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AN INQUIRY INTO THE RELATIONSHIP BETWEEN HEALTH EXPENDITURE, HEALTH INDICATORS AND HUMAN DEVELOPMENT INDEX

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ABSTRACT Health expenditure is part of public expenditure and reflects the welfare activities of the government. Governments of difficult countries give importance to health expenditure, particularly after COVID-19, because health is wealth. Without health, it is very difficult to produce the best human capital, which is essential for physical capital formation. That is why many countries are worried about health status, health indicators, and human development. Researchers on health economics have emphasized the demand for and supply of health care services, which seem to be moderate in developed countries, yet these countries have readymade solutions to solve the health issues. In developed countries, patients have to wait a long time to see health service providers. This may be due to insufficient and more efficient health service providers in developed countries, or due to population explosion in developed countries. But in the case of developed countries, the demand for health services is greater than the supply of health services, which led to a scarcity of health service professionals. In this paper, the authors have attempted to understand the nexus between health expenditure, health indicators, and the human development index by using the data available in world health statistics provided by the World Bank in 2023.

KEYWORDS : Health Indicators, Health Expenditure, Human Development

INTRODUCTION

Investment or expenditure on health is one of the determinants of the quality of human capital. Humans can be considered as capital because they provide a stream of economic benefits over their lifetime society. Thus, investment in human capital produces benefits both to the individual and to society as a whole. In this context, one can understand the concepts of health and health expenditure. The **WHO (1947)** defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. **Fuchs (1982)** a well-known health economist opined that health can be defined according to criteria such as life expectancy, work capacity, need for medical care or ability to perform a variety of personal and social functions. In other words, health is a stock of capital and yields a stream of healthy days just as wealth is a stock of financial capital that yields a stream of income **(Dewar, 2010)**. Anything that contributes to producing better health such as food, clean air, and exercise can be considered health care **(Johnson-Lans, 2006)**. Health care expenditure refers to the amounts defrayed towards health care by the government, which include expenditure on medical and public health, family welfare, nutrition, water supply and sanitation, social security and welfare in respect of the child and handicapped care **(Reddy and Selvaraju, 1994).** Every health indicator is an estimate of a given dimension in a target population. The measurement in terms of measure health in the population, the physical characteristic of the population concerning ecological and environmental measurement and global measurement **(PAHO, 2018)**.

Some of the indicators of health in four domains are; health situation (morbidity); health situation (mortality); behavioural risk factors; and health services. Morbidity indicators are designed to measure the occurrence of diseases, injuries and disabilities in the population. Mortality data are the fundamental source of demographic, geographic and cause-of-death information. These data are used to quantify problems as well as to define or monitor health priorities and goals. Demographic and epidemiological populations have led to an increase in the relative importance of Chronic Non-Communicable Diseases (CND) arising from stroke, insufficient physical activity, poor consumption of fruits and vegetables, excessive consumption of alcohol, etc.

Health service indicators include structure, process and outcome. Structural indicators reflect the quality of material resources (buildings, equipment and financial resources), human resources (number and qualifications) and organisational structure (organisation of medical teams, quality control methods and reimbursement methods). Process indicators describe the important process of providing health care, including diagnostic activities, treatment recommendations and care. Outcome indicators reflect the state of health of the patient and the population – better knowledge of the part of the patient; patients' behavioural charges related to self-care and patient satisfaction concerning the care they received **(WHO, 2000; Arah et al. 2006)**.

Human Development is defined as the process of enlarging people's freedoms and opportunities and improving their well-being. The three areas of human development are access to health (leading a long and healthy life); access to education (being able to gain knowledge) and access to resources (having enough means to be able to live a decent life). The six pillars of human development are equity, sustainability, productivity, empowerment, cooperation and security. There are several approaches for human development and some of them are the income approach (linked to income), welfare approval (linked to beneficiaries or target population or stakeholders), basic need approach (health, education, food, water supply sanitation and housing) and capability approach (building human capabilities in the areas of health, education and access to resources).

