INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

Determinants of Life Expectancy in Malaysia

Wong Siew Keen, Jerome Kueh Swee Hui

Faculty of Economics and Business, University Malaysia Sarawak

DOI: https://dx.doi.org/10.47772/IJRISS.2025.909000241

Received: 27 August 2025; Accepted: 04 September 2025; Published: 07 October 2025

ABSTRACT

Life expectancy is regarded as a vital indicator of a nation's health, social progress, and economic development. This study analyzes the determinants affecting life expectancy in Malaysia, employing annual data on GDP per capita, inflation rate, mortality rate, and unemployment rate from 1990 to 2022. The research employed the Augmented Dickey-Fuller (ADF) unit root test, the Johansen and Juselius cointegration test, and the Vector Error Correction Model (VECM) to analyze the relationship between life expectancy and its determinants. The results demonstrate a long-term equilibrium among the variables, revealing that GDP per capita positively influences life expectancy, whereas inflation, unemployment, and mortality exert negative effects. The Granger causality analysis within the VECM framework demonstrates unidirectional short-run causal relationships: inflation and mortality rates affect GDP per capita, mortality influences inflation and unemployment, and life expectancy impacts unemployment. These findings underscore the interconnectedness of economic, demographic, and health determinants, providing essential insights for policymakers in developing integrated strategies to sustain improvements in population health and life expectancy in Malaysia.

Keywords: Life Expectancy, GDP per capita, Inflation Rate, Mortality Rate, Unemployment Rate

INTRODUCTION

Life expectancy is a well-known sign of a country's social progress, economic stability, and overall health. It shows how many years a person is likely to live on average, based on current health conditions and death rates. Malaysia's life expectancy has steadily gone up over the past few decades, from 70.7 years in 1990 to 76.5 years in 2022. This is higher than the world average and better than some of its neighbours, like Indonesia. Most of the progress has come from improvements in healthcare, the economy, and social welfare. But there are still differences between income groups, regions, and demographic groups, which shows how macroeconomic and social factors affect things.

Global events such as the COVID-19 pandemic revealed the fragility of these gains. Between 2019 and 2021, global life expectancy fell by nearly two years, reversing a decade of progress (World Health Organization, 2024). In Malaysia, despite continued increases in life expectancy during this period, the pandemic highlighted underlying vulnerabilities, including rising healthcare costs, economic uncertainty, and mental health challenges. Research shows that inflation, unemployment, mortality, and income inequality directly shape population health and longevity by influencing access to nutritious food, healthcare services, stable employment, and safe living conditions (Movsisyan et al., 2024; The Health Foundation, 2024).

Life expectancy serves as a crucial metric of a nation's social and economic advancement, encapsulating overall health standards and quality of life. Malaysia has experienced consistent enhancements over the last thirty years, bolstered by economic expansion and progress in healthcare services. Based on Figure 1, from 1990 to 2022, life expectancy increased from 70.7 years to 76.5 years, above the global average and that of together with emerging nations like Indonesia. By 2020, life expectancy at birth approached 75 years, with improvements noted in older demographics as well. Notwithstanding the interruptions caused by the COVID-19 pandemic, Malaysia continued to advance, achieving a life expectancy of 76.5 years in 2022. These accomplishments underscore advancements in public health and living conditions, although problems persist, especially from non-communicable diseases and environmental concerns.

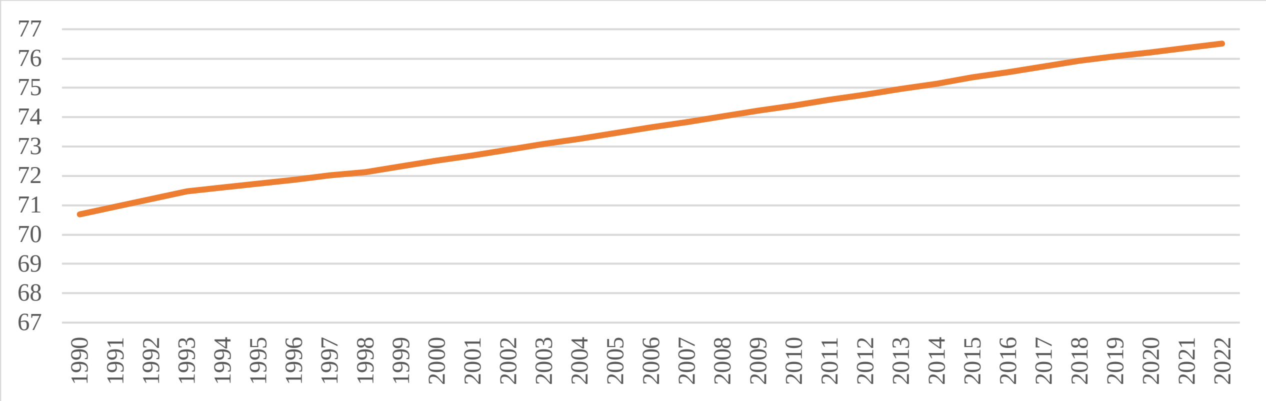

Figure 1: Life Expectancy in Malaysia from 1990 to 2022

In Figure2, between 1990 and 2022, Malaysia's inflation rate had phases of stability interspersed with significant surges during economic crises. Inflation was comparatively moderate and consistent in the early 1990s (about 2–4%), but surged to 5.3% during the 1998 Asian Financial Crisis and reached 5.44% in 2008, the peak for that period. It plummeted to 0.58% in 2009 after the global financial crisis, subsequently stabilizing about 1–3% from 2010 to 2019. In 2020, inflation declined to -1.14% as a result of the COVID-19 pandemic's effect on demand and oil prices, but then increased to 2.48% in 2021 and 3.38% in 2022 as the economy recovered and global commodity prices escalated (Cynrhia Ignatius, 2022). High inflation diminishes purchasing power, increasing expenses for food, housing, and healthcare, prompting households to defer medical treatment or compromise on nutrition, as seen by a 2022 Gallup poll indicating that 38% of individuals postponed care due to financial apprehensions (Nguyen, 2024). Extended inflation consequently deteriorates health outcomes and reduces life expectancy (Abubakar et al., 2023). Conversely, steady inflation enhances affordability and facilitates access to healthcare, hence contributing to increased longevity.

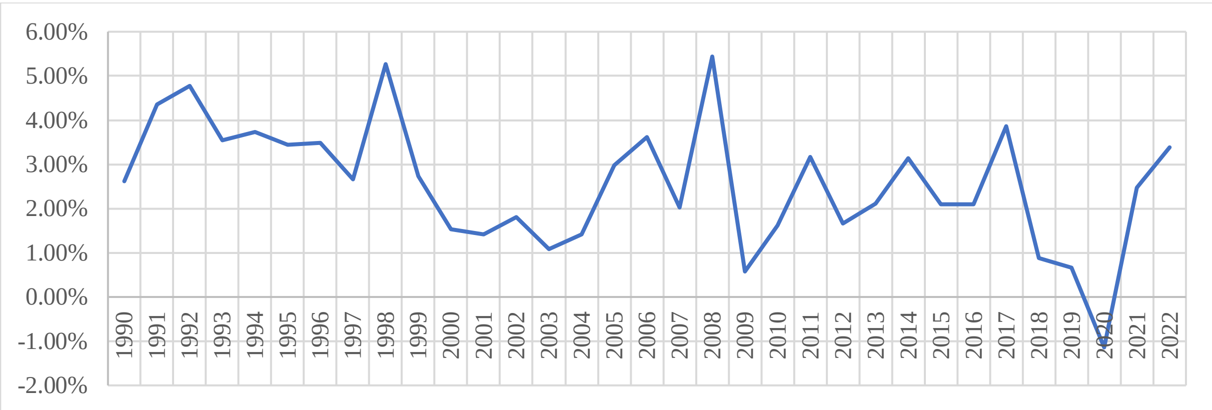

Figure 2: Inflation Rate in Malaysia from 1990 to 2022

In Figure 3, Malaysia's mortality rate decreased steadily from 4.9% in 1990 to 4.5% in 2004, but commenced an upward trajectory in 2005, with more pronounced increases following 2014. By 2022, the rate attained 5.39%. The increase has been closely associated with non-communicable diseases (NCDs), especially cancer and cardiovascular ailments. The incidence of cancer rose by over 50% from 2012 to 2022, with the majority of patients detected at advanced stages, greatly impacting mortality rates ("Cancer on the Rise: A Doctor's Perspective on Malaysia Growing Issue," 2024). In 2022, ischemic heart disease was the predominant cause of mortality, with 20,322 instances or 16.1% of all medically certified fatalities, predominantly affecting those over 60 years of age (CodeBlue, 2024). The World Health Organization (2024) identifies diabetes and elevated blood glucose as significant factors in global cardiovascular mortality, whereas in Malaysia, leading causes of premature death include ischemic heart disease, lower respiratory infections, road traffic accidents, stroke, and diabetes mellitus (Khaw et al., 2023). NCDs collectively represented more than 72% of years of life lost in 2018, highlighting their significant influence on health outcomes. Rising mortality rates directly diminish

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

overall life expectancy, underscoring the pressing necessity for enhanced preventive health strategies and improved management of chronic diseases in Malaysia.

