

Expenditure Elasticities in Rural West Pakistan

by

A.N.M. AZIZUR RAHMAN*

INTRODUCTION

Internal consistency of a development plan requires, among other things, some knowledge of the way in which increments of consumption expenditure will be distributed among various goods and services. This in turn requires, as the *Second Five Year Plan* emphasizes¹, information on consumer budgets and income elasticities of demand.

Moreover, planning is not simply a matter of matching expected spontaneous consumer demand with supply. Both the level and pattern of consumption demand must be controlled to some extent if sufficient resources are to be mobilized for development.

So far, in the course of industrial development in Pakistan consumption has been controlled mainly by import licensing, rather than by tax and credit policies. This kind of control over consumption becomes increasingly less effective, however, as industrialization proceeds and is successful in substituting domestically produced consumption goods for imports. In order to implement an effective policy of tax and credit controls over consumption, however, there is again the need for the kind of information that comes from an analysis of family budgets.

Moreover, knowledge of income elasticities of demand has a special role to play in Pakistan in view of the large import of foodgrains by this country under the PL 480 programme. Effective utilization of these imports requires some information about the consumption pattern of the people of that area where they are to be absorbed.

We do not have comprehensive data required for a detailed study of income elasticities of consumption demand. The C.S.O.² sample survey of rural areas in West Pakistan does provide some data which, however, can warrant a more limited study such as this. It should be emphasized that this study is not intended to give final answers, but rather to begin the process of forming better estimates of consumption behaviour.

*The author is a Staff Economist at the Institute of Development Economics. He is indebted to John H. Power, Richard C. Porter and Mark W. Leiserson for suggesting improvements in earlier drafts.

¹Planning Commission, Government of Pakistan, *The Second Five Year Plan*. (Karachi: Manager of Government Publications, June 1960), p. 20.

²Central Statistical Office, Economic Affairs Division, President's Secretariat, Government of Pakistan.

Because of ambiguities in the definition of income in the survey, and because *a priori* we would expect the pattern of consumption to depend more closely on expenditure than income³, expenditure elasticities rather than income elasticities are estimated from the data. Since saving is insignificant among rural families in the income range studied, there is not likely to be any substantial difference between the two elasticities in any case.

DESCRIPTION AND USE OF DATA

The C.S.O. carried out a sample survey of rural areas of former provinces of West Pakistan in 1959. Among other things, the survey provided information relating to income and expenditure of households. The size of the survey sample was rather large for a limited study like this. Hence we decided to use a subsample from that sample. A detailed description of the subsample is given in connection with another work of the Institute where it was also used⁴. Four households were selected randomly from each of 57 villages of the former provinces of West Pakistan. Of the 228, however, some schedules had to be discarded. Twenty two schedules were either incomplete, not traceable from the office of the C.S.O., or internally inconsistent. Six households showed a per-capita expenditure over four times the per-capita income in the country and over twelve times the lowest per-capita expenditure included in the subsample. We considered these cases to be very unusual and decided not to use them. While grouping the data we found that the lowest group consisted of only three households. Some of them did not have any expenditure on some items. For these cases, we, therefore, had to abandon the whole group.

Commodities for which the lowest group was abandoned are: *i*) pulses, *ii*) milk and milk products, *iii*) meat, fish and poultry, and *iv*) fruits and vegetables. Thus, the present study is based on an analysis of family budgets of 200 households for some consumption items and 197 households for others.

The unit of enquiry in the survey was a household. The C.S.O. defined a household as a unit where a person or a group of persons live together and share their income. In their instructions to the enumerators, the C.S.O. divided all the persons in the household to which the information related into three groups⁵.

³S. J. Prais and H. S. Houthakker, *The Analysis of Family Budgets*. (Cambridge: Cambridge University Press, 1955), p. 81.

⁴A.R. Khan and A.H.M.N. Chowdhury, "Marketable Surplus Function: A Study of the Behaviour of West Pakistan Farmers", *Pakistan Development Review*, Vol. II, No. 3, pp. 354-376.

⁵C.S.O., *Instruction to Enumerators, Family Expenditures Schedule, (second round)* (unpublished).

Group A—The “head of the household, dependents, servants, lodgers and guests who ate and lived with the family for 15 days or more,” during the last 30 days before the date of enquiry.

