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Environmental and economic drivers of subjective well-being: evaluating the effects of pollution, income growth, and income inequality in Pakistan

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Abstract
Environmental pollution has emerged as an increasingly severe issue on a global scale, significantly impacting individuals' well-being due to the influence of environmental factors. Moreover, higher income levels play a crucial role in poverty reduction, enhanced productivity, improved quality of life, and overall national development. In the context of Pakistan, both polluted air and income inequality have detrimental effects on the well-being of its population. This research aims to investigate the influence of environmental pollution and income growth on subjective well-being in Pakistan, using data from the period spanning 1975 to 2022. The study employs the Autoregressive Distributed Lag (ARDL) technique to assess the short-term and long-term impacts of environmental pollution and income growth on economic well-being. The findings indicate that CO_2 emissions, solid waste, and GDP per capita have a negative long-term impact on subjective well-being, while CO_2 emissions and initial solid waste management have a positive short-term effect. Additionally, income inequality exerts a negative short-term influence and a positive long-term effect on subjective well-being. The Granger causality estimates confirm the bidirectional relationship between the country's income and subjective well-being. Moreover, subjective well-being Granger-causes environmental factors. Solid waste, environmental factors, and income inequality influence the country's income. The impulse response function suggests that carbon emissions, income growth, and solid waste are likely to exert a positive impact on subjective well-being, while income inequality and PM2.5 are likely to decrease subjective well-being over the next 10 years. The variance decomposition analysis suggests that PM2.5 is likely to exert the greatest variance shock on subjective well-being, followed by solid waste management and the country's per capita income over the next 10 years. These results highlight the need for Pakistan to prioritize sustainable environmental practices to achieve a clean and healthy environment. Furthermore, the country should promote economic inclusion and strive to create decent employment opportunities, ultimately leading to higher incomes and improved well-being for its citizens.

Keywords: *Subjective well-being; Environmental pollution; Income inequality; income growth; ARDL estimator; Pakistan*

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Introduction

Subjective well-being (SWB) is determined by an individual's level of satisfaction with their existence and specific aspects of it. It substantially influences pleasure in the present and the future, surpassing simplistic life satisfaction (Bruk et al., 2024). A high SWB indicates ideal health, happiness, and life satisfaction. People with higher SWB have more positive experiences and less negative impacts, increasing happiness. SWB affects people's emotional, physical, and social well-being, as well as their communities and organizations. It affects many people's mental and physical health by fostering groups, communities, and organizations (Imamatsu et al., 2023). Multifaceted well-being includes optimal functioning and pleasant sentiments like satisfaction and pleasure. It involves character development, meaningful relationships, and life control. People and communities may thrive and realize their potential for sustainable well-being (Mumford et al., 2023). Internal and environmental factors affect subjective well-being. Internal factors include personality, behaviour, viewpoint, and temperament. External influences include necessities, social relationships, culture, and nature. People are good at adapting to new settings, while outside forces may lessen their interest over time (Qi et al., 2023; Hu et al., 2023). Higher SWB scores indicate physical fitness, mental sharpness, social connection, and job productivity. Dealing with constant negative emotions like anger, sorrow, or worry is less efficient and unhealthy. SWB is essential for individual and societal health, not just entertainment. Subjective well-being is a crucial indicator of population health. It helps academics and psychologists examine social, economic, and public health concerns by revealing how people view their lives (Tang et al., 2023). Organizations and governments increasingly use SWB assessments to assess social program performance and population health. Due to its significant association with physical and mental health, happiness, and longevity, SWB is a powerful indication of these characteristics (Mathentamo et al., 2024).

Impact of environmental pollution on subjective well-being

Economic development has caused environmental degradation, affecting whole economies. Most governments emphasize economic benefits above environmental integrity in development programs (Huo et al., 2023). Economic expansion has increased earnings, basic requirements, and subjective well-being. However, it has damaged the living environment, affecting people's physical and mental health and SWB. Wang & Li (2024) found that air pollution harms human health and lowers SWB. Air pollution perception affects daily life, emotional well-being, and community satisfaction (Li et al., 2024). Environmental deterioration affects subjective well-being directly and indirectly. Pollution may directly affect people's feelings and situations. A psychology study has connected air pollution to anxiety and psychiatric disorders. This affects children and the elderly the most. Subjective well-being positively correlates with indirect air pollution effects on physical health, social activities, and quality of life (Huang et al., 2023). The UN Environment Program estimates that one billion people face harmful air pollution worldwide. Poor air quality kills infants and babies in some of the world's poorest nations and increases respiratory and allergy disorders. Outdoor air pollution comes from ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), carbon monoxide (CO), and volatile organic compounds (VOCs, including benzene). Industrial, power, automotive, and home heating systems are significant emitters. Ozone and PM are secondary pollutants produced by major pollutants (Nnaji et al., 2023). Environmental pollution includes various chemical and physical components. Industrial emissions, vehicle traffic, home heating, air travel, construction, war, and fires are primary sources of outdoor air pollution. Earthquakes, tsunamis, volcanic eruptions, and wildfires may damage people and property. Diesel engines, volcanic eruptions, asbestos, farming, and unpaved roads produce dangerous PM2.5, PM10, and ultrafine particles (Henning, 2024). The rapid expansion of cities and technology and rising population, energy usage, and emissions have intensified pollution and discontent. The friction between economic growth and environmental protection contributes to increased health issues in industrialized and urbanized areas. Industrialization and urbanization have boosted fossil fuel use and carbon dioxide emissions. Industries concentrate production components in cities, which boosts employment and markets but pollutes, harms health, and decreases well-being (Javan et al., 2023). Large amounts of biomass thrown away as field garbage from the forestry, agricultural, agribusiness, and food sectors pollute the environment. Due to population growth and globalization, nonrenewable natural resources are being consumed rapidly, which

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requires big adjustments in practice (Xuan et al., 2023). Technological advances have led to bio-based products created from animals, plants, air, water, soil, and microbes. Due to development waste, knowledge and technology boost economic growth but harm the environment (Shah et al., 2023).

Income growth and subjective well-being

Over the past several decades, money and happiness have been studied extensively (Aknin et al., 2020; Lin et al., 2021; Cai et al., 2023). Money determines a person's capacity to afford food, housing, and healthcare. However, social and cultural variables may impact how much money affects happiness. Many individuals feel economic growth is vital, but more is needed for long-term enjoyment (Burhan et al., 2023). The benefits of development must be appropriately shared to improve people's lives. Economic development and employment via investment opportunities may increase life satisfaction (Yin et al., 2023). Because money is essential to individuals and society, scholars have spent much time investigating the relationship between the two. Studies show that income increases happiness, even after adjusting for age, gender, and education (Castro & Bleys, 2023; Bardo & Cummings, 2023). A greater quality of life comes from having adequate money for wants and needs. Income and wealth affect a nation's economy differently. Wealth and money may increase life pleasure for the rich. Income indicates spending power, but wealth has other uses. It offers a consistent income, protects against financial difficulty in sickness or retirement, and allows individuals to consume more. Zhu & Yu (2023) stated that money is necessary for happiness. Education is one of several factors that raise residents' income. Higher education improves happiness and living circumstances. When their expectations are met, educated people may be happier. Better economic knowledge, productivity, and intellectual capacity boost consumer utility, making education more valuable. Information from formal education directly affects an individual's potential to make more money via enhanced cognitive capacity and labour efficiency (Børing & Grøgaard, 2023). Life happiness depends on many factors. Work, money, and leisure are examples. A person's life satisfaction depends on how content they are in each of these categories, which are impacted by particular activities. Research shows that comparing wages significantly affects happiness (Kasinger et al., 2023).

Climate change and environmental challenges in Pakistan

Pakistan is highly vulnerable to climate change due to its warm climate. Due to its position in a region with above-average temperature increases, the country faces several climate challenges (Otto et al., 2023). Heat strokes, water-related illnesses (cholera and diarrhoea), vector-borne diseases, cyclones, floods, and droughts that destroy human settlements come under this group. Environmental pollution, primarily produced by GHG emissions, is a significant health risk. Continuous and massive GHG emissions threaten the climate system, accelerating climate change and its health effects (Campbell-Lendrum et al., 2023). CO_2, the most prevalent greenhouse gas humans create, is a significant source of climate change and a health risk. CO_2 emissions affect the economy and public health. Therefore, they cannot be ignored (Dritsaki and Dritsaki, 2024). Pakistan is threatened by air pollution and global warming. In recent decades, Pakistan's rapidly developing metropolitan regions and population have increased energy demand. High energy use has strained the country's natural environmental balance throughout sustainable economic growth. Due to Pakistan's increased dependency on polluting energy sources, researchers are studying how they affect carbon emissions, a component of climate change (Lin & Ullah, 2024; Amin et al., 2023). Energy use affects society's environment. The 2008 oil shock and macroeconomic instability produced fuel price disruptions, prompting searches for greener energy sources, including electric power, nuclear power, biomass, and biofuels. Solid waste management (SWM) is a prominent problem in Pakistan owing to rising environmental degradation (Iqbal et al., 2023). Effective municipal solid waste (MSW) management is essential for sustainable development. MSW quality, quantity, and leachates depend on living standards, socioeconomic status, municipal regulations, recycling systems, and resident behaviour (Ye et al., 2023). Pakistan's primary solid waste sources include fast industrialization, poorly planned urbanization, inadequate agriculture, and poor construction and demolition practices. Pakistan cities need to manage solid waste properly. Poor solid waste collection, transporttation, and disposal degrade the environment at every level. Open trash disposal causes site quality issues, toxic pollution, odours, leachate seepage, groundwater contamination, disease-carrying pests (mosquitoes, rats, and flies), and smells (Nadeem et al., 2023). Elimi-

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nating open burning solid waste in residential areas and informal dumpsites might prevent 191,000 of Pakistan's 270,000 lung cancer and heart disease deaths. Islamabad's Saaf Mahol ("Clean Environment") effort provided daily trash collection to low-income urban districts that had previously used unregulated methods, allowing researchers to study its impacts (Schmidt et al., 2022). This initiative's solid waste management results may assist in understanding health effects in low-resource settings.

Income inequality and poverty in Pakistan

Pakistan continuously struggles with extreme poverty, income inequality, and population growth despite climatic and ecological changes. The wealth gap hinders economic growth, development, and well-being (Adnan et al., 2024). Pakistan, like many emerging countries, has suffered from persistent poverty since independence. Between 1960 and 1980, poverty reduced from 46% to 18%. In the 1990s, the poverty rate rose to 34%, worsening the country's socioeconomic issues. Pakistan's income distribution could be more balanced compared to other rising economies (van der Eng, 2025). Despite its growing economy, Pakistan remains one of the poorest countries. Current economic estimates do not ensure that severe poverty will be abolished by 2030, but they suggest that income distribution and economic growth may lower it. Due to increased income inequality, Pakistan must meet SDGs' poverty reduction objectives (Kanat et al., 2023). Income inequality affects health in developing and wealthy countries. Due to Pakistan's wealth inequality, low-income people consume less and are poorer. Thus, more people are malnourished and starving (Tabassum, 2023). In emerging countries, financial imbalance causes dissatisfaction, social instability, and insecurity, which harms health. Political and social conflict costs human capital and harms education, nutrition, and health (Baker et al., 20230. Wealth imbalance is expanding globally, but Pakistan's slow economic progress exacerbates it. Wealth and income inequality affects everyone socially and politically. Vertical disparities like gender, race, and location may cause these discrepancies. Income and wealth inequality may cause health and education inequities (Islam et al., 2022). Due to structural characteristics, including geography, job position, career choice, education, and experience, the population is now divided. When some earn more and others less, wage discrepancies across occupations lead to income inequality. Gender, education returns, and degree contribute to workplace inequality. Slow economic growth, extensive poverty, hunger, poor health, and social and political instability have affected income distribution (Miladinov, 2023). These elements affect society's mental and physical health and everyday social interactions. Pakistan has considerable economic inequality for numerous reasons. Globalization has increased trade and finance but may have increased inequality. The economy's openness to global trade has enormously affected income inequality across sectors and regions (Jameel et al., 2023). Another cause is the long-criticized education system, which needs to be more trustworthy and inaccessible. Due to public school budget inequalities and other circumstances, only some have equal access to education, essential to overcoming poverty and rising socially (Malik & Anwar, 2023).