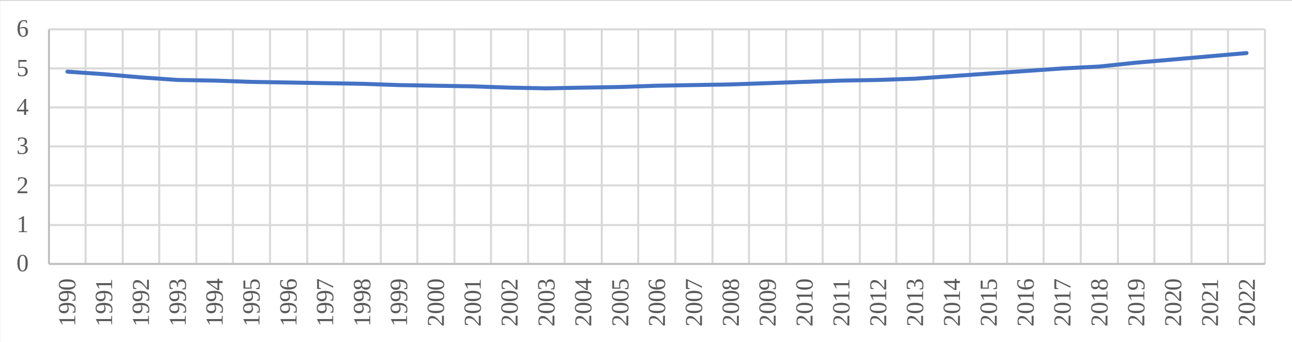

Figure 3: Mortality Rate in Malaysia from 1990 to 2022

Numerous challenges persist as pivotal to Malaysia's demography and health outcomes. Initially, rising inflation has heightened the expenses associated with healthcare and other goods, disproportionately impacting marginalized populations. Malaysia's medical inflation rate stands at 12.6%, above the global average by more than twofold, compelling numerous households to defer treatment or sacrifice nutritional quality, so adversely affecting long-term health outcomes (Ramendran, 2024). Secondly, GDP per capita consistently affects life expectancy by determining the capacity of individuals and governments to allocate resources towards health and welfare. Episodes of economic instability, including the Asian Financial Crisis (1997–1998) and the COVID-19 pandemic (2020), have illustrated the correlation between diminishing GDP per capita and worse health outcomes. Third, unemployment has both direct and indirect effects on life expectancy. In addition to the economic loss that limits healthcare access, unemployment induces stress, worry, and other mental health disorders that aggravate physical ailments. Empirical research indicates a robust correlation between unemployment and increased death rates as well as reduced life expectancy. Mortality rates, especially from non-communicable diseases such cardiovascular conditions, diabetes, and cancer, persistently stay elevated in Malaysia. Increasing death rates among working-age and elderly populations diminish overall life expectancy and indicate deficiencies in preventative health strategies.

This study seeks to analyze the factors influencing life expectancy in Malaysia utilizing secondary data from 1990 to 2022. This study aims to: (1) analyze the correlation between inflation and life expectancy; (2) assess the effect of GDP per capita on life expectancy; (3) evaluate the role of unemployment on longevity; and (4) investigate the degree to which mortality rates affect variations in life expectancy. Given this context, it is important to examine the macroeconomic determinants of life expectancy in Malaysia. This study investigates the role of inflation, unemployment, mortality, and GDP per capita in shaping longevity outcomes between 1990 and 2022. By employing time series econometric techniques, the study contributes to the literature by providing empirical evidence on both the long-term equilibrium relationships and short-term dynamics between these variables. The findings are expected to guide policymakers in designing integrated economic and health policies that promote not only economic growth but also sustained improvements in public health and social well-being.

The paper begins with an introduction that outlines the background, research issues, objectives, and significance of the study. This is followed by a literature review, methodology, results discussion section, conclusion and policy recommendations.

LITERATURE REVIEW

The study of life expectancy as a development indicator has long attracted scholarly attention. Life expectancy reflects the health status and quality of life of a population and is influenced by economic conditions, healthcare systems, and social structures. This review explores four major determinants, such as inflation, unemployment, mortality, and GDP per capita, drawing from theoretical and empirical studies in both developed and developing countries.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

Inflation and Life Expectancy

Inflation represents a persistent increase in the general price level, which erodes purchasing power and restricts access to essential goods and services such as healthcare and nutritious food (Fernando, 2024). Theoretical models, including the Grossman Health Demand framework, suggest that when healthcare costs rise, individuals, particularly low-income households, are more likely to delay or forego medical treatment, leading to poorer health outcomes. Empirical evidence supports this negative association. Studies by Salatin and Bidari (2014) and Ali and Ahmad (2014) show that higher inflation significantly reduces life expectancy in middle-income countries, while Movsisyan et al. (2024) highlight the disproportionate effects on vulnerable groups.

Unemployment and Life Expectancy

Employment plays a central role in sustaining income, access to healthcare, and psychological well-being. Conversely, unemployment increases financial stress, reduces access to healthcare, and is linked to higher risks of depression, anxiety, and premature death. Empirical studies confirm this adverse relationship. Bianchi et al. (2022) report that unemployment shocks lead to notable reductions in life expectancy, while Assari (2017) finds that being unemployed raises mortality risk by 63%. The Psychosocial Stress Theory further explains how prolonged unemployment contributes to physiological stress responses that undermine health outcomes.

Mortality and Life Expectancy

Mortality trends directly determine life expectancy, with reductions in premature death leading to longer lifespans. The Epidemiological Transition Theory (McKeown, 2009; Klenk et al., 2016) describes how societies shift from high mortality due to infectious diseases toward chronic non-communicable diseases as economies advance. Woolf and Schoomaker (2019) and Clarke et al. (2009) find that increases in cardiovascular and cancer-related deaths reduce life expectancy, while improvements in prevention and treatment extend longevity. In Malaysia, rising deaths from non-communicable diseases such as ischemic heart disease and diabetes highlight the importance of strengthening preventive health measures.

GDP per Capita and Life Expectancy

Economic prosperity is positively correlated with health outcomes. The Preston Curve illustrates that higher per capita income improves life expectancy by enhancing access to healthcare, housing, education, and nutrition (Fumagalli et al., 2024). Bayati et al. (2013) and He and Li (2018) show that income growth significantly extends life expectancy, particularly in low- and middle-income settings. Similarly, Boucekkine et al. (2020) argue that higher GDP per capita facilitates greater investment in health infrastructure, vaccination programs, and disease prevention. However, Kabir (2008) cautions that income growth alone does not guarantee improvements unless paired with equitable distribution and effective public health spending.

Although numerous studies have examined the relationship between macroeconomic variables and life expectancy, several gaps remain. First, much of the evidence comes from cross-country analyses, with limited research focused specifically on Malaysia’s socioeconomic and cultural context. Second, most studies evaluate variables in isolation, overlooking their combined and interactive effects. Finally, while theories such as the Grossman Model, Psychosocial Stress Theory, and Epidemiological Transition provide valuable insights, few Malaysian studies integrate these frameworks into empirical analyses. Addressing these gaps, this study applies time series econometric techniques to investigate the long-term and short-term dynamics between inflation, unemployment, mortality, GDP per capita, and life expectancy in Malaysia.

Data Description

This study examines the factors influencing life expectancy (LE) in Malaysia for 32 years period from 1990 to 2022, utilizing annual time-series data. The dependent variable is life expectancy, which is measured by the average number of years a person is expected to live. The independent variables include the inflation rate (INF), unemployment rate (UR), mortality rate (MR), and gross domestic product per capita (GDPC). Data were sourced from esteemed entities like MacroTrends and official statistical agencies, guaranteeing precision

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

and dependability. Table 4 summarizes the measures of the variables, with life expectancy denoted in years, inflation and unemployment represented as percentages, mortality rate quantified as deaths per 1,000 people, and GDP per capita stated in current US dollars.

Table1: Description of Variables

Variables	Notation	Measurement
Life Expectancy	LE	The number of years a person or population in a country expects to live
Inflation Rate	INF	% of the inflation rate
Unemployment Rate	UR	% of the unemployment rate
Mortality Rate	MR	Deaths per 1,000 people
Gross Domestic Product per capita	GDPC	Per capita, current US$

Conceptual Framework

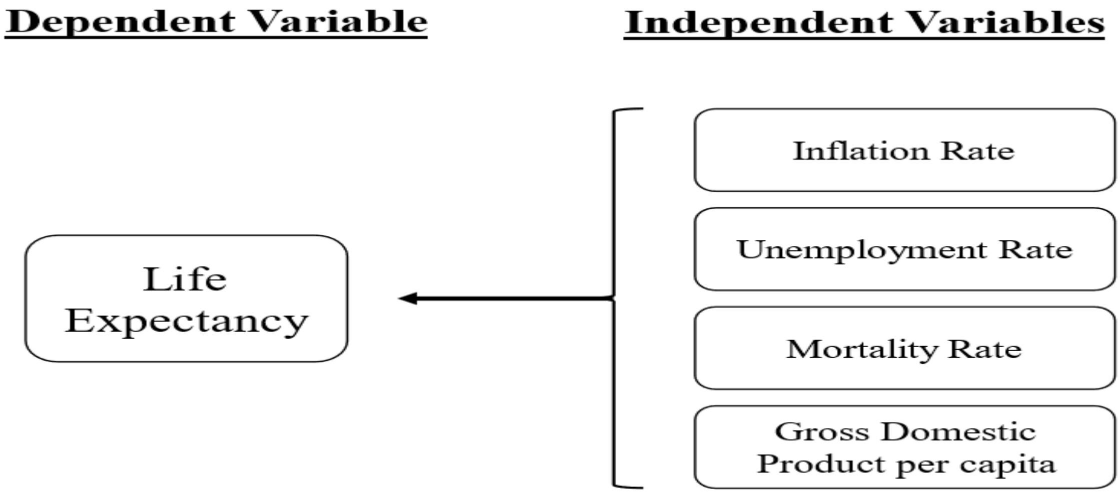

Figure 4: Conceptual Framework

This study examines the factors influencing life expectancy in Malaysia, utilizing four primary independent variables. The inflation rate is anticipated to adversely impact life expectancy, since escalating costs diminish purchasing power, restrict access to healthcare and nutrition, and ultimately degrade health outcomes. The unemployment rate is expected to have an inverse association with life expectancy, as income loss and financial hardship limit healthcare expenditures and heighten susceptibility to stress-related diseases. Conversely, GDP per capita is anticipated to favourably affect life expectancy, as elevated income levels facilitate more investment in healthcare, enhanced living standards, and improved access to key services. Ultimately, the mortality rate is anticipated to exhibit an inverse correlation with life expectancy, where elevated death rates indicate inferior health outcomes and diminish overall longevity.

