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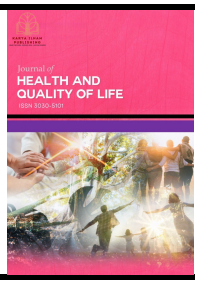

The Impact of COVID-19 on the Cost of Living in Malaysia

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ABSTRACT

The issue of the cost of living has become a crucial focus for the government and has worsened, particularly during the COVID-19 pandemic. While many factors are believed to be contributing to the rising cost of living, there have been limited studies focusing on the duration of the COVID-19 pandemic. Thus, this study aims to identify the relationship between factors influencing the cost of living in Malaysia, both before and during the COVID-19 pandemic. The factors analyzed include gross domestic product per capita, population growth, and the unemployment rate. The study also identifies three major new influences during the pandemic: supply chain disruptions, significant changes in household income, and a dramatic shift in consumer spending toward essential goods and digital services. This study employs several statistical methods such as descriptive statistics, correlation tests, variance inflation factors, and the Multiple Linear Regression model (MLR). Using MLR with 108 monthly data points from 2014 to 2022, the findings from two models consistently indicate that population growth has the greatest impact on the cost of living for households. This result suggests that demographic changes and population dynamics are the most significant drivers of the cost of living, even more so than GDP per capita or the unemployment rate.

1. Introduction

The issue of the cost of living has been a long-standing concern in Malaysia, with its complexity growing over time. The Department of Statistics Malaysia (DOSM) have highlighted, average monthly household expenditures have steadily increased, rising from RM4,608.81 in 2019 to RM5,150.21 in 2022 [1]. This upward trend is particularly acute in urban centres, where the cost of living is significantly higher than in rural areas [2]. The disparity between income and expenses is a critical factor, as Azahar [2] notes that a minimum income of RM2,216 is required to meet basic needs in a city, which is double the basic monthly salary. The government has attempted to mitigate this issue through various subsidies on essential items and financial aid. However, as Aziz [3] points out, despite

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spending a substantial amount on subsidies, the issue persists, suggesting that temporary solutions are insufficient to address the underlying structural problems.

The COVID-19 pandemic introduced an unprecedented layer of complexity to Malaysia's economic landscape, exacerbating existing challenges. The government's implementation of the Movement Control Order (MCO), as described by Kamarudin *et al*., [4] led to widespread business disruptions, resulting in job losses and salary reductions. This sudden financial instability, combined with the continued rise in the price of basic goods and services, left many households in a precarious position [5]. While the government responded with financial assistance programs, such as the Bantuan Prihatin Nasional (BPN) and loan moratoriums, these measures were widely viewed as temporary fixes rather than long-term solutions [6]. The pandemic, therefore, serves as a crucial case study, highlighting how external shocks can interact with pre-existing economic vulnerabilities to create a compounding effect on the cost of living. This review suggests that a deeper analysis is needed to understand and compare the factors that influenced living costs both before and during the pandemic.

1.1 Consumer Price Index (CPI) and its Fluctuations

The Consumer Price Index (CPI) is a crucial metric for measuring changes in the cost of a fixed basket of goods and services over time, serving as a benchmark for inflation [7]. As Lemanowicz [8] notes, the CPI acts as a proxy for the cost of living, as price changes in its 13 main groups, including food, housing, and transportation directly affect household expenditure. The CPI in Malaysia has seen significant fluctuations, particularly during the COVID-19 pandemic. A downturn was observed in April to May 2020 when the index dropped to -2.9%, lowest since 2011. However, this was followed by a sharp surge to 4.7% in April 2021, indicating a rise in inflation. The pandemic also caused a shift in consumer behavior, as people focused on purchasing essential items such as hand sanitizers and toilet paper, leading to unexpected price hikes [9]. Additionally, panic buying, triggered by the initial MCO announcement, enabled merchants to raise prices for higher profits. Trade barriers also contributed to the increased cost of imported goods, further driving up consumer prices.

