



**ORIGINAL RESEARCH PAPER**

**Economics**

**ENVIRONMENTAL HEALTH: ANALYSIS OF GLOBAL HEALTH INDICATORS**

**KEY WORDS:** Environmental Health, Well-being, Sustainable development

<b>S. Ramaswamy*</b>	Advisor-Cum-Adjunct Professor (Economics), GTN Arts College (A), Dindigul. *Corresponding Author
<b>C. Vijayaraj-kumar</b>	Research Scholar, Department of Economics, The Gandhigram Rural Institute (Deemed to be University), Gandhigram, Dindigul District, Tamil Nadu.
<b>Clerin Varghese</b>	Research Scholar, Department of Economics, The Gandhigram Rural Institute (Deemed to be University), Gandhigram, Dindigul District, Tamil Nadu.

**ABSTRACT**  
 Environmental health is the art and science of protecting against environmental factors that may adversely affect human health or ecological balances essential to long-term health and environmental quality. Environmental health is the systematic development, promotion, and conduct of measures which modify or otherwise control those external factors in the indoor and outdoor environment which might cause illness, disability, or discomfort through interaction with the human system. This includes not only health and safety factors but also aesthetically desirable conditions to community demands and expectations. Environmental health focuses on the prevention and control of environmental exposures and associated adverse health effects. It addresses the effect of environmental sources on human health, including the human impact on the environment and how that might influence the health of humans as well as the environment itself. Thus, environmental health stresses the protection of the public from environmental hazards, as contrasted with the protection of the environment.

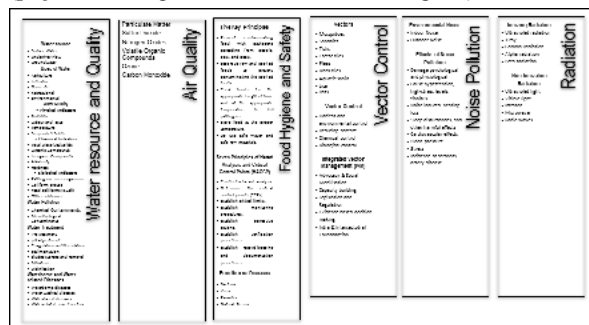
**INTRODUCTION**

Environmental Health is an interdisciplinary academic field, an area of research, and an arena of applied public health practice. Environmental health is a branch of public health which addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. Health is a positive attribute of life. It is characterized by a state of complete physical, mental and social well-being and not merely the absence of disease. Maximally attainable and acceptable levels of health for all people are important to our goal. Every citizen should be able to attain a level of health necessary to develop his mental and physical faculties to their full genetic potential. Health cannot be viewed in isolation from the overall goals and policies of national development. Development implies progressive improvement in the living conditions and quality of life enjoyed by the society and shared by its members and the central focus of such development is 'man'. Thus, health is both an important pathway to development as well as a desirable end-product of development. Environmental health comprises those aspects of human health, that is including quality of life, that are determined by physical, biological, social and psycho-social factors in the environment (Figure 1.1).

Archives of Environmental Health (1997) The Archives of Environmental Health published articles dealing with the effects of environmental agents on human health. These include epidemiological, clinical, or experimental studies of man. "Environment" involves occupational or personal environments as well as the global environment, land, water, and air. Buchner (1997) Environmental health is the study of the effects on human health of all external abiotic conditions and influences, including naturally occurring phenomena and anthropogenic environmental pollutants. European Charter on Environment and Health Environmental health included both the direct pathological effects of chemicals, radiation and some biological agents, and the effects (often, indirect) on the health and well-being of the broad physical, psychological, social, and aesthetic environment, which includes housing, urban development, land use, and transport (Johnson, 1997). Gordon (1997) Environmental health strived to link the environmental quality of both the natural and built

environments, with the level of public health and well-being. Though lacking consensus in definition, environmental health addresses the interrelationship between human health and the environment. It has been described as "the art and science of protecting against environmental factors that may adversely affect human health and environmental quality. Such factors include, but are not limited to air, food, and water contaminants; radiation; toxic chemicals; wastes; disease vectors; safety hazards; and habitat alterations. Hawaii Department of Health (Resnick, 1998) Environmental health is to protect and enhance environmental quality for all people of Hawaii, thus preserving our quality of life.

