Educational Administration: Theory and Practice
2024, 30(2), 2104-2111
ISSN: 2148-2403
https://kuey.net/

Research Article

An Assessment of Households expenditure share on processed food in the valley districts of Manipur using the working-leser model

Thongbam Ibotombi Singh[1*], Dr Ngasepam Pikeshwor Singh[2]

[1*]Associate Professor, Department of Economics, DM College of Arts, Imphal, Dhanamanjuri University, Manipur,
Email: ibotombithongbam@gmail.com, Phone No.7005336878, Pincode: 795001
[2]Assistant Professor, Department of Geography, Dhanamanjuri University, Manipur,
Email- ngpikeshwor@gmail.com, Phone No. 6009286631, Pincode: 795001

***Corresponding Author:** Thongbam Ibotombi Singh
*ngpikeshwor@gmail.com

Citation: Thongbam Ibotombi Singh, (2024). An Assessment of Households expenditure share on processed food in the valley districts of Manipuri using the working-leser model, *Educational Administration: Theory and Practice*, 30(2) 2104-2111
Doi: 10.53555/kuey.v30i2.10988

ARTICLE INFO

ABSTRACT

This study investigates the share of expenditure on processed foods amongst the households of the valley districts of Manipur. A functional form of Working-Leser model has been employed to assess the relationships between income and consumption of processed foods in these districts. The data were collected through a cross-sectional survey of 400 households from both urban and rural areas of Imphal East, Imphal West, Bishnupur, Thoubal and Kakching Districts of Manipur. Working-Lesser model was applied to estimate the elasticity of expenditure on Processed foods with respect to income of the household. The results show distinctive patterns of consumption behaviour across urban and rural areas of different districts. Urban areas of districts such as Bishnupur, Imphal East and Kakching have negative β coefficients indicating that processed foods are inferior goods in these areas. The expenditure share on processed foods decline as income rises in these areas. This in due to preference of natural or un-processed foods by higher income households. In contrary to this, positive β values in the rural households of Imphal East and Thoubal districts suggest that processed foods behave as normal goods. The consumption of such goods increases with the increase of income. Co-efficient of determination (R^2) values are very high for the districts of Kakching and Thoubal which show that variation in consumption expenditure of processed food is substantially explained by variations in income for these areas. However, low R^2 values in districts such as Imphal West also indicates the existence of factors other than income that influence buying decisions in such areas. The overall findings reveal that although there is nutrition transition in the valley districts of Manipur, it remained partial with processed foods forming only minor share in the household diets. Consumer behaviour is inconsistent and localized depicting socio-economic diversity and existence of cultural resistance with gradually evolving dietary modernisation.

Keywords: Processed food, Expenditure share, Working–Leser model, Income elasticity, Manipur valley districts, Nutrition transition.

Introduction

The food items that are modified from their natural forms using methods such as freezing, canning, drying, baking or using preservatives or synthetic ingredients are known as processed foods (Kukreja and Patil, 2025). There is a global transition towards more processed global diet but with variations amongst countries and regions (Baker et al., 2020). India as a country is also witnessing nutrition transition (Shetty, 2002). A common change that can be observed in consumption pattern is the shift to processed food (Prakash et al., 2016). The changes in food consumption patterns generally results from increased disposable income and food price changes (Bouis and Huang, 1996). It is also attributed to increase in urbanization, changing lifestyles and disintegration of joint family system (Srinivasan and Nirmala, 2014). The consumption of

processed foods is more in younger age groups as compared to the older people (Srivastava, 2019). The earliest and most commendable works on relationship between income or total expenditure and expenditure on specific items was undertaken by Engel in 1987 (Daoud, 2021). Following Engel's work, various functional models were proposed in due course for econometric analysis of Engel's curves such as Working-Leser Model (Working, 1943; Leser, 1963). In studies involving household size economies estimation, Engel's method has been mainly applied because of its simplicity (Deaton and Muellbauer, 1980). Working-Leser Model is one of the most widely used models for the study of household expenditure and income based on Engel's method. Out of the numerous functional forms of Working-Leser model only a few is being used for household expenditure studies (Daoud, 2021). The recent functional forms such as Working-Leser model take into account restrictions of consumer theory and provide best fitting functional forms for complete system of Engel curves (Tansel, 1986). Numerous studies have employed functional forms of this model to assess household expenditure (Bewley, 1982, Toh et al., 2018, Uni et al. 2018). Raihan et al., (2021) applied Working-Leser model to study the impact of remittances on marginal spending behaviour of households in Bangladesh proving the model's effectiveness in such studies. Similar studies have also been conducted in other Asian countries and Asian migrant households using the same approach to study the relationships between income and spending (Naheed and Hussain, 2014, Ahmed et al., 2018).

