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Household Consumption Behavior In Pakistan: Evidence From Engel Curve Analysis Using PSLM (2018-19)

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<p>Aisha Sadiqa Assistant Professor, Department of Economics, Hazara University, KPK, Pakistan Agriecon24@yahoo.com; aisha.eco@hu.edu.pk</p> <p>Fahim Nawaz*(Corresponding author) Department of Economics, University of Peshawar, KPK, Pakistan Email: fahimnawaz@uop.edu.pk</p> <p>Inam Khan BS Economics Department of Economics, University of Malakand, KPK, Pakistan Inam.uom6@gmail.com</p>	<p>Abstract</p> <p>This research aims to investigate household consumption behaviour across rural and urban regions in Pakistan. The main focus of the study is on the association of income, regional, demographic, and socioeconomic factors with food and nonfood expenditures. The 20 categories of commodities have been selected, and data collected from the PSLM/HIES 2018-19. The econometric method, Ordinary Least Squares (OLS), was used. According to Engel's law, as income rises, people tend to spend more on luxury goods, such as meats, fruits, and soft water, which are pretty inelastic, while spending less on raw foods such as rice, sugar, and oil. According to the results, there is evidence of income difference, as Engel's law states that the part of expenditure on necessities such as rice, sugar, and oil with inelastic demand is directly related to income. Besides, expenditure on luxuries such as meat, fruits, and soft drinks, classified as non-essential necessities, is inversely related to Engel's coefficient. All food groups and individual food items are subdivided into nonfood categories; thus, food, housing, fuel, and clothing become important expenditure categories, and housing elasticity stands out as the highest among the nonfood categories, illustrating the dominance of this category as incomes rise. The study results suggest that the government emphasise food security initiatives and provide some region-specific interventions in Sindh and Baluchistan. This is aimed at alleviating food insecurity through subsidies of the basic staples. Also, it is essential to enhance access to nutrition-rich food items.</p>
<p>Keywords:</p>	<p>Household consumption, Engel Curve, PSLM</p>



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INTRODUCTION

Consumption plays a significant role in the daily lives of households, as they allocate their income to food and non-food products, which include education, health, housing, and clothing, all within the constraints of their total budget. This allocation process is referred to as a household consumption pattern (Shahzabi, 2010; Ahmad et al., 2025; Gul et al., 2026). By examining these consumption patterns, we can often gain a better understanding of a household's standard of living. Globally, consumption patterns can range from basic necessities to more complex bundles of products (Kearney, 2010; Gul et al., 2020).

According to Engel's Law, as a household's income increases, spending on food decreases (albeit at a decreasing rate), while spending on luxury goods tends to increase. Meanwhile, expenditures on essential items such as fuel, lighting, and clothing are expected to remain constant (Siddiqui, 1982; Chai & Stepanova, 2023). Engel's Law has been validated in various studies conducted in Pakistan, with research by Burney and Khan (1991) and Shahzadi (2010) supporting this theory. Particularly, Shahzadi (2010) observed that wealthier households are more inclined to spend on luxury items as their incomes rise, whereas poorer households allocate a higher percentage of their income to basic needs (Matabaro et al., 2024). Additionally, a decline in income typically leads to reduced spending among both income groups.

Food consumption is greatly influenced by factors such as the household income, preferences, education, and local prices (Watson et al., 2011). Consumption theory examines how households allocate a significant portion of their income to food. Literature on food consumption patterns is crucial for understanding how food demand responds to fluctuations in income and prices. It is important to assess the impact of economic shocks on the well-being of households at different income levels (Ceylan F., 2019; Hoang V., 2009; Gul et al., 2020).

The issue of food security in the country is complex. Various factors, including fluctuations in food prices, climate change, natural disasters, and inflation, contribute to this problem. Food insecurity affects 39.6 percent of all households nationwide. Specifically, Sindh and Baluchistan have higher rates of food insecurity, impacting 50 percent and 47 percent of households, respectively. In contrast, Khyber Pakhtunkhwa (29%) and Punjab (32%) are less affected by food insecurity.

Additionally, challenges such as militancy, political instability, and an energy crisis have weakened the agricultural, industrial, and service sectors, leading to reduced household incomes and diminished purchasing power. Consequently, poverty has risen, making it increasingly difficult for families to afford basic necessities. Rapid urbanization driven by migration further influences household food consumption behavior in Pakistan (National Nutritional Survey, 2018; Gul et al., 2022).

The existing literature explores household consumption behavior in both urban and rural areas of Pakistan. Most studies utilize Household Integrated Economic Survey (HIES) data and employ techniques such as Almost Ideal Demand System (AIDS) and Quadratic Almost Ideal Demand System (QUAIDS) to analyze changes in consumption patterns. The Engel curve method simplifies the estimation of demand and expenditure elasticities for food and non-food products.

Recent studies have begun to investigate the impact of socioeconomic factors on consumption. For instance, Bhalotra and Attfield (1998) examined age and gender effects on household consumption in a rural context. This paper further develops the literature by analyzing regional differences in household consumption expenditures in Pakistan using the 2018-19 Pakistan Social and Living Standards Measurement (PSLM-HIES) data. It specifically aims to determine whether these differences are influenced by gender bias or other factors such as gender, employment status, and age.

The research assesses consumption differences to demonstrate that they reflect changing needs rather than unequal resource allocation based on gender. Based on Yuan et al. (2025), the analysis explores age-related changes in gender-based consumption disparities and how employment status stratified by age affects consumption shares by gender. Finally, this study explains consumption patterns by province and region, distinguishing between food and non-food items, and evaluates how socioeconomic and demographic factors influence these consumption patterns.

Hypotheses of the study

H₁: The impact of household income on food and non-food consumption patterns is high, with the low-income households spending more on the staples compared to the higher-income households, which have more of their resources being spent on luxury goods.

H₂: There is less expenditure on luxury and non-food goods by rural households and more by urban households.

Objectives of the study

1. To test the effects of income on household consumption from the perspective of food and non-food products, and specifically the differences between socioeconomic classes in Pakistan.
2. To compare rural and urban households' consumption significance and measure the impact of socioeconomic determinants on expenditure distribution.

Research Questions of the study

1. How does income shape food and non-food expenditure patterns in households across rural and urban regions of Pakistan?
2. What differences exist between rural and urban households in consumption priorities, and what factors influence these differences?

LITERATURE REVIEW

Recent studies have thoroughly examined food consumption patterns in Pakistan, focusing on various aspects of household consumption behavior across provinces and regions. Haider and Zaidi (2017) utilized HIES data from 2000-01 to 2013-14 to analyze changes in household consumption patterns across 11 food commodity groups. Their investigation, based on the Quadratic Almost Ideal Demand System (QUAIDS), confirmed that food choices vary significantly between different regions and provinces.

