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REASSESSING POVERTY INCIDENCE BROUGHT BY THE COVID-19 PANDEMIC IN MALAYSIA

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Abstract

The COVID-19 pandemic has caused health-economic related shocks that compounded the Malaysian population's vulnerability to poverty. It has put in the spotlight the economics of poverty, fragility of the social safety net, and has also disproportionally increased the risks of poverty among the population in the country. Malaysia has recorded higher overall poverty rates during the pandemic compared to the post Asian Financial Crisis in 1998-2002. This abrupt episode has adversely impacted the gains made by the country within the realm of poverty reduction, where the downtrend of the incidence of poverty over the past five decades will be difficult to maintain. This prompted the question of 'how have the prolonged pandemic and its unprecedented economic impacts reverses the decreasing trend of poverty?' It aims to forecast the incidence of absolute poverty as the result of the pandemic, represented by the number of households at risk of falling into poverty from 2021-2025. A baseline trend of published poverty statistics from 1970-2020 was used to produce the estimation. A quantitative forecasting using time series models – Autoregressive Integrated Moving Average and Linear Exponential Smoothing – is leveraged to estimate the future poverty trends. The results suggest an increase in poverty incidence between 6.4% to 8.4% from 2021-2025. This effectively yields a jump in the number of poor households by 670,000 come 2025. The implication of the study is that it provides some measure of the increase of poverty estimates in light of the prolonged pandemic. This insight will prove to be practical to policymakers involved in orchestrating the COVID-19 economic recovery of Malaysia.

Keywords: absolute poverty, forecasting, poverty level, COVID-19, vulnerability

Introduction and Background

Against the rapid economic growth experienced in the last five decades, Malaysia has been doing exceptionally well in reducing its absolute poverty incidence between the years 1970-2019. Poverty reduction progressed gradually and steadily from a whopping figure of 52.4% in 1970 to a mere 0.2% in 2019, with the Poverty Line Income (PLI) set at RM983 per month. Although the decline in poverty rate is encouraging, the topic of poverty remains a concern (Nair & Sagaran, 2015; Ravallion, 2020; United Nations, 2019). This is because, various poverty incidence may still be observed in various parts of the country, which includes rural areas in East Malaysia and the East Coast of Peninsular Malaysia. On top of that, there is also the issue of the concentration of poverty in urban and rural areas, as well as the existence of pockets of poverty within large cities (Kuala Lumpur, Penang, Johor Bahru, Ipoh, and others). The COVID-19 pandemic is likely to make 100% poverty eradication even harder to achieve.

Based on new growth estimates, the number of global poor is predicted to have risen between 115 to 124 million in 2021 (Lakner, Yonzan, Mahler, Aguilar, & Wu, 2021; World Bank, 2020a). Within the context of Malaysia, poverty rate is observed at 2.8 points higher from 5.6% in 2019 to 8.4% in 2020, with an estimated number of poor households of above 640,000 (Department of Statistics Malaysia, 2021). Relating this to the economic growth, the International Monetary Fund (2021) estimated an overall reduction of Malaysia's gross domestic product from 6.5% in 2021 to 5.0% in 2026. The Bank Negara Malaysia (2021) has revised its domestic economic forecast to 3% to 4% in 2021, largely due to the re-imposition of Movement Control Order (MCO) from March 2020 to June 2021. The pandemic has caused long-term economic disintegration and an increase in poverty rate, complicating stakeholders' poverty reduction efforts (Kharas & Dooley, 2021). It has been shown that there is a strong association between growth and poverty (Sundaram, 2007). With the onset of the pandemic, the socioeconomic impacts associated to it may weaken the country's ability and progress toward sustainable and inclusive development. The pandemic further exacerbates pre-existing levels of poverty in the country.

An important question that requires immediate answer is 'how has the prolonged pandemic and unprecedented economic impacts reverses the decreasing trend of poverty?'. While poverty appears to have increased post-pandemic, producing a reliable forecast of the new poverty rates can be more challenging. In order to quantify the impact of the pandemic on the rates of poverty, it is vital to understand its past trends for baseline estimates. This begs the question of "How well does the time series data predicts the future incidence of poverty?". This question forms the basic motivation for this study, which aims

to forecast the incidence of poverty by estimating the number of households at risk of falling into poverty from 2021-2025. The time series model utilised in this study is limited to building forecasting model of absolute poverty for Malaysia, and the methods are comparable to other forecasting methods in estimating poverty trend. The significance of this study is that it provides a better understanding of poverty estimates within the context of the prolonged pandemic, and it guides the design of appropriate policies to support economic recovery. The approach of this study is to utilise the measures of absolute poverty, without touching on aspects of relative poverty that is beyond its scope. The paper is structured as follows: Section 2 provides a discussion on poverty reduction and pandemic, Section 3 discusses the methodology, Section 4 presents the findings followed by the discussion, and the final section (Section 5) provides the conclusions and summary.

Literature Review

Poverty Reduction: A Note on Measurement

Measures of poverty involve absolute and relative poverty. Poverty measurement at the global context defines the poor from the non-poor based on basic consumption of US$1.25 to US$1.90/person/day (Bhorat, 1999). In Malaysia, the absolute measurement was set at US$4.00 per day, equivalent to RM18 with a PLI of RM2,208 in 2019 (World Bank, 2020b). The PLI is based on a household of four that spends RM1,170 for food and RM1,038 for non-food items (Department of Statistics Malaysia, 2020). This breaks down to an individual needs slightly above RM18/person/day, but a household or individual is only considered poor when they receive a monthly income below the threshold line. The issue with PLI is that the total PLI has increased over 100% since its introduction, but PLI per person does not reflect the present cost of living. As an extension of this absolute poverty measure, Malaysia has also adopted several other poverty measurements such as 50% of the median income as a relative threshold, and the Multidimensional Poverty Index to measure deprivation profile in Malaysia based on selected socio-economic and demographic characteristics (Department of Statistics Malaysia, 2021).

Published works on poverty trends in Malaysia dates back to five decades ago, which began during the post-New Economic Policy in 1970. Official data reported that the reduction of poverty from 52.4% in 1970 to 16.7% in 1990 was strongly associated with economic growth (Sundaram, 2007). The poverty rate continued to decline from 1990 to 1996, before rising by 1.0% from 6.1% in 1997 to 7.1% in 1998 due to the 1997 Asian Financial Crisis (AFC). The poverty rate has consistently declined to 5.1% in 2002 from 5.5% in 2000, despite the deteriorating economy post-AFC (Athukorala, 2010). The previous poverty reduction strategies

have had its triumph in addressing poverty at the national level. Nonetheless, the credibility of official Malaysian PLI has been questioned on several grounds. For example, the low level of PLI has underestimated the number of poor in Malaysia which contributed to underinvestment in poverty reduction strategies (Nair & Sagaran, 2015; United Nations, 2019). These raises doubts about the previous PLI measures that do not accurately commensurate with the escalation in the standard of living each year.

