to the formulation of food policy.

When it comes to food policy-making, which relates the areas of agriculture, health and economics of development, there is a need for factual information on consumption patterns and behaviour. So far the factual information, in Western Samoa, is directly drawn from basic tabular analyses using Agricultural census data, household income and expenditure surveys. These analyses mainly illustrate general consumption patterns derived from food expenditures and therefore fail to capture consumption dynamics (responses) which result from behavioural factors. An understanding of this consumption dynamics is essential for the formulation of effective food policy.

This study attempts to provide insights into household consumption behaviour in Western Samoa. And therefore intend to provides a useful basis for food policy formulation. In line with this overall objective, a statistical estimation food demand response with respect to price and income variables is carried out.

The present study consists of three main sections. The section two discusses the methodology and data base. The third section presents the results and economic analysis them. In the final section policy considerations are discussed.

2. METHODOLOGY AND DATA

Theories involving utility maximising rationality explain real world consumption behaviour remarkably well. The basic assumptions of this "rationality" approach have been repeatedly confirmed by empirical studies (eg., Deaton and Muelibauer, 1980). Accordingly, the demand function derived from a constrained maximisation of utility provides the analytical framework for this study. At the household level, a range of factors can be listed as determinants of quantity demanded, or consumption level, of a commodity. However, in most studies, income, price and household size are found to be the important variables.

Jogaratham and Poleman (1969) concluded that expenditure is a better variable than income in household consumption studies. Household income data are unsatisfactory as they generally suffer from measurement error while expenditure is a reasonably good proxy for permanent income. Expenditure and household size are likely to be collinear variables, and this relationship may lead to insignificant estimates of the parameters. Gray (1982) suggests that this problem can be avoided by using per capita expenditure. Hence our analytical quantity demanded model includes price and per capita expenditure as explanatory variables.

$$Q_{ijt} = f(P_{ijt}, \bar{Y}_{jt}) \quad (1)$$

where

Q_{ijt} - Quantity of i^{th} commodity consumed by j^{th} household in t time period.

P_{jt} - Price of i^{th} commodity consumed by j^{th} household in t time period.

Y_{jt} - Per capita expenditure of j^{th} household in t time period.

The population of Samoa consists of households from urban and rural villages. Apia, the capital, is structurally a cluster of villages. These villages are classified as "urban villages" in this study, while all the other villages scattered over the islands are identified as "rural villages". Though the spatial difference between the two may not be large, the degree of remoteness makes them distinguishable in terms of the availability of consumables and their prices. These factors may contribute to the difference in food consumption between urban and rural dwellers (Ward and Epeli Hau'ofa, 1980). Hence it would be more appropriate to study these consumer (household) classes separately.

A sample survey method was applied to determine the number of respondent sources. Limitations of budget, available manpower (suitable enumerators) and time constraint have restricted the number of sample villages to three. However for the data to exhibit the differences in consumption one among the sample villages was purposively selected from the urban area and the other two were from the rural areas. To make a better rural representation one among the rural ones was selected from the main island Upolu while the other was from Savaii island.

The household income and food expenditure survey was conducted in the three villages over six month period, from June to November 1991. Erratic changes in income and price, after cyclone Ofa, had started to smooth out by the onset of this study period. Two of the villages selected for the study were from Upolu island, Momoa village near Apia and Poutasi village in the Falealili district. Satupaitaea on Savaii island was the third village used in this study. These villages all had enumerators with reasonable communicative skills and previous experience in conducting survey interviews.

A random sample of 30 households was conducted from each village which is nearly half the number of total households. Using a structured questionnaire, at bi-weekly intervals, price and quantity data of various food commodities consumed by the households were collected. The livelihood of the households is by semi-subsistence farming hence the food consumption partly consisted of non-monetary consumables. In valuing these consumables, the respective market prices were assumed as reasonable proxies.

Aggregation of individual variables into groups was necessary to improve manageability of the data. Aggregation increases the degrees of freedom in statistical estimation, especially when the number of observations is limited (Grunfield and Griliches, 1960). For the purpose of this study, household expenditure on food commodities were broadly categorised (aggregated) into seven groups: Energy foods, Milk foods, Protein foods, Vegetables, Fruits, Beverages and Miscellaneous. Aggregate price and quantity values for each food group were constructed using a weighted arithmetic mean procedure.

