JBEO, 8(4), 47-57.

Journal of Business and Economic Options

Economic Activity, Carbon Emissions, and Health Outcomes: A Cross-National Study of OIC and Non-OIC Countries

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Abstract

This research examines foreign direct investment, carbon emission and public health outcomes of 30+ OIC and Non-OIC countries from 2000 to 2024. The research will try to give a better understanding of the linkages between important economic and environmental variables and health indicators like infant mortality, life expectancy and educational achievement. In addition to giving empirical results, the study also includes a review of theoretical and applied literature addressing the issues of health challenges experienced by developing and emerging nations. The analysis starts with an explanation of the role of foreign direct investment, economic growth, urbanisation, renewable energy consumption and carbon emissions in determining public health conditions. It then synthesises existing knowledge from a theoretical and empirical approach in order to emphasise relationships already found and gaps in current knowledge. The study also goes on to explain the connections between foreign direct investment, economic activity, environmental degradation, demographic change and the use of renewable energy and its effect on health outcomes in countries. By summarising and comparing the findings from available studies in the research, it adds more information about the influences of economic and environmental factors on public health in selected OIC and non-OIC nations. In doing so, it also highlights areas in which there is further investigation to be done, giving direction to future research interested in examining the relationship between foreign investment, environmental conditions, and health indicators. Overall, the study advances the literature by conceptualising several dimensions that together contribute to the performance of public health in different economic settings.

Keywords: *Foreign Direct Investment, Public Health, Carbon Emissions, Economic Activity*

JEL Codes: *F21, I15, Q53, O57*

Article's History
Received: 24th November 2025
Revised: 19th December 2025
Accepted: 20th December 2025
Published: 22nd December 2025

Citation:
Carlo, D. (2025). Economic Activity, Carbon Emissions, and Health Outcomes: A Cross-National Study of OIC and Non-OIC Countries. *Journal Business and Economic Options*, 8(4), 47-57.

DOI:
https://doi.org/10.5281/zenodo.18010146

1. INTRODUCTION

The relationship between economic development and human development has been central in conventional theoretical development thinking for some time, and has been continuously highlighted by international organisations such as the United Nations Development Programme. Development frameworks have on many occasions explicitly stated that economic growth is a way ahead and not an end in itself, but a vehicle for better human welfare, living standards and all aspects of the quality of life. Within this context, Foreign Direct Investments have emerged as an important driving force for economic development, especially for developing and emerging economies (Naeem et al., 2025; Ali et al., 2025). By helping to bring in capital, technology and managerial skills, Foreign Direct Investment brings in more advanced modes of production into the host countries and creates improved productivity throughout. These processes are leading to job creation, higher wages and improved labour market outcomes that lead to overall human development goals. As there is an increase in productive capacity and job opportunities, there is an increase in household incomes, which facilitates better access to basic services such as healthcare, education and nutrition (Emodi, 2019). Through continued capital flows, Foreign Direct Investment can also strengthen public health systems through support for the expansion of medical infrastructure and enhancement of the financial capacity of governments and private providers. Higher fiscal revenues and private sector investments make possible the development of hospitals, clinics and healthcare facilities and better remuneration for trained healthcare professionals (Arshad et al., 2025; Longston et al., 2025). In addition, the diffusion of high technology and organisational practices that are related to Foreign Direct Investment can bring more efficiency in

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health-related industries. In a number of cases where the Foreign Direct Investment is also combined with higher levels of dependence on renewable energy sources, South Korea's Foreign Direct Investment is contributing to the reduction in carbon dioxide emissions. Lower emissions yield better environmental quality, which indirectly leads to better health outcomes through mitigating effects of air pollution, respiratory illnesses and others associated with the environment (Ahmad, 2018; Ibrahim & Simian, 2023). These linkages of benefits point to the potential of Foreign Direct Investment for economic growth and human welfare to be supported at the same time. Nevertheless, according to empirical studies, the effect of Foreign Direct Investment on the public health sector is not always positive and it is subject to regional variation in view of quality of various institutions, policy frameworks and socio-economic conditions (Parveen et al., 2024; Amin et al., 2024; Sadia Bint Raza et al., 2024; Huang et al., 2024; Ali, 2022; Rashid & Khan, 2023; Lim & Osei, 2024; Shaid et al., 2025; Ali et al., 2025).