Methodology

This study examines household level socio-economic factors, patterns of expenditure and consumption behaviour towards processed foods in the valley districts of Manipur. The data of the study came from a cross-sectional household survey conducted using structured household schedule from 400 sampled households. The study area comprises of all the valley districts of Manipur which includes Imphal East, Imphal West, Bisnupur, Thoubal, and Kakching Districts. These districts constitute the most densely populated region of Manipur characterized by urban and rural settlements with emerging small-scale food processing industries. These areas also exhibit a shift from traditional home-processed foods to commercially processed food items. Stratified random sampling technique was applied and 80 samples were collected from each of the valley districts. From each districts sample households were selected from both urban and rural areas.

Expenditure Elasticity

In order to highlight the relationship between expenditure share of processed food (s_p) and household income (Y_i) a Working-Lesser model was adopted (Working, 1943; Leser, 1963). The Working-Leser regression model has been applied to the district-wise and area wise data to assess the expenditure elasticity on processed food. The model is being use effectively by Daoud (2021) for econometric analysis of Engel's curve (Daoud, 2021). The functional form of the model is specified as (Daoud, 2021):

$$s_{ip} = \alpha + \beta \ln(Y_i) + \varepsilon_i \quad \text{---------- (1)}$$

Where:
s_{ip} = Share of processed food expenditure in total food expenditure for household i.
$\ln(Y_i)$ = Natural logarithm of monthly household income.
α, β = Parameters to be estimated.
ε_i = Random error term.

In the present work Working-Leser model is applied to district-wise household data of the valley districts of Manipur. The focus is on the relationship between household income and the expenditure share on processed food, by using the functional form given in equation (1). The data are assessed for district-wise and separately for urban and rural households.
The Ordinary Least Squares (OLS) estimates derived from the model (equa. 1) using the standard results of econometric and regression theories, are obtained as follows (Gujarati and Porter, 2009, Greene, 2018, Montgomery et al., 2021):

$$\hat{\beta} = \Sigma(x_i - \bar{x})(y_i - \bar{y}) / \Sigma(x_i - \bar{x})^2 \text{---------- (2)}$$
$$\text{(ii) } \hat{\alpha} = \bar{y} - \hat{\beta}\bar{x} \quad \text{----------(3)}$$
$$\text{(iii) } \hat{\sigma}^2 = \Sigma(y_i - \hat{\alpha} - \hat{\beta}x_i)^2 / (n - 2) \text{----------(4)}$$
$$\text{(iv) } Var(\hat{\beta}) = \hat{\sigma}^2 / \Sigma(x_i - \bar{x})^2 \quad \text{----------(5)}$$
$$\text{(v) } se(\hat{\beta}) = \sqrt{Var(\hat{\beta})} \quad \text{----------(6)}$$
$$\text{(vi) } t(\hat{\beta}) = \hat{\beta} / se(\hat{\beta}) \quad \text{----------(7)}$$
$$\text{(vii) p-value} = 2(1 - F(|t|)) \text{----------(8)}$$
$$\text{(viii) } R^2 = 1 - \Sigma(y_i - \hat{y}_i)^2 / \Sigma(y_i - \bar{y})^2 \text{----------(9)}$$

Where,
x_i=The independent variable which is the log of household income $\ln(Y_i)$

y_i=The dependent variable which is the processed food expenditure share (s_i)
$\bar{x}$=Mean of ln(income) for that group
$\bar{y}$=Mean of the share of processed food for that group
$\hat{\alpha}$=Estimated intercept which is the baseline processed food share when ln(income)=0
$\hat{\beta}$=Estimated slope which shows how much the processed food share changes when ln(income) increases by 1
$\hat{\sigma}^2$=Estimated variance of residuals which is the average squared deviation between observed and fitted shares
Var($\hat{\beta}$)=Sampling variance of $\hat{\beta}$
se($\hat{\beta}$)=Standard error of $\hat{\beta}$
t($\hat{\beta}$)=t-statistic for $\hat{\beta}$
p-value =Probability that
$\hat{y}_i$=Predicted share from model = $\hat{\alpha} + \hat{\beta} x_i$
R^2=Coefficient of determination = fraction of variance in y explained by x

