

Original Article

Environmental Pollution and Health Dynamics in Developing Nations: Do Carbon Emission, Economic Growth and Renewable Energy Matter?

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Abstract

Ensuring lifespan and good health became a hot concern for academics and governments. The literature has addressed a number of determinants, including socioeconomic factors. However, there are few empirical research on this topic in developing nations with low health indicators, such as Pakistan, Bangladesh, India, Nepal, Afghanistan, Iran, and Indonesia. This project looks at how economic growth, environmental degradation, and renewable energy affect life expectancy between 1991 and 2023. The Granger Casualty Method is used in this investigation. The research findings showed that economic development and renewable energy are statistically significant, but environmental pollution is not. The life expectancy is positively impacted by economic growth and renewable energy, in addition to increasing marginal effects. Additionally, there is indication of a causal affiliation amid natural life prospect and fiscal evolution, environmental pollution, and renewable energy. In order to increase people's longevity, the study recommends making a financial adjustment to address health-related issues brought on by a lack of medical facilities and deprived cleanness. Because they will enhance fitness results without sacrificing monetary progress, clean energy investments are essential.

Keywords: *Environmental Changes, Learning Expectancy, Open Educational Resources, Higher Education, Environmental Degradation*

INTRODUCTION

The 2015 (SDGs) for well-being and wellbeing. SDG-13, seeks to promise that everybody has admittance to decent jobs, inexpensive, clean energy, and bearable cities and humanity by 2030 (Zahra et al., 2023). The (HDI) is unique of the three main indicators that the (UNDP) uses to overgrown the level of social progress in different nations (Irfan et al., 2023; Minhas et al., 2024). In addition to hindering lives and the economy, environmental pollution and climate change have a negative impact on consequences for health. However, the nation's health outcome metrics remain subpar. Only six out of ten homes in Somalia have access to better sanitary facilities, according to the country's most recent health and demographic study. 42% of the houses examined have direct entree to sea for their residents. Additionally, 24% of men and

25% of women are expected to pass away before turning 50 (Directorate of National Statistics, 2023; Rahman & Bakar, 2019).

In fact, strategies targeted at extending life expectancy in South Asia must be developed immediately. In order to enhance health outcomes and expand access to healthcare services, politicians, particularly those in the health sector, should start principal healthiness overhaul amenities, increase civic clinics, and offer national health insurance. Finding the socioeconomic factors that influence life expectancy in Somalia is even more crucial. However, this project represents the possible effects on life expectancy of urbanization, economic expansion, renewable energy, and environmental damage. Reports state that seven zillion individuals' worldwide death from air pollution each time. Solitary the core



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How to cite:

Razzaq, N., Rahman, S. U., Ahmad, M. J., & Idrees, S. (2026). Environmental Pollution and Health Dynamics in Developing Nations: Do Carbon Emission, Economic Growth and Renewable Energy Matter?. *Siazga Research Journal*, 5(2), 149–157. <https://doi.org/10.5281/zenodo.21610547>



features influencing life expectancy is believed to be environmental pollution. Anthropogenic contaminants, like as (CO₂), sulfur dioxide (SO₂), nitrogen oxide (NO_x), and particulate matter (PM)—resultant from fuel used in manufacturing shubberies and boiler procedures, as well as diesel-run means of transportations—have been shown in numerous previous studies (Ahman (2023), to shorten lifecycle anticipation and cause a number of diseases. Studies (Bakar, 2019; Abro et al., 2024; Tanveer Ahmad Shahid, 2023) have shown that aging persons are extra vulnerable to air pollution because of compromised insusceptible arrangements, the addition of dangerous chemicals, and pre-remaining medical disorders.