Group B—“Persons who lived and ate with the family for less than 15 days during the last 30 days preceding the date of enquiry.”

Group C—“Dependents who are living away from the family for the last 30 days preceding the date of inquiry, for instance, children living in hostels, etc.”

We excluded all those persons who come under Group C. We considered all the persons in Group A as ‘full consuming units’ since the expenditure on these people are likely to appear in the household expenditure in full. Since the expenditure incurred on people in Group B are included only in part we gave 20 per cent less weight to this group as a consuming unit.

The questionnaire covers the income and expenditure of households for a period of one month preceding the date of enquiry. Expenditures were expressed both in value and quantity terms. There is not likely to be any divergence in expressing consumption in either terms here because they do not represent independent sources. Sometimes consumption was expressed in quantity in which case the enumerator converted it into value terms at the prevailing market prices, while at other times the enumerator proceeded in the reverse direction.

The information in value terms reflects the prices prevailing at different places at the time of the survey. It may be possible that differences in consumption expressed in values in many cases do not show real differences but only price differences. We decided not to attempt to correct for price differences, however, since the items of household consumption covered in this study are less susceptible to geographical influences than others, such as rent; and our study covers areas which are to a large extent geographically contiguous and climatically homogeneous.

METHOD OF ANALYSIS

Cross-Section Versus Time-Series Data

Since our information is based on a family-budget survey of one month only, it relates to a point of time. It tells us what the present consumption pattern of the people at a given level of income is but nothing about how it is going to behave with a change in income. To calculate income elasticities we make the usual assumption that the variation in consumption patterns is due to the differences in income between groups. For these elasticities to

have predictive value, there is implied the assumption that the consumption pattern of households in one Income Group A will be the same as households in Income Group B when A reaches the income level of B and vice versa.

We should, however, be aware of the limitations of the above assumption. The static behaviour of the consumer that it assumes is not likely to be very realistic when rapid changes are going to take place in the economy. Changes in income bring also other socio-economic changes which may be very important in moulding consumption pattern.

Grouping of Commodities

The C.S.O. questionnaire provides information for more than 100 items of consumption. A detailed investigation of each may not be very meaningful because many of these items involve zero consumption for a large number of households. Accordingly, we shall consider variation in consumption in terms of groups of commodities rather than the individual items of consumption.

A crude principle has been adopted for the purpose of grouping. Items, which are substitutes in some static sense, have been brought under one group. It is quite possible, however, that the grouping may involve some substitution between groups.

Again, the groups on which this study is based do not cover all the items reported in the questionnaire. Only major items of consumption have been included. They cover, however, about 80 per cent of total household expenditure.

Per-Capita Consumption and Use of Equivalent Adult Scale

Since the households were selected randomly, they are not identical in their composition. This by itself may have some influence on the pattern of consumption apart from variation in income and other factors. So far as this study is concerned, we shall make the familiar assumption that *consumption per person depends on income per person*. This assumption will enable us to ignore the scale effect of household size. We shall, therefore, express both consumption and income in our data in per-capita terms.

A family is generally composed of a number of persons belonging to different sex-and-age groups. Since consumption is also affected by age and sex, it would be misleading to rely on the absolute number of persons in the family. Some adjustment is necessary which will help us to put all the members of the family on a comparable level irrespective of age and sex. This is done here by using an "equivalent adult scale" which expresses the number of persons in a family in terms of standard equivalent adults. The scale

used here is given below:

Males aged 14 and over	=	1.00	consumer unit
Females aged 14 and over	=	0.90	" "
Children aged 10 to 13	=	0.70	" "
Children below 10	=	0.50	" "

The above scale is not the result of any research work directed to determine the appropriate scale. However, in framing the scale we have taken into consideration similar scales used by others⁶. We have also taken into account the prevailing conditions in the area to which the data refer.

We have used a single scale for all the items of expenditure, even though the weight is likely to be different for different items of consumption. It was felt that, in a brief study like this, a detailed investigation of appropriate scales for different items of consumption would probably not be very fruitful.

EXPENDITURE ELASTICITIES

Results Obtained

Elasticities were estimated with the help of regression equations. The determining variables are: *i*) income, and *ii*) size of the family. The relationship can be expressed in the following form:

- 1) $X_i = f_i(X_2)$, where
 X_i = expenditure on the *i*th commodity, and
 $X_2 = \sum X_i$ or sum of the expenditure on all commodities.