The empirical model explains the association between life expectancy and four principal drivers in Malaysia: inflation rate, unemployment rate, GDP per capita, and mortality rate. Inflation, unemployment, and death are anticipated to adversely impact life expectancy by diminishing purchasing power, constraining access to healthcare, and indicating inferior health outcomes. In contrast, GDP per capita is expected to exert a beneficial influence, as elevated income levels facilitate more investment in health and enhanced living standards. The model highlights the interaction of economic and demographic factors in influencing population health, hence enhancing the comprehension of life expectancy determinants in Malaysia.

Empirical Model

The empirical framework will be used to examine the relationship between these variables and the life expectancy in Malaysia, which is Gross Domestic Product per capita (GDP per capita), inflation rate, mortality rate, and unemployment rate. The study uses linear regression to investigate how the inflation rate, unemployment rate, mortality rate, and GDP per capita affect the standard of living in Malaysia from 1990-2022. The variables will form a linear regression as below:

$$LE_t = \beta_0 + \beta_1 \mathrm{INF}_t + \beta_2 \mathrm{GDPC}_t + \beta_3 \mathrm{MR}_t + \beta_4 \mathrm{UR}_t + \varepsilon_t \quad (1)$$

where LE=Life Expectancy, INF=Inflation Rate (%), GDPC=Gross Domestic Product per Capita (US), MR=Mortality Rate (%), UR=Unemployment Rate (%), ε = Error terms.

The inflation rate influences purchasing power and the accessibility of healthcare services. Escalating inflation elevates living expenses and healthcare costs, disproportionately affecting low-income households that may forgo treatment, resulting in deteriorating health outcomes and reduced life expectancy. The unemployment rate is inversely correlated with longevity. Unemployment diminishes income, restricts access to healthcare and nutritional food, and induces financial and psychological stress, all of which adversely affect living standards and health outcomes. Third, GDP per capita functions as an indicator of economic welfare and living standards. A higher GDP per capita facilitates increased governmental and private expenditure on healthcare, education, and social services, resulting in improved health outcomes and extended life expectancy. In contrast, diminished GDP per capita indicates poorer economic conditions and less access to effective healthcare, leading to decreased longevity. Ultimately, death rates are intrinsically connected to life expectancy, especially with baby and under-five mortality rates. Decreased mortality rates, facilitated by enhanced healthcare, improved living conditions, and diminished infectious diseases, contribute to consistent increases in Malaysia's life expectancy in recent decades.

Unit Root Test

This study employs the unit root test to assess the stationarity of time-series variables and determine their integration order for accurate estimation. Stationarity is crucial in time-series analysis, as employing non-stationary variables in regression can result in false outcomes and distorted parameter estimates (Dickey & Fuller, 1979). The assessment determines if the variables exhibit trend-stationarity or level-stationarity, therefore informing suitable econometric models (Shameer Fahmi et al., 2018). The Augmented Dickey-Fuller (ADF) test is utilized for this purpose, as it yields more robust and accurate results by addressing higher-order serial correlation in the data.

The Augmented Dickey-Fuller (ADF) test was developed by David Dickey and Wayne Fuller. The ADF test will be employed to assess the stationarity of all time series data. The ADF test is employed to ascertain the existence of unit roots in a time series and to establish the series' order of integration.

The regression equation for the ADF test is represented below:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta_{\gamma_{t-1}} + \alpha_i \sum_{i=1}^{n} \Delta\gamma_{t-1} + \varepsilon_t$$

Where γ_t represent the variables of interest in a logarithm form, which are the inflation rate, unemployment rate, mortality rate, GDP per capita, and life expectancy. Δ is the differencing operator while, t is the period and ε is an error term.

The hypotheses for ADF are:

$$H_0: The\ series\ has\ a\ unit\ root$$

$$H_1: The\ series\ has\ no\ unit\ root$$

The null hypothesis $H_0: \alpha = 0$ posits that the series is non-stationary and possesses a unit root, whereas the alternative hypothesis $H_0: \alpha < 0$ asserts that the series is stationary. The significance decision series is predicated on the critical value at a 5% significance level, wherein the rejection criterion is to dismiss H_0if the t-statistic exceeds the critical value. Consequently, the series is both significant and stationary at a 5% significance threshold. If the t-statistic is below the crucial value, the series is deemed inconsequential, and the null hypothesis is accepted. Consequently, it was determined that the series is non-stationary and possesses a unit root at a 5% significance level.

Johansen-Juselius (JJ) Cointegration Test

The Johansen-Juselius Cointegration Test is used to find out if there is a stationary in series that shows the long-term relationship between the inflation rate, unemployment rate, mortality rate, GDP per capita, and life expectancy. Cointegrating relationships between multiple non-stationary time series data can be tested using the Johansen test, which permits multiple cointegrating relationships in contrast to the Engle-Granger test (C. Team, 2023). Trace statistics and max-Eigen statistics in JJ tests were used to determine the number of cointegration vectors of a model.

The regression equation for the trace test is distributed as below:

$T_{trace} = -T \sum_{i=q+1}^{p} log(1\text{-}\lambda_t)$

where T is the number of valid estimations of observations used and λ_t represent the i^{th} the largest estimated eigenvalue.

Hypotheses for trace test are:

$$H_0: Number\ of\ cointegrating\ vector\ is\ less\ than\ or\ equal\ to\ r$$

$$H_1: At\ most\ r\ cointegrating\ vectors\ is\ r = 1, 2, 3, \dots, \rho$$

The regression for eigenvalue is as below:

$\lambda_{max} = -T \log(1 - \lambda_{r-1})$

which explains that T is the number of valid estimations of observation use and λ_{r-1} is the largest estimated eigenvalue at $r - 1$.

The hypothesis test for eigenvalue is as below:

$$H_0: r\ cointegeating\ vectors$$

$$H_1: r + 1\ cointegrating\ vectors$$

The decision rule to determine the significant series is based on the critical value at a 5% significance level. Reject Ho if either trace-statistic or max-Eigen statistic is larger than the critical value. The null hypothesis is rejected as it is significant and the conclusion is the model contains most of the cointegrating vectors at a 5% significance level.

Vector Error Correction Model (VECM) Granger Causality test

After detecting cointegration in the Johansen Cointegration test, the Vector Error Correction Model (VECM) Granger Causality test is utilized to determine the short-term relationship among the variables (Granger, 1969). The Granger causation Test based on VECM aims to determine the direction of causation between variables throughout time, encompassing both short-term and long-term relationships.

The regression equation for the Granger causality test based on VECM is expressed as follows:

$$INF_t = \beta_0 + \sum_{i-1}^{m}\beta_{1i}INF_{t-1} + \sum_{i-1}^{m}\beta_{2i}UR_{t-1} + +\sum_{i-1}^{m}\beta_{3i}MR_{t-1} + +\sum_{i-1}^{m}\beta_{4i}GDPC_{t-1} + +\sum_{i-1}^{m}\beta_{5i}LE_{t-1} + \mu_{1t}$$

$$UR_t = \alpha_0 + \sum_{i-1}^{m}\beta_{1i}INF_{t-1} + \sum_{i-1}^{m}\beta_{2i}UR_{t-1} + +\sum_{i-1}^{m}\beta_{3i}MR_{t-1} + +\sum_{i-1}^{m}\beta_{4i}GDPC_{t-1} + +\sum_{i-1}^{m}\beta_{5i}LE_{t-1} + \mu_{2t}$$

$$MR_t = \gamma_0 + \sum_{i-1}^{m}\beta_{1i}INF_{t-1} + \sum_{i-1}^{m}\beta_{2i}UR_{t-1} + +\sum_{i-1}^{m}\beta_{3i}MR_{t-1} + +\sum_{i-1}^{m}\beta_{4i}GDPC_{t-1} + +\sum_{i-1}^{m}\beta_{5i}LE_{t-1} + \mu_{3t}$$

$$GDPC_t = \delta_0 + \sum_{i-1}^{m}\beta_{1i}INF_{t-1} + \sum_{i-1}^{m}\beta_{2i}UR_{t-1} + +\sum_{i-1}^{m}\beta_{3i}MR_{t-1} + +\sum_{i-1}^{m}\beta_{4i}GDPC_{t-1} + +\sum_{i-1}^{m}\beta_{5i}LE_{t-1} + \mu_{4t}$$

$$\mathrm{LE}_t = \alpha_0 + \sum_{i-1}^{m}\beta_{1i}\mathrm{INF}_{t-1} + \sum_{i-1}^{m}\beta_{2i}\mathrm{UR}_{t-1} + +\sum_{i-1}^{m}\beta_{3i}\mathrm{MR}_{t-1} + +\sum_{i-1}^{m}\beta_{4i}\mathrm{GDPC}_{t-1} + +\sum_{i-1}^{m}\beta_{5i}\mathrm{LE}_{t-1} + \mu_{5t}$$

From the illustration above, $\alpha, \beta, \gamma, and\ \delta$ presents the estimated coefficient for the equation while m, n, 0, and p indicate the optimal lags of the series number of inflation rate (INF), unemployment rate (UR), mortality rate (MR), GDP per capita (GDPC), and life expectancy (LE). μ is a measurement for a single period of a departure from the equilibrium of the dependent variables.

