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Income, food expenditure, and household food consumption: Evidence from urban communities in Denpasar City

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Abstract---This study examines the influence of income and food prices on household food consumption among urban communities in Denpasar. The study aims to analyze the partial and simultaneous effects of income and food commodity prices on household food consumption behavior. The research employed econometric and statistical testing approaches to evaluate the relationship between the independent and dependent variables. The findings indicate that income, rice prices, poultry meat prices, ruminant meat prices, and family size have a significant effect on household food consumption. Meanwhile, the prices of corn, sugar, eggs, onions, and chili do not show a significant influence on household food consumption. Simultaneously, all variables related to income and food prices significantly affect household food consumption. These findings suggest that economic factors, particularly household income and strategic food commodity prices, play an important role in shaping food consumption patterns in urban areas. This study is expected to provide practical insights and policy recommendations for local governments and stakeholders in formulating food security and price stabilization policies in Denpasar City.

Keywords---Income, Food Prices, Food Consumption, Urban Households, Denpasar City.



Introduction

Food security has become a major global concern due to rapid population growth, climate change, and geopolitical crises that disrupt food distribution systems and trigger food price volatility. The Food and Agriculture Organization reported that more than 700 million people experienced hunger in 2023, with developing countries being the most vulnerable because of their dependence on imported food commodities. In Southeast Asia, including Indonesia, food security challenges are increasingly complex due to land degradation, climate vulnerability, urbanization, and the conversion of agricultural land into residential and commercial areas. These conditions threaten domestic food production capacity and increase dependency on external food supplies.

In Indonesia, urbanization has accelerated alongside economic transformation from an agrarian economy toward industrial and service sectors. According to Badan Pusat Statistik (BPS, 2025), more than 56% of Indonesia's population currently lives in urban areas, and this figure is projected to continue increasing. Although urbanization contributes to economic growth and employment expansion, it also creates challenges related to food accessibility, rising living costs, and inequality in household purchasing power. Rapid urban growth has also influenced food consumption patterns, shifting preferences from traditional local foods toward processed and instant food products (Mulyana & Hidayat, 2020).

In Denpasar, urbanization has intensified due to the rapid development of tourism, trade, and service industries. BPS (2025) reported that Denpasar's population exceeded 676,383 people, accompanied by high population density and increasing food demand. Urban expansion has reduced agricultural land availability, increased dependence on food supplies from outside the region, and contributed to food price fluctuations. Rising income levels in urban communities have simultaneously altered household consumption behavior, particularly in the allocation of food expenditures. However, income distribution remains unequal, causing lower-income households to become more vulnerable to food price increases and declining food quality. Previous studies mainly focused on general food security and macroeconomic issues, while limited research specifically examines the relationship between income, food expenditure, and household food consumption in urban communities of Denpasar City. Therefore, this study aims to analyze the influence of income and food expenditure on household food consumption among urban communities in Denpasar City as a basis for supporting sustainable urban food security policies.

Methods

This study employed a quantitative research approach to analyze the influence of income and food expenditure on household food consumption among urban communities in Denpasar. The research was conducted in four traditional markets representing the four districts of Denpasar City, namely Kreneng Market, Ketapian Market, Sanglah Market, and Badung Market, during January–February

2026. The population consisted of urban households purchasing food commodities in these markets. A total of 100 respondents were selected using the Lemeshow sampling formula and accidental sampling technique. Primary data were collected through structured questionnaires and interviews, while secondary data were obtained from government reports, previous studies, and statistical publications.

The study applied the Cobb–Douglas regression model to examine the relationship between household food consumption and several independent variables, including household income, food expenditure, and family size. Data analysis was conducted using econometric and statistical approaches, including normality, multicollinearity, heteroscedasticity, and linearity tests to ensure model validity. Furthermore, coefficient of determination (R^2), F-test, and t-test were employed to evaluate the simultaneous and partial effects of the independent variables on household food consumption.

Result and Discussion

Cobb–Douglas Functional Model

The functional model used in this study was the Cobb–Douglas function model. The coefficient values and standard errors of the Cobb–Douglas model are presented in Table 1.

