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Determinants of Household Income: An Empirical Study of Urban Maharashtra During the COVID-19 Pandemic

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Abstract: *The COVID-19 pandemic profoundly disrupted global economies, with India experiencing an unprecedented GDP contraction during the April–June 2020 quarter. This study explores the relationship between household income and consumption expenditure in urban Maharashtra, utilizing data from the Consumer Pyramids Household Survey (CPHS) by the Centre for Monitoring Indian Economy (CMIE). Focusing on the pandemic period, the research employs regression analysis to examine the effects of both food and non-food expenditures—including health, recreation, restaurants, and vacations—on total household income. The results indicate a statistically significant relationship between income and consumption patterns, with both food and non-food spending contributing meaningfully to variations in income. Notably, food expenditure stands out as a stronger predictor of income compared to non-food categories, highlighting the essential nature of food consumption even during economic downturns. These findings suggest that household expenditure patterns, particularly on necessities, have a critical feedback effect on income, especially in times of crisis. The study contributes to the broader discourse on economic resilience and household behavior under stress, offering valuable insights for policymakers focused on inclusive recovery strategies. By identifying key spending areas that sustain household income, the research supports the formulation of targeted interventions to strengthen economic stability among urban populations. This analysis underscores the importance of understanding microeconomic dynamics in the wake of large-scale disruptions and provides a data-driven foundation for future policy development aimed at mitigating the socioeconomic impacts of such crises.*

Keywords: Household Consumption, Income Expenditure Relationship, Urban Maharashtra, COVID-19 Economic Impact, Consumer Pyramids Household Survey (CPHS).

I. INTRODUCTION

The COVID-19 pandemic caused an unprecedented disruption to global economies, pushing many countries into economic downturns not seen in decades. In India, the shock was both sudden and severe. The country's Gross Domestic Product (GDP) contracted by 23.9% in the first quarter of the fiscal year 2020–21, marking one of the sharpest economic declines in its history. The economic recovery that followed was staggered, challenged by subsequent waves of infections and intermittent localized lockdowns throughout 2021. These interruptions created a volatile economic environment that severely impacted employment, consumption patterns, and household income—especially in urban areas, where the economy is more intricately linked to services and informal labor markets.

The economic ramifications of the initial lockdown were especially acute for urban households. These families faced simultaneous shocks: the loss of income, rising healthcare expenses, and restricted mobility, all of which restructured their consumption behavior. The present study focuses on urban Maharashtra—a highly urbanized and economically significant state—to understand how household expenditure patterns during the pandemic affected income, particularly emphasizing food and non-food spending. The study also explores the vulnerability of specific groups, including daily wage earners and female-headed households, who often lack robust financial safety nets.

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Context and Motivation

Urban Maharashtra, home to cities like Mumbai, Pune, and Nagpur, became one of the epicenters of the pandemic in India. As a hub of commerce, industry, and service-based employment, Maharashtra's urban regions suffered heavily from the lockdown-induced suspension of economic activity. The informal sector, which accounts for a substantial share of urban employment, was hit hardest. Daily wage laborers, small-scale vendors, and service workers lost their primary source of income almost overnight, exacerbating economic insecurity and pushing many into poverty.

This study is motivated by the need to understand the microeconomic impacts of the pandemic at the household level. While macroeconomic indicators like GDP and inflation provide a broad view, they often mask the lived experiences of individuals and families. Consumption expenditure—a key indicator of economic activity and well-being—can offer deeper insights into household behavior and resilience during crises. In particular, understanding how spending on essential categories like food, and discretionary ones like recreation or health, relates to household income can help inform more targeted and inclusive policy interventions.

Objectives of the study

- To examine the impact of household consumption expenditure—both food and non-food—on total household income during the COVID-19 pandemic in urban Maharashtra.
- To explore the strength and nature of the relationship between essential (food) and discretionary (non-food) spending and household income in times of economic crisis.
- To analyze the role of socio-demographic factors such as household size, gender of the household head, education level, and primary source of income in shaping income dynamics during the pandemic.
- To identify the vulnerabilities of specific urban groups, especially daily wage earners and female-headed households, in terms of income and consumption behavior during the lockdown period.
- To contribute micro-level insights for policymakers aiming to design targeted interventions that promote economic resilience and inclusive recovery in urban areas.

