Communications on Applied Nonlinear Analysis
ISSN: 1074-133X
Vol 32 No. ICMASD (2025)

Environment Analysis and Standard of Living: A Case of Member Nations of Indian Ocean RIM Association

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Article History:

Received: 12-11-2024

Revised: 25-12-2024

Accepted: 05-01-2025

Abstract:

The world economy is experiencing rapid changes with advancement of technology, globalization and liberalization. All these factors also influence the standard of living, well being and quality of life of a particular nation. Indian Ocean is the third largest ocean of the world. The Indian Ocean RIM Association is an inter governmental organization, which established in the year 1997 to promote the regional economic corporation, consisting of 23 members and 10 dialogue partners. This study analysed the impact of GDP, Trade Openness and Urban Population, on CO2 Emissions of members of Indian Ocean RIM Association for the period of 1990 to 2019 and standard of living and quality of life of member nations of Indian Ocean RIM Association.

Keywords: Indian Ocean RIM Association (IORA), CO2 Emissions, Trade Openness, Population, Standard of Living ,Quality of Life, Human Development Index

Introduction

The world economy is experiencing rapid changes with advancement of technology, globalization and liberalization. All these factors also influence the standard of living, well being and quality of life of a particular nation. Indian Ocean is the third largest ocean of the world. The Indian Ocean RIM Association is an inter governmental organization, which established in the year 1997 to promote the regional economic corporation, consisting of 23 members and 10 dialogue partners. In the recent times debate on CO2 emissions has gained a great matter of concern. International trade also influenced the CO2 emissions.

. But the outbreak of the Covid-19 pandemic has highly impacted the economic, social and other activities, which further influenced the standard of living and quality of life.

Review of Literature:

Islam & Huda (1999) explained that even a densely populated country can live quite comfortably with a solar energy input of 79) and all the amenities that modern technology can provide[This does not even require any novel technology[Rich countries can afford to buy fossil fuel and are accustomed to a wasteful way of life[They will not initiate research for large-scale solar energy utilization[It is critical that poor countries in tropical regions mobilise their resources to develop technology .

Mazumdar (2002) examined the test approach is used in this study, which expands the study to look at convergence in quality of life across nations from 1960 to 1995. It evaluates convergence of those variables for other income categories, such as high, middle, and poor human development nations, in addition to the whole sample of 91 countries. The findings indicate divergence in all cases, showing that global economies are getting increasingly distinct in terms of human development index and per capita real gross domestic product throughout the period 1960-1995.

Voth (2004) narrated that most fresh research findings have offered growing but not clear credence to gloomy perspectives during the previous two decades. Importantly, real wages did not rise at anywhere near the rate predicted by previous forecasts. Between 1760 and 1830, overall improvements were moderate, with periods of reversal. Even by 1850, actual earnings had barely increased little. Longer hours of more strenuous work, conducted in more risky and unpleasant environments, were most likely purchased by Englishmen and women, many of whom lived in the unsanitary, disease-ridden, dark, wet, and congested circumstances of British cities throughout the mid-nineteenth century.

Bérenger & Chouchane (2007) examined about health and education standards are related with excellent functioning (or quality) in each sector using Sen's capabilities approach. In the area of health, we may examine if public spending, access to water, and the number of physicians allow women and children to live in healthy environments, and the population to have a high birth rate (as in Algeria, Egypt, Mauritius, Morocco, the Seychelles, Swaziland, and Tunisia). The inefficiency of the two sectors is due to their functioning (poor quality).

Antony & Rao (2007) described that the genuine level of life is determined by demographic, socioeconomic, health, and nutritional factors. Poverty, living standards, and human growth are all influenced by a variety of circumstances. Existing indices, such as the HDI and HPI, utilise income data to determine a person's level of living but ignore food and nutritional health. Because it is a complete index of income and non-income variables, the suggested index was found to be more suited for gauging the genuine quality of living and human development. Validation for diverse populations might be done in the future.

Winiarczyk & Razniak (2011) mentioned that according to the living conditions index, many of Poland's main metropolitan centres are not adequately suited to accommodate a growing population. Sub-regions bordering ód and the lskie Province had significant drops in the comprehensive index. The Kraków urban sub-region, as well as the sub-regions of Ek, Lublin, and Szczecin, saw the biggest gains in the index. During the study period, community infrastructure was also determined to be insufficient. In this example, the areas around significant cities like ód, Szczecin, and Katowice (more generally - Upper Silesia) had rather large declines. In terms of healthcare, the previously described shadow zone deepens surrounding Poland's largest cities. Kraków, Katowice, and the Tri-City are included. According to the living conditions index, several large urban centres in the United States are in poor shape. In terms of education, the future is brighter. The education index decreased the most in northern Poland, while it grew little in central Poland. This was notably true in the Tarnobrzeg, Radom, and Sieradz sub-regions. In terms of the culture index, the picture does not appear to be promising. Access to cultural services is similar to access to healthcare in that the comprehensive index has dropped practically everywhere in Poland. Only six sub-regions performed

better, including Biaystok, Sosnowiec, and Katowice. For the Jelenia Góra sub-region, the highest reduction in the cultural services index was computed. Poland is ill-equipped to deal with the situation.

Schoch & Pfister (2012) specified that the average height series for each social stratum has a distinct pattern when compared to the underlying job profiles' respective real-wage series, which indicates a certain income bracket. Lower-class conscripts' height is most strongly connected with their real-pay series, whereas skilled workers' wage series is significantly less so. The average height series of upper-class conscripts, on the other hand, is strongly connected to the salary series of carpenters, that is, employees with substantial abilities, reasonably steady working circumstances, and long-term employment contracts. As a result, we find that the biological standard of living yearly average for each class is extremely strongly connected to the associated real-wage series and hence reflects underlying economic realities

Madzík & Daňková (2015) expressed that the goal of this research was to look at the relationship between a country's competitiveness and its population's level of life. Long-term statistics show that there is a link between GDP per capita and population living standards, as evidenced by the strongest correlation between income and other relevant variables in our study. One of the study's most important contributions is the use of empirical research findings to theory creation and the identification of future scientific research areas.

Brambert & Kiniorska (2018) expressed that the standard of living is not a uniform category, and its diversity is mostly determined by a region's character, structure, and, above all, socioeconomic situations. Fast growth is a characteristic of rural regions located near metropolitan centres; yet, it is dependent to a considerable extent on labour resources and the potential of a specific zone connected to big cities.

Njiru & Letema (2018) mentioned that Kirinyaga residents are facing energy poverty as manifested in reliance on traditional fuels by households, educational institutions, and agroprocessing industries, coupled with low access to electricity. Energy access directly or indirectly influences availability and consumption of goods and services and hence affects peoples' standard of living. Low energy access thus lowers people's living standards. The low access to electricity has led reliance on traditional fuels. Use of solid fuels leads to indoor air pollution which is associated with premature death caused by respiratory and heart ailments. Fuel wood scarcity and associated high cost have affected the dietary patterns of Kirinyaga residents through switching from their traditional foods that take long time to cook, to foods that demand less fuel, thus impacting on calorific intake. Some residents have resorted to street foods exposing themselves to health risks associated with street food. Diseases resulting from consumption of street food can lower living standards if household income is largely diverted to health issues. Regions with higher electrification rates have more residents with higher educational levels and life expectancy. Electricity access improves school completion rates, thus enabling the residents get well-paying jobs which in turn improves their purchasing power eventually raising living standards. Electricity access improves provision of health care and reduces maternal and child morbidity and mortality, thus raising the life expectancy. Access to modern energy services therefore has a positive impact on standard of living.

Research Methodology

To make an analysis of the standard of living of member nations of IORA RIM Association five variables have been taken into consideration. The variables are life quality index, safety index, healthcare index, pollution index and climate index. . The Indian Ocean RIM Association is an inter governmental organization, which established in the year 1997 to promote the regional economic corporation, consisting of 23 members and 10 dialogue partners. But the present research concentrated on 11 members. For find out the relationship between CO2 Emissions , GDP, Trade Openness and Urban Population of members of Indian Ocean RIM Association, Unit Root, Johnson Cointegration test and Granger Causality test has been applied.

Karl Pearson correlation coefficients between Life Quality Index, Safety Index, Healthcare Index, Pollution Index and Climate Index to find out the association exist among them. Proximity Matrix of Life Quality Index, Safety Index, Healthcare Index, Pollution Index and Climate Index of Select Member Nations of Indian Ocean RIM Association, calculate the similarity of standard of living indexes between Australia, United Arab Emirates proximities, Singapore, Malaysia, India, Thailand, Indonesia, Sri Lanka, Iran, Kenya and Bangladesh.

Environmental Analysis

Ho1: D(LOG(GDP)) has a unit root

Ho2: D(LOG(TRADEOPENESS)) has a unit root

Ho3:D(LOG(URBAN_POPULATION_IORA)) has a unit root

Ho4: D(LOG(CO2_EM)) has a unit root

Table 1 Augmented Dickey-Fuller test statistic(At First Difference)

Variable	t-Statistic	Prob.*	Null Hypothesis
Log(GDP)	-3.535407	0.0144	Rejected
Log(TRADEOPENESS)	-4.325332	0.0021	Rejected
Log(URBAN_POPULATION_IORA)	-3.731961	0.0088	Rejected
Log(CO2_EM)	-3.038911	0.0439	Rejected

Source: Authors Calculation

Table 1 describes the ADF Unit Root Test on GDP, Trade Openness , Urban Population, CO2 Emissions of members of Indian Ocean RIM Association. The value of ADF is -3.535407 for GDP, -4.325332 for TRADEOPENESS, -3.731961 for URBAN_POPULATION_IORA and -3.038911 for CO2_EM . In all cases p value is less than 0.05. The null hypothesis is rejected and it is concluded that series is stationery at first difference for GDP, Trade Openness , Urban Population, CO2 Emissions of members of Indian Ocean RIM Association.

Cointegration Test

Assumption: Quadratic deterministic trend

H0: No deterministic Trend

Table 2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05		Null Hypotheses
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	
None *	0.571601	65.28168	55.24578	0.0051	Rejected
At most 1 *	0.564441	42.39379	35.01090	0.0069	Rejected
At most 2 *	0.368421	19.95344	18.39771	0.0301	Rejected
At most 3 *	0.243826	7.546064	3.841466	0.0060	Rejected

Source: Authors Calculation

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
. * denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Co-integration test examine the existence of long run relationship between GDP, Trade Openness , Urban Population, CO2 Emissions of members of Indian Ocean RIM Association. The p value is less than 0.05 and this explains the rejection of null hypothesis. A long run association exists in case of GDP, Trade Openness , Urban Population, CO2 Emissions of members of Indian Ocean RIM Association.

Table 3:Granger Causality

Null Hypothesis	F-Statistic	Prob	Result
LOG(GDP) does not Granger Cause LOG(CO2_EM)	0.43196	0.6546	Accepted
LOG(CO2_EM) does not Granger Cause LOG(GDP)	3.80893	0.0380	Rejected
LOG(TRADEOPENESS) does not Granger Cause LOG(CO2_EM)	0.27448	0.7625	Accepted

LOG(CO2_EM) does not Granger Cause LOG(TRADEOPENESS)	4.95339	0.0167	Rejected
LOG(URBAN_POPULATION_IORA) does not Granger Cause LOG(CO2_EM)	0.28751	0.7529	Accepted
LOG(CO2_EM) does not Granger Cause LOG(URBAN_POPULATION_IORA)	6.84996	0.0049	Rejected
LOG(TRADEOPENESS) does not Granger Cause LOG(GDP)	3.82641	0.0368	Rejected
LOG(GDP) does not Granger Cause LOG(TRADEOPENESS)	3.30450	0.0548	Rejected
LOG(URBAN_POPULATION_IORA) does not Granger Cause LOG(GDP)	0.23265	0.7943	Accepted
LOG(GDP) does not Granger Cause LOG(URBAN_POPULATION_IORA)	8.39052	0.0018	Rejected
LOG(URBAN_POPULATION_IORA) does not Granger Cause LOG(TRADEOPENESS)	0.36077	0.7010	Accepted

LOG(TRADEOPENESS) does not Granger Cause LOG(URBAN_POPULATION_IORA)	5.18965	0.0138	Rejected

The results show that there is bidirectional causal relationship between CO2 emissions, GDP , Trade Openness and Urban Population.

$\log Co2ijt = \alpha 0 + \alpha 1 \log Yit + \alpha 2 \log Tit + \alpha 3 \log Pit + uit$

Where Co2= Carbon dioxide emissions of IORA nations in time period t

Yit= Gross Domestic Product of IORA nations in the time period t

Tit= Trade Openness

Pit=Urban Population

Uit= Error term

Table4: Ordinary Least Square

Dependent Variable: LOG(CO2_EM)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDP)	0.713621	0.062560	11.40706	0.0000
LOG(TRADEOPENESS)	-0.111323	0.040714	-2.734254	0.0111
LOG(URBAN_POPULATION_IORA)	0.099764	0.168067	0.593593	0.5579
R-squared	0.954211	Mean dependent var		19.26108
Adjusted R-squared	0.950689	S.D. dependent var		0.217017
S.E. of regression	0.048191	Akaike info criterion		-3.129581
Sum squared resid	0.060382	Schwarz criterion		-2.988137
Log likelihood	48.37892	Hannan-Quinn criter.		-3.085282
Durbin-Watson stat	0.449363			

Source: Authors calculations

The OLS results reveal that a 1% increase in GDP leads to a %0.713621increase CO2 emissions and a 1% increase in trade openness leads to % 0.111323 decrease in CO2 emissions.

Standard of living of Indian Ocean RIM Association Member Nations: The Standard of Living in India varies from member nation to member nation. All the member nations have different Rate of poverty, per capita income and income inequality, education system, healthcare amenities,

life quality, safety parameters, environmental concerns, Cultural resources etc. According to United Nations Human Development Index (HDI), the standard of living refers to the level of capital, comfort, requirements, and material goods available to a particular geographic area. Quality of life is the standard of health, comfort, and happiness experienced by a group. The quality of life index is based on purchasing power, safety, health care, cost of living, traffic commuting time, climate and level of pollution.

Table 5 Standard Of Living Index of Indian Ocean RIM association member nations

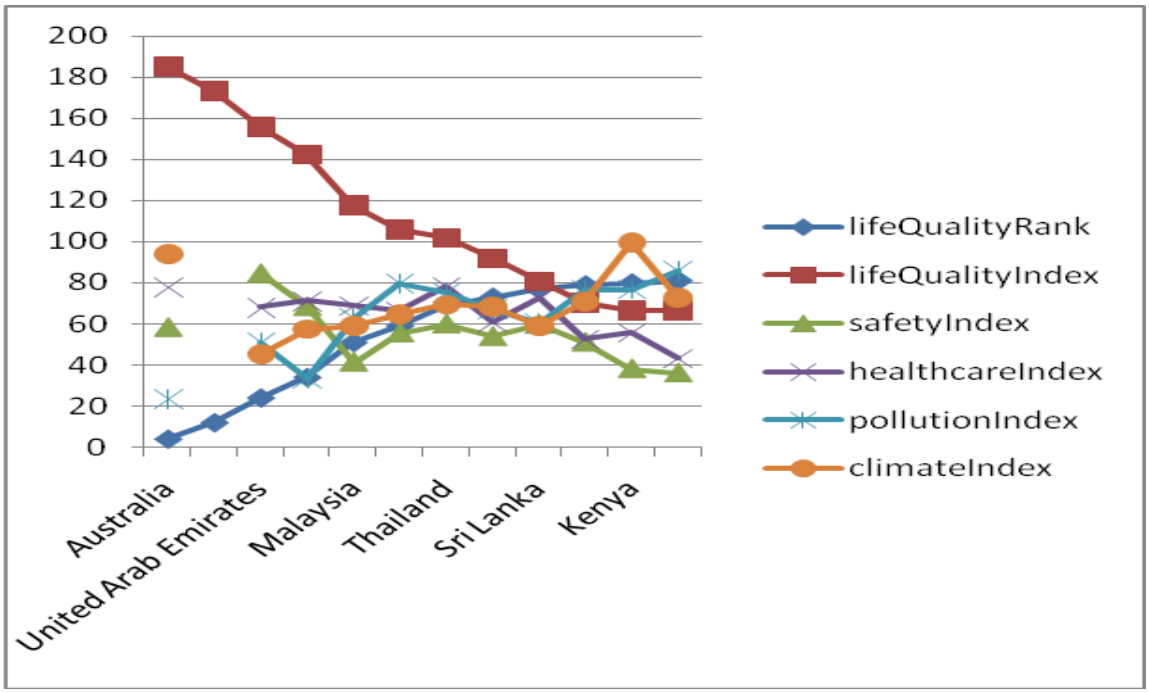
Country	lifeQuality Rank	lifeQualityIndex	safetyIndex	healthcareIndex	pollutionIndex	climateIndex
Australia	4	185.03	58.33	77.81	23.22	94.2
Oman	12	173.08	-	-	-	-
United Arab Emirates	24	155.41	84.55	67.92	50.66	45.23
Singapore	34	142.25	68.47	70.97	33.3	57.45
Malaysia	51	117.42	41.45	68.87	62.81	59.21
India	59	105.86	55.58	66.21	79.56	64.74
Thailand	69	101.64	59.99	78.04	75.26	69.45
Indonesia	73	91.63	53.94	60.51	66.9	68.48
Sri Lanka	77	80.36	59.77	72.44	60.03	59.11
Iran	79	70.32	51.09	52.23	76.69	70.99
Kenya	80	66.6	38.27	55.58	76.56	99.79
Bangladesh	81	66.29	36.18	43.08	85.83	72.91

Source:worldpopulationreview.com

Table 5 explains life Quality Rank, life Quality Index, safety Index, healthcare Index, pollution index, climate index. In case of IORA member nations in case of life Quality Rank only Australia, Oman, UAE and Singapore are in better position. Bangladesh attained the lower middle economy status in the year 2015. There is a reduction in poverty from 43.8 per cent recorded in 1991 to 14.8 per cent recorded in year 2016. Kenya congregated various Millennium Development Goals, by reducing child mortality, primary school enrollment, investment in healthcare sector etc. In case of Kenya there are severe rural/urban differences in poverty rate, rural areas witnessed 27 per cent and 6 per cent in urban areas. Sri Lanka is a lower middle income economy. There is a decline in head count poverty from 15.6 per cent in the Year 2006-07 to 4.1 per cent in the year 2016. Before the outbreak of pandemic, Indonesia was in a better position. But due to lack of social assistance 5.5 to 8 million people in Indonesia have been pushed in to poverty. Thailand witnessed lower poverty rate as compare to 80's. There is a decline in poverty from last 3 decades from 65.2 per cent to 9.85 per cent in the year 2018. Since the 2000s, there has been reduction in absolute poverty. Poverty levels

recorded in 2015 declined, lifted 90 million people out of extreme poverty. The impact of pandemic on Indian economy is also very severe. The majority of the population in India engaged in informal sector. This further deteriorated the standard of living of the people. The Covid-19 has impacted the Malaysia. Less than 1 per cent of the population living in extreme poverty. The low income group is the main victim of pandemic, because there is increase in cost of living. Income inequality in case of Malaysia is relatively higher as compare to other East Asian economies. (worldbank.org)

Fig 1 Standard Of Living Index of Indian Ocean RIM association member nations



Source:worldpopulationreview.com

Table 6 Correlations between Life Quality Index, Safety Index, Healthcare Index, Pollution Index and Climate Index

		lifeQualityIndex	safetyIndex	healthcareIndex	pollutionIndex	climateIndex
lifeQualityIndex	Pearson Correlation	1	.634*	.682*	-.871**	-.144
	Sig. (2-tailed)		.036	.021	.000	.672
safetyIndex	Pearson Correlation	.634*	1	.577	-.559	-.581
	Sig. (2-tailed)	.036		.063	.074	.061
healthcareIndex	Pearson Correlati	.682*	.577	1	-.636*	-.187

	on					
	Sig. (2-tailed)	.021	.063		.036	.582
pollutionIndex	Pearson Correlation	-.871**	-.559	-.636*	1	.042
	Sig. (2-tailed)	.000	.074	.036		.902
climateIndex	Pearson Correlation	-.144	-.581	-.187	.042	1
	Sig. (2-tailed)	.672	.061	.582	.902	
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: Author's Calculations

There is positive correlation between life quality index ,safety index and health care index. But a negative association exists between life quality index, pollution index and climate index.

Table 7 Proximity Matrix of Life Quality Index, Safety Index, Healthcare Index, Pollution Index and Climate Index of Select Member Nations of Indian Ocean RIM Association

	Correlation between Vectors of Values										
	1:Australia	3:United Arab Emirates	4:Singapore	5:Malaysia	6:India	7:Thailand	8:Indonesia	9:Sri Lanka	10:Iran	11:Kenya	12:Bangladesh
1:Australia	1.000	.835	.950	.852	.697	.788	.829	.799	.119	.092	-.020
3:United Arab Emirates	.835	1.000	.956	.800	.738	.756	.718	.813	-.027	-.352	-.173
4:Singapore	.950	.956	1.000	.836	.699	.782	.754	.864	-.049	-.204	-.194
5:Malaysia	.852	.800	.836	1.000	.946	.993	.946	.887	.385	.150	.285
6:India	.697	.738	.699	.946	1.000	.950	.949	.734	.582	.197	.488
7:Thailand	.788	.756	.782	.993	.950	1.000	.920	.890	.396	.142	.312

8:Indonesia	.829	.718	.754	.946	.949	.920	1.000	.696	.608	.369	.496
9:Sri Lanka	.799	.813	.864	.887	.734	.890	.696	1.000	-.064	-.208	-.144
10:Iran	.119	-.027	-.049	.385	.582	.396	.608	-.064	1.000	.786	.985
11:Kenya	.092	-.352	-.204	.150	.197	.142	.369	-.208	.786	1.000	.807
12:Bangladesh	-.020	-.173	-.194	.285	.488	.312	.496	-.144	.985	.807	1.000
This is a similarity matrix											

Source: Author's calculations

1. Australia proximities: Australia They are lowest with Iran , Kenya and Bangladesh , highest with Singapore, United Arab Emirates, Malaysia, Thailand, Sri Lanka and Indonesia, and in between with India.
2. United Arab Emirates proximities: They are lowest with Iran , Kenya and Bangladesh , highest with Australia, Singapore, Malaysia , Thailand, , Sri Lanka, Indonesia and India.
3. Singapore: They are lowest with Iran, Kenya and Bangladesh, highest with Australia, United Arab Emirates, Malaysia, Thailand, Sri Lanka and Indonesia, and in between with India.
4. Malaysia: They are lowest with Iran, Kenya and Bangladesh, highest with Australia, Singapore, United Arab Emirates, Thailand, Sri Lanka, Indonesia and India.
5. India: They are lowest with Kenya and Bangladesh, highest with Malaysia, Thailand, Indonesia, Sri Lanka, UAE and in between with Australia, Singapore and Iran.
6. Thailand: They are lowest with Iran , Kenya and Bangladesh , highest with Australia, Singapore, Malaysia , Thailand, , Sri Lanka, Indonesia and India.
7. Indonesia: They are lowest with Kenya and Bangladesh, highest with Malaysia, India, Thailand, Australia, UAE, Singapore and in between with Sri Lanka and Iran.
8. Sri Lanka: They are lowest with Iran , Kenya and Bangladesh , highest with Australia, United Arab Emirates, Malaysia, Thailand, Sri Lanka and India, and in between with Indonesia.
9. Iran: They are lowest with Australia, UAE, Singapore and Sri Lanka highest with Bangladesh, Kenya and Indonesia and in between with Malaysia, India and Thailand.
10. Kenya: They are lowest with Australia, UAE, Singapore, Malaysia, India, and Thailand, highest with Iran and Bangladesh and in between with Indonesia and Sri Lanka.
11. Bangladesh: They are lowest with Australia, UAE, Singapore, and Sri Lanka, highest with Iran and Kenya and in between with Malaysia, India, Thailand and Indonesia.

Conclusion(s): The results show that there is bidirectional causal relationship between CO2 emissions, GDP , Trade Openness and Urban Population. The OLS results reveal that a 1% increase in GDP leads to a %0.713621increase CO2 emissions and a 1% increase in trade openness leads to

% 0.111323 decrease in CO2 emissions. The outbreak impacted all the economies badly in the world. But in case of Indian Ocean RIM Association, majority of member nations are low income or middle income economies with social assistance from Government. Main part of the population in India is engaged in informal sector, any package announced by the government for the support may not be beneficial for them. In case of IORA member nations, life Quality Rank is in better position only for Australia, Oman, UAE and Singapore.

References

[1] Akin, C. S. (2014). The impact of foreign trade, energy consumption and income on CO2 emissions. *International Journal of Energy Economics and Policy*, *4*(3), 465.

[2] Alkhathlan, K., Alam, M. Q., & Javid, M. (2012). Carbon dioxide emissions, energy consumption and economic growth in Saudi Arabia: A multivariate cointegration analysis. *Journal of Economics, Management and Trade*, 327-339.

[3] Bérenger, V., & Verdier-Chouchane, A. (2007). Multidimensional measures of well-being: Standard of living and quality of life across countries. *World Development*, *35*(7), 1259-1276.

[4] Brambert, P., & Kiniorska, I. (2018). Changes in the standard of living in rural population of Poland in the period of the Eu membership. *European Countryside*, *10*(2), 263.

[5] Destek, M. A., Balli, E., & Manga, M. (2016). The relationship between CO2 emission, energy consumption, urbanization and trade openness for selected CEECs. *Research in World Economy*, *7*(1), 52-58.

[6] Deutsch, J., Ramos, X., & Silber, J. (2003). Poverty and inequality of standard of living and quality of life in Great Britain. In *Advances in quality-of-life theory and research* (pp. 99-128). Springer, Dordrecht.

[7] Easterlin, R. A. (2000). The worldwide standard of living since 1800. *Journal of Economic Perspectives*, *14*(1), 7-26.

[8] Easterlin, R. A., & Angelescu, L. (2012). Modern economic growth and quality of life: Cross-sectional and time series evidence. In *Handbook of social indicators and quality of life research* (pp. 113-136). Springer, Dordrecht.

[9] Filtzer, D. (2006). Standard of living versus quality of life: Struggling with the urban environment in Russia during the early years of post-war reconstruction. In *Late Stalinist Russia* (pp. 93-114). Routledge.

[10] Halicioglu, F. (2009). An econometric study of CO2 emissions, energy consumption, income and foreign trade in Turkey. *Energy policy*, *37*(3), 1156-1164.

[11] Hasanov, F. J., Liddle, B., & Mikayilov, J. I. (2018). The impact of international trade on CO2 emissions in oil exporting countries: Territory vs consumption emissions accounting. *Energy Economics*, *74*, 343-350.

[12] Jayanthakumaran, K., Verma, R., & Liu, Y. (2012). CO2 emissions, energy consumption, trade and income: a comparative analysis of China and India. *Energy Policy*, *42*, 450-460.

[13] https://worldpopulationreview.com/country-rankings/standard-of-living-by-country

[14] https://www.worldbank.org/en/country/bangladesh/overview

[15] http://hdr.undp.org/en/content/human-development-index-hdi

[16] Islam, S., & Huda, A. U. (1999). Technical note Proper utilization of solar energy in Bangladesh: effect on the environment, food supply and the standard of living. *Renewable energy*, *17*(2), 255-263.

[17] Madzík, P., Piteková, J., & Daňková, A. (2015). Standard of living as a factor of countries' competitiveness. *Procedia Economics and Finance*, *34*, 500-507.

[18] Mazumdar, K. (2002). A note on cross-country divergence in standard of living. *Applied Economics Letters*, *9*(2), 87-90.

[19] Njiru, C. W., & Letema, S. C. (2018). Energy poverty and its implication on standard of living in Kirinyaga, Kenya. *Journal of Energy*, *2018*.

[20] Powdthavee, N. (2007). 21 Happiness and the standard of living: the case of South Africa. *Handbook on the Economics of Happiness*, 447.

[21] Schoch, T., Staub, K., & Pfister, C. (2012). Social inequality and the biological standard of living: An anthropometric analysis of Swiss conscription data, 1875–1950. *Economics & Human Biology*, *10*(2), 154-173.

[22] Sebri, M., & Ben-Salha, O. (2014). On the causal dynamics between economic growth, renewable energy consumption, CO2 emissions and trade openness: Fresh evidence from BRICS countries. *Renewable and Sustainable Energy Reviews*, *39*, 14-23.

[23] Shahbaz, M., Mahalik, M. K., Shah, S. H., & Sato, J. R. (2016). Time-varying analysis of CO2 emissions, energy consumption, and economic growth nexus: Statistical experience in next 11 countries. *Energy Policy*, *98*, 33-48.

[24] Voth, H. J. (2004). Living standards and the urban environment. *The Cambridge economic history of modern Britain*, *1*, 1700-1860.

[25] Winiarczyk-Razniak, A., & Razniak, P. (2011). Regional differences In the standard of living in Poland (based on selected indices). *Procedia-Social and Behavioral Sciences*, *19*, 31-36.

[26] Wawrzyniak, D. (2016). Standard of living in the European Union. *Comparative Economic Research. Central and Eastern Europe*, *19*(1), 141-155.

[27] Zhang, S., Liu, X., & Bae, J. (2017). Does trade openness affect CO 2 emissions: evidence from ten newly industrialized countries?. *Environmental Science and Pollution Research*, *24*(21), 17616-17625.