The linkage between human development and economic growth is an important area of academic research. In general, human development is defined as "enlarging people's choices, which enables them to lead longer, healthier and fuller lives" **(Ranis and Stewart, 2000)**. But for the easiness of measurement and comparison, the concept of human development is narrowed down and developed Human Development Index (HDI). The HDI consists of three components; longevity, knowledge and standard of living, in that longevity, is measured by life expectancy, which is the only health indicator included in the HDI **(Nayak, 2008)**. In their article, **Ranis and Stewart (2000)** argued that there is a strong bidirectional relationship between economic growth and human development. They found that the allocation of household income to human development and the proportion of GNP devoted to priority social expenditure by the government are the important factors connecting economic growth and human development. They observed a negative relationship between the shares of GDP invested in health and education and life expectancy shortfall. Similar findings were made in their studies by other researchers. In their study **Aba and Ates (2016)**, **Arvas and Torusdag (2017)** found that an increase in per

capita health expenditure increased life expectancy. Besides the linkage between health expenditure and life expectancy, researchers also discussed the relationship between public health expenditure and other health indicators such as Infant Mortality Rate (IMR), Maternal Mortality Rate (MMR), Child Mortality Rate (CMR), Total Fertility Rate (TFR), Neo-Natal Mortality Rate and Percentage of Children born Underweight **(Theint, 2020; Owusu, Sarkodie, Pedersen (2021); and Mohapatra, 2021).** They found that public expenditure affects health outcomes positively. Another group of researchers has also made a study on the relationship between government health expenditure and the HDI **(Mirahsani, 2013; Marvelous, 2020; Ndaguba, Hlotywa, Nsiah (2021)**. They revealed that there is a positive and significant relationship between public health expenditure and HDI. From the above literature, it is clear that most of the studies discuss the relationship between public health expenditure and several health outcomes and HDI. And these studies were either conducted in a region or the countries like India, Turkey, Nigeria etc. The studies on the relationship between both public and private expenditure and health outcomes and HDI were found to be less. Similarly, the studies on the relationship between the performance in health indicators, HDI and health expenditure among countries belonging to different income groups have not received much attention in the previous studies. Thus, this paper tries to fill this research gap.

THE OBJECTIVES OF THE STUDY ARE:

1. To study and compare the performance of countries in selected health indicators;
2. To examine the relationship between health expenditure and health indicators of countries belonging to different income groups;
3. To analyse the relationship between HDI and health expenditure of countries belonging to different HDI categories.

Review of Literature

Akca et al. (2017) identified that the Gross Domestic Product (GDP) is a variable that is primarily responsible for any changes in the level of health expenditure. **Balwant Singh Mehta (2008)** analysed both public and private healthcare expenditure patterns in India based on secondary sources of information from the Reserve Bank of India and the National Sample Survey Organisation. It was found that the average per capita health expenditure in the year 2002 turned out to be Rs. 617. However, the average public per capita health expenditure (Rs. 170) was far less than household per capita health expenditure (Rs. 641). The developed states had less share of public expenditure than developing states. Contrary to this, private health expenditure pattern was found to be higher in the developed states like Kerala (8.38 per cent), Punjab (7.51 per cent), Haryana (7.46 per cent) and Maharashtra (7.07 per cent) as compared to poorer states such as Odisha (6.05per cent), Rajasthan (5.24 per cent), West Bengal (5.12 per cent), Bihar (4.39 per cent) and Assam (3.45 per cent).

