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A New View on The Socio-Economic Factor In Child Mortality Asymmetric ARDL Provides New Evidence for Developing Country SDG (SDG'S) Achievement

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ABSTRACT

Purpose – The purpose of this study is to explain the link between child mortality and education, environmental health, water sanitation, and climate change. It seeks to manage and reduce child mortality by detailing why and how education, climate change, and environmental factors are crucial in lowering child mortality during a five-year period. The study intends to broaden the realm of child mortality reduction by integrating a water sanitation and health component not commonly identified in the literature.
Design/methodology/approach – The paper for an exploratory research between 1996 and 2020 utilising the Asymmetric Auto Regressive Distributed Model (ARDL). Long-run co-integration results suggest that Auto Regressive Distributive Lag (ARDL) is appropriate for examining the short-run connection between the modelled variables. The information comes from the World Development Indicator (WDI), which covers seven developing countries: Pakistan, Iran, Indonesia, Afghanistan, India, Bangladesh, and Nepal.
Findings – According to the study, access to improved water and sanitation facilities, environmental health, and climate change all have a substantial and negative impact on child survival. Furthermore, the study looked at the impact of schooling on child mortality.
Research limitations/implications – The chosen research technique may limit the generalizability of the study findings. As a result, researchers are encouraged to examine the presented hypotheses further.
Practical implications – This report advises policymakers and international organisations that in order to fulfil the needed rate of child mortality, households should have access to clean water and sanitation services. Furthermore, the report suggests that the government adjust environmental and educational policies in order to reduce child mortality.

Originality/value – The major objectives of the study are to construct a extrapolative exemplary for under-5 mortality and to categorize important hazard variables connected with under-5 deaths using nationwide demonstrative facts on kids under-5.

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Introduction

The health and development of a child, as well as the general development of the country, are strongly correlated with toddler mortality. A nation's economic, environmental, and quality of life conditions are all largely determined by child mortality, especially for families with young children. Finding potential risk factors for child mortality in children under five was the study's main objective. It serves as a reliable gauge of how well the Sustainable Development Goals are being achieved.

The major objectives of the study are to construct an extrapolative exemplary for under-5 mortality and to categorize important hazard variables connected with under-5 deaths using nationwide demonstrative facts on kids' under-5. Although infant death among kids' under-5 has decreased significantly worldwide, it remains a critical civic fitness issue in unindustrialized nations, where rates have remained higher than in other countries from 1996 to 2020. The international under-five-year-old toddler death rate in 2016 was 42 deaths per 1000 live births, down from 94 deaths per 1000 live births in 1990. This equates to a 56% decrease in global infant death rates under-5.

The goal of Sustainable Development Goal (SDG) 3 is to diminish kid death under-5 to at least 25 per 1000 live births by 2030. Child mortality among children under the age of five has dropped dramatically worldwide, from 217 deaths per 1000 live births in 1951 to 388 deaths per 1000 live births in 2018. Allowing to projections since the Global Burden of Disease (GBD) 2018 SDG Collaborators, countless nations are on pathway to meet the mark of slightest 26 fatalities per 1000 alive labors by 2030. Every year, approximately 7 million toddlers under the age of five die around the world, with poor countries bearing a disproportionately high burden of child mortality. Despite the fact that seven developing countries have been working to reduce infant mortality rates since 1990, they are still falling short of their goal. Globally, child mortality fell from 9.6 million to 7.6 million between 2000 and 2010, but the MDG-4 of reducing infant morbidity 1990 and 2015 remains unattainable; clearly, developing countries fall short of the target level of infant survival (Echavarri, 2022). (Echavarri, 2022). It has been widely reported that 10 million children under-5 are still on the verge of dying each year (Sharrow et al., 2022), with the burden of those child deaths increasing in low-income countries, particularly developing countries (Lelieveld et al., 2018)