Hypotheses for Granger causality are as below:

$$H_0: The\ independent\ does\ not\ granger\ by\ the\ dependent\ variable$$

$$H_1: The\ independent\ granger\ by\ the\ dependent\ variable$$

The Granger causality test uses a *p*-value to figure out how variables are related to each other. The decision to accept or reject the series is based on the critical value at the 5% significance level. If the *p*-value is less than 0.05, the criterion for rejection is to reject H_0. So, it's important to note that the null hypothesis is rejected, which means that the independent variable Granger causes the dependent variable with a 5% significance level. If the *p*-value is greater than α = 0.05, the series is considered insignificant, and the null hypothesis is not rejected. So, at a 5% significance level, the independent variable does not Granger-cause the dependent variable.

Unit Root Test Results

This study will employ Augmented Dickey-Fuller (ADF) unit root tests to assess the stationarity of the following variables: life expectancy, inflation rate, mortality rate, GDP per capita, and unemployment rate, in order to determine whether the time series is stationary or non-stationary. Based on the result, all the variables become stationary after first differences, as some of the variables have a unit root at the level. Since all the variables are integrated of the same order, *I*(1), the dataset is suitable for cointegration testing by using the Johansen and Juselius method.

Table2: ADF Test Results

Test Statistics		
	t_μ	t_τ
A: Level		
LLE	-0.434 (1)	-1.996 (0)
LGDPC	-1.278 (0)	-2.033 (0)
LIR	-1.710 (2)	-3.313 (1)

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

LMR	0.246 (1)	-1.965 (8)
LUR	-2.211 (2)	-3.111 (0)
B: First Differences		
ΔLLE	-3.125 (0) *	-5.219 (2) *
ΔLGDPC	-4.957 (0) *	-4.921 (0) *
ΔLIR	-6.127 (1) *	-6.005 (1) *
ΔLMR	-4.945 (12) *	-5.356 (7) *
ΔLUR	-5.596 (1) *	-5.880 (1) *

Notes: The t statistics correspond to the ADF. The subscript μ term in the model represents intercept, while τ term in the model represents trend and intercept. While the asterisks (*) indicate statistically significant at the 5 percent level. Figures in brackets ( ) are the lag length and Δ represent first difference.

Table 5 presents the results of the Unit Root Test conducted with the ADF method. Assume all tests are conducted at a 5% significance threshold. The ADF test results indicate that the intercepts for all variables, including LLE, LGDPC, LIR, LUR, and LMR, are non-stationary in level form. Consequently, all variables exhibit non-stationarity at the level, as their test statistics fail to attain significance at the 5% threshold. Furthermore, with the exception of LMR, which exhibits positivity under t_{μ}, signifying strong non-stationarity. Nonetheless, at the equivalent level, demonstrate that the outcome of the trend and intercept is identical to the result of the intercept when all variables are non-stationary. Furthermore, in initial differences, all variables exhibit stationarity, as evidenced by the results of the intercept and the trend and intercept. All variables, including LLE, LGDPC, LIR, LMR, and LUR, have refuted the null hypothesis of a unit root at the 5% significance level. In conclusion, the ADF Test consistently demonstrates that LLE, LGDPC, LIR, LMR, and LUR are stationary at the initial difference, $I(1)$. This indicates its appropriateness for the subsequent phase, namely the Johansen and Juselius Test.

Johansen and Juselius Cointegration Test Results

The outcome of the preceding unit root test indicates that all variables are integrated of the same order, specifically $I(1)$. Consequently, the Johansen cointegration method is appropriate for validating long-term relationships among variables. The cointegration study utilized both the Maximum Eigenvalue and Trace statistics at the 5% significance threshold. The results substantiate the rejection of the null hypothesis of no cointegration ($r = 0$) and endorse the alternative hypothesis that at least one cointegrating vector is present ($r < 1$). This discovery indicates a steady and consistent long-term correlation among the variables. Changes in the inflation rate, unemployment rate, mortality rate, and GDP per capita specifically influence the variation in life expectancy. This outcome demonstrates that economic and demographic factors will influence Malaysia's health outcomes. In the subsequent phase, we will employ the Vector Error Correction Model (VECM).

Table 3: Johansen & Juselius Cointegration Test Result

Null	Alternative	k=1 r=1					
		λmax			Trace		
		Unadjusted		95 percent C.V.	Unadjusted		95 percent C.V.
r = 0	r = 1	43.49024*		33.87687	87.54701*		69.81889
r<= 1	r = 2	21.99839		27.58434	44.85613		47.85613
r<= 2	r = 3	12.03032		21.13162	22.05838		29.79707
r<= 3	r = 4	10.02639		14.26460	10.02805		15.49471
r<= 4	r = 5	0.001665		3.841465	0.001665		3.841465

Notes: Asterisks (*) denote statistically significant at the 5 percent level. The k is the lag length, and r is the cointegrating vector(s).

Table 6 displays the findings of the Johansen cointegration test, employing both the Maximum Eigenvalue and Trace statistics, alongside their respective 5% critical values. The null hypothesis of no cointegration (r = 0) was rejected at the 5% significance level, as both the λmax statistic (43.49024) and the Trace statistic (87.54701) surpassed their critical values (33.87687 and 69.81889, respectively). This signifies the existence of a minimum of one cointegrating vector. Nevertheless, when evaluating the null hypothesis of a maximum of one cointegrating relationship (r < 1), the test statistics did not exceed the critical levels, indicating that no other cointegration relationships exist beyond the first. Therefore, it can be concluded that there exists one significant cointegrating vector among the variables, implying the presence of a stable long-run relationship.

Normalized Cointegrating Equation

$$LLE = 4.0687 + 0.0132LGDPC_t - 0.0118LIR_t + 0.0872LMR_t - 0.0553LUR_t$$

t-statistics values [3.4343] [-6.8336] [3.4309] [-6.8690]

The normalized cointegrating equation, which estimates the long-run relationship between life expectancy and GDP per capita, inflation rate, mortality rate, and unemployment rate. The results show that there is an existence of long-run relationship between LLE and LGDPC, as well as LIR, LMR, and LUR. A rise of 1% in LGDPC will result in a 0.0132% increase in LLE. This conclusion aligns with the established economic literature of Bao et al. (2022), Delavari et al. (2016), Boucekkine et al. (2020), and Salatin and Bidari (2014), indicating that elevated income levels are generally correlated with enhanced access to healthcare, superior nutrition, and overall improved living standards, all of which contribute to increased life expectancy. An increase of 1% in LIR will result in a drop of 0.0118% in LLE. This indicates that increasing price levels may adversely affect life expectancy in the long term. The adverse effect of the inflation rate on life expectancy aligns with the findings of Ali and Ahmad (2014), Salatin and Bidari (2014), Garcia et al. (2019), and Monsef and Mehrjardi (2015). This may be ascribed to inflation diminishing citizens' purchasing power, thereby restricting access to important healthcare services and necessities. The association between LLE and LMR exhibits a positive coefficient of 0.872, indicating that a 1% rise in LMR will result in a 0.872% increase in LLE. Nonetheless, a theoretical paradox exists in the positive link between life expectancy and death rate. Life expectancy is expected to decline as the mortality rate rises. Life expectancy represents the average duration of survival, accounting for the likelihood of mortality at each age. An increase in mortality rates, particularly among younger or middle-aged demographics, leads to a decline in overall survival probabilities, hence diminishing the anticipated remaining years of life. Conversely, the findings are corroborated by the research conducted by Gu et al. (2018), which indicates a positive correlation between life expectancy and mortality rate, wherein regions with greater life expectancy are associated with heightened total cancer incidence and death. Conversely, a study conducted by Nagarajah et al. (2018) has demonstrated that a 1% increase in the newborn death rate correlates with an increase in life expectancy. Although LUR exhibits an inverse correlation with LLE, a 1% rise in LUR will result in a 0.0553% drop in LLE. The findings are corroborated by the research of Singh, G.K., & Siahpush, M. (2016), Sing Yun and Yassin (2020), and Monsef and Mehrjardi (2015). This implies that protracted joblessness may lead to unfavourable health consequences due to economic insecurity, psychological stress, and restricted healthcare accessibility.

Granger Causality on Vector Error Correction Model (VECM)

Table 4: Vector Error Correction Model on Granger Causality Test Result

Dependent	**DLLE**	**DLGDPC**	**DLIR**	**DLMR**	**DLUR**
Variable	**χ^2 Statistics**				
DLLE	-	2.4730 (0.1158)	2.4207 (0.1197)	0.0066 (0.9352)	0.4345 (0.5098)
DLGDPC	1.8942 (0.1687)	-	7.4508 (0.0063)**	10.6618 (0.0011)**	3.5294 (0.0603)

DLIR	2.0362 (0.1536)	0.4332 (0.5104)	-	4.1181 (0.0424)**	1.9481 (0.1628)
DLMR	0.0002 (0.9884)	1.0296 (0.3103)	1.3023 (0.2538)	-	0.5677 (0.4512)
DLUR	5.9179 (0.0150)**	0.3445 (0.5573)	4.5624 (0.0327)**	6.6819 (0.0097)**	-

Notes: Δ refers to the first difference operator. Asterisks (**) indicate statistically significant at the 5 percent level. Values in parentheses indicate the probability value.