Environmental health is the art and science of protecting and promoting good health through the organized efforts of society and includes: the promotion of aesthetic, social, economic, cultural, and amenity values; fostering positive environmental factors; and reduction of potential hazards (physical, biological, chemical, and radiological).



**Figure 1.1 Determinants of Environmental Health**  
 Source: Compiled by Researchers.

**Environmental Health: Analysis Of Global Health Indicators**

Table 1 shows the changes in the health indicators (Birth Rate (BR), Total Fertility Rate (TFR), Life Expectancy (LE), Death Rate (DR), and Infant Mortality Rate (IMR)) among the different income groups of countries in the world. It is inferred from the table that the BR significantly declined between the period 1960 and 2020 in all the countries. It declined by (-) 46.07 per cent in the world. The highest decline in the BR was observed among Upper-Middle-Income Countries (UMICs)

(-) 58.31 per cent) and the lowest decline was observed among Low-Income (LIC) Countries (-) 26.37 per cent). The BR of LICs (LIC) was found to be three times higher than that of High-Income Countries (HICs) during the period 1960 and it increased to 3.5 times higher than that of the HICs during the period 2020. This shows that as compared to HICs, the decline

in the BR was found to be lower among the LICs. Table 1 also shows that globally the TFR significantly declined between the period 1960 and 2020. It declined by (-)51.28 per cent in the world. The highest decline in TFR was observed among UMICs (-) 65.64 per cent) and the lowest decline was observed among LICs (-) 27.67 per cent.

**Table 1 Analysis Of The Performance Of Different Income Groups Of Countries In The Health Indicators**

Sl. No	Health Indicators	LIC			LMIC			MIC			UMIC			HIC			World		
		1960	2020	Growth Rate (per cent)	1960	2020	Growth Rate (per cent)	1960	2020	Growth Rate (per cent)	1960	2020	Growth Rate (per cent)	1960	2020	Growth Rate (per cent)	1960	2020	Growth Rate (per cent)
1	Birth Rate	47.4	34.9	(-)26.37	43.4	20.76	(-)52.17	34.6	16.69	(-)51.89	26.89	11.21	(-)58.31	21.56	9.73	(-)54.87	31.93	17.22	(-)46.07
2	Total Fertility Rate	6.47	4.68	(-)27.67	5.98	2.6	(-)56.52	5.23	2.17	(-)58.51	4.54	1.56	(-)65.64	3.01	1.52	(-)49.587	4.79	2.228	(-)51.28
3	Life Expectancy	41.1	62.8	52.8	46.8	68.6	46.58	44.9	71.7	59.69	43.3	75.8	75.06	68.4	80.2	17.25	50.86	72.26	42.08
4	Death Rate	23.64	7.8	(-)67.01	19.16	7.6	(-)60.33	19.64	7.67	(-)60.95	20.06	7.76	(-)61.32	9.74	9.86	1.23	17.25	8.03	(-)53.45
5	Infant Mortality Rate	110.5	47	(-)57.47	83	33.9	(-)59.16	66.18	25.87	(-)60.91	41.2	9.1	(-)77.91	10.3	4.1	(-)60.19	64.8	27.4	(-)57.72

Source: World Bank Group (2023), World Development Indicators; and <https://databank.worldbank.org/reports.aspx?source=2&country=HIC,LIC,LMIC,UMIC>

Source: Derived from the Table 1.

The TFR of LICs was found to be three times higher than that of the HICs during the period 2020. The table analysis regarding LE in the world and among the major classifications of income groups for the period 1960-2020 shows that LE increased by 42.08 per cent in the world. All the groups of countries showed an increase in LE during this period. The highest increase in LE was observed among the Upper Middle-Income Countries (UMICs) and the lowest increase in LE was observed among the HICs. However actual LE was found to be higher among the HICs. And the lowest LE observed among LICs. The LE for the year 2020 ranges between 62.8 and 80.2 among the countries with different income groups.