Allah et al. (2018) explored consumer choices for food items during this period using the Linear Almost Ideal Demand System (LA/AIDS). Although their study was based on HIES data from 2011-2012 and may have been impacted by a time lag, it still provided insights into price elasticity. They found that the demand for basic goods was more elastic concerning food expenditures, suggesting that these items could be treated as luxury goods. Furthermore, imposing income taxes on household income could lead to a decrease in the consumption of these items.

Akram (2020) also estimated the QUAIDS using HIES data from 2015-16 to analyze household food demand. A related study by Hameed and Salam (2021) identified income inelasticity in demand for most food commodities, with the exception of fruits, meat, sugar, and a few other products. Their findings indicated that meat, milk, and fruit are considered complementary goods.

Hina et al. (2021) conducted a similar study at both provincial and national levels, employing the AIDS model with HIES data from 2015-2016. Their results highlighted the influence of socioeconomic factors—such as profession, household size, and the head of the family—on food demand.

Jalil and Khan (2018) further analyzed changes in household consumption patterns using annual HIES data from 2000 to 2015, identifying 17 food groups. Their application of the QUAIDS model revealed significant shifts in expenditure shares over the last fifteen years. They noted a general increase in spending on dairy products, vegetables, and fruits, while expenditures on cereal foods decreased. Additionally, the study observed regional differences in income elasticity, attributed to varying tastes and preferences across provinces. Their analysis classified all food commodities considered as necessities, with the exception of chillies and mangoes.

Past studies on the Engel curve and household consumption patterns of the Pakistani population are illustrated in Figure 1, while Figure 2 describes the expenditure patterns and household consumption in Pakistan from 2000 to 2018.

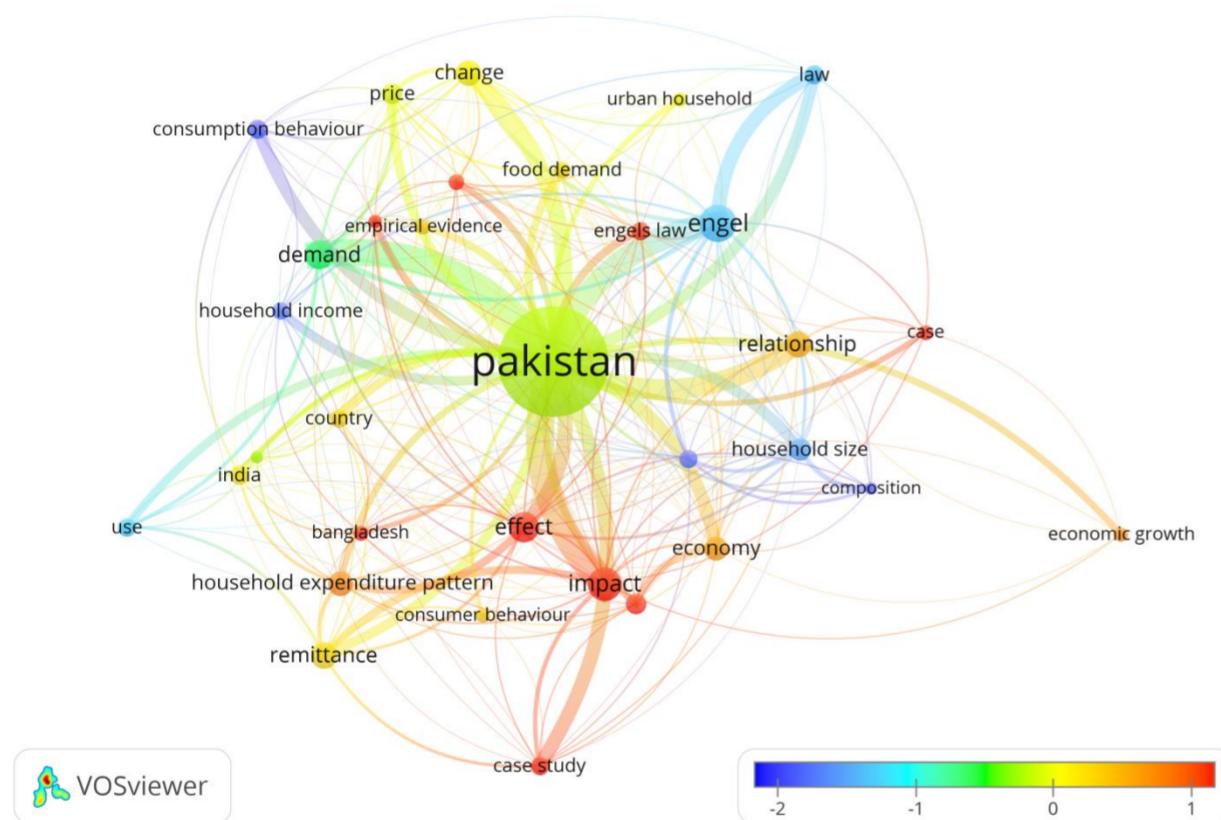


Figure 1: Past studies of Engle curve and household expenditure on Pakistan

Kharisma et al. (2021) analysed the effects of income, food prices, and other demographic characteristics on food expenditure among poor households in both urban and rural regions of West Java. In the course of the study, the authors identified that poor households changed their food consumption regime in response to changes in food commodity prices, household size, the education of the household head, household income, location and the nature of employment of the head of the household. Nonetheless, in light of price fluctuations, the analysis of the own-price elasticity suggested that consumers' consumption of broad food categories remained unchanged. However, in the case of cross-price elasticity, it was evident that a complementary relationship existed among some food groups. Collectively, these studies provide a useful understanding of demand changes in Pakistan's food sector, highlighting the regional, economic, and demographic factors households in the country are using to purchase food items.