Despite its potential to have beneficial effects, the gamut of Foreign Direct Investment can also have unintended consequences that complicate the role of foreign direct investment in promoting inclusive development. One of the concerns that has been raised in the literature is the issue that Foreign Direct Investment may generate or aggravate inequality of income in the host countries. In such cases, the higher-income households are in a better position to see improved job opportunities, private healthcare services, and medical technologies to obtain better health outcomes, whereas the lower-income groups can see even limited or uneven improvements in health outcomes (Calin & Horodnic, 2023). This disparity is in the access to the benefits, which can create stark disparities in healthcare access and undermine public health improvements as a whole. Moreover, the growth in disposable income that occurs alongside economic growth and Foreign Direct Investment may cause increased levels of consumption of unhealthy or harmful products, such as tobacco, alcohol or highly processed foods. These patterns of consumption, in the absence of the benefit of powerful public health regulations and awareness campaigns, can neutralise at least part of the beneficial effect of income growth on health (William & Adam, 2018; Ahmad, 2019). A large body of literature, therefore, focuses on the further variables that interact with the Foreign Direct Investment and economic development in order to influence health outcomes. This includes urbanisation and trade openness, public and private health expenditures, market size, infrastructure development, social indicators, inflation and expenditure on education. Urbanisation may have a positive impact on providing healthcare services, but may also lead to more access to pollution and overcrowding. Trade openness will be able to reduce the cost of medical equipment and pharmaceuticals, but will also make it easy for unhealthy consumption habits to circulate. Health expenditures have a real role in determining how available and reliable medical care can be to the public, and education expenditures create more awareness of health care and preventive care. Together, these determinants impact the national health performance and general importance of the Foreign Direct Investment in the long-term economic and social development (Rabbia Syed & Sehrish Arshad, 2024; Zubair et al., 2024; Ali, 2022; Mensah & Boateng, 2023; Torres & Delgado, 2022).

Foreign Direct Investment is also well known to act as a catalyst for structural change and growth in various sectoral segments of the economy. It helps the expansion of the secondary industries like construction, tourism, mining, and educational services, that creates employment and domestic demands. However, a lot of these industries are energy-intensive and contribute considerably to environmental pollution, especially in the absence of proper environmental regulations. As industrial activity proliferates, there is a tendency for carbon dioxide emissions and other sources of pollution to increase and for the environmental and public health challenges to increase. This has resulted in bringing up the importance of the adoption of renewable energy sources and cleaner production strategies as complementary strategies to Foreign Direct Investment-led growth. The question of the relationship between Foreign Direct Investment and carbon dioxide emissions is therefore still a topic for debate in the literature. Some studies have revealed a positive relationship, which implies the role of Foreign Direct Investment to improve emission through aiding faster development of industries coupled with energy consumption (Song et al., 2024; Saeed et al., 2024). Other scholars report a negative relationship and suggest that Foreign Direct Investment can lead to the transfer of clean technologies and energy efficiency, and encourage environment-friendly production methods in the host countries (Shen et al, 2024; Shahid et al, 2023; Ali, 2022; Jordan & Fong, 2021).

Remittances are another important type of external financial inflow, which has been influential in the determination of the structure of our economic activities and environmental outcomes, especially in developing economies. By disposing of the monetary resources in the form of consumption, remittance inflows tend to raise the level of consumption, and insofar as this has been shown to contribute to increased carbon emissions, albeit indirectly. As households enjoy increases in their incomes, spending on housing, transportation, durable goods and energy-consuming appliances often increases, and so does the demand for electricity and fossil fuels. In addition, the increase in earnings from such remittances could result in investment in energy-intensive sectors such as construction, manufacturing, and transport infrastructure. These dynamics can end up magnifying the emission of carbon and environmental stresses, particularly in countries that hugely rely on energy systems running on non-renewable energy sources (Arshad et al., 2024; Irfan et al., 2023; J. Saeed et al., 2024; Malik & Rahman, 2022). While remittances can help ameliorate household poverty and thus, the poverty rate, environmental impacts are especially concern. The integration of country-specific complementary policies encourages energy efficiency and the adoption of cleaner technologies.