Table 2 given above exhibits the data on Maternal Mortality Rates in the world. During the period 2000-2017, the maternal mortality rate significantly declined in all the groups of countries in the world. During the period 2000-2017, the MMR declined by (-) 38.3 per cent in the world. It is also inferred that, among the countries, there is a significant difference in the MMR. The MMR of low-income countries was found to be 41.18 times higher than that of HICs in the year 2017. The MMR of lower middle-income countries was observed to be 23 times higher than that of HICs. And the MMR of UMICs was observed to be 3.7 times higher than that of HICs during the same year. During the period 2000-2017, the highest decline in MMR was observed in the LICs followed by LMICs, UMICs and HICs.

It is also inferred from the table that the DR significantly declined between the period 1960 and 2020 in the world. It declined by (-) 53.45 per cent in the world. The highest decline in DR was observed among the LICs (-) 67.01 per cent) and the lowest decline was observed among the Lower-Middle-Income Countries (LMICs) (-) 60.33 per cent). Surprisingly, the DR increased in the High-income group from 1960 to 2020. In 1960, the lowest DR was found to be among the HICs. However, in 2020, it recorded the highest DR among the high-income groups. It is inferred from the table that similar to that of other health indicators IMR significantly declined between the period 1960 and 2020. It declined by (-) 57.72 per cent in the world. The highest decline in IMR was observed among UMICs (-) 77.91 per cent) and the lowest decline was observed among LICs (-) 57.47 per cent). The IMR of LICs was found to be 11.4 times higher than that of HICs. During the period 1960, it was 1.7 times higher than that of the HICs. But the difference increased between the high-income and LICs during 1960-2020.

**Global Disease Burden**

Leading causes of death globally: The top global causes of death, in order of the total number of lives lost, are associated with three broad topics: cardiovascular (ischaemic heart disease, stroke), respiratory (chronic obstructive pulmonary disease, lower respiratory infections) and neonatal conditions – which includes birth asphyxia and birth trauma, neonatal sepsis and infections, and preterm birth complications. Ischaemic heart disease caused the most deaths and was responsible for 16.0 per cent of total deaths. Since 2000, it has seen the largest increase in deaths, rising by more than 2 million to nearly 9 million deaths in 2019. Lower respiratory infections accounted for the highest number of deaths in the communicable disease category. This has not changed since 2000. Lower respiratory infections were the fourth leading cause of death in 2019. However, the number of deaths decreased from 3.0 million in 2000, to 2.6 million in 2019. HIV/AIDS dropped from the eighth leading cause of death in 2000 to the nineteenth in 2019, reflecting the success of timely diagnosis and effective treatment and control. Tuberculosis has also dropped from seventh place in 2000 to thirteenth in 2019, with a 30.0 per cent reduction in global deaths. Yet it remains among the top 10 causes of death in the African and South-East Asia regions and Africa has seen a slight increase in deaths since 2000 followed by a decline that only started in recent years. Among the top 10 causes of death in 2000, deaths from neonatal conditions and diarrhoeal diseases have seen the greatest global decrease in absolute number, each falling by more than 1 million since 2000.

**Table 2 Changes In The Maternal Mortality Ratio In The World**

Sl. No.	Classification of Countries	2000	2017	Growth Rate (Per Cent)
1	Low-Income	845	453	-46.39
2	Lower Middle-Income	422	253	-40.05
3	Upper Middle-Income	67	41	-38.81
4	High-Income	13	11	-15.38
	World	342	211	-38.30