1.2 Key Factors Influencing the Cost of Living

Beyond the CPI, several economic variables have been identified as crucial determinants of the cost of living, including gross domestic product (GDP) per capita, population growth (PG), and the unemployment rate (UR) [10] .

GDP per capita is a widely used measure of a country’s economic health and productivity [11]. A study by Kamarudin *et al.*, [4] and Ingoglia *et al*., [12] confirms a statistically significant relationship between GDP per capita and the cost of living. Higher GDP per capita often reflects increased demand for goods and services, which can drive up prices. The COVID-19 pandemic had a severe impact on Malaysia's GDP, with the DOSM (2020) reporting negative growth across all economic sectors in 2020, particularly in tourism. This decline led to a decrease in GDP per capita for states heavily reliant on tourism, underscoring the link between economic performance and living standards.

Population growth, defined as an increase in the number of people in a country, is another key factor [13]. A larger population increases demand for resources, which can inflate prices. Spitzer *et al.*, [14] notes that the costs of raising children, both direct (e.g., food, healthcare) and indirect (e.g., lost income), contribute to household expenses. Atuesta & Araya [15] and Asmat [16] support the idea that population size and density are positively correlated with the cost of living, explaining why urban areas with higher populations tend to have higher living costs.

The unemployment rate is a critical indicator of economic performance [16]. A high unemployment rate typically signifies slow economic growth. As Penrose and Cava [17] demonstrate, unemployment has a profound negative impact on household welfare and spending habits, as the loss of income forces people to reduce their expenditures. The COVID-19 pandemic saw Malaysia's unemployment rate rise significantly, from 3.3% in 2019 to a high of 4.6% in 2021 [18]. This period of rising unemployment, coupled with negative GDP growth, highlights the strong relationship between job market instability and the financial burden on households, ultimately affecting the cost of living.

This study highlights that while many factors are believed to contribute to the rising cost of living, there is a lack of research that specifically examines this issue within the context of the pandemic. As such, the main objective of this study is to identify and compare the factors that influenced the cost of living in Malaysia both before and during the COVID-19 pandemic. By incorporating dummy variables into a multiple linear regression (MLR) model, this research will determine which factors had the greatest impact, providing a more comprehensive understanding of the economic pressures on Malaysian households. The findings can help guide the government in formulating targeted policies, such as those related to demographics, housing, and social welfare, to better manage and mitigate the rising cost of living for households.

2. Data and Methodology

2.1 Data Collection

The study utilizes a dataset of 108 monthly observations spanning from 2014 to 2022. The variables include the CPI, gross domestic product (GDP) per capita, population growth (PG), and the unemployment rate (UR). Data for these variables were collected from the DOSM, MacroTrends, and Datastream. The analysis was performed using Microsoft Excel and EViews.

2.2 Methodology

This study employs several methods to achieve its objectives:

i. Descriptive Statistics: Some statistical measures such as mean, median, mode, standard deviations, skewness, and kurtosis are computed. These measures will summarize the key features of the data, providing a fundamental overview of the variables.

ii. Augmented Dickey-Fuller (ADF) Unit Root Test: This ADF test is employed to investigate the stationarity of the time-series data. A general model of ADF unit root test is given by:

$$y_t = \emptyset y_{t-1} + e_t \quad (1)$$

Where the $\emptyset$ in Eq. (1) detects the presence of the unit root test. The null hypothesis of a unit root (non-stationarity) is rejected if the p-value is less than the significance level, typically 0.05.

iii. Pearson Correlation Test: This test is used to detect the linear correlation between variables, and it is the crucial step before running the MLR model. The correlation coefficient values range from -1 to 1. A value of 1 indicates a perfect positive linear relationship, while -1 indicates a perfect negative linear relationship.

iv. Variance Inflation Factor (VIF): This VIF measure will be computed to investigate the presence of multicollinearity among the independent variables. A VIF value ranging from 1 to 5 indicates a low to moderate level of multicollinearity, suggesting that it is not a significant problem for the model. A value above 5 indicates the presence of multicollinearity issues among the variables.