The World Health Organization (WHO) announced Plan 2030 in order to achieve global sustainable development and decided to diminish infant deaths from 172 million to 100 million between 2012 and 2025. Developing countries, like other sub-regions, strive to meet MDGs and reduce poverty, but their infant and child mortality rates remain among the highest in the world. Furthermore, Pakistan has the highest child mortality rate among developing countries. Figure 1 can be used to investigate the problem's extremes. In 2021, Pakistan (PAK) will detect 65.2, while India (IND) will detect 32.6. Bangladesh (BGD) comes in third place with 29, Iran (IRN) comes in fourth with 13,5, Afghanistan (AFG) comes in sixth with 58, Indonesia (INDO) comes in seventh with 23, and Nepal (NEP) comes in seventh with 28.2 infants' losses per 1000 alive births. Regardless, the worldwide goal is to diminish infant death in developing countries to 13 deaths per 1000 alive births. As a result, this research will continue with the goal of contributing to the global vision of 2030 by identifying significant socioeconomic determinants of child mortality. This research will aid in the representation of intervention measures in developing countries to reduce child mortality rates, thereby accelerating long-term fiscal evolution. These indicators are considered urgent in the literature because they have a direct impact on child health and survival. However, in addition to the variable execute child mortality rate, social and economic factors such as education, climate change, environmental health, and better water facilities that use overdue proximal indicators essential be considered. Every day, nearly 30,000 children under the age of five face death in low-income countries due to poverty, a lack of clean water, and inadequate health care (Kousar et al., 2019). High child mortality is strongly associated with low economic growth rates in developing countries (Roopnarine and Yildirim 2019). (2013) (Kraft, Nguyen, Jimenez-Soto, & Hodge). This study discovered a link between social and economic factors such as education, income, and occupation (Cutler et al., 2006) People with less education are more likely to die young (Grytten et al., 2020). The following is a discussion of our research findings: Child mortality can be reduced through education. One extra year of education results in a 10% reduction in mortality for men aged 16 to 64. In addition to women.

Furthermore, many developing countries have identified admittance to unrestored water and cleanliness among kids under the age of five as a major public health issue (Nakamura, Ikeda, et al. 2011). Newborns are especially defenseless to health problems connected with insufficient water and sanitation because their on-child mortality in developing countries under the age of five (Ezeh et al., 2015). According to research, developed and high-income countries invest more in health infrastructure than developing and low-income countrues (Hill et al., 2007). Climate change is also a significant contributor to the mortality rate among children under the age of five. Effects are classified into two types: direct and indirect. These variables, however, have an impact on child mortality outcome of co2, because greenhouse gas emissions transform the Earth's system, resulting in advanced infections, reformed rain, and weather changes. Temperature changes (for example, heatwaves and rapidly changing temperatures) are direct consequences of climate change. Indirect effects include air pollution and aeroallergens. These possessions can be classified source of straight injury to children, as well as an upsurge in illness risk and the child mortality rate. "The most serious and direct consequence of environmental deterioration in poor countries is damage to human health," (Pearce & Warford, 1993)"The utmost serious besides direct significance of ecofriendly deterioration in poor countries takings the shape of harm to humanoid well-being," (Franz & FitzRoy, 2006). As a result, the economic repercussions of poor environmental health have received less attention in underdeveloped countries (Franz & FitzRoy, 2006). Agriculture has resulted in extensive chemical contamination, low water quality and quantity, and a loss in human well-being and economic productivity, particularly in developing countries with greater populations that are increasingly reliant on natural resources. Despite this, only a few studies have focused on the implications of lost output and the consequent morbidity (Franz & FitzRoy, 2006)

Research Questions

1. What effect does schooling have on child mortality?
2. What effect does climate change have on child mortality?
3. What effect does a better water supply have on child mortality?
4. What effect does the environment have on child mortality?
5. What does environmental health affect child mortality?

Literature Revie

Infant death among children under-5 is an excellent display of a nation's progress and growth. Toddler mortality under the age of five years is estimated to rank fourth among the millennium development goals established in 1990. According to the Millennium Development Goals, all developing countries should strive to reduce child mortality to one per 1000 live births, with under-5 set at 30 per 1000 alive births. Despite the fact that the entire world had made significant progress since 1990, several poor countries had yet to achieve a sufficiently beneficial outcome in terms of lowering child mortality rates under the age of five. As a result, (Bustreo et al., 2015) established sustainable development targets, stating that by 2030, child mortality under the age of five must be reduced to 13 losses per 1000 alive births. There are also a few articles that are relevant in the context of developing countries.