The official data on the incidence of poverty shows that the poverty rate declined below 0.5% from 2014 to 2019 based on the 2005 PLI. The incidence below 1% is certainly influenced by the low-level of PLI which was approximately below RM980 from 2015 to 2019. This measurement has ignored the notion of living above the poverty line and other dimensions of poverty, e.g., deprivations in access to basic services, quality living conditions, and other aspect of socio-economic welfare. The indicators of MPI reported that only 0.8% of Malaysians are multidimensionally poor in terms of health, education, and living standards in 2016 (Abdul Rahman, Sani, Hamdan, Ali Othman, & Abu Bakar, 2021). On the other hand, the PLI of RM2,208 has yielded national poverty rate of 5.6% in 2019 compared to 0.2% based on the previous level (RM980 per month). Via the redefinition of the PLI, the number of households living below poverty line increased from 16,650 to 405,000 in 2019 (Department of Statistics Malaysia, 2020).

COVID-19 and the Society: A Vulnerability

Malaysia reported its first local COVID-19 case in February 2020. The World Health Organization declared COVID-19 as a global pandemic in March the same year. Following the announcement, the Malaysian government implemented the MCO dated 18 March 2020. As of April 2022, the total confirmed cases are above 4.4 million with total death surpassing 35,000 people (Ministry of Health Malaysia, 2021). A series of nationwide lockdowns and cordon sanitaire measures were imposed to mitigate the risk of COVID-19 disease. The measures, however, have severely impacted the financial standing of low-income and middle-class households, particularly those who experienced job loss, salary cut, and lack of social protection to sustain a living during the pandemic (Department of Statistics Malaysia, 2021). These have deteriorated the household's financial security as their income was slashed and employment was lost during MCO. In other words, the onset of the pandemic has pushed more households in Malaysia into poverty as household income shrunk due to job losses and pay cuts. This has caused the low-income households to become the new poor as more income groups from the middle 40 percentile (M40) slipped to become the bottom 40 percentile (B40) (Kok & Goh, 2021). As a result of the pandemic and economic deterioration, about 20%

(or 600,000 households) slipped from belonging to the M40 income group to become B40 (Carvalho, Rahim, & Tan, 2021).

Responding to this, the Government has carried various rescue plans and stimulus packages to cushion the affected households. For instance, the Government announced the PRIHATIN Economic Stimulus Package worth RM250 billion, with RM128 billion for welfare assistance and RM20 billion allocated for cash assistance programme. A one-time cash assistance of RM1,600 was distributed to almost 4 million B40 households. Additionally, a three-month wage subsidy amounting to RM600 per month was given out to those who suffered a salary cut during the MCO. Recently, the Government has unveiled the National People's Well-Being and Economic Recovery Package (PEMULIH) worth RM150 billion, with an additional RM10 billion to strengthen Malaysia's economy, welfare assistance, and expedite the rollout of vaccination. However, it has been suggested that the assistance given for the new poor requires targeted strategies that provide opportunities rather than to be directed as fiscal incentives and cash handouts (Berma, 2021; Siwar, 2021).

In June 2021, the Government has extended its third series of nationwide lockdown amid the third wave of COVID-19 cases. This has caused greater strain on government finances and exacerbated the situation further as the affordability of basic basic needs – mainly food – progressively worsens. In response to this, the Government has allowed withdrawals from the Employee Provident Fund (EPF) to ease the burden of households. In total, the Government has approved a withdrawal of RM21,000 from employees' account to cushion the household financial strain amid the global pandemic (Ministry of Finance Malaysia, 2021). However, these schemes only benefited those employed in formal employment. For those without, the risks of destitution are further increased as they are not insured with any social protection scheme.

As mentioned earlier, poverty in Malaysia is measured based on the income line that can be broken down into food and non-food items. A household or individual living below the defined PLI is considered as poor, and evidence has shown that the pandemic has increased the vulnerability of M40 falling below the income threshold. For example, the pre-pandemic poverty rate stood at 5.6% in 2019, while the pandemic has spiked this rate to 8.4% in 2020 (Department of Statistics Malaysia, 2021). This shows that the pandemic has reversed the decreasing trend of poverty. The possibility of a person or household falling into poverty is influenced by the government's health and economic measures to mitigate the COVID-19 risks. In the light of the several waves of outbreak – where an exponential trend of newly infected cases and number of deaths were observed – a dynamic economic model is needed to sustain people's livelihood amid the

reopening of the economy. Resilient economic recovery is essential because the deterioration of people's livelihood will only further exacerbate poverty in the country. This situation is not unique to Malaysia, where the perverse impact of the pandemic on global poverty has been recorded in many parts of the world.

For example, the 2020 Poverty Projection in the United States by Giannarelli, Wheaton, and Acs (2020) noted that the pandemic has not only caused a rise in poverty by 9.2% in 2020, but also brings into light different dimensions of poverty during pandemic – employment hardship, financial insecurity, food shortage, and debts. The motivation to forecast poverty incidence is not only to identify the potential total number of households at risk of falling into poverty, but to also consider the concentration of poverty. If both poor households and the middle-class are at risk of poverty, the already vulnerable hardcore poor are in a far greater danger. It has been reported that the living conditions of the hardcore poor worsened amid the pandemic, including in Malaysia (United Nations, 2020; World Bank, 2020a). The pandemic has caused the goal to eradicate poverty – a key Sustainable Development Goal – to be almost impossible to achieve. It has wiped out all the gains made over many decades as most people are pushed back into poverty with bleak and slow recovery.

Against the pandemic's background, the academic community's interest has been very much centred on forecasting trends and patterns on rising infected cases. Gupta and Pal (2020), for example, used daily infected cases data to predict the future trend of COVID-19 infection in India. The study employed time series forecasting – the Auto-Regressive Integrated Moving Average (ARIMA) and Linear Exponential Smoothing (LES) – to predict future trend of daily infected cases in India for the next 30 days. The pandemic has shown that getting the right data and doing the right analysis can provide guidance for policy makers to design the appropriate response for recovery. The impact of pandemic on poverty exacerbation (United Nations, 2020; World Bank, 2020a) is a global concern. Some works done during the pandemic include forecasts on the level of extreme poverty using different forecasting approaches and parameters (Giannarelli et al., 2020; Lakner et al., 2021; Parolin & Wimer, 2020). However, less attention is given to estimating the future trends of absolute poverty using quantitative forecasting methods in Malaysia. With the motivation to fill this gap, this study utilises time series forecasting to estimate the post-pandemic incidence of poverty in Malaysia, and to predict the total number of households that live in poverty from 2021-2025.