Table 8 displays the Granger causality results derived from the Vector Error Correction Model (VECM). The Granger causality test indicates that the Unemployment Rate (LUR) Granger-causes Life Expectancy (LLE) in the near term, as evidenced by a χ^2 value of 5.9179 and a p-value of 0.0150, surpassing the 5% significance threshold. The statistical correlation between unemployment rates and variations in life expectancy suggests that unemployment rates can forecast changes in life expectancy, highlighting a substantial economic and social linkage between these factors. Elevated unemployment rates appear to influence living standards, healthcare accessibility, and overall well-being, hence affecting life expectancy. The analysis shows that LGDPC (Gross Domestic Product per capita) depends significantly on LIR (Inflation Rate) and LMR (Mortality Rate) because the χ^2 values reach 7.4508 ($p = 0.0063$) and 10.6618 ($p = 0.0011$), respectively, which exceed the 5% significance level. Short-term data indicates that inflation and mortality rates can forecast GDP per capita values. The findings illustrate the impact of economic instability due to inflation and population health dynamics as indicated by death rates on economic growth. The Inflation Rate (LIR) is notably influenced by the Mortality Rate (LMR), evidenced by a χ^2 value of 4.1181 ($p = 0.0424$), beyond the 5% significance threshold. This indicates that mortality trends exert a short-term causal influence on inflation, maybe reflecting healthcare expenses or alterations in demographic-economic demand.

The Unemployment Rate (LUR) is strongly Granger-caused by Life Expectancy (LLE), Inflation Rate (LIR), and Mortality Rate (LMR), with p-values of 0.0150, 0.0327, and 0.0097, respectively, all beyond the 5% significance threshold. These findings underscore a bidirectional dynamic in which demographic and socioeconomic data collectively impact the labour market. For example, heightened life expectancy may alter the age composition of the workforce, whereas inflation and mortality rates might disturb employment prospects and economic cycles. Conversely, certain relationship between variables lack significance. Table 8 indicates that LLE is considerably influenced solely by the LUR variable, while LGDPC does not significantly Granger-cause LLE. This implies that life expectancy may affect the unemployment rate in the short term, but it has a marginal influence on variations in GDP per capita, inflation rate, and death rate throughout the same timeframe. This may be attributed to public healthcare support and demographic trends.

In conclusion, the VECM Granger causality results illustrate the diverse short-term correlations among variables. The unemployment rate will impact life expectancy, whereas the inflation rate and mortality rate will affect GDP per capita. Nonetheless, the death rate can influence both the inflation rate and the unemployment rate. This illustrates the intricate relationship between overall health outcomes and economic indices. Consequently, these findings may provide policymakers with a profound comprehension of how tackling employment market challenges, enhancing healthcare accessibility, and managing inflation can substantially influence the economy's overall success.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

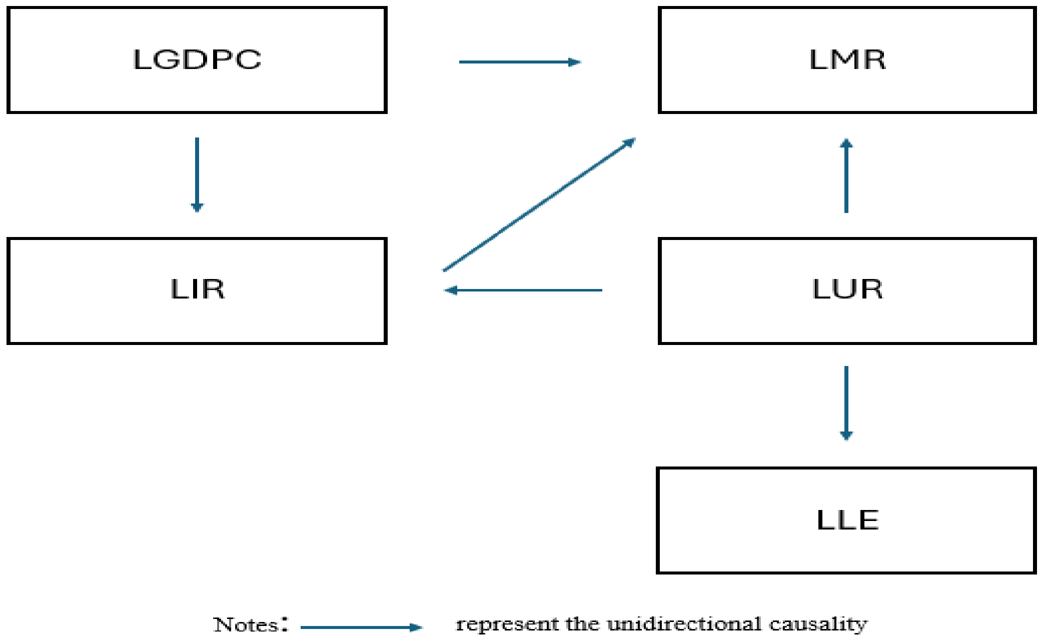

Figure 5: Summary of Short Run Causal Linkage

Based on Figure 7 shows the causality association between LLE, LGDPC, LIR, LMR, and LUR. There is a short-run unidirectional Granger causality running from IR to GDPC, MR to GDPC, MR to IR, IR to UR, and MR to UR. Furthermore, there is also a unidirectional causality from LE to UR, which is consistent with Sing Yun and Yassin (2020). However, there is no bidirectional causality that runs among the variables. Thus, there is no causal relationship between IR and LLE, which is consistent with the findings of Lawal et al. (2021).

Results of Variance Decomposition

Table 5: Results of Variance Decomposition

Percentage of variations in	**Horizon (Years)**	**Due to innovation in:**					
		DLLE	**DLGDPC**	**DLIR**	**DLMR**	**DLUR**	**DCU**
Years relative variance in: DLLE							
	1	**100.000**	0.000	0.000	0.000	0.000	0.000
	4	**94.291**	0.060	1.873	2.388	1.388	5.709
	12	**89.714**	0.035	2.101	5.559	2.591	10.286
	20	**87.246**	0.095	2.600	7.616	2.443	12.754
	30	**84.674**	0.202	3.159	9.758	2.207	15.326
	40	**82.569**	0.313	3.619	11.491	2.008	17.431
	50	**80.864**	0.413	3.990	12.881	1.852	19.136
Years relative variance in: DLGDPC							
	1	10.721	**89.279**	0.000	0.000	0.000	10.721
	4	30.082	**48.433**	5.503	12.360	3.622	51.567
	12	43.838	**41.197**	4.650	8.638	1.677	58.803
	20	45.656	**40.110**	4.269	8.672	1.293	59.890
	30	46.211	**39.710**	3.913	9.095	1.071	60.290

	40	46.287	**39.578**	3.648	9.544	0.943	60.422
	50	46.226	**39.531**	3.445	9.940	0.859	60.469
Years relative variance in: DLIR							
	1	2.125	44.027	**53.848**	0.000	0.000	46.152
	4	2.505	53.043	**36.011**	5.916	2.524	63.989
	12	1.050	62.513	**30.732**	3.603	2.101	69.268
	20	0.676	66.645	**27.974**	2.494	2.211	72.026
	30	0.476	69.817	**25.603**	1.717	2.388	74.397
	40	0.371	71.919	**23.858**	1.304	2.548	76.142
	50	0.307	73.409	**22.519**	1.082	2.682	77.481
Years relative variance in: DLMR							
	1	31.266	1.749	9.713	**57.272**	0.000	42.728
	4	15.955	6.747	14.981	**58.154**	4.164	41.846
	12	3.329	10.088	16.986	**65.175**	4.422	34.825
	20	1.583	10.562	17.202	**66.446**	4.208	33.554
	30	0.925	10.769	17.267	**66.960**	4.080	33.040
	40	0.662	10.862	17.288	**67.175**	4.013	32.825
	50	0.528	10.913	17.296	**67.289**	3.974	32.711
Years relative variance in: DLUR							
	1	4.876	56.882	0.080	4.104	**34.058**	65.942
	4	5.243	66.839	3.300	8.757	**15.862**	84.138
	12	1.984	71.365	2.628	10.561	**13.462**	86.538
	20	1.185	70.726	1.835	13.580	**12.674**	87.326
	30	0.779	69.052	1.214	16.776	**12.179**	87.821
	40	0.580	67.438	0.861	19.252	**11.869**	88.131
	50	0.465	66.085	0.655	21.145	**11.650**	88.350

Notes: The last column provides the percentage of forecast error variances of each variable explained collectively by the other variables. The column in bold represents the impact of their own shock.

This study will use variance decomposition to determine the association between life expectancy, GDP per capita, inflation, mortality, and unemployment. Table 9 shows how shock (innovation) in themselves and other variables affects the variation in the dependent variable (LLE) and four independent variables (LGDPC, LIR, LMR, and LUR) over 1 to 50 years. Variance Decomposition determines the system's long-term most exogenous variable.
Table 9 shows that in the short term (Year 1), life expectancy (LLE) is totally explained by prior shocks, with no other variables. It becomes more dependent on external influences with time. Life expectancy is self-explained by 94.291% in year 4, with GDP per capita (0.06%), inflation (1.873%), mortality (2.388%), and unemployment (1.388%) having less impact. These consequences gradually increase. In year 12, 89.714% of life expectancy variance is self-explained, while the mortality rate increases to 5.559 %, with inflation and unemployment contributing more. By 50, 81% of life expectancy variance is self-explained, although mortality (12.88%), inflation (3.99%), and unemployment (1.85%) influence it more.