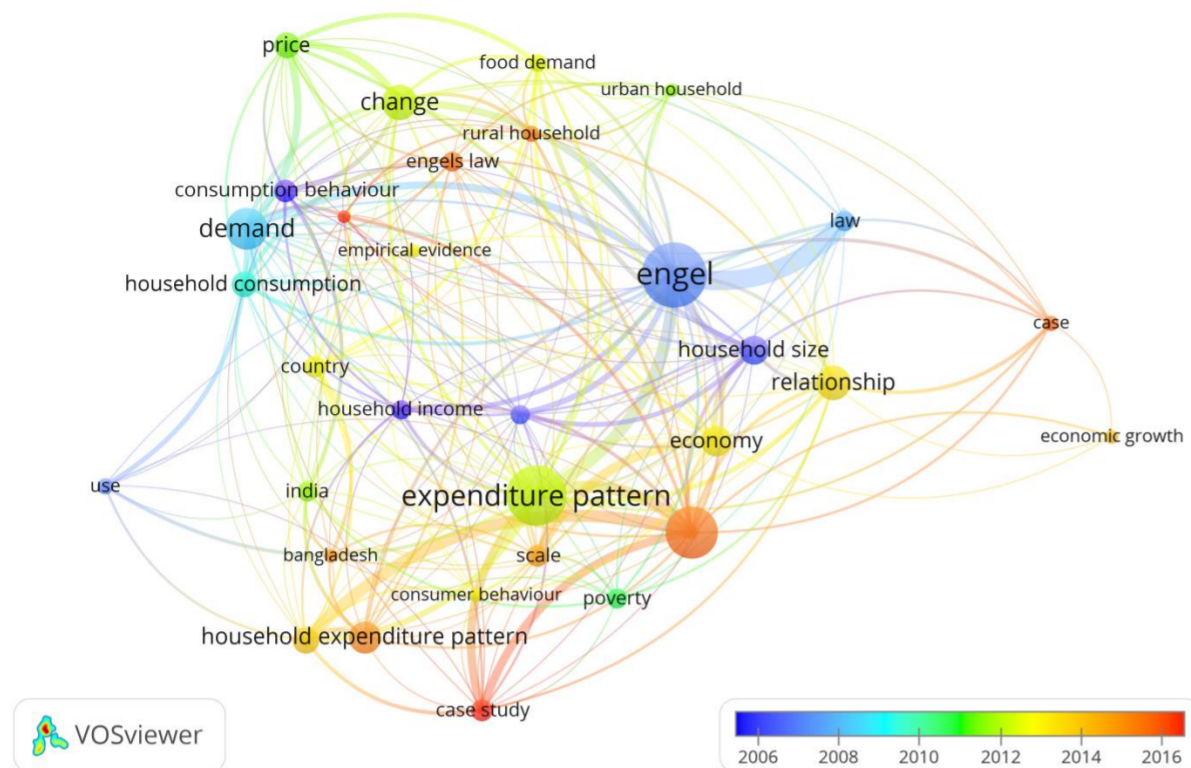


Figure 2: Past studies of Expenditure Pattern and household consumption on Pakistan

METHODOLOGY

There are three main types of econometric data sets: time series, cross-sectional, and panel data. Recently, most empirical research has utilized a panel or pooled data design, which combines cross-sectional and time-series data. This approach is generally more effective than using either type of data in isolation. However, this does not exclude the relevance of time-series or cross-sectional studies. The time-series methodology remains a cornerstone of econometrics, primarily because ordinary least squares (OLS) methods form the basis of most econometric techniques.

Several advanced panel econometric methods have gained popularity, including the panel autoregressive distributed lag (ARDL) model (Khan et al., 2023), the cross-sectional augmented ARDL (CS-ARDL or CA-ARDL) model (Safdar et al., 2026), fully modified OLS (FMOLS), dynamic OLS (DOLS) (Ullah et al., 2023; Muhammad et al., 2025), panel-corrected standard errors (PCSE), and feasible generalized least squares (FGLS). In analyzing cross-sectional data, discrete choice specifications—such as logit, probit, and multilevel logit models—are often employed, particularly when the dependent variable is binary or categorical. Together, these methodological considerations enhance the robustness and depth of empirical economic inquiry.

Study Design

This study employed a quantitative research design to analyze the consumption behavior of households in both rural and urban areas of Pakistan. It aims to determine and compare the consumption of twenty food and non-food products using the PSLM/HIES 2018-19 data. The methodological framework and econometric model are built on previous research, particularly referencing Shahzadi (2010), which supports the strength of this approach.

Model Specification

In the analysis, ordinary least squares (OLS) are used to estimate the equation (Jamal et al., 2024) of household expenditure and the consumption ratio for each category of commodities. In this context, twenty different models were defined, with the expenditure share of a specific commodity as the dependent variable. The analysis is guided by the quadratic Engel curve, where there is the nonlinearity between income and expenditure shares. The functional form is presented as follows:

$$E_i + \alpha_0 + \beta_0 \ln y_i + \beta_1 (\ln y_i)^2 + \beta_2 HS_i + \beta_3 \sum (Age_q) + \beta_4 \sum (GAge_i) + \beta_5 \sum (EmGA_m) + \beta_6 UR_i + \beta_7 P_i + \varepsilon_i$$

Where:

E_i : Household spending on each food and non-food commodity.

$\ln y_i$: Logs of overall household spending (used as a proxy for income)

$\ln y_i^2$: Square of the log of total expenditure

HS_i : Household size, included to account for changes in expenditure shares due to dependency ratios.

Age_q : Groups of ages based on consumption

$GAge_i$: Age and gender hold possible gender differences based on consumption patterns

$EmGA_m$: Age and gender based employment, which shows the household employment distribution.

UR_i : Urban or rural region as a single variable that is a dummy variable to capture regional variations

P : Dummy variables that represent the four provinces in Pakistan

ε_i : It explains variables that have not been observed to affect household consumption patterns



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UR_i : Urban or rural region, represented as a dummy variable to capture regional differences.

P : Provincial dummy variables, distinguishing the four provinces of Pakistan.

ε_i : Error term, accounting for unobservable factors influencing household consumption patterns.

RESULTS AND DISCUSSION

The findings of this study are summarised following an analysis of household expenditure patterns, particularly food and non-food consumption. The findings reveal that several determinants, including income level, household size, age, employment status, gender, and regional differences, shape the configuration of consumption patterns amongst Pakistani households. These determinants have a substantive impact on how expenditures are distributed across various food and non-food products, reflecting unequal consumption priorities and the current economic constraints prevailing in the country.

Table 1: Food Groups' Results

Share of Expenditure											
Variable	Milk	Meat	Fruit and Vegetable	Sugar	Rice	Oil	Tea	Tobacco	Other Food	Wheat	Pulses
Constant	-0.025	0.002	0.040	-0.012	-0.009	-0.180	-0.005	-0.007	0.055	-0.045	-0.002
LTEXP*	0.045	-0.008	0.032	0.025	0.021	0.050	0.003	0.025	-0.010	0.120	0.003
LTEXP^2	-0.004	0.001	-0.003	-0.005	-0.004	-0.008	-0.032	-0.001	0.001	-0.020	-0.001
Size of Household	0.007	-0.003	0.010	0.015	0.012	0.016	0.011	0.012	-0.010	0.085	0.002
KPK	-0.015	0.005	0.007	0.009	0.006	0.003	0.005	-0.003	0.008	0.010	0.004
Punjab	0.003	0.006	0.005	0.011	0.002	0.004	0.002	0.001	0.006	0.190	-0.002
Sindh	-0.011	0.003	0.006	0.015	0.001	0.005	0.004	0.003	0.007	0.020	0.003
Baluchistan	-0.030	0.020	0.001	0.009	0.000	0.006	0.011	0.005	0.009	0.550	0.004
Rural	-0.190	-0.002	-0.005	-0.004	-0.003	-0.005	-0.002	-0.002	0.000	-0.005	-0.003
Urban	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.100
Controlling group											
Age	Y**	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Gender	N***	N	N	N	N	N	N	N	Y	Y	Y
Employment	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
R ²	0.045	0.150	0.145	0.335	0.230	0.500	0.450	0.120	0.220	0.600	0.270

*, **, and *** indicate log total expenditure, Yes and No respectively. Therefore, a group of age = if [yes], means it is significant. Besides, the age of gender = if [yes], means it is significant. Employment is the same in both groups (age and gender).