The justification to predict the incidence of poverty from 2021-2025 is to align with the overarching national development policy formulation in Malaysia, which is based on five-year plans (with the latest being the 12th Malaysia Plan 2021-2025). As Malaysia experienced several waves of exponential increase of new

COVID-19 cases over the past two years, it will be of great interest to know how pandemic affects the rates of poverty in the following years. Some research confirmed that the pandemic will accentuate the long-term impact of poverty as more people are economically distressed to sustain their pre-pandemic living conditions (Giannarelli et al., 2020; Kharas & Dooley, 2021). The pandemic will certainly further exacerbate pre-existing poverty. The forecasted trend of poverty would therefore provide a quantifiable information that policymakers can utilise to understand the association between pandemic and poverty. It is assumed that the pandemic has caused a rise in national poverty due to its overwhelmingly negative socio-economic impacts. The interesting questions at the more granular level would be: "How many Malaysians are exposed to poverty?", "Does the pandemic reverse the decreasing trend of poverty in Malaysia? If so, what would be the forecast rates in the upcoming five years?".

The Sustainable Livelihood Framework

The COVID-19 pandemic is a form of health-related shock that compound vulnerability to poverty. It has significantly affected people's livelihood as the ability to sustain pre-existing living conditions has deteriorated due to prolonged lock downs and low economic activities. As indicated in the Sustainable Livelihood Framework, vulnerability factors such as trends, seasonality, and shocks have direct impacts on people's livelihood and assets (Department for International Development, 1999). This framework views poverty beyond economic issues by considering other dimensions of external and internal vulnerabilities. A household or individual will have experienced an external side of shocks, seasonality, and critical trends to sustain pre-existing living conditions due to the pandemic. These cause an internal defencelessness due to limited capability in coping with socio-economic impacts of the pandemic.

Different people have different access to good livelihood. The early stages of the pandemic showed that the poor households are the most affected by the imposition of MCO. They were not able to work to earn income for a living and were not covered with social protection because of the nature of less productive employment. There have been several waves of high infection rates in Malaysia where each wave has experienced exponential increase in cases. The prolonged pandemic has adversely impacted people's livelihood, particularly those who had experienced salary cuts and retrenchment – some even had no option but to take the Voluntary Separation Scheme. These has substantially jeopardised people's livelihoods and increased the risk of poverty regardless of income levels. Without concerted action, Malaysia will be witnessing a rise in absolute poverty due to the significant decline in household's resources such as income and employment.

The landscape of poverty has changed amid the pandemic. The extended health measures and economic disruption during the pandemic have ravaged households' financial security, employment, and savings. On the one hand, the restriction of movement order has helped to prevent the spike of COVID-19 cases, but on the other hand, the extended restriction movement order decreased households' financial ability to sustain their pre-pandemic living conditions. This further exacerbates poverty and puts more people at risk of becoming poor due to the devastating health and economic impacts of the pandemic. It has put in the spotlight the economics of poverty and the fragility of the social safety net. The B40 group are adversely affected, and the pandemic has also disproportionally increased the risks of poverty among middle-income group due to income and employment shocks coupled with high monthly financial commitments.

Methodology

A predictive research design was used to forecast the incidence of poverty with the utilisation of quantitative forecasting using time series models – ARIMA and LES methods. The justifications of utilising the models are two-fold. First, the models enable researchers to predict future poverty trends by analysing the baseline trend. Second, the modes allow the researcher to understand the past trend of poverty rates for baseline estimates.

Data Collection

A time series of absolute poverty statistics from 1970-2020 was obtained from the Economic Planning Unit and Department of Statistics Malaysia. The data was used for two purposes: first, to analyse the trend of pre-pandemic absolute poverty; second, to forecast the incidence of absolute poverty and the number of households at risk of falling into poverty post-pandemic from 2021 through 2025. There is, however, some challenges to forecast the future trend of poverty as some observed data is missing completely at random. A linear interpolation is used to manage the missing data points to address this. Most importantly, the available data is useful for researchers to observe the trend of pre-pandemic poverty, which was heavily influenced by economic shocks, and to predict the future trend of poverty caused by the pandemic.

Data Imputation Methods

Various data imputation methods in the literature address missing values problems, such as complete case analysis, mean imputation, regression imputation, and stochastic regression imputation. As the collected data is

univariate, linear interpolation is the most suitable method to be used to impute in the missing values of the time series data set. A linear interpolation is an imputation method for a unidimensional data that estimates a linear relationship between data points, where the observed data was utilised to compute a value for a missing data point (Huang, 2021; Zhang & Chen, 2001). By constructing new data points within the range of observed data points, the entire time series can be leveraged to exhibit the trend and patterns of pre-and post-pandemic poverty. Given that the poverty rate at point X is missing, the last observed value taken prior to point X, denoted as a_{value}., and the first observed value taken after point X denoted as b_{value}. Both values will be used to calculate the value at point X. The equation below calculates the missing value of x_{value} at x_{year} for X observation.

$$x_{value} = b_{value} + \left[\frac{(a_{value} - b_{value}) * (x_{year} - b_{year})}{(a_{year} - b_{year})}\right]$$

Time Series Model

According to Hyndman and Athanasopoulos (2018), time series data can be categoriszed into four different behaviours: trend, seasonal, cyclic, and irregular patterns. In this regard, the ARIMA and LES models are considered to produce forecasts. As defined by Hyndman and Athanasopoulos (2018), ARIMA model is the most general class of models for forecasting a time series, and can be made to be stationary by differencing with non-linear transformations, if necessary. The LES, on the other hand, is a forecasting method for univariate data that is particularly aimed to estimate the sequence of observations at a specific future point in time.