**Global Disease Burden: Leading Causes Of DALY In The**

**World**

In 2019, there were 55.4 million deaths and 2.5 billion healthy years of life lost worldwide. And over 30 million – or nearly 3 in 5 people – died of the same 10 causes. Globally, age-standardized rates of deaths and DALYs decreased across all three cause categories between 2000 to 2019. This trend is underscored by the dramatic decline in communicable diseases, most significantly in Africa and South East Asia as well as in low- and middle-income countries. In these two regions, age-standardized mortality rates for communicable diseases dropped by over 50.0 per cent, at least double the decline in NCDs and injuries. While DALYs due to communicable diseases have dropped by 40.0 per cent since 2000, the top 5 noncommunicable diseases and injuries alone added nearly 100 million years to global DALYs from 2000-2019. Of note is diabetes, for which DALYs have increased by over 80.0 per cent. Despite the overall decline in DALYs, the number of years the global population lived with disability (YLDs) increased by 210 million years in 2019 compared to 2000, partly offsetting the decrease of over 360 million years lost due to premature death (YLLs). Diabetes, chronic obstructive pulmonary disease, stroke, road injuries, Alzheimer's disease and other dementias, ischaemic heart disease and cancers are major contributors to this increase, as well as to global causes of death. Both causes of death and DALYs are due to Alzheimer's disease and other dementias are on the rise. DALYs for these conditions have also doubled in nearly all regions and income groups.

**Global Disease Burden: Leading Causes Of Death By Region**

**African Region:** Six of the top 10 leading causes of death in Africa in 2019 are communicable diseases. Africa is the only region in which HIV/AIDS and malaria remain in the top 10. Encouragingly, Africa has seen HIV/AIDS deaths fall by more than half, dropping from over 1 million in 2000 to 435000 in 2019. It is now the region's fourth leading cause of death. In 2000, the disease was responsible for the greatest number of lives lost in Africa. Deaths from malaria are also falling, with 6.7 million in 2000 compared to 3.9 million in 2019. However, recent WHO reports indicate a slowdown or plateauing of progress against infectious diseases. Neonatal conditions and lower respiratory infections remained the leading cause of DALYs in 2019 for the region and have now moved up to become the first and second leading cause of death. Despite significant decreases in total numbers, diseases such as diarrhoea and malaria remain high contributors to both death and DALYs. In contrast, both deaths and DALYs for tuberculosis have risen by over 7.0 per cent since 2000. In terms of injuries, there has been a significant rise in road traffic injuries for the African Region, with a 51.0 per cent rise in deaths and a 45.0 per cent rise in DALYs. Deaths and DALYs for diabetes have also increased by 48.0 per cent and 59.0 per cent, respectively.

**Region of the Americas:** The rise of diabetes in the Region of the Americas has disproportionately contributed to DALYs through disability relative to other causes. We can see this when comparing it to ischaemic heart disease, which has been the number one cause of death and DALYs in the region since 2000. In 2019, for every four deaths due to ischaemic heart disease, there was one death from diabetes. Yet for every life-year lost due to disability from ischaemic heart disease, there were 10 years lost due to diabetes. In 2019, diabetes became the second greatest contributor to the regional DALYs. Compared to other regions, the Region of the Americas is also marked by high mortality from interpersonal violence, and it is the only region where this cause ranked in the top 10 causes of death for 2019. Similarly, the Americas is the only region where drug use disorder is a top 10 contributor to YLDs. In all other regions, drug use does not make the top 25. There has been nearly a threefold increase in deaths from drug use disorders and an increase of more than 150.0 per cent in DALYs between 2000 and 2019. While

Alzheimer's disease and other dementias are on the rise in many parts of the world, in the Americas and Europe they account for one of the primary causes of death, these conditions are now the third leading cause of death in the Americas and Europe.

**Eastern Mediterranean Region:** In the Eastern Mediterranean Region, deaths and DALYs from diabetes have more than doubled compared to 2000 - the greatest percentage increase in deaths and DALYs due to the disease across all regions. The greatest decrease among the top 10 causes of death over the period has been for diarrhoeal diseases, for which deaths have fallen by 90000, or 38.0 per cent. In line with a global increase in disability and death due to road traffic injuries, one can see a similar but slightly smaller increase (at around 40.0 per cent) for the Eastern Mediterranean Region. Gender-wise, 70.0 per cent of these deaths in the region are men, close to the global average of 75.0 per cent.

**European Region:** The European Region stands out for the relative decline in ischemic heart disease compared with other regions of the world, falling by 15.0 per cent in deaths and 25.0 per cent in DALYs, although the disease remained the top cause of deaths and DALYs. The region has also seen a decline in suicide and road injuries, with both out of the top 10 lists of death and disability. From 2000 to 2019, deaths from suicide in Europe dropped from the seventh leading cause of death to the seventeenth. Europe is the only region where accidental falls are among the top 10 causes of DALYs. Only one communicable disease (lower respiratory infections) features in Europe's top 10 causes of death.