2.2.1 Multiple regression model

This study examines the relationship between the cost of living and three independent variables: GDP per capita, the unemployment rate, and population growth. Using monthly time series data from 2014 to 2022, the research employs two models: a primary model (Model 1) to estimate the overall significance of the variables across the entire period, and a second model (Model 2) with a dummy variable to specifically test the effect of these variables during the COVID-19 pandemic [19]. The models are given as follows:

Model 1:

$$y_t = \alpha_0 + \sum_{i=1}^{3} \alpha_i X_t + \varepsilon_t \quad (2)$$

Model 2:

$$y_t = \alpha_0 + \sum_{i=1}^{3} \alpha_i X_t + \gamma D_t + \sum_{i=1}^{3} \beta_i D_t X_t + \varepsilon_t \quad (3)$$

where
y_t : Cost of Living (COL)
α_0 : Intercept
X_t : GDP, PG and UR.
D_t : Dummy variable in Eq. (2) is given as:

$$D_t = \begin{cases} 1, \text{period during COVID} - 19 \\ 0, \text{period before COVID} - 19 \end{cases}$$

α_i : Coefficient of X_t
γ : Coefficient of dummy variable
β_i : Coefficient for interaction between X_t and D_t
t : 1, 2, …, 108
ε_t : Error term

For test-statistics, all coefficients are measured by their p-value and compared to a 10% level of significance to determine their statistical significance. A t-test will investigate the significance of the parameter while a p-value of the F-test will be used to determine the reliability of the model.

3. Results and Discussion

3.1 Descriptive Statistics Results

Based on nine years of monthly data from 2014 to 2022, the descriptive statistics in Table 1 reveal that the Consumer Price Index (CPI) has the highest variability, followed by the unemployment rate (UR) and population growth (PG). Gross Domestic Product (GDP) per capita shows the least variability. The shape of the distributions indicates that all variables have negative kurtosis,

suggesting flatter peaks and lighter tails. Furthermore, the CPI, GDP per capita, and PG are negatively skewed (displaying longer left tails), while the UR is positively skewed (with a longer right tail).

Table 1
Results of the descriptive statistics for the variables

	CPI	GDP	PG	UR
Mean	1.9326	9.2693	1.3356	3.5993
Median	2.2461	9.3059	1.3201	3.4000
Mode	2.2000	9.3098	1.5700	3.4000
Standard Deviation	1.6721	0.0721	0.1633	0.6296
Kurtosis	-0.0153	-1.2080	-1.4123	-0.9930
Skewness	-0.7499	-0.0198	-0.0591	0.9793

3.2 Preliminary Test Result

As shown in Table 2, the unit root test indicates that all variables are stationary, allowing for reliable further analysis. Specifically, the CPI, GDP and UR are stationary at the first difference, while PG is stationary at the second difference. The probability values for these variables are less than the 5% significance level, confirming the absence of a unit root.

Table 2
The unit root test of the variables

	p-value		
Variables	**Level**	**1st Difference**	**2nd Difference**
CPI	0.3767	0.0001*	
GDP	0.7891	0.0174*	
PG	0.2069	0.2660	0.003*
UR	0.7058	0.0076*	

Note: * significant at 5% level of significance

Table 3 presents the correlation coefficients, showing the relationships between the independent variables and CPI. Both GDP and PG are positively correlated with CPI, indicating that an increase in either variable is associated with a rise in the cost of living. Conversely, the unemployment rate has a negative correlation with CPI, suggesting that an increase in unemployment is associated with a decrease in the cost of living.

Table 3
Correlation between dependent variable (CPI) and independent variables (GDP, PG, and UR)

Variables	CPI
GDP	0.1141
PG	0.2497
UR	-0.3820

The results from the VIF test, displayed in Table 4. The result in the VIF test reveals that there is low evidence of a multicollinearity problem. All VIF values for the independent variables are within the acceptable range of 2 to 5, indicating that the variables are not overly correlated with each other, which is crucial for the reliability of the regression model.