Child mortality and education

The primary goal of the underlying cause theory is to explain why there is still a link between child mortality and education. The educational levels of both the mother and father are the most important factors in reducing child mortality among children under the age of five. Education is critical for parents to reduce child mortality in developing countries, according to (Jayathilaka et al., 2021) Child mortality under the age of five decreases as parents' education improves. It was determined that education was not the only factor influencing child mortality. Other factors may contribute to the deaths of children (Marshall et al., 2021)

Households with heads who have only received primary education have a difficult danger of infant death than households with heads who have received secondary education, according to (Mamani et al., 2021). In impoverished countries, claim that a father's level of education is also related to child mortality. Furthermore, highly educated males have a lower risk of infant death, and the father's educational level has an undesirable impact on child mortality under-5, according to this study. The mother's education is in the middle of the determinant variables; however, the mother's education may be the most important variable because of its direct link with the near factor of mortality. Women who are educated may be able to provide improved well-being attention for their kids. They are more inclined to provide enhanced nourishment and hygiene.. Through education, women gain access to the outside world, which improves their perspectives and slants (Nawaz & Anwar, 2021)

H1: Education has an effect on child mortality.

Climate change and child mortality

Infants are especially vulnerable to the negative health effects of rapid heat waves. A heat wave raises the total child mortality rate in a population. (Yang et al., 2021) discovered extensive evidence of heat waves are associated with an increased risk of child mortality, however the evidence was greater for babies than for other age groups. Further research, particularly underdeveloped countries, indicates an increase in the risk of child mortality from warmness rollers in children, particularly babies. Climate change and increased carbon dioxide accumulation affect allergic conjunctivitis by extending and exacerbating the pollen season and influencing allergic conjunctivitis; additionally, warm and moist weather may raise the danger of mould growth indoors, bug and contact allergies, as well as the creation of fungal spores.

H2: Climate change has an effect on child mortality.

Water sanitation and child mortality

This study expresses the relationship between the SDG index 'under-five mortality rate' and the SDG index 'level of water stress (Liu, 2021), with the premise that no identical SDGs (and also different SDG indicators) are inextricably linked (Liu, 2021). A clear link between child mortality and water stress is that children's health can suffer as a result of a lack of access to water, leading to higher child mortality. For example, (Liu et al., 2021) use research from Ethiopia and Nigeria to argue that a lack of water may increase the risk of diseases in children, which is a significant predictor of child mortality. (Liu, 2021) discovered that access to clean water is not directly related to children's health, with the hypothesis that installing piped water in households may reduce child mortality. Despite the fact that tap water is hazardous to children's health, another study on child mortality had nothing to do with water supply (Geere & Hunter, 2020)

H3: water sanitation has an effect on child mortality

Environmental Health

Access to clean water and sanitation are the environmental health indicators that are most frequently examined. With over one billion people in developing nations missing access to clean water and two to three billion lacking even the most basic sanitation, access to safe drinking water and improved sanitation is one of the most crucial factors affecting both urban and rural populations' health. (Franz & FitzRoy, 2006) Globally, it is stated that omitted variable bias confuses environmental health variables' capacity to explain variation in mortality resulting from indirect contamination routes, and that they are therefore more frequently utilised in disease-specific morbidity analyses. (Franz and FitzRoy 2006). But controlling the health concerns linked to a lack of access to safe drinking water and adequate sanitation is challenging due to disparities between and within nations. (Franz & FitzRoy, 2006). When other socioeconomic variables are included in a multivariate cross-country study, their explanatory value is limited (Filmer & Pritchett, 1999) Determining the relationship between the two is challenging, particularly in the absence of household-level data, due to the indirect relationship between poor water quality and sanitation and therefore death.

H4: Environmental health has an effect on child mortality.

Methodology

This information provided secondary data to research the contribution of social and economic variables on child and newborn mortality. This knowledge is based on information from the World Development Indicators (WDI) for Education (government expenditure on education total (% of government expenditure), improved water and sanitation facilities (Level of water stress: freshwater withdrawal as a proportion of available freshwater resource), and three environmental quality indicators, including CO2 emissions from electricity and heat production, total (% of total fuel combustion), and child mortality rate under the age of five. In developing nations, child mortality is analyzed using seven variables. Explain the relationship between education, child mortality, environmental variables, water sanitation, and environmental health. Econometric model:

$$CMR = f\ (CO2, EDU, HEALTH, WS) \qquad (1)$$

whereas CMR denotes the child mortality rate for children under the age of five.