From the OLS results, change in expenditure share of processed foods and percentage in share of processed food per mean share devoted to processed foods are being calculated as follows:
ΔShare (1%) = Change in processed food share per 1% increase in income i.e., ΔShare (1%) is obtained as
$\Delta Share(1\%) = 0.01 \times \hat{\beta}$ ----------(10)
Percentage change in share of processed food per mean share which is the average fraction of food expenditure devoted to processed foods i.e., %ΔShare/Mean (1%) is obtained as
$\%\Delta Share/Mean(1\%) = \{\Delta Share(1\%)/ Mean\ Share\} \times 100$ ----------(11)

Results and Discussions

Bishnupur Rural: Negative $\hat{\beta}$ generally shows that expenditure share on processed food decreases with increase in income in the case of Rural areas of Bishnupur district. This shows that processed foods are considered as inferior goods in these areas. High-income households prefer fresh and natural foods to processed foods. Additionally, the average share of processed food in the income is only 0.40 (Table-1).
Bishnupur Urban: A high R^2 value of 0.837 shows that variation income explains around 84 per cent of variation in the expenditure of processed foods. A negative $\hat{\beta}$ indicates that processed foods behave as inferior goods. In the urban areas of Bishnupur district, families decrease the consumption of processed foods as their income increases. It can also be seen that, the share of process food expenditure is only 0.20 of the total income in this area (Table-1).
Imphal East Rural: The positive $\hat{\beta}$ implies that in the rural areas of Imphal East district of Manipur processed foods are normal goods whose consumption increases with increase in the income of households. However, the low value of R^2 shows that the relationship is weak. Average expenditure share of processed food is around 0.38 (Table-1).
Imphal East Urban: In the case of the urban areas of Imphal East district, negative $\hat{\beta}$ shows that processed foods are inferior goods. A high R^2 (0.80) value in these areas also shows that variation in income explains a substantial portion of variation in the consumption of processed foods. It can be seen that higher-income families prefer natural foods than commercially processed foods. The average share of processed food is 0.14 (Table-1).
Imphal West rural: in the case of Imphal West rural, the $\hat{\beta}$ value is positive but as the R^2 (0.043) value is very low, there is no significant relationship between income and expenditure share of processed food. The average share of processed food out of total income is 0.170 (Table-1).

Table-1. District-wise Regression Results (Eq. 2 to 11)

District	Area	n	$\hat{\alpha}$	$\hat{\beta}$	p(β)	R^2	Mean Share	ΔShare (1%)	%ΔShare/ Mean(1%)
Bishnupur	Rural	34	0.85	-0.04	0.014677	0.17	0.40	-0.000439	-0.11
Bishnupur	Urban	35	2.76	-0.25	0.0	0.84	0.20	-0.002478	-1.22
Imphal East	Rural	66	-0.45	0.08	0.001149	0.15	0.37	0.000818	0.21
Imphal East	Urban	55	3.10	-0.27	0.0	0.81	0.14	-0.002693	-1.87
Imphal West	Rural	40	-0.18	0.03	0.200767	0.04	0.17	0.000349	0.20
Imphal West	Urban	56	0.10	0.01	0.228315	0.02	0.28	0.00017	0.06
Kakching	Rural	30	2.70	-0.23	0.0	0.91	0.28	-0.002328	-0.82
Kakching	Urban	38	1.78	-0.16	0.0	0.92	0.18	-0.001569	-0.87
Thoubal	Rural	26	-0.01	0.008	0.0	0.85	0.08	7.6e-05	0.09
Thoubal	Urban	17	-0.02	0.045	0.0	0.82	0.45	0.000453	0.10

Source: Worked out from household survey data.

*ΔShare (1%) = Change in processed food share per 1% increase in income. *%ΔShare/Mean (1%) = percentage change in share of processed food per mean share which is the average fraction of food expenditure devoted to processed foods.