Table 4
The VIF result of the variables

Variables	VIF
GDP	2.2941
PG	4.8130
UR	3.1871

3.3 *Multiple Linear Regression Model Results*

The MLR results for both models are presented in Table 5. For Model 1, all variables were statistically significant at a 10% significance level prior to the COVID-19 pandemic, except for GDP per capita. For Model 2, which includes a dummy variable for the pandemic, PG and UR were not significant, nor was the interaction variable between the dummy and GDP. However, GDP and the interaction variables between the dummy and PG, and the dummy and UR were all statistically significant at a 10% level.

Before the pandemic (refer to Model 1), the relationship between key economic variables and the cost of living was mixed. The analysis showed a significant positive relationship between population growth and the cost of living, indicating that a larger population led to higher expenses. Similarly, the unemployment rate had a significant negative relationship, suggesting that as unemployment rose, the cost of living decreased due to reduced household spending. However, GDP per capita was not a significant factor, a finding that contradicted previous research. This suggests that during this period, economic output was not a primary driver of the cost of living, which was instead more closely tied to demographic factors and household financial status.

The COVID-19 pandemic significantly altered these relationships, as shown in Model 2. The most notable change was that GDP per capita became a statistically significant factor, having a much larger positive impact on the cost of living. This shift highlights how a major economic downturn and the subsequent recovery directly influenced prices and expenses. Conversely, the relationships for both population growth and the unemployment rate became insignificant. While their coefficients remained positive, the lack of statistical significance suggests that other factors such as government assistance, changes in spending habits, and supply chain disruption became more influential than population size or employment status alone. This indicates a fundamental shift in the economic drivers of the cost of living, moving away from demographic factors toward broader economic output and external shocks.

The F-test values for both models are below the 0.10 significance level, indicating that both Model 1 and Model 2 are statistically significant. This means that the independent variables in each model collectively do a good job of explaining the variability in the dependent variable (cost of living). While Model 1 has a higher F-value, this indicates that the model's independent variables are more jointly significant in explaining the variability in the dependent variable. In Model 1, the variables PG and UR are statistically significant and collectively account for the variation in the cost of living. In contrast, for Model 2, the variable GDP and the interaction terms between the dummy variable and both PG and UR are sufficient to explain the variation in the cost of living.

Table 5
The MLR results for two models

Variables	Coefficient Value		Standard Error		t-test	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Constant	0.0135	-0.0366	0.0407	0.0489	0.3317	-0.7487
GDP	2.7160	8.0965	3.0578	4.7497	0.8882	1.7046*
PG	12.2349	7.6707	6.0869	7.0886	2.0100*	1.0821
UR	-2.0196	0.8919	0.3800	1.6434	-5.3143*	0.5427
DUMMY		0.1350		0.0845		1.5969
DUMMY*GDP		-5.9482		6.6578		-0.8934
DUMMY*PG		22.9752		13.4738		1.7052*
DUMMY*UR		-3.2154		1.6881		-1.9047*

	F-value	**p-value**
Model 1	11.5713	0.0000*
Model 2	6.5458	0.0000*

Note: * significant at 10% level of significance

4. Conclusions

This study successfully addressed its objective by identifying and comparing the key factors influencing the cost of living in Malaysia before and during the COVID-19 pandemic. The analysis found that while the same core variables GDP per capita, population growth, and the unemployment rate were relevant in both periods, their impact on the cost of living changed significantly.

The study concluded that population growth was the most influential factor before the pandemic. However, during the pandemic, the interaction effect between the pandemic and population growth had the largest impact, indicating an amplification of financial strain on larger households. A key finding that contrasts with pre-pandemic results is the shift in GDP per capita, which became a statistically significant driver of living costs during the pandemic. For future research, it is suggested that studies incorporate additional variables, such as lifestyle and personal preferences, and use higher-frequency data to provide a more comprehensive and precise analysis.

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