The above table describes the results of the food groups. It shows that the expenditure share on most food commodities, for instance, milk, rice, oil, tea, tobacco, and wheat, increases by 4.5%, 2.1%, 5%, 0.3%, 2.5%, and 12%, respectively, with a 1% rise in income. Besides, it is at a decreasing rate, as shown by the negative coefficients of squared income (log total expenditure squared). It suggests that these items are everyday goods at lower income levels but become less significant as income rises, eventually perceived as inferior goods. Shahzadi (2010) further clarified that the consumption percentage of food items declines as per capita income increases. Nonetheless, the amount spent on pulses has a minimal impact on income growth. Figure 3 shows the elasticity of demand by food group. In Pakistan, income elasticity is entirely different from price elasticity. Pakistan's household consumption is higher than that of the rest of the world.

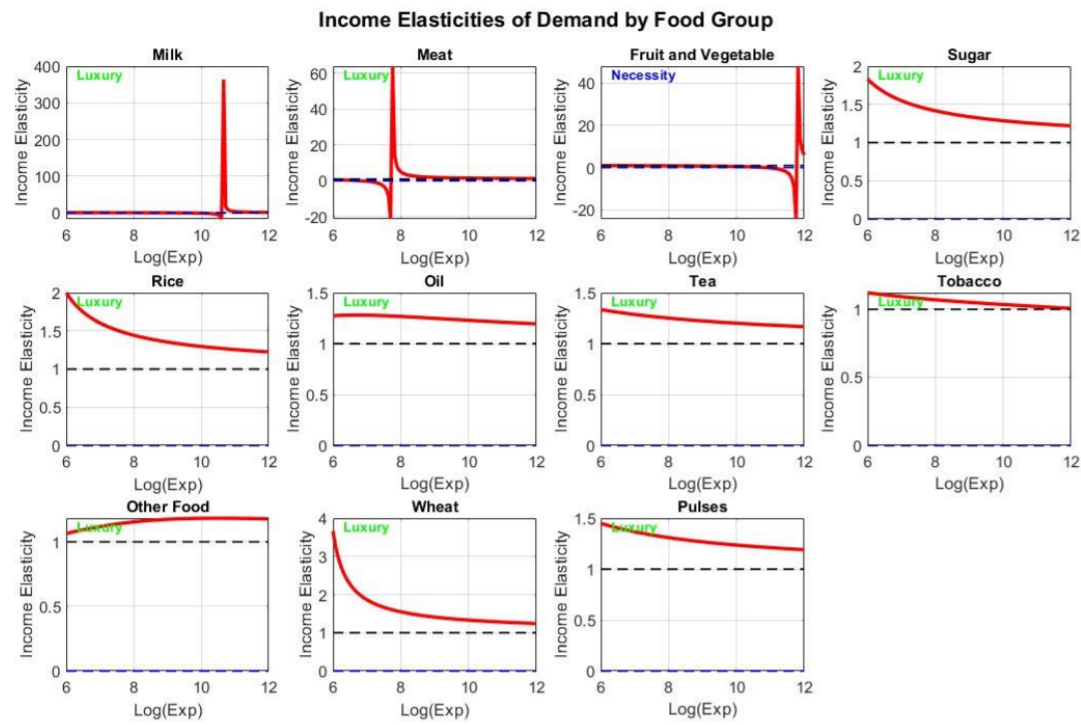
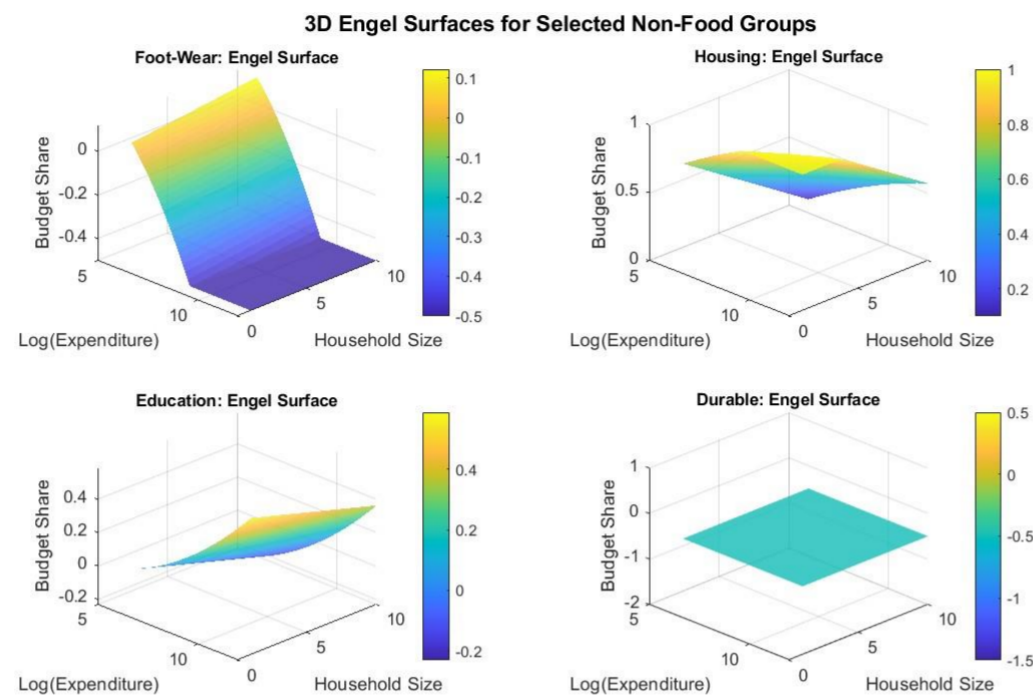


Figure 3: Income Elasticity of Demand by Food Group

Moreover, the expenditure shares on meat, fruits, vegetables, and other food items show a slight decline with a 1% increase in income, indicating that these are luxury or non-essential goods for many households. Pulses exhibit minimal responses to changes in income, reflecting their essential nature. These findings align with Engel's law, which states that food consumption initially rises with income but then slows or declines as income increases, reflecting changing preferences and consumption patterns.