The above relationship has been estimated with the help of the following regression equations:

- 2)⁷ $X_i = a + b X_2$
- 3) $\log X_i = a' + b' (\log X_2)$

The elasticities with respect to Equations (2) and (3) are as follows:

For form (2): $E = b \frac{X_2}{X_i}$

For form (3): $E = b'$

Equations of form (3) assume a constant elasticity over the whole income range which is indicated by the coefficient b' . Equations of form (2), on the other hand, imply either rising or falling elasticity throughout the entire range, approaching a value of unity as X_2 approaches infinity.

⁶A.J. Coale and E.M. Hoover, *Population Growth and Economic Development in Low Income Countries*. (Princeton, New Jersey: Princeton University Press, 1958), p.88, footnote. G. Stuvell, and S.F. James, "Household Expenditure on Food in Holland," *Journal of the Royal Statistical Society, Series A (General)*, Vol. CXIII, Part I, p. 61.

⁷The constants a and b are estimated by the least-squares method.

Since elasticity is susceptible to the form of regression equation used, the choice of a particular form of equation is quite important. It should be emphasized, however, that the purpose here is not to determine the real nature of the relationship and, therefore, to find the most satisfactory fit, but simply to describe it reasonably well. The two forms above have been chosen only because: they have been widely used and found to provide good fit in many family-budget studies and they are relatively easy to handle. Also, they can be used to serve different purposes. If we are interested to find out the marginal propensity to consume over the whole range, then form (2) would be more appropriate⁸. On the other hand, if we want to know the elasticity over the whole range, then form (3) would be more appropriate. This is due to the fact that, over the range, the linear form assumes a constant marginal propensity to consume, while the double-log assumes a constant elasticity.

The functions were estimated for the whole subsample and separately for the former Punjab and the non-Punjab areas to study the effect of geographical factors upon consumption.

The elasticities are estimated for the linear functions around the mean level of overall expenditure. For our subsample $\bar{x} = \text{Rs. } 30.48$. The elasticities along with the percentage distribution of income are shown in Table I.

At first glance, the traditional belief that the proportion of expenditure on food declines as income increases does not appear to be borne out by our results. But in this subsample, we are dealing with a group of people who have an income near the subsistence level. In other words, we are moving around the lower level of the Engel curve. It is quite conceivable to have an income elasticity of food even greater than one if the population concerned have an income sufficiently low⁹.

Items (4), (5) and (6) have elasticities greater than one and items (2), (3), (7) and (8) have elasticities less than one whether we use the linear or the double-log form. Item (1) lies on the border line.

Cereals form the single major item of food expenditure of the people of West Pakistan, accounting for about 31 per cent of total expenditure. Cereals, however, is a joint name given to a group of agricultural food products.

⁸The marginal propensity to consume for form (2) is given by the b coefficients. These are shown in the Appendix along with that of the Punjab and non-Punjab.

⁹It is interesting to note that Colin Clark found an income elasticity of 0.9 for food for industrial workers in India and 1.14 for farm families in China. See, T. W. Schultz, *The Economic Organization of Agriculture*. (New York: McGraw-Hill Book Company, Inc., 1953), p. 237, footnote.

TABLE I

**EXPENDITURE ELASTICITY FOR WEST PAKISTAN BASED ON
DIFFERENT REGRESSION FORMS AND PERCENTAGE
DISTRIBUTION OF TOTAL EXPENDITURE**

Commodities	Percentage of total expenditure	Expenditure elasticities	
		Linear	Double- log
1. Food (aggregate)	67.20	1.00	0.96
2. Cereals and baked products	30.69	0.48	0.44
3. Pulses	2.30	0.57	0.66
4. Milk and milk products	18.89	1.56	1.46
5. Meat, fish, poultry, <i>etc.</i> ^a	2.85	1.62	1.37
6. Fruits and vegetables	2.42	1.35	1.32
7. Clothing	8.43	0.72	0.72
8. Footwear	2.41	0.71	0.67

^a The relatively high elasticity given by the linear form for this group of commodities is due to the fact that the behaviour of the data of lower income levels is quite different from that of the data at upper levels. This suggests separate treatment for the data in the two ranges. The results become quite different if we estimate a separate straight line for the lower half of income groups, as is indicated below:

	Expenditure elasticities	Correlation coefficients
For the whole	1.62	0.9620(+0.38)
For the lower half	1.18	0.9636(+0.15)

These are: wheat, rice, jowar, millet, maize, *etc.* Since these are the staple food of the region and serve the basic necessities of life, people have to make some expenditure on this group of commodities irrespective of their current level of income. With a rise in income, they become more interested in other commodities and the expenditure on it does not increase in the same proportion.