A non-seasonal ARIMA model was used and characterised as ARIMA (*p*,*d*,*q*), where *p* represents the number of autoregressive terms, *d* denotes the number of seasonal differences needed for stationarity, and *q* shows the number of lagged forecast errors in the prediction equation. Hence, the general forecasting equation for ARIMA can be calculated as follows:

$$\hat{y}_t = \mu + \emptyset_1 y_{t-1} +_{\dots} + \emptyset_p y_{t-p} - \emptyset_1 e_{t-1} -_{\dots} - \emptyset_q e_{t-q} \quad (1)$$

Following the convention by Box-Jenkins, the moving average parameters are displayed as θ. The ARIMA model (2,1,2) with constant variance is considered in this study, where $p = 2$, $d = 1$, and $q = 2$. The prediction equation is given as:

$$\widehat{Y}_t = \mu + Y_{t-1} - \emptyset_1 e_{t-1} \tag{2}$$

In essence, the Holt's LES is suitable for forecasting data with trend and involves two smoothing constants, namely the level and trend (Hyndman & Athanasopoulos, 2018). A time series of poverty statistics showed that Malaysia has experienced a decreasing trend in absolute poverty over the last five decades. The incidence of poverty was reported on a yearly basis from 1970-2020 and seasonality is not a concern (Economic Planning Unit Malaysia, 2019). As pandemic is predicted to further exacerbate pre-existing poverty, the utilisation of LES method is appropriate to model time series of post-pandemic poverty as households experienced a reduction in income, savings, and employment due to the series of extended health measures to curb the virus. In LES, the estimated level and trend of the time series at time t can be illustrated as follows:

$$l_t = \alpha y_t + (1-\alpha)(l_{t-1} + d_{t-1}) \tag{3}$$

$$d_t = \beta\,(l_t + l_{t-1}) + (1-\beta)\,d_{t-1} \tag{4}$$

Where l_t represents an estimate of the level of the time series and d_t represents an estimate of the trend of the time series at time t. Here, α is the smoothing parameter for the level, with $0 \leq \alpha \leq 1$, and β is the smoothing parameter for the trend, with $0 \leq \beta \leq 1$. l_t is a weighted average of observation Y_t, and $l_{t-1} + d_{t-1}$ is a forecast for time t as characterised in Equation (3). In Equation (4), d_t describes a weighted average of the estimated trend at time t based on $l_t - l_{t-1}$ and d_{t-1}, the previous estimate of the trend. The forecast function of the time series at time t are obtained by the extrapolation of the estimated level and trend as showed in Equation 5.

$$Y_{t+k} = l_t + kd_t \tag{5}$$

Hyndman and Athanasopoulos (2018) suggests that the criteria for selecting the models can be obtained by minimising the Akaike's Information Criterion (AIC) or Bayesian information Criterion (BIC). Relating to the model's goodness of fit, the model with the lowest BIC value was considered. At the same time, low value of Root Mean Squared Error (RMSE) also indicates a good fit for the model, while the high value of Mean Absolute Percentage Error (MAPE) suggests a perfect prediction over the mean (Clement, 2014).

Findings and Analysis

Trend Analysis

The analysis of this study can be divided into two sections: (1) trend analysis on the absolute poverty 1970-2020; and (2) forecast poverty incidence and the number of households at risk of falling into poverty from 2021-2025. A time series data of this study shows cyclic behaviour for a period of 1970-2020, as shown in Figure 1.

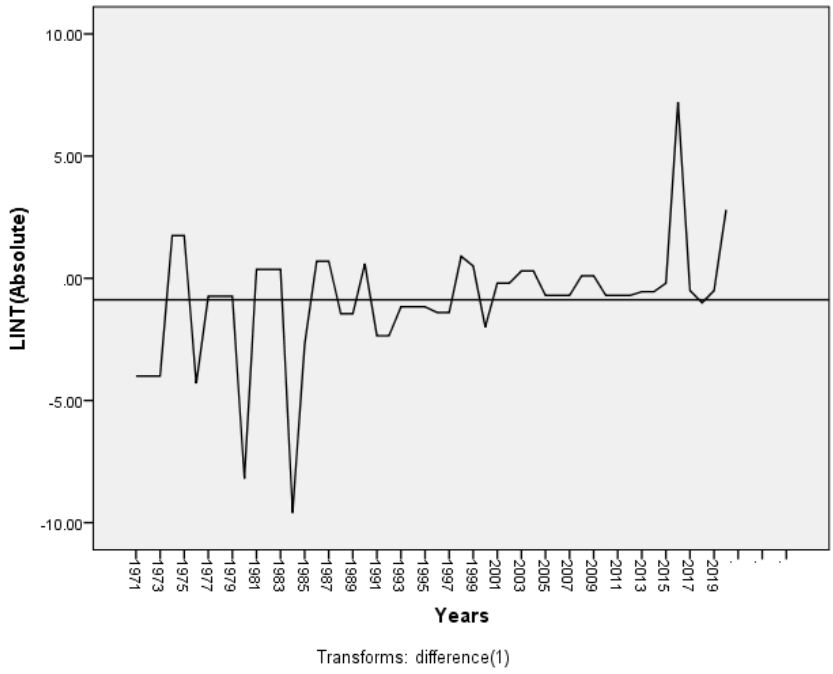

Figure 1: Time Series Patterns in the Data
(Source: Author's calculation, data from Economic Planning Unit Malaysia [2019].)

The model statistics is summarised in Table 1 and was calculated using the Statistical Package for the Social Sciences (SPSS) software. The Ljung-Box statistics of the model is not significantly different from 0 – ARIMA model (10.821, 14 df, p-value = 0.700); Holt's model (10.805, 16 df, p-value = 0.821); and Damped trend (10.914, 15 df, p-value = 0.759). As suggested by Clement (2004) a model with p-value higher than 0.05 is not statistically significant and indicates the lack of evidence to reject the null hypothesis of white noise. This indicates that the model has sufficiently captured the correlation in the time series.

Table 1: Model Statistics

Model	Model Fit statistics			Ljung-Box Q (18)			
	R^2	RMSE	MAPE	BIC	Statistics	DF	Sig.
ARIMA	.994	.994	9.332	1.171	10.821	14	.700
Holt's	.977	2.317	14.431	1.835	10.805	16	.821
Damped Trend	.977	2.361	14.917	1.950	10.914	15	.759

Note: Ljung–Box(Q) statistic test was performed using SPSS Expert Modeler

Trend of Absolute Poverty in Malaysia 1970-2025

The trend analysis of this study showed that Malaysia has experienced a secular poverty reduction trend from 1970-2020 irrespective of PLI. Three methodologies that have been used to measure poverty indicates a consistent reduction of poverty – the 1977 methodology shows a substantial decline from 52.4% in 1970 to 5.0% in 2005; the incidence of poverty was recorded to be below 0.5% in 2019 based on the 2005 methodology; and the trend continued to decline from 7.6% in 2016 to 5.6% in 2019 despite the PLI increasing to RM2,208 from RM980. The analysis observed that the downward trend of poverty can be seen from 52.4% in 1970 to 40.4% in 1973, before slightly rising to 43.9% in 1975. An increase of 3.5 points in 1975 was due to high inflation rate of 18% caused by the 1974 oil crisis (Athukorala, 2010). Two years after the 1974 oil crisis, Malaysia recorded a significant decline in poverty from 1976 to 1980 before encountering a slight rise from 29.2% in 1980 to 30.3% in 1983. Figure 2 illustrates the trend of absolute poverty in Malaysia from 1970-2025.