Table 2: Non-Food Groups' Results

Share of Expenditure									
Variable	Cloth	On Personal	Fuel	Foot-Wear	Housing	Health	Education	Recreation	On Durable
Constant	-0.020	-0.004	-0.010	-0.006	0.045	0.002	0.001	-0.007	0.750
LTEXP*	0.060	0.006	0.120	0.140	0.150	0.004	-0.045	-0.015	-0.280
LTEXP^2	-0.020	-0.002	-0.018	-0.022	-0.004	-0.003	0.008	-0.002	0.005
Size of Household	0.040	0.006	0.015	0.008	-0.070	0.010	-0.025	0.003	-0.001
KPK	-0.012	-0.002	0.005	-0.004	0.010	-0.003	-0.004	-0.004	0.008
Punjab	0.003	0.001	0.006	0.002	0.011	-0.002	0.002	-0.002	0.010
Sindh	-0.008	-0.001	-0.001	-0.002	0.012	0.003	-0.003	-0.006	0.004
Baluchistan	-0.020	-0.005	-0.002	-0.001	0.018	0.001	-0.010	-0.015	0.007
Rural	-0.003	0.000	-0.004	-0.005	0.070	-0.004	-0.002	-0.005	-0.004
Urban	0.002	0.002	0.000	0.000	0.005	-0.001	0.007	0.002	-0.006
Controlling group									
Age	Y**	Y	Y	Y	Y	N	Y	Y	Y
Gender	N***	N	N	Y	Y	N	N	Y	N
Employment	Y	Y	Y	N	Y	Y	Y	Y	Y
R²	0.380	0.150	0.300	0.290	0.370	0.120	0.280	0.045	0.030



*^a describes same like table 1.

Figure 4: Non-Food Groups

The results for non-food commodities are provided in Table 2. Spending on fuel, footwear, and housing grows by 12 percent, 14 percent and 15 percent, respectively, as per capita income, which is the logarithm of total expenditure, increases by 1 per cent. This growth rate, however, can be reduced at higher income levels, meaning that at lower income levels, the same items can be considered regular commodities. Still, they become rather less desirable as income increases. There is an increase in expenditure on clothing and personal activities of 6.3 and 0.6, respectively, at decreasing rates. The increase in health expenditure is smaller (0.4 -1) than the change in income. Figure 3 shows the Engle surfaces for the non-food groups. Therefore, appendix 1 provides the Engel-curve analysis using various graphical techniques that explain the household expenditure behaviour. Figure 5 demonstrates how household size affects the consumption of food groups, and Figure 6 shows that there are variations in food-expenditure patterns by region. The Engel curve of food has been provided in Figure 7 where it is clear that food consumption rises at a decreasing rate with a rise in income. Figure 8 deals with regional differences in non-food spending, and Figure 9 recaps the categorization of non-food items. The non-food Engel curves in Figures 10 and 11 show that the non-food expenditure increases faster with income, indicating a shift in consumption behaviour in favour of non-food items as the household income increases. Thus, the expenditure shares for education, recreation, and durable goods decrease by 4.5, 1.5, and 28 per cent, respectively, as income increases. This trend suggests that education and durable goods are considered inferior in Pakistan, possibly because of low purchasing power in rural areas. Household size and regional heterogeneity are also major factors, as reflected in disparities in expenditure patterns across provinces and between rural and urban localities. In Pakistan, the simultaneous interactions among income, age, gender, employment, household composition, and geographic differences affect household spending patterns. The proportion of resources older adults spend on essentials, such as food and clothing, is even higher, whereas spending on health and pulses is relatively insensitive, presumably because of limited funds (Zehra et al., 2022). Gender disparities in consumption patterns are not extreme. Still, they can be grouped into categories such as food, personal, housing, and recreation, as these have different needs for men and women, as per Bhalotra and Attfield (1998). Employment strengthens expenditure as workers' pay for food, fuel, and other essential commodities and value education, knowing its role (Zehra et al., 2022). More prominent families, nevertheless, focus their expenditures on areas like wheat, cooking oil, clothing, and health care while curbing items related to meat, fruits, vegetables, accommodation, and education. Inequality of this conception can also be seen in regional and provincial classifications, where simple necessities such as food and clothing stand out as the most cared-for items by rural households. However, urban households spend more only on utilities, education, and non-food categories. These results further support the study by Zehra et al. (1993) and Khan et al. (2017) that showed marked variation in the cross-sectional consumption patterns comparing rural and urban areas and across provinces, where the former consumed a relatively lower amount of lower-quality food than the latter.

CONCLUSION AND RECOMMENDATION

The present research investigates household consumption behaviour in Pakistan: the role of income level, region, demography, and socioeconomic status on food and non-food consumption. The study shows that income differentials are large: specifically, Engel's law shows that share expenditure on necessities such as rice, sugar, and oil, all of which have an inelastic demand, changes little with income, whilst spending on luxury goods such as meat, fruits, soft drinks, and all the other non-staple food items change a great deal with income. Rural consumers spend relatively more on necessities because they have lower purchasing ability. In contrast, the consumption of new varieties and gourmet consumer goods per urban consumers is higher. Inter-regional inequality is evident; food insecurity is relatively high in provinces like Sindh and Baluchistan, where more budgets are spent on necessities due to poverty and poor access to markets. Significant components that stand out as food components are housing, fuel, and clothing, and housing has the highest elasticity among all non-food categories, revealing its increase as a share of per capita consumption as incomes increase. Rural households bear higher expenditure percentages for housing, such as temples in the Baluch, implying infrastructural difficulties. Two factors assume high importance in the spending analysis: household size and the number of employed persons living within the household, as the former prefers to spend only on necessities. At the same time, the latter freed up their money for other purchases. Metabolize by age and gender, take cognisance of necessary expenditures dependent on life cycle necessities. This paper shows, using econometric models, that it is easier to measure expenditure on staple foods and housing than on luxury and recreational goods. The discussion also explains why people consume in such a complex way, which is determined by interconnected social factors and demographic characteristics, including age. The findings support the need to use accurate regional indicators and perform proper analyses to make



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effective policies to address food security and food distribution. It is urgent to learn that efforts to provide employment opportunities, income, and rural income supplements can address the prevailing weaknesses. These actions can also contribute to long-term positive change in household well-being, especially in food-insecure regions and among economically underprivileged groups. The study recommends some policies, such as the government targeting food security programs (Shahid et al., 2025) and implementing region-specific interventions, particularly in Sindh and Baluchistan, to address food insecurity by subsidizing essential staples and improving access to nutrition-rich food items. Therefore, the government and local government should boost household incomes through skill development and employment generation, especially in rural areas, to reduce disparities in luxury and non-food consumption.