EDU = government education spending as a percentage of total government spending.

CO2 = CO2 emissions from climate change.

WS = Water sanitation level of water stress

HEALTH=life expectancy at birth due to environmental health.

After converting all of the variables into natural logarithmic form, we obtain the following equations, where each variable's coefficient directly contributes to the elasticity.

$$lncmr_t = \alpha + \beta_1 lnco2_t + \beta_2 lnedu_t + \beta_3 lnhealth_t + \beta_4 lnws_t + \mu_t$$

Where α is the intercept, and β1, β2, β3, β4, are coefficients, cmr_t is the natural log of per capita child mortality rate, $co2_t$ is the natural log of per capita co2, the edi_t is the natural log of per capita education, *health* is the natural log of per capita health, ws_t is the natural log of per capita of water sanitation and *u* is the Gaussian error term.

Recent research employs models with enormous durations (T) for analysis in panel data analysis due to the ease of access to data. Dynamic panels with a lot of cross sections (N) and long periods (T) exhibit asymptotics. (Cheng & Bang, 2021) Fixed and random effect estimators, or, are used in small periods (T) panel estimation (1991). With these estimators, cross sections are pooled and only the constant term is allowed to change amongst cross sections. It is often incorrect to assume that the slope coefficients are uniform, according to the main findings from the big N and large T. (Breitung & Pesaran, 2008). Numerous estimate strategies are provided by the most current research on dynamic heterogeneous panel valuation with huge N and T. The fixed effect estimate approach pools time series data for each cross section, and intercept terms are permitted to change between cross sections. Inconsistent slope coefficients might lead to misleading results from the fixed effect. The model can, however, be constructed individually for each cross-section and the arithmetic means of the calculated coefficients. The Mean Group (MG) estimator, which is the name of this approach, was first out by Pesaran and Smith (1995). The intercepts, slope coefficients, and error variances can all differ between cross sections when employing the MG technique. The Pooled Mean Group (PMG) technique, popularised by Pesaran et al. (1997, 1999), is used to estimate nonstationary dynamic panels, which becomes increasingly important as the length of the analysis period increases. The PMG estimator employs a mix of averaging and amalgamating coefficients (Pesaran et al., 1997, 1999). This estimator, like the MG estimator, allows for cross-group variation in short-run parameters, intercept terms, and error variance.
The general form of the PMG model's empirical specification is as follows.

$$y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} X_{i,t-j} + \mu_t + \varepsilon_{it}$$

Where $\lambda_{it}$is a scalar, u_{it} is a group-specific effect, and I = 1, 2,... N for the number of cross sections, and x_{it} is a vector of $K \times 1$ regressors. The disturbance term is an I(0) process if the variables are I(1) and co-integrated. The co-integrated variables' response to any departure from long-term equilibrium is one of their key characteristics. This trait implies that the system's variables' error-correction dynamics are affected by deviations from equilibrium. In order to create the error correction equation, it is typical to re-parameterize the above equation as

$$\Delta y_{it} = \emptyset_i y_{i,t-j} - \theta_i x_{i,t-j} \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij} \Delta x_{i,t-j} + \mu_t + \varepsilon_{it}$$

The speed of adjustment is indicated by the error correction parameter $\emptyset_i$. There is no proof that variables have a long-term association if $\emptyset_{i=}0$ exist. According to the prior assumption that variables reflect a convergence to long-run equilibrium in the event of any disturbance, it is expected $\emptyset_i$ that is negative and statistically significant. . The current study uses the unit root tests developed by Levin, Lin, and Chu (LLC) and I'm Pesaran, and Shin (IPS) to account for the nonstationarity of dynamic panels as the analysis lengthens. Regardless of size, culture, or population, the panel nations may have commonalities and interdependence because of economic globalisation. Heteroscedasticity, serial correlations, and cross-sectional dependences (CD) between variables are now more likely as a result. According to Baum's [13] technique, heteroscedasticity will be identified using the Modified Wald statistic for GroupWise heteroskedasticity, and the presence of a serial correlation will be assessed using the Wooldridge test for autocorrelation in panel data. The Pesaran CD statistic test will be utilised in this study to determine the cross-sectional dependence among the variables in the equation below:

$$CMR = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\sqrt{Tijpij^2}\right)$$

T represents the passage of time, N represents the cross-sectional dimension, and pij 2 represents the pairwise residual cross-sectional correlation coefficient. The judgment instruction states that the alternative hypothesis is cross-sectionally dependent, whereas the null hypothesis is cross-sectionally independent with CD N. (0, 1).