Bhadra and Bhadra (2012) examined various factors affecting low public expenditure on health across states in India. The study revealed the level of public spending on health for the Central and States combined remains less than one per cent of the GDP. The study disclosed the status of the states in meeting their committed liabilities, which leaves very little room to spend on health. It also discussed the role and contribution of the finance commission towards complete equalization across the states. **Bhat and Nishant (2006)** in their study found that the elasticity of government health expenditure concerning the GDP is less than one and the coefficient varies between 0.47 per cent to 0.68 per cent. The results showed that health services are not luxury goods rather it is necessary. **Bhola Khan (2022)** attempted to assess the relationship between health expenditure and its determinants, such as SGDP, infant mortality, capital receipts, revenue receipts and internal borrowing, in nineteen states of India. For this purpose, Researcher analysed 12 years of data, i.e. 2010-2021, from various issues of State finance reports and run the panel regression. After careful analysis of the data, results indicate that some of the States are doing well and they are spending more percentage of their total revenue receipts as some of them have less over the health issue. The SGDP and revenue receipts by the States have a statistically significant impact on the total health expenditure by the States of India while internal debt has an insignificant impact on the total health expenditure. The author suggested to the State Governments of India that they must have focused to increase the SGDP and Revenue receipts while they should have to reduce internal borrowing and depending on other resources. **Elango et al. (2021)** described health as both an input and an outcome of broader social and economic development. It is also well known that achievements in health do not simply depend on the health sector, other than arise out of improvements in education, the standard of living, social stability, housing, water supply, sanitation and other environmental factors. These are amenable to change by actions taken by households, communities and governments and are typically outside the domain of the health system. The major objectives of this aimed to estimate the extent of public health expenditure in India and Tamil Nadu over the period under review concerning five-year plans. The particulars regarding the total plan investment outlay and health and family welfare expenditures in India and Tamil Nadu have been collected from the published source. From the analysis, it's evident that the total expenditure on health and family welfare of the Central and State governments reflected a steady increase over the plan periods. The plan outlay on both health and family welfare has increased from the first plan (1951-56) to the twelfth plan (2012-17) in absolute terms. However, it has been always low sharing to the total plan investment outlay of the country. In Tamil Nadu, almost in all the plan periods, the approved outlay was less than incurred actual expenditure.

Haldar (2008) stated that a wide range of variations in income, health expenditure and health status across 15 states in India, from 1980-81 to 2005-06. In the study, interconnections and causality were examined between socioeconomic status of health, income and health expenditure using Granger Causality Test and concluded that the results vary across states. **Himanshu (2010)** analysed the gender bias (or unbiased) in the HHE based on primary data collected from four districts of Odisha, India, by adopting a multi-stage random sampling method. To substantiate the gender bias (or unbias) in health expenditure, multiple regression analysis was used and estimated the descriptive statistics. The results showed that there is a significant difference between the average male and female HHE in rural, urban and combined areas. To reduce the gender disparity in HHE long-term and sustained improvements in women's and men's health is required. This may be brought out through the expansion of education and economic opportunities among men and women. **Hooda (2013)** analysed the implications of changing pattern of government health expenditure in India during the last two and a half decades (1987 88 to 2011 12). This study included the impact of different policy (health and macroeconomic) changes on the change level and compositional pattern of health expenditure. The Major results showed that government health spending has remained almost constant during the period and hovered around one per cent of GDP, which is even lower than most of the developing countries. The existing level of health spending is much lower than the required level of resources to provide basic health facilities in the country across the States. The spending in rural areas, where basic health facilities were missing, and on preventive services was not only accounted very low compared to urban and curative care but also showed a declining trend over the period. India's spending on health is current in nature which has left meagre resources for capital accounts and to purchase of drugs, medicines and equipment. The adverse macroeconomic conditions have resulted in declining in health expenditure both at the Central and State level. The health policy change, particularly the National Rural Health Mission (NRHM), however, has shown a positive impact on health expenditure. The health expenditure shows an increased trend after the implementation of NRHM but remained lower (about 1.2 per cent of GDP) than its ambitious commitment of 2–3 per cent of GDP. Based on the finding, it argued that to secure better health outcomes, India needed to double or triple its existing health spending with their proper allocations. The high spending however is a necessary condition but not sufficient. Therefore, along with the high commitments to spending, it became important to ensure that allocated funds were spent effectively across states.

Joe William et al. (2008) used the National Family Health Survey data and presented an empirical assessment of income-related health inequality in India. To examine income-related health inequality, they adopted the standard technique of employing concentration curves and concentration indices. It was found that the poorer sections of the population were beleaguered with ill health, whether in the quest for child survival or due to anxieties about child nutrition. Further, an attempt was made to comprehend the relationship between income inequality and health status in the Indian context. **Mohammed Ashfaq Ahmed and Honakeri (2012)** examined the trends, composition and rate of growth of public expenditure on the health sector in India during the period from 2000-01 to 2012-13. It has perused the Annual Financial Statements of the Budget of Government of India (GoI) for various years to analyse the Public expenditure on health. The total