Research questions, objectives and value of the study

The inquiry aims to answer these questions. First, does environmental degradation affect subjective well-being? Environment affects human health and well-being. Environmental degradation may harm people's health and happiness, which rely on a clean environment. This study examines how environmental factors affect subjective well-being and provide solutions to Pakistan's environmental degradation. Second, how can growing economic differences affect life quality? Rising economic inequality affects life expectancy, infant mortality, educational success, social mobility, violence, mental illness, etc. This examines how economic disparity impacts health, comfort, and enjoyment to improve the nation's efficiency and sustainability. It also studies ways to reduce this knowledge gap to move forward towards sustained growth. Finally, has a country's healthcare affordability improved health outcomes? Income growth often indicates financial soundness. Income for food, shelter, and healthcare may increase people's quality of life and happiness. Conversely, a lack of funds hurts personal and national well-being. This examines how wealth impacts subjective well-being and improves Pakistan's quality of life. This study examines the positive effects of economic growth on Pakistanis' financial well-being and quality of life and the adverse effects of environmental degradation. Many studies have examined how environmental degradation and wealth inequality affect regional economies (Acheampong and Opoku, 2023; Uzar and Eyuboglu, 2023). According to Rando Cueto et al.,

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(2023), environmental degradation harms human health and happiness. Chen & Hsu (2024) examined European countries and concluded that affluence increases happiness. Rustamov et al. (2023) revealed that life satisfaction improves with increasing income levels in Azerbaijan. The study needs to pay more attention to Pakistan's environmental degradation and economic progress. This research addresses this knowledge gap by examining Pakistan's expanding environmental problems and how rising earnings are essential to future generations' quality of life. A complete assessment of these factors gives a new perspective on Pakistan's environmental deterioration and economic progress. This study seeks to understand how pollution and growing earnings impact Pakistanis' happiness. Subjective well-being was examined in light of Pakistan's climate change and economic disparity. Healthcare challenges, growing economic disparity, high illiteracy, environmental concerns, and inadequate government funding for healthcare and education are impacting Pakistan's economy. These problems must be addressed to enable positive economic change and shared prosperity that prioritizes human enjoyment and well-being. This study may help policymakers find long-term solutions to environmental degradation, economic growth, and low quality of life. The study's findings will benefit ecologists, public workers, NGOs, and the public. Ecologists may utilize the findings to justify environmental laws. Pakistan's authorities may promote economic growth, environmental protection, and citizen well-being by exploring climate adaptation alternatives alongside environmental and economic policies. Local waste reduction, reuse, and recycling programs may improve the environment and national well-being.

Literature review

Understanding the relationship between environmental pollution, income growth, and subjective well-being is pivotal; numerous empirical studies focus on individual countries and groups of countries to estimate the effects of environmental pollution and income growth on subjective well-being (Du et al., 2024; Rüger et al., 2023). This section builds on previous discussions and comprehensively evaluates the intersection between environmental pollution, income growth, and subjective well-being. Furthermore, this section aims to provide a clear synthesis of existing research and its implications for our study. Additionally, it discusses crucial factors affecting subjective well-being and concludes with a description of the study's hypotheses and contributions. Earlier literature mainly focused on various antecedents of subjective well-being, among which environmental pollution is identified as a primary adverse factor affecting human happiness (Ke et al., 2021; Yıldız & Erciş, 2022) Addressing this issue requires the allocation of sufficient funds for its mitigation. Tsurumi & Managi (2020) examined the impact of air pollution on subjective well-being. The results reveal that air pollution has a powerful effect on subjective well-being. PM2.5 is negatively and significantly linked, leading to more adverse effects on subjective well-being. Hautekiet et al. (2022) found that air pollution increases stress and decreases life satisfaction, two mental health indices. Limayani & Tanur (2024) noted that environmental conditions lower self-reported happiness because pollution worsens chronic diseases and reduces quality of life. These findings demonstrate the necessity for long-term pollution reduction initiatives to boost social happiness and the importance of clean environments for wellbeing. Rising income is another factor that affects people's subjective wellbeing in the Easterlin Paradox. Easterlin (1974) contends that wealth increases subjective wellbeing to a point but diminishes afterward. Some research has shown that money improves wellbeing at higher levels, while others have found that income's marginal value diminishes when basic needs are met. According to Tauseef (2022), money increases wellbeing, but the link is nonlinear and diminishing. However, according to Masuda et al. (2021), income increases life appraisal because emotional wellbeing plateaus at a specific financial level. This shows that income and well-being are affected by various factors, including individual aspirations, societal norms, and economic situations.Many studies have linked pollution levels to lower life satisfaction, stress, and health issues that impair well-being (Petrowski et al., 2021; Abed Al Ahad et al., 2022). Air pollution causes respiratory illnesses, anxiety, and sadness, lowering quality of life (Fan et al., 2021). SWB may decline due to chronic stressors such as noise pollution, water contamination, and environmental degradation. Pollution affects SWB residents' physical and mental well-being (Lai et al., 2020). Income growth allows individuals to meet their fundamental needs, acquire better healthcare, and have more leisure and spending alternatives, which improves SWB. In fast-industrializing nations, economic growth has destroyed

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environmental sustainability. Therefore, growing wages may worsen the situation (Sibt-e-Ali et al., 2023). The association between income and SWB gets more convoluted when pollution reduces the benefits of growing earnings (Norris & McKibban, 2023). Empirical research on pollution, SWB, and income growth provides contradictory results, depending on the context and characteristics analyzed (Ahumada & Iturra, 2021; Navarro et al., 2020). According to Prilleltensky (2023), higher wages allow individuals to acquire cleaner technology, move to less polluted areas, or pay for medical treatment, reducing SWB pollution. However, multiple studies have shown that in densely congested urban regions with heavy pollution, the negative consequences on mental and physical health may exceed the benefits of higher money (Cao et al., 2023; Piracha & Chaudhary, 2022). When comparing nations, pollution and wealth growth have distinct effects on SWB at different development and income levels (Yerema & Managi, 2021; Salameh et al., 2022). Income growth may reduce poverty and improve SWB in low-income countries (Alloush & Wu, 2023). At the same time, pollution may have a greater detrimental impact in high-income countries due to environmental awareness and ambitions for a high-quality existence (Rahman & Sultana, 2024; Neves et al., 2020). Due to the interconnectedness of pollution, economic development, and SWB, a com-preehensive economic-environmental plan is needed. Policymakers should weigh the costs and advantages of environmental sustainability vs. economic growth to protect public health and wellbeing. Income growth may benefit SWB without exacerbating environmental degradation, provided sustainable development policies emphasize green growth, pollution control, and environmental protection (Chen, 2023). Interventions encouraging pro-environmental beha-vior and knowledge may empower individuals to make choices that benefit themselves and the planet (Rau et al., 2022). As this subject advances, strategies that promote long-term wellbeing will require a better knowledge of pollution, income, and SWB. Complex interactions between pollution and economic growth affect people's subjective wellbeing. Several studies have examined whether wealth reduces pollution's health risks (Chen & Chen, 2021; Apergis et al., 2020). More money allows individuals to have better healthcare, live in cleaner environments, or migrate to lower-pollution areas, which improves their health and happiness (Zhu & Lin 2022). Industrialization and urbanization increase pollution in rising countries, and economic growth often harms the environment (Sarkodie et al., 2020). The Environmental Kuznets Curve (EKC) hypothesis states that pollution rises early in economic growth but falls as a society becomes more affluent and invests in cleaner technologies. However, EKC empirical data is inconsistent. Some studies questioned the EKC's applicability, suggesting that increased earnings would not be adequate to alleviate pollution's negative effects on human health (Wang et al., 2023; Beyene, 2022; Aminu et al., 2023). Table 1 shows the current literature on the influence of environmental pollution on subjective well-being. Following the literature review, the study's research hypotheses are as follows:

H1: Environmental pollution is expected to have a substantial impact on reducing subjective well-being. Environmental contamination is expected to impact individuals' happiness, overall life satisfaction, and positive perspective. This could result in a deterioration of people's health and pose a risk to human well-being. Exposure to a polluted environment increases the likelihood of individuals experiencing despair and anxiety. Furthermore, it might have many repercussions, such as the development of diabetes, a heightened risk of asthma, and respiratory disorders that impair job capacity and reduce productivity in the labour force.

H2: The level of income disparity has a substantial influence on the subjective well-being of a nation. A significant disparity in income levels is expected to lead to a rise in economic instability, financial crises, inflation, and debt, all of which may harm happiness and subjective well-being in Pakistan. Income inequality in communities may result in a breakdown of trust among individuals and less engagement in civic and social activities. Furthermore, it may result in reduced availability of enough sustenance and nutritious food, as well as limited opportunities for secure housing, employment, a clean environment, and other aspects that promote an improved quality of life for individuals.

H3: Favorable economic development and increased family income improve subjective well-being in nations. Enhancing economic growth and raising family income has a more positive impact on improving the overall subjective well-being of a nation. It can enhance overall well-being, provide more favorable employment prospects, alleviate poverty, decrease social inequality, and contribute to developing a higher standard of living. Moreover, a lar-

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Table 1. *Current literature on subjective well-being influenced by environmental* pollution

Authors	Country	Results
Zhao et.al (2024)	China	The disparity in effort exerted by individuals has a notable impact on their subjective sense of well-being, but the presence of unequal opportunities has a detrimental influence.
Haider et al. (2024)	India	Income disparity affects lower-income groups and detrimentally influences the living satisfaction of upper-income groups.
Sedeh & Caiazza (2024)	56 countries	A rise in economic disparity generally reduces people's overall life pleasure. The correlation between happiness and economic disparity is particularly pronounced among populations with limited social mobility.
Hu et al., (2024)	China	The Dibao initiative has significantly reduced the influence of poverty and economic disparity on the life happiness of residents.
Deng & Schob (2024)	China	The significant economic disparities between rural and urban populations greatly influence the subjective well-being of rural inhabitants in China. However, the level of income inequality within a particular group has a negligible impact on the well-being of residents in China.
Zhou et al. (2024)	China	Economic disparity's impact on happiness and health is statistically indistinguishable from zero within a nation.
H et al. (2024)	China	Income disparity within a particular group has a pronounced U-shaped impact, but income inequality in China's urban and rural areas demonstrates an inverted U-shaped effect.
Fang et.al (2024)	China	The average subjective well-being of urban residents is greater than that of rural residents, indicating a higher overall level of subjective well-being in western China. Regional variations influenced the impact of social capital and money on subjective well-being.
Caudill et al. (2024)	Russia	An increased level of money has a beneficial impact on the happiness of those living in rural areas. Being more active in social activities and having a strong social network are reliable indicators of happiness.
Araki & Olivos (2024)	European Social Survey	The correlation between income and life happiness is stronger among the low-income group than among the high-income group. The correlation between SWB and income did not significantly vary between the two groups.
Stéphane & Noumba (2024)	African countries	Gaining income results in heightened happiness over time, but its effect is less pronounced in the near term. Unemployment influenced happiness via the loop of economic globalization.
Shuang et al. (2024)	Pakistan	Life happiness is inversely correlated with income, accounting for income's influence and other socio-economic and demographic characteristics.
Behera et al. (2024)	166 countries	Citizens' contentment increases as their income level increases, but it eventually reaches a peak and subsequently decreases.
Li & Dong (2024)	China	A positive correlation exists between life satisfaction and income rank, meaning that a better ranking position leads to greater contentment.
Yang et al (2024)	China	Both education and income significantly and directly influence the happiness of individuals in China. Work status, gender, and other related variables also have a discernible impact on happiness.
Karahan et al. (2024)	Turkey	There is a strong and positive correlation between income and happiness. A strong correlation was found between a high income level and a high degree of happiness, while the stress level was reported to be low.
Azzahra et al. (2024)	Indonesia	A significant income level is achieved via successful employment and education, associated with improved access to resources for maintaining good health and promoting overall well-being.

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ger income serves as a sign of social standing and plays a crucial role in sustaining the health of individuals. It can reduce tension and anxiety while creating a conducive atmosphere for happiness and life satisfaction. This research aims to analyze the correlation between environmental degradation, economic development, and individual happiness in the specific setting of Pakistan. The study aims to investigate the relationship between environmental pollution, income growth, happiness levels, and general quality of life at the national and global levels. The research provides some noteworthy additions to the current body of knowledge. This study differs from prior research by using macro-level factors to evaluate subjective well-being in Pakistan, while earlier studies have primarily focused on micro-level data (Said, 2024; Shams & Kadow, 2023)). Having a broader viewpoint enables a more thorough comprehension of the subject matter. Furthermore, the research focuses on the crucial matter of incorporating sustainable environmental practices into the modeling of subjective well-being. Although previous research (Mouratidis, 2021) has examined this correlation, only a limited number of studies have included solid waste as a factor in their models (Blaauw et al., 2020; Gong et al., 2023). This research aims to enhance the literature on Pakistan by including solid waste and CO2 emissions as crucial components for a more comprehensive assessment of the effects. Furthermore, subjective well-being model-ling has yet to fully include the economic disparity concept. This research incorporates income inequality as a crucial element in thoroughly evaluating socioeconomic comparisons across families on a macro scale. By including these factors, the research enhances the current understanding of the connection between environmental pollution, income development, and subjective well-being in Pakistan. It addresses gaps in the existing literature and provides more reliable and useful findings.

Data and Methodology

The time series data were obtained from the World Development Indicator (WDI, 2023) and consisted of yearly observations from 1975 to 2022. The dependent variable is subjective well-being, assessed by life expectancy in a year. The independent variables in this study are CO2 emission per capita, solid waste as a percentage of the total, PM2.5 as a percentage of the total, income inequality measured by the Gini index, and GDP per capita measured in constant 2010 US dollars. All of these variables are represented in terms of the natural logarithm. Table 2 displays a comprehensive list of variables.