Table 1
Variables Forming the Equation Function

Variables	Coefficient	Std. Error
Constant	6.818	0.961
Household income (X1)	0.077	0.039
Rice expenditure (X2)	0.213	0.033
Corn expenditure (X3)	0.027	0.058
Poultry meat expenditure (X5)	0.094	0.026
Ruminant meat expenditure (X6)	0.075	0.026
Sugar expenditure (X7)	0.030	0.024
Egg expenditure (X8)	0.016	0.020
Onion expenditure (X9)	0.017	0.017
Chili expenditure (X10)	0.025	0.013
Family size (X11)	0.109	0.040

Primary Data, 2026

Based on Table 1, the soybean expenditure variable (X4) was excluded from the model because it did not show variation or correlation with household food consumption. Therefore, the resulting Cobb–Douglas function model is expressed as follows:

$$\ln Y = 6,818 + 0,077\ln X1 + 0,213\ln X2 + 0,027\ln X3 + 0,094\ln X5 + 0,075\ln X6 + 0,030\ln X7 + 0,016\ln X8 + 0,017\ln X9 + 0,025\ln X10 + 0,109\ln X11$$

Where:

Y = household food consumption expenditure (IDR/month)

X1 = household income (IDR/month)

X2 = rice expenditure (IDR/month)

X3 = corn expenditure (IDR/month)

X5 = poultry meat expenditure (IDR/month)

X6 = ruminant meat expenditure (IDR/month)

X7 = sugar expenditure (IDR/month)

X8 = egg expenditure (IDR/month)

X9 = onion expenditure (IDR/month)

X10 = chili expenditure (IDR/month)

X11 = number of family members (persons/household)

Econometric Criteria

The econometric criteria in this study were evaluated using classical assumption tests, including normality, multicollinearity, heteroscedasticity, and linearity tests. The results are presented in Table 2.

Table 2
Results of Classical Assumption Tests

Classical Assumption Test	Result
Normality Test	Zskew = 1.58; Zkurt = 1.91; Critical Value ± 2.58
Multicollinearity Test	All VIF values < 10 and TOL values > 0.10
Heteroscedasticity Test	All P-values > 0.05
Linearity Test	Scatterplot distributed randomly

Primary Data, 2026

The normality test using skewness and kurtosis significance indicated that the residual values were normally distributed because the Zskew and Zkurt values were smaller than the critical value of ± 2.58 . The multicollinearity test showed that all independent variables had Variance Inflation Factor (VIF) values below 10 and tolerance (TOL) values above 0.10, indicating no multicollinearity problem. Furthermore, the Glejser heteroscedasticity test showed that all variables had P-values greater than 0.05, confirming the absence of heteroscedasticity symptoms. The linearity test through scatterplot analysis demonstrated that the data points were randomly distributed above and below the regression standardized residual axis, indicating that the model fulfilled the linearity assumption.

Statistical Criteria

The statistical analysis consisted of the coefficient of determination (R^2), simultaneous test (F-test), and partial test (t-test). The results are shown in Table 3.

Table 3
Results of Statistical Tests

Statistical Test	Result
R² Test	0.888 (88.8%)
F-Test	P-value < 0.001
t-Test	X1 = 0.048*; X2 < 0.001*; X3 = 0.645**; X5 < 0.001*; X6 = 0.005*; X7 = 0.211**; X8 = 0.418**; X9 = 0.329**; X10 = 0.054**; X11 = 0.008*

Primary Data, 2026

*Significant at $P\text{-value} < 0.05$

**Not significant at $P\text{-value} > 0.05$

The coefficient of determination (R^2) value of 0.888 indicates that 88.8% of the variation in household food consumption can be explained by household income, rice expenditure, corn expenditure, poultry meat expenditure, ruminant meat expenditure, sugar expenditure, egg expenditure, onion expenditure, chili expenditure, and family size. The remaining 11.2% is explained by variables outside the model.

The F-test result showed a P-value of less than 0.001, indicating that all independent variables simultaneously have a significant effect on household food consumption among urban communities in Denpasar City.

The t-test results revealed that household income (X1), rice expenditure (X2), poultry meat expenditure (X5), ruminant meat expenditure (X6), and family size (X11) significantly affect household food consumption because their P-values were below 0.05. Meanwhile, corn expenditure (X3), sugar expenditure (X7), egg expenditure (X8), onion expenditure (X9), and chili expenditure (X10) did not significantly influence household food consumption because their P-values exceeded 0.05.

Conclusion

This study examined the influence of household income and food expenditure on household food consumption among urban communities in Denpasar using the Cobb–Douglas regression model. The findings demonstrate that household income, rice expenditure, poultry meat expenditure, ruminant meat expenditure, and family size significantly influence household food consumption. These results indicate that economic capacity and household demographic characteristics play important roles in determining food consumption patterns in urban areas. In contrast, expenditures on corn, sugar, eggs, onions, and chili were found to have no significant effect on household food consumption behavior.

The simultaneous analysis revealed that all independent variables collectively have a significant effect on household food consumption, with the model explaining 88.8% of the variation in food consumption. This finding confirms that household food consumption in urban communities is strongly associated with purchasing power, food commodity allocation, and household characteristics. Rapid urbanization, increasing living costs, and changing consumption lifestyles

in Denpasar City have contributed to shifts in food consumption behavior, particularly toward higher dependence on strategic food commodities.

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