This implies that life expectancy is largely driven by internal health factors, but mortality and inflation rate ultimately affect it. This suggests that long-term economic instability, such as rising mortality and inflation, may impair population health. This illustrates that policymakers must always consider long-term health outcomes, as well as healthcare system innovation and macroeconomic stability. Innovation drives 89.28% of GDP per capita (LGDPC) change in Year 1. Its explanatory power declines from 48.43% (Year 4) to 39.53%

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

(Year 50). In year 4, 48.433% of GDP per capita variance is self-explained, 30.082% is life expectancy, 12.36% is mortality, 5.503%) is inflation, and 3.622%) is unemployment. As we enter year 12, 41.197% of the variance in GDP per capita is self-explained; by life expectancy, 43.838%; but the mortality rate remains significant, 8.638%; followed by inflation (4.650%) and unemployment (1.677%). By 50, just 39.53% of GDP per capita variance is self-explanatory. Significantly, life expectancy contributes for 46.23% of GDP per capita variance, with mortality rate (9.94%) and other variables playing lower proportions. In Malaysia, increasing life expectancy can boost GDP per capita, suggesting that life expectancy drives economic growth over time. A healthier population is more productive, uses less healthcare, and boosts economic outcomes in different industries. In the short run (Year 1), inflation depends equally on prior shocks (53.85%) and GDP per capita (44.03%). The link between inflation and GDP per capita (53.04%) strengthens in year 4. By 50, GDP per capita explains 73.41% of inflation variance, up from 62.51% in 12. Self-explanatory inflation falls progressively to 22.52% by 50. As shown in Table 4.6, life expectancy barely contributes 0.31% at year 50. It appears that inflation is directly tied to economic activity. GDP per capita affects inflation, possibly due to demand forces and monetary policy. Health indicators have little effect on inflation, indicating that fiscal and monetary policies can fix it better than social and health initiatives.

Also, in the short term (Year 1), 57.27% of the mortality rate variance is self-explained, whereas life expectancy accounts for 31.27%. A close short-term link between life expectancy and mortality rate is suggested. At 50, mortality becomes even more self-explanatory, reaching 67.29%. The influence of life expectancy decreases to 0.53% at 50. In contrast, inflation and GDP per capita rise. Year 12 inflation is 16.99% and GDP per capita 10.09%; year 50 inflation is 17.30% and GDP per capita 10.91%. This suggests that life expectancy only affects mortality in the near term, whereas GDP per capita and inflation will do so in the long term. Thus, higher inflation and lower GDP per capita may indicate a lack of healthcare accessibility and affordability, directly affecting Malaysia's mortality rate. Finally, in Year 1, 34.06% of the unemployment rate variance is self-explained. GDP per capita—56.88%—influences it most. At present, life expectancy, inflation, and mortality have little impact. This trend grows over time. GDP per capita accounts for 66.84% of unemployment rate fluctuation in year 4. In 12 and 50, GDP per capita explains 66.09% of the variance in unemployment rate, whereas the unemployment rate explains 11.65%. Other variables like life expectancy and inflation rate do not affect long-term unemployment. These findings reveal that unemployment is mostly a macroeconomic result that depends on GDP per capita, while inflation, life expectancy, and mortality rates have little long-term impact. Economic growth is the biggest factor in lowering unemployment. LUR will be the most interacting variable in the system, with LLE (0.465 percent), LGDPC (66 percent), LIR (0.655 percent), and LMR (21 percent) explaining 88 percent of error variance after 50 years. LUR is the most endogenous variable, while LNEG is the most exogenous because it is least affected by other factors.

Results of Impulse Response Function

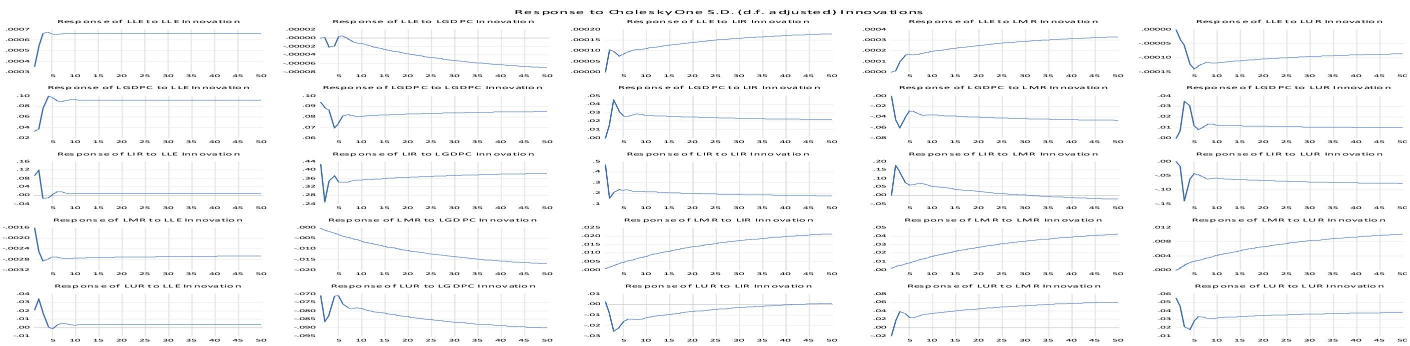

Figure 6: Impulse Response Function Results

The stimulus Response Function (IRF) illustrates the temporal behaviour of a variable in reaction to an exogenous stimulus. All variables tend to stabilize in the long run, typically after 20 periods, indicating convergence toward equilibrium. The graph indicates that a positive shock to LGDPC initially results in a slight negative influence on LLE, perhaps attributable to transitory factors such as urban stress; however, this effect lessens over time.

The LIR and LMR shocks yield positive marginal effects on LLE, as they signify health sector policy responses. The variable LUR significantly undesirably impacts the variable LLE, illustrating the unfavourable effects of unemployment on health outcomes. While the variable LGDPC shows positive responses to its own shocks and those of LLE and LIR, but experiences negative impacts from LMR and LUR, which confirms that mortality and joblessness harm economic performance. The variable LIR exhibits a continual rise following shocks from the variables LGDPC, LLE, and LMR, indicating the responsiveness of inflation to macroeconomic and demographic alterations. The variable LMR exhibits a significant decline when subjected to shocks in LLE and LGDPC, whereas it rises in response to shocks in LIR and LUR.

Ultimately, the variable LUR exhibits an upward trajectory with increases in LMR and LIR variables, although declines with enhancements in LGDPC and LLE variables, as employment and health significantly impact economic growth. The research illustrates that health, economic, and labour systems are intricately interconnected, as simultaneous GDP growth, mortality reduction, and unemployment decline contribute to enhanced life expectancy and economic stability.

CONCLUSION AND POLICY RECOMMENDATION

The objective of the study is to analyze the factors influencing life expectancy in Malaysia. The study's findings confirm a stable long-term relationship between life expectancy and its primary determinants, namely GDP per capita, inflation, unemployment, and mortality rates. GDP per capita favourably affects life expectancy, however inflation and unemployment have detrimental impacts, with unemployment being the most significant short-term determinant. Granger causality and variance decomposition reveal significant interconnections, including the influence of mortality on economic variables and the pronounced sensitivity of GDP per capita to disturbances. Impulse response analysis indicates that all variables achieve stability in the long term, while unemployment shocks significantly diminish life expectancy. The findings underscore the necessity for cohesive economic, labour market, and health policies to maintain enhancements in life expectancy and guarantee enduring social and economic stability in Malaysia.

Life expectancy in Malaysia is influenced by interrelated economic, labour market, and health issues, necessitating cohesive policy interventions. Consistent and inclusive economic growth is crucial, as increased GDP per capita improves access to food, housing, and healthcare, while strategic investments in healthcare, education, and rural development can mitigate regional inequalities. Inflation diminishes purchasing power and restricts access to necessities, rendering price stability, subsidies, and regulations for healthcare and key products vital for protecting at-risk people. Unemployment has significant detrimental effects on health by diminishing income, elevating stress levels, and heightening mortality risks; therefore, active labour market programs, reskilling initiatives, public-private partnerships, and healthcare protections for the unemployed are essential. Simultaneously, decreasing mortality through preventive health initiatives, early screenings, rural health enhancement, and improved maternal and emergency care is essential for minimizing preventable deaths. Collectively, these criteria emphasize the necessity for a cohesive policy framework that integrates economic, labour, and public health initiatives to maintain and enhance life expectancy improvements in Malaysia.