**South-East Asia Region:** In the South-East Asia Region, diarrhoea accounted for the largest number of deaths and the second largest number of DALYs (following neonatal conditions) in 2000. In 2019, it dropped by 45.0 per cent and 60.0 per cent – to fourth and fifth place – respectively. Similarly, death and disability from neonatal conditions have declined by more than 50.0 per cent in the last two decades. However, deaths from ischaemic heart disease have dramatically increased from 1.2 million in 2000 to 2.1 million in 2019. Similar to the African Region, we also see a rise in road traffic injuries in the Southeast Asia Region, which is now among the top 10 leading causes of death and disability.

**Western Pacific Region:** Unlike many other regions, the leading cause of death and DALYs in the Western Pacific Region is stroke rather than ischaemic heart disease (IHD). However, deaths from IHD in the region have doubled, with more than a million additional fatalities in 2019 (2.3 million) compared to 2000 (1.1 million). Three cancers – lung, stomach and colorectal – ranked in the top 10 causes of death in 2019. In particular, deaths for lung and colorectal cancers have increased by 80.0 per cent and 100 per cent, respectively, since 2000. It reveals similar trends for DALYs, with increases of 65.0 per cent and 85.0 per cent respectively.

**Global Burden Of Disease Study: Mortality Due To Unintentional Carbon Monoxide Poisoning**

Unintentional carbon monoxide poisoning, a largely preventable cause of death that has not received adequate attention, prompted our extensive global analysis. We aimed to comprehensively examine demographic, temporal, and geographical trends in fatal unintentional carbon monoxide poisoning cases from 2000 to 2021. In 2021, the global mortality rate attributed to unintentional carbon monoxide poisoning stood at 0.366 per 100,000 individuals (with a 95% uncertainty interval ranging from 0.276 to 0.415). This resulted in 28,900 deaths (ranging from 21,700 to 32,800) and 1.18 million years of life lost (YLLs, with a range of 0.886 to 1.35 million YLLs) across all age groups. It's noteworthy that nearly 70% of these fatalities occurred in males, totalling 20,100 deaths (ranging from 15,800 to 24,000), and the age group of



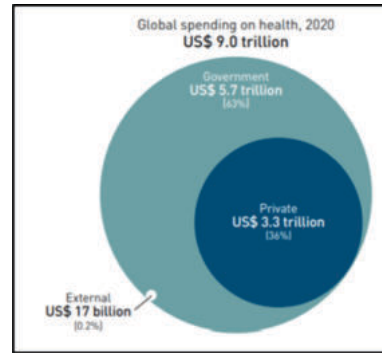
50–54 years witnessed the highest number of deaths, with 2,210 fatalities (ranging from 1,660 to 2,590). The age group of individuals aged 85 years or older experienced the highest mortality rate, with 1.96 deaths per 100,000 (ranging from 1.38 to 2.32). The region with the highest age-standardized mortality rate was Eastern Europe, where it reached 2.12 deaths per 100,000 (with a range of 1.98 to 2.30). Globally, there was a 53.5% decline in the age-standardized mortality rate from 2000 to 2021, although this decrease was not consistent across all regions. The population attributable fractions (PAFs) for occupational injuries and high alcohol consumption were 13.6% (ranging from 11.9 to 16.0) and 3.5% (ranging from 1.4 to 6.2), respectively.