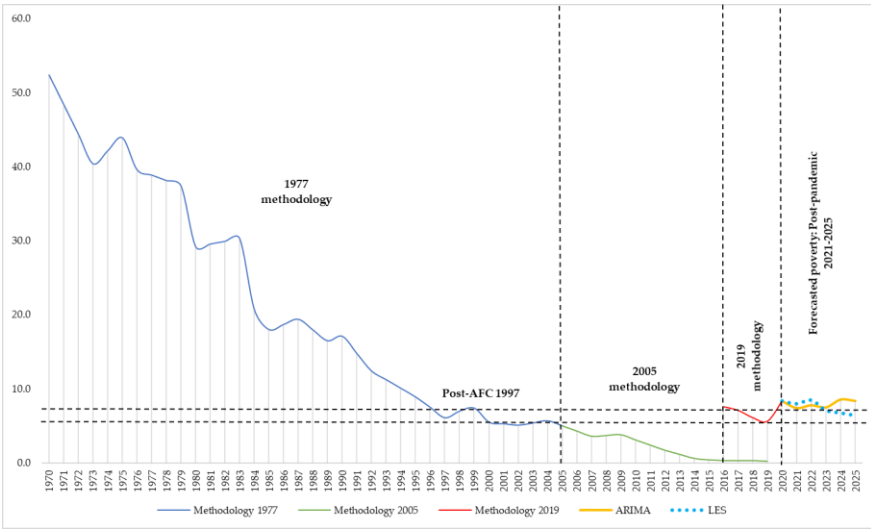

Figure 2: Trend of Absolute Poverty in Malaysia 1970-2025

(Source: Author's calculation, data from Economic Planning Unit Malaysia [2019].)

The incidence of absolute poverty has plunged drastically to 18.0% in 1985 before marginally increased by 1.4%, resulting in a slightly higher poverty rate of 19.4% in 1987. The trend analysis discovered that the incidence of poverty has steadily decreased to 6.0% in 1997 – the lowest over two decades. Although the incidence of poverty increased by 1.0% after the 1997 AFC, the decreasing trend in poverty resumed until 2004, with poverty incidence of 4.5% at RM588 poverty line based on the 1977 methodology. Amid an increase in the poverty line methodology to RM691 per month, the incidence of poverty raised to 5.7% in 2005 (Zain, 2007). With the marginal increase in the PLI from 2005-2019, the Malaysia's poverty incidence has continuously shown a decreasing trend from 4.3% in 2006 to 0.3% in 2016, before slightly falling to 0.2% in 2019. It has been showed that Malaysia experienced significant decrease in absolute poverty from 1970 to 2019.

Regardless of the substantial decline in poverty, the low-level of PLI has contributed to the small number of poor counted in the country, despite them earning slightly above the RM983 poverty line. The possibility to vastly undercount the poor is high. Therefore, as the PLI was increased to RM2,141, the incidence of poverty rose significantly to 7.6% from 0.3% in 2016, and 5.6% in 2019 (in comparison, the PLI of RM983 estimates a poverty level of 0.2%). Due to the unprecedented socio-economic impacts of the pandemic, the number of poor has experienced an uptick as more people are projected to fall into poverty, despite large economic packages provided by the government between March 2020 to June 2021. One of the time series models of this study, the ARIMA model, predicts an increase in poverty incidence from 7.4% in 2021 to 8.4% in 2025. The LES model, however, forecasts a reversed trend in the incidence of poverty, in which the rate falls from 8.0% in 2021 to 6.4% in 2025. Both models provide satisfactory estimation and results of this study discovered two important conclusions: (1) the concentration of poverty caused by the pandemic is greater than the one recorded post-AFC 1997-2002; (2) under the LES model, the incidence of poverty is projected to decrease from 2022-2025, but the figure remains high in comparison with the incidence of poverty after the revision of PLI in 2019.

Poverty Reduction and Pandemic: A Trend Reversal

The updated estimates on global poverty by Lakner et al. (2021) forecast an additional 97 million people who are expected to live in poverty in 2021. This is an increase from 88 million in 2020. In Malaysia, the pandemic has reversed the decreasing trend of poverty with poverty rate shooting up to 8.4%, that can be translated to around 640,000 households falling into poverty in 2020 (Department of Statistics Malaysia, 2021). The rise in the number of poor is led by various economic factors, including the reduction in the household income, employment,

and savings due to prolonged restriction movement order. To put some numbers into perspective, the national mean and median monthly household income has decreased by 10.3% and 11.3% in 2021, respectively, during the pandemic, with the unemployment rate remained above 4.0% from October to December 2021 (Department of Statistics Malaysia, 2021).

ARIMA Method

The ARIMA method predicts an oscillating trend of poverty from 2022-2025. It suggests a slight decrease from 7.8% in 2022 to 7.5% in 2023, before rising slightly to 8.6% in 2024. The model estimated a decrease in poverty rate to 8.4% in 2025 with an estimate of above 670,000 poor households by 2025. These figures are comparable with the incidence of poverty recorded in 1995 which is about 8.9%, and comparatively higher than 7.0% that was observed one year after the 1997 AFC (Athukorala, 2010). Although the ARIMA model projected a decrease in poverty incidence to 8.4% by 2025, the pandemic has further exacerbated pre-existing poverty in Malaysia. The projected figures suggest that Malaysia will be experiencing an upward trend in poverty with an average rate above 8% from 2022-2025. Figure 3 illustrates the estimated trend of poverty using the ARIMA model.

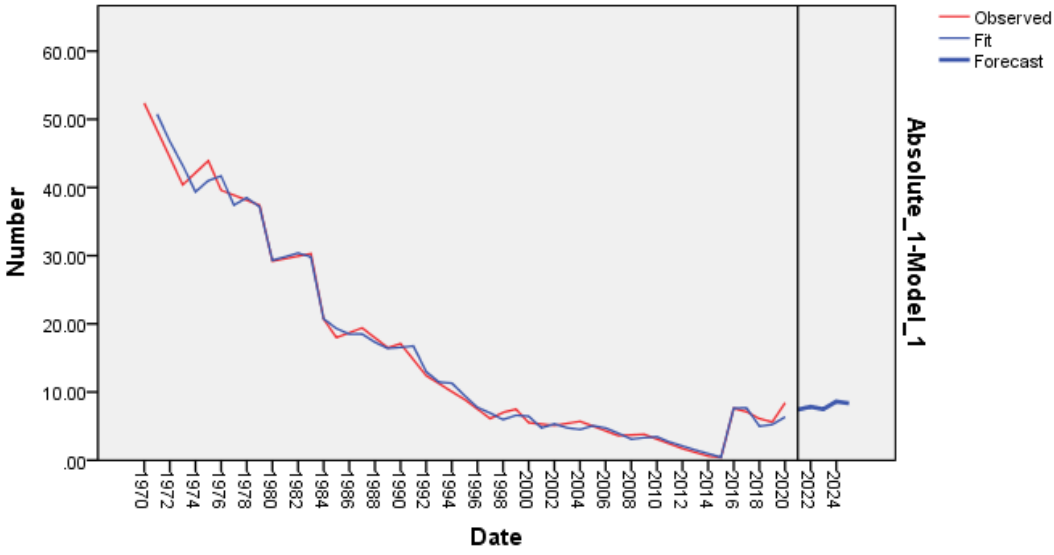

Figure 3: Forecasted Incidence of Absolute Poverty using ARIMA (2,1,2) 2021-2025
(Source: Author's calculation, data from Economic Planning Unit Malaysia [2019].)