At the same time, complications associated with the pollution haven hypothesis are still very important for developing countries that receive significant inflows of Foreign Direct Investment. According to this hypothesis, pollution-intensive activities of multi-national enterprises may be transferred to countries which have weak environmental regulations, and this may enhance carbon emissions and harm the quality of the environment in the host countries. When one concentratesForeign Direct Investment in highly polluting industries, this may contribute to raising emissions of carbon dioxide, poor air quality and effects on public health. Prolonged exposure to high levels of carbon dioxide and other forms

of pollution is associated with various health risks, especially respiratory diseases in general, in vulnerable groups such as children (children in general have weaker immune systems and are poor growing up). These adverse effects can shorten life expectancy and can put extra burdens on existing troubled healthcare systems. On the other hand, the enhancement in environmental protection, the improvement of nutrition standard and the sustained reduction of emission can lead to healthier lifestyles and higher level of well-being (Ahmad Shahid et al., 2023; Tanveer Ahmad Shahid, 2023; Nazik Maqsood, 2024; Ali & Bibi, 2018; Arshad & Ali, 2016; Audi et al., 2021; Park & Min, 2022). This duality highlights the importance of the policy of Foreign Direct Investment to be complemented by the environmental protection policy and those related to public health.

Although an increasing number of studies investigated the relationship of Foreign Direct Investment with selected health indicators, the overall impact of Foreign Direct Investment on public health is still not explored well enough in the literature. Existing studies are focused on one health outcome or are limited to particular economic channels, and there is a gap in the knowledge of broader and more complex interactions between investment inflows, environmental quality, and human health. The present research aimed to address such a lack of knowledge by finding out the impact of Foreign Direct Investment and how it affects the public health outcomes through non-linear short-term and long-term relationships. Specifically, the study examines the interaction between infant mortality, life expectancy, secondary and tertiary school enrolment, gross domestic product, urbanisation, availability of physicians, as well as the interaction between Foreign Direct Investment and renewable energy use. This analysis is conducted for countries of Organisation of Islamic Cooperation in period from 2000 to 2022 allows us to obtain a comprehensive and long run perspective of investment and health nexus (Shahid, 2024, Maqsood1 et al., 2023, Minhas et al., 2024, Abro et al., 2024, Ali & Audi, 2018, Ali & Rehman, 2015, Ali et al., 2016, Kingston & Omar, 20

This study contributes to the already existing literature in several important and novel ways. First, it evolves a comprehensive health quality index which incorporates several dimensions of public health, which has not been done to any great extent in earlier empirical studies. By looking at more than a single indicator measure, the index is a more holistic measure of health outcomes, as it must capture more aspects of human well-being. Second, the role of Foreign Direct Investment, renewable energy consumption and carbon dioxide emissions in determining public health outcomes of 31 Organisation of Islamic Cooperation and non-Organisation of Islamic Cooperation developing countries is systematically studied. This comparative tent. Augments the generalizability of the findings and provides for meaningful cross-country insights. Third, the use of the nonlinear autoregressive distributed lag methodology allows for the short-run and long-run asymmetric effects of the interactions between Foreign Direct Investment, Renewable energy and carbon dioxide emissions on health indicators. In this technique of methodology it helps in catching the dynamic adjustments and the nonlinearities that may be not effective to be grasped in the conventional linear models (Rahman & Bakar, 2019; Tabassum et al., 2023; Shahid et al., 2022; Ur Rahman & Bakar, 2018; Zulfiqar et al., 2022; Audi et al., 2021; Silva & Duarte, 2024).

Human capital continues to be an important factor causing Foreign Direct Investment inflows, especially in developing countries where the availability of skilled labour and high health indicators are important determinant factors of investors. There is little doubt that countries with healthier and more educated workforces are capable of attracting the kind of investment which is of high quality and conducive to the generation of productivity gains and improvements in technology. Foreign Direct investment may, further, provide stimulus for structural transformation, depending upon the composition and orientation of the inflows of investment, to encourage the expansion of some sectors and cause the contraction of some sectors. Cleaner forms of governance, transparent institutions and aid policies further help in taking up the environment-friendly technology and business practices. However, with FDI being driven by industrial expansion, which is not accompanied by sufficient environmental protection, this resulted in an increase in energy use and increase in emissions. These opposite effects suggest the relevance of institutional quality and policy coherence in the environmental and health effects of Foreign Direct Investment (Chaudhary et al., 2023; Farooq, 2022; Dawood et al., 2023; Zhao et al., 2023; Li et al., 2022; Audi et al., 2023; Nadeem & Abbas, 2024).