Carbon monoxide is a toxic gas that lacks any odour, colour, or taste, rendering it imperceptible to the human senses (Raub et al., 2000; Chiew, 2014). It is generated during the incomplete combustion of various fuels, such as wood, coal, and natural gas. Common household sources of carbon monoxide include heating and cooking appliances like furnaces, wood stoves, charcoal grills, gas stoves, heaters, and generators, as well as vehicle exhaust (Graber et al., 2007; Rupert et al., 2013; Ball et al., 2005; Chiew, 2014). Accidental, fatal poisonings from carbon monoxide predominantly take place in residential settings, and they are more frequent during the winter season when heating systems are in use, windows remain closed, and ventilation is limited (Rupert et al., 2013; Braubach et al., 2013). Elevated concentrations of carbon monoxide or extended exposure to this gas can swiftly result in severe harm to the body through various mechanisms. These mechanisms include hindering the distribution of oxygen throughout the body, obstructing oxygen utilization, inducing oxidative stress, and impairing cellular function (Chiew, 2014; Rose et al., 2017; Eichhorn, 2018). Mild carbon monoxide poisoning often manifests with vague symptoms such as nausea, headaches, and fatigue, while more severe poisoning can lead to diverse consequences, including loss of consciousness, acute cardiac events, and even death (Raub et al., 2000; Chiew, 2014; Rose et al., 2017). Despite recommendations for immediate removal from the source of exposure and the use of hyperbaric oxygen therapy as strategies for mitigating and reducing the lasting effects of carbon monoxide poisoning, there is currently no definitive antidote. This underscores the paramount importance of prevention (Rose et al., 2017; Eichhorn, 2018).

The majority of carbon monoxide poisoning takes place in residential settings, with some studies indicating that up to 80% of these incidents occur within homes (Braubach et al., 2017; Dianat et al., 2011; Sikary et al., 2017). Many cases of unintentional carbon monoxide poisoning in residential areas have been linked to outdated, poorly maintained, or incorrectly installed heating systems (Dianat et al., 2011; Plis, 2022). Residences that exclusively use biomass fuels for heating or cooking pose a significant risk of carbon monoxide poisoning for their occupants (Sambuu, 2023). It's important to note that even in regions with warmer climates or during warmer months, carbon monoxide poisoning can still occur in such situations (Liu, 2019).

In summary, it is crucial to recognize that fatalities resulting from unintentional carbon monoxide poisoning are, for the most part, avoidable. Nevertheless, every year, roughly 30,000 individuals worldwide lose their lives to carbon monoxide poisoning. Despite a decrease in unintentional carbon monoxide poisoning mortality over the past two decades, this reduction has not been uniform, varying across different periods and geographical regions. There is a pressing need for enhanced public health surveillance to gain a more comprehensive understanding of the extent of this issue. To further decrease mortality rates, there is a demand for improved access to safe heating and cooking equipment, increased utilization of carbon monoxide alarms, and public education efforts aimed at enhancing awareness

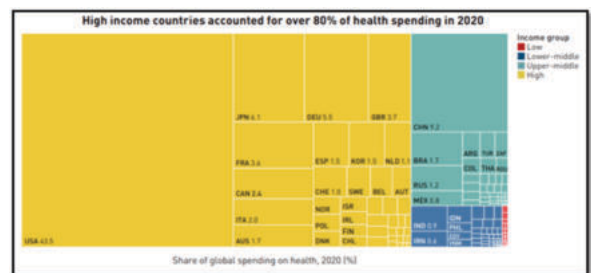
of the causes and risks associated with carbon monoxide exposure. These measures are essential to drive further reductions in carbon monoxide poisoning-related deaths.



**Figure 2 Global Spending On Health**  
Source:WHO Global Health Expenditure Database, 2022

Global Spending on Health: Global spending on health totalled US\$ 8.5 trillion in 2019, more than double, in real terms, the US\$ 4.2 trillion spent in 2000. About 60.0 per cent of health spending came from government sources, whereas 40.0 per cent came from domestic private sources and only 0.21 per cent came from external aid (Figure 2). Over the same period, global GDP increased by 74.0 per cent, from US\$ 50 trillion to US\$ 86 trillion. Consequently, health spending as a share of global GDP rose from 8.5 per cent to 9.8 per cent. The distribution of global spending on health by income group remained highly unequal in 2019, with high-income countries accounting for approximately 80.0 per cent of the total, compared with 17.0 per cent for upper-middle-income countries, 2.8 per cent for lower-middle income countries and 0.24 per cent for low-income-countries (Figure 2). The United States alone accounted for 42.0 per cent of global health spending, equivalent to what the 83 lowest-spending countries spent combined.