Imphal West Urban: In the case of Imphal west urban also, though the $\hat{\beta}$ value is positive the low R^2 value implies that there is no significant relationship between expenditure on processed food and income. However, the average share of processed food is around 0.28 which is high (Table-1).
Kakching rural: Negative $\hat{\beta}$ value indicates that processed food is considered as inferior goods in the rural areas of Kakching. This implies that with the increase of household income, the share of expenditure on processed food decreases. In addition to this, the high (0.908) shows that 90 per cent of the variation in expenditure on processed food is explained by the variation in income. Out of the total income, around 0.28 is devoted to processed food (Table-1).
Kakching urban: In Kakching urban the negative $\hat{\beta}$ value (-0.157) shows that processed foods are regarded as inferior goods. The high R^2 value (0.918) implies that the association between income and expenditure on processed food is strong. The average share of processed food is 0.18 of the total income (Table-1).
Thoubal rural: The positive $\hat{\beta}$ value shows that in Thoubal rural area processed foods behave as normal good whose consumption increases with increase in income. The high R^2 value (0.854) implies a strong association between the two variables. The average spending on processed food is 0.08 (Table-1).
Thoubal urban: The value of $\hat{\beta}$ is positive in Thoubal urban areas. This implies that the processed foods are normal goods the expenditure on which increases with increase in household income. In the case of Thoubal urban, 82 per cent of the variation in processed food expenditure is explained by variation in household income. The average share of processed food is 0.45 of the total income (Table-1).
Negative β coefficients of urban areas of Bishnupur, Imphal East and Kakching districts show that processed foods behave like inferior goods in these areas. The negative β coefficient indicate that the share of expenditure on processed foods decreases with the increase in household income in the urban areas of these districts. This may be due to a preference to un-processed or foods in their natural conditions amongst the higher-income households of these areas (Table-1).
On the other hand, rural areas of Imphal East and Thoubal districts have positive β coefficients which show that in these areas processed foods are regarded as normal goods. The expenditure on such goods increases with increase in income. This is due to increase modernization and accessibility. As most of the p-values of β coefficients are statistically significant ($p<0.05$) especially in Imphal East and Kakching, there is a strong relationship between processed food expenditure and income (Table-1). In addition to this, the R^2 values in several districts such as Bishnupur Urban and Kakching Urban, increase in household income alone explains significant portion of the variation in processed food share.
The higher income households in urban areas of the valley districts of Manipur tends to decrease their expenditure on processed foods and generally do not prefer processed foods. On the other hand, rural households have a tendency to consume processed foods as convenience items with increase in income. The income elasticity does not show consistent pattern across urban and rural areas of different districts. This shows that the consumer behaviour pattern towards processed food is localized and has some more factors responsible other than household income.

District-wise Regression Coefficient ($\hat{\beta}$) Comparison

The regression coefficients ($\hat{\beta}$) between rural and urban areas across districts are compared in figure-1. Negative $\hat{\beta}$ values in the urban areas of Bishnupur, Imphal East and Kakching districts depicts the decreasing share expenditure on processed food with increasing income (Fig.1). This is due to the preference of natural or fresh food in higher-income households. Whereas, the positive $\hat{\beta}$ values in rural areas of Imphal East and Thoubal indicate that with the increase in income, there is also an increase in the expenditure towards processed foods (Fig.1). This is due to increase market penetration and nutrition transition following sub-urbanization in these areas.

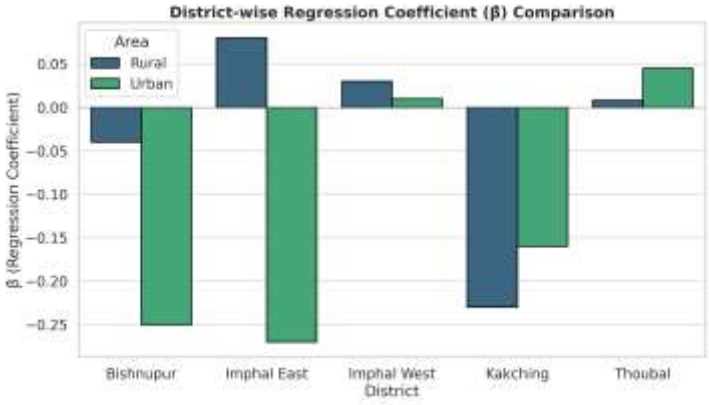

Fig.1. Regression Coefficient

Goodness of Fit (R^2)

The R^2 values in figure.2 shows the Working-Lesser model's capability in capturing the variations in expenditure share on processed foods. The districts such as Kakching and Thoubal which shows very high R^2 values implies the strong explanatory relationships between independent and dependent variables i.e., income and expenditure on processed foods. Lower R^2 values indicate existence of other factors that determine buying decisions other than the factor of income alone. In general, it has been found that urban areas have higher predictability with higher R^2 values and rural areas have lower R^2 values.