Theoretical and econometric framework

The Easterlin Paradox refers to an observed empirical correlation between many indicators of total subjective well-being, such as happiness and life satisfaction. Richard Easterlin, an economics professor at the University of Pennsylvania, established the paradox in 1974. It was the first research to examine happiness statistics (Easterlin, 1974). The Easterlin Paradox posits that, at any given moment, there is a positive correlation between money and happiness, both inside individual nations and across different countries. Nevertheless, the correlation between the increase in wealth and long-term satisfaction diminishes with time. The paradox emphasizes the distinction between cross-sectional data, which captures information at a particular moment in time, and time-series data, which tracks information over some time. It prompts the inquiry as to whether individuals experience increased happiness and satisfaction when their actual living conditions improve within a society, with wealthier individuals usually exhibiting higher levels of happiness than those less affluent. Various hypotheses have been proposed in an attempt to elucidate the Easterlin conundrum; nevertheless, the conundrum itself persists as an empirical generalization. The primary conclusion of the Easterlin Paradox is that over time, there is no inherent correlation between economic progress and heightened levels of pleasure. This phenomenon might be attributed to social comparison's impact on individuals' wealth evaluation. The following sequential statistical techniques applied to the data set to get parameter estimates, help to formulate sustainable policies. In econometrics, a crucial issue is ascertaining the data transformation's appropriate form. Unit root in time series data refers to a stochastic trend known as "Random walk with drift". If a time series data has a unit root, it indicates the presence of a systematic pattern. The unit root test is used to determine the level of integration in time series data. Various approaches are utilized, such as DF, ADF, and PP. However, the Augmented Dickey-Fuller (ADF) methodology is the most often used method to assess the stationarity of the variables. The Augmented Dickey-Fuller (ADF) test examines the stationarity of a time series under three different scenarios: no intercept, intercept alone, and intercept.

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Table 2. *List of Variables. Source: WDI (2023)*

Variables	Symbol	Measurements	Definitions	Expected sign
Dependent variables				
Subjective well-being	SWB	Life-expectancy in years	Subjective well-being refers to the levels of prosperity, economic accomplishment, and standards of life experienced by individuals within a community.	------
Independent variables				
Carbon dioxide emission	CO_2	Metric tons per capita	CO_2 emissions result from the combustion of fossil fuels (such as coal, natural gas, and oil) and certain industrial activities.	Carbon emissions hurt human health. The rise in CO2 emissions has resulted in an escalation of health-related harm and a decline in economic prosperity.
PM 2.5	PM2.5	% of total	PM2.5 is a hazardous air pollutant that poses a significant health risk when present at high concentrations in the air.	The rise in PM2.5 concentration in the atmosphere results in an escalation of hazardous illnesses and a decline in economic prosperity.
Solid waste	SW	% of total	Solid wastes are any kind of garbage, rubbish, waste or discarded substances.	An increase in solid waste results in heightened pollution levels, leading to a decline in economic prosperity.
GDP per capita	GDPPC	Constant (2010 US$)	Gross Domestic Product (GDP) per capita is a measure of the economic production of a nation, calculated by dividing the total economic output by the population.	A rise in GDP per capita indicates a thriving economy, thereby improving overall economic welfare.
Income inequality	INEQ	Gini index	Income inequality refers to a substantial disparity in income distribution among people, groups, communities, or nations.	The growth in income inequality contributes to a significant difference between happiness and economic well-being, resulting in a drop in overall economic well-being.

and trend. The determination of the stability of variables relies on the t-statistic and p-values In order to assess the stationarity of the variables, we use the Autoregressive component. The AR(1) model states that $y_t = \theta y_{t-1} + \varepsilon_1$. Using the following equations from [1] to [6], the Augmented Dickey-Fuller (ADF) unit root test is used to investigate the order of integration of the selected variables.

$$\Delta SWB_t = \alpha + \beta T + \gamma SWB_{t-1} + \delta_1 \Delta SWB_{t-1} + \ldots + \delta_{p-1} \Delta SWB_{t-p-1} + \varepsilon_t \quad [1]$$

$$\Delta CO2_t = \alpha + \beta T + \gamma CO2_{t-1} + \delta_1 \Delta CO2_{t-1} + \ldots + \delta_{p-1} \Delta CO2_{t-p-1} + \varepsilon_t \quad [2]$$

$$\Delta PM_{2.5_t} = \alpha + \beta T + \gamma PM_{2.5_{t-1}} + \delta_1 \Delta PM_{2.5_{t-1}} + \cdots + \delta_{p-1} \Delta PM_{2.5_{t-p-1}} + \varepsilon_t \quad [3]$$

$$\Delta \mathrm{GDPPC} = \alpha + \beta T + \gamma GDPPC_{t-1} + \delta_1 \Delta GDPPC_{t-1} + \ldots + \delta_{p-1} \Delta GDPPC_{t-p-1} + \varepsilon_t \quad [4]$$

$$\Delta SW_t = \alpha + \beta T + \gamma SW_{t-1} + \delta_1 \Delta SW_{t-1} + \ldots + \delta_{p-1} \Delta SW_{t-p-1} + \varepsilon_t \quad [5]$$

$$\Delta INEQ_t = \alpha + \beta T + \gamma INEQ_{t-1} + \delta_1 \Delta INEQ_{t-1} + \ldots + \delta_{p-1} \Delta INEQ_{t-p-1} + \varepsilon_t \quad [6]$$

Where 'α' is a constant, 'β' is the time trend coefficient, and 'p' shows the AR lag process. The lag is found on the basis of AIC method. By applying the restriction on α=β=0, random walks with drift are developed by this equation. The study considers lag criteria and chooses the most suitable lag length. The study selected

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the model based on the Akaike information criterion (AIC) and Schwarz criterion (SC) since they provide the most accurate depiction. The minimal values of AIC and SC are criteria for model selection. The study favors AIC for model selection. An autoregressive distributed lag (ARDL) model, based on ordinary least squares (OLS) analysis, is particularly suitable for non-stationary time series data with varied orders of integration. The estimation of unit root for integrands of order 0 and 1 may be performed using the ARDL-Bounds testing approach, which was developed by Pesaran et al. (2001). Unexpected results may arise when variables are interchanged, and the integration sequence is I(0) and I(1), leading to a single regression equation. In order to tackle the issue of simultaneity, difference and lag operators were created. Furthermore, estimating the parameter is contingent upon knowing about the variables' long-term trend. The regression procedure shows the model's convergence by including the error correction term. The equation [7] reflects the ARDL specification used for model estimation:

$$ln(SWB)_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i \, \Delta \, ln(SWB)_{t-i} + \sum_{i=0}^{q} \theta_i \, \Delta \, ln(CO2)_{t-i} + \sum_{i=0}^{r} \theta_i \, \Delta \, ln(PM_{2.5})_{t-i} + \sum_{i=0}^{t} \phi_i \, \Delta \, ln(GDPPC)_{t-i} + \sum_{i=0}^{u} \phi_i \, \Delta \, ln(SW)_{t-i} + \sum_{i=0}^{w} \phi_i \, \Delta \, ln(INEQ) + \delta_1 \, ln(CO2)_t + \delta_2 \, ln(PM_{2.5})_t + \delta_3 \, ln(GDPPC)_t + \delta_4 \, ln(SW)_t + \delta_6 \, ln(INEQ)_t + \varepsilon_t \quad [7]$$

where Δ shows first and p shows optimal lag length.
After the regression, for long-run cointegration the research using Wald F-statistics.
The Wald F-statistics are used to examine the null and alternative hypotheses, i.e.
The null hypothesis for equation (1)
H0: $\delta 1 = \delta 2 = \delta 3 = \delta 4 = \delta_5 = \delta_6 = 0$
H1: $\delta 1 \neq \delta 2 \neq \delta 3 \neq \delta 4 \neq \delta_5 \neq \delta_6 \neq 0$

The given variables do not exhibit cointegration, as indicated by the null hypothesis in all three equations. However, this finding is confirmed by the alternative hypothesis. Both assumptions are examined by evaluating the critical values stated by Narayan (2004). Regression analysis confirmed the model's convergence to equilibrium at a consistent pace of model change. Equation (8) shows the error correction's ARDL specification mode, i.e.,

$$ln(SWB)_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i \, \Delta \, ln(SWB)_{t-i} + \sum_{i=0}^{q} \theta_i \, \Delta \, ln(CO2)_{t-i} + \sum_{i=0}^{r} \theta_i \, \Delta \, ln(PM_{2.5})_{t-i} + \sum_{i=0}^{t} \phi_i \, \Delta \, ln(GDPPC)_{t-i} + \sum_{i=0}^{u} \phi_i \, \Delta \, ln(SW)_{t-i} + \sum_{i=0}^{w} \phi_i \, \Delta \, ln(INEQ) + \delta_1 \, ln(CO2)_t + \delta_2 \, ln(PM_{2.5})_t + \delta_3 \, ln(GDPPC)_t + \delta_4 \, ln(SW)_t + \delta_6 \, ln(INEQ)_t + \lambda ECT_{t-1} + \varepsilon_t \quad [8]$$

where ECT shows the error correction term, and λ shows the adjustment factor of the model.
The Granger causality test is a statistical technique used to investigate the possibility of a causal link between certain variables. The F-test is used to determine the direction of the connections between variables or to infer that the associations are neutral despite their magnitude. These three causal conclusions help to formulate sustainable growth plans. A potential sequence of events linking the given variables, i.e., a unidirectional connection, is a relationship that only exists in one way.
Suppose X is the cause of Y in a unidirectional manner. In that case, Y is the cause of X. Reverse causality refers to the occurrence of causation in a sequence contrary to what was first expected. Bidirectional causality refers to a situation where two variables mutually influence one other. Neutrality refers to the variables that do not exhibit any causal relationship among the specified variables. The VAR framework is used to analyze equation [9 in Granger causality.

$$\begin{bmatrix} \tau_0 \\ \tau_1 \\ \tau_2 \\ \tau_3 \\ \tau_4 \\ \tau_5 \end{bmatrix} + \sum_{i=1}^{p} \begin{bmatrix} \sigma_{11t}\sigma_{12t}\sigma_{13t}\sigma_{14t}\sigma_{15t}\sigma_{16t} \\ \sigma_{21t}\sigma_{22t}\sigma_{23t}\sigma_{24t}\sigma_{25t}\sigma_{26t} \\ \sigma_{31t}\sigma_{32t}\sigma_{33t}\sigma_{34t}\sigma_{35t}\sigma_{36t} \\ \sigma_{41t}\sigma_{42t}\sigma_{43t}\sigma_{44t}\sigma_{45t}\sigma_{46t} \\ \sigma_{51t}\sigma_{52t}\sigma_{53t}\sigma_{54t}\sigma_{55t}\sigma_{56t} \\ \sigma_{61t}\sigma_{62t}\sigma_{63t}\sigma_{64t}\sigma_{65t}\sigma_{66t} \end{bmatrix} \times \begin{bmatrix} ln(SWB)_{t-1} \\ ln(CO2)_{t-1} \\ ln(PM_{2.5})_{t-1} \\ ln(GDPPC)_{t-1} \\ ln(SW)_{t-1} \\ \ln(INEQ)_{t-1} \end{bmatrix} + \sum_{j=p+1}^{dmax\Sigma} \begin{bmatrix} \theta_{11j}\theta_{12j}\theta_{13j}\theta_{14j}\theta_{15j}\sigma_{16j} \\ \theta_{21j}\theta_{22j}\theta_{23j}\theta_{24j}\theta_{25j}\sigma_{26j} \\ \theta_{31j}\theta_{32j}\theta_{33j}\theta_{34j}\theta_{35j}\sigma_{36j} \\ \theta_{41j}\theta_{42j}\theta_{43j}\theta_{44j}\theta_{45j}\sigma_{46j} \\ \theta_{51j}\theta_{52j}\theta_{53j}\theta_{54j}\theta_{55j}\sigma_{56j} \\ \theta_{61j}\theta_{62j}\theta_{63j}\theta_{64j}\theta_{65j}\sigma_{66j} \end{bmatrix} \times \begin{bmatrix} ln(SWB)_{t-j} \\ ln(CO2)_{t-j} \\ ln(PM_{2.5})_{t-j} \\ ln(GDPPC)_{t-j} \\ ln(SW)_{t-j} \\ \ln(INEQ)_{t-j} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \\ \varepsilon_6 \end{bmatrix} \quad [9]$$