public health expenditure in the country, irrespective of revenue and capital accounts, has increased gradually over the period 2000-01 to 2010-11 with a CAGR of 19.58 per cent. The per capita public expenditure on the health sector in India increased from Rs.24.26 in 2000-01 to Rs.157.18 during the year 2010-11. For the year 2012-13, the Budget estimates for the health sector in India are earmarked at Rs. 24261.06 crores. The percentage share of public health expenditure to the GDP of the country saw a mere increase from 0.13 per cent to 0.26 per cent during the period 2000-01 to 2010-11 respectively. Besides this revealing trend, the GoI has set the target of increasing government health spending to 2.0-3.0 per cent of the country's GDP over the next five years, but it seems to be an uphill task to be achieved.

Mohapatra (2017) investigated the bi-directional causal linkages between economic growth and Public Expenditure on Health (PHE); public expenditure on health and infant mortality rate; and economic growth and infant mortality in the Indian context. The study highlighted the linkage between economic growth and PHE to achieve better results, suggesting that GDP granger causes PHE both in the short and long-run but PHE granger causes GDP only in the long run. **Rajanbabu (2021)** examined the growth and trends of public expenditure in the health sector in India and Tamil Nadu over the study period concerning five-year plans. It is based on secondary data, which satisfies the objectives chosen for the study. The particulars regarding the total plan investment outlay and health and family welfare expenditures in India and Tamil Nadu had been collected from the published source. Researchers concluded that the total expenditure on the health sector of the Central and State government showed a stable increase over the plan periods. Understandably, the plan outlay on the health sector has increased from the first plan to the twelfth plan in absolute terms. Nevertheless, it has been always near the ground sharing to the total plan investment outlay of the country. In Tamil Nadu, almost in all the plan periods, the approved outlay was less than incurred actual spending. **Ram and Kumar (2021)** assessed the determinants of healthcare expenditure in the eastern region of Uttar Pradesh and used secondary data from the National Sample Survey Office (NSSO) of the 75th round on social consumption related to health and they used the Heckman two-step selection model used to analyse household and individual decisions to seek care. One of the findings of the study revealed that the majority of people visited private hospitals in the region which increased the healthcare spending at large and it burdened financially to the vulnerable section of society.

Santhanalakshmi and Malathi (2017) have examined the trends, composition and rate of growth of Government Expenditure on Health in India during the period from 2001 to 2015. The study focused on expenditures incurred by the Central Government in the health sector in India. It covered the period from 2001 to 2015. Further, the study perused the "Annual Financial Statements" of the Union Budget of various years available at the website of the Ministry of Finance, Reserve Bank of India, GoI as the chief source for analysing the expenditure incurred by the Government on the health sector in India. They concluded that it understood that the total expenditure on health and family welfare of the Central and State governments showed a steady increase over the study period. The analysis of the determinants of the government expenditure on health reveals that the variables such as population, per capita income and the number of hospitals, have positively influenced the government expenditure on health. **Lago (2013)** analysed the relationship between income and health expenditure in 31 OECD countries. They focused on the differences between short and long-term elasticity; and checked the adjustment process of healthcare expenditure to changes in per capita Gross Domestic Product (GDP) and its cyclical and trend components. Econometric results showed that the long-run income elasticity is close to unity; and that the adjustment to income changes in countries with a higher share of private health expenditure over total expenditure is faster. **Sakthivel and Karan (2009)** examined the nature and significance of the growing burden of health expenditure on households because of the increased dependence on private providers. They found that during the period under consideration, the role of the private sector in healthcare delivery had witnessed a manifold rise. In 2004, public sector provision of outpatient healthcare accounted for approximately one-fifth of the total outpatient care as against over one-fourth (26.1 per cent) in 1987-88. Further, the comparative cost of hospitalization indicated that households ending up in private healthcare institutions paid more than double that in the government setting. Unfortunately, government healthcare facilities, which used to offer services free of cost, had been forcing patients to procure drugs and receive diagnostic services from private sector providers. **Singh and Singh (2021)** examined the trends, composition and growth rate of government expenditure on the health sector in India, during the period from 2009-10 to 2018-19. Public expenditure on health in India is categorized as: Medical and Public Health, Family welfare, and other department's demand to Central and State governments about the health sector. The total government health expenditure and per capita government health expenditure in the country witnessed a minor increase during the period 2009-10 to 2018-19. The per capita government expenditure on the health sector in India was also on a notch higher from Rs 621 in 2009-10 to Rs.2085 in the year 2018-19. The Reform era shifted the Indian economy towards the private sector, hitherto the GoI, which not only intended to reduce its non-plan expenditures but also welcomed private investors to the core industries through the PPP model. The aftermath not only affected industries but also the core sectors such as education and health. The new government came into power in mid-2014; they also followed the trajectory, the foundation of NITI AYOG and the abolition of the Planning Commission also impacted the expenditure pattern in India. The study analysed the efforts to track the health sector spending during this overwhelming proposition of the economy.