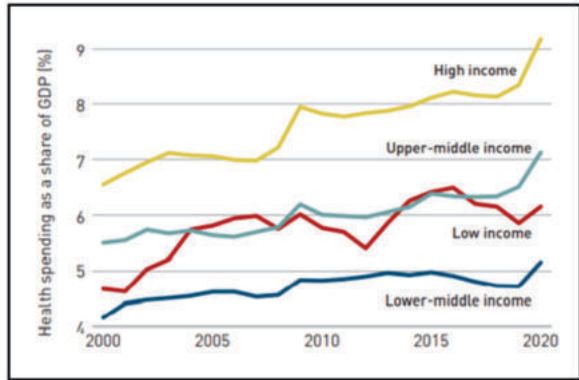
Strikingly, the distribution of health spending was more unequal than the distribution of global GDP, as high-income countries spent a larger share of their wealth on health (Figure 3). Global average health spending per capita was US\$ 1,105 in 2019, but there was wide variation across income groups. The average was only US\$ 39 a person in low-income countries. Figure 3 The distribution of global spending on health across income groups was more unequal than the distribution of global GDP compared with US\$ 3,191 in high-income countries more than 80 times larger, and about four times the average GDP per capita in low-income countries (US\$ 693 in 2019). Health spending per capita was US\$ 119 in lower-middle-income countries and US\$ 472 in upper-middle-income countries.



**Figure 3 High-income Countries**  
Source:WHO Global Health Expenditure Database, 2022

Most of the countries with low health spending were in South Asia and Sub-Saharan Africa, while most of the countries with high health spending were in Europe, North America and East Asia. WHO estimates that an additional US\$ 41 per person per year in health spending, on average, is needed in low and middle-income countries to make progress towards the

health targets of Sustainable Development Goal 3 by 2030. This implies more than doubling current health spending in low-income countries and a 34.0 per cent increase in lower-middle-income countries.



**Figure 4 Health Spending As A Share Of GDP Jumped In 2020**

Source:WHO Global Health Expenditure Database,2022

Health spending relative to the size of the overall economy varied across income groups. As a share of GDP, health spending in 2019 ranged from 4.9 per cent on average in lower-middle-income countries to 8.2 per cent in high-income countries. Health spending as a share of total government spending reflects health priority in public spending. In 2019, the share was 2.5 times larger in high-income countries (14.0 per cent) than in low-income countries (5.4 per cent). In upper-middle and high-income countries, the share of government health spending grew steadily from 2000 to 2019. But health priority remained largely unchanged in lower-middle income countries, at 6.0 per cent–7.0 per cent of government spending, and even fell in low-income countries to a low of 4.2 per cent in 2011 before recovering to 5.4 per cent in 2019. Between 2000 and 2019, household OOPS increased faster on average than household total consumption or OOPS increased but did so more slowly than household total consumption. External health aid has risen considerably since 2005. Global aid for health peaked at US\$19 billion in 2014 and then fell to US\$ 16 billion in 2015, where it stagnated before rising again to US\$ 17 billion in 2019. The top five recipients of external health aid in 2019 were Nigeria, Ethiopia, the United Republic of Tanzania, Kenya and Mozambique, three of which are middle-income countries. Nigeria was the largest recipient, with health aid totalling US\$ 1.1 billion, or 6.5 per cent of global external health aid spending in 2019. On a per capita basis, the top five low or middle-income country recipients of health aid were Eswatini, Lesotho, Zimbabwe, Zambia and Botswana. Eswatini, with the highest HIV prevalence of all UN member states, spent the most in health aid per capita (US\$ 69).

**Summary**

Environmental health is contingent on both the personal and surrounding environments. The personal environment pertains to personal hygiene, while the surrounding environment encompasses factors such as health, sanitation, access to clean drinking water, and proper toilet facilities, which also includes the elimination of open defecation. Both of these environments play a vital role in upholding the well-being of individuals and the preservation of natural resources. Neglecting either of these environments can result in underdevelopment and unsustainable progress. Therefore, it falls upon individuals, communities, and society as a whole to ensure the well-being of both environments. This necessitates collaborative efforts involving government agencies (GOs), non-governmental organizations (NGOs), and community-based organizations. Furthermore, governments should formulate strategic policies and programs aimed at safeguarding environmental health. The

global sphere continually grapples with various challenges in both the human-made and natural environments, leading to issues such as global warming, ozone layer depletion, acid rain, loss of biodiversity, desertification, unexpected natural disasters, and the problem of electronic waste. In light of these challenges, a global partnership becomes an imperative requirement to uphold the environmental health of nations and societies.