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Equation (10) to (16) shows the Granger causality specification in regression apparatus, i.e.,

$$SWB_t = c_1 + \sum_{i=1}^{2} \beta_1 SWB_{t-i} + \sum_{i=1}^{2} \beta_2 CO2_{t-i} + \sum_{i=1}^{2} \beta_3 PM_{2.5}{}_{t-i} + \sum_{i=1}^{2} \beta_4 GDPPC_{t-i} + \sum_{i=1}^{2} \beta_5 SW_{t-i} + \sum_{i=1}^{2} \beta_7 INEQ_{t-i} + \varepsilon_t \quad [10]$$

$$CO2t = c_1 + \sum_{i=1}^{2} \beta_1 CO2_{t-i} + \sum_{i=1}^{2} \beta_2 PM_{2.5}{}_{t-i} + \sum_{i=1}^{2} \beta_3 SWB_{t-i} + \sum_{i=1}^{2} \beta_4 GDPPC_{t-i} + \sum_{i=1}^{2} \beta_5 SW_{t-i} + \sum_{i=1}^{2} \beta_7 INEQ_{t-i} + \varepsilon_t \quad [11]$$

$$PM_{2.5t} = c_1 + \sum_{i=1}^{2} \beta_1 PM_{2.5}{}_{t-i} + \sum_{i=1}^{2} \beta_2 CO2_{t-i} + \sum_{i=1}^{2} \beta_3 SWB_{t-i} + \sum_{i=1}^{2} \beta_4 GDPPC_{t-i} + \sum_{i=1}^{2} \beta_5 SW_{t-i} + \sum_{i=1}^{2} \beta_7 INEQ_{t-i} + \varepsilon_t \quad [12]$$

$$GDPPC_t = c_1 + \sum_{i=1}^{2} \beta_1 GDPPC_{t-i} + \sum_{i=1}^{2} \beta_2 SWB_{t-i} + \sum_{i=1}^{2} \beta_3 CO2_{t-i} + \sum_{i=1}^{2} \beta_4 PM_{2.5}{}_{t-i} + \sum_{i=1}^{2} \beta_5 SW_{t-i} + \sum_{i=1}^{2} \beta_7 INEQ_{t-i} + \varepsilon_t \quad [13]$$

$$SW_t = c_1 + \sum_{i=1}^{2} \beta_1 SW_{t-i} + \sum_{i=1}^{2} \beta_2 EWB_{t-i} + \sum_{i=1}^{2} \beta_3 CO2_{t-i} + \sum_{i=1}^{2} \beta_4 PM_{2.5}{}_{t-i} + \sum_{i=1}^{2} \beta_5 GDPPC_{t-i} + \sum_{i=1}^{2} \beta_6 HI_{t-i} + \sum_{i=1}^{2} \beta_7 INEQ_{t-i} + \varepsilon_t \quad [14]$$

$$INEQ_t = c_1 + \sum_{i=1}^{2} \beta_1 INEQ_{t-i} + \sum_{i=1}^{2} \beta_2 EWB_{t-i} + \sum_{i=1}^{2} \beta_3 CO2_{t-i} + \sum_{i=1}^{2} \beta_4 PM_{2.5}{}_{t-i} + \sum_{i=1}^{2} \beta_5 GDPPC_{t-i} + \sum_{i=1}^{2} \beta_6 SW_{t-i} + \sum_{i=1}^{2} \beta_7 HI_{t-i} + \varepsilon_t \quad [15]$$

The null and alternative hypothesis is as follow:

H0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$
HA: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$

The acceptance of the null hypothesis indicates no causal link between the dependent and independent variables, whereas the rejection of the null hypothesis indicates the presence of a causal connection. The model is capable of estimating the anticipated relationships between variables. The impulse response function (IRF) is a valuable tool for examining the correlation between variables in a vector autoregressive (VAR) model. The IRF is a practical approach to describing how variables respond to a sudden impact on a system. It also demonstrates predicted factors' positive or negative reactions for future investigation. Variance decomposition analysis (VDA), commonly referred to as prediction error variance decomposition. The VDA is a statistical approach used to investigate relationships between variables to identify a simplified structure within an extensive collection of variables. It also indicates that unexpected events in other time series within the system cause the uncertainty of future events in one-time series. VDA involves partitioning the variance of exogenous factors contributing to a particular trend in an endogenous component.

Results and Discussion

Table 3 shows the descriptive statistics of the varia-

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bles. The dependent variable is subjective well-being, which ranges from a minimum of 55.02800 to a high of 60.42800. The mean value of this variable is 62.10023. With a range from 0.331783 to 0.981820, CO2 emissions are one of the independent variables with a mean of 0.669234. The GDP per capita ranges from 477.9679 to 1197.913, with an average of 838.4817. With a range of 33.30000 to 28.70000, income inequality has an average value of 30.98125. PM2.5 mean value of 99.92857, with a range of 99.94984 to 99.90110. Finally, solid waste has a range of values from 8.064387 to 15.81278.. Subjective well-being has a dispersion of 3.774996 according to the standard deviation, which quantifies the dispersion of data. The standard deviations of CO2, GDP per capita, PM2.5, and solid waste are 0.189320, 0.019120, and 1.865144, respectively; income inequality and PM2.5 also exhibit higher levels of variability, with a standard deviation of 213.5277. Except for income inequality and GDP per capita, the skewness of the variables shows that most of them have a left-handed distribution with a larger tail. All of the kurtosis values are less than 3, meaning the distributions are platykurtic, meaning they are flatter than typical.

Table 3
Descriptive statistics
Source: Author's estimate.

Methods	SWB	SW	PM2.5	INEQ	GDPPC	CO2
Mean	62.10023	11.67392	99.92857	30.98125	838.4817	0.669234
Maximum	67.42800	15.81278	99.94984	33.30000	1197.913	0.981820
Minimum	55.02800	8.064387	99.90110	28.70000	477.9679	0.331783
Std. Dev.	3.774996	1.865144	0.019120	1.933320	213.5277	0.189998
Skewness	-0.222853	-0.183998	-0.111780	0.142584	0.060509	-0.059754
Kurtosis	1.867758	2.108500	1.402776	1.305122	2.012304	2.134869

The unit root test results reveal the stationary and non-stationary variables and their order of integration. This test is crucial prior to analyzing the autoregressive distributed lag model. The unit root of each variable is shown in Table 4. The unit root test is a statistical method used to ascertain the stationarity of variables. The unit root test findings indicate that SWB and CO2 are stationary at the level, implying that they do not possess a unit root and remain stationary throughout time. The other variables exhi-

Table 4
Unit Root Estimates
Source: Author's estimate. Small bracket shows probability value.

Variables	At Level		
	None	Intercept	Intercept & trend
SWB	2.9829 (0.0038)	-8.5892 (0.010)	-2.6925 (0.9677)
GDPPC	2.7283 (0.9980)	-0.548780 (0.8716)	-2.8137 (0.2001)
CO2	3.201369 (0.9995)	-0.446127 (0.8922)	-4.3566 (0.0064)
INEQ	-0.568345 (0.4656)	-2.42261 (0.1413)	-3.1169 (0.1146)
PM2.5	-1.515596 (0.1200)	-0.72846 (0.8281)	-2.5949 (0.2845)
		First Difference	
SWB	-2.3638 (0.019)	0.01862 (0.990)	-2.9487 (0.9202)
GDP prc	-2.830 (0.005)	-4.4339 (0.0009)	-4.3772 (0.006)
CO2	-4.4994 (0.000)	-5.4733 (0.0000)	-5.4050 (0.0003)
I.INEQ	-6.6906 (0.0000)	-6.6416 (0.0000)	-6.5698 (0.000)
PM2.5	-1.1121 (0.2372)	-1.8895 (0.085)	-1.6161 (0.7691)
SW	-7.8813 (0.0000)	-7.8506 (0.0000)	-7.7559 (0.000)

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bit non-stationarity at the level but become stationary after being differenced once. This result suggests that a trend or unit root is present in the original series. This information is crucial for selecting the appropriate econometric model to assess the data. The lag length conditions are shown in Table 5. The lag length is commonly selected using an explicit statistical criterion such as AIC and SIC. The lag length criteria findings for the variables indicate that the AIC, FPE, and HQ criteria all recommend using a two-lag length for coefficient estimations. Nevertheless, the Schwartz Information Criterion (SIC) and the Lagrange Multiplier (LR) criteria recommend using a single lag length for variable estimation. Given these estimations, the research has used the AIC criteria for further estimation. This implies that the research has selected a model with two lags as the most suitable, indicating that the present variable's values are being affected by the values of the variable from two periods ago. Selecting the suitable lag duration is crucial as it prevents the model from overfitting or underfitting the data and aids in attaining the most precise predicting outcomes. Table 6 displays .the ARDL estimates for both the short and long run..

Table 5
VAR Lag Selection Criteria.
** indicates lag order selected by the criterion.*
Source: Author's estimate.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-215.6322	NA	0.000956	10.07419	10.31749	10.16442
1	96.80870	525.4687	3.39e-09	-2.491305	-0.788215*	-1.859717
2	155.8407	83.18152	1.31e-09	-3.538216	-0.375334	-2.365267
3	222.0498	75.23755*	4.27e-10*	-4.911354	-0.288681	-3.197044*
4	267.0426	38.85743	4.94e-10	-5.320119*	0.762346	-3.064448

The ARDL model is superior to other models in demonstrating independent variables' short-term and long-term impact on economic well-being, as per the research objectives. The ARDL model is advantageous for predicting and disentangling the long-term connection from short-term variations.

Table 6
ARDL Long-Run Estimates
Source: Author's estimate

Dependent Variable: Δln(SWB)				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
ln(CO2)	-0.036112	0.008037	-4.493303	0.0002
ln(GDPPC)	-0.881926	0.082988	-10.62719	0.0000
ln(INEQ)	0.007661	0.003693	2.074746	0.0489
ln(PM2.5)	-0.488851	5.037992	-0.097033	0.9235
ln(SW)	-0.006550	0.001650	-3.969339	0.0006

A strong and statistically significant negative correlation exists between subjective well-being and carbon emissions, indicating that cutting carbon emissions should improve a country's economy. The increase in CO_2 levels leads to climate change, global warming, and significant illnesses. Health and environmental repercussions diminish economic prosperity. Osei-Kusi et al. (2024), Muradov et al. (2024), and Ronaghi & Scorsone(2023) have also shown that carbon dioxide (CO_2) emissions hurt life expectancy, highlighting the risks associated with elevated CO_2 levels. The implementation of energy efficiency measures may alleviate these consequences, the adoption of less polluting practices by companies, and the use of clean development funding. These activities are necessary to reduce CO_2 emissions, promote public health, and improve living conditions. In the long run, incomes decrease subjective well-being. People's aspirations and objectives rise with their earnings, i.e., the "aspiration treadmill" (Mori & Sakamoto, 2024). When income grows, ambitions and expectations for achievement climb faster, which might lead to disappointment if new objectives still need to be met. Despite having more income, individuals may not be happier. Because their money may rise, so may their perceived needs and desires, but their ability to meet them cannot (Easterlin, 2023). Income inequality has a significant and positive

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impact on economic welfare. Therefore, income disparity has the potential to enhance a country's economy. The relative income hypothesis posits that individuals gauge their level of contentment by comparing with others. When there is a significant disparity in income, those who see themselves as financially stable may have a heightened sense of well-being. Adedeji et al. (2023) discovered a positive correlation between income disparity and happiness. Reducing solid waste (SW) may positively influence a nation's economy (Hayda et al., 2023). Inadequate waste management systems result in environmental and marine pollution, obstruct water drainage, and exacerbate flooding, facilitating the spread of vector-borne illnesses such as malaria, dengue fever, and cholera (Kibria et al., 2023; Banerjee et al., 2024). These circumstances have a detrimental impact on the overall well-being of the general population and reduce the average lifespan. This research, similar to the works of Dada et al. (2023); Shammi et al. (2023), Roy et al. (2023, demonstrates that insufficient waste management hurts life satisfaction. It underscores the need to implement pollution control measures to enhance overall well-being. Comprehending the long-term consequences is essential since every policy or action that affects one variable will influence other variables. Understanding the connections between variables is crucial for ensuring the efficacy of policies and the correctness of statistical analyses. Long-term adjustments will counteract the short-term oscillations, resulting in a high likelihood of significant correlation between the variables. Table 7 illustrates the results of error correction regression, namely the short-run coefficients and long-run modifications.