Similar arguments are applicable to the low elasticities for pulses although expenditure on this item does not constitute a large proportion of total expenditure.

The behaviour of clothing and footwear, however, is quite interesting. The relatively low elasticities of these two goods lead one to bracket them with the 'essential' commodities like cereals and pulses. This is perhaps due to the peculiar position these two commodities occupy in the budgets

of the people of West Pakistan. As a result of the climatic and geographical factors, people even in the very low-income group are found to incur some expenditure on footwear and relatively heavy expenditure on clothing which people living under different conditions and with the same level of income would not normally do.

The elasticities with respect to commodities in Groups (4), (5) and (6) are what one would expect them to be. The results for fruits and vegetables may be a bit distorted. This category includes, on the one hand, onions, potatoes, *etc.*, and all fresh and dried vegetables on the other. It is quite likely that the elasticities for vegetables would be different from that for fruits if separate estimates could be made for each.

The behaviour of those in the income group next below the highest, as can be seen from the graphs given at the end of the paper, appears to be quite out of line with the overall trend for many commodities. They spend relatively heavily on meat, clothing and footwear and lightly on cereals and pulses. This erratic behaviour might be due to the peculiar bias of one or more families in this group.

Choice of Regression Form

The elasticity estimates obtained for the two forms of equations are quite similar in each category, which suggests that the choice between the two forms is not a critical one. Nevertheless, we have calculated correlation coefficients to compare the two forms for goodness of fit. These are shown in Table II.

It should be pointed out that these coefficients are based on grouped data rather than on all the observations in the subsample. In other words, the regressions were fitted to only six "observations"—one for each group. The high values of the coefficients in Table II derive to a great extent from the effect of this grouping.

While it would appear that on the whole the double-log form gives a better fit than the linear form, the magnitudes of their differences are not very substantial. Hence, there is no basis for any conclusion on this score.

However, an attempt to represent the underlying relationships (between dependent and independent variables) for eight different types of commodities by only two forms of equations not only runs the risk of oversimplification but also that of misrepresentation of the relationships. The underlying relationship for cereals, for example, may well follow a different function than that for milk or meat. Although the purpose here was not to determine these actual relationships, the data were inspected on double-logarithmic

TABLE II

CORRELATION COEFFICIENTS OF REGRESSION EQUATIONS

Commodity	Equations	
	Simple linear	Double-log
1. Food (aggregate)	0.9985	0.9991
2. Cereals and baked products	0.9732	0.9819
3. Pulses	0.8390	0.8825
4. Milk and milk products	0.9892	0.9995
5. Meat, fish, poultry, <i>etc.</i>	0.9620	0.9585
6. Fruits and vegetables	0.9119	0.9606
7. Clothing	0.9363	0.9786
8. Footwear	0.9632	0.9800

charts to see if there was evident any strong tendency for elasticity to vary over the range of incomes. Three types of cases were observed:

- i) elasticity higher in the upper range—includes meat-and-milk groups of commodities.
- ii) elasticity lower in the upper range—includes cereals-and-pulses groups.
- iii) elasticity about the same throughout—includes food (aggregate), fruits, clothing and-footwear groups.

Variation in Consumption due to Geographical Factors

An attempt was made to see if there is any real difference in the pattern of consumption of people living in different geographical regions owing to the effects of climate, regional customs, *etc.* But the size of the subsample does not allow detailed grouping. Out of the 200 observations on which the present study is based, the former province of the Punjab alone accounts for 139, while the other provinces account for only 61. Since any sub-grouping of the latter would not be very meaningful, the data was divided into two groups: one consisting of all the households in the Punjab and the other comprising the rest¹⁰.