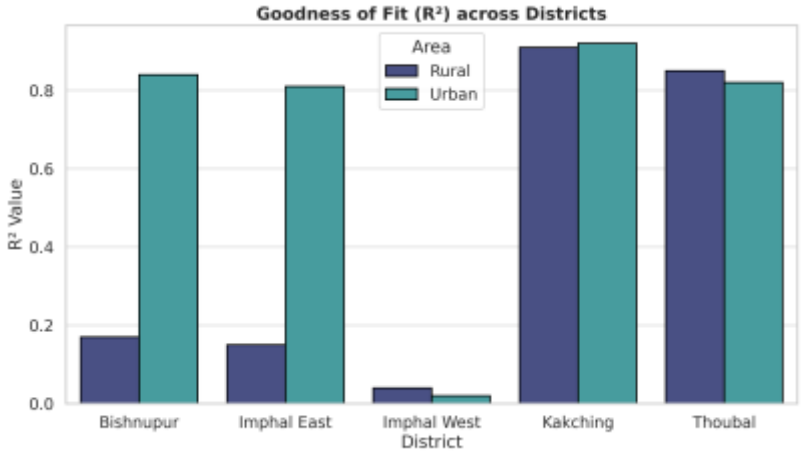

Fig.2. District Wise Co-efficient of Determination (R^2)

Mean Expenditure Share on Processed Food versus Change in Expenditure Share of Processed Food for a 1% Increase in Income

The change in the mean processed food share in response to a one per cent (1%) rise in income is depicted in Figure.3. Urban areas lie mostly in the lower left quadrant showing small mean shares and negative change in share of processed food expenditure with increase income (Fig.3). This reveal diminishing demand with rising income associated with either maturity or saturation. In the case of Imphal East and Thoubal there is positive change depicting expanding demand with rising income (Fig.3).

Correlation Matrix of Regression Variables

The correlation heatmap in Figure.4 depicts the relationships amongst the regression parameters used in the study. A negative correlation between $\hat{\beta}$ and Mean Share shows that there is less income responsiveness in areas where there is higher processed food expenditure share (Fig.4). On the other hand, a positive correlation between $\hat{\alpha}$ and R^2 indicates that higher baseline expenditure levels have better model fits. This also suggests the rural-urban differences in expenditure predictability (Fig.4).

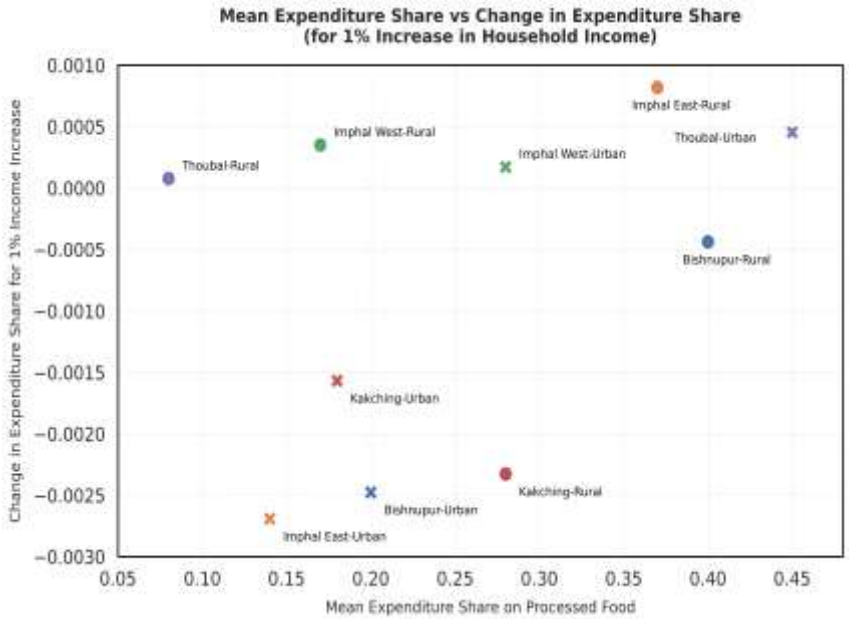

Fig.3. Expenditure change on Processed Food for a 1% Increase in Income.