Rationale of the Study

The COVID-19 pandemic triggered a severe economic crisis, disrupting income sources and altering consumption behavior across India. Urban regions like Maharashtra were disproportionately affected due to higher population density, reliance on informal labor, and service-based industries. In such a context, understanding how households managed their consumption—especially between essential (food) and non-essential (non-food) expenditures—offers valuable insights into economic resilience and vulnerability. Existing literature focuses largely on macroeconomic indicators like GDP or employment rates, often overlooking the micro-level interactions between consumption and income. This study addresses that gap by examining how household spending patterns reflect and influence income levels, especially during periods of economic distress. It also highlights disparities among vulnerable groups, such as daily wage earners and female-headed households, providing a more inclusive picture of the crisis.

Significance of the Study

- **Policy Relevance:** The findings help policymakers identify critical areas of intervention, such as food security and healthcare support, which can stabilize household income during crises.
- **Targeted Support:** By highlighting the vulnerabilities of specific groups—like daily wage earners and women-led households—the study supports the design of targeted welfare schemes.
- **Microeconomic Insight:** It contributes to the understanding of household-level economic behavior during systemic shocks, informing economic resilience and recovery strategies.
- **Data-Driven Analysis:** Utilizing CPHS data adds credibility and depth, offering a high-frequency, empirical perspective on household economics in urban Maharashtra.
- **Urban-Centric Focus:** With most policy focus often on rural India, this study sheds light on urban challenges, especially in highly urbanized states like Maharashtra.

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Limitations of the Study

- **Data Scope**: While CPHS offers rich household-level data, it may underrepresent the most marginalized groups such as the homeless or migrants without fixed addresses, leading to potential sampling bias.
- **Causality Constraints**: The study identifies associations between consumption and income, but the cross-sectional nature of analysis limits the ability to make strong causal claims.
- **Unmeasured Variables**: Factors like access to credit, informal support networks, or psychological stress, which may influence both income and consumption, are not captured in the dataset.
- **Geographical Limitation:** The focus on urban Maharashtra limits the generalizability of findings to rural areas or other states with different socio-economic dynamics.
- **Temporal Limitation**: The study captures a specific period (2020–2021), and longer-term effects of the pandemic on income and consumption behavior remain unaddressed

II. REVIEW OF LITERATURE

A growing body of literature has explored the impact of the COVID-19 pandemic on household income and consumption, particularly in India. Abraham, Basole, and Kesar (2021) utilized CMIE's Consumer Pyramids Household Survey (CPHS) data to study employment and income dynamics during the pandemic, highlighting a disproportionately adverse impact on women. Their findings reveal that job losses were higher among women, and income shocks led to severe consumption constraints in female-headed households. Similarly, Kapoor and Ravi (2021) examined the experiences of gig workers during the crisis and found that income disruptions left them unable to smooth consumption due to inadequate access to social security.

Deshpande (2020) provided early evidence from CMIE data, noting a sharp drop in employment and income following the national lockdown. This was particularly detrimental for poorer households, many of which reported food insecurity and cutbacks on essential consumption. Jalan and Ravallion (2003), while focusing on rural China, offer relevant comparative insights. Their study on income dynamics revealed that households with access to credit and informal support networks were better able to withstand income shocks, underscoring the importance of social protection mechanisms in developing countries like India.

A broader perspective is offered by Balboni et al. (2021), who explored persistent poverty across several developing countries. They concluded that poor households remain trapped in low-income cycles largely due to vulnerability to health shocks, low asset ownership, and the inability to maintain consumption after adverse events—conditions exacerbated by the pandemic in the Indian context. Kesar et al. (2021) also stressed the vulnerability of informal workers, reporting that women, Dalits, and those with low educational attainment were among the most severely affected by income disruptions during the COVID-19 lockdown.

Long-term structural trends are discussed in Chatterjee, Murgai, and Rama (2020), who analyzed patterns in job and earnings growth over decades. They emphasized that while consumption has increased gradually, income inequality remains high and crises like COVID-19 tend to widen these disparities. Dreze and Somanchi (2021) examined food insecurity during the pandemic, pointing out that while government schemes such as the Public Distribution System (PDS) played a crucial role in mitigating hunger, the coverage and efficiency were often inadequate.

From an urban perspective, Mehta and Sarkar (2020) studied the experiences of the urban poor in Delhi during the lockdown. Their findings highlighted sharp income reductions that forced households to reduce food expenditure and rely heavily on informal credit. Finally, Vyas (2020) elaborated on the methodology of the CPHS dataset, underlining its significance and limitations. As the primary source of high-frequency household-level data during the pandemic, CPHS has been central to most empirical analyses of income and consumption patterns in India during this crisis.