A pair-wise (Rahman, Alam, et al. 2022) interconnection of slanted test will be used to detect causation among the variables in the current investigation, using the techniques of (Rahman, Alam, et al. 2022).

$$Y_{i,t} = \pi_{0,i} + \pi_{1,i}Y_{i,t-1} \dots\dots\dots\dots\dots + \pi_{k,i}Y_{i,t-1} + \delta_{1.i}X_{i,t-1} + \vartheta_{i,t}$$

Table 1. Variables Description and Data Sources.

variables	Description of variables	Unit of measurement	Data sources
CMR	Child mortality	Mortality rate, under 5 (per 1,000 live births)	WDI
CO2	Climate change	Co2	WDI
EDU	Education	Government expenditure on education, total (% of GDP)	WDI
HEALTH	Environmental Health	Immunization, DPT (% of children ages 12-23 months)	WDI
WS	Water sanitation	People using at least basic sanitation services (% of the population)	WDI

Table 2: Descriptive Statistics

Variable	CMR	CO2	EDU	HEALTH	WS
Mean	47.90421	1.690132	2.586115	77.02105	45.97320
Median	48.20000	0.384025	2.593520	77.00000	37.14470
Maximum	90.50000	7.883095	4.770000	99.00000	93.69684
Minimum	11.90000	0.037055	1.015059	27.00000	10.92753
Std. Dev.	21.84068	2.694781	0.922697	17.96449	26.48550
Skewness	0.075049	1.548072	0.490239	-0.478146	0.742663
Kurtosis	1.888722	3.548176	2.442002	2.386418	2.254148
Jarque-Bera	4.977474	39.13446	5.037760	5.110111	10.93485
Probability	0.083015	0.000000	0.080550	0.077688	0.004222

Table 2 displays the modeled variables. This table shows the mean, median, skewness, kurtosis, and minimum and maximum values for each variable from 1971 to 2020. CMR has an average value of 47.90421 with the smallest value of 11.90000 and an extreme value of 90.50000.

Furthermore, the CO2 value varied from 0.037055 to 7.883095, with a mean score of 1.690132. The average value of EG is 1.569144, with values ranging from -2.119071 to 2.213161. Similarly, the mean poverty level is 3.536812, with a range of 3.004345 to 4.163560. POP has a middling value of 1.461974, with a low-slung of -0.266960 and a height of 2.870201. (Al Azies and Dewi 2021) is used to test residual normality. The probability value indicates that the WS or CO2 null hypothesis of "normally distributed residuals" is rejected. However, in macro data analysis, we can proceed with our model without satisfying the normality assumption because it will not disrupt the relationships (Amemiya, 1974).

Unit Root Test

Different panel unit root tests with varying specifications were presented by Levin, Lin, and Chu (2002) based on the presumption of entity-specific intercept terms and temporal trends. According to (Khan), the LLC test homogenizes the autoregressive coefficient, which determines whether or not there is a unit root. This test, which looks at the unit root problem, is based on ADF regression. The standard LLC test with an exclusive intercept term may be written as

$$\Delta y_{i,t} = \gamma_{0i} + py_{it-1} + \sum_{i=0}^{pi} \gamma_{1i} \Delta y_{i,t-j} + \mu_{i,t}$$

In the overhead equation, u_{it} is the disturbance term that is supposed to be sovereign across panel entities and follows an ARMA stationary process for every cross-section, while γ_{0i} is the constant term that is supposed to vary across cross-sectional entities while p is the same autoregressive coefficient and $\gamma_i$is the lag order.