The procedure followed above is likely to have some effects on the mean-

¹⁰It is quite possible to have a grouping based on geographical contiguity of the regions rather than the one based on former provinces. But this will again ignore the effect of historical factors.

ing and use of elasticity in the two regions. Of the two regions, the former (Punjab) is likely to include more homogeneous elements than the latter one. So the elasticities obtained for that group can be reasonably applied to areas within that group. But the elasticities for the latter group may not be very representative for the regions within the group.

The expenditure elasticities and the correlation coefficients for former Punjab are given in Tables III and IV respectively. For non-Punjab they are shown in Tables V and VI.

The percentage distribution of total expenditure appears to be quite similar in both regions except for food. The people of former Punjab spend more on nonfood items than the people of non-Punjab. This is borne out, to some extent, by the percentage expenditure on clothing and footwear, the two nonfood items included in this study.

Some differences in the elasticities obtained from any two groups of data

TABLE III

EXPENDITURE ELASTICITY FOR PUNJAB BASED ON DIFFERENT REGRESSION FORMS AND PERCENTAGE DISTRIBUTION OF TOTAL EXPENDITURE

Commodities	Percentage of total expenditure	Expenditure elasticities	
		Linear	Double-log
1. Food (aggregate)	65.07	1.12	1.01
2. Cereals & baked products	30.20	0.49	0.51
3. Pulses	2.20	0.93	0.91
4. Milk and milk products ^a	18.35	1.76	1.41
5. Meat, fish, poultry, etc. ^a	2.44	3.01	2.10
6. Fruits and vegetables	2.48	1.50	1.41
7. Clothing	8.69	0.59	0.77
8. Footwear	2.64	0.68	0.75

^a The simple linear form gives an unusually high elasticity for commodities in Groups (4) and (5) for the same reason as discussed in footnote to Table I. Accordingly, a separate estimate is made for the lower half of the observations. The results are as follows:

	Elasticities	Correlation coefficient
4. For the whole	1.76	0.9748
For the lower half	1.03	0.9932
5. For the whole	3.01	0.9525
For the lower half	1.32	0.9984

are always to be expected. In the present study, however, the elasticities of the two regions do not appear to be widely different from the elasticities obtained from the overall data. For those commodities with low elasticities the difference is negligible. Regional factors may, however, be quite prominent in the case of such commodities as milk, meat and fruits. A more detailed investigation into these cases is, therefore, called for.

TABLE IV
CORRELATION COEFFICIENTS OF REGRESSION EQUATIONS
(FOR PUNJAB)

Commodities	Equations	
	Simple linear	Double-log
1. Food (aggregate)	0.9859	0.9871
2. Cereals and baked products	0.9495	0.9543
3. Pulses	0.9439	0.9625
4. Milk and milk products	0.9748	0.9861
5. Meat, fish, poultry, <i>etc.</i>	0.9525	0.9714
6. Fruits, vegetables, <i>etc.</i>	0.8663	0.9434
7. Clothing	0.7834	0.8884
8. Footwear	0.9580	0.9809

TABLE V
EXPENDITURE ELASTICITY FOR NON-PUNJAB BASED ON DIFFERENT
REGRESSION FORMS AND PERCENTAGE DISTRIBUTION OF TOTAL
EXPENDITURE

Commodities	Percentage of total expenditure	Expenditure elasticities	
		Linear	Double-log
1. Food (aggregate)	71.91	0.91	0.95
2. Cereals and baked products	31.75	0.43	0.43
3. Pulses	2.50	0.28	0.76
4. Milk and milk products	20.09	1.52	1.54
5. Meat, fish, poultry, <i>etc.</i>	3.76	1.27	1.29
6. Fruits and vegetables	2.27	1.21	2.07
7. Clothing	7.88	0.77	0.71
8. Footwear	1.91	0.62	0.53

TABLE VI

CORRELATION COEFFICIENTS OF REGRESSION EQUATIONS
(NON-PUNJAB)

Commodities	Equations	
	Simple linear	Double-log
1. Food (aggregate)	0.9953	0.9984
2. Cereals and baked products	0.9610	0.9880
3. Pulses	0.3046	0.6667
4. Milk and milk products	0.9540	0.9890
5. Meat, fish, poultry, <i>etc.</i>	0.9960	0.9920
6. Fruits, vegetables, <i>etc.</i>	0.9548	0.9356
7. Clothing	0.9689	0.9785
8. Footwear	0.9301	0.9216

COMPARISONS WITH OTHER COUNTRIES

Expenditure elasticities for India and a range of elasticities for European countries are given in Table VII. Any intercountry comparison of elasticities is beset with a host of difficulties. To mention a few: the coverage for each commodity, the level of income, climatic conditions, *etc.*, each of which may be different in different countries. A comparison with the rural areas of India, however, is probably meaningful.