Linear Exponential Smoothing Model

On average, the LES model of this study suggests a downward trend of poverty from 8.0% in 2021 to 6.4% in 2025. The descending trend of poverty is equally striking for both LES method employed – the Holt's and Damped trend model. For example, the Holt's method projected that the incidence of poverty will decrease from 7.4% in 2022 to 6.9% in 2023, and to 6.6% in 2024, before decreasing to 6.2% in 2025, as shown in Figure 4. While the damped trend method suggests an overall reduction in poverty rate from 7.6% in 2022 to 7.3% in 2023, before decreasing slightly to 6.9% and 6.6% in 2024 and 2025, respectively, as depicted in Figure 5. Overall, the LES model found that the trend of poverty post-pandemic estimated by both the Holt's and Damped trend models are comparable and display a downward movement for a period of five years.

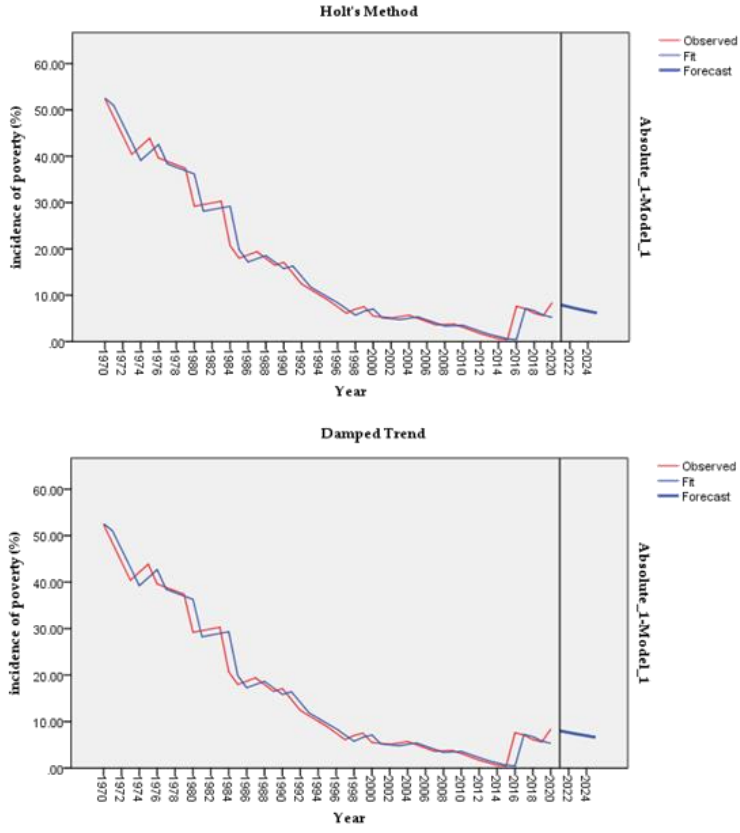

Figure 4: (Top) LES with Holt's Method Figure 5 (bottom) LES with Damped Trend

(Source: Author's calculation, data from Economic Planning Unit Malaysia [2019].)

Discussion

It has been more than two years since the first appearance of COVID-19, and it is therefore important to measure the impact of this prolonged pandemic on poverty incidence. This study aims to forecast the incidence of absolute poverty brought about by the COVID-19 pandemic. In this regard, a baselined trend of poverty statistics from 1970-2020 was used and quantitative forecasting – using ARIMA and LES time series models – were carried out to estimate the poverty trends from 2021 through 2025. The time series model suggests an overall increase between 6.4% to 8.4% from 2021-2025. Based on the projection rates, about 510,000 to 670,000 households will be at risk of falling into poverty from 2021-2025. This is in line with the global projection of poverty that estimated an increase from 88 to 97 million poor people by 2021 (Lakner et al., 2021). In addition, this study's projection of the number of people falling into poverty is higher than the 640,000 poor households reported in 2020 (Department of Statistics Malaysia, 2021). The abrupt change in health measures amid the virus outbreak has negatively affected people's livelihood and lead to more households being exposed to poverty due to income deterioration and job loss during the pandemic.

The ARIMA and LES forecasting model can be considered the most general class for forecasting the future values of time series data (Hyndman & Athanasopoulos, 2018). However, both models provide a predictive range of possible change in absolute poverty between 0.2% to 2.0% for a period of five years. The ARIMA model, for example, suggests an overall increase from 7.8% in 2022 to 8.4% in 2025. The LES' Damped trend model predicts a decrease by 1.0% in Malaysia's poverty rate from 7.6% in 2022 to 6.6% in 2025; and the Holt's method indicates an overall reduction by 1.2% from 7.4% in 2022 to 6.2% in 2025. Although the findings of the ARIMA model contradict the ones by the LES model, the projected poverty figure suggests that Malaysia will be undergoing an upward trend in poverty. This is because, the ARIMA model shows an average increase above 8% and the LES model estimates poverty rates above 6.0% from 2022-2025. Regardless of the time series model, the overall incidence of poverty in this study is higher than the incidence of poverty reported post-AFC of around 7% in 1998. On top of that, the estimates are way above the average poverty rates during the post-financial crisis of 5.3% from 2000 to 2002 (Athukorala, 2010).

The pandemic has caused a concentration of poverty in Malaysia. However, the model used in this study indicates a modest decrease in poverty rate in 2021. For instance, the ARIMA and LES model shows a 7.4% and 8.0% decrease, respectively. The substantial economic support can explain the downward trend from 2020-2021 handed out by the Government during the MCO from March 2020 to June 2021 such as the cash assistance programme for B40 and M40 households

as well as the withdrawal of retirement savings (Ministry of Finance Malaysia, 2021). The economic measures taken by the government has contributed to an increase in the real income and improved domestic consumption that positively dampened the rising incidence of absolute poverty. As the recovery package is provided on a short-term basis, lack of income can be detrimental to the society despite the reopening of the economy. This is because the ability to return to pre-pandemic living may take a while depending on the rate of economic recovery and magnitude of job creations.

