



Afsheen Hashmat¹, Ghulam Ghouse², Nawaz Ahmad³

Abstract

The whole world is facing the issue of altering climate and bad environmental quality due to the extreme increase in carbon emissions. Against the backdrop, this study plans to examine the effect of environmental degradation on human development, controlling for income inequality, education inequality, gender inequality, unemployment, GDPPC, institutional quality and urbanization in the context of very high, high, medium and low HDI economies during the time scope from 1996 to 2021. For measuring environmental impact, we use both ecological footprints and carbon dioxide emission (CO₂) figures for these countries. Overall, the generalized method of moments analysis confirms the strong relationship among the study variables. GMM analysis confirms that environmental quality by surging the ecological footprints and carbon emission deteriorates human development of the selected nations. Similarly, disparities in the form of income, education and gender impose an adverse impact on human development as unemployment also has a contrary impact on human development. While GDP, institutional quality and urbanization are evidenced to ensure human welfare. Hence, considering these key outcomes, a set of relevant human welfare-related policies needs to be recommended in the context of selected countries.

Keywords: Human development index, Ecological footprints, Carbon dioxide emissions, Inequalities, Institutional quality, Urbanization

1. Introduction

The development of humans by humans is called human development. The human development index can be defined as “The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living,” (UNDP). The United Nations Development Program (UNDP) highlighted the fact in the Human Development Report that human development is at the first rank from the 1990s to the present and it is linked to society (Klugman, 2010). The human development index (HDI) refers to an environment in which people get pleasure from their healthy, wealthy and long lives. Thus, it becomes essential to create a situation where the humans of the society can meet the expense of a decent living standard. The human development index is the mixture of better health, education and standard of life. However, the per capita income is not the only factor that governs human development. Because an increase in per capita does not mean that the lives of humans would be better off (Taqi et al., 2021). But increase in levels of human development causes to increase more opportunities for enhancing economic growth.

The HDI provides a broader perspective on development, encompassing health, education, and income. It offers a comparative measure to assess and rank countries based on their achievements in these areas. The HDI ranges from 0 to 1, with higher values indicating higher levels of human development. Public health expenditures and the Human Development Index (HDI) are two distinct indicators that provide insights into the well-being and development of a country. While they are related in some ways, they represent different aspects of a nation's progress (Ali, 2018). Public health expenditures can contribute to improvements in the components of the HDI. For instance, investing in healthcare infrastructure, disease prevention, and healthcare services can positively impact life expectancy at birth. Similarly, investments in education and income growth can also be influenced by public health spending, as healthier populations are more likely to be productive and participate in education (Ali, 2015).

The main source of climatic change is global warming. At a worldwide level, many efforts have been made to treat the ecology and climate change pressures (Ji et al., 2021). Day by day demand for humans has increased for survival because of the high increase in population and urbanization. So, this thing has placed an extra burden on the industrial sector as well as economic growth (Ji et al., 2021). Thus, the survival countries are facing different challenges of sustainability due to poor environmental quality (Umar et al., 2021b). For this purpose of sustainable development, the United Nations developed many goals in 2018 to protect the environment from more degradation (Ali & Bibi, 2017; Mehmood & Mansoor, 2021; Usman & Hammar, 2021; Zeng et al., 2020).

Carbon emissions contribute to air pollution, which can lead to respiratory and cardiovascular diseases, among other health issues. Poor air quality can decrease life expectancy and overall quality of life, thereby affecting the HDI. Additionally, climate change, driven by carbon emissions, can exacerbate health risks, including heat-related illnesses, infectious diseases, and food insecurity (Ali & Ahmad, 2014; Sajid & Ali, 2018; Chen, Cai & Ma, 2020).

Gender inequality in education and health has hindered a country's progress in achieving high levels of human development. When girls and women face barriers to accessing quality education and better health opportunities, it can lead to lower literacy rates, limited opportunities for skill development, low rate of life expectancy and reduced economic participation. This gender disparity in education and health can negatively impact the HDI by limiting human capital development and economic empowerment (Arshad & Ali, 2016; Gelard and Abdi, 2016; Dijkstra and Hanmer, 2000).

The effects of income and wealth inequality have been the foremost concern of researchers forever and day (Aiyar and Ebeke, 2020). The relation between income distribution and economic growth can be at least tracked down by Kaldor (1956) who highlights the influence of the distribution of income on capital accumulation and hence on economic growth. On the other hand, the other study concentrates mostly on the opposite direction and that is the effect of growth or stage of development on the distribution of income (Kuznets, 1955). Inequality and income distribution can sluggish capital accumulation and growth through three transmission channels.

¹ Ph.D. Scholar, the University of Lahore, Pakistan, afsheenhashmat198@gmail.com

² Associate Professor, the University of Lahore, Pakistan, ghulam.ghouse@econ.uol.edu.pk

³ Research Professor, Al-Baraiem Al-Khadhra, Dubai, UAE, nawazecon74@gmail.com

Health is the basic indicator of the population for measuring the environmental as well as the economic situation of a country. Thus spread of diseases depends on human environmental factors like social, medical, and hereditary (Goloshumova et al., 2019). Changes in the environment through urbanization of the population caused an increase in the number of patients with chronic dermatoses. The condition of both the living environment and working environment plays a vital role in human physical and mental health (Sokolovskaya et al., 2019; Senturk & Ali, 2021; Mehmood et al., 2022).

The first one is, that inequality could cause social and political volatility that weakens the incentives to save and invest. The second is, that the social and political volatility through income inequality can create pressure on the government to raise the redistribution of income. So that economic incentives could reduce, by this means, capital accumulation and economic growth slowdown. The third channel works by the accumulation of human capital. Poor people refuse to invest in human capital if the borrowing is costly and difficult and consequently, income inequality leads towards the poverty cycle (Benabou, 1996; Mo, 2000). So, inequality is detrimental to economic growth (Alesina & Rodrik, 1994; Persson & Tabellini, 1994; Deininger & Squire, 1998; Easterly, 2001; Castelló & Doménech, 2002; Knowles, 2005). But some researchers have given evidence of the opposite (Partridge, 1997; Li & Zou, 1998; Forbes, 2000). So, income inequality and economic growth have ambiguous relations. There are some theories behind this study so; the first theory is the "Social Disruption" theory argues that environmental pollution can lead to a disruption of social norms and relationships, which in turn can negatively impact mental health and human well-being. This theory is supported by research showing that exposure to pollution can lead to a loss of community cohesion, social isolation, and other social problems that can contribute to mental health issues. Same as another theory "Environmental Stress" proposes that exposure to environmental pollution can lead to chronic stress, which can negatively impact mental health. This theory is supported by research showing that exposure to pollution can lead to an increase in cortisol, a stress hormone, as well as changes in brain chemistry that can contribute to mental health problems.

Individual factors, neighbourhood level, or environmental elements can characterize socio-environmental risk factors for schizophrenia. Individual factors incorporate unemployment, poverty, low financial status, and migration (Byrne et al., 2004; Cooper, 2005; Subramanian & Kawachi, 2004), while neighbourhood-level elements incorporate urbanization and ethnic violence (Krabbendam & Van Os, 2005; Myin-Germeys et al., 2005). Inadequate internal resources and self-respect may be an important precondition of mental health in adults, and this will happen when social support is low. Because in bi-variable analysis, social support has a positive link with mental health (Bovier et al., 2004).

Urbanization is one of the most fast-changing phenomena in the current world; this is because a large number of individuals are moving to urban areas day to day for different economic needs and social security. Under ordinary conditions, urbanization improves efficiency, opens up more monetary forecasts, creates more capital, and leads to more advancement that reshapes arts, science, politics, and different professions (Bloom et al., 2008; Glaeser, 2011; Stewart, 1986). Contrariwise, urbanization speeds up the spread of diseases, crime, poverty, unemployment, and environmental degradation (Bloom et al., 2008). Climatic changes are presently viewed as a vital threat to feasible and sustainable development and human prosperity (Yasin et al., 2020).

Institutional quality has to strengthen relations with long-term mental health. Proper institutional care is the core component of reducing long-term mental health problems. However, on the other hand, inadequate provision of institutional care negatively impacts mental health. Institutional quality is related to long-term and short-term mental health issues. (Taylor et al., 2009).

This study is unique in several aspects within this framework. We aimed to conduct a study that utilized global data, considering HDI classifications, to analyze the impact of economic and environmental drivers on the Human Development Index (HDI). Furthermore, we encountered a lack of studies that estimate the impact of the ecological footprint as an environmental driver on HDI. Additionally, our study incorporates a comparative analysis of global data within HDI classifications.

2. Literature Review

Zhang et al. (2023) examine the impact of urbanization, natural resources, and the use of energy on carbon emissions. Results of the study propose that natural resources, urbanization and use of energy have positive effects on carbon emission in top carbon emitter countries. Contrariwise, human development has a negative effect on carbon emissions for top-emitter countries.

Mahalik et al. (2022) discovered the influence of CO₂ emissions on life expectancy in developing countries from 1990 to 2017. This study examines the relationship between CO₂ emissions and life expectancy by using disaggregated panel data analysis. Mainly focused of this study is on two types of CO₂ emissions consumption and production-based CO₂ emissions. The result of the study shows that there is a negative relationship between CO₂ emissions and life expectancy in developing countries. The finding shows that CO₂ emission has decreased the expectancy of life. Thus, the consumption side of CO₂ emissions has a positive relationship with life expectancy instead of the production side. Furthermore, an increase in income does not mean that it reduces environmental degradation and provides a healthy life.

Usman et al. (2023) tried to examine the impact of energy consumption, and financial and economic development on the ecological footprint of 119 developed and developing countries. It used panel data. Panel unit root was employed and an autoregressive distributed lag (ARDL) model was used. The ARDL results showed that energy consumption, financial development, urbanization, globalization, foreign direct investment, and population growth had a positive impact on the ecological footprint in developed countries. Whereas, the HDI and natural resources affected negatively the ecological footprint in the developed countries. On the other side, in developing countries, energy consumption, financial development, urbanization, foreign direct investment, and population growth positively affect the ecological footprint in the long run. Moreover, HDI, natural resources and globalization showed an inverse effect on the ecological footprint. The study emphasized implementing effective policy implications for developing and developed countries to overcome their ecological footprint.

Zhang et al. (2019) worked to find out the drivers of carbon emissions in the top 10 countries. The logarithmic mean division index (LMDI) was used for analyzing the drives of CO₂ emission change pertinent to population (thousand people), per capita income, energy intensity (metric ton energy/ \$GDP) and carbon intensity effects (metric ton CO₂/ton energy from 1991 to 2014 in China,

United States, India, Russian Federation, Japan, Germany, South Korea, Iran, Canada, and Saudi Arabia. The study also analyzed the impact of carbon emissions by sectors like Agriculture, Energy, Fugitive, Industrial, Manufacturing, Transportation and Waste, the corresponding Human Development Index (HDI) and economic growth (EG%) using the panel model. The prediction was made for the next 16 years about carbon emissions. The results showed that carbon emission was significantly affected by population and income in China and the United States especially. It also showed that there exists a strong relationship between the human development index, economic growth, as well as Healthy Life Expectancy (HLE) by carbon emission sector. The carbon emission sector showed an increase in carbon emission for all the countries in 2030 which should be controlled by a proper policy.

Hossain and Chen (2021) worked to find out the relationship between carbon emissions and HDI in Bangladesh based on the decoupling relationship and index decomposition. It used time series data from 1990 to 2018. The results showed a weak but strong decoupling all through the analysis time. From different factors' points of view of the index decomposition, it showed that change in economic activity factor produced a significant amount of carbon emissions about 0.0623 tonnes or 105%. Energy intensity and economic structure factors increased carbon emissions by 10.77% and 2.77% respectively. On the other side, CO₂ emissions' coefficient and energy structure factors decreased carbon emissions to some extent, and in terms of percentage, it replicates 7.27% and 11.97%, respectively. The paper suggested regulations to speed up low-carbon growth.

Jiang and Shi (2023) worked to Estimate sustainability and regional inequalities using an enhanced sustainable development index in China. Global warming has led to natural disasters and a lower margin for greenhouse gas emissions which has affected development sustainability and regional inequalities. Time series data was used from 1997 to 2018 for China. An enhanced sustainable development index (ESDI) was developed, which retained the base formula of the sustainable development index (SDI) but restructured the ecological component by replacing the material footprint (MF) with agricultural disaster intensity. The results showed that an overall ESDI decreased in China with (regional) differences between the northern and southern half of China (north decreasing and south increasing). While the spatial inequities of development sustainability continued to increase in the northern half of China. The lower sustainability is in the northern half, and the higher sustainability is clustered in the southern half. The former showed more imbalances than the latter. CO₂ emissions increased since the late 2000s mainly accounts for the ESDI decrease in all of China and was more responsible for the enlarging sustainability imbalance as well.

Elistia and Syahzuni (2018) tried to explain the correlation of HDI towards Economic growth (GDP per capita) in ten ASEAN member countries. It explained that growth had shown an important determinant in the economic development of a country. Many factors could increase economic growth. The growth rate of a country appears in the GDP per capita. The presence of human power resources had shown in the value of HDI. The period was taken between 2010 to 2016. Ten countries were taken to test economic growth in GDP per capita. The results indicated that each country had a significant correlation between HDI and GDP. It also concluded that the level of HDI could affect GDP per capita. So, GDP per capita could be an indicator of welfare in the country.

Hudakova (2017) tried to explain the relationship between GDP and HDI. The study explained that GDP per capita is a measure of the economic output of a country, but it could not measure economic welfare. So, HDI was used which not only describes the economic growth of a country but also describes the abilities of people which could be the criteria to evaluate the development of a country. A correlation coefficient (+1, -1 or 0) was used. Data were obtained from Eurostat and the United Nations Development Programme ranging from 2000 to 2015. The result pointed out some small regional differences. While in most regions, the correlation value was more than 0.9. The correlation value in Bulgaria and Slovenia was between 0.8 and 0.9. In Croatia, the value of correlation was lowest at 0.71. GDP showed an important determinant of economic welfare and was closely linked with HDI.

Shah and Smith (2016) tried to find out the determinants of HDI. Seven variables were used for this purpose. Regression analysis was made for GDP per capita, literacy rate, inflation, CO₂ emissions, fertility rate and Gini index. Human Development Report, 2014 for seven regions was used as a data source. The result showed that GDP per capita, literacy rate, life expectancy at birth, Gini index, fertility rate and CO₂ emissions were significantly related to HDI. It also showed that Europe and Central Asia, Latin America and the Caribbean had higher HDI. On the other side, South Asia and Sub-Saharan Africa had lower HDI. The policy suggested that HDI could be achieved by using three dimensions education index, income index and health index.

This study involves examining the trends and patterns of COVID-19 waves and correlating them with fluctuations in the Islamic finance industry. Researchers might use quantitative methods to analyze data and develop models for forecasting future trends. The study also provides a general understanding of how pandemics, such as COVID-19, might impact the Islamic finance industry, and how researchers may approach studying these effects (Ghouse et al. 2023; Ghouse et al. 2021).

Feriyanto (2016) tried to find out the effect of employment, economic growth and investment on HDI in Indonesian provinces partially and simultaneously. It used domestic investment (DI) and Foreign Direct Investment (FDI). Pool data regression analysis was made for thirty-three provinces from 2006 to 2013. The result showed that employment variables had a positive and significant effect on HDI, whereas economic growth rate did not affect HDI. Domestic investment and foreign domestic investment partially affected positively and significantly HDI. While employment, economic growth rate, domestic investment and foreign direct investment had a significant effect on HDI simultaneously.

3. Materials and methods

This study encompasses micro panel data for very high HDI, high HDI, medium HDI and low HDI countries from 1996 to 2021. The segregation of the world is based on the Human Development Index's categorization.

3.1. Empirical framework

The most recent and firm effort to analyze the comparative situation of socio-economic development in both developed and less developed nations has been started by the United Nations Development Programme (UNDP) in its annual series of human development reports in 1990. In these reports, the human development index (HDI) was constructed. The rank of HDI for all countries is on a scale of 0 to 1.

- 0 represents the lowest human development

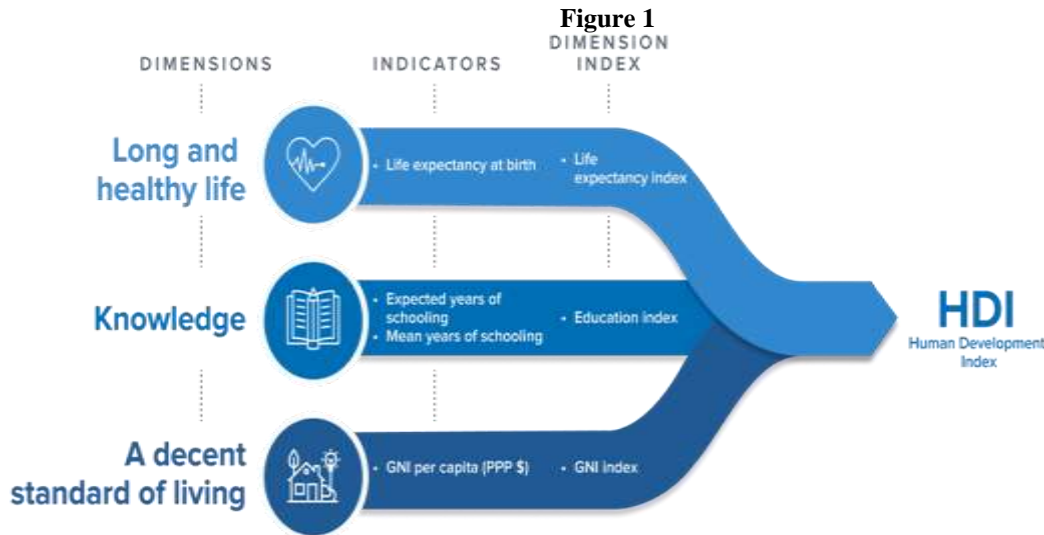
- 1 represents the highest human development

The HDI of a country is then simply the arithmetic average of its three indexes:

$$\text{HDI} = \frac{1}{3} (\text{income index} + \text{longevity index} + \text{education index})$$

Or,

$$\text{HDI} = \frac{1}{3} (\text{income index}) + \frac{1}{3} (\text{longevity index}) + \frac{1}{3} (\text{education index})$$



HDI Dimensions and indicators

Source: Human Development Reports (HDR)

The basic model is:

$$Y_{it} = \alpha_i + X_{it}\beta + a_t + V_{it}$$

Where Y_{it} is represented as human health for $t = 1 \dots T$, $i = 1 \dots N$, and α_i represent the intercept. Further, a_t is the unobserved time-invariant individual effect. V_{it} is the unobserved time-variant factor (error term). In a fixed-effects model, the unobserved variables are permitted to have any relations with the observed variables (Allison, 2009). With the help of this basic model, we extract these models. The defined models explored the effect of ecological footprints, CO_2 emissions, unemployment, gross domestic product per capita, urbanization and institutional on human development, which can be elaborated as follows:

$$HDI_{it} = \beta_0 + \beta_1 EnD_{it} + \beta_2 GINI_{it} + \beta_3 EI_{it} + \beta_4 GI_{it} + \beta_5 UN_{it} + \beta_6 GDPPC_{it} + \beta_7 INST_{it} + \beta_8 URBAN_{it} + \epsilon_{it} \quad (1)$$

Where,

- HDI stands for Human Development Index;
- EnD stands for environmental degradation;
- GINI stands for income inequality;
- EI education inequality;
- G1 gender inequality;
- UN unemployment;
- GDPPC (Gross Domestic Product) per capita;
- INST stands for institutional quality; and
- URBAN for Urbanization.

$$HDI_{it} = \beta_0 + \beta_1 EF_{it} + \beta_2 CO2_{it} + \beta_3 GINI_{it} + \beta_4 EI_{it} + \beta_5 GI_{it} + \beta_6 UN_{it} + \beta_7 GDPPC_{it} + \beta_8 INST_{it} + \beta_9 URBAN_{it} + \epsilon_{it} \quad (1.1)$$

The human development index (HDI) refers to an environment in which people get pleasure from their healthy, wealthy and long lives. Thus, it becomes essential to create a situation where the humans of the society can meet the expense of a decent living standard. The human development index is the mixture of better health, education and standard of life. However, the per capita income is not the only factor that governs human development. Because an increase in per capita does not mean that the lives of humans would be better off (Taqi et al., 2021). But increase in levels of human development causes to increase more opportunities for enhancing economic growth.

4. Results and Discussion

When we face the heteroskedasticity issue of unknown form than usual approach to be used is the Generalized Method of Moments (GMM), introduced by (Hansen, 1985; Hansen, 2010). GMM allows the number of moment conditions to be greater than the number of parameters. So, using these extra moment conditions makes GMM more efficient. Thus GMM estimates have consistently smaller standard errors than WLS, which are much smaller than the OLS standard errors. When you run into endogeneity problems, GMM is almost the only estimation method you can use. Since these are more or less unique to econometrics, this explains GMM attraction. GMM uses assumptions about specific moments of the random variables instead of assumptions about the entire distribution, which makes GMM more robust than ML at the cost of some efficiency.

Table 1: Description of variables and expected signs

Variables Category	Symb.	Description		Data Source
Dependent Variables				
Human Development Index	HDI	The Human Development Index (HDI) is a measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.		WDI/HDI reports
Independent Variables	Symb.	Description	Expected Sign	Data Source
Ecological Footprints	EF	The Ecological Footprint per person is a nation's total Ecological Footprint divided by the nation's total population.	-	Global Footprint Network
Carbon Dioxide	CO2	The cost of damage due to carbon dioxide emissions from fossil fuel use and the manufacture of cement is estimated to be US\$40 per ton of CO2 (the unit damage in 2017 US dollars for CO2 emitted in 2020) times the number of tons of CO2 emitted.	-	WDI
Unemployment	UN	% of the unemployed population (out of the total population)	-	WDI/ILO
GDP Per capita	GDPPC	GDP per capita, (constant 2015 US \$)	+/-	WDI
Urbanization	URBAN	% of the urbanization population (out of the total population)	+/-	WDI
Income Inequality	GINI	Gini index captures the distribution of income	-	WIID/WDI
Institutions	INST	Political stability, the rule of law, regulatory quality, control of corruption, government effectiveness, and voice and accountability.	+	ICRG/WGI
Education Inequality	EI	It is the unequal distribution of academic resources It is a fundamental human right and that right is violated by gender-based discrimination	-	UNDP/HDR
Gender Inequality	GI		-	UNDP/HDR

The estimates from the panel generalized method of moments (GMM) analysis as shown in Table 2, reveal that environmental degradation by instigating the ecological footprint (EFCC) and carbon emission level (CO2mtc) deteriorates the human development index (HDI) for very high HDI countries. Ecological footprint has a negative effect on HDI respectively. The results indicate that a 1% rise in Ecological Footprints (EFCC) is predicted to reduce HDI by 0.003351% respectively, as the coefficient is observed to be negative and statistically significant at 5%. The coefficient of Carbon emission (CO2mtc) is observed negative and significant at a 1% level. So a 1% rise in the value of CO2 emission causes a 0.001313% decrease in HDI. These results are consistent with the findings highlighted in the study by Chen, Cai & Ma (2020) that carbon emissions and Ecological footprints contribute to air pollution, which can lead to respiratory and cardiovascular diseases, among other health issues. Poor air quality can decrease life expectancy and overall quality of life, thereby affecting the HDI. Additionally, climate change, driven by carbon emissions, can exacerbate health risks, including heat-related illnesses, infectious diseases, food insecurity and poor quality of life. As far as income inequality (GINI), education inequality (EI) and gender inequality (GI) have a negative effect on HDI and are significant at 1%, 5% and 1% levels respectively. The value of coefficients indicates that a 1% rise in the value of GINI, EI and GI causes -0.000478%, 0.001480% and 0.083517% reduction in HDI. Castells-Quintana et al. (2019) show the relationship between income inequality and HDI. Therefore, the results indicate a long-run and negative association between income inequality and HDI, (Cifuentes et al., 2008). Gender inequality in education and health has hindered a country's progress in achieving high levels of human development. When

girls and women face barriers to accessing quality education and better health opportunities, it can lead to lower literacy rates, limited opportunities for skill development, low rate of life expectancy and reduced economic participation. This gender disparity in education and health can negatively impact the HDI by limiting human capital development and economic empowerment, (Gelard & Abdi, 2016; Dijkstra & Hanmer, 2000).

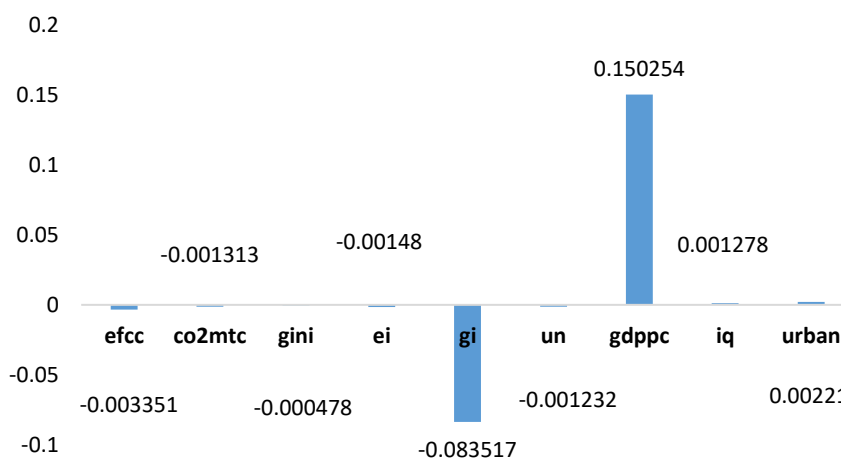
Table 2: Panel Generalized Method of Moments (Very high HDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HDI(-1)	0.546956	0.004200	130.227619	0.000000*
EFCC	-0.003351	0.001651	-2.030303	0.048000**
CO2MTC	-0.001313	0.000260	5.050000	0.000000*
GINI	-0.000478	0.000068	-7.081481	0.000000*
EI	-0.001480	0.000596	-2.483221	0.016200**
GI	-0.083517	0.022347	-3.737280	0.000500*
UN	-0.001232	0.000019	-64.166667	0.000000*
GDPPC	0.150254	0.004807	31.25738	0.000000*
IQ	0.001278	0.000453	2.821192	0.006700*
URBAN	0.002210	0.000362	6.104972	0.000000*
Residual Diagnostics				
Root MSE	0.005773	Mean dependent var		0.004432
S.D. dependent var	0.005817	S.E. of regression		0.005796
Sum squared resid	0.042156	J-statistic		49.09718
Instrument rank	56	Prob(J-statistic)		0.350073

The parentheses show standard error. *, **, *** are representing 1%, 5%, 10% level of significance respectively.

The next variable is unemployment (UN) which also shows a negative impact on HDI and is significant at a 1% level. Specifically, a 1% rise in the value of unemployment (UN) causes a 0.001232% reduction in HDI. The results of Priambodo (2021) study are in favour of these results which are negatively related to HDI. So, the results of the Priambodo (2021) study show unemployment and poverty have a negative effect on the HDI.

Figure 2: Coefficients of Very High HDI Countries Model



In contrast, the results shown in Table 2 indicate that GDPPC improved the HDI in very high HDI economies as the coefficient shows positive and statistically significant as well. A rise in the value of GDPPC by 1% is predicted to increase a 0.150254% in HDI. Similar findings were testified in some past studies by (Dasic et al., 2020). The human development index is a complex composite indicator that depicts quality of life. As the income level increased the quality of life also improved by proper education and health care facilities. The next results are shown in Table 2 that institutional quality (IQ) is statistically significant at 1% and positive with HDI. A 1% rise in institutional quality (IQ) is predicted to rise a 0.001278% in HDI. Specifically, table 1 highlights that a 1% rise in urbanization has a 0.002210% rise in HDI respectively. The value of the coefficient shows a positive relation between urbanization and HDI and is significant at a 1% level. This is an expected finding since the very high HDI economies are heavily dependent on urbanization. Urbanization has a potentially positive effect on economic activities, better availability of healthcare facilities and employment opportunities in high-income economies by (Rahim, 2019).

This figure shows that ecological footprints (EFcc), carbon emission (CO2mtc) income inequality (GINI), education inequality (EI), gender inequality (GI) and unemployment (UN) have a negative impact on HDI in case of very high HDI countries while, GDPPC have a strong and positive impact on HDI. In contrast, institutional quality (IQ) and urbanization (URBAN) depict a positive but minor change on human development.

Table 3: Panel Generalized Method of Moments (High HDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HDI(-1)	0.182261	0.003014	60.47146	0.000000*
EFCC	-0.010046	0.001518	-6.617918	0.000000*
CO2MTC	-0.001603	0.000542	-2.957565	0.005500*
GINI	-0.000378	0.000352	-1.073864	0.289800
EI	-0.013166	0.000884	-14.89366	0.000000*
GI	-0.065606	0.012335	-5.318687	0.000000*
UN	-0.000204	0.000045	-4.553571	0.000100*
GDPPC	0.184551	0.023075	7.997833	0.000000*
IQ	0.001572	0.000713	2.204769	0.034000**
URBAN	0.004354	0.000899	4.843159	0.000000*
Root MSE	0.015632	Mean dependent var		0.004261
S.D. dependent var	0.014066	S.E. of regression		0.015724
Sum squared resid	0.207694	J-statistic		23.48382
Instrument rank	39	Prob(J-statistic)		0.753951

The parentheses show standard error. *, **, *** are representing 1%, 5%, 10% level of significance respectively.

The estimates from the panel generalized method of moments (GMM) analysis as shown in Table 3, disclose that environmental degradation by initiating the ecological footprint (EFCC) and carbon emission level (CO2mtc) deteriorates the human development index (HDI) for high HDI countries. Ecological footprints have a negative impact on HDI respectively in the case of high HDI countries. The results specify that a 1% rise in Ecological Footprints (EFCC) is forecast to reduce HDI by 0.010046% respectively, as the coefficient is observed to be negative and statistically significant at 1%. The coefficient of Carbon emission (CO2mtc) is observed negative and significant at a 1% level. Thus, a 1% rise in the value of CO2 emission causes a 0.001603% decrease in HDI. These results are reliable with the findings highlighted in the study by Zhang and Zhu (2022) in which authors argued that CO2 emission and material footprints harm HDI specifically in the case of high-income economies. Same as some developed countries environmental degradation has a bad impact on human life such as a decline in their quality of life, (Fanning et al., 2020; Hickel, 2020; Yasin, 2021).

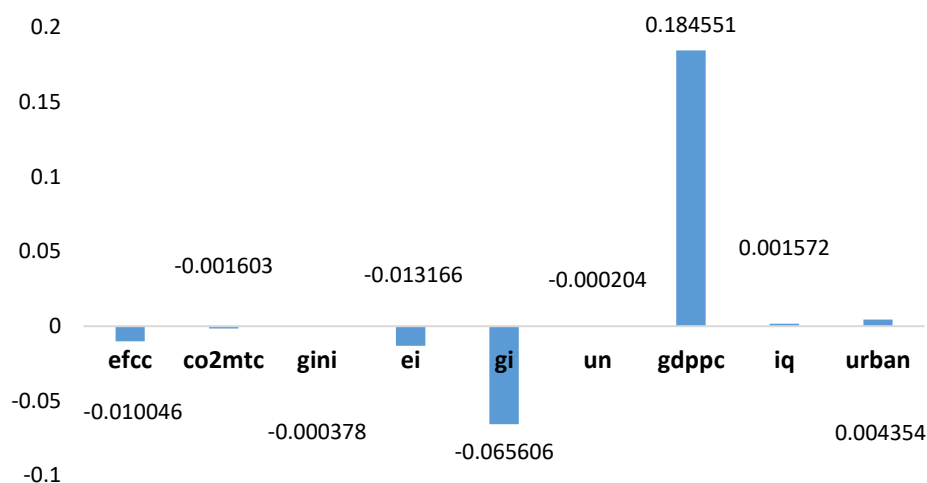
Same as income inequality (GINI) is insignificant to HDI. These results are reliable with the findings highlighted in the study by Amer (2020) that renewable energy consumption had an insignificant impact in the case of lower-middle-income countries.

The coefficient of education inequality (EI) is observed negative and significant at a 1% level. So, a 1% rise in EI has a 0.013166% decline in HDI respectively. Some studies found long-run effects tend to find a negative impact of education inequality on economic performance (Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Easterly, 2007; Herzer and Vollmer, 2012; Oechslin and Zweimüller, 2014; Ostry et al., 2014).

As far as gender inequality (GI) is concerned, it can be seen that gender inequality has a harmful role in human development, as the associated coefficient of gender inequality (GI) is observed to depict a negative sign and is statistically significant at a 1% level. Specifically, a 1% rise in gender inequality (GI) is depicted to reduce HDI by 0.065606%. These results are reliable by the study of Gelard and Abdi (2015) which shows a negative relationship between inequality and life expectancy and disparities in wages with a high human development index. The next variable is unemployment (UN) which has a negative and significant effect on HDI. Thus, the value of the coefficient shows a 1% increase in unemployment (UN) has a 0.000204% decline in HDI respectively. A study by Wahyuningrum and Soesilowati (2021) shows the same results as in this study, unemployment has a significant and negative effect on the human development index in the case of developed countries.

In contrast, the results shown in Table 3 indicate that GDPPC improved the HDI in high HDI economies as the coefficient shows positive and statistically significant as well. A rise in the value of GDPPC by 1% is predicted to increase a 0.184551% in HDI. Similar findings were testified in some past studies by Deb (2015) which shows that GDP is a significant and strong element in improving the quality of life and human well-being. The other variable institutional quality (IQ) has a positive and significant effect at a 5% level on HDI. So, a 1% change in institutional quality has a 0.001572% positive change in HDI. Listyaghi (2015) study showed that institutional quality, as indicated by governance and democratic quality has a significant positive impact on HDI. As far as is concerned, it can be seen that urbanization(URBAN) has a significant and positive link with HDI. Thus the value of the coefficient indicates that a 1% increase in urbanization has a 0.004354% rise in HDI specifically. This is an expected finding from a previous study which shows that urbanization has a potentially positive effect on economic activities, better availability of healthcare facilities and employment opportunities in high-income economies by (Tripathi, 2019).

Figure 3: Coefficients of High HDI Countries Model



This figure shows that ecological footprints (EFCC), carbon emission (CO2mtc) income inequality (GINI), unemployment (UN) and education inequality (EI) have a negative but less effect as compare to gender inequality (GI). Gender inequality has a strong but negative impact on HDI in case of high HDI countries while, GDPPC have a strong and positive impact on HDI. In contrast, institutional quality (IQ) and urbanization (URBAN) depict a positive but minor change on human development.

Table 4: Panel Generalized Method of Moments (Medium HDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HDI(-1)	0.38540	0.00075	513.386	0.00000*
EFCC	-0.00166	0.00009	-18.8209	0.00000*
CO2MTC	-0.00622	0.00127	-4.88062	0.00000*
GINI	-0.00094	0.00032	-2.95202	0.00580*
EI	-0.00130	0.00071	-1.83378	0.07570***
GI	-0.19343	0.02279	-8.48811	0.00000*
UN	-0.00035	0.00003	-10.9237	0.00000*
GDPPC	0.10251	0.01071	9.56359	0.00000*
IQ	0.00677	0.00056	12.1303	0.00000*
URBAN	0.00552	0.00032	17.5440	0.00000*
Root MSE	0.018405	Mean dependent var		0.005857
S.D. dependent var	0.015883	S.E. of regression		0.018519
Sum squared resid	0.276409	J-statistic		24.57444
Instrument rank	34	Prob(J-statistic)		0.429172

The parentheses show standard error. *, **, *** are representing 1%, 5%, 10% level of significance respectively.

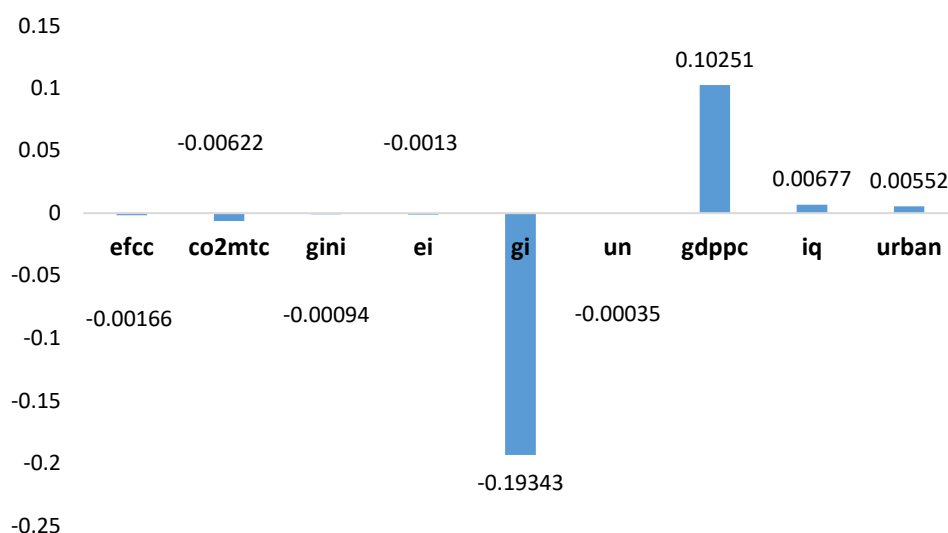
The findings from the panel generalized method of moments are presented in Table 4 for medium human development index (HDI) economies. Ecological footprints have a negative impact on HDI respectively in the case of medium HDI countries. The results postulate that a 1% rise in Ecological Footprints (EFCC) is forecast to reduce HDI by 0.00166% respectively, as the coefficient is observed to be negative and statistically significant at 1%. CO2 emission (CO2mtc) has a negative and significant impact on HDI. Thus, a 1% increase in carbon emission (CO2mtc) has a 0.00622% decline in HDI. These results are reliable with the findings highlighted in the study by Zhang and Zhu (2022) in which authors argued that ecological footprints and carbon emissions have a damaging impact on HDI in the case of China. The value of the coefficient shows a negative relationship with HDI and is statistically significant at a 1% level.

As far as income inequality (GINI) is concerned, it can be seen that income inequality has a harmful role in human development, as the associated coefficient of income inequality (GINI) is observed to depict a negative sign and is statistically significant at a 1% level. Specifically, a 1% rise in income inequality (GINI) is described to reduce HDI by 0.00094%. The value of the coefficient in the case of education inequality (EI) and gender inequality (GI) showed a negative and significant impact at a 1% and a 10% level. Thus, a 1% rise in education inequality (EI) and gender inequality (GI) have a 0.00130% and 0.19343% decline in HDI respectively.

These results are reliable by the study of Suryanarayana et al. (2016) in which authors show that disparities in income and education in India have an adverse impact on human development and economic growth. Moreover, a 1% rise in unemployment (UN) has a 0.00035% decline in HDI. Specifically, unemployment (UN) has a negative and statistically significant at 1% level. These results are reliable by the study of Fahrikaa (2020) which shows that higher levels of unemployment decline the quality of life as well.

In contrast, the results shown in Table 4 indicate that GDPPC improved the HDI in medium HDI economies as the coefficient shows positive and statistically significant effects as well. A rise in the value of GDPPC by 1% is predicted to increase a 0.10251% in HDI. Similar findings were testified in some past studies by Khodabakhshi (2011) to evaluate the relationship between GDP and three indicators of human development. The result shows that GDP increases the quality of life by improving education and health facilities as well. As far as is concerned, it can be seen that institutional quality (IQ) has a significant and positive link with HDI. The value of the coefficient shows that a 1% rise in institutional quality (IQ) has a 0.00677% rise in HDI. Institutional quality (IQ) has a positive and significant effect at a 1% level on HDI. Listyaghi (2015) study showed that institutional quality, as indicated by governance and democratic quality has a significant positive impact on human development. Urbanization (URBAN) has a significant and positive link with HDI. Thus the value of the coefficient indicates that a 1% increase in urbanization has a 0.00552% rise in HDI specifically. The study of Ahmad et al. (2023) shows the relevant results as per this study. The findings of the study indicate that urbanization has a positive impact on life expectancy. The study also shows that maintainable urbanization is necessary to achieve a quality of life.

Graph 4: Coefficients of Medium HDI Countries Model



This figure shows that ecological footprints (EFCC), carbon emission (CO2mtc) income inequality (GINI) and unemployment (UN) have a negative but less effect as compare to education inequality (EI) and gender inequality (GI) on HDI in case of medium HDI countries while, GDPPC have a strong and positive impact on HDI. In contrast, institutional quality (IQ) and urbanization (URBAN) depict a positive but minor change in human development.

The estimates from the panel generalized method of moments (GMM) analysis as shown in Table 5, reveal that environmental degradation by instigating the ecological footprint (EFCC) deteriorates the human development index (HDI) for low HDI economies. Ecological footprint has a negative effect on HDI respectively. The results indicate that a 1% rise in Ecological Footprints (EFCC) is predicted to reduce HDI by 0.027529% respectively, as the coefficient is observed to be negative and statistically significant at a 1% level. A study by Salman (2022) cited that environmental damage like ecological footprints has a negative impact on HDI.

Consequently, carbon emission (CO2mtc) has an insignificant impact on HDI. These results are reliable with the findings highlighted in the study by Amer (2020) that renewable energy consumption had an insignificant impact in the case of lower-middle-income countries. Same income inequality (GINI) has an insignificant relationship with HDI in the case of low HDI economies. The study by Sinaga (2020) examines the impact of GDPPC, inequality and income distribution on human development. The results of the study show that inequalities have an insignificant impact on human development.

As far as education inequality (EI) is concerned, it can be seen that education inequality has a harmful role in human development, as the associated coefficient of education inequality (EI) is observed to depict a negative sign and is statistically significant at a 5% level. Specifically, a 1% rise in education inequality (EI) is described to reduce HDI by 0.001151%. The next variable is gender inequality (GI). The coefficient shows a negative and statistically significant effect at a 1% level as well. Specifically, a 1% rise in gender inequality (GI) has a 0.291396% decline in HDI in the case of low HDI economies. Unemployment (UN) has an insignificant impact on HDI. These results are reliable by the study Arkum and Amar (2022) obtained that unemployment has a negative and insignificant impact on human development. Improvement in purchasing power is an important element for human development.

In contrast, the results shown in Table 5 indicate that GDPPC improved the HDI in low HDI economies as the coefficient shows positive and statistically significant effects as well. A rise in the value of GDPPC by 1% is predicted to increase a 0.235040% in HDI. Similar findings were testified in some past studies by Taqi et al. (2021) showed that there is a strong and significant relationship between GDP and the human development index in the case of Pakistan. As far as is concerned, it can be seen that institutional quality (IQ) has a significant and positive link with HDI. The value of the coefficient shows that a 1% rise in institutional

quality (IQ) has a 0.006959% rise in HDI. Institutional quality (IQ) has a positive and significant effect at a 1% level on HDI. Recent results are confirmed by a previous study by Ullah and Majeed (2023) in which authors indicate that institutional quality has a significant role in defining well-being.

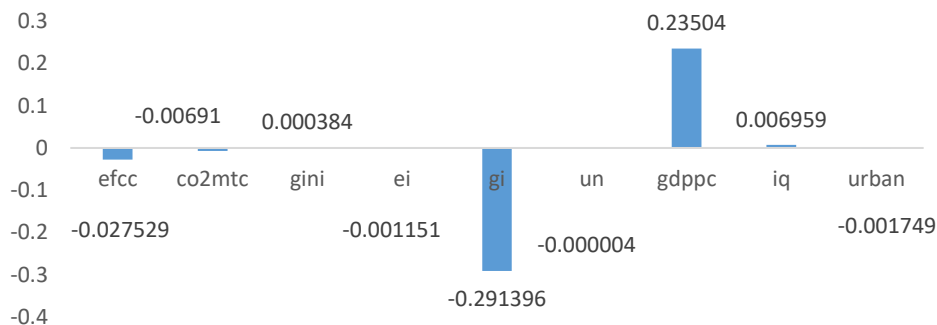
Table 5: Panel Generalized Method of Moments (Low HDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HDI(-1)	0.441541	0.001655	266.7921	0.000000*
EFCC	-0.027529	0.002373	-11.60092	0.000000*
CO2MTC	-0.006910	0.006749	-1.023855	0.314700
GINI	0.000384	0.000364	1.054945	0.300000
EI	-0.001151	0.000448	-2.569196	0.015800**
GI	-0.291396	0.029342	-9.931020	0.000000*
UN	-0.000004	0.000051	-0.069922	0.944800
GDPPC	0.235040	0.018780	12.51544	0.000000*
IQ	0.006959	0.001588	4.382242	0.000100*
URBAN	-0.001749	0.000507	-3.449704	0.001800*
Post Estimation Analysis				
Root MSE	0.023063	Mean dependent var		0.005719
S.D. dependent var	0.019978	S.E. of regression		0.02323
Sum squared resid	0.370193	J-statistic		22.90561
Instrument rank	31	Prob(J-statistic)		0.349032

The parentheses show standard error. *, **, *** are representing 1%, 5%, 10% level of significance respectively.

As far as urbanization (URBAN) is concerned, it can be seen that urbanization (URBAN) has a negative and statistically significant impact on HDI. Specifically, a 1% rise in urbanization (URBAN) has a 0.001749% decline in HDI in the case of low HDI economies. Tripathi (2021) urbanization has a negative effect on the human development index in the case of developing countries. Developing countries need to promote balanced urbanization with the improvement of basic services in urban areas to improve the HDI rank.

Figure 5: Coefficients of Low HDI Countries Model



This figure shows that ecological footprints (EFCC), carbon emission (CO2mtc) income inequality (GINI), unemployment (UN) and education inequality (EI) have a negative but less effect as compare to gender inequality (GI). Gender inequality has a strong but negative impact on HDI in case of low HDI countries while, GDPPC have a strong and positive impact on HDI. In contrast, institutional quality (IQ) depict a positive but minor change on human development while, urbanization (URBAN) has a negative impact in human development in case of low HDI economies.

5. Conclusion and policy implications

The whole world is facing the issue of altering climate and bad environmental quality due to the extreme increase in carbon emissions. Against the backdrop, this study plans to examine the effect of environmental degradation on human development, controlling for income inequality, education inequality, gender inequality, unemployment, GDPPC, institutional quality and urbanization in the context of very high, high, medium and low HDI economies during the time scope from 1996 to 2021. For measuring environmental impact, we use both ecological footprints and carbon dioxide emission (CO2) figures for these countries. Overall, the generalized method of moments analysis confirms the strong relationship among the study variables. GMM analysis

confirms that environmental quality by surging the ecological footprints and carbon emission deteriorates human development of the selected nations. Similarly, disparities in the form of income, education and gender impose an adverse impact on human development as unemployment also has a contrary impact on human development. While GDP, institutional quality and urbanization are evidenced to ensure human welfare. Hence, considering these key outcomes, a set of relevant human welfare-related policies needs to be recommended in the context of selected countries.

Firstly, considering the findings of environmental degradation in the form of ecological footprints and CO₂ emission negatively impacting human well-being, it is important, especially for the medium and low HDI economies to enact the rules and regulations that simultaneously limit the role of emissions in human development. The rationale behind these policy interventions is that if environmental damage is reduced by implementation and compliance with environmental laws would become easier to improve human development. Secondly, disparities in the form of income, education, gender and unemployment have a bad impact on human welfare as well. If these inequalities are perfectly removed from any economy then automatically it can improve the quality of life. Thirdly, taking into account the GDPPC was evidenced to promote human development, in some past studies by Dasic et al. 2020, the human development index is a complex composite indicator that depicts the quality of life. As the income level increased the quality of life also improved by proper education and health care facilities. Fourthly, institutional quality has a strong effect on human welfare. Furthermore, corruption-free institutions have a strengthened relation with better quality of life in the form of proper education and health care facilities.

Lastly, urbanization was found to be effective for very high, high and medium human development countries because proper and balanced urbanization is a key source of better human development. Urbanization has a potentially positive effect on economic activities, better availability of healthcare facilities and employment opportunities in high-income economies by (Rahim, 2019). In contrast, in the case of low HDI countries urbanization has a negative association with human development. Tripathi (2021) depicted that developing countries need to promote balanced urbanization with the improvement of basic services in urban areas to improve the HDI rank. From the previous literature, we find that unplanned urbanization is a major cause of low quality of life in low HDI countries as well.

References

- Ahmad, N., Raid, M., Alzyadat, J., & Alhawal, H. (2023). Impact of urbanization and income inequality on life expectancy of male and female in South Asian countries: a moderating role of health expenditures. *Humanities and Social Sciences Communications*, 10(1), 1-9.
- Aiyar, Shekhar, and Christian Ebeke. (2020). Inequality of opportunity, inequality of income and economic growth. *World Development* 136, 105115.
- Alesina, A. & Rodrik, D. (1994). Distributive Politics and Economic Growth. *The Quarterly Journal of Economics*, 109(2), 465-490.
- Alesina, A., & Rodrik, D. (1994). Distributive politics and economic growth. *Quarterly Journal of Economics*, 109(2), 465-490.
- Ali, A. (2015). *The impact of macroeconomic instability on social progress: an empirical analysis of Pakistan*. (Doctoral dissertation, National College of Business Administration & Economics Lahore).
- Ali, A. (2018). Issue of Income Inequality Under the Perceptive of Macroeconomic Instability: An Empirical Analysis of Pakistan. *Pakistan Economic and Social Review*, 56(1), 121-155.
- Ali, A. and Bibi, C. (2017). Determinants of Social Progress and its Scenarios under the role of Macroeconomic Instability: Empirics from Pakistan. *Pakistan Economic and Social Review* 55 (2), 505-540.
- Ali, A., & Ahmad, K. (2014). The Impact of Socio-Economic Factors on Life Expectancy in Sultanate of Oman: An Empirical Analysis. *Middle-East Journal of Scientific Research*, 22(2), 218-224.
- Allison, P. D. (2009). *Fixed effects regression models*. SAGE publications.
- Amer, H. (2020). The impact of renewable energy consumption on the human development index in selected countries: panel analysis (1990–2015). *Int J Econ Energy Environ*, 5(4), 47.
- Arkum, Darol, and Hattami Amar. "The Influence of Economic Growth, Human Development, Poverty and Unemployment on Income Distribution Inequality: Study in the Province of the Bangka Belitung Islands in 2005-2019." *Jurnal Bina Praja: Journal of Home Affairs Governance* 14.3 (2022): 413-422.
- Arshad, S., & Ali, A. (2016). Trade-off between Inflation, Interest and Unemployment Rate of Pakistan: Revisited. *Bulletin of Business and Economics (BBE)*, 5(4), 193-209.
- Ashraf, I., & Ali, A. (2018). Socio-Economic Well-Being and Women Status in Pakistan: An Empirical Analysis. *Bulletin of Business and Economics (BBE)*, 7(2), 46-58.
- Benabou, R. (1996). Inequality and growth. *NBER macroeconomics annual*, 11, 11-74.
- Bloom, D. E., Canning, D., & Fink, G. (2008). Urbanization and the wealth of nations. *Science*, 319(5864), 772-775.
- Bovier, P. A., Chamot, E., & Perneger, T. V. (2004). Perceived stress, internal resources, and social support as determinants of mental health among young adults. *Quality of life research*, 13(1), 161-170.
- Byrne, M., Agerbo, E., Eaton, W. W., & Mortensen, P. B. (2004). Parental socio-economic status and risk of first admission with schizophrenia. *Social psychiatry and psychiatric epidemiology*, 39(2), 87-96.
- Capriati, M. (2022). Capabilities, Innovation and Economic Growth in EU Regions. *Journal of Human Development and Capabilities*, 23(3), 373-399.
- Castelló, A. and R. Doménech, 2002. Human capital inequality and economic growth: Some new evidence. *The Economic Journal*, 112(478): C187-C200.
- Castells-Quintana, D., Royuela, V., & Thiel, F. (2019). Inequality and sustainable development: Insights from an analysis of the human development index. *Sustainable Development*, 27(3), 448-460.

- Chen, L., Cai, W., & Ma, M. (2020). Decoupling or delusion? Mapping carbon emission per capita based on the human development index in Southwest China. *Science of The Total Environment*, 741, 138722.
- Cifuentes, M., Sembajwe, G., Tak, S., Gore, R., Kriebel, D., & Punnett, L. (2008). The association of major depressive episodes with income inequality and the human development index. *Social science & medicine*, 67(4), 529-539.
- Cooper, B. (2005). Schizophrenia, social class and immigrant status: the epidemiological evidence. *Epidemiology and Psychiatric Sciences*, 14(3), 137-144.
- Deb, S. (2015, April). Gap between GDP and HDI: Are the rich country experiences different from the poor. In *IARIW-OECD Special Conference*.
- Deininger, K. and L. Squire, 1998. New ways of looking at old issues: Inequality and growth. *Journal of Development Economics*, 57(2), 259-287.
- Dijkstra, A. G., & Hanmer, L. C. (2000). Measuring socio-economic gender inequality: Toward an alternative to the UNDP gender-related development index. *Feminist economics*, 6(2), 41-75.
- Easterly, W. 2007. Inequality Does Cause Underdevelopment: Insights from a New Instrument. *Journal of Development Economics*, 84(2): 755-776.
- Easterly, W., 2001. The lost decades: Developing countries' stagnation in spite of policy reform 1980–1998. *Journal of Economic Growth*, 6(2): 135-157.
- Ecological Disruption and Human Health by G. D. Smith, S. R. Subramanian (2020).
- Elistia, E., & Syahzuni, B. A. (2018). The correlation of the human development index (HDI) towards economic growth (GDP per capita) in 10 ASEAN member countries. *Jhss journal of humanities and social studies*, 2(2), 40-46.
- Fanning, A.L., O'Neill, D.W., Büchs, M., 2020. Provisioning systems for a good life within planetary boundaries. *Global Environ. Change*, 64, 102135.
- Feriyanto, N. (2016). The effect of employment, economic growth, and investment on HDI: In provinces in Indonesia. *Journal of Economics, Business & Accountancy Ventura*, 19(1), 1.
- Forbes, K. (2000). A reassessment of the relationship between inequality and growth. *American Economic Association*, 90(4), 869–887.
- Gelard, P., & Abdi, A. (2016). Evaluating the effect of gender inequality on economic growth in countries with high human development index. *European Online Journal of Natural and Social Sciences: Proceedings*, 4(1 (s)), pp-1714.
- Ghose, G., Bhatti, M. I., Aslam, A., & Ahmad, N. (2023). Asymmetric spillover effects of Covid-19 on the performance of the Islamic finance industry: A wave analysis and forecasting. *The Journal of Economic Asymmetries*, 27, e00280.
- Ghose, G., Khan, S. A., Rehman, A. U., & Bhatti, M. I. (2021). ARDL as an elixir approach to cure for spurious regression in nonstationary time series. *Mathematics*, 9(22), 2839.
- Glaeser, E. (2011). Cities, productivity, and quality of life. *Science*, 333(6042), 592-594.
- Goloshumova, G. S., Albakova, Z. A., Marchev, K. V., Kidinov, A. V., Gustova, E. A., Salakhova, V. B., & Krasheninnikova, N. A. (2019). The interrelation of environmental and social factors and man's mental health. *Ekoloji*, 28(107), 6013-6016.
- Hansen, L. P. (1985). A method for calculating bounds on the asymptotic covariance matrices of generalized method of moments estimators. *Journal of Econometrics*, 30(1-2), 203-238.
- Hansen, L. P. (2010). Generalized method of moments estimation. *Macroeconometrics and time series analysis*, 105-118.
- Herzer, D., & Vollmer, S. 2012. Inequality and growth: evidence from panel cointegration. *Journal of Economic Inequality*, 10(4), 489-503.
- Hickel, J., 2020a. The sustainable development index: Measuring the ecological efficiency of human development in the Anthropocene. *Ecol. Econ.* 167, 106331.
- Hossain, M. A., & Chen, S. (2021). Nexus between Human Development Index (HDI) and CO 2 emissions in a developing country: Decoupling study evidence from Bangladesh. *Environmental Science and Pollution Research*, 28, 58742-58754.
- Hudakova, J. (2017, August). Relationship between gross domestic product and human development index. In *The Proceeding of 4th International Multidisciplinary Scientific Conferences on Social Sciences & Arts SGEM*.
- Ji, X., Chen, X., Mirza, N., & Umar, M. (2021). Sustainable energy goals and investment premium: Evidence from renewable and conventional equity mutual funds in the Euro zone. *Resources Policy*, 74, 102387.
- Ji, X., Zhang, Y., Mirza, N., Umar, M., & Rizvi, S. K. A. (2021). The impact of carbon neutrality on the investment performance: Evidence from the equity mutual funds in BRICS. *Journal of Environmental Management*, 297, 113228.
- Jiang, Y., & Shi, C. (2023). Estimating sustainability and regional inequalities using an enhanced sustainable development index in China. *Sustainable Cities and Society*, 104555.
- Kaldor, N. (1956). Alternative Theories of Distribution, *Review of Economic Studies*. 23: 83–100.
- Klugman, J. (2010). Human development report 2010–20th Anniversary edition. The real wealth of nations: Pathways to human development.
- Knowles, S. (2005). Inequality and economic growth: The empirical relationship reconsidered in the light of comparable data. *The Journal of Development Studies*, 41(1), 135-159.
- Krabbendam, L., & Van Os, J. (2005). Schizophrenia and urbanicity: a major environmental influence—conditional on genetic risk. *Schizophrenia bulletin*, 31(4), 795-799.
- Kuznet, S. (1955). Economic Growth and Income Inequality, *American Economic Review*. 45, 1–28.
- Li, H., & Zou, H. F. (1998). Income inequality is not harmful for growth: theory and evidence. *Review of development economics*, 2(3), 318-334.
- LISTYAGHI, H. B. (2015). *The Impact of institutional quality on standard of living* (Doctoral dissertation, KDI School).

- Mahalik, M. K., Le, T. H., Le, H. C., & Mallick, H. (2022). How do sources of carbon dioxide emissions affect life expectancy? Insights from 68 developing and emerging economies. *World Development Sustainability*, 1, 100003.
- Mehmood, A. Siddique, H. M. A., and Ali, A. (2022). Impact of Health on Worker Productivity: Evidence from South Asia. *Bulletin of Business and Economics*, 11(2), 1-8.
- Mehmood, U., & Mansoor, A. (2021). CO2 emissions and the role of urbanization in East Asian and Pacific countries. *Environmental Science and Pollution Research*, 28(41), 58549–58557.
- Mo, P. H. (2000). Income inequality and economic growth. *Kyklos*, 53(3), 293-315.
- Mohammed, A., Li, Z., Arowolo, A. O., Su, H., Deng, X., Najmuddin, O., & Zhang, Y. (2019). Driving factors of CO2 emissions and nexus with economic growth, development and human health in the Top Ten emitting countries. *Resources, Conservation and Recycling*, 148, 157-169.
- Myin-Germeys, I., Marcelis, M., Krabbendam, L., Delespaul, P., & van Os, J. (2005). Subtle fluctuations in psychotic phenomena as functional states of abnormal dopamine reactivity in individuals at risk. *Biological psychiatry*, 58(2), 105-110.
- Oechslin, M. & Zweimüller, J. 2014. Inequality and growth: the neglected time dimension. *Journal of Economic Growth*, 19(1): 81–104.
- Ostry, J., Berg, A. & Tsangarides, C. 2014. Redistribution, inequality and growth. IMF Staff Discussion Note (SDN/14/02).
- Partridge, M. D. (1997). Is inequality harmful for growth? Comment. *The American Economic Review*, 87(5), 1019-1032.
- Persson, T. & Tabellini, G. (1994). Is Inequality Harmful for Growth? *The American Economic Review*, 84(3), 600-621.
- Persson, T., & Tabellini, G. (1994). Is inequality harmful for growth? Theory and evidence. *American Economic Review*, 84, 600–621.
- Priambodo, A. (2021). The impact of unemployment and poverty on economic growth and the human development index (HDI). *Perwira International Journal of Economics & Business*, 1(1), 29-36.
- Sajid, A. & Ali, A. (2018). Inclusive Growth and Macroeconomic Situations in South Asia: An Empirical Analysis. *Bulletin of Business and Economics (BBE)*, 7(3), 97-109.
- Salman, M., Wang, G., & Zha, D. (2022). Modeling the convergence analysis of sustainable production and consumption in terms of ecological footprints and human development index in Belt and Road Initiative countries. *Sustainable Production and Consumption*, 30, 233-254.
- Şentürk, İ., & Ali, A. (2021). Socioeconomic Determinants of Gender Specific Life Expectancy in Turkey: A Time Series Analysis. *Sosyoekonomi*, 29(49), 85-111.
- Shah, S. (2016). Determinants of human development index: A cross-country empirical analysis.
- Sinaga, M. (2020). Analysis of effect of grdp (gross regional domestic product) per capita, inequality distribution income, unemployment and hdi (human development index) on poverty. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, 3(3), 2309-2317.
- Sokolovskaya, I. E., Grinenko, A. V., Miroshkin, D. V., Udodov, A. G., Egorova, E. V., & Diatlova, E. V. (2019). The Eco-Psychological Approach in the Psychological Follow-Up Program for Children with Limited Abilities. *Ekoloji*, 28(107), 659-664.
- Stewart, C. T. (1986). Urban concentration and sectoral income distribution. *The Journal of Developing Areas*, 20(3), 357-368.
- Suryanarayana, M. H., Agrawal, A., & Prabhu, K. S. (2016). Inequality-adjusted human development index: States in India. *Indian Journal of Human Development*, 10(2), 157-175.
- Taqi, M., e Ali, M. S., Parveen, S., Babar, M., & Khan, I. M. (2021). An analysis of Human Development Index and Economic Growth. A Case Study of Pakistan. *iRASD Journal of Economics*, 3(3), 261-271.
- Taqi, M., e Ali, M. S., Parveen, S., Babar, M., & Khan, I. M. (2021). An analysis of Human Development Index and Economic Growth. A Case Study of Pakistan. *iRASD Journal of Economics*, 3(3), 261-271.
- Taylor, T. L., Killaspy, H., Wright, C., Turton, P., White, S., Kallert, T. W., ... & King, M. B. (2009). A systematic review of the international published literature relating to quality of institutional care for people with longer term mental health problems. *BMC psychiatry*, 9(1), 1-30.
- Tripathi, S. (2019). Urbanization and human development index: cross-country evidence.
- Uddin, I., Ullah, A., Saqib, N., Kousar, R., & Usman, M. (2023). Heterogeneous role of energy utilization, financial development, and economic development in ecological footprint: how far away are developing economies from developed ones. *Environmental Science and Pollution Research*, 30(20), 58378-58398.
- Ullah, K., & Majeed, M. T. (2023). District-level multidimensional poverty and human development in the case of Pakistan: does institutional quality matter?. *GeoJournal*, 88(1), 561-581.
- Umar, M., Ji, X., Mirza, N., & Rahat, B. (2021b). The impact of resource curse on banking efficiency: Evidence from twelve oil producing countries. *Resources Policy*, 72, 102080.
- Usman, M., & Hammar, N. (2021). Dynamic relationship between technological innovations, financial development, renewable energy, and ecological footprint: Fresh insights based on the STIRPAT model for Asia Pacific Economic Cooperation countries. *Environmental Science and Pollution Research*, 28(12), 15519–15536.
- Wahyuningrum, F., & Soesilowati, E. (2021). The effect of economic growth, population and unemployment on HDI. *Efficient: Indonesian Journal of Development Economics*, 4(2), 1217-1229.
- Yasin, I., Ahmad, N., & Chaudhary, M. A. (2020). Catechizing the Environmental-Impression of Urbanization, Financial Development, and Political Institutions: A Circumstance of Ecological Footprints in 110 Developed and Less-Developed Countries. *Social Indicators Research*, 147(2), 621-649.

- Yasin, I., Naseem, S., Anwar, M. A., Madni, G. R., Mahmood, H., & Murshed, M. (2022). An analysis of the environmental impacts of ethnic diversity, financial development, economic growth, urbanization, and energy consumption: fresh evidence from less-developed countries. *Environmental Science and Pollution Research*, 29(52), 79306-79319.
- Zeng, Y., Maxwell, S., Runting, R. K., Venter, O., Watson, J. E., & Carrasco, L. R. (2020). Environmental destruction not avoided with the sustainable development goals. *Nature Sustainability*, 3(10), 795–798.
- Zhang, S., & Zhu, D. (2022). Incorporating “relative” ecological impacts into human development evaluation: Planetary Boundaries–adjusted HDI. *Ecological Indicators*, 137, 108786.
- Zhang, Y. C., Liu, X. H., Ullah, A., & Mehmood, U. (2023). Effects of human capital, natural resource, urbanization, energy consumption on carbon emissions in the top ten emitter countries. *Economic Research-Ekonomska Istraživanja*, 36(3), 2149589.