On the basis of a Box-Cox transformation (Johnston, 1984), a test was conducted to choose the functional form, and a log-linear relationship was preferred. In this relationship, the elasticity is directly obtained from the estimated demand function. Hence, a log-linear specification was used for the purpose of estimation in this study.

$$\log Q_{ijt} = a + b \log P_{ijt} + c \log \bar{Y}_{jt} \quad (2)$$

The data used in this study were pooled over a period of six months across thirty households yielding 180 observation in total. Pooled data generally suffer from non-spherical disturbances (i.e., Auto-correlation and Heteroskedasticity) and thus the variances of the parameter estimates tend to be biased upward. Therefore as suggested by Intriligator (1978), the generalised least squares approach was applied to obtain efficient estimates

of the parameters in the logarithmic demand function.

3. RESULTS AND DISCUSSION

The empirical results are presented and discussed in two distinct sections. Section (a) analyses the consumption responses in terms of expenditure and section (b) illustrates the consumption responses with respect to price elasticities.

Consumption Elasticities

Equation 2 was estimated for each of the seven food groups for both rural and urban households. The overall explanatory power of the regressions, i.e., R-squares, range between 68 to 74 percent. Further, the F-ratios are reasonably high, majority of the explanatory variables are being significant at the 5 percent level. These estimates suggest that price and per capita expenditure are seen to be reasonable good determinants of food consumption. Consumption elasticities summarise the responsiveness the quantity demanded to the determining factors. Furthermore, consumption elasticities are convenient comparable indexes because they are independent of the unit of measurement of the quantity, price and income variables. For the purpose of this study consumption elasticities (i.e., expenditure and own-price elasticities) are derived from a set of estimated equation 2. Expenditure elasticity gives the relative change in quantity consumed to a change in disposable income whereas own price elasticity is a relative change of quantity consumed to a change in the price of the commodity. Table 3 provides expenditure and own-price elasticities for the seven food groups for consumers from rural and urban areas. Nearly two thirds of the expenditure elasticity estimates for the food groups are significant at the one percent level, while the rest are significant at the five percent level. The own-price elasticity, except those for energy foods in rural areas and for beverages in

urban areas, are found to be significant at the five percent level.

Table 3 EXPENDITURE AND OWN-PRICE ELASTICITIES OF DIFFERENT FOOD GROUPS FOR PERI-URBAN (A) AND PERI-RURAL (B, C) VILLAGES

FOOD GROUPS	EXPENDITURE ELASTICITIES			OWN-PRICE ELASTICITIES		
	VILLAGES			VILLAGES		
	A	B	C	A	B	C
Energy	0.16 ^{**}	0.28 [*]	0.25 ^{**}	-0.18 [*]	-0.12 [*]	-0.10 [*]
Milk and Milk products	0.81 ^{**}	0.33 ^{**}	0.35 ^{**}	-0.52 [*]	-0.68 [*]	-0.72 [*]
Protein	1.29 ^{**}	1.19 ^{**}	1.10 ^{**}	-0.25 [*]	-0.36 [*]	-0.38 [*]
Vegetables	0.82 ^{**}	0.52 [*]	0.56 [*]	-0.79 [*]	-0.61 [*]	-0.59 [*]
Fruits	0.65 ^{**}	0.50 ^{**}	0.48 [*]	-0.82 [*]	-0.48 [*]	-0.43 [*]
Beverages	0.78 ^{**}	0.42 ^{**}	0.46 [*]	-0.22 [*]	-0.42 [*]	-0.46 [*]
Miscellaneous	0.28 [*]	0.26 [*]	0.25 [*]	-0.55 [*]	-0.44 [*]	-0.40 [*]
All Food	0.62 [*]	0.48 [*]	0.45 [*]	-0.58 [*]	-0.43 [*]	-0.46 [*]

** - significant at 1% level.
* - significant at 5% level.

(a) Expenditure Elasticities:

The overall expenditure elasticities for food are less than unity which is consistent with the corollary of Engel's law of consumption behaviour. The corollary of Engel's law states that the proportion of personal expenditure devoted to necessities declines as disposable income rises (Phillips, 1974). In general, the overall food expenditure elasticities are greater in urban village. Except for energy foods, the expenditure elasticities are found to be higher in urban households. This suggests, perhaps with economic growth, that urban areas would provide a potentially strong market for local produce.

Low expenditure elasticities for Energy Foods and Miscellaneous food items reflect the fact that these are basic necessities and thus people have to spend on these food groups irrespective of their income levels. High elasticity values for protein foods implies that consumption will increase

significantly as the income rises.

In urban villages the expenditure elasticities for milk foods, vegetables and beverages are comparatively higher than in rural areas. This indicates that urban consumers are more likely to diversify their consumption patterns as income levels improve. As Musgrave (1988) explained, this could be due to a "demonstration effect" which influences the tastes of consumers. The factors underlying the demonstration effect are personal experiences, advertisements or displays and the desire to keep up with others. The demonstration effect is greater among urban people in Western Samoa for at least three reasons; one is that a greater variety of foods are available in urban areas, frequent interaction with expatriate's living style and dietary habits and to some degree nutritional awareness.