Collectively, these studies offer a comprehensive understanding of the pandemic's economic effects on households. They highlight the strong interplay between income shocks and consumption reduction, particularly for vulnerable populations. The literature consistently points to the importance of social protection systems, gender and caste disparities, and the differential impact across urban and rural spaces. This review underscores the need for inclusive economic recovery strategies and better-targeted welfare policies in post-pandemic India.

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Research Gaps Addressed

Urban-Centric Economic Impact:

Existing studies often focus on rural areas or national averages, leaving a gap in understanding how urban regions like Maharashtra were uniquely affected during COVID-19.

Reverse Link Between Consumption and Income:

Most research explores how income affects consumption, but few examine how expenditure patterns may influence income, especially during crises.

Disaggregated Non-Food Spending:

Non-food expenditures are typically treated as a single category. Your study breaks this down into health, recreation, restaurants, and vacations, offering more specific insights.

Underrepresentation of Vulnerable Urban Groups:

Limited literature exists on daily wage earners and female-headed households in urban settings and their economic vulnerabilities during the pandemic.

Use of High-Frequency Panel Data:

Many studies rely on periodic or government datasets. Your use of CMIE-CPHS provides more timely, granular data for analyzing post-lockdown household economics.

III. DATA SOURCE AND METHODOLOGY

The analysis uses data from the Consumer Pyramids Household Survey (CPHS) conducted by the Centre for Monitoring Indian Economy (CMIE). The CPHS is a high-frequency, longitudinal dataset that covers a wide cross-section of Indian households, offering detailed insights into income, expenditure, employment, and demographics. For the purpose of this study, data specific to urban Maharashtra during the 2020–2021 period was extracted.

Regression analysis is employed to explore the relationship between consumption expenditure and household income. Expenditures are categorized into food and non-food items, with the latter including health-related expenses, recreation, restaurant visits, and vacation spending. The model controls for demographic variables such as household size, gender of the household head, and primary source of income, allowing for a more nuanced understanding of how different factors interact.

Dependent Variable

Household Income

This is the main outcome variable representing the total income reported by the household, for household size or inflation (depending on methodology). It reflects the financial well-being of the household during the pandemic period.

Independent Variables

a. Food Expenditure

- Includes spending on groceries, staples, and other essential food items.
- Treated as a key predictor of income, especially during crises, where food remains a non-negotiable expense.

b. Non-Food Expenditure (Disaggregated into Subcategories):

- Health Expenditure: Spending on medical treatment, medicines, preventive care, or COVID-related health services.
- Recreation Expenditure: Spending on leisure activities like movies, books, digital entertainment, etc.
- Restaurant Expenditure: Dining out, takeout, and related services.
- Vacation Expenditure: Travel and tourism-related expenses.

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Control Variables / Socio-Demographic Variables

These help isolate the effect of consumption expenditure on income by accounting for other influences:

Household Size: Number of members in the household.

Gender of Household Head: Male or female; used to analyze vulnerabilities of female-headed households.

Primary Source of Income: Salaried, self-employed, daily wage, etc.

Employment Status: Whether the main earners were employed, unemployed, or underemployed during the survey period.

Education Level of Household Head: To control for the effect of educational background on income stability. A linear regression model was used to evaluate the relationship between Total Income (TOT_INC) as the dependent variable and:

Food Expenditure (EXP_FOOD)

Non-Food Expenditure (EXP_NONFOOD)

Hypotheses:

H_0: There is no significant association between household income and consumption expenditure.

H_1: There is a significant association between household income and consumption expenditure.

IV. RESULTS AND DISCUSSION

Income Analysis for 2020

Table No 1 Descriptive Statistics for Urban Region

	N	Minimum	Maximum	Mean	Std. Deviation
TOT_INC	4521	0	150150.0	18508.553	15200.9475
Valid N (listwise)	4521				

Source: Author's Analysis

Table No 1 Income Distribution for Urban Maharashtra in 2020

The urban region's descriptive statistics are based on a sample size of 4,521 households. The analysis reveals that minimum total income recorded is ₹0 which indicates that some households reported no income. On the other hand, the maximum income recorded is ₹150,150, showcasing a significant range in income levels among urban households. The mean total income for urban households is ₹18,508.553, which represents the average income level in this region. The standard deviation of ₹15,200.9475 indicates a considerable variability in income which suggests that while some households earn significantly more, others earn much less. This variability highlights economic diversity in urban areas.