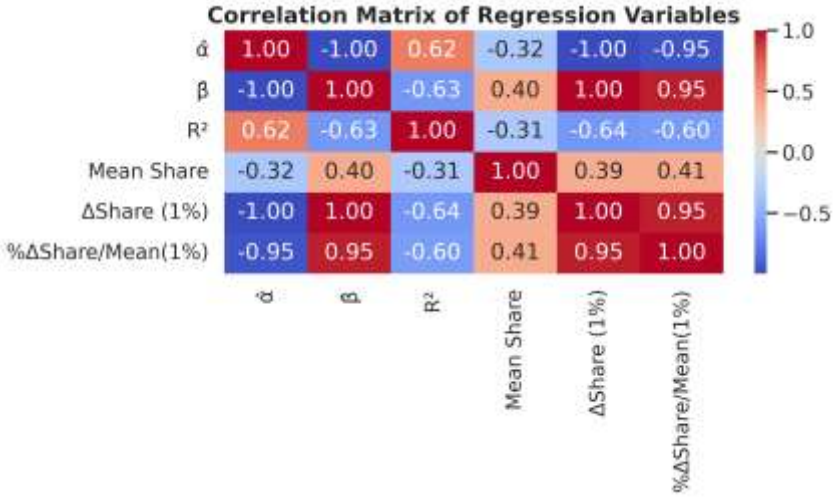

Fig. 4. Heatmap of regression parameters

General attitude of the population on processed foods

Bishnupur District

In most of the households in Bishnupur districts the consumption of processed food is not frequent. A large proportion of households rarely or never purchase processed foods. Nevertheless, in rural households, the consumption frequency is once or twice a month. This frequency is influenced by children's preference and the need for convenience (Table-2). The respondents from this district also mildly agree that processed foods are hygienic and safe. This attitude may have influenced buying decisions rather than taste or price. On the contrary, most of the urban households are neutral or disagree on price, taste, cooking time saving, availability, advertisement or hygienic related questions of processed foods. There is therefore, a strong liking for home prepared or traditional diets in the urban areas of Bishnupur districts.

Kakching District

The majority of rural households in Kakching district generally buy processed foods once or twice a month for the reason that packaged foods save cooking time and are considered safe and hygienic. The children's demand also have significant influence in the buying behaviour of these households (Table-2). There are also significant number of households that do not agree that processed foods are tastier or healthier than home-prepared foods. This implies cultural resistance towards processed foods. On the other hand, majority of urban residents of Kakching districts rarely or never purchase processed foods.

Thoubal District

In comparison to others districts, both the urban and rural households of Thoubal district are more actively oriented towards processed food. Many rural households buy processed food items once a week or once or twice a month. Majority of them also agree that these products ae time-saving, easily available and also sometimes their buying decisions are influenced by advertisements. Nevertheless, the safety and hygienic aspects of processed foods have mixed opinion in the rural areas. Most of the urban residents also agree that their purchasing behaviour is influenced by children's preferences and as convenience food (Table-2). Thus, it can be seen that Thoubal district has a balance food habits with traditional diets and increasing acceptance of processed foods. This may be due to younger household compositions and better accessibility to processed foods.

Imphal East District

In the Imphal East district there is sharp distinction between urban and rural areas as far as consumption behaviour of processed food is concerned. Majority of rural household rarely purchase processed foods and are concerned about health risk posed by processed foods (Table-2). They also do not agree with the concept that processed foods are tastier or have more nutritional values. Their responses suggest that they are concerned about their health and yet have high preferences for traditional home prepared foods. In a sharp contrast, urban households of Imphal East district purchase process for two to three times a week which is more than any other districts. Urban residents of Imphal East districts also agrees that processed foods are time saving. They also agree that availability influence their buying decisions. However, they are not sure about the taste and safety of processed foods.