$$\mu_{i,t} = \sum_{j=o}^{\infty} \gamma_{1i} \Delta y_{i,t-j} + \varepsilon_{i,t}$$

The hypothes are as

H0: ρi = ρ = 0 (Null Hypothsis)

HA:ρi = ρ < 0

The all LLC model predicts that will remain constant across entities under the null and alternative hypotheses based on t-statistics.

$$t_p = \frac{p}{SE(p)}$$

Under the conditions of independently and normally distributed error terms and cross-sectional independence, panel regression test statistics converge.

standard normal distribution when N and T $\rightarrow \infty$ and $\sqrt{\frac{N}{T}} \rightarrow 0$. However, test statistics If cross-sectional units are dependent, the error term is serially correlated, and there is a temporal trend, the function does not converge to 0. In these instances, LLC provided a modified version of test statistics.

$$t_p = \frac{t_p - NTS_N \sigma_0^{-2}(P) \mu_m^*}{\sigma_m^*}$$

μ_m^* and σ_m^* are modified mean and standard deviation, values of these are generated from monte Carlo simulation by LLC (1993).

IPS Unit Root Test I'm, Pesaran, and Shin (IPS), 2003, developed a test to verify the unit root in a heterogeneous panel. Although the overall test statistics are based on the arithmetic mean of individual series, the ADF test to individual series is used in this test. ADF may designate a series as.

$$\Delta y_{i,t} = w_i + py_{it-1} + \sum_{j=1}^{pi} p_{i,j}\, \Delta y_{i,t-j} + v_{i,t}$$

IPS test allows for heterogeneity in $v_{i,t}$ value, the IPS unit root test equation may be written as

$$t_T = \frac{1}{N}\sum_{i=1}^{N} t_{i,t}(p_i)$$

Where $t_{i,t}$ is the ADF test statistics, p is the lag order. In the ADF test statistics is calculated as:

$$A_I = \sqrt{\frac{N(T)}{VAR(t_T)}}\frac{[t_T - E(t_T)]}{}$$

variables	Levin, Lin &Chu test statistics		Im, Pesaran and Shin W − stat	
	I(0)	I(1)	I(0)	I(1)
CMR	-6.755	12.109	-5.533	2.886
	(0.031)	(0.000)	(0.024)	(0.000)
CO2	8.844	-7.023	8.864	-6.907
	(0.764)	(0.000)	(0.782)	(0.000)
EDU	-0.724	-11.28	-0.902	-11.51
	(0.719)	(0.000)	(0.743)	(0.000)
HEALTH	-6.536	-6.406	-4.219	-8.228
	(0.021)	(0.000)	(0.011)	(0.000)
WS	0.759	-6.290	1.015	-2.339
	(0.705)	(0.000)	(0.705)	(0.000)

Table 3. When it comes to macroeconomic data, the unit root test is a superior method to descriptive statistics for evaluating the suitability of secondary data for ARDL modeling. Through these experiments, it is discovered that child mortality and health are stable at a level, whereas CO2 emission, education, and water sanitation are not. However, they become stationary at the first difference. Furthermore, since CO2 emission, EDU, and WS are stationary at the first difference and both unit root tests (Levin, Lin, and Chu Test Statistics and I'm, Perasan, and Shin) produce nearly identical results, these variables are I (1) variables. It means that the unit root test demonstrated that the stationarity requirement for using ARDL modeling on current time series data is met. The lag order selection criteria were chosen after evaluating the data's stationarity, and the results are shown in Table 3. The two primary lag indicators are AIC and SC. Because the AIC has the lowest value at lag 2, two delays are chosen for the current ARDL modeling. Table 4 displays the lag order option for the current data. The ARDL model below depicts the current connections that must be investigated:

$$CMR_t = y_0 + y_1 CMR_{t-1} + y_2 CO2_{t-1} + y_3 EDU_{t-1} + y_4 WS_{t-1} + \sum_{i=1}^{p} a_1 \, \Delta CMR_{t-1} + \sum_{i=1}^{q} a_2 \, \Delta Co2_{t-1} + \sum_{i=1}^{q} a_3 \, \Delta EDU_{t-1} + \sum_{i=1}^{q} a_4 \, \Delta WS_{t-1} + \varepsilon_t$$

In this equation, $\alpha_1, \alpha_2,, \alpha_3,, \alpha_4$represent the short-term parameters while y_1, y_2, y_3, y_4, represent the long-term parameters. The ARDL bound test is first used to validate the co-integration, in which the critical values are calculated and compared in instruction to evaluate the long-term association of CO2, EDU, HEALTH, and WS emission with cmr. To decide on co-integration, the F-statistics must be better than the highest lower sure, as advised by Pesaran et al. (2001).