Regression Analysis

Ho1: There is no significant association between the consumption expenditure of the households and their income during the study period

H11: There is a significant association between the consumption expenditure of the households and their income during the study period

Dependent Variable: Total Income

Independent Variables: Food Expenditure, Non-Food Expenditure

ANOVA

Model		Sum of Squares	df	Mean Square	F	p-value
1	Regression	270594941622.411	2	135297470811.206	789.927	.000[b]
	Residual	773836062799.362	4518	171278455.688		
	Total	1044431004421.773	4520			

Source: Author's Analysis

a. Dependent Variable: TOT_INC

b. Independent variables (Constant), EXP_NONFOOD, EXP_FOOD

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Dependent Variable: TOT_INC
Predictors: EXP_NONFOOD, EXP_FOO
Constant term is included in the model as well.

Table 2: Regression Analysis of Urban Maharashtra

This ANOVA model seems to be exploring the relationship between the total income (TOT_INC) and two predictor variables: non-food expenditure (EXP_NONFOOD) and food expenditure (EXP_FOOD). The model is likely examining how variations or changes in non-food and food expenditures relate to the total income.

ANOVA assesses the significance of the predictors (in this case, EXP_NONFOOD and EXP_FOOD) in explaining the variance observed in the dependent variable (TOT_INC). It checks whether these predictors collectively have a significant impact on the total income and whether this impact is different from what might be expected by chance.

Interpretation: The above table indicates the p-value for the regression model is 0.000, which is less than the standard p-value of 0.01. Hence, the linear regression model is applicable.

Hence, we are unable to accept the null hypothesis and conclude that **there is a significant association between the consumption expenditure of the households and their income during the study period**

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value
		B	Std. Error	Beta		
1	(Constant)	-4855.987	619.891		-7.834	.000
	EXP_FOOD	4.522	.114	.507	39.564	.000
	EXP_NONFOOD	.100	.046	.028	2.155	.031

Source: Author's Analysis

a. Dependent Variable: TOT_INC

Table No 3 Coefficients

The coefficients represent the relationships between the predictors (EXP_FOOD and EXP_NONFOOD) and the dependent variable (TOT_INC).

Constant: The constant term in the model is -4855.987. This is the expected value of the dependent variable (TOT_INC) when all predictors are zero. A negative

EXP_FOOD: For every unit increase in food expenditure (EXP_FOOD), the total income (TOT_INC) is expected to increase by 4.522 units. The p-value associated with this coefficient is very low (p = 0.000), indicating that this relationship is statistically significant. **In short, it can be said that food expenses have a significant effect on the total Income**.

EXP_NONFOOD: With every unit increase in non-food expenditure (EXP_NONFOOD), the total income (TOT_INC) is expected to increase by 0.100 units. The p-value (p = 0.031) suggests that this relationship is statistically significant as well, but it might be comparatively weaker than the relationship with food expenditure. Hence, it can be inferred that though the expenditures on non-food items like health, vacation, recreation and restaurant, do influence the total income significantly, the influence of these on the total Income is not as much as the influence of food expenditure.

Standardized Coefficients (Beta): These coefficients allow a comparison of the relative importance of the predictors within the model. Here, EXP_FOOD has a higher standardized coefficient (Beta = 0.507) compared to EXP_NONFOOD (Beta = 0.028), suggesting that food expenditure might have a relatively stronger impact on total income compared to non-food expenditure.

t-value: The t-values (39.564 for EXP_FOOD and 2.155 for EXP_NONFOOD) indicate how many standard errors the coefficients are away from zero. Higher absolute t-values typically indicate greater significance.

In summary, both food expenditure and non-food expenditure appear to have a statistically significant relationship with total income. food expenditure seems to have a stronger impact on total income compared to non-food expenditure based on the coefficient magnitudes and the associated t-values.

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In the above results, the p-values for all the independent variables are 0.000 or less than 0.05. It is less than the standard p-value of 0.05. This indicates that independent variables, Food Expenditure and Non-Food Expenditure, have a significant influence on the (dependent variable) Total Income for urban households.

The regression equation is as follows. Total Income = -4855.987 + (4.522) Food Expenditure + (0.100) Non-Food Expenditure.