Table-2. Factors influencing buying decisions of Processed Foods	
Aspect	**Observation from the survey data**
Frequency of Purchase	Processed foods are purchased occasionally and are not staple items in majority of the households.
Price Factor	Ability or affordability to buy is not the main determinant of processed food consumption. Households buy it when the budget allows and frequency of purchase is not dependent on the price factor alone.
Cooking Convenience	In some rural areas processed foods are used to save efforts when there is limited time.
Taste Preference	As far as taste is concerned, traditional foods are preferred. Processed foods are not perceived as tastier.
Availability	Accessibility to processed food does not strongly influence purchase decisions of the consumers.
Advertisements	Advertisements have very lesser influence on penetration of processed food market. It also implies a strong traditional food consumption culture.
Safety and Hygiene	Packaged foods are perceived as safer than open market food in rural households. Urban dwellers are more skeptical in this regard.
Health Concerns	There is increasing awareness about the potential health risks and benefits that the processed foods may have.
Nutrition Labels	People are not too much concerned about the nutritional information labels in the packages of processed foods.
Children's Influence	Most households agree that children are the major influencer for consumption of processed foods particularly in urban families.

Source: Household Survey.

Imphal West District

There is an emerging processed food culture in the urban areas of Imphal west district. On the other hand, the rural households have lesser exposure to processed foods. The urban households purchase once or twice a month or once a week. The buying decisions are largely influenced by children's preferences and convenience (Table-2). Other factors like price, advertisement or nutritional labels have neutral responses in this area. There is also a conspicuous absence of strong opinions on health safety or advertisements suggesting that consumption of processed food is habitual and not shaped by marketing or health awareness. In Imphal West unlike Imphal East, the traditional meals still dominate food culture but processed foods are gradually and occasionally becoming part of household routines.

By the by, in the valley districts of Manipur, the consumption of processed food remains occasional rather than a regular affair. Motivations ranges from social context to price concerns with the former dominating. The urban-rural gap remains but is relatively narrow. Imphal East and Thoubal districts are more open to processed foods and frequency of consumption is more in these districts as compared to the rest. Bishnupur and Kakching districts are more conservative in this regard. In many of the cases, children's preferences appear as a consistent factor influencing buying decisions of processed foods. Hence, the consumers of valley districts of Manipur are in early or mid-stage of dietary transition. The processed foods forms minor parts of the diet and has not replaced significantly traditional foods.

Conclusion

The investigation with the help of Working-Leser model reveals valuable insights into the consumption behaviour of the households with respect to processed foods in the Valley districts of Manipur. The study highlighted a distinct rural-urban divide in the processed food consumption patterns. In urban areas of Bishnupur, Imphal East and Kakching, processed foods behave as inferior goods whose demands diminishes with increase in income levels highlighted by negative β coefficients. Whereas, positive β values in the rural areas of Imphal East and Thoubal districts show that processed foods are normal goods with increasing expenditure as income grows. High R^2 values for Kakching and Thoubal indicates strong relationships between income and expenditure on processed foods. In contrast to this, the low R^2 values in Imphal West indicate the influence of determinants other than income. The overall findings give indications that Manipur valley districts are in early stage of nutrition transition. Processed foods constitute minor share in the diet with traditional foods still dominant. Consumer behaviour is localized determined by socio-economic diversity, availability and generational factors. Policy interventions may focus on increasing consumer awareness, standards of food safety and developing sustainable food system balancing modernization with nutritional well-being.

References

(i) Ahmed, J., Mughal, M., & Martinez-Zarzoso, I. (2018). They earn and send; we spend: consumption patterns of Pakistani migrant households. *International Journal of Social Economics*, *45*(7), 1092–1108. https://doi.org/10.1108/ijse-01-2017-0029

(ii) Baker, P., Machado, P., Santos, T., Sievert, K., Backholer, K., Hadjikakou, M., Russell, C., Huse, O., Bell, C., Scrinis, G., Worsley, A., Friel, S., & Lawrence, M. (2020). Ultra-processed foods and the nutrition transition: Global, regional and national trends, food systems transformations and political economy drivers. *Obesity Reviews*, *21*(12). https://doi.org/10.1111/obr.13126

(iii) Bewley, R. A. (1982). On the Functional Form of Engel Curves: The Australian Household Expenditure Survey 1975–76*. *Economic Record*, *58*(1), 82–91. https://doi.org/10.1111/j.1475-4932.1982.tb00351.x

(iv) Bouis, H. E., & Huang, J. (1996). *Structural changes in the demand for food in Asia*. (2020 Vision Discussion Paper No. 11). International Food Policy Research Institute (IFPRI).