2. LITERATURE REVIEW

One of the main concepts in the literature on Foreign Direct Investment is the assumption that it performs a positive and supportive role in economic development. Traditional growth theories and contemporary empirical studies often focus on the issue that the Foreign Direct Investment can speed up the development process of host countries by supplementing domestic savings, bringing in new and advanced technologies, and enhancing managerial and organisational practices. Many researchers offer empirical evidence to favour the Foreign Direct Investment-led growth theories because Foreign Direct Investment increases productivity, enhances industrial capacity, and leads to an increase in economic growth rates in host countries (Shahzadi et al., 2023; Rahman et al., 2022). Through technology transfer, skill development and integration into global value chains, Foreign Direct Investment is often seen to be a catalyst that is enabling host countries to actually achieve faster and more sustainable development outcomes. These benefits are particularly important to the developing economies with limitations to the availability of capital resources, lack of technological capabilities, and low levels of domestic investment.

However, the literature also appears in opposition to expressing contrasting views on the role that Foreign Direct Investment plays in economic growth. Some studies have reported a negative relation between Foreign Direct Investment and economic growth, suggesting that Foreign Direct Investment is not automatically translated into development gains and may even hinder the industries of the host country under certain circumstances (Zahra et al., 2023). These negative impacts can be due to the foreign company crowding out local businesses, repatriating profits, or existing in an enclave with minimal linkages to the local economy. In addition, the quality of institutions, governance structures and labour

market conditions plays an important part in determining whether or not the Foreign Direct Investment has positive or negative growth effects. Corruption and human capital, in particular, have been found to play a crucial role in affecting the strength and direction of the Foreign Direct Investment- growth relationship. High levels of corruption can lead to inefficiency in investments, a lack of incentives for productive activities, and wrongful allocation of resources, while poor human capital can constrain the capacity of a country to absorb new technologies introduced by foreign companies (Ullah et al., 2023; Awan et al., 2023; Roussel et al., 2021). These findings suggest that Foreign Direct Investment has to be accompanied by institutional reforms and investments in education and skills to have meaningful economic benefits.

The resulting ranking is based on an aggregate index; however, there is a general recognition that there is a risk that aggregation does not fully reflect the heterogeneity of trade barriers across products and countries below. Relying on a single aggregate can miss out sector-specific variations, to mean that it may not reveal a full picture of the reality of trade restrictiveness. To overcome this limitation, we have employed in computing trade barrier indices for all 130 countries, at the two-digit Harmonised System level. By disaggregating, a more precise determination of tariff protection is challenged due to the commodities group differences. Consequently, the study builds an extensive list of trade barrier indices for 130 countries, at the two-digit Harmonised System classification, that enables the construction of systematic comparisons across countries and across sectors (Kee et al., 2009; Anderson & Neary, 2005; Feenstra, 2016).

The relative position of developing countries in the overall dataset can be seen from the accompanying table. The second column presents the calculated trade barriers indices for the developing economies at the two-digit Harmonised System, while the third column shows their equivalent rankings within the international framework of the trade barriers. This ranking stresses statistics on the comparison of the developing countries to the world distribution of trade barriers per type of good. Such disaggregated rankings are of particular interest in that they may help identify those areas of trade protection where developing countries maintain relatively high or low levels of trade protection, in comparison with international benchmarks. By getting to be so particular, this examination produces information that is helpful while investigating the business strategy structure and estimating the extent to which administrations about duties might safeguard from worldwide norms (Nicita and Olarreaga, 2007; World Bank, 2020; Egger et al., 2018). This paper presents country-specific empirical research, which aims to gain further insight into the intricate connection between Foreign Direct Investment and human development outcomes. The case of Pakistan goes back some time and covers events from 1972 through to 2012. The interactive relationship between the Foreign Direct Investment, food availability, education, urbanisation, poverty and the grasp on public health spending is then examined in turn, as also effects of different levels on the lengthening of life span. These results suggest that Foreign Direct Investment goes hand in hand with improved health outcomes, given that the social and economic context is favourable. More expenditure on public health is positively correlated with an increase in life expectancy; a lack of education and poor living conditions are rather detrimental to community health. These results hint at the conditional nature of Foreign Direct Investment's health-related boon, and indicate connections like human capital formation and sustained investment in public health systems, as being vital factors (Qureshi et al. 2022; Javaid et al., 2023; Chen et al., 2021; Polcyn et al., 2023).