However, there is also a correlation between increasing incomes and the longevity of a nation's people. Faster economic growth is necessary for a higher level of living (Shahid et al. (2024) and others claim that life expectancies are higher in nations that Devote in cultivating public indices identical vigor, education, food facilities, annuity policies, sanitary dispositions, and better environmental quality. By significantly lowering scarcity rates and boosting investments in diet refuge, clean intake marine, health, sanitation, improved diet, and tutoring, the majority of industrialized countries are recognized to have greater life expectancies and strong growth rates. (Shahbaz et al. 2016; T. A. Shahid, 2024). Furthermore, the main cause of air pollution is fossil fuels, which have been demonstrated in multiple earlier studies to lower people's excellence of life cycle by beginning breathing and cardiac glitches (Caruso et al. 2020; A. U. Shahid et al., 2022). According to Warsame and Sarkodie (2022) and Warsame 2022c, cutting back on fossil fuel use lowers economic activity because energy is a crucial component of economic production. However, because it progresses shape conclusions deprived of foregoing long-term economic growth, renewable vitality is gotten as the best alternative to fossil fuels (Maqsood1 et al., 2023).

The following are the reasons why these parameters were selected: (1) CO₂ emissions cause environmental pollution, which poses a number of health risks to humans; (2) renewable energy is used in place of fossil fuel energy, which lowers pollution and increases lifetime suspense through enhanced lavatories (3) development offers the financial resources and medical facilities needed to continue a vigorous lifecycle and (4) pecuniary progress justifies modern amenities

to increase life expectancy. By evaluating how environmental contamination and economic growth concurrently impact life expectancy, this study advances the subject. Although earlier empirical studies have demonstrated a robust affiliation amid fiscal evolution, life expectancy, and conservation dilapidation, this study is the first of its kind and focuses on Somalia. Second, this study fills a break in the prose by evaluating the effects of renew-able liveliness and sprawl on lifespan suspense.

LITERATURE REVIEW

Association amongst Fiscal Development and Health

In the empirical literature, fiscal progress is another important factor that determines quality of life. Through intermediary elements including healthcare affordability, a healthy diet and lifestyle, improved admittance to health accommodations, and community funding, it promotes health outcomes. In particular, Luo and Xie (2020) have noted that China's lifetime prospect rises with commercial evolution. Shahbaz et al. (2019) for SSA nations and Mahyar (2016) for Iran came to similar conclusions. Even though SSA countries have lower per capita incomes than other areas, pecuniary evolution is crucial to achieving and preserving excellent health. Similarly, in the ecosphere's most polluted nations, economic expansion increases natural life bated breath. Alam et al. (2015) found that while fiscal hardship reduces life anticipation in India, economic progress increases it using a variety of cointegration techniques. Interestingly, economic globalization has an affirmative effect on lifecycle expectation in less pay realms in addition to having a power on wellbeing conclusions (Guzel et al. 2021; Shahid, Rahman, et al., 2024; Saeed et al., 2024).

Relationship between Renewable Energy and Health

The empirical literature discusses how energy affects health outcomes. According to some research, energy utilization improves a number of health outcomes. According to some, energy use has a harmful effect on strength upshots (Shahzadi et al., 2023; Ur Rahman & Bakar, 2019). For example, Ibrahim et al. (2021) initiate that non-renewable vitality practice lowers value of lifespan in 43 SSA countries by raising mortality rates and lowering life expectancy utilizing a variety of health metrics, such as life expectancy, mortality rate, and human development index,

as well as combined and dis cumulative data on non-renewable verve. Regarding fresh liveliness, can et al. (2022) evaluated how job plainness and clean dynamism affected mortal welfare in a panel of EU member nations between 2003 and 2016. It was determined that, in the nations that were sampled, renewable energy plays a positive effect in improving human wellness. According to Caruso et al. (2020) and Ur Rahman & Bakar (2018), sustainable energy increases lifecycle expectation at natal in twelve European homelands. Similar findings has been reported by Hanif (2018) in 34 SSA nations.

