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ORIGINAL ARTICLE

An Analytical Study on the Impact of Development-Driven Education on Environmental Improvement with Emphasis on the Human Development Index

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ABSTRACT

The present study aims to present an analytical review of the relationship between development-driven education and environmental improvement. Previous research in this field has often examined the effect of environmental pollution on the human development index in general. However, this study uniquely focuses on a separate review of human development indicators on the environment and education. Thus, this study applied an econometric method using $Eviews_{13}$ software during the years 1990-2023. The analytical review of the effect of development-driven education on environmental improvement, with an emphasis on the human development index, was conducted among selected countries of the Middle East (United Arab Emirates, Bahrain, Egypt, Iran, Iraq, Jordan, Yemen, Kuwait, Lebanon, Libya, Oman, Qatar, Turkey, Syria, Cyprus, and Saudi Arabia) and Iran. The dependent variable in this paper was CO2 emission, and the independent variables included education, health, standard of living (a measure to evaluate the human development index), fossil fuel consumption, and the growth rate of the urban population. The results of the study in the Middle Eastern countries indicate that the measurement dimensions of the human development index have a negative and significant effect on environmental pollution. Higher human development is beneficial for the environment and mitigates CO2 emissions and other pollutants. Additionally, this protects the environment by lowering pressure on natural resources. The variables of urbanization rate and fossil fuel consumption have a positive effect on the level of air pollution. In addition, the results of the study in Iran demonstrate that fossil fuel consumption and urbanization are factors that directly influence the country's air pollution, and the measurement dimensions of the human development index. No significant relationship was found regarding education (average years of education for adults), but a negative and significant effect was shown on environmental pollution.

KEYWORDS

Pollution, Human Development Index, Environment.

آموزش محیط‌زیست و توسعه پایدار

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«مقاله پژوهشی»

ارزیابی تحلیلی تأثیر آموزش توسعه محور بر بهبود وضعیت محیط‌زیست با تأکید بر شاخص توسعه انسانی

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چکیده

هدف مقاله حاضر ارزیابی تحلیلی ارتباط آموزش توسعه محور بر بهبود محیط‌زیست می‌باشد. مطالعات صورت‌گرفته در این حوزه اغلب تأثیر آلودگی محیط‌زیست بر شاخص توسعه انسانی را به‌صورت کلی مورد بررسی قرار داده‌اند؛ اما در این پژوهش به بررسی تفکیک شده شاخص‌های توسعه انسانی بر وضعیت محیط‌زیست و تمرکز بر آموزش تأکید داشته که وجه تمایز این مطالعه می‌باشد؛ لذا در پژوهش حاضر با استفاده از روش اقتصادسنجی و کاربرد نرم‌افزار $Eviews_{13}$ در سال‌های ۱۹۹۰-۲۰۲۳، ارزیابی تحلیلی تأثیر آموزش توسعه محور بر بهبود وضعیت محیط‌زیست با تأکید بر شاخص توسعه انسانی در کشورهای منتخب خاورمیانه شامل (امارات متحده عربی، بحرین، مصر، ایران، عراق، اردن، یمن، کویت، لبنان، لیبی، عمان، قطر، ترکیه، سوریه، قبرس و عربستان سعودی) و ایران مورد بررسی قرار گرفته است. متغیر وابسته مورداستفاده در این پژوهش شامل انتشار گاز CO_2 و متغیرهای مستقل مورد بررسی شامل آموزش، سلامت، سطح استاندارد زندگی که معیاری برای سنجش شاخص توسعه انسانی هستند، مصرف سوخت فسیلی و نرخ رشد جمعیت شهرنشینی هستند. نتایج حاصل از تحقیق در کشورهای خاورمیانه نشان می‌دهد که ابعاد سنجش شاخص توسعه انسانی تأثیر منفی و معناداری آلودگی محیط‌زیست دارد. توسعه انسانی بالاتر برای محیط‌زیست مفید است و موجب کاهش انتشار گازهای CO_2 و سایر آلاینده‌ها شده و با کاهش هرگونه فشار بر منابع طبیعی، به حفظ محیط‌زیست کمک می‌کند؛ و نیز متغیرهای نرخ شهرنشینی و مصرف سوخت‌های فسیلی تاثیر مثبتی بر میزان آلودگی هوا دارد. همچنین نتایج مربوط به کشور ایران نشان داد که مصرف سوخت‌های فسیلی و شهرنشینی از فاکتورهایی هستند که به طور مستقیم آلودگی هوای ایران را تحت‌تأثیر قرار می‌دهد و ابعاد سنجش شاخص توسعه انسانی به غیر از شاخص آموزش به کار رفته در این تحقیق (میانگین سال‌های تحصیل افراد بزرگسال) منفی و اثر معناداری بر آلودگی محیط‌زیست دارد.