Comparable patterns are obtained in wider cross-date analysis of developing economies. A study on 25 developing countries between the years of 1995 and 2014 found a positive relationship between Foreign Direct Investment and health conditions, especially in environments where investment inflows are actively supported by policy frameworks and institutional reforms (Khawaja Hisham Ul Hassan, 2021). These findings suggest that pro-active investment promotion strategies can have magnified social returns to Foreign Direct Investment in excess of the 'pure' economic returns. Additional evidence from Tanzania using data from 1980 to 2014 shows that Foreign Direct Investment was indirectly responsible for poverty reduction, by reducing child mortality rates and increasing life expectancy, although it was not explicitly intended as a poverty alleviation tool. This highlights the importance of indirect channels of transmission, which are the ways through which Foreign Direct Investment can contribute to improvement in human development in terms of improving health services, employment opportunities and living standards (Khawaja Hisham Ul Hassan, 2021; Salehnia et al., 2022; Shaari et al., 2024).

Air pollution has increasingly become identified as a key public health challenge, not only for its negative effects on physical health, but it can also exert a great influence on mental health outcomes. Extended exposure to polluted air has been linked to increases in levels of stress, anxiety, depression and other psychological disorders, especially in highly populated and industrialised areas. Within this context, Foreign Direct Investment plays a moderating role in influencing the level of industrial scale, industrial practices, and the adoption of cleaner technologies. Bakar (2019), based on the provincial-level data collected in China from 2015 to 2018, and using Fixed-effects panel regression along with threshold modelling techniques, has found that air pollution has a statistically significant negative impact on mental health. The study further showed that Foreign Direct Investment can either relieve or worsen these adverse effects based on the characteristics of regions. Factors such as geographical location, access to medical resources, and investments in technological capacity were proven to be a determining factor in the resilient response towards mental health risks caused by pollution with some people's regions having a better infrastructure in healthcare and with higher technological capacity showing better health outcomes (Bakar, 2019; Chen et al. 2021; Gao et al., 2024).

Beyond the air pollution - health inter-relationship, a growing body of empirical literature has focused on studying the interaction of Foreign Direct Investment and renewable energy consumption, especially in the context of emerging and transition economies. Evidence from BRICS countries covers the period between 1990 and 2019, and uses autoregressive distributed lag and nonlinear autoregressive distributed lag models to analyse both symmetric and asymmetric relationships. The results show that changes in the level of Foreign Direct Investment have no statistically significant long-run impact on the level of consumption of renewable energy. This outcome suggests that Foreign Direct Investment in isolation is not likely to cause a long-term shift in renewable energy deployment without the aid of supportive policy