REFERENCES

1. Abubakar, M. S., Mustapha, A., & Mallum, A. (2023). Impact of macroeconomic variables on life expectancy in Nigeria. International Journal of Economics and Development Policy (IJEDP), 6(1), 2651-5644.https://www.researchgate.net/profile/Abubakar-Saidu-5/publication/373072436_Impact_of_Macroenomic_Variables_on_Life_Expectancy_in_Nigeria/links/64d6a556ad846e288285e7e0/Impact-of-Macroenomic-Variables-on-Life-Expectancy-in-Nigeria.pdf
2. Ali, A., & Ahmad, K. (2014). The Impact of Socio-Economic factors on life expectancy for Sultanate of Oman: An Empirical analysis. MPRA Paper. https://ideas.repec.org/p/pra/mprapa/70871.html
3. Assari, S. (2017). Life expectancy gain due to employment status depends on race, gender, education, and their intersections. Journal of Racial and Ethnic Health Disparities, 5(2), 375-386. https://doi.org/10.1007/s40615-017-0381-x

4. Assob, J., Nsagha, D., Njouendou, A., Zofou, D., Sevidzem, W., Ketchaji, A., Chiara, A., Asangbeng, T., Dzemo, K., Samba, B., Wenze, A., Malika, E., Penlap, V., & Kuete, V. (2017). Diseases in Africa: An Overview. In Elsevier eBooks (pp. 1-69). https://doi.org/10.1016/b978-0-12-809286-6.00001-7
5. Aydin, B. (2020). The Impact of economic indicators on life Expectancy: a panel data analysis. İstanbul İktisat Dergisi - Istanbul Journal of Economics, 70(1), 163-181. https://ideas.repec.org/a/ist/journl/v70y2020i1p163-181.html
6. AYDIN, S., & MULENDA, E. (2024). Exploring Determinants of Life Expectancy: A comprehensive analysis of health, socioeconomic, and environmental factors in European countries. International Journal of Economic Studies, 10(1). https://dergipark.org.tr/tr/download/article-file/3883583
7. Bai, R., Wei, J., An, R., Li, Y., Collett, L., Dang, S., Dong, W., Wang, D., Fang, Z., Zhao, Y., & Wang, Y. (2018). Trends in Life Expectancy and Its Association with Economic Factors in the Belt and Road Countries—Evidence from 2000–2014. International Journal of Environmental Research and Public Health, 15(12), 2890. https://doi.org/10.3390/ijerph15122890
8. Bao, W., Tao, R., Afzal, A., & Dördüncü, H. (2022). Real estate prices, inflation, and health outcomes: Evidence from developed economies. Frontiers in Public Health, 10. https://doi.org/10.3389/fpubh.2022.851388
9. Bayar, Y., Gavriletea, M. D., Pintea, M. O., & Sechel, I. C. (2021). Impact of Environment, Life Expectancy and Real GDP per Capita on Health Expenditures: Evidence from the EU Member States. International Journal of Environmental Research and Public Health, 18(24), 13176. https://doi.org/10.3390/ijerph182413176
10. Bayati, M., Akbarian, R., & Kavosi, Z. (2013). Determinants of life expectancy in Eastern Mediterranean region: a health production function. International Journal of Health Policy and Management, 1(1), 57–61. https://doi.org/10.15171/ijhpm.2013.09
11. Bianchi, F., Bianchi, G., & Song, D. (2022). The long-term impact of the COVID-19 unemployment shock on life expectancy and mortality rates. Journal of Economic Dynamics and Control, 146, 104581. https://doi.org/10.1016/j.jedc.2022.104581
12. Boucekkine, R., Diene, B., & Azomahou, T. (2020). Socioeconomic development and life expectancy relationship: evidence from the EU accession candidate countries. Genus, 76(1). https://doi.org/10.1186/s41118-019-0071-0
13. Cancer on the rise: A doctor's perspective on Malaysia's growing issue. (2024). NST Online. https://www.nst.com.my/lifestyle/heal/2024/06/1068502/cancer-rise-doctors-perspective-malaysias-growing-issue
14. Centre for Mental Health. (2024). Cost-of-living crisis has cast a long shadow over people with mental health problems, says Centre for Mental Health - Centre for Mental Health. https://www.centreformentalhealth.org.uk/news/item/cost-of-living-crisis-has-cast-a-long-shadow-over-people-with-mental-health-problems-says-centre-for-mental-health/
15. Chau, C. (2021). Malaysia’s jobless rate highest since 1993. HRM Asia. https://hrmasia.com/malaysias-jobless-rate-highest-since-1993/
16. Chung, N. (2020). Price too low, face mask producer says will stop output. Free Malaysia Today FMT. https://www.freemalaysiatoday.com/category/nation/2020/03/30/price-too-low-face-mask-producer-says-will-stop-output/
17. Clarke, R., Emberson, J., Fletcher, A., Breeze, E., Marmot, M., & Shipley, M. J. (2009). Life expectancy in relation to cardiovascular risk factors: 38 year follow-up of 19 000 men in the Whitehall study. BMJ, 339(sep16 3), b3513. https://doi.org/10.1136/bmj.b3513
18. CodeBlue. (2024). Over a third of Malaysian heart attack fatalities aged below 60. CodeBlue. https://codeblue.galencentre.org/2024/04/over-a-third-of-malaysian-heart-attack-fatalities-aged-below-60/
19. Dayanikli, G., Gokare, V., & Kincaid, B. (2016). Effect of GDP Per Capita on National Life Expectancy. https://smartech.gatech.edu/bitstream/1853/56031/1/effect_of_gdp_per_capita_on_national_life_expectancy.pdf
20. Delavari, S., Zandian, H., Rezaei, S., Moradinazar, M., Delavari, S., Saber, A., & Fallah, R. (2016). Life Expectancy and its Socioeconomic Determinants in Iran. Electronic Physician, 8(10), 3062–3068. https://doi.org/10.19082/3062

21. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. Journal of the American Statistical Association, 74(366), 427-431.
22. Duffy, S. (2023). When inflation rises, health outcomes fall. Harvard Business Review. https://hbr.org/2022/11/when-inflation-rises-health-outcomes-fall
23. EmilyEvans. (2023). From stalling to falling. Life expectancy decline hits economy and workforce - ILCUK. ILCUK. https://ilcuk.org.uk/life-expectancy-decline-hits-economy-and-workforce/
24. Felice, E., Andreu, J. P., & D'Ippoliti, C. (2016). GDP and life expectancy in Italy and Spain over the long run: A time-series approach. Demographic Research, 35, 813-866. https://doi.org/10.4054/demres.2016.35.28
25. Fernando, J. (2024). Inflation: What it is and how to control inflation rates. Investopedia. https://www.investopedia.com/terms/i/inflation.asp
26. Garcia. L, Rabago.B.S.,& Occam. (2019). Predictive capacity of country inflation rate to life expectancy at birth. International Journal of Advanced and Applied Sciences, 6(12), 67-70. https://doi.org/10.21833/ijaas.2019.12.007
27. Greater income inequality linked to worse HIV outcomes. (2024). aidsmap.com. https://www.aidsmap.com/news/jan-2024/greater-income-inequality-linked-worse-hiv-outcomes
28. Gu, X., Zheng, R., Xia, C., Zeng, H., Zhang, S., Zou, X., Yang, Z., Li, H., & Chen, W. (2018). Interactions between life expectancy and the incidence and mortality rates of cancer in China: a population-based cluster analysis. Cancer Communications, 38(1), 1-15. https://doi.org/10.1186/s40880-018-0308-x
29. Harun, H. N., & Sallehuddin, Q. (2024). Rising medical costs: 'Consider subsidy for low-income earners' NST Online. https://www.nst.com.my/news/nation/2024/09/1105804/rising-medical-costs-consider-subsidy-low-income-earners
30. He, L., & Li, N. (2018). The linkages between life expectancy and economic growth: some new evidence. Empirical Economics, 58(5), 2381-2402. https://doi.org/10.1007/s00181-018-1612-7
31. Health At A Glance 2017. (2017). In Health at a glance. https://doi.org/10.1787/health_glance-2017-en
32. Herbig, B., Dragano, N., & Angerer, P. (2013). Health in the Long-Term unemployed. Deutsches Ärzteblatt International. https://doi.org/10.3238/arztebl.2013.0413
33. Huang, G., Guo, F., Zimmermann, K. F., Liu, L., Taksa, L., Cheng, Z., Tani, M., & Franklin, M. (2023). The effect of the COVID-19 pandemic on life expectancy in 27 countries. Scientific Reports, 13(1). https://doi.org/10.1038/s41598-023-35592-9
34. Kabir, M. (2008). Determinants of life expectancy in developing countries. The Journal of Developing Areas, 41(2), 185-204. https://doi.org/10.1353/jda.2008.0013
35. Khaw, W., Chan, Y. M., Nasaruddin, N. H., Alias, N., Tan, L., & Ganapathy, S. S. (2023). Malaysian burden of disease: years of life lost due to premature deaths. BMC Public Health, 23(1). https://doi.org/10.1186/s12889-023-16309-z
36. Klenk, J., Keil, U., Jaensch, A., Christiansen, M. C., & Nagel, G. (2016). Changes in life expectancy 1950–2010: contributions from age- and disease-specific mortality in selected countries. Population Health Metrics, 14(1). https://doi.org/10.1186/s12963-016-0089-x
37. Lawal, Nurudeen & Osirus, Kunle & Bisiriyu, Sodiq Olaide. (2021). Inflation and Life Expectancy in Nigeria: A Granger Causality Approach. Acta Universitatis Danubius: Oeconomica. 17. Lemaignen, J. (2024, March 13). Covid-19 has shortened human life expectancy by one and a half years, according to new study. Le Monde.fr. https://www.lemonde.fr/en/environment/article/2024/03/13/covid-has-shortened-human-life-expectancy-by-one-and-a-half-years-according-to-new-study_6615253_114.html
38. Lin, R., Chen, Y., Chien, L., & Chan, C. (2012). Political and social determinants of life expectancy in less developed countries: a longitudinal study. BMC Public Health, 12(1). https://doi.org/10.1186/1471-2458-12-85
39. Loheswar, R. (2020). Putrajaya raises ceiling price for three-ply face masks. Malay Mail. https://www.malaymail.com/news/malaysia/2020/03/20/putrajaya-raises-ceiling-price-for-three-ply-face-masks/1848435
40. Mahumud, R. A., Hossain, G., Hossain, R., Islam, N., & Rawal, L. (2013). Impact of life expectancy on economics growth and health care expenditures in Bangladesh. Universal Journal of Public Health, 1(4), 180-186. https://doi.org/10.13189/ujph.2013.010405