Connection among Ecological Toxic Waste and Health

The connection among eco-friendly contamination and lifecycle anticipation is the subject of the third literary strand. One major issue that is averse to maintaining positive health outcomes is environmental pollution. It is thought to be among the most notable characteristics of health quality determinants. The affiliation

stuck between environmental pollution and The discipline of health economics has explored lifespan suspense in great detail (Wen 2012; Gu (2012) evaluated in depth how outdoor pollution affected elderly Chinese people’s life expectancy. According to the empirical findings, pollution reduces older persons’ life expectancy in China. Women are more negatively impacted by pollution than males are. Azam et al. (2022); T. A. Shahid et al. (2023) cast-off annual spell sequence figures beginning 1975 to 2020 to investigate the result of emissions on lifecycle hope in Pakistan. The empirical findings show that life expectancy declines as carbon emissions increase. The detrimental things of ecological trash on lifecycle suspense have been proven by numerous other Asian research (Nazik Maqsood, 2024). Additionally, Rodriguez-Alvarez (2021) found that in 29 European nations, air pollution shortens life expectancy. Similarly, Kolasa-Wałcek (2017) found that a rise in environmental pollution reduces life expectancy in Spain and panel European countries, respectively.

Table 1
Unit of Measurement

Code	Indicator name	Source
UR	Percent of an urban population of the total population	World Bank
RE	Renewable energy consumption (% of total energy consumption)	World Bank
CO ₂	Carbon dioxide emissions (thousand metric tons)	World Bank
LE	Life expectancy at birth	World Bank
RGDP	Real gross domestic product (constant 2010)	SESRIC

METHODOLOGY

In this study, we look at how economic growth, environmental pollution, and renewable liveliness affect lifetime suspense in seven

developing nations. The Granger causality approach is used in this investigation. In accordance with the earlier research the next model specification is suggested for the study: l

$$nLE_{tt} = \beta_0 + \beta_1 \ln RE_{it} + \beta_3 \ln GDP_{it} + \beta_4 \ln CO_{2it} + \epsilon_{it}$$

Empirical Result and Discussion

Descriptive Sstatistics

Table 2 presents a instant of the sampled capricious. It showed average life expectancy (3.8), economic growth (19.7), renewable energy (4.4), and environmental pollution (6.6). The

fluctuation of renewable energy is lower than that of other variables (0.032). The factors are all skewed adversely. All of the series, with the exception of renewable energy, are generally and equally allocated, according to the Jarque–Bera statistics.

Table 2
Summary statistics

	lnLE	lnRE	lnRGDP	lnCO ₂
Mean	3.811	4.322	19.701	6.602
Median	3.946	4.532	20.831	6.429
Maximum	4.031	4.551	21.126	6.593
Minimum	3.812	4.468	20.577	6.194
Std. dev	0.069	0.032	0.1692	0.100
Skewness	- 0.451	- 1.128	- 0.029	- 0.371
Kurtosis	1.893	3.718	1.672	2.454
Jarque-Bera	2.126	6.001	1.447	0.796
Probability	0.334	0.048	0.434	0.631

According to the results of pairwise correlations, Urbanization, Health is absolutely correlated with financial evolution and renewable vitality, but eco-friendly effluence and lifecycle prospect are inversely correlated (Table 3). Similarly, urbanization and commercial progress are clearly linked with renewable

energy, whereas environmental pollution and renewable energy are negatively correlated. Additionally, there is a favorable correlation between economic expansion and environmental contamination. Lastly, a helpful correlation has been found between urbanization and environmental contamination.

Table 3
Correlation matrix

	lnLE	lnRE	lnRGDP	lnCO ₂
lnLE	1			
lnRE	0.821	1		
lnRGDP	0.436	0.2334	1	
lnURB	0.832	0.5213	0.3256	
lnCO ₂	-0.0727	-0.2903	0.5492	1

Unit Root Test

This test is analyzed in the study using Fisher ADF and Fisher PP. The upshots of test are presented in Bench 4. It demonstrates that while the other factors are participated at close I (0),

some capriciouss, such as CO2 emissions, have harms at level I (0). Nonetheless, the stationary assumption is satisfied when entirely the parameters are incorporated at original variance I (1).