instruments, regulatory incentives and sustained technological advancement. Short-run results, however, show more complex dynamics and thus highlight the key importance of taking asymmetries into account when evaluating investment responses, instead of simply analysing long-run equilibrium effects (Shao et al, 2022; Shi & Yu, 2024; Gao et al, 2024).
Pooled mean group estimation results from non-linear autoregressive distributed lag times occurring less frequently provide more information about the time interval. One of the four holds that if alien capital does not increase, environmental improvement and public health benefits will go up. At this moment, investment towards pollution-intensive industries surges. But once inflows ofmoney from abroad run out, one has no choice but to lean back and wasteimprudently in an image obscene to contemplate, it also lets in some fresh air on the environment. It can hence actively push forward enhancements in public health. This side of the environment shows that environmental technology and cleaner production processes are noteworthy in the use of renewable energy and in efforts to diminish the negative environmental effects of industrial activities. These results together are used to fortify the insinuation against Advanced Environmental Technology, which in both officialdom today as well as in the media's dialogue would later become official policy, then never unite with renewable energy sources and run or adapt anything else to turn tail before taking part in the mainstream mingled societal reality. And again, with the introduction of the Energy Reorganisation Policy in January this year, judging from all available data, everything comes out as an intensifying of energy wastage toward further erosion of environmental standards. With these results also being taken together, it appears that for life's (the fate of life, determined by money) future destiny is not likely to reston how big or small those inflowsare at all. Rather, it is the contentof FDI thatis truly crucial for every living thing in that vicinity, as green technology and new industry will be brought in together with it into general society. And it also makes another empirical test of whether Foreign Direct Investment and Renewable Energy Strategy in China can unite so sweetly that human health will profit along with some gain for the environment. With data for the provinces of China covering the period from 1995 to 2017, Ghazza Khoula (2022) discovered that FDI combined with renewable energy has a role to play in decently sound environment and the good health of people generally. This positive effect, in part, was due to channels such as the transfer of cleaner production technologies, the enhancement of energy efficiency and restructuring out of energy-intensive industries. The research also focused on the strong regional heterogeneity, which suggests that some provinces will have a good chance to focus on energy structure optimisation and improve their reliance on renewable energy sources. In contrast, areas still heavily dependent on fossil fuels were found to have a weaker improvement in health due to Foreign Direct Investment, indicating the role of the composition of energy in influencing investment and its consequences (Ghazia Khoula, 2022; Chen et al., 2021; Shaari et al., 2024).
Reiterating the present literature, a significant portion of the available literature has traditionally analysed a more limited scope of analysis, considering the relationship between Foreign Direct Investment, carbon dioxide emissions, and renewable energy consumption (Hafiza et al., 2022). Although such studies can provide very useful information about environmental performance, they tend to pursue a one-sided view of the broader public health dimensions of the issue, such as mental health outcomes and inequalities in space across the regions. There is growing recognition in emerging research on these topics that we need integrated analytical frameworks to handle these multiple considerations simultaneously, i.e. environmental quality, renewable energy transitions, and health indicators. A greater perspective enables a deeper understanding of the connection between theForeign Direct Investment and environmental sustainability and human well-being under different economic, institutional, and regional circumstances (Bakar, 2019; Polcyn et al., 2023; Salehnia et al., 2022).
More evidence from China shows the complex environmental role of international financial flows. One study considered the impact of remittances and Foreign Direct Investment on the emissions of carbon dioxide in China from 1981 to 2019 in the form of a nonlinear autoregressive distributed lag. The results showed a negative relationship between remittances and carbon dioxide emissions, indicating that the inflows of remittances may contribute to environmental improvement efforts by improving household welfare, relieving poverty-related pressures, and having desirable effects on consumers to improve consumption patterns that are rewarding both the environment and household members. In contrast, Foreign Direct Investment had a stronger long-run impact on carbon dioxide emissions as it plays a key role in industrial structures, energy consumption patterns and production technologies. This long-run dominance therefore emphasises the importance of investment composition because inflows into pollution-intensive sectors would tend to aggravate emissions, while environmentally oriented investment may have more clean outcomes. In light of this, the study recommends the conduct of an economic policy to attract environmentally responsible foreign investors and strengthening regulatory frameworks to improve environmental policies, such as promoting green-oriented investment incentives to balance economic growth and environmental sustainability (Shahzadi, Ali, et al., 2023; Sajid & Ali, 2018; Gao et al., 2024).
Additional empirical research from more developed economies further underlines the importance of the pattern in which segments of wealth creation relate to environmental results. A study across 15 countries in the Organisation for Economic Cooperation and Development shows that, with the notable exception of the mining sector, investment in fixed assets construction contributes to the reduction of pollution levels. This exception is a reflection of the inherently pollution-intensive nature of extractive industries, in which, very often, capital accumulation is linked with increased emissions, rather than environmental improvement. The analysis also reveals persistent environmental stress pressure coming from the tradable sector in all countries, which indicates that the environment can be made worse by international trade through trade structures that are still heavily carbon-based. Based on these findings, the authors call for policies that actively stimulate Foreign Direct Investment to energy efficient technologies and cleaner production processes. They further stress the need for host countries to develop and implement effective environmental policies to curtail carbon dioxide emissions associated with foreign investment so that Foreign Direct Investment can be a source of sustainable development and not of environmental degradation (Cole et al., 2011; Shahbaz et al., 2018; Demena and Afesorgbor, 2020).