The difference in consumption pattern of people in the rural areas of the two countries, as indicated by their elasticities, does not appear to be very substantial, except for meat and footwear which are to a great extent influenced by climate as well as cultural factors.

The comparison with European countries emphasizes the fact that Pakistan is at a stage of development where the expenditure elasticity for (total) food is still relatively high. For the foreseeable future we must expect the demand for food to increase about in proportion to increases in national income. The much higher elasticities for milk, meat, and fruits and vegetables in comparison with cereals suggest, however, that development planning in Pakistan should aim at a rather rapid diversification of agriculture as per-capita income rises.

Before concluding, the tentative nature of the findings should once again be emphasized. Because of the important role that analysis of family budgets must play in planning for development, more attention should be given to this field which has been left virtually unexplored in this country.

TABLE VII
EXPENDITURE ELASTICITIES IN DIFFERENT COUNTRIES

Commodities	West Pakistan (rural)	India (rural)	European countries
1. Food (aggregate)	0.96	—	0.50 to 0.70
Foodgrains	—	0.75	—
2. Cereals & baked products	0.44	—	—
3. Pulses	0.66	0.76	—
4. Milk and milk products	1.46	1.37	0.80 to 0.90
5. Meat, fish, poultry, etc.	1.37	0.90	1.00 to 1.30
6. Fruits and vegetables:	1.32	—	1.50 to 2.00
Fruits	—	0.90	—
Vegetables	—	0.97	—
7. Clothing	0.72	0.80	1.00 to 1.70
8. Footwear	0.67	1.13	—

Note: '—' shows comparable figures not available.

Sources:

West Pakistan: Table I of this paper.

India: J. Roy, and R. G. Laha, "Preliminary Estimates of Relative Increase in Consumer Demand in Rural and Urban India", *Studies on Consumer Behaviour*. (Calcutta: Statistical Publishing Society for Indian Statistical Institute, 1960), p. 13.

European countries: H. S. Houthakker, "An International Comparison of Household Expenditure Patterns", *Econometrica*, October 1957.

Appendix

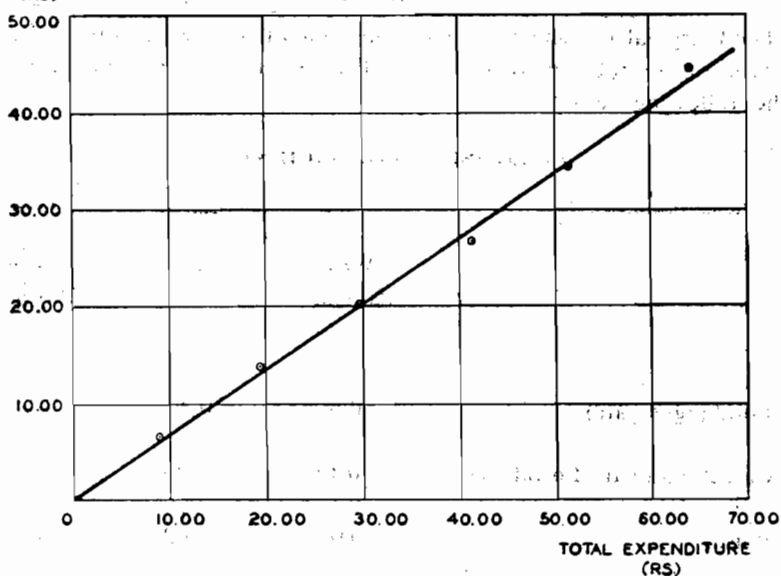
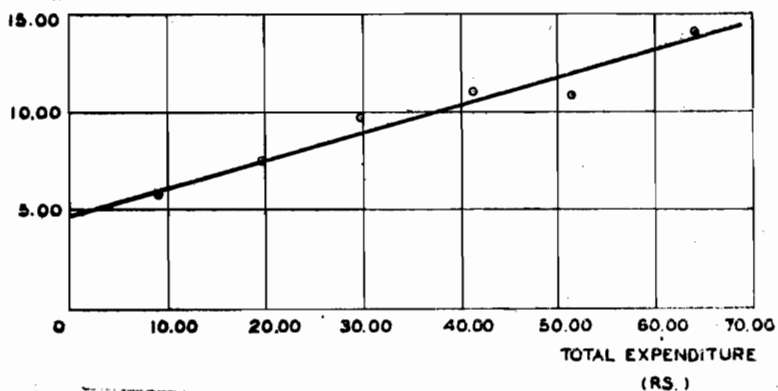
The marginal propensity to consume (out of total expenditure) for the linear form is given by the regression coefficients. These coefficients are given in the following table:

REGRESSION COEFFICIENTS

	West Pakistan	Punjab	Non- Punjab
1. Food (aggregate)	0.68	0.72	0.64
2. Cereals and baked products	0.14	0.14	0.13
3. Pulses	0.01	0.02	0.01
4. Milk and milk products	0.33	0.32	0.34
5. Meat, fish, <i>etc.</i>	0.07	0.08	0.05
6. Fruits and vegetables	0.03	0.04	0.03
7. Clothing	0.06	0.05	0.06
8. Footwear	0.02	0.02	0.01

CONSUMPTION
(RS)FOOD
(AGGREGATE)

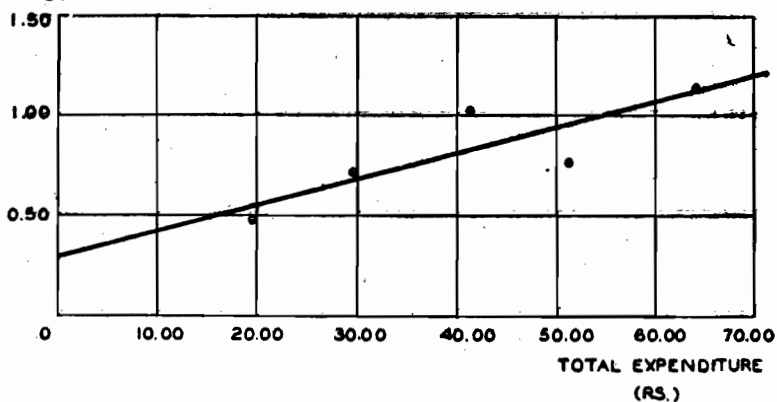
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CONSUMPTION
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CONSUMPTION