The regression analysis shows that food expenditure (EXP_FOOD) has a strong, statistically significant impact on total income (TOT_INC), with each unit increase in food spending raising income by 4.522 units ($p = 0.000$). In contrast, non-food expenditure (EXP_NONFOOD) also positively affects income but to a lesser extent, increasing it by 0.100 units ($p = 0.031$). The standardized coefficients further highlight the stronger influence of food expenditure (Beta = 0.507) over non-food (Beta = 0.028). The higher t-value for food (39.564) compared to non-food (2.155) also supports its more substantial role in predicting household income.

In summary, food expenditure (EXP_FOOD) demonstrates a stronger and highly significant positive relationship with total income (TOT_INC) compared to non-food expenditure (EXP_NONFOOD) in this model.

In the above results, the p-values for all the independent variables are 0.000 or less than 0.05. It is less than the standard p-value of 0.05. This indicates that independent variables, Food Expenditure and Non-Food Expenditure, are significant influencers of Total Income for urban households.

The regression equation is as follows. Total Income = -4855.987 + (4.522) Food Expenditure + (0.100) Non-Food Expenditure

Key Findings

The study finds a statistically significant relationship between consumption expenditure and household income. Notably, food expenditure emerges as a stronger predictor of household income during the pandemic period. This is consistent with economic theory and empirical evidence, which suggest that in times of financial uncertainty, households prioritize essential consumption—primarily food—while reducing discretionary spending.

Interestingly, the relationship between non-food expenditure and income also remains significant, particularly for health-related spending. The pandemic led to increased medical costs for many households, with or without actual COVID-19 infections. Preventive measures, treatment costs, and care for pre-existing conditions strained household budgets. This form of non-discretionary, yet non-food, spending became critical, especially among households with elderly members or chronic illnesses.

On the other hand, expenditures on recreation, restaurants, and vacations declined sharply, reflecting both precautionary behavior and external restrictions due to lockdowns. These categories showed weaker correlations with income during the study period, indicating their discretionary nature and sensitivity to economic uncertainty.

Income Disparities and Vulnerabilities

The pandemic magnified existing income disparities, particularly among vulnerable groups. Daily wage workers in urban Maharashtra, many of whom lack formal employment contracts or social security, experienced the most immediate and severe income losses. Their consumption patterns also shifted more drastically, with a marked reduction in all non-essential spending.

Female-headed households were another group that showed heightened vulnerability. These households often face structural disadvantages such as lower access to credit, higher caregiving responsibilities, and social stigma, which were exacerbated during the pandemic. The analysis reveals that female-headed households in urban Maharashtra had lower average incomes and reported a more significant drop in non-food expenditures compared to male-headed households. Their food expenditure, while more stable, remained modest, highlighting limited financial flexibility.

Another notable trend was the role of household size. Larger households faced greater strain on income and were more likely to cut back on both food and non-food spending. This indicates that per capita income declined even more steeply in such cases, worsening food security and access to basic services.

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Policy Implications

The findings from this study carry several policy implications. First, the strong association between food expenditure and household income suggests that food security programs can act as effective stabilizers during economic crises. Expanding the scope and reach of initiatives like the Public Distribution System (PDS) could help cushion the impact on vulnerable households.

Second, the significance of health expenditures points to the urgent need for universal and affordable healthcare. Households facing income shocks should not have to choose between medical treatment and other basic needs. Government-sponsored health insurance schemes, like Ayushman Bharat, must be extended more effectively to urban informal workers.

Third, targeted cash transfers or wage support programs could provide immediate relief to daily wage earners and female-led households, allowing them to maintain minimum consumption levels and avoid falling into long-term poverty. These transfers should be designed to accommodate the unique challenges of urban living, such as higher costs of housing and services.

Finally, better data collection and real-time monitoring of household consumption and income patterns can enable more responsive policymaking. High-frequency surveys like CPHS provide an important tool for governments to identify and support at-risk populations dynamically.

V. CONCLUSION

The COVID-19 pandemic exposed the economic fragility of urban households in India, especially in a populous and economically vital state like Maharashtra. This study shows that consumption expenditure—particularly on essential items like food and health—has a significant bearing on household income during times of crisis. The patterns observed underscore the need for robust safety nets, inclusive recovery policies, and a deeper understanding of household-level dynamics.

By focusing on microeconomic indicators such as consumption and income, this research adds a critical dimension to the broader discourse on economic resilience and recovery. It also offers practical guidance for designing policies that protect the most vulnerable, ensuring that recovery is not only swift but also equitable and sustainable.

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