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APPENDIX I

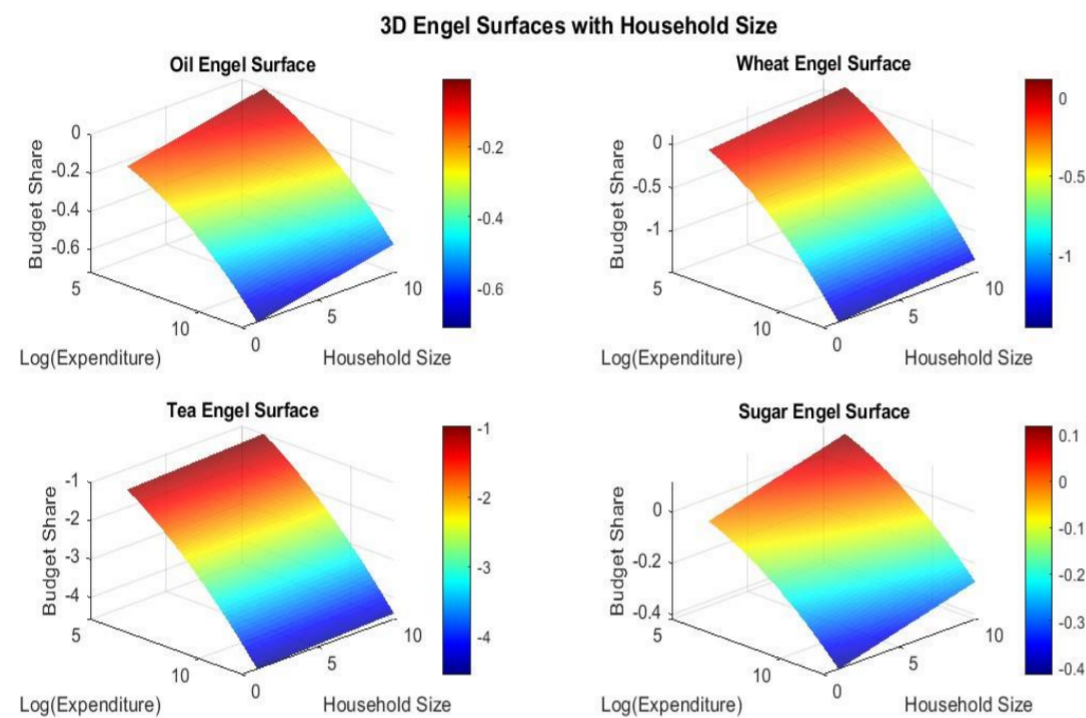


Figure 5: Household size of Food Group

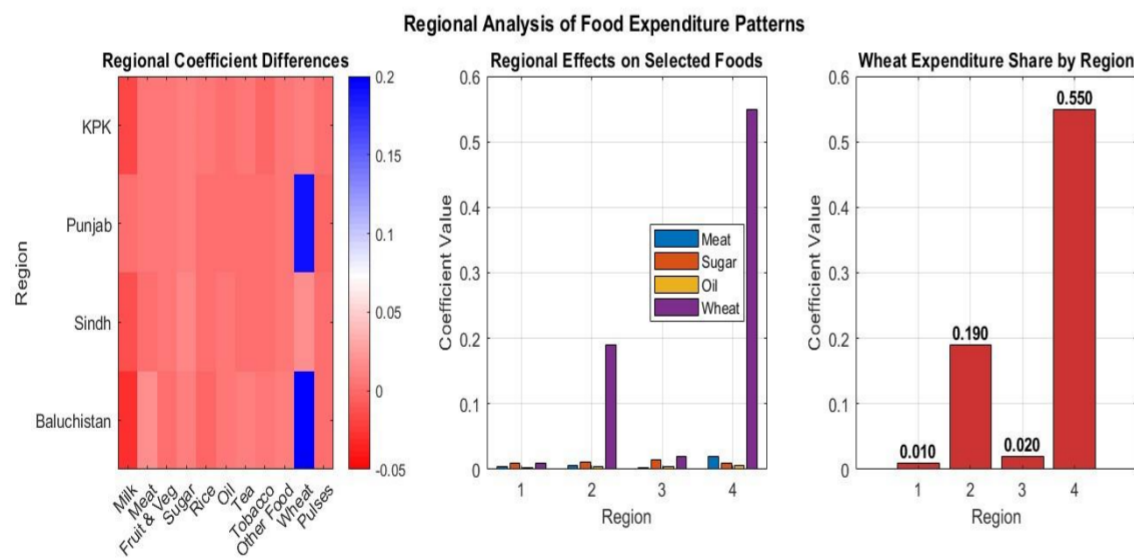


Figure 6: Regional classification and analysis of the Food Expenditure Patterns