Table 7
ARDL Short-Run Estimates
Source: Author's estimate

Dependent Variable: Δln(SWB)				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta\ln(SWB)_{t-1}$	1.974819	0.259836	7.600247	0.0000
$\Delta\ln(SWB)_{t-2}$	-0.198617	0.277135	-0.716682	0.4833
$\Delta\ln(CO2)$	0.003700	0.001298	2.849946	0.0111
$\Delta\ln(CO2)_{t-1}$	-0.003242	0.001281	-2.531102	0.0215
$\Delta\ln(CO2)_{t-2}$	-0.002592	0.001142	-2.269757	0.0365
$\Delta\ln(GDPPC)_{t}$	-0.008106	0.051297	-0.158027	0.8763
$\Delta\ln(GDPPC)_{t-1}$	0.050375	0.051819	0.972126	0.3446
$\Delta\ln(GDPPC)_{t-2}$	0.341353	0.053480	6.382879	0.0000
$\Delta\ln(INEQ)_{t}$	-0.002997	0.001119	-2.679211	0.0158
$\Delta\ln(INEQ)_{t-1}$	0.002114	0.001073	1.969581	0.0654
$\Delta\ln(INEQ)_{t-2}$	0.002083	0.001003	2.076686	0.0533
$\Delta\ln(PM2.5)_{t}$	1.362977	1.334064	1.021673	0.3213
$\Delta\ln(PM2.5)_{t-1}$	0.783036	1.631132	0.480057	0.6373
$\Delta\ln(PM2.5)_{t-2}$	-0.002261	1.632308	-0.001385	0.9989
$\Delta\ln(SW)_{t}$	-0.000301	0.000346	-0.870091	0.3964
$\Delta\ln(SW)_{t-1}$	0.001156	0.000428	2.702921	0.0151
$\Delta\ln(SW)_{t-2}$	0.000753	0.000444	1.696559	0.1080
ECT	-0.002669	0.000313	-8.537517	0.0000
F-Bounds Test				
Test Statistic	Value	Significance	I(0)	I (1)
F-statistic	7.696375	10%	1.75	2.87
K	6	5%	2.04	3.24
		2.5%	2.32	3.59
		1%	2.66	4.05

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Income inequality has a strong and statistically significant inverse correlation with economic well-being. The findings indicate that a rise in income disparity will result in a decline in the nation's economic well-being. Income disparity is a pervasive issue that is encountered by every community. When income disparity rises in a nation, it leads to a higher prevalence of health and social problems, a decrease in social benefits like clean air and water, lower literacy rates, reduced happiness and contentment among the people, and even slower economic progress (Zhuang, 2023; LaVeist et al., 2023). The study examined the relationship between income inequality and economic well-being, building upon previous research conducted by Vezzoli et al. (2023), Zhou & Zhang (2023), Ghosh et al. (2023). The studies indicate that increased income inequality hurts people's life satisfaction. To reduce geographical income inequality, the studies suggest implementing place-based development policies such as providing affordable housing, relaxing zoning requirements, and promoting social cohesion (Kim, 2024; Corinth & Feldman, 2024). These measures are expected to stimulate economic growth and enhance the country's overall well-being. A strong correlation exists between carbon emissions (CO2) and economic prosperity in the short term. The findings indicate that a rise in carbon dioxide emissions in the short term will increase the country's economic prosperity. Industrial activity and heightened energy consumption often result in elevated GDP, the generation of employment opportunities, and enhanced living standards (Raihan, 2023). Individuals may undergo an instantaneous enhancement in their sense of satisfaction due to enhanced economic development circumstances, augmented job prospects, and better availability of products and services (Cimini et al., 2023). The study examines the correlation between CO_2 emissions and life expectancy, building upon previous research by Azam & Adeleye (2024) and Hasnawati et al. (2024). The research reveals a positive correlation between the rise in CO_2 emissions and an increase in life expectancy. An inverse correlation exists between GDP per capita and economic well-being. The findings indicate that a rise in the GDP per capita might result in a decline in the economic welfare of the nation's population. A high GDP per capita neither guarantees life expectancy nor reflects the extent of societal inequality (Nkoa et al., 2024). GDP is the only metric to gauge a country's economic development and prosperity. However, GDP must accurately reflect a nation's progress in leading the way on environmental issues, such as reducing carbon emissions (Guan et al., 2024). The GDP does not account for the potential societal impacts of such issues, necessitating the development of policies to measure social well-being (Zhang et al., 2023). The study establishes a connection with previous research conducted by Lee & Goh (2023), Kundu et al., (2024), and Suárez Álvarez & Vicente (2023) in order to compare GDP per capita and economic well-being. The findings indicate that GDP per capita has a detrimental effect on economic well-being. The long-run adjustment may be seen via the ECT coefficient value, which is -0.002. This negative value indicates how the system adjusts towards long-run equilibrium. The associated probability value is very significant at 0.0000. This outcome indicates that the model will consistently and continuously adapt. Bounds testing confirms a long-term relationship between the variables, as the F-statistic (7.696) surpasses the upper critical value of the I(1) test at a 1% significant level. Cointegration occurs when two or more variables exhibit a consistent and enduring link as they evolve. Table 8 displays the results of the diagnostic test, a component of regression analysis that examines the computed model, the assumptions made about the data, and the model compatible with the recorded data. The diagnostic testing used the Jarque-Bera test to assess normality, the Serial LM test to detect autocorrelation issues, the Heteroskedasticity test to determine whether the residuals are Homoscedastic, and the Ramsey Reset test to quantify errors in the model. The analysis indicates that the error term does not deviate from normality, there is no autocorrelation, the residuals exhibit homoscedasticity, and there is no measurement error in the model. This is supported by the fact that the probabi-

Table 8. *Diagnostic Test Estimates. Source: Author's estimate*

Test	Value	Prob. Value	Decision
Jarque-Bera Test	2.3212	0.3132	There is no normality issue in the error term.
Serial LM Test	0.4921	0.6934	No autocorrelation in the model
Heteroskedasticity Test	1.5270	0.2236	Residual is Homoscedastic
Ramsey Reset Test	0.5532	0.5878	No measurement error in the model

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lity value of each test is greater than 0.05, indicating the absence of the aforementioned issues in the model. Figure 1 shows the outcome of Granger causality test.

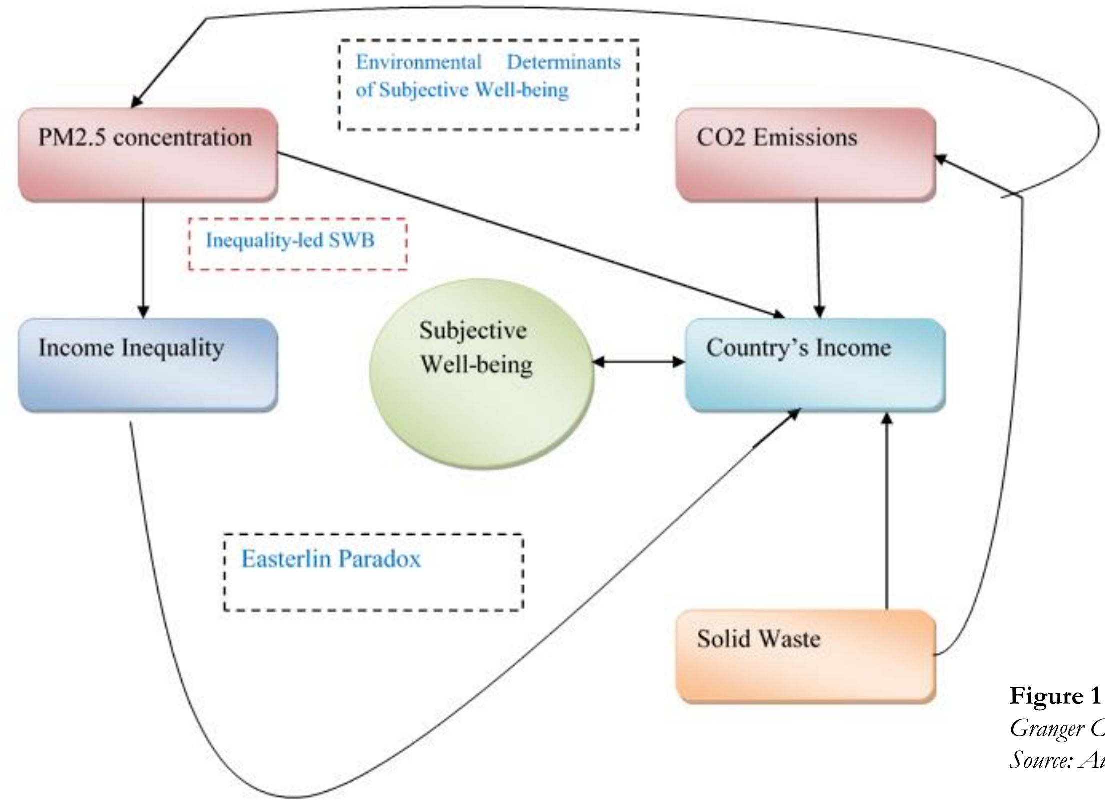

Figure 1
Granger Causality Estimates
Source: Author's work.

The results suggest a bidirectional connection between individuals' subjective well-being and the economic measure of GDP per capita. The bidirectional link implies that an augmentation in GDP per capita might result in an augmentation in subjective well-being and vice versa. A greater GDP per capita leads to more tax income, enabling the government to invest in public services, thus improving living standards, increasing life expectancy, and stimulating economic development. A unidirectional causality exists between income inequality, solid waste, and economic well-being. Similarly, the findings demonstrate a one-way connection between income disparity and PM2.5. This indicates that variations in PM2.5 levels significantly affect income inequality, but alterations in income inequality do not significantly affect PM2.5 levels. The findings indicate a unidirectional association between GDP per capita and income inequality, solid waste, PM2.5, subjective well-being, and CO_2 emissions. This means that changes in these factors affect GDP per capita, but GDP per capita does not influence these variables. There is a direct link between CO_2 emissions and subjective well-being, indicating that an increase in CO2 emissions might result in a decline in subjective well-being. Table 9 displays the results of the impulse response function analysis. Empirical evidence suggests that a rise in CO2 emissions positively impacts subjective well-being, as shown by impulse response analysis. Changes in GDP per capita will have a significant positive impact on subjective well-being in the coming decade, will support Easterlin paradox, where income increases subjective well-being. Income disparity shocks have an immediate negative impact on well-being until 2033. Further, an increasing PM2.5 levels are expected to hurt people's subjective well-being, leading to a decline in overall satisfaction and happiness. The implementation of measures to manage solid waste will lead to an improvement in subjective well-being during the following decade. Table 10 shows the analysis of variance decomposition. The variance decomposition study reveals that a shock in GDP per capita (2.1108) is expected to influence subjective well-being over the

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Table 9
IRF Estimates
Source: Author's estimate.

Period	SWB	CO2	GDPPC	INEQ	PM2.5	SW
2024	0.022019	0.000000	0.000000	0.000000	0.000000	0.000000
2025	0.051540	0.003754	0.003844	-0.003054	-0.003392	0.000376
2026	0.085671	0.008851	0.010209	-0.008052	-0.013154	0.002142
2027	0.123021	0.013879	0.018640	-0.011861	-0.027280	0.008937
2028	0.162969	0.018974	0.027404	-0.015054	-0.044376	0.020495
2029	0.205169	0.024011	0.035712	-0.019246	-0.063527	0.034748
2030	0.249795	0.029597	0.043172	-0.026077	-0.084564	0.049532
2031	0.296866	0.036458	0.049749	-0.036510	-0.107539	0.063425
2032	0.345892	0.045120	0.055544	-0.050808	-0.132581	0.075966
2033	0.395720	0.055687	0.060658	-0.068682	-0.159695	0.087346

Table 10
VDA Estimates
Source: Author's estimate.

Period	S.E.	SWB	CO2	GDPPC	INEQ	PM2.5	SW
2024	0.022019	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2025	0.056517	98.34396	0.441319	0.462577	0.291926	0.360191	0.004428
2026	0.104746	95.52513	0.842419	1.084573	0.675897	1.681950	0.043089
2027	0.166230	92.69890	1.031616	1.688021	0.777472	3.361063	0.306164
2028	0.240700	90.05381	1.113393	2.101285	0.761948	5.001949	0.871055
2029	0.327875	87.69003	1.136363	2.318817	0.755210	6.449725	1.592627
2030	0.427697	85.64518	1.146686	2.381616	0.815578	7.699724	2.277194
2031	0.540189	83.89029	1.174335	2.341135	0.968063	8.789889	2.806102
2032	0.665283	82.33968	1.234205	2.240554	1.221494	9.766568	3.153907
2033	0.802556	80.89337	1.329563	2.110890	1.571754	10.67067	3.351771

following decade substantially. This highlights the significant impact of higher GDP per capita on promoting a country's well-being. Enhancing the workforce's size and productivity is necessary to achieve effective economic growth. While both factors can contribute to increasing the economy's overall size, productivity growth leads to higher income and GDP per capita. In addition, the findings show that CO2 emissions, PM2.5, and solid waste have a substantial influence on subjective well-being, with a variance shock of (1.3295), (10.6706), and (3.3517) respectively. It is recommended to increase the adoption of renewable energy, improve energy efficiency in buildings, industries, and households, promote the production of goods that minimize waste generation, support recycling methods, and avoid engaging in regular physical activity or using combustion sources such as burning wood, biomass, or other materials. Income disparity substantially influences subjective well-being, resulting in a variance shock of 1.5717 over the following decade. Addressing economic disparity and creating equitable work opportunities are recommended to enhance living standards and eventually improve the well-being of the nation. The variance decomposition study provides useful insights into the factors anticipated to influence subjective well-being in the next decade. It also helps identify policies that might mitigate the effect of these variables and promote economic well-being in the nation.