**REFERENCES**

- [1] Ball, L. B., Macdonald, S. C., Mott, J. A., and Etzel, R. A. (2005). Carbon monoxide-related injury estimation using ICD-coded data: methodologic implications for public health surveillance. *Archives of Environmental and Occupational Health*, 60, 119–127.
- [2] Braubach, M., Algoet, A., Beaton, M., Lauriou, S., Héroux, M.-E., and Krzyzanowski, M. (2013). Mortality associated with exposure to carbon monoxide in WHO European Member States. *Indoor Air*, 23, 115–125.
- [3] Buchner, V. (1997). Memo to Risk Communication and Education Subcommittee.
- [4] Chiew, A.L., and Buckley, N.A. (2014). Carbon monoxide poisoning in the 21st century. *Critical Care*, 18, 221.
- [5] Dianat, I., and Nazari, J. (2011). Characteristics of unintentional carbon monoxide poisoning in Northwest Iran—Tabriz. *International Journal of Injury Control and Safety Promotion*, 18, 313–320.
- [6] Eichhorn, L., Thudium, M., and Jüttner, B. (2018). The diagnosis and treatment of carbon monoxide poisoning. *Deutsches Ärzteblatt International*, 115, 863–870.
- [7] Gordon, L. (1997). Department of Political Science, University of New Mexico, Albuquerque. Personal communication.
- [8] Graber, J. M., Macdonald, S. C., Kass, D. E., Smith, A. E., and Anderson, H. A. (2007). Carbon monoxide: the case for environmental public health surveillance. *Public Health Reports*, 122, 138–144.
- [9] Instructions to Authors. *The International Journal of Artificial Organs*. 1997;20(3):191-191. doi:10.1177/039139889702000314
- [10] Johnson, BL. (1997). Agency for Toxic Substances and Disease Registry, Atlanta. Personal communication
- [11] Liu, F., Jiang, X., and Zhang, M. (2022). Global burden analysis and AutoGluon prediction of accidental carbon monoxide poisoning by Global Burden of Disease Study 2019. *Environmental Science and Pollution Research International*, 29, 6911–6928.
- [12] Plis, S. S., Veselkina, O. V., Klevno, V. A., and Vlassov, V. V. (2022). Acute lethal poisonings in children: a 10-year retrospective study of the Moscow region, Russia. *Journal of Public Health Research*, 11, 1932.
- [13] Raub, J. A., Mathieu-Nolf, M., Hampson, N. B., and Thom, S. R. (2000). Carbon monoxide poisoning—a public health perspective. *Toxicology*, 145, 1–14.
- [14] Resnick, B. (1998). National Association of County and City Health Officials, Washington, DC. Personal communication.
- [15] Rose, J. J., Wang, L., Xu, Q., et al. (2017). Carbon monoxide poisoning: pathogenesis, management, and future directions of therapy. *American Journal of Respiratory and Critical Care Medicine*, 195, 596–606.
- [16] Rupert, D. J., Poehlman, J. A., Damon, S. A., and Williams, P. N. (2013). Risk and protective behaviours for residential carbon monoxide poisoning. *Injury Prevention*, 19, 119–123.
- [17] Sambuu, T., Gunsmaa, G., Badarch, T. U., Mukhtar, Y., and Ichikawa, M. (2023). Carbon monoxide poisoning following a ban on household use of raw coal, Mongolia. *Bulletin of the World Health Organization*, 101, 470–477.
- [18] Sikary, A. K., Dixit, S., and Murty, O. P. (2017). Fatal carbon monoxide poisoning: a lesson from a retrospective study at All India Institute of Medical Sciences, New Delhi. *Journal of Family Medicine and Primary Care*, 6, 791–794.
- [19] WHO (2022). Global Health Expenditure Database, Geneva.