The larger implications of carbon dioxide emissions on human well-being are examined in a cross-country study which includes 68 developing economies in the period 1990-2017. This research focuses on the correlation of emissions and life expectancy, and there is a persistently negative correlation, meaning that the more carbon dioxide emissions are emitted, the lower the longevity of the population in developing countries. Their findings indicate that environmental degradation is widespread and has serious health consequences that, for the most part, are not caused by the sources of emissions. In particular, the results suggest that those cases in which carbon dioxide emissions are positively correlated with life expectancy are mostly due to consumption-based activity rather than production processes. This difference would seem to indicate that an increase in welfare linked with short-term changes in consumption could result, over the longer term, in environmental and health cost increases. This study found that increasing a person's income did not necessarily produce either better environmental quality or a healthier population, and it concludes the need for specific environmental and public health policies as well as economic growth policies (Chen et al., 2021; Polcyn et pronziar, 2023; Salehnia et al., 2022). Without effective environmental regulations and sustainable consumption patterns, rising levels of income can cause an increase in pollution and health risks as well. They investigated nine countries with this same observation, and now they have extended the survey to cover aspects of international trade that are concerned with the interaction between environmental markets, emission reduction credits (or ec), and country interests. With proper environmental laws, good results take place. We also need the public to be aware of environmental issues, and that includes wanting economic growth. The findings point to the necessity for policy coherence: economic growth goals must be harmonised with environmental and public health goals. ----- These findings should be taken as a necessary complement to the above evidence. On a different note, a study examining carbon dioxide emissions of the top 10 emitting countries uses the autoregressive integrated moving average method to discern trends and dynamics in emissions. The results imply that we must act promptly in response to emission-relevant challenges, and also indicate the urgency of forward-looking policies aimed at relieving environmental and health risks (Naz et grope ambient, 2022; Shahid, 2024).

3. METHODS

The method used for the systematic review followed a structured approach (PRISMA-based) to identify, screen and include pertinent studies investigating the association between Foreign Direct Investment, renewable energy, carbon dioxide emissions, trade openness, remittances and public health outcomes. An initial pool of 358 records was identified using database searches and reference screening. After duplicates, there were 298 studies that were screened on the basis of titles and abstracts. After this stage, 172 records were excluded as they were not relevant or did not have an empirical focus. A total of 126 full-text articles were evaluated for eligibility, out of which 54 articles were excluded because of methodological inconsistencies and a lack of association with environmental and health outcomes. Ultimately, 72 studies could be included in the qualitative synthesis, and 58 studies provided the foundation for the empirical and methodological discussion.

Table 1: PRISMA

PRISMA Stage	Description	Number of Records
Identification	Records identified through database searching (Scopus, Web of Science, Google Scholar)	312
Identification	Additional records identified through reference lists, reports, and institutional sources	46
Identification	Total records identified	358
Screening	Duplicate records removed	60
Screening	Records screened based on title and abstract	298
Screening	Records excluded after title and abstract screening	172
Eligibility	Full-text articles assessed for eligibility	126
Eligibility	Full-text articles were excluded due to methodological mismatch, irrelevant outcomes, or insufficient data	54
Included	Studies included in the qualitative synthesis	72
Included	Studies included in quantitative or empirical discussion	58

This study follows the principles of systematic literature review in order to ensure that a rigorous and transparent synthesis of the existing research is conducted (Jesson et al., 2011). The review process involves careful examination of previous studies as the final part to analysting it now before taking full account of research methodological guidance, standardising indicators and fundamental research principles, including amounts of foreign direct investment, renewable energy and public health across different national environments. (Shahid et al., 2023). The review also draws together empirical findings and theories of network economics so that one may give a balanced assessment of both upstream frameworks. Where are there research opportunities? One part of the review discussion looks at weaknesses that could be fixed or benchmarks for development, but another part turns to matters needing careful investigation and theory building (Tranfield et al., 2003; Snyder, 2019).