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Conclusions and Policy Recommendations

Every living organism on Earth requires a pristine environment. It enhances both physical and mental well-being, as well as the overall health of individuals. Additionally, it contributes to the development and strengthening of communal structures. In particular, in developing nations, a rise in income may play a crucial role in alleviating poverty and enhancing the overall living conditions for all individuals. This research used the Autoregressive Distributive Lag (ARDL) methodology to examine the subjective well-being of individuals in Pakistan from 1975 to 2022, specifically focusing on the impact of pollution and increasing incomes. The research takes into account both environmental and economic issues in order to provide comprehensive findings. The findings indicate that carbon emissions have a negative impact in the long-run while its positive impact in the short run on subjective well-being. In the long-run, country's per capita income decreases subjective well-being in a country. Income inequality has a positive impact on subjective well-being in the long-run while its negative impact in the short-run. Solid waste has a negative long run impact while positive short-run impact on subjective well-being in a country. The Granger causality results substantiate the feedback hypothesis between the country's income and subjective well-being. On the other hand, subjective well-being Granger-causes environmental factors. The country's per capita income is influenced by subjective well-being, environmental factors, and growing income disparity. The IRF estimates suggest that subjective well-being will be positively influenced by the country's income, carbon emissions, and solid waste management. Conversely, it will be negatively influenced by rising income inequality and PM2.5 concentrations over the next 10 years. The VDA estimates indicate that PM2.5 will have the greatest variance shock of 10.670% on subjective well-being, followed by solid waste management and the country's per capita income, with variance shocks of 3.351% and 2.110%, respectively. Addressing environmental deterioration and economic injustice requires a nuanced strategy. Ensure a secure and conducive work environment, promote resistance to climate change, foster chemical safety, implement sustainable agriculture methods, promote the well-being of communities, and protect natural resources to optimize health. Income inequalities may be reduced by enhancing workers' skills, dismantling obstacles to gender equality, and enhancing job prospects. In order to achieve sustainable development, legislators must draft economic and environmental legislation that effectively diminishes income disparity, enhances economic growth, and mitigates pollution. Planting trees, which can absorb and store carbon dioxide, is a straightforward and cost-effective method to save the environment. Recycling reduces water pollution, greenhouse gas emissions, and energy consumption by decreasing the extraction and purification of raw materials. Improved land management practices could facilitate the development of innovative technology for carbon dioxide removal and smokestack emissions avoidance. Adopting cleaner manufacturing technology decreases pollution and waste while also allowing for the recovery of valuable byproducts. This results in improved environmental performance, productivity, and pricing. Air pollution reduction may lead to a decrease in lung cancer, stroke, and respiratory illnesses. By adopting a low-carbon paradigm, healthcare professionals, patients, and communities may achieve improved and more affordable healthcare while mitigating environmental health hazards. Education investment may tackle economics, productivity, and wealth inequality issues. Implementing equitable compensation and comprehensive benefits might enhance the earnings of those with low incomes, whilst increasing welfare payments may reduce the income disparity and alleviate relative poverty. Carbon pricing mechanisms such as emissions trading systems and carbon taxes have the potential to stimulate investments in clean technologies. The government should prioritize the implementation of pollution mitigation technology and initiatives from foreign-invested companies to reduce carbon dioxide emissions effectively. Prioritizing energy efficiency initiatives is crucial, and Pakistan should decrease its exports of pollution-producing technologies. Progressive taxation, which imposes more taxes on the wealthy than the less affluent, can potentially decrease income disparity. Additional job opportunities are required to decrease income disparity and enhance economic development. Furthermore, decreasing inflation has the potential to diminish inequality and alleviate poverty. While the results are essential, the study has several limitations that might be rectified in further studies. The study's three economic and environmental indicators demonstrate a strong association between environmental quality and income growth. Inflation,

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population growth, energy poverty, and water contamination significantly influence a nation's economy. These factors should be considered in future studies to provide more precise conclusions. The research is limited to the geographical boundaries of Pakistan. Future studies should adopt a worldwide perspective to understand better the correlation between environmental sustainability, economic growth, and well-being in diverse situations. Implementing this approach can enhance precision and provide more detailed explanations.

Declarations

Ethical Approval: Not Applicable.
Consent to Participate: The study was conducted with equal participation by all authors.
Consent to Publish: The paper's publication is permitted by all of the authors.
Competing Interests: There is no potential conflict between any of the authors.
Availability of data and materials: The data is freely available at World Development Indicators published by World Bank (WDI, 2023) at https://databank.worldbank.org/source/world-development-indicators.

References

ABED AL AHAD M., DEMŠAR U., SULLIVAN F., KULU H. (2022) Air pollution and individuals' mental well-being in the adult population in United Kingdom: A spatial-temporal longitudinal study and the moderating effect of ethnicity. Plos one, 17(3):e0264394. https://doi.org/10.1371/journal.pone.0264394

ACHEAMPONG A.O., OPOKU E.E.O. (2023) Environmental degradation and economic growth: Investigating linkages and potential pathways. Energy Economics, 123: 106734. https://doi.org/10.1016/j.eneco.2023.106734

ADEDEJI A., OLONISAKIN T.T., BUCHCIK J., IDEMUDIA E.S. (2023) Socioeconomic status and social capital as predictors of happiness: evidence and gender differences. Humanities and Social Sciences Communications, 10(1):1-8.

ADNAN M., XIAO B., BIBI S., XIAO P., ZHAO P., WANG H., AN X. (2024) Known and unknown environmental impacts related to climate changes in Pakistan: an under-recognized risk to local communities. Sustainability, 16(14):6108. https://doi.org/10.1057/s41599-023-01606-0

AHUMADA G., ITURRA V. (2021). If the air was cleaner, would we be happier? An economic assessment of the effects of air pollution on individual subjective well- being in Chile. Journal of Cleaner Production, 289:125152. https://doi.org/10.1016/j.jclepro.2020.125152

AKNIN L. B., DUNN, E. W., PROULX, J., LOK, I., & NORTON, M. I. (2020). Does spending money on others promote happiness?: A registered replication report. Journal of Personality and Social Psychology, 119(2):e15. https://doi.org/10.1037/pspa0000191

ALLOUSH M., WU S. (2023) Income improves subjective well-being: evidence from South Africa. Economic Development and Cultural Change, 71(2):485-517. https://doi.org/10.1086/716056

AMIN A., BTE MOHAMED YUSOFF N.Y., YOUSAF H., PENG S., IŞIK C., AKBAR M., ABBAS S. (2023) The influence of renewable and non- renewable energy on carbon emissions in Pakistan: evidence from stochastic impacts by regression on population, affluence, and technology model. Frontiers in Environmental Science, 11: 1182055. https://doi.org/10.3389/fenvs.2023.1182055

AMINU N., CLIFTON N., MAHE S. (2023) From pollution to prosperity: Investigating the Environmental Kuznets curve and pollution haven hypothesis in sub-Saharan Africa's industrial sector. Journal of Environmental Management, 342: 118147. https://doi.org/10.1016/j.jenvman.2023.118147

APERGIS N., BHATTACHARYA M., HADHRI W. (2020) Health care expenditure and environmental pollution: a cross-country comparison across different income groups. Environmental Science and Pollution Research, 27 (8):8142-8156. https://doi.org/10.1007/s11356-019-07457-0

ARAKI S., OLIVOS F. (2024) Low income, ill-being, and gender inequality: explaining cross-national variation in the gendered risk of suffering among the poor. Social Indicators Research. https://doi.org/10.1007/s11205-024-03358-z.

AZAM M., ADELEYE B.N. (2024) Impact of carbon emissions sources on life expectancy in Asia and the Pacific region. In UK: Blackwell Publishing Ltd. Natural Resources Forum 48(1):35-57. Oxford, https://doi.org/10.1111/1477-8947.12303

AZZAHRA A., RAHAYU R., MARLINA N.S., SAEBAH, N., SAPUTRO W.E. (2024) The role of education in economic growth and breaking the chain of poverty in Indonesia. Journal of Management, Economic, and Financial, 2(2): 55-63. https://doi.org/10.46799/jmef.v2i2.31

BAKER P., LACY-NICHOLS J., WILLIAMS O., LABONTÉ R. (2021) The political economy of healthy and sustainable food systems: an introduction to a special issue. International Journal of Health Policy and Management, 10(12):734. https://doi.org/10.34172/ijhpm.2021.156

BANERJEE D., NATH S., MODAK B.K. (2024) The Intersection of Climate Crisis and Disease Outbreaks: Cataclysmic Consequences. In: Mukhopadhyay, U., Bhatta-

DOI: 10.6092/issn.2281-4485/20659

charya, S., Chouhan, P., Paul, S., Chowdhury, I.R., Chatterjee, U. (eds) Climate Crisis, Social Responses and Sustainability. Climate Change Management. Springer, Cham. https://doi.org/10.1007/978-3-031-58261-5_11

BARDO A.R., CUMMINGS J.L. (2023) Life, longevity, and the pursuit of happiness: The role of disability in shaping racial and sex disparities in living a long and happy life. Population Research and Policy Review, 42(4), 72. https://doi.org/10.1007/s11113-023-09819-6

BEHERA D.K., PADMAJA M., DASH A.K. (2024) Socioeconomic determinants of happiness: Empirical evidence from developed and developing countries. Journal of Behavioral and Experimental Economics, 109:102187. https://doi.org/10.1016/j.socec.2024.102187

BEYENE S.D. (2022) Human activities and environmental quality: evidence beyond the conventional EKC hypothesis. Heliyon, 8(9), e10756. https://doi.org/10.1016/j.heliyon.2022.e10756

BLAAUW P., PRETORIUS A., VILJOEN K., SCHENCK R. (2020) Adaptive expectations and subjective well-being of landfill waste pickers in South Africa's Free State province. In Urban Forum, 31;135-155. Springer Netherlands. https://doi.org/10.1007/s12132-019-09381-5

BØRING P., GRØGAARD J.B. (2023) Do older employees have a lower individual productivity potential than younger employees?. Journal of Population Ageing, 16 (2):369-397. https://doi.org/10.1007/s12062-020-09323-1

BRUK Z., IGNATJEVA S., FEDINA L., VOLOSNIKOVA L. (2024). Measuring Subjective Well- Being of High School Students: Between the Desired and the Real. Child Indicators Research, 17(2): 525-549. https://doi.org/10.1007/s12187-024-10104-x

BURHAN N.A.S., SABRI M.F., RINDERMANN H. (2023) Cognitive ability and economic growth: how much happiness is optimal?. International Review of Economics, 70(1):63-100.https://doi.org/10.1007/s12232-022-00409-0

CAI, H., YUAN, J., SU, Z., WANG, X., HUANG, Z., JING, Y., & YANG, Z. (2023). Does economic growth raise happiness in China? A comprehensive reexamination. Social Psychological and Personality Science, 14(2):238-248. https://doi.org/10.1177/19485506221089804

CAMPBELL-LENDRUM D., NEVILLE T., SCHWEIZER, C., NEIRA, M. (2023) Climate change and health: three grand challenges. Nature medicine, 29(7), 1631-1638. https://doi.org/10.1038/s41591-023-02438-w

CAO Z., ZHOU J., LI M., HUANG J., DOU D. (2023) Urbanites' mental health undermined by air pollution. Nature sustainability, 6(4): 470-478. https://doi.org/10.1038/s41893-022-01032-1

CASTRO D., BLEYS B. (2023) Do people think they have enough? A subjective income sufficiency assessment. Ecological economics, 205:107718. https://doi.org/10.1016/j.ecolecon.2022.107718

CAUDILL S.B., FARIA J.R., MIXON JR F.G., YOUNG, E.H. (2024) Expropriation, money, and happiness: the impact of state theft in Russia. Empirical Economics, 66(2): 483-501. https://doi.org/10.1007/s00181-023-02466-y

CHEN C.W. (2023) Can smart cities bring happiness to promote sustainable development? Contexts and clues of subjective well-being and urban livability. Developments in the Built Environment, 13:100108. https://doi.org/10.1016/j.dibe.2022.100108

CHEN F., CHEN Z. (2021). Cost of economic growth: Air pollution and health expenditure. Science of the Total Environment, 755:142543. https://doi.org/10.1016/j.scitotenv.2020.142543

CHEN W.Y., HSU L.Y. (2024) Is income catch-up related to happiness catch-up? Evidence from eight European countries. Heliyon, 10(5):e26544. https://doi.org/10.1016/j.heliyon.2024.e26544

CIMINI C., LAGORIO A., GAIARDELLI P. (2023) The evolution of operators' role in production: how Lean Manufacturing and Industry 4.0 affect Job Enlargement and Job Enrichment. International Journal of Production Research, 61(24):8493-8511. https://doi.org/10.1080/00207543.2022.2152894

CORINTH K., FELDMAN N. (2024) Are opportunity zones an effective place-based policy?. Journal of Economic Perspectives, 38(3):113-136. ISSN: 0895-3309.