41. Martins, Jo. M. (2021). Malaysia's Health and Socio-economic Transformation. In Jo. M. Martins, I. Pathmanathan, D. T. Tan, S. C. Lim, & P. Allotey (Eds.), Systems Thinking Analyses for Health Policy and Systems Development: A Malaysian Case Study (pp. 33–64). chapter, Cambridge: Cambridge University Press.
42. McKeown, R. E. (2009). The epidemiologic transition: changing patterns of mortality and population dynamics. American Journal of Lifestyle Medicine, 3(1_suppl), 19S-26S. https://doi.org/10.1177/1559827609335350
43. Meikeng, Y. (2024). Higher income and access to healthcare will boost life expectancy in Malaysia, says experts. Asia News Network. https://asianews.network/higher-income-and-access-to-healthcare-will-boost-life-expectancy-in-malaysia-says-experts/
44. Milanović, S. M., Uhernik, A. I., Mihel, S., Pristas, I., Stanić, A., & Stevanović, R. (2006). Life expectancy and mortality differences between populations on Croatian islands and the mainland. PubMed, 47(4), 611-618. https://pubmed.ncbi.nlm.nih.gov/16909459
45. Monsef, A., & Mehrjardi, A. S. (2015). Determinants of Life Expectancy: A panel Data approach. Asian Economic and Financial Review, 5(11), 1251-1257. https://doi.org/10.18488/journal.aefr/2015.5.11/102.11.1251.1257
46. Movsisyan, A., Wendel, F., Bethel, A., Coenen, M., Krajewska, J., Littlecott, H., Stöckl, H., Voss, S., Wollmershäuser, T., & Rehfuess, E. (2024). Inflation and health: a global scoping review. The Lancet Global Health, 12(6), e1038–e1048. https://doi.org/10.1016/s2214-109x(24)00133-5
47. Nagarajah, V., Kanadasan, S., & Rajamoorthy, Y. (2018). Determinant of life expectancy in Malaysia. The 2nd Syiah Kuala International Conference on Medicine and Health Sciences, 97–103. https://doi.org/10.5220/0008787900970103
48. Nandi, D. C., Hossain, M. F., Roy, P., & Ullah, M. S. (2023). An investigation of the relation between life expectancy & socioeconomic variables using path analysis for Sustainable Development Goals (SDG) in Bangladesh. PLoS ONE, 18(2), e0275431. https://doi.org/10.1371/journal.pone.0275431
49. News-Medical. (2023). What is Life Expectancy? https://www.news-medical.net/health/What-is-Life-Expectancy.aspx
50. Nguyen, K. (2024). 4 ways to mitigate inflation's impact on healthcare. Healthcare Blog. https://www.experian.com/blogs/healthcare/4-ways-to-mitigate-inflations-impact-on-healthcare/#:~:text=Inflation's%20impact%20on%20healthcare%20can%20be%20seen,amount%20since%20the%20poll%20began%20in%202001.
51. Nixon, S., Asada, H., & Koen, V. (2017). Fostering inclusive growth in Malaysia. OECD Economics Department Working Papers. https://doi.org/10.1787/24837aed-en
52. Norström, F., Waenerlund, A., Lindholm, L., Nygren, R., Sahlén, K., & Brydsten, A. (2019). Does unemployment contribute to poorer health-related quality of life among Swedish adults? BMC Public Health, 19(1). https://doi.org/10.1186/s12889-019-6825-y
53. OECD. (2023). HEALTH CARE FINANCING IN TIMES OF HIGH INFLATION. https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/01/health-care-financing-in-times-of-high-inflation_765e2bf9/78c11b24-en.pdf
54. Onwube, O., Chukwu, A. B., Ahamba, K., Emenekwe, C., & Oguwuike, M. E. (2021). Determinants of Life Expectancy in Nigeria: An Autoregressive Distributed Lag Approach. Journal of Sustainability Science and Management, 16(8), 177-192. https://doi.org/10.46754/jssm.2021.12.012
55. Period and cohort life expectancy explained - Office for National Statistics. (2023, 19 January). https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/methodologies/periodandcohortlifeexpectancyexplained
56. Pritchett, L., & Summers, L. H. (1996). Wealthier is Healthier. The Journal of Human Resources, 31(4), 841. https://doi.org/10.2307/146149
57. Ramendran, C. (2024). Healthcare getting out of reach. The Star. https://www.thestar.com.my/news/nation/2024/09/23/healthcare-getting-out-of-reach
58. Reidpath, D. D., & Allotey, P. (2003). Infant mortality rate as an indicator of population health. Journal of Epidemiology & Community Health, 57(5), 344-346.
59. Salatin, P., & Bidari, M. (2014). Effects Of Inflation On Women's Health In Selected Middle-Income Countries. African Journal of Health Economics, 03(01), 01-08. https://doi.org/10.35202/ajhe.2014.3103

60. Sede, P. I., & Ohemeng, W. (2015). Socio-economic determinants of life expectancy in Nigeria (1980 – 2011). Health Economics Review, 5(1). https://doi.org/10.1186/s13561-014-0037-z
61. Shameer Fahmi, M., Geetha, C., & Mohidin, R. (2018). Testing for unit roots and structural breaks in Malaysia's unanticipated macroeconomic variables. Malaysian Journal of Business and Economics, 6(2), 2289-8018.
62. Sing Yun, W., & Yassin, J. (2022). The nexus between health and Economy: Evidence from Malaysia. Journal of International Business, Economics and Entrepreneurship, Volume 7(2550–1429). https://mycite.mohe.gov.my/en/files/article/183254
63. Singh, G. K., & Siahpush, M. (2016). Inequalities in US life expectancy by area unemployment level, 1990–2010. Scientifica, 2016, 1-12. https://doi.org/10.1155/2016/8290435
64. Tafran, K., Tumin, M., & Osman, A. F. (2020). Poverty, Income, and Unemployment as Determinants of Life Expectancy: Empirical Evidence from Panel Data of Thirteen Malaysian States. Iranian journal of public health, 49(2), 294–303.
65. Țarcă, V., Țarcă, E., & Moscalu, M. (2024). Social and economic determinants of life expectancy at birth in Eastern Europe. Healthcare, 12(11), 1148. https://doi.org/10.3390/healthcare12111148
66. Team, C. (2023). Cointegration. Corporate Finance Institute. https://corporatefinanceinstitute.com/resources/data-science/cointegration/
67. Team, I. (2024). GDP per capita: definition, uses, and highest per country. Investopedia. https://www.investopedia.com/terms/p/per-capita-gdp.asp#:~:text=Gross%20domestic%20product%20per%20capita,compare%20it%20to%20other%20countries.
68. Team, I. (2024). What is the unemployment rate? Investopedia. https://www.investopedia.com/terms/u/unemploymentrate.asp
69. The Health Foundation. (2021). Unemployment and mental health - The Health Foundation. https://www.health.org.uk/publications/long-reads/unemployment-and-mental-health
70. The Health Foundation. (2024). How employment status affects our health - The Health Foundation. In The Health Foundation. https://www.health.org.uk/evidence-hub/work/employment-and-unemployment/how-employment-status-affects-our-health
71. The Health Foundation. (2024). Relationship between employment and health - The Health Foundation. In The Health Foundation. https://www.health.org.uk/evidence-hub/work/employment-and-underemployment/relationship-between-employment-and-health
72. The Health Foundation. (2024). Relationship between income and health - The Health Foundation. In The Health Foundation. https://www.health.org.uk/evidence-hub/money-and-resources/income/relationship-between-income-and-health
73. Vinz, S. (2023). What is a theoretical framework? | Guide to organizing. Scribbr. https://www.scribbr.com/dissertation/theoretical-framework/
74. Woolf, S. H., Masters, R. K., & Aron, L. Y. (2021). Effect of the covid-19 pandemic in 2020 on life expectancy across populations in the USA and other high-income countries: simulations of provisional mortality data. BMJ, n1343. https://doi.org/10.1136/bmj.n1343
75. World Health Organization: WHO. (2024). COVID-19 eliminated a decade of progress in global level of life expectancy. World Health Organization. https://www.who.int/news/item/24-05-2024-covid-19-eliminated-a-decade-of-progress-in-global-level-of-life-expectancy
76. World Health Organization: WHO. (2024). The top 10 causes of death. https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
77. Yang, Y., Niu, L., Amin, S., & Yasin, I. (2024). Unemployment and mental health: a global study of unemployment's influence on diverse mental disorders. Frontiers in Public Health, 12. https://doi.org/10.3389/fpubh.2024.1440403
78. Yari, F., Agheli, L., Sadeghi, H., & Faraji Dizaji, S. (2022). The socioeconomic and political determinants of life expectancy in selected countries of the world. Social Determinants of Health, 8(1). https://journals.sbmu.ac.ir/sdh/article/view/37839/29953
79. Yavari, K., & Mehrnoosh, M. (2006). Determinants of Life Expectancy: A cross – country analysis. Iranian Economic Review, 11 (15), 132-142. https://ier.ut.ac.ir/article_30853_3cf0e32798b75440e7f6859748e0f149.pdf