PULSES

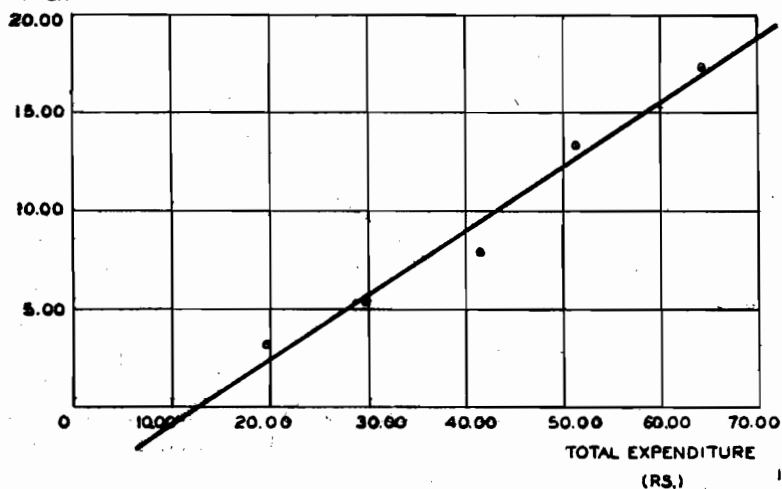
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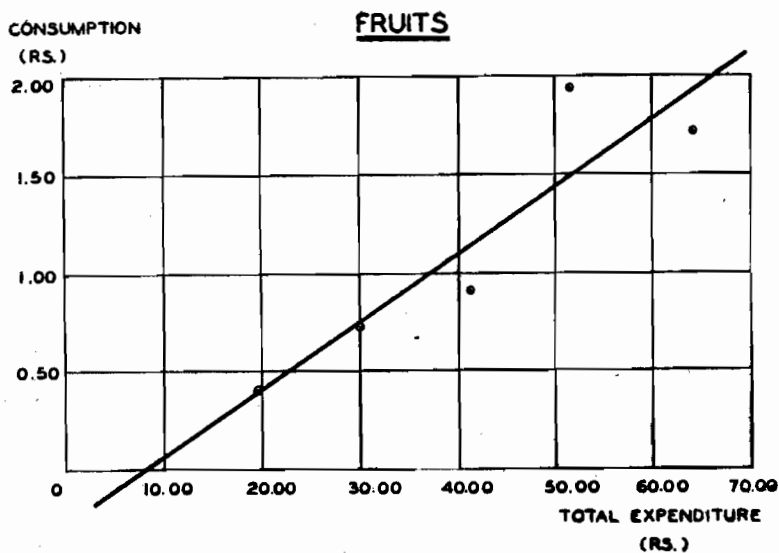
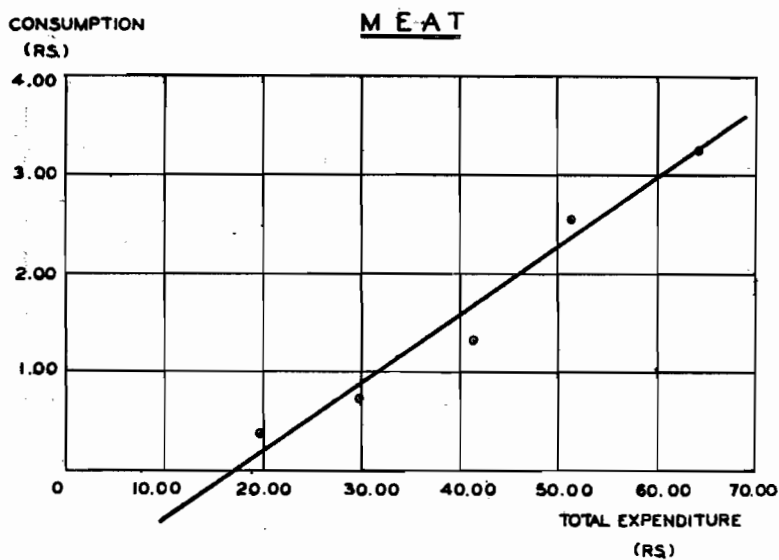


CONSUMPTION

MILK

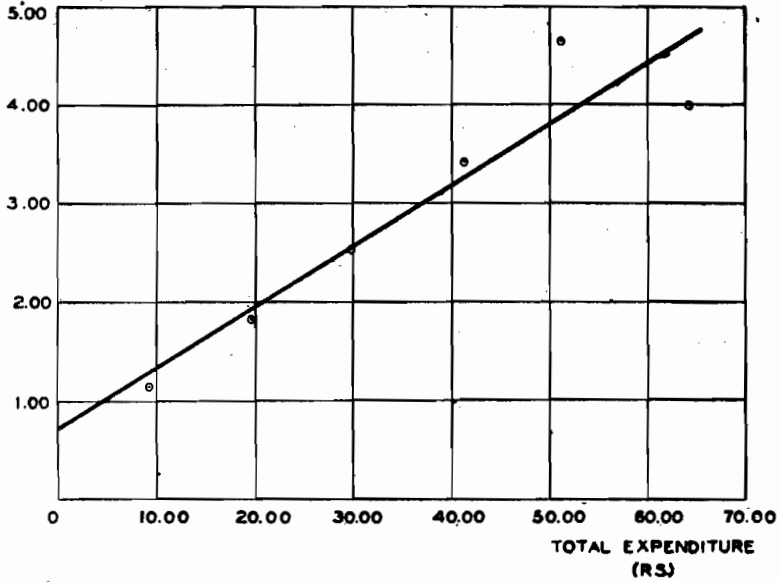
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CONSUMPTION
(RS.)

CLOTHING



CONSUMPTION
(RS.)

FOOTWEAR