DADA O.T., FANIRAN G.B., OJO D.B., TAIWO A.O. (2023) Waste pickers' perception of occupational hazards and well-being in a Nigerian megacity. International Journal of Environmental Studies, 80(4):933-947. https://doi.org/10.1080/00207233.2022.2055344

DENG P., SCHÖB R. (2024). Group-specific redistribution, inequality, and subjective well-being in China. Review of Income and Wealth, 70(3), 862-882. https://doi.org/10.1111/roiw.12671

DRITSAKI M., DRITSAKI C. (2024). The relationship between health expenditure, CO2 emissions, and economicgrowth in G7: Evidence from heterogeneous panel data. Journal of the Knowledge Economy, 15(1): 4886- 4911. https://doi.org/10.1007/s13132-023-01349-y

DU J., LIU Y., XU Z., DUAN H., ZHUANG M., HU Y., FU B. (2024) Global effects of progress towards Sustainable Development Goals on subjective well- being. Nature Sustainability, 7(3): 360-367. https://doi.org/10.1038/s41893-024-01270-5

EASTERLIN R.A. (1974) Does Economic Growth Improve the Human Lot? Some Empirical Evidence. Nations and Households in Economic Growth, 89-125. https://doi.org/10.1016/B978-0-12-205050-3.50008-7

DOI: 10.6092/issn.2281-4485/20659

EASTERLIN R.A. (2023). Why does happiness respond differently to an increase vs. decrease in income?. Journal of Economic Behavior & Organization, 209:200-204. https://doi.org/10.1016/j.jebo.2023.03.005

FAN S.J., HEINRICH J., BLOOM M.S., ZHAO T.Y., SHI T.X., FENG W.R., DONG G. H. (2020) Ambient air pollution and depression: a systematic review with meta-anasis up to 2019. Science of The Total Environment, 701: 134721. https://doi.org/10.1016/j.scitotenv.2019.134721

FANG Z., LIAO Y., MA C., WU R. (2024) Examining the impacts of urban, work and social environments on residents' subjective wellbeing: a cross- regional analysis in China. Frontiers in Environmental Sciences, 11:1343340. https://doi.org/10.3389/fenvs.2023.1343340

GHOSH S., DOĞAN B., CAN M., SHAH M.I., APERGIS N. (2023) Does economic structure matter for income inequality?. Quality & Quantity, 57(3):2507-2527. https://doi.org/10.1007/s11135-022-01462-1

GONG Y., LI Y., SUN Y. (2023) Waste sorting behaviors promote subjective well-being: A perspective of the self-nature association. Waste Management, 157:249-255. https://doi.org/10.1016/j.wasman.2022.12.025

GUAN C., YANG P., YANG H., ZHANG J. (2024) Is the genuine progress indicator a better policy goal for sustainable development? An empirical study based on the environmental Kuznets curve. Social Indicators Research, 171(1):47-86.https://doi.org/10.1007/s11205-023-03237-z

HASNAWATI S., USMAN M., ELFAKI F.A., FAISOL A., RUSSEL E. (2024). Modeling the relationship between life expectancy, population growth, carbon dioxide emission, and GDP growth in Indonesia. International Journal of Energy Economics and Policy, 14(4):484-500. https://doi.org/10.32479/ijeep.16303

HAUTEKIET P., SAENEN N.D., DEMAREST S., KEUNE H., PELGRIMS I., VAN DER HEYDEN J., NAWROT T.S. (2022) Air pollution in association with mental and self-rated health and the mediating effect of physical activity. Environmental Health, 21(1):29. https://doi.org/10.1186/s12940-022-00839-x

HAYDA Y., DLUHOPOLSKYI O., ZATONATSKA T., HAIDA T., LAVRENTIEV M., SMYK A. (2023) Solid waste market: cross-country analysis. In IOP Conference Series: Earth and Environmental Science, 1150(1): 012012. https://doi.org/10.1088/1755-315/1150/1/012012

HE D., SHENG Z., TIAN C. (2024) Examining the U-shaped relationship between non-agricultural sources water pollution and the urban-rural income gap. Plos one, 19(7): e0305530. https://doi.org/10.1371/journal.pone.0305530

HENNING R.J. (2024) Particulate matter air pollution is a significant risk factor for cardiovascular disease. Current Problems in Cardiology, 49(1):102094. https://doi.org/10.1016/j.cpcardiol.2023.102094

HU G., WANG J., FAHAD S., & LI, J. (2023) Influencing factors of farmers' land transfer, subjective well-being, and participation in agri-environment schemes in environmentally fragile areas of China. Environmental Science and Pollution Research, 30(2):4448-4461. https://doi.org/10.1007/s11356-022-22537-4

HU H., HE H., LI Y., ZHANG K., HU X. (2024) Does cash transfer program improve recipients' social participation? Evidence from low-income households data in China. International Journal of Social Welfare, https://doi.org/10.1111/ijsw.12670

HUANG D., TIAN M., YUAN L. (2023) Do objective and subjective traffic-related pollution, physical activity and nature exposure affect mental wellbeing? Evidence from Shenzhen, China. Science of the Total Environment, 869, 161819. https://doi.org/10.1016/j.scitotenv.2023.161819

HUO W., ZAMAN B. U., ZULFIQAR M., KOCAK E., SHEHZAD K. (2023) How do environmental technologies affect environmental degradation? Analyzing the direct and indirect impact of financial innovations and economic globalization. Environmental Technology & Innovation, 29:102973. https://doi.org/10.1016/j.eti.2022.102973

IMAMATSU Y., OE N., ITO E., IWATA Y., ARIMOTO, A., KOBAYASHI K., TADAKA E. (2023) Subjective well-being and related factors among independent, healthy, community-dwelling older adults in Japan. Healthcare, 11(15):2211. https://doi.org/10.3390/healthcare11152211

IQBAL A., YASAR A., NIZAMI A.S., SHARIF F., TABINDA A.B., SULTAN I.A., AHMAD M. (2023) Evolution of solid waste management system in Lahore: A step towards sustainability of the sector in Pakistan. Applied Sciences, 13(2):983. https://doi.org/10.3390/app13020983

ISLAM T.U., ABRAR M., ARSHAD R., AKRAM N. (2022) Income inequality in Pakistan. International Journal of Social Economics, 49(11): 1652-1662. https://doi.org/10.1108/IJSE-09-2021-0573

JAMEEL M.A., HINA H., & UL-HAQ, J. (2023). Sectoral and regional impacts of trade liberalization on the skilled-unskilled wage-gap in Pakistan. Edelweiss Applied Science and Technology, 7(2):87-103. https://doi.org/10.55214/25768484.v7i2.374

JAVAN K., ALTAEE A., BANIHASHEMI S., DARESTANI M., ZHOU J., PIGNATTA G. (2023) A review of interconnected challenges in the water–energy– food nexus: Urban pollution perspective towards sustainable development. Science of the Total Environment, 912:169319. https://doi.org/10.1016/j.scitotenv.2023.169319

KANAT O., YAN Z., ASGHAR M.M., ZAIDI S.A.H., SAMI A. (2023) Gender inequality and poverty: The role of financial development in mitigating poverty in Pakistan. Journal of the Knowledge Economy. https://doi.org/10.1007/s13132-023-01527-y.

DOI: 10.6092/issn.2281-4485/20659

KARAHAN M., KIZILTAN ELIACIK B.B., BAYDILI K.N. (2024) The interplay of spiritual health, resilience, and happiness: an evaluation among a group of dental students at a state university in Turkey. BMC Oral Health, 24(1):587. https://doi.org/10.1186/s12903-024-04297-4

KASINGER C., BRAUNHEIM L., BEUTEL M., BRÄHLER E. (2023) Closing the "happiness gap" by closing the wealth gap: the role of wealth on life satisfaction between east and west-Germans. Journal of Public Health, 31(9):1433-1442. https://doi.org/10.1007/s10389-022-01716-0

KE J., ZHANG J., TANG M. (2021) Does city air pollution affect the attitudes of working residents on work, government, and the city? An examination of a multi-level model with subjective well-being as a mediator. Journal of Cleaner Production, 295: 126250. https://doi.org/10.1016/j.jclepro.2021.126250

KIBRIA M.G., MASUK N.I., SAFAYET R., NGUYEN H.Q., MOURSHED M. (2023) Plastic waste: challenges and opportunities to mitigate pollution and effective management. International Journal of Environmental Research, 17(1):20. https://doi.org/10.1007/s41742-023- 00507-z

KIM G. (2024) Assessing the effects of place-based policy on spatial inequality and the distribution of household income: Evidence from tax increment financing. Economic Development Quarterly, 38(2):82-99. https://doi.org/10.1177/08912424231217695

KUNDU S., KUNDU R., CHETTRI K.B. (2024) Asymmetric effects of democracy and macroeconomic factors on happiness under high and low per capita incomes: A threshold panel analysis. Ecological Economics,216:108030. https://doi.org/10.1016/j.ecolecon.2023.108030

LAL R.M., DAS K., FAN Y., BARKJOHN K.K., BOTCHWEY N., RAMASWAMI A., RUSSELL A.G. (2020) Connecting air quality with emotional well-being and neighborhood infrastructure in a US city. Environmental Health Insights, 14:11. https://doi.org/10.1177/1178630220915488

LAVEIST T.A., PÉREZ-STABLE E.J., RICHARD P., ANDERSON A., ISAAC L.A., SANTIAGO R., GASKIN D.J. (2023) The economic burden of racial, ethnic, and educational health inequities in the US. Jama, 329(19):1682-1692. https://doi.org/ 10.1001/jama.2023.5965

LEE Y.Y., GOH K.L. (2023) The Happiness-Economic Well-Being Nexus: New Insights From Global Panel Data. SAGE Open, 13(4): 21582440231199659. https://doi.org/10.1177/21582440231199659

LI Z., KONG D. (2024) Is one's happiness associated with their spouse's income, and vice versa? Insights from China. Social Science Quarterly, 105(1):81-99. https://doi.org/10.1111/ssqu.13330

LI Z., MAO B., AO C., XU L., JIANG N. (2024) How does air pollution risk perception affect residents' subjective well-being? A structural equation model approach. Journal of Environmental Planning and Management, 67(1):1-24. https://doi.org/10.1080/09640568.2022.2094226

LIMAYANI N., TANUR E. (2024) Happiness and air quality: microdata analysis in Indonesia. Journal of Health, Population and Nutrition, 43(1):25. https://doi.org/10.1186/s41043-024-00517-3

LIN B., ULLAH S. (2024) Effectiveness of energy depletion, green growth, and technological cooperation grants on CO2 emissions in Pakistan's perspective. Science of The Total Environment, 906:167536. https://doi.org/10.1016/j.scitotenv.2023.167536

LIN Y., YAO D., CHEN X. (2021) Happiness begets money: Emotion and engagement in live streaming. Journal of Marketing Research, 58(3): 417-438. https://doi.org/10.1177/00222437211002477

MALIK W.S., ANWAR Z. (2023) Constitutional Pledges, Ground Realities and Horizontal Inequalities for Education in South Punjab, Pakistan. Journal of Development and Social Sciences, 4(4):565-576. https://doi.org/10.47205/jdss.2023(4-IV)50

MASUDA Y.J., WILLIAMS J.R., TALLIS H. (2021) Does life satisfaction vary with time and income? Investigating the relationship among free time, income, and life satisfaction. Journal of happiness studies, 22:2051-2073. https://doi.org/10.1007/s10902-020-00307-8

MATHENTAMO Q., LAWANA N., HLAFA B. (2024) Interrelationship between subjective wellbeing and health. BMC Public Health, 24(1):1-14. https://doi.org/10.1186/s12889-024-19676-3

MILADINOV G. (2023) Impacts of population growth and economic development on food security in low-income and middle-income countries. Frontiers in Human Dynamics, 5:1121662. https://doi.org/10.3389/fhumd.2023.1121662

MORI Y., SAKAMOTO N. (2024) Does the choice of well-being measures matter in respecting human dignity? empirical results from an Indian slum survey. In: Gotoh, R. (eds) Dignity, Freedom and Justice. Springer, Singapore. https://doi.org/10.1007/978-981-97-0519-1_12

MOURATIDIS K. (2021) Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being. Cities, 115: 103229. https://doi.org/10.1016/j.cities.2021.103229

MUMFORD E.L., MARTINEZ D.J., TYANCE-HASSELL K., COOK A., HANSEN G.R., LABONTÉ R., PARRISH-SPROWL J. (2023). Evolution and expansion of the One Health approach to promote sustainable and resilient health and well-being: A call to action. Frontiers in public health, 10:1056459. https://doi.org/10.3389/fpubh.2022.1056459

DOI: 10.6092/issn.2281-4485/20659

MURADOV A.J., AYDIN M., BOZATLI O., TUZCUOGLU F. (2024) Air pollution and life expectancy in the USA: Do medical innovation, health expenditure, and economic complexity matter?. Science of The Total Environment, 946: 174441. https://doi.org/10.1016/j.scitotenv.2024.174441

NADEEM K., SHAHZAD S., HASSAN A., USMAN YOUNUS M., ASAD ALI GILLANI S., FARHAN K. (2023) Municipal solid waste generation and its compositional assessment for efficient and sustainable infrastructure planning in an intermediate city of Pakistan. Environmental Technology, 44(21):3196-3214.