Singh Narinder Deep (2010) estimated the level of credit acquisition for health care purposes by marginal and small farmers in Punjab using primary data collected. It revealed that in Punjab, households had undertaken nearly 76.1 per cent of the total health care spending from their sources, whereas public spending was only 18.0 per cent, and all other sources like non-governmental organizations, charitable trusts, etc. contributed only 5.9 per cent of the total health expenditure. The Researcher suggested that rural areas should be given top priority in various policies and programs concerning health to bridge the rural-urban gap and to provide equitable justice to the rural population.

Sudhakara and Rajendra Prasad (2016) revealed that health is an important constituent of human resource development. Good health is the real wealth of society. It not only increases human efficiency but also decreases private and public expenditure on sickness and diseases. Health has been declared a fundamental human right. The present concern in both developed and developing countries is not only to reach the whole population with adequate healthcare services but also to secure an acceptable level of health for all through the application of primary healthcare programmes. Healthcare services helped to reduce the infant mortality rate, check the crude death rate, keep diseases under control and raise life expectancy. **Suzanne and McCoskeya (1998)** presented unit root test results for time series on per capita national healthcare expenditures and GDP in the OECD. Data collected country-by-country exploited the panel data nature of the OECD. Using this approach, results proved to reject the null hypothesis that these series contain unit roots. No single test is likely to be definitive in this rapidly-evolving area of econometric research. **Tiemin Zhai (2017)** studied health expenditure in two decades (1993-2012) in China and observed it to grow at a rate of 11.6 per cent per year much faster than the growth of the country's economy (9.9 per cent per year). He concluded that to reduce the growth in expenditure per case of disease and to ensure that excess health price inflation did not grow out of control, measures should be taken to strengthen the capacity of health personnel at the grass-roots facilities and to establish an effective referral system.

Analysis of the relationship between health expenditure, health indicators and HDI

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 3 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.

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 classification 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 different income groups.

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 and it was 1.7 times higher than that of the HICs. But the difference increased between the high-income and LICs during 1960-2020.

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

Source: As in the previous table

Table 2 given 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 38.30 per cent in the world. It is also inferred that, among the counties, there is a significant difference in the MMR. The MMR of lowest-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.

The result of the correlation analysis between the health expenditure (measured in terms of CHE per capita and CHE as a percentage of GDP) and various health indicators (DR, IMR, MMR, BR, TFR, LE) is provided in **Table 3**. A Pearson Correlation analysis was applied to analyse the relationship between the variables.

Table 1 Analysis of the performance of different income groups of countries in the health indicators

Sl. No	Health Indicators	Low-Income Countries			Lower Middle-Income Countries			Middle-Income Countries			Upper Middle-Income Countries			High-Income Countries			World		
		1960	2020	Growth Rate (%)	1960	2020	Growth Rate (%)	1960	2020	Growth Rate (%)	1960	2020	Growth Rate (%)	1960	2020	Growth Rate (%)	1960	2020	Growth Rate (%)
1	Birth Rate	47.4	34.9	(-)26.37	43.4	20.76	(-)52.17	34.69	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	(-)49.5	4.7	2.29	(-)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,LMC,UMC

In the case of the DR, it is found that there is a significantly high negative correlation between the DR and per capita CHE in the lower income country and a lower middle-income country. On the other hand, the analysis showed a positive correlation between the DR and CHE per capita in UMICs and HICs. But it is not significant.