Table 4. Long Run Estimates

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-1042.494	NA	930798.	27.93318	28.08768	27.99487
1	-168.2032	1608.695	0.000136	5.285419	6.212414	5.655558
2	22.76652	325.9217	1.64e-06	0.859559*	2.559051*	1.538148*
3	32.29463	14.99090	2.54e-06	1.272143	3.744130	2.259181
4	62.44437	43.41562	2.31e-06	1.134817	4.379300	2.430303

as well as a maximum value the null hypothesis for the F-bound co-integration test is as follows:

$$y_1 = y_2 = y_3 = y_4 = 0$$

It denotes that the null hypothesis predicts no co-integration in the data, whereas the alternative hypothesis predicts co-integration in the data. The co-integration test results are shown in Table 4.

Table 4.ARDL Model: Long Run

Variables	Coefficient	Std. Error	t-Statistics	Prob.
C02	-1.040	1.691	-0.615	0.504
EDU	2.492	0.618	4.027	0.000
HEALTH	-0.099	0.065	-1.511	0.135
WS	-2.225	0.119	-1.885	0.064
SHORT RUN				
Variables	**Coefficient**	**Std. Error**	**t-Statistics**	**Prob.**
COINTEQ01	-0.0155	0.021	-0.726	0.470
D(CO2)	-0.244	0.444	-0.550	0.584
D(EDU)	-0.021	0.036	-0.587	0.558
D(HEALTH)	0.005	0.005	-0.972	0.334
D(WS)	-4.611	3.989	-1.156	0.252
C	-0.068	0.965	-0.070	0.944

$$\Delta lnCMR_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta lncmr_{t-1} + \sum_{i=1}^{p} \alpha_2 \Delta lnco2_{t-1} + \sum_{i=1}^{p} \alpha_3 \Delta lnEDU_{t-1} + \sum_{i=1}^{p} \alpha_4 \Delta lnhealth_{t-1} + \sum_{i=1}^{p} \alpha_5 \Delta lnws_{t-1} + \lambda_1 lnCMR_{t-1} + \lambda_2 lnco2_{t-1} + \lambda_3 lnEDU_{t-1} + \lambda_4 lnHEALTH_{t-1} + \lambda_5 lnWS_{t-1} + \varepsilon_t$$

In this equation, the expression from λ_1 to λ_5 depicts the long-run relationship between the variables, while the expression from α_1 to α_5 with the summation signs corresponds to the short-run dynamics of the variables. On the other hand, α0 represents drift constant and ε_t is Gaussian white noise

Table 4; Indicating result of long result ARDL model findings confirm that there is a negative. The probability value show that there is a insignificant relation between co2 and cmr at 5percent. It employs that increase 1percent in co2 in this response there will be decrease of 1.02 units in cmr.

Conclusion

Newborn death amount is the major factor nation economy Child impermanence rate is the main key of any nation development. Infant death under the age of five is the important factor of the budget that can be resolved by increasing in education of father and mother of children. in developing countries. Nevertheless, the reduce in CO2is also effect in reducing the child mortality rate. this study explains the encouraging and negative effects of health and environmental factor related with long run and short run. Furthermore, this study originates an important effects of water sanitation and facilities.

Theoretical and Practical Implication

This learning has many theoretic, concrete, and financial suggestions: firstly; this learning spreads the presented literature on poverty by empirically establishing the direct and indirect effect ofCO2. Secondly; the government should ensure contact to clean water to poor sector for culture of child Mortality reduction in developing countries. Thirdly; Environmental factor responsible Agencies in developing countries should step in to Clean Air Act to reduce environmental degradation and pollution. Fourthly; the government should provide subsidies to promote the health facilities. Fifthly; the availability of cheap and equal education for poor sector also to reduce child mortality.

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