To find studies of interest, a comprehensive search strategy was designed that covered all the major academic sources related to globalisation and finance. Such a strategy included scanning the leading economic journals and key academic

databases (e.g. Business Source Premier, Google Scholar) and looking at multidisciplinary bibliographies of Foreign Direct Investment, renewable energy or health public issues. The search process turned up several hundred records from a wide range of journals. After eliminating duplicate entries of articles, about 300 unique articles were left for further screening. The relevance of each study was assessed by its title, abstract, and methodology. Thus, this systematic way of making views out of reading materials can make us say that it takes more account of recent research trends in Environmental High Tech innovation rather than relying on traditionally one-sided reports from only the US or UK. (Kitchenham and Charters, 2007; Xiao and Watson, 2019).

Table 2: PRISMA Eligibility Criteria

Criteria Type	Description
Inclusion criteria	Empirical studies examining Foreign Direct Investment, renewable energy, carbon dioxide emissions, trade openness, remittances, and public health outcomes
Study design	Panel data studies, time-series analyses, and nonlinear econometric models
Time period	Studies published between 1980 and 2024
Geographic focus	China, BRICS, OECD, Organisation of Islamic Cooperation countries, developing and emerging economies
Exclusion criteria	Non-empirical papers, purely descriptive reports, policy notes without data analysis
Language	English only

4. CONCLUSIONS

After a thorough review of existing research papers, we find that the entangled relationships between foreign direct investment and renewable energy use have with carbon emissions and public health outcomes in developing economies. The report is based on the extensive research developed and underdeveloped countries done subject to those problems with different institutional settings. Comprising comparable research in underdeveloped and developed countries, this study shows the complexity of these relationships, and also, there is no uniform result for any one area or any one country. The review results suggest that foreign investment and renewable energy impact environmental quality and public health differently in each country. In this process, there are positive and negative impacts, depending on the specific conditions of each country. A review conducted shows that foreign direct investment has a complex role to play in both environmental outcomes and health outcomes. In some cases, incoming investments do contribute positively: they bring technical advancement, for example, more efficient production lines that need less raw materials, so do not pollute the environment or cleaner production techniques, and infrastructure gets repaired. In other cases, however, a host government is indolent in infrastructure or environmental enforcement. Consequently, industrial activity, which follows the investments, intensifies pollution and heaps new pressures on public health systems. This dual character explains why government quality imposition, along with policy structures, is important: whether foreign investment promotes sustainable development, or becomes just an extra problem that is internationally certified to fail our planet. The adoption of renewable energy is a crucial factor in changes of environment qualification, as well as public health. But its efficacy may vary among countries of different sizes. Where the incorporation of renewable energy policies with national development directions is good, there are more positive results. Conversely, bridging technology gaps, financing constrains and policy coordination mechanisms lacking may hold back the orderly proliferation of renewable energy. As regards relations between the use of renewable energy and carbon emissions, without doubt, it is possible to state that advances toward sustainability require a mixture of numerous measures compared to any single measure. Further, the study suggests that public health outcomes depend in large part on environmental quality and forms of energy. Environmental deterioration caused by carbon emissions involves health problems, while clean energy technologies offer a greater opportunity to reduce health hazards from pollution agents and therefore benefit people more generally. Nevertheless, the relationship remains complex, with many of the determinants coordinated action across different regions of life, including that of healthcare. As a whole, the findings support the current debate about dual approaches to foreign investment, renewable energy use, carbon emissions and public health in developing countries. They enhance our knowledge through additional perspectives by drawing attention to patterns found in both directions - on negative effects of certain kinds of policies (and equally, positive insights from correspondingly subtle nuances in developing world countries. Future work could go into this kind of deeper links between systems and applications within a framework based largely on development, and then adapted to each particular socio-economic situation according to the possibility of contact points. These efforts are vital if we are to form strategies for economic development in a way that is good for our economies but also healthy.

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Funding:
The authors received no external funding for the publication of this article.

Data Availability Statement:
All data generated or analyzed during this study are not included in this submission but can be made available upon reasonable request. Additionally, the data are publicly available.

Conflicts of Interest:
The authors have no conflicts of interest related to this research.