Expenditure elasticity values for milk foods in rural villages are less than half of those in the urban villages. It would seem that, in rural areas, milkfoods are considered an expensive energy and protein supplement and consumers therefore tend to substitute this with other sources. A moderate expenditure elasticity for fruits is found in the urban area, this may also be the result of a demonstration effect.

(b) Price Elasticities:

The own price-elasticities for all food commodities are negative and in absolute terms are moderate. The general inference to be drawn from these estimates is that food consumption in Western Samoa is quite responsive to price changes. Except for protein and beverages, the estimates of urban elasticities are relatively higher than rural estimates. Urban consumption is more responsive to price changes compare to village consumption. However the absolute values of all these estimates are less than one, which indicates that all food commodities are essential to both urban and rural consumers.

Energy and protein foods are clearly the most essential food groups with elasticity estimates are approaching near zero (inelastic). The price

elasticities for energy foods in the rural areas are not significant, hence they can be considered as almost inelastic. This implies that rural consumers are most unlikely to alter the level of energy food consumption in response to price variations. A similar response is shown by urban consumers with respect to beverages.

Price elasticities for vegetables and fruits are relatively high in urban areas whereas they appear to be moderate in rural areas. These figures suggest the potential market demand for these commodities are remarkable. Demand differences for these commodities probably reflect the growing concern among the urban consumers for balanced diet. This may be the initial impact of the recently introduced nutrition awareness programs. The elasticity estimates for milk foods in rural areas are relatively higher because these commodities are regarded as expensive sources of energy and may be readily substituted by domestically produced energy foods.

4. CONCLUSION

Improving agricultural production to meet expected demand for food and nutritional requirements has been considered an important food policy issue by the policy makers in many developing countries. A similar policy concern is also emerging in Western Samoa, where the economy is burdened with heavy food imports and declining health status among the population. It is generally consented, in a free market that an appropriate food policy signal is required to initiate changes in agricultural food production. Information drawn, mainly, from food expenditure pattern and consumer responses provides the basis for food policy design. This study has attempted to provide this information from a household consumption analysis.

It is important to note that estimated expenditure patterns and responses of households are micro-level (partial) information. To generalise to the macro-level, a simplifying assumption has to be made that the relevant macro economic relationships can be obtained by multiplying the corresponding micro-economic relationships by the total number of households.

The results of this study show that the main parameters influencing aggregate food consumption are price and per capita expenditure (equivalently disposable income). Hence variation in both price and income can be used as policy instruments to bring about required changes in food consumption and production. The magnitude of the elasticities suggest that income would be more effective in both rural and urban areas where as urban dwellers are also more responsive to price factor.

High price inelasticity for protein and energy foods along with the low expenditure elasticity for energy foods and the high income substitution effect towards protein foods explains the behaviour of spending more on protein and energy foods. And this behavioural pattern suggest that a high demand would continue to exist for these food commodities. Hence production level of these commodities must be adequately stimulated.

The analytical result also suggests that particular attention need to be paid towards increasing the domestic production of vegetables and fruits, for

two reasons. Firstly, both the price and expenditure elasticities are reasonably high and thus the demand for vegetables and fruits are likely to grow relatively faster than other food items. Secondly, these two groups have substantial amounts of minerals, vitamins and fibre and thus can be utilised to mitigate the nutritional deficiencies in protein-energy rich diets.

Assuming that anticipated changes in agricultural production progressively taking place, this, in turn, would increase the disposable income among rural households thereby making rural people diversify their consumption pattern as well as meet their nutritional needs. Such a transformation can be further induced by influencing taste with nutritional awareness programs combined with improved marketing techniques.

As a food policy links both consumers and producers, the consequences of a price change on total revenue earned by the producers is an useful information to the policy makers because total revenue to the producers depends on the price elasticity of demand. Estimates show moderate inelasticity for food in both rural and urban areas. And so with a fall in price for food commodities, as result of improved/increased production, the total farm revenue is likely to fall even though a small increase in quantity demanded is experienced. Such a loss is quite critical, proportionally a large price fall will be experienced as a result of further/continued increase in output. Hence a provision for commodity based price support scheme with a minimum sales guarantee need to be made placed in the food policy, especially for energy and protein foods.

Energy foods are a major component in animal feed and animals feed is being imported in large quantities. Hence food policy should recognise this derived demand to effectively utilise the energy foods produced in excess and save valuable foreign exchange.

Despite the weakness that the cross-price elasticities are not estimated, this study has provided useful consumption findings. Possible extension to this study is disaggregated analyses within each food group using system estimation method.

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