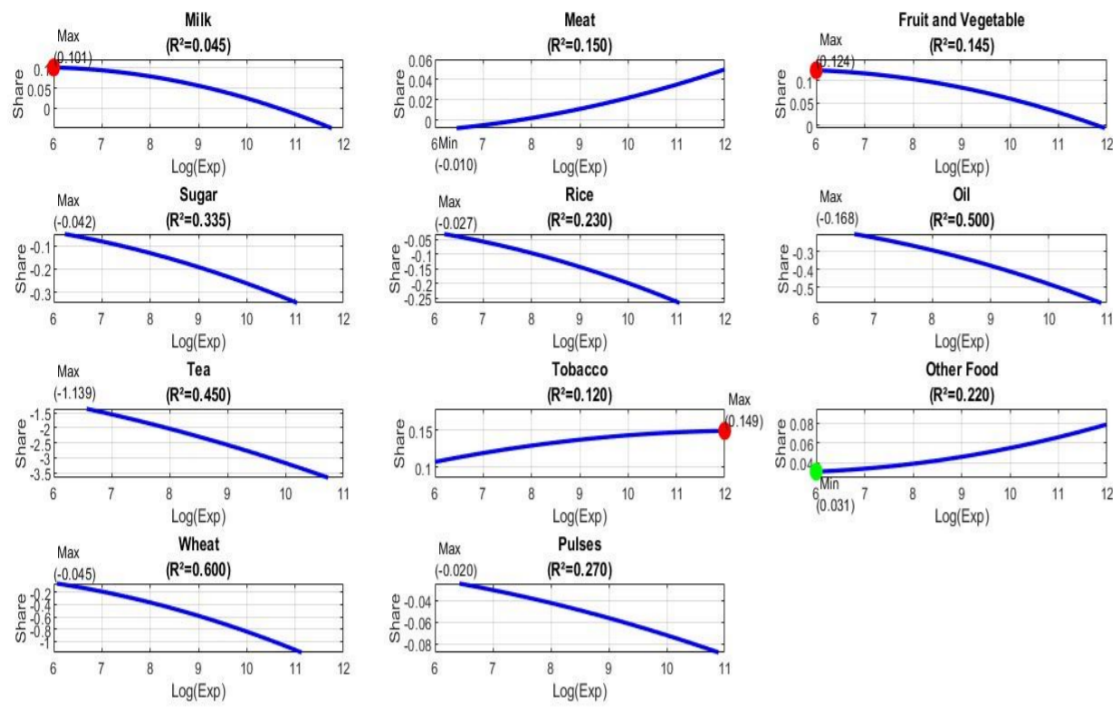


Figure 7: Engle curve pattern of the foods

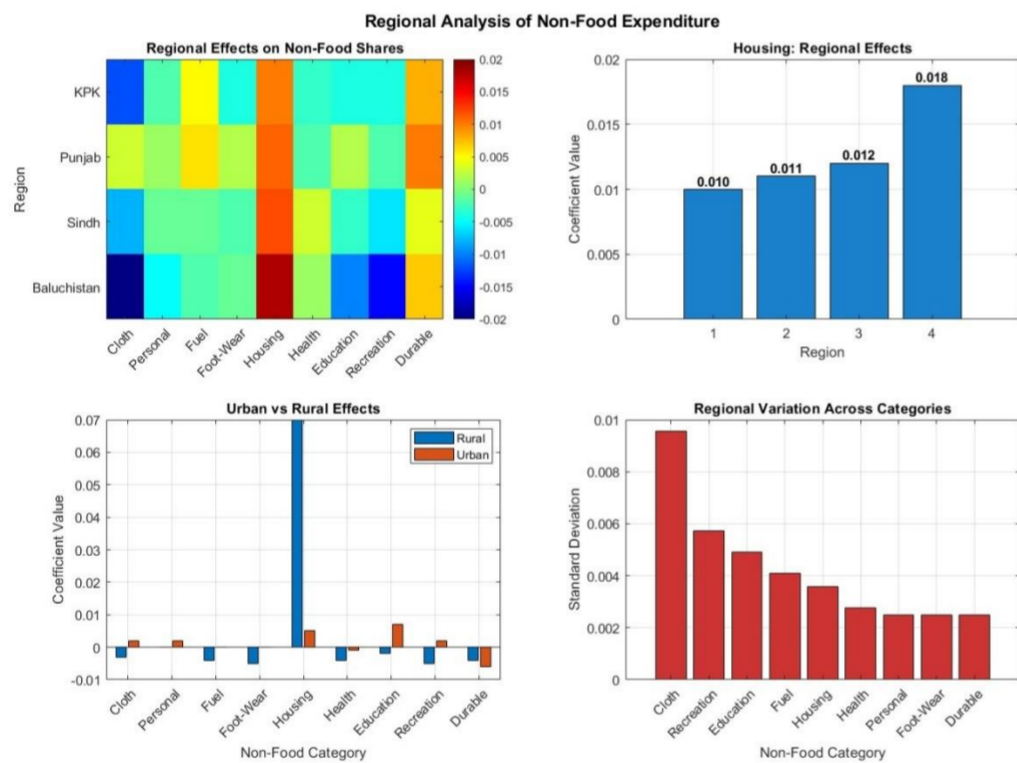


Figure 8: Regional Analysis of Non-Food Expenditure

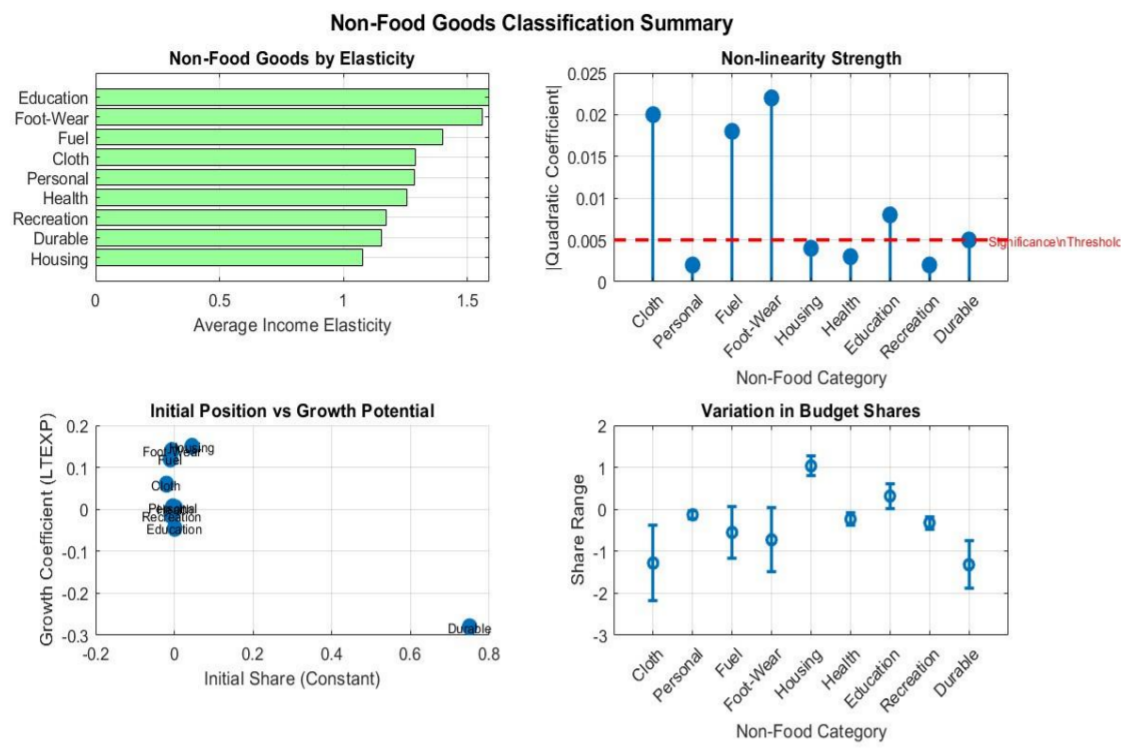