NARAYAN P. (2004) Reformulating critical values for the bounds F-statistics approach to cointegration: an application to the tourism demand model for Fiji, 2(04). Australia: Monash University. ISSN: 1441-5429

NAVARRO M., D'AGOSTINO A., NERI L. (2020) The effect of urbanization on subjective well-being: Explaining cross-regional differences. Socio-Economic Planning Sciences,71:100824.https://doi.org/10.1016/j.seps.2020.100824

NEVES S.A., MARQUES A.C., PATRÍCIO M. (2020) Determinants of CO_2 emissions in European Union countries: does environmental regulation reduce environmental pollution?. Economic Analysis and Policy, 68:114-125. https://doi.org/10.1016/j.eap.2020.09.005

NKOA B.E.O., BITOTO F.E., MINKOE S.B.B. (2024) Resource dependence and life expectancy in sub-Saharan Africa: Does financial sector stability break the curse?. Resources Policy, 97:105243. https://doi.org/10.1016/j.resourpol.2024.105243

NNAJI C.C., CHIBUEZE C., AFANGIDEH C.B. (2023) The menace and mitigation of air pollution in the built environment: A review. Nigerian Journal of Technology, 42(1):12-29. https://doi.org/10.4314/njt.v42i1.3

NORRIS J.I., MCKIBBAN A.R. (2023) Well-Being and Self-Wants. In: Maggino, F. (eds) Encyclopedia of Quality of Life and Well-Being Research. Springer, Cham. https://doi.org/10.1007/978-3-031-17299-1_3899

OSEI-KUSI F., WU C., TETTEH S., CASTILLO W.I.G. (2024) The dynamics of carbon emissions, energy, income, and life expectancy: Regional comparative analysis. Plos one, 19(2):e0293451. https://doi.org/10.1371/journal.pone.0293451

OTTO F.E., ZACHARIAH M., SAEED F., SIDDIQI A., KAMIL S., MUSHTAQ H., CLARKE B. (2023) Climate change increased extreme monsoon rainfall, flooding highly vulnerable communities in Pakistan. Environmental Research: Climate, 2(2): 025001. https://doi.org/10.1088/2752-5295/acbfd5

PESARAN M.H., SHIN Y., SMITH R. J. (2001) Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3): 289- 326. https://doi.org/10.1002/jae.616

PETROWSKI K., BÜHRER S., STRAUß B., DECKER O., BRÄHLER E. (2021) Examining air pollution (PM_{10}), mental health and well-being in a representative German sample. Scientific reports, 11(1):18436. https://doi.org/10.1038/s41598-021-93773-w

PIRACHA A., CHAUDHARY M.T. (2022) Urban air pollution, urban heat island and human health: a review of the literature. Sustainability, 14(15):9234. https://doi.org/10.3390/su14159234

(PRILLELTENSKY I. (2023) Wellness as Fairness. In: Maggino, F. (eds) Encyclopedia of Quality of Life and Well-Being Research. Springer,Cham. https://doi.org/10.1007/978-3-031-17299-1_4165

QI W., XU W., QI X., SUN M. (2023) Can environmental protection behavior enhance Farmers' subjective well-being?. Journal of Happiness Studies, 24(2):505-528. https://doi.org/10.1007/s10902-022-00606-2

RAHMAN M.M., SULTANA N. (2024) Nexus of Human Development and Environmental Quality in Low- Income and Developing Countries: Do Renewable Energy and Good Governance Matter?. Sustainability, 16(13):5382. https://doi.org/10.3390/su16135382

RAIHAN A. (2023) The dynamic nexus between economic growth, renewable energy use, urbanization, industrialization, tourism, agricultural productivity, forest area, and carbon dioxide emissions in the Philippines. Energy Nexus, 9:100180. https://doi.org/10.1016/j.nexus.2023.100180

RANDO CUETO D., JAMBRINO-MALDONADO C., JIMÉNEZ-MARÍN G., IGLESIAS-SÁNCHEZ P.P. (2024) Exploring the domain of relationship between happiness management in organizations and the environment. Management Decision, 62(2):740-764. https://doi.org/10.1108/MD-11-2022-1495

RAU H., NICOLAI S., STOLL-KLEEMANN S. (2022) A systematic review to assess the evidence-based effectiveness, content, and success factors of behavior change interventions for enhancing pro-environmental behavior in individuals. Frontiers in Psychology, 13:901927. https://doi.org/10.3389/fpsyg.2022.901927

RONAGHI M., SCORSONE E. (2023) The Impact of COVID-19 Outbreak on CO2 Emissions in the Ten Countries with the Highest Carbon Dioxide Emissions. Journal of Environmental and Public Health, (1):4605206. https://doi.org/10.1155/2023/4605206

ROY S., BOSE A., BASAK D., CHOWDHURY I.R. (2023) Open landfill site and threat to the proximity resident's: addressing perceived consequences of unscientific

DOI: 10.6092/issn.2281-4485/20659

solid waste dumping using GIS techniques. In: Chatterjee, U., Antipova, A., Ghosh, S., Majumdar, S., Setiawati, M.D. (eds) Urban Environment and Smart Cities in Asian Countries. Human Dynamics in Smart Cities. Springer, Cham. https://doi.org/10.1007/978-3-031- 25914-2_11

RÜGER H., HOHERZ S., SCHNEIDER N.F., FLIEGE H., BELLINGER M.M., WIERNIK B.M. (2023) The effects of urban living conditions on subjective well-being: The case of German foreign service employees. Applied Research in Quality of Life, 18(4):1939-1963. https://doi.org/10.1007/s11482-023-10169-w

RUSTAMOV E., MUSAYEVA T., XALILOVA X., ISMAYILOVA G., NAHMATOVA U. (2023) Investigating the links between social support, psychological distress, and life satisfaction: a mediation analysis among Azerbaijani adults. Journal of Positive Psychology and Wellbeing, 7(3): 309-321. ISSN: 2587-0130.

SAID Q. (2024) An Assessment of Subjective Well-Being of Inter-Provincial Migrant Workers in Balochistan, Pakistan. International Journal of Community Well-Being, 7:345–365. https://doi.org/10.1007/s42413-024-00212-5

SALAMEH A.A., AMIN S., DANISH M.H., ASGHAR N., NAVEED R.T., MUNIR M. (2022) Socio-economic determinants of subjective wellbeing toward Sustainable Development Goals: An insight from a developing country. Frontiers in Psychology, 13: 961400. https://doi.org/10.3389/fpsyg.2022.961400

SARKODIE S.A., OWUSU P.A., LEIRVIK T. (2020) Global effect of urban sprawl, industrialization, trade and economic development on carbon dioxide emissions. Environmental Research Letters, 15(3):034049. https://doi.org/10.1088/1748-9326/ab7640

SCHMIDT W.P., HAIDER I., HUSSAIN M., SAFDAR M., MUSTAFA F., MASSEY T., BIRAN A. (2022) The effect of improving solid waste collection on waste disposal behaviour and exposure to environmental risk factors in urban low-income communities in Pakistan. Tropical Medicine & International Health, 27(7):606-618. https://doi.org/10.1111/tmi.13787

SEDEH A. A., CAIAZZA R. (2024) Does entrepreneurship hold the key? Steering through income inequality towards happiness. Business Strategy and the Environment, 33(5):4424-4440. https://doi.org/10.1002/bse.3709

SHAH W.U.H., YASMEEN R., SARFRAZ M., IVASCU, L. (2023) The repercussions of economic growth, industrialization, foreign direct investment, and technology on municipal solid waste: Evidence from OECD economies. Sustainability, 15(1): 836. https://doi.org/10.3390/su15010836

SHAMMI A.T., HASSAN N., GOLDER M.R., MOLLA H., ISLAM S.S. (2023) Health status assessment of people adjacent to temporary waste disposal sites in Khulna city, Bangladesh. Heliyon, 9(9): e19810. https://doi.org/10.1016/j.heliyon.2023.e19810

SHAMS K., KADOW A. (2023) COVID-19 and subjective well-being in urban Pakistan in the beginning of the pandemic: A socio-economic analysis. Applied Research in Quality of Life, 18(1), 93-113. https://doi.org/10.1007/s11482-022-10114-3

SHUANG Y., WARIS M., NAWAZ M.K., CHAN C., YOUNIS I. (2024) National income accounting attributes and economic welfare. Evidence from Pakistan. PloS one, 19(8): e0301829. https://doi.org/10.1371/journal.pone.0301829

SIBT-E-ALI M., WEIMIN Z., JAVAID M.Q., KHAN M. K. (2023) How natural resources depletion, technological innovation, and globalization impact the environmental degradation in East and South Asian regions. Environmental Science and Pollution Research, 30(37):87768-87782. https://doi.org/10.1007/s11356-023-28677-5

STÉPHANE M.N., NOUMBA I. (2024). Does Being Globalized Matter for Happiness in African Countries?. Journal of Happiness Studies, 25(3):27. https://doi.org/10.1007/s10902-024-00738-7

SUÁREZ ÁLVAREZ A., VICENTE M.R. (2023). Going “beyond the GDP” in the digital economy: exploring the relationship between internet use and well- being in Spain. Humanities and Social Sciences Communications, 10(1):1-10. https://doi.org/10.1057/s41599-023-02110-1

TABASSUM U. (2023) Unveiling economic inequality: An analysis of Income inequality trends in Pakistan. Pakistan Journal of Applied Economics, 33(2):241-249. ISSN: 0254-9204

TANG Z., XIE M., CHEN B., XU M., JI Y. (2023) Do social and ecological indicators have the same effect on the subjective well-being of residents?. Applied Geography,157: 102994. https://doi.org/10.1016/j.apgeog.2023.102994

TAUSEEF S. (2022) Can money buy happiness? Subjective wellbeing and its relationship with income, relative income, monetary and non-monetary poverty n Bangladesh. Journal of Happiness Studies, 23(3): 1073- 1098. https://doi.org/10.1007/s10902-021-00443-9

TSURUMI T., MANAG, S. (2020) Health-related and non-health-related effects of PM2. 5 on life satisfaction: Evidence from India, China and Japan. Economic Analysis and Policy, 67:114-123. https://doi.org/10.1016/j.eap.2020.06.002

UZAR U., EYUBOGLU K. (2023) Does income inequality increase the ecological footprint in the US: evidence from FARDL test?. Environmental Science and Pollution Research, 30(4):9514-9529. https://doi.org/10.1007/s11356-022-22844-w

DOI: 10.6092/issn.2281-4485/20659

VAN DER ENG P. (2025) Pakistan's Economy: Fallout of 2022 Economic Distress Magnified the Need for Structural Reforms. Asian Economic Policy Review. https://doi.org/10.1111/aepr.12486

VEZZOLI M., VALTORTA R.R., MARI S., DURANTE F., VOLPATO C. (2023). Effects of objective and subjective indicators of economic inequality on subjective well-being: Underlying mechanisms. Journal of Applied Social Psychology, 53(2): 85-100. https://doi.org/10.1111/jasp.12928

WANG J., LI Y. (2024) Do subjective well-being influence people's willingness to pay for improved air quality: evidence from China. Environment, Development and Sustainability, 26(3):7857-7879. https://doi.org/10.1007/s10668-023-03039-w

WANG, Q., YANG, T., LI, R. (2023). Does income inequality reshape the environmental Kuznets curve (EKC) hypothesis? A nonlinear panel data analysis. Environmental Research, 216, 114575. https://doi.org/10.1016/j.envres.2022.114575

WDI (2023). World development indicators, World Bank, Washington D.C.

XUAN D., JIANG X., FANG Y. (2023) Can globalization and the green economy hedge natural resources? Functions of population growth and financial development in BRICS countries. Resources Policy, 82:103414. https://doi.org/10.1016/j.resourpol.2023.103414

YANG J., ZENG Y., WANG X. (2024) The Gender Happiness Gap in China: Composition Effect or Coefficient Effect?. Feminist Economics, 30(1):70-105. https://doi.org/10.1080/13545701.2023.2279212

YE Q., UMER Q., ZHOU R., ASMI A., ASMI F. (2023) How publications and patents are contributing to the development of municipal solid waste management: Viewing the UN Sustainable Development Goals as ground zero. Journal of environmental management, 325:116496. https://doi.org/10.1016/j.jenvman.2022.116496

YEREMA C.T., MANAGI S. (2021) The multinational and heterogeneous burden of air pollution on well-being. Journal of Cleaner Production, 318: 128530. https://doi.org/10.1016/j.jclepro.2021.12853

YILDIZ T., ERCIŞ A. (2022) Investigation of green consumers' subjective well being within the scope of purchase behavior, attitudes and personality traits. Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 36(1):29-42. https://doi.org/10.54614/TBE.2022.881257

YIN R., LEPINTEUR A., CLARK A.E., D'AMBROSIO C. (2023) Life satisfaction and the human development index across the world. Journal of Cross- Cultural Psychology, 54(2):269-282. https://doi.org/10.1177/00220221211044784

ZHANG J., PRETTNER K., CHEN S., BLOOM D.. (2023). Beyond GDP: Using healthy lifetime income to trace well-being over time with estimates for 193 countries. Social Science and Medicine, 320:115674. https://doi.org/10.1016/j.socscimed.2023.115674

ZHAO X., FENG Y., JIN L., SUN S.B. (2024) Unraveling the nexus between overeducation and depressive symptoms in China: the roles of perceived fairness of earnings and job autonomy. Applied Research in Quality of Life, 1-26. https://doi.org/10.1007/s11482-024-10311-2

ZHOU L., ZHANG Z. (2023) Ecological well-being performance and influencing factors in China: From the perspective of income inequality. Kybernetes, 52(4):1269-1293. https://doi.org/10.1108/K-06-2021-0452

ZHOU Q., EGGLESTON K., LIU G.G. (2024) Health insurance and subjective well-being: evidence from integrating medical insurance across urban and rural areas in China. Health Policy and Planning, 39(6):564-582. https://doi.org/10.1093/heapol/czae031

ZHU P., LIN B. (2022) Vanishing Happiness: How Does Pollution Information Disclosure Affect Life Satisfaction?. International Journal of Environmental Research and Public Health, 19(15):9530. https://doi.org/10.3390/ijerph19159530

ZHU Y., YU D. (2023) Education and happiness: Does education expenditure undermine households' subjective well-being? Evidence from China. Applied Economics, 55(50): 5925-5938. https://doi.org/10.1080/00036846.2022.2140772

ZHUANG J. (2023) Income and wealth inequality in Asia and the Pacific: Trends, causes, and policy remedies. Asian Economic Policy Review, 18(1):15-41. https://doi.org/10.1111/aepr.12399