Table 4
Unit root tests

Variable	Fisher ADF	Fisher PP
lnLE	- 5.196 ^a	- 1.232
ΔlnLE	- 4.232 ^b	- 3.143
lnRGDP	- 27.988 ^a	- 4.641 ^a
ΔlnRGDP	- 5.353 ^a	- 5.369 ^a
lnRE	- 3.307 ^c	- 2.812
ΔlnRE	- 3.779 ^b	- 3.795 ^b
lnCO ₂	- 2.774	- 2.317
ΔlnCO ₂	- 3.237 ^c	- 3.213 ^c

Δ is a representation of the initial difference variables. The connotation smooths for a, b, and c are one %, five%, and ten%, respectively. Only the trend and intercept t-statistics are presented.

Granger Causality

Table 6 displays the findings of the test, which is rummage-sale to ascertain whether the variables are causative. Renewable energy and

health (life expectancy) have been shown to be causally related in both directions. Economic growth and clean energy are crucial for good health, which in turn boosts both. Economic productivity is greatly impacted by lower death and fertility rates as well as increased longevity. It is common knowledge that poor water quality,

dirty air, and rubbish disposal increase the risk of sickness. Furthermore, it is shown that urbanization and renewable energy contribute to economic growth in a unidirectional manner, but not the other way around. Lastly, it is found that eco-friendly smog and pecuniary advance are causally related in both directions.

Table 6

Granger Causality

Null hypothesis	F-statistic	Prob	Decision
$\ln RE \nrightarrow \ln LE$	5.6160000	0.01160	Two-way causality
$\ln LE \nrightarrow \ln RE$	9.3034200	0.00140	
$\ln RGDP \nrightarrow \ln LE$	15.769300	8.E – 050	Two-way causality
$\ln LE \nrightarrow \ln RGDP$	23.04120	6.E – 060	
$\ln CO_2 \nrightarrow \ln LE$	28.79750	1.E – 060	Two-way causality
$\ln LE \nrightarrow \ln CO_2$	7.089000	0.004700	
$\ln RGDP \nrightarrow \ln RE$	0.252920	0.779000	One-way causality from renewable energy to economic growth
$\ln RE \nrightarrow \ln RGDP$	15.9582	7.E – 05	
$\ln CO_2 \nrightarrow \ln RE$	1.16854	0.3312	No causality
$\ln RE \nrightarrow \ln CO_2$	2.43248	0.1134	
$\ln CO_2 \nrightarrow \ln RGDP$	5.28186	0.0144	Two-way causality
$\ln RGDP \nrightarrow \ln CO_2$	6.90274	0.0053	

CONCLUSION & POLICY IMPLICATION

For policymakers, confirming a long lifespan hope suited crucial. In the literature, a number of socioeconomic characteristics have been used to assess their impact on life expectancy. Furthermore, there is proof that lifecycle suspense and monetary advance, conservation degradation and lifecycle expectancy, and renewable energy and life expectancy are all causally related in both directions. In addition to negative externalities that may impair health outcomes, urban environments offer access to medical services that improve human wellbeing and health quality.

The report suggests that a financial adjustment be made in order to solve health-related issues brought on by inadequate sanitation and a lack of healthcare services in order to increase people's longevity. Therefore, more money should be given to the health sector by government and its member states. Additional progression results in longer lifetime expectancies. Officials should therefore begin enacting policies designed to encourage fast growth. Lastly, the schoolwork reassures the use of ecological municipal architecture., which benefits human longevity by making investments in infrastructure, health care, and education. Based on this research, we may advise future studies to take into account a wide range of additional factors that affect

life expectancy, including hospital services, institutional quality, health costs, conflicts, and dietary consumption.

Competing Interests

The authors did not declare any competing interest.

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