Figure 9: Non-Food Goods classification summary

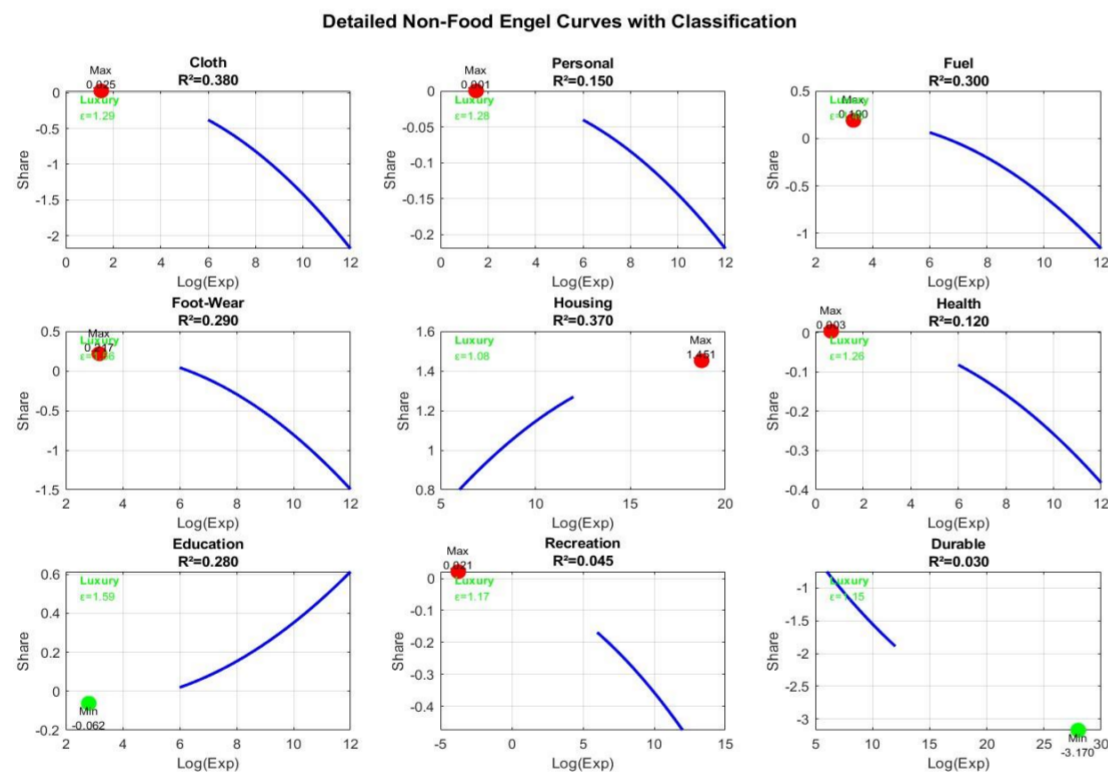


Figure 10: Non-Food Engle Curves

Comprehensive Non-Food Engel Curve Analysis

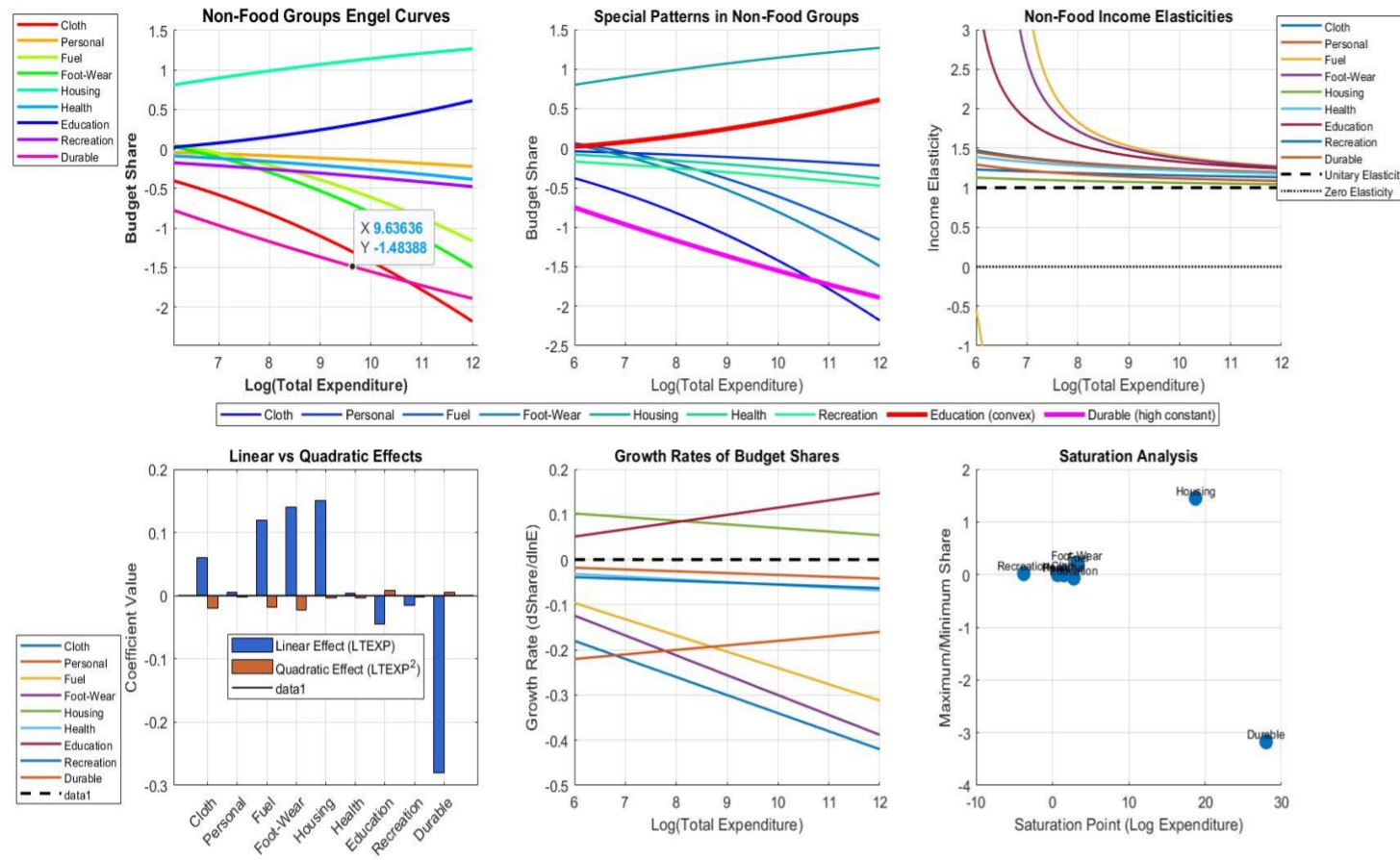


Figure 11: Comprehensive Non-Food Engel Curve Analysis