(v) Daoud, H. (2021). An Econometric Analysis of Engel's Curve: Household Commodity Group in Jordan. *Indian Journal of Economies and Business*, *20*(1). http://www.ashwinanokha.com/IJEB.php

(vi) Deaton, A., & Muellbauer, J. (1980). *Economics and consumer behavior*. Cambridge University Press.

(vii) Greene, W. H. (2018). Econometric Analysis (8th ed.). Pearson.

(viii) Gujarati, D. N., & Porter, D. C. (2009). Basic Econometrics (5th ed.). New York: McGraw-Hill.

(ix) Kukreja, N., & Patil, P. C. (2025). Packaging as a strategic communication tool: Influencing consumer perception in processed food markets. *Journal of Marketing & Social Research, 2*(2), 487. https://jmsr-online.com/

(x) Leser, C. E. V. (1963). Forms of Engel functions. *Econometrica*, *31*(4), 694–703. https://doi.org/10.2307/1909167https://www.jstor.org/stable/1909167

(xi) Montgomery, D. C., Peck, E. A., & Vining, G. G. (2021). *Introduction to Linear Regression Analysis* (6th ed.). Wiley.

(xii) Naheed, K., & Hussain, I. (2014). *Estimation of the food demand in Pakistan: Working–Leser approach*. Gomal University Journal of Research. http://gujr.com.pk/index.php/GUJR/article/view/359

(xiii) Prakash J., Puttarathnamma D and Prabhavathi S.N. (2016). Consumption Trends of Processed Foods Among Rural Population Selected from South India. *International Journal of Food and Nutritional Science*, *2*(6), 1–6. https://doi.org/10.15436/2377-0619.15.039

(xiv) Raihan, S., Uddin, M., & Ahmmed, S. (2021). Impact of foreign remittances on the household spending behaviour in Bangladesh. *Migration and Development*, *11*(3), 1104–1126. https://doi.org/10.1080/21632324.2020.1870835

(xv) Shetty, P.S. Nutrition transition in India. (2002) Public Health Nutr 5(1A): 175-182.

(xvi) Srinivasan, K., & Nirmala, R. (2014). A study on consumer behavior towards instant food products (with special reference to Kanchipuram town). *IOSR Journal of Business and Management, 16*(11, Ver. III), 17–21. https://www.iosrjournals.org/iosr-jbm/papers/Vol16-issue11/Version-3/C0161131721.pdf

(xvii) Srivastava, B. (2019). Consumer Buying Pattern of Processed Food Products in National Capital Region of India. *International Journal of Recent Technology and Engineering (IJRTE)*, *8*(3), 3663–3669. https://doi.org/10.35940/ijrte.c4718.098319

(xviii) Tansel, A. (1986). An engel curve analysis of household expenditure in Turkey 1978-79. *ResearchGate*.https://www.researchgate.net/publication/286685155_An_engel_curve_analysis_of_household_expenditure_in_Turkey_1978-79

(xix) Toh, S. M., Rusmawati, S., & Universiti Putra Malaysia. (2018). A cross-sectional household analysis of household consumption patterns: an indirect approach to identify the possible factors of personal bankruptcy. In *Jurnal Ekonomi Malaysia* (Vol. 52, Issue 3, pp. 231–246). https://www.ukm.my/jem/wp-content/uploads/2021/06/jeko_523-18.pdf

(xx) Working, H. (1943). Statistical Laws of Family Expenditure. *Journal of the American Statistical Association*, *38*(221), 43–56. https://doi.org/10.1080/01621459.1943.10501775

(xxi) Yuni, D. N., Urama, N. E. & Urom, C. O.(2018). Migrant remittances and household expenditure patterns: case study of Enugu and Anambra states of Nigeria. In *World Applied Sciences Journal* (Vol. 36, Issue 2, pp. 319–327)