Table 3 Correlation between health indicators, CHE Per capita and CHE as a Percentage of GDP

Sl. No	Classification of Countries	Health Indicators	CHE Per capita (US$)	CHE as a Percentage of GDP
1	Low Income	Death Rate	-.918**	-.814**
2		Infant Mortality Rate	-.905**	-.815**
3		Maternal Mortality Rate	-.961**	-.830**
4		Birth rate	-.840**	-.766**
5		Total Fertility Rate	-.840**	-.750**
6		Life Expectancy	.906**	.802**
7	Lower-Middle Income	Death Rate	-.952**	-.728**
8		Infant Mortality Rate	-.971**	-.786**
9		Maternal Mortality Rate	-.980**	-.842**
10		Birth rate	-.933**	-.739**
11		Total Fertility Rate	-.960**	-.778**
12		Life Expectancy	.950**	.730**
13	Upper-Middle Income	Death Rate	.507*	.638**
14		Infant Mortality Rate	-.982**	-.787**
15		Maternal Mortality Rate	-.983**	-.891**
16		Birth rate	-.575**	-.806**
17		Total Fertility Rate	-0.222	-.615**
18		Life Expectancy	.981**	.799**
19	High Income	Death Rate	0.418	.652**
20		Infant Mortality Rate	-.965**	-.880**
21		Maternal Mortality Rate	-.863**	-.745**
22		Birth rate	-.757**	-.818**
23		Total Fertility Rate	-0.358	-.545*
24		Life Expectancy	.953**	.815**

Source: Computed from world bank data. and **Note**: **. Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed), CHE – Current Health Expenditure, GDP-Gross Domestic Product

The result indicates that as CHE per capita increases in the lower-income country, the DR declined significantly. Regarding the relationship between IMR and CHE per capita, it is observed from the table that, there is a significantly high negative correlation between IMR and CHE per capita among all the income groups. This indicates as CHE per capita increases IMR declines. And the negative correlation was found to be high in the UMICs and lower in the LICs. Concerning the correlation between MMR and CHE per capita, it is observed from the table that, there is a significantly high negative correlation between MMR and CHE per capita among all the income groups. The highest negative correlation between MMR and CHE per capita was observed in the UMICs and the Lower Income Countries. It is found to be lower in HICs. This indicates that as CHE per capita

increases the MMR decline more significantly in the UMICs and the Lower Middle-Income countries than in the HICs.

With regards to BR, it is observed that, in the four income groups of the world, there is a significant negative correlation between CHE per capita and BR. But the negative correlation was found to be strong in the lower middle-income country and weak in the UMICs. In the case of the correlation between CHE per capita and TFR, it is observed from the table that, there is a significant negative correlation between these two variables in Lower Middle-Income Countries and Lower Income Countries. However, the negative relationship between CHE per capita and TFR in the UMICs and the HICs was found to be non-significant. And the negative relationship between these two variables was found to be high in the LICs. This indicates that an increase in the CHE per capita has a significant impact on the reduction in TFR in the lower income countries than in other income groups of countries. The analysis of the correlation between LE and CHE per capita showed that there is a significant positive correlation between these two variables among all the income groups. And the positive correlation was found to be strong in UMICs and it is relatively weak in LICs.

Within the LICs, the correlation between health indicators and CHE per capita showed that there is a significantly high negative correlation between CHE per capita and MMR and a significantly low negative correlation between CHE per capita and TFR and BR. Among the LMICs, it is observed that a relatively strong negative correlation exists between MMR and CHE per capita and a relatively weak correlation exists between BR and CHE per capita. Within the UMICs, it is observed that there is a relatively strong correlation exist between CHE per capita and IMR, MMR and LE. On the other, a relatively weak correlation exists between CHE per capita, DR and TFR. A similar trend is observed in the case of HICs. In brief, there is a significant correlation that existed between all the health indicators and CHE per capita in LICs and LMICs. In the case of UMICs and HICs, a significant correlation was found between CHE per capita and MMR, IMR, LE, and BR.

The correlation analysis between CHE as a percentage of GDP is analysed in the following paragraph. In the case of the DR, it is found that there is a significant correlation exists