Based on the nature of data used in this study, the ability to forecast future incidence of poverty caused by the pandemic is deemed reliable. The ARIMA method predicts an oscillating pattern, where the absolute poverty rate appeared to decrease from 7.8% in 2022 to 7.5% in 2023 and rises to 8.6% in 2024, before slipping to 8.4% in 2025. Meanwhile, the LES model projected a decreasing trend of poverty from 7.5% in 2022 to 6.4% in 2025. In this regards, the Holt's methods projected an overall decrease of absolute poverty incidence from 7.4% in 2022 to 6.9% in 2023 and 6.6% in 2024, before decreasing slightly to 6.2% in 2025. On the other hand, the Damped trend method projected an overall reduction from 7.6% in 2022 to 7.3% in 2023 and 6.9% in 2024, before dropping marginally to 6.6% in 2025. Despite the slight difference in forecasting the incidence of poverty between the ARIMA and LES model, the fact remains that after two decades of persistent fall in poverty incidence, the poverty rate is now projected to increase at an alarming rate. Similar findings have been documented by Giannarelli et al. (2020) where the pandemic has not only caused a rise in the US poverty rate by 9.2% in 2020, but has also increased the vulnerability to poverty due to employment hardship, financial insecurity, food shortage, and debts.

From 1970-2019, Malaysia has experienced significant reductions in absolute poverty irrespective of the PLI used. A possible explanation of this is that the strong economic conditions and macroeconomic policies coupled with institutional change and pro-poor growth models have contributed to substantial reduction in the overall incidence of poverty (Sundaram, 2007). The deterioration of income and employment as well as the prolonged restrictive health measures imposed by the government during pandemic has adversely impacted the gains made by Malaysia, where the downtrend of incidence of poverty over the past five decades will be difficult to maintain. As observed by this study, the incidence of poverty was tragically high in the early 1970s (about 52.4%) a figure that has fuelled the 1969 social tension due to unequal income distribution across ethnic group. The lowest poverty rate in Malaysian history was recorded in 2019 (about 0.2%) using the RM983 measurement of poverty. However, the pandemic has induced 670,000 more people to live in absolute poverty and widened the income

inequality gap. A study by Xinghui and Goh (2021) argued that the pandemic has only adversely affected poor people but has also disproportionally increased the risks of poverty among middle-class households. Moreover, about 600,000 middle-class households has slipped to the B40 demarcation due to multiple economic impacts, such as salary cuts, income loss, and retrenchment (Carvalho et al., 2021).

Although the published statistics can be accessed through the government portal, data on poverty incidence is limited with multiple missing values. A linear interpolation analysis was used to impute the missing data. Time series models were utilised to build a forecasting model of poverty to understand the impact of pandemic on poverty trends in Malaysia. The implications of thing findings call for an urgent concerted action with strong economic support to formulate poverty-focused policy in order to prevent more people from falling into poverty. The recent reopening of the economy has slightly improved the country's economic activities, nonetheless, the employment prospects can be quite challenging as job growth is predicted to be slower in pace. The pandemic has changed how people work and required major reskilling as most businesses shift to digital.

Conclusion and Policy Recommendations

This study has forecasted the incidence of absolute poverty to estimate the number of households at risk of falling into poverty from 2021-2025. The incidence of poverty was estimated using the ARIMA and LES models. The ARIMA model predicts an increase in poverty incidence from 7.4% in 2021 to 8.4% in 2025. The LES model forecasts the reversal trends in the incidence of poverty from 8.0% in 2021 to 6.4% in 2025. An important conclusion drawn from the results is that the COVID-19 pandemic has reversed the downward trend of poverty and caused a long-term socio-economic implication that could further exacerbate pre-existing poverty levels in Malaysia. Although the Malaysian Government has initiated some short-term solutions to help the affected society, the recovery process may take a while due to the persistent long-run impacts of pandemic on the economy and people's livelihood. The economic support offered through a series of moratorium, cash assistance, and the withdrawal of EPF for eligible employees has temporarily reduced people's financial insecurity and improved domestic consumption; yet the economic intervention during the pandemic seems to be temporary in nature and incapable to stimulate country's economy and protect the poor from descending into extreme poverty in the long run.

Regardless of the variety in economic packages, it remains a fact that they are not sufficient to protect people from slipping into poverty. The Government has identified approximately 600,000 of M40 households who has fallen into the B40 demarcation due to income and job loss during the pandemic. The health

measures taken to flatten the COVID-19 curve – while were instrumental in keeping the number of cases at check – may adversely impact the economy through the decrease in real income, employment, and savings. This situation demonstrates that the COVID-19 has not only ravaged the poor's economy but has also disproportionally increased the risks of absolute poverty among the middle-income group.

An important contribution of this study is it can be a reference for future research of projections for poverty, while at the same time improving the data bank on poverty in Malaysia. Upon extensive scrutiny of past literature on poverty, the authors' found that less attention has been given to forecast poverty incidence in Malaysia using quantitative forecasting. Thus, this five-year poverty rate projection reassesses the progress of poverty reduction in Malaysia and act as a baseline for policymakers to develop the appropriate policy interventions. At the same time, the projection timeframe reflects Malaysia's five-year development plan, and may be important to be taken into factor when implementing the development strategies outlined in the 12th Malaysia Plan 2021-2025. Furthermore, this study provides a better understanding of poverty estimates by considering the impact of the prolonged pandemic, an approach that will prove to be useful in guiding policymakers to draft the appropriate policy interventions to support a robust economic recovery. It is hoped that the projected figures will provide quantifiable and valuable information for policymakers to reframe specific poverty eradication programmes for poor communities through factoring in the pandemic as one of the vulnerability factors in policy formulation.

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References

Abdul Rahman, M., Sani, N. S., Hamdan, R., Ali Othman, Z., & Abu Bakar, A. (2021). A clustering approach to identify multidimensional poverty indicators for the bottom 40 percent group. *PloS one, 16*(8), 255-312.

Athukorala, P. C. (2010). *Malaysian economy in three crises* (Working Papers in Trade and Development, Arndt-Corden Department of Economics Crawford School of Economics and Government ANU College of Asia and the Pacific). Retrieved from https://crawford.anu.edu.au/acde/publications/publish/papers/wp2010/wp_econ_2010_12.pdf

Bank Negara Malaysia. (2021). Economic and financial developments in Malaysia in the second quarter of 2021. Bank Negara Malaysia. Retrieved from https://www.bnm.gov.my/-/economic-and-financial-developments-in-malaysia-in-the-second-quarter-of-2021

Berma, M. (2021, 14 July). Poverty eradication in Sabah and Sarawak. Paper presented at the Ungku Aziz Development Forum on Poverty Eradication, University of Malaya, Kuala Lumpur.

Bhorat, H. (1999). Distinguishing between individual ‐ and household ‐ level poverty. *Development Southern Africa, 16*(1), 157-162.

Carvalho, M., Rahim, R., & Tan, T. (2021, 25 October). Roughly 600,000 families went from M40 to B40 due to pandemic, says Tok Pa. *The Star*. Retrieved from https://www.thestar.com.my/news/nation/2021/10/25/roughly-600000-families-went-from-m40-to-b40-due-to-pandemic-says-tok-pa

Clement, E. P. (2014). Using normalized bayesian information criterion (BIC) to improve box-jenkins model building. *American Journal of Mathematics and Statistics, 4*(5), 214-221. https://doi.org/10.5923/j.ajms.20140405.02

Department for International Development. (1999). *Sustainable livelihoods guidance sheets*. Department for International Development. Retrieved from https://www.livelihoodscentre.org/documents/114097690/114438878/Sustainable+livelihoods+guidance+sheets.pdf/594e5ea6-99a9-2a4e-f288-cbb4ae4bea8b?t=1569512091877

Department of Statistics Malaysia. (2020). *Household income and basic amenities survey report 2019*. Department of Statistics Malaysia. Retrieved from https://www.dosm.gov.my

Department of Statistics Malaysia. (2021). *Household income estimates and incidence of poverty report 2020*. Retrieved from

https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=VTNHRkdiZkFzenBNd1Y1dmg2UUlrZz09

Economic Planning Unit. (2019). *Household income, poverty and household expenditure*. Retrieved from https://www.epu.gov.my/en/socio-economic-statistics/household-income-poverty-and-household-expenditure

Giannarelli, L., Wheaton, L., & Acs, G. (2020). *2020 poverty projections. Initial US policy response to pandemic projected to blunt rise in poverty*. Urban Institute. Retrieved from https://www.urban.org/sites/default/files/publication/102521/2020-poverty-projections.pdf

Gupta, R., & Pal, S. K. (2020). Trend analysis and forecasting of COVID-19 outbreak in India. *MedRxiv*. https://doi.org/10.1101/2020.03.26.20044511

Huang, G. (2021). Missing data filling method based on linear interpolation and lightgbm. *Journal of Physics: Conference Series, 1754*(1), 012187. https://doi.org/10.1088/1742-6596/1754/1/012187

Hyndman, R. J., & Athanasopoulos, G. (2018). *Forecasting: Principles and practice*. n.p.: OTexts. Retrieved from https://otexts.com/fpp2/

International Monetary Fund. (2021). *World economic outlook: Managing divergent recoveries*. International Monetary Fund. Retrieved from https://www.imf.org/en/Publications/WEO/Issues/2021/03/23/world-economic-outlook-april-2021

Kharas, H., & Dooley, M. (2021, 2 June). Long-run impacts of COVID-19 on extreme poverty. Brookings. Retrieved from https://www.brookings.edu/blog/future-development/2021/06/02/long-run-impacts-of-covid-19-on-extreme-poverty/

Kok, X., & Goh, N. (2021, 10 July). Is COVID-19 terminal for the rising middle classes of Malaysia and Indonesia? *The South China Morning Post*. Retrieved from https://www.scmp.com/week-asia/politics/article/3140392/covid-19-terminal-rising-middle-classes-malaysia-and-indonesia

Lakner, C., Yonzan, N., Mahler, D. G., Aguilar, R. A. C., & Wu, H. (2021). Updated estimates of the impact of COVID-19 on global poverty: Looking back at 2020 and the outlook for 2021. World Bank Data Blog. Retrieved from https://blogs.worldbank.org/opendata/updated-estimates-impact-covid-19-global-poverty-looking-back-2020-and-outlook-2021

Ministry of Finance Malaysia. (2021). PEMULIH: Comprehensive assistance for the people to face pandemic's impact. Retrieved from https://www.mof.gov.my/en/news/press-citations/pemulih-comprehensive-assistance-for-the-people-to-face-pandemic-s-impact

Ministry of Health Malaysia. (2021, 30 April). COVID-19 cases in Malaysia. Ministry of Health Malaysia and COVID-19 Task Force. Retrieved from https://covidnow.moh.gov.my/cases

Nair, S., & Sagaran, S. (2015). Poverty in Malaysia: Need for a paradigm shift. *Institutions and Economies*, *7*(3), 95-123.

Parolin, Z., & Wimer, C. (2020). Forecasting estimates of poverty during the COVID-19 crisis. *Poverty and Social Policy Brief, 4*(8), 1-18.

Ravallion, M. (2020). Ethnic inequality and poverty in Malaysia since May 1969. Part 2: Poverty. *World development, 134*, 105039. https://doi.org/https://doi.org/10.1016/j.worlddev.2020.105039

Siwar, C. (2021, 14 July). Poverty eradication in peninsular Malaysia. Paper presented at the Ungku Aziz Development Forum on Poverty Eradication, University of Malaya, Kuala Lumpur.

Sundaram, J. K. (2007). Poverty reduction: A note on mesurement and policy. In S. Nambiar (Ed.), *Reassessing poverty in Malaysia* (pp. 170-187). Leeds: Wisdom House.

United Nations. (2019, 23 August). Statement by Professor Philip Alston, United Nations Special Rapporteur on Extreme Poverty and Human Rights, on his visit to Malaysia, 13-23 August 2019. Retrieved from https://www.ohchr.org/EN/HRBodies/HRC/Pages/NewsDetail.aspx?NewsID=24912&LangID=E

United Nations. (2020). *Families on the edge. Issue 2: Status of the households post-MCO*. United Nations Childrens' Fund and United Nations Population Fund Malaysia. Retrieved from https://www.unicef.org/malaysia/media/1576/file/Families%20on%20edge%20part%202.pdf

World Bank. (2020a). COVID-19 to add as many as 150 million extreme poor by 2021. Retrieved from https://www.worldbank.org/en/news/press-release/2020/10/07/covid-19-to-add-as-many-as-150-million-extreme-poor-by-2021

World Bank. (2020b). Poverty & equity brief: Malaysia. Retrieved from https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_MYS.pdf

Zain, R. M. (2007). Understanding the formulation of the revised poverty line in Malaysia. *Akademika, 70*(1), 21-39.

Zhang, J., & Chen, D. (2001). Interpolation calculation made EZ. In *14th Annual Conference Proceedings*. Baltimore: NorthEast SAS Users Group NESUG.

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