واژه‌های کلیدی

آلودگی، شاخص توسعه انسانی، محیط‌زیست.

Introduction

An environment is a set of natural and unnatural factors, including environmental factors and living creatures, that interact together and affect the vital trend of living organisms and their behavior. In the 21st century, environmental protection has been known as one of the eight Millennium Development Goals and one of the three elements of sustainable development. The environment is a combination of knowledge and different sciences, such as biological and non-biological (physical, chemical) factors that affect the lives of individuals and are affected by them. Currently, with the advancement of human civilization and technological developments, as well as the increasing population, the world is facing a problem called pollution in the air and the earth, which threatens the lives of the inhabitants of the planet. The problem is so interconnected worldwide that governments, in general, have been paying serious and considerable attention to environmental protection. Today, the environmental situation is exacerbated to the extent that the people of a city or even a country are not isolated from the impacts of pollution in another city or country. Therefore, there is a serious threat that the growing population, along with technological advancement, might lead to environmental pollution and the deterioration of natural resources (Rahimi, 2022). The current study has attempted to analyze the effect of development-driven education on improving the environment using the approach of the human development index.

The theoretical literature of human development is not merely limited to economic development. The idea of human development emerged with the basic assumption that revenue does not dominate all human life. Thus, human progress cannot be measured only by per capita income. In order to achieve a better life, other than owning a higher income, it is required to promote human talents and capacities, which are dependent on income and other factors such as life expectancy, education, literacy, health, and environmental issues (Anand & Sen, 2000). In human development, man is introduced as the development source, with emphasis on increasing the scope of human choice; on the one hand, instead of focusing on the consumption of goods and services, it creates capacities and, on the other hand, cultivates talents and mental powers along with the development of material capacities; besides, by targeting a better life it makes human choices more dynamic. Generally, man is at the center of development patterns in the concept of human development, not at the margins (Sadeghi et al., 2010). As a new measure of development, the human development index was introduced in 1990 based on Amartya Sen's theories and has been used by the United Nations Development Program (UNDP) since then. This index is based on the main idea that the need to achieve a better life, other than having higher revenue, involves cultivating and promoting human talents and capacities. The human development index aims to measure the average achievement in a country based on the three basic dimensions of human development, which are a healthy, long life, knowledge, and appropriate living standards (economic welfare). This index investigates the gross domestic product and the national gross product with a human-driven view. Therefore, several factors were involved in the replacement of the human development index with per capita income: for example, we can mention the need to develop talents to attain progress and economic prosperity and to enhance the quality of life. On the one hand, this attitude leads to the cultivation of capabilities, and on the other hand, it results in the method of applying the capabilities (UNDP, 2000). In other words, this index measures the average economic and social progress of countries. Human capabilities such as improved health, knowledge, and skills, and people's use of acquired capabilities to create opportunities, such as being active in the political, social, and cultural arena, are considered in this index (Agheli & Samdeliri, 2021), but as these issues are qualitative and general, it is required to use alternative variables for their quantification.

In the report given by the United Nations Development Program from 1990 to 2010, for the issue of health, the duration and health of

life were considered, which is shown by the index of life expectancy at birth; for education, two indicators of literacy rates in adults, and the schooling years were considered. For the standard of living level, the GDP per capita index was considered in terms of purchasing power in US dollars. However, in the 2010 report, apart from the health issue, which is still measured using the life expectancy index at birth, the variables have been changed for the other two issues such that for education, out of the two indices, mean years of schooling (for adults aged 25 years and older) and the expected length of schooling for school-age children, and Gross National Income (GNI) per capita is used instead of GDP per capita for the standard level of living.

The existing theoretical literature shows a positive relationship between human development and environmental improvement. Grossman and Krueger (1995) believe that human capital reduces pollution by increasing the number of clean industries. According to Boyce (2003), social and economic inequalities lead to environmental inequalities and may finally have a negative effect on the environment. Boyce also states that educational status as an indicator for measuring the human development index can result in environmental improvement.

Education has a crucial role in the environment in terms of creating environmental beliefs and a cultural basis to avoid environmental destruction and pollution; therefore, the education issue has captured attention in the global arena, and the raising of awareness among people has changed their attitude towards the environment and has improved their relationship with the environment (Rafiei & Amirnejad, 2010). Based on the Stockholm Conference Declaration in 1972, the importance of environmental education was officially recognized. After this conference, other international conferences, including the Belgrade and Tbilisi conferences, were held under the supervision of UNESCO and with the cooperation of the UN Environment Program on Education. With the efforts of the community, the strategic goals of education in the environment were developed (Singh & Sharma, 2021). In 1992, the second international environmental conference was held on the relationship between the environment and development. Among the 40 principles of this agenda classified in the Rio Declaration, one principle was assigned to promote education and public awareness. It indicates that education, as one of the comfort factors, has a significant role in improving the environment and achieving sustainable development (Schneller et al., 2021). Thus, raising awareness and empowering people through the human development index (HDI) leads to a better perception of the importance of energy security and environmental protection. The communities with a high level of human development choose a healthy and environmentally friendly lifestyle (Desha et al., 2015). Also, Jain and Nagpal (2019) demonstrated a positive relationship between human development and better environmental performance. This indicates that the increase in the human development index enhances the environment and mitigates pollution and environmental damage. Also, Mukherjee and Chakraborty (2013) showed that environmental protection and sustainability increase with the increase in HDI, but decline slightly at higher levels.

Finally, it can be stated that if people have a moral responsibility for environmental protection, the basic grounds for their participation and cooperation in environmental programs are established. Also, if people think of the environment as their own property, its retention not only seems necessary but also becomes an inseparable part of their lives (Khajouie et al., 2019).

In their study, Javaheri et al. (2024) examined the effect of political freedom and human development on environmental sustainability in Iran during the period 1990-2022 using the dynamic ordinary least squares method. It was found that HDI has a negative effect on environmental sustainability, and political freedom has a positive and significant effect on it. On the other hand, the Kuznets hypothesis test also indicated that the square of the human development index has had a positive and significant effect on environmental sustainability. Therefore, based

on this hypothesis, the inverted U relationship between HDI and environmental sustainability is verified in this study. Other results demonstrated that energy consumption has had a negative effect, and urbanization rate and commercial openness have had a positive and significant effect on environmental sustainability in the long run.

In their study, Javaheri et al. (2023) examined the effect of human development, political and civil freedom indicators on the quality of the environment in selected developing and developed countries during the years 2000-2017 using the system generalized method of moments. This study used the human development index, which covers the economic and social dimensions of development and investigates the environmental Kuznets hypothesis. The findings of the research have shown that the indicators of human, political, and civil freedom development in both groups of studied countries have had a negative and significant impact on the quality of the environment. Besides, based on the results of the Kuznets hypothesis, the relationship between the HDI and ecological footprints confirms the Kuznets hypothesis and the inverted U among the studied countries.

In their study, Hossainzadeh et al. (2022) employed a comprehensive concept of the state of the environment (environmental performance index), and examined the effect of variables related to human and social development in the form of human development index variables on the environmental performance of countries. Considering the non-stationarity of the dependent variable, the generalized method of moments and the time period of 2000-2018 were applied. The research sections include D-8 member countries and oil-exporting countries in the proximity of the trade group. The results of the research show that the variables of the human development index, the use of oil substitute commodities for energy production, and taxes have a positive effect, and the gross domestic product has a negative effect on environmental performance.

In their research, Pourali et al. (2019) aimed to investigate the effect of the HDI dimensions of the HDI, especially education, on the environmental performance index. The results of the estimation indicated that the three dimensions of the HDI, i.e. health, education, and welfare indicators, have had a positive and significant relationship with environmental performance.

Voumik et al. (2023) aimed to analyze how population growth, industrialization, and education affect the environment in Argentina. The findings indicate the presence of a convergent relationship among CO2 emissions, population, industrialization, and education. Also, it was found that population growth and industrialization will damage Argentina's environment in the long run. Furthermore, there is a negative and significant relationship between CO2 gas emissions and education costs in the short run.

In their study, Nathaniel et al. (2021) investigated the relationship between the Environmental Footprint (EF) and human well-being in N11 countries using advanced estimation techniques compatible with heterogeneity, endogeneity, and cross-sectional dependence in country groups. The findings recommended that human well-being, captured by the HDI, increases the EF, and EF increases human well-being, which shows a strong trade-off between both indicators. This indicates that policies regarding promoting human well-being are consistent with environmental health. Financial development and biocapacity increase the EF, while natural resources and globalization reduce it. Human well-being increases the EF in all countries except Egypt.

In their research, Mrabet et al. (2021) examined the effects of human development and political stability on environmental quality. Thus, 16 countries in the Middle East and North Africa were used over the period 1990-2016. The findings revealed the existence of an inverted U-shaped association between human development and environmental quality, which differs between oil and non-oil countries; besides, political unrest can delay environmental improvements.

Pata et al. (2021) aimed to analyze the role of globalization, renewable energy consumption, natural resource abundance, and human development index on environmental degradation for the top ten countries with the highest impact on the environmental footprint. To achieve this purpose, a panel cointegration

test and augmented mean group estimator were employed based on annual data from 1992 to 2016. Empirical results reveal that the human capital Kuznets curve hypothesis is not valid for the top ten states, because the sign of the coefficients on the human development index and its square might be negative. The results of the panel estimator indicate that the increase in human development and renewable energy consumption has a negative and statistically significant impact on the ecological footprint. Natural resource abundance mitigates environmental quality, while globalization shows no effect on environmental pressure. As shown in the results, it can be stated that human development and renewable energy consumption are two necessary elements in fighting against environmental pollution; however, natural resource abundance significantly damages the environment. Thus, we are required to be cautious when utilizing natural resources.

Research Methodology

One of the most important sections of the present research is the presentation and explanation of an appropriate model to attain the goals. Therefore, after collecting the required data and statistical information using the econometric methods and Eviews 13 software during the time period of 1990-2023, we performed an analytical evaluation of the impact of development-driven education on the environment improvement or the emphasis on the human development index in selected 15 countries in Middle East (United Arab Emirates, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Syria, Cyprus, Turkey, Saudi Arabia and Yemen) and Iran that has been chosen based on human development indicators and unhealthy air quality as moderate. Also, how to extract them and analysis of the structure of the model based on the examined factors have been considered.

According to the various research carried out in this field and based on the theoretical foundations, the formula of the model used in this study for the selected countries of the Middle East is expressed as follows:

$$co2_{i.t} = f(exp_{it}, edu_{it}, gdp_{it}, fec_{it}, urb_{i.t})$$

$$\ln co2_{i.t} = \alpha_0 + \alpha_1 \ln exp_{i,t} + \alpha_2 \ln edu_{i,t} + \alpha_3 \ln gdp_{i,t} + \alpha_4 \ln fec_{i,t} + \alpha_5 \ln urb_{i,t}$$

Where,

Co2: air pollution index in country i during the period t, is used as a substitution for environmental improvement. Given the special importance of carbon dioxide in air pollution and the increase in global warming, this gas is considered transboundary pollution. Due to the high correlation of carbon dioxide gas emissions with other polluting gases, it can be used as an air pollution indicator. So, in order to examine the relationship between human development indicators and the environmental improvement index, CO2 gas emission is considered as a measure of pollution and substitution for the environmental condition.

As mentioned, three criteria of health, education, and well-being are considered measures for evaluating the human development index.

EXP: life expectancy index in country i, at the period t; as a proxy in describing people's health status.

EDU: the average years of education of adults aged 25 and over in country i and at period t. it is used as an education indicator.

GDP variable: per capita income index in country i and at time t is considered as the quality of well-being and the standard level of living.

FEC: energy consumption of fossil fuels in country i at time t

URB: urbanization population rate in country i at time t

Research Findings

Model tests

Data stationarity test

The most important discussion in econometrics is the examination of methods to ensure that the estimated regression is not spurious. One of the recommended methods for the above case is to evaluate the validity of the time series. Based on the results obtained from the test of Lin, Levin, and Chu, the variables in the

model with intercept and without trend in the first order of differentiation have been stationary. According to the results, if the value of the Prob statistic is higher than 0.05, the variable would be null, and to prevent spurious regression and other statistical problems it shall be made stationary.

Table 1. The Lin, Levin and Chu Test

Variable	Statistic	Prob.	Lvel
CO2 Air pollution	-17.7702	0.0000	I(1)
EDU	-5.28069	0.0000	I(1)
EXP Health	-4.15094	0.0000	I(1)
GDP Living standard level	-3.21685	0.0006	I(1)
FCE Fossil fuel combustion	-9.2284	0.0000	I(1)
URB Urbanization rate	-7.480926	0.0000	I(1)

F Limer test

The first step in panel data estimations is to determine the constraints imposed on the econometric model. In other words, we should first determine whether the regression relationship in the sample has heterogeneous intercepts and homogeneous slope or not. Or if the hypothesis of common intercepts and slope is accepted among sections (integrated data model). For this purpose, to estimate Equation (1), we first use the F statistic to determine the presence or absence of separate intercepts for each section.

Table 2. F Limer Results

Effects test	Statistic	Prob.	d.f.
Cross- section F	4.533556	0.0000	(15,523)
Cross-section chi-square	66.498673	0.0000	15

According to the results of the above table, the acceptable value of F Limer statistic, and the value of significant value is less than 0.05. Therefore, the null hypothesis (based on using pool method) is rejected and the opposite hypothesis based on using the panel data method is verified. Then, we use the Hausman test to test whether the model is estimated using the fixed or random effects method.

Hausman test

The Hausman test is one of the main tests in panel researches and it can be stated that it is the second test after the poolability test. So, if it is determined in the poolability test that for all sections or times in the study separate intercepts could be considered, i.e. the pattern of group or time fixed effects, the researcher should also estimate group or time random effects and then discuss the choice between fixed effects and random effects model using the Hausman test. The main assumption in the fixed effects model is that the error component can be correlated with the explanatory variables with the time-invariant error component. However, in the random effects model, it is assumed that there is no correlation between the error component and the explanatory variables. Hausman's test applies the chi-square criterion. if the probability of the test statistic is higher than 0.1 at a significance level of 90%, we can prefer random effects to fixed effects, otherwise fixed effects are chosen. We use the Hausman test to determine the correct and preferred model among the fixed effect and random effect models. Unlike the fixed effect model, in the random effect model, x_i ,$\mu_i$are independent of each other. Because $\mu_i s$ are included in the error sentence, so in the random effects model, we can assume that $E(u_{it}/x_{it}) = 0$ and the null hypothesis in this test is presented as follows:

H_0: $E\ (u_{it}/x_{it}) = 0$

H_1: $E\ (u_{it}/x_{it}) \neq 0$

Table 3. Hausman Test Results

Test summary	Chi-sq.statistic	Chi-sq.d.f.	Prob.
Cross-section random	72.099108	5	0.0000

The results of the Hausman test for the studied model are presented in Table 3. The results show that the statistics of the Hausman test are not significant at the 72% confidence level. This shows the rejection of the H0 hypothesis based on the use of the random effects method. Therefore, according to the Hausman test, the fitting of the main regression model of this research, using the panel data model with the fixed effects method (hypothesis H1), would be suitable. Therefore, according to the results of the F- Limer and Hausman test, to investigate the analytical evaluation of the relationship between development-oriented education and environmental improvement, it is concluded that the given model should be estimated using the panel data method and the fixed effects method.

Table 4. The Results of Estimating the Effect Coefficients of Independent Variables on Dependent Variables

Variable	Coefficient	t-statistic	Prob.
C Intercept coefficient	-3.98503	-6.161507	0.0000
LEXP Health	-0.164429	-19.33083	0.0000
LEDU Education	-0.085623	-2.276907	0.0232
LGDP Living standard level	-2.87E-05	-1.813679	0.0503
LFCE Fossil fuel combustion	0.136996	4.973577	0.0000
LURB Urbanization rate	0.197961	4.543212	0.0000
R-squared: 0.838659 Coefficient of determination		F-statistic: 752.27386	
D-W: 1.606237 Durbin-Watson		Prob. (F-statistic): 0.00000 F statistics probability	

As shown in the results of Table 4, all the independent variables applied in the research are statistically significant with a confidence interval of 5% and have signs of estimated coefficients that are also consistent with economic theories. The coefficient of determination is verified and shows the explanatory power of 83% of the dependent variable by the independent variables. The given Durbin-Watson value indicates the lack of autocorrelation between the variables. F values and probability values also indicate the significance of model coefficients.

Hence, according to the fitted model, all the variables used in the model were significant, so that the variables of the measurement criteria of the human development index, including the quality of health, education and well-being (standard of living) of the individuals showed a negative effect, and the variables of urbanization rate and fossil fuel consumption indicated a positive effect on the amount of air pollution which signifies the environment status. The health variable has a negative and significant impact on the air pollution index; so that a decrease of 1 percent in life expectancy increases air pollution by 0.01 percent. The living standard level is the highest effective variable in air pollution, with a negative and significant trend; in a way that with an increase of 1 percent in people's well-being, air pollution decreases by 2.8%. Education is one of the other variables in this research. The mentioned variable has a negative and significant impact on air pollution in selected countries in the Middle East. It shows that with an increase of 1% in education, air pollution is decreased by 0.08%.

Urbanization rate is another variable; there is a positive and significant relationship between this index and air pollution. With an increase of 1% in the rate of urbanization, the level of air pollution has increased by 0.1%. Certainly, this causes some problems in the area of environmental improvement. Finally, the fossil fuel consumption variable has a positive and significant relationship with air pollution, in a way that an increase of 1% in fossil fuel consumption increases air pollution by 0.1%.

Evaluation of Iran

Based on the theoretical foundations and the cases mentioned in this section, the model used in this study for Iran is shown as follows:

$$LCO2_t = \beta_1 + \beta_2 EXP_t + \beta_3 LEDU_t + \beta_4 GDP_t + \beta_5 LURB_t + \beta_6 LFCE_t$$

Table 5. The Results of Estimating the Effect Coefficients of Independent Variables on Dependent Variables in Iran

Variable	Coefficient	t-statistic	Prob.
C Intercept coefficient	-4.393659	-1.434690	0.1619
LEXP Health	-0.232110	-4.691928	0.0001
LEDU Education	-0.059426	-0.329016	0.7446
LGDP Living standard level	-0.001028	-0.344576	0.0330
LFCE Fossil fuel consumption	0.282514	2.123695	0.0427
LURB Urbanization rate	0.010535	0.050875	0.0518
R-squared: 0.681495 Coefficient of determination		F-statistic: 11.98214	
D-W: 2.100359 Durbin-Watson		Prob. (F-statistic): 0.00003 Probability (F-statistics)	

According to the results of Table 5 regarding Iran, all the independent variables used in the research, except for the education variable, are statistically significant with a confidence interval of 5%, and have signs of estimated coefficients that are consistent with economic theories. The coefficient of determination is verified and indicates the explanatory power of 68% of the dependent variable by the independent variables. The given Durbin-Watson value shows the lack of autocorrelation among the variables. Fossil fuel consumption and urbanization are factors that directly influence Iran's air pollution. Based on the results of this research, the positive and significant effect of fossil fuel consumption on the improvement of the environment indicates that this variable has the highest impact on environmental pollution in Iran. Thus, an increase of 1% in fossil fuel consumption increases pollution by approximately 0.28%. Also, the role of urbanization as an important determining factor in environmental pollution is such that a 1% increase in the amount of urbanization increases air pollution by 0.01 percent; On the other hand, it was found that the environmental improvement is affected by the level of dimensions of human development indicators. So, a 1% increase in the health and quality of people's well-being mitigates pollution by 0.23 and 0.01, respectively. The insignificance of the education index in this study does not indicate that education has no effect on decreasing environmental pollution. Therefore, it shows that the variable used in the present study as a proxy of education (years of education of adults 25 years old and above) in Iran has no effect on the improvement of the environment.

Conclusion

Given the special importance of carbon dioxide in air pollution and the increase of the global warming phenomenon, this gas is considered a trans-boundary pollutant. Due to its high emission along with other polluting

gases, it can be used as an air pollution indicator. Therefore, the current study, for an analytical investigation of the impact of development-driven education on improving the environment, emphasizing the human development index in the Middle East and Iran during the period of 1990-2023, considers CO2 emissions as a measure of pollution and a proxy for the environmental status.

The results for Iran showed that all the independent variables used in this research, except for the education variable, are statistically significant. Moreover, the signs of the estimated coefficients are consistent with economic theories. Fossil fuel consumption and urbanization are factors that directly influence Iran's air pollution. Also, the improvement of the environment is affected by the criteria for measuring human development indicators, including health, standard of living, and education. It indicates that by improving these dimensions, the probability of achieving clean air is increased. It should be considered that the insignificance of the education index in this study does not indicate the lack of effect of education on mitigating environmental pollution; rather, it shows that the variable used in this study as a proxy for education in Iran has no impact on the improvement of the environment. Furthermore, it was found that the measurement dimensions of the human development index in selected countries of the Middle East have a negative and significant impact on environmental pollution. Higher human development is beneficial for the environment. By reducing CO2 emissions and other pollutants, it helps to protect the environment by reducing pressure on natural resources. If the level of income, education, and health services in the country is improved, the awareness of the importance of a safe and high-quality environment will also increase. In other words, as health is one of the main elements of the development of societies, and is used in measuring the human development index with the life expectancy component, it can be stated that there is an indirect relationship between the life expectancy index and air pollution. If the life expectancy and health of people are increased, and the cardiovascular and pulmonary diseases caused by air pollution are decreased, we will see an improvement in the environment and the reduction of air pollution as a consequence. These findings are consistent with the studies of Pour Ali et al. (2019). Compliance with environmental considerations, in addition to increasing the level of society's health, can, through increasing life expectancy and improving health in the studied countries, strengthen the motivation of the current generation to save money and leave significant effects on domestic investment, and finally increase the economic growth rate (the quality of well-being), which is one of the criteria for measuring the human development index. Healthier households, owing to their increased productivity, can have higher incomes. Since income is a key factor in improving the health of society, high income helps in purchasing many goods and services, such as good nutrition, clean water, and high-quality health services. Thus, health conditions might be improved through higher incomes. Also, higher income leads to new technological advancements in industries and the protection of the environment. These results are consistent with the studies of Abolhasani et al. (2019). Educated individuals have a role beyond economic development in the improvement of the environment. Education is considered the most important factor in raising awareness about the environment. As the increase of this index, consistent with the study of Mukherjee & Chakraborty (2009), increases the awareness of people and promotes the necessary motivation for improving the environmental conditions, acquires the necessary skills for solving environmental problems, and finally creates a conscious movement towards environmental sustainability. Thus, providing the education system and health care for all members of society can lead to the mitigation of environmental destruction and air pollution via the improvement of the human development index. Despite playing a crucial role in the process of economic development, the energy sector also leads to the release of various environmental pollutants, the most important of which is air pollution because of the emission and leakage of gases caused by the

combustion of fossil fuels, which accelerates the process of industrial development, increases energy consumption, and fails to observe environmental regulations. These results are consistent with the findings of Nasrollahi & Ghafari (2010). Additionally, the increase in pollutants caused by the consumption of fuels and air pollution, in addition to environmental destruction, leads to an increase in diseases and a decline in the health of individuals in society. Thus, some policies such as pollution tax, green tax, and the increase in the price of carriers with more pollution might decrease energy consumption and reduce the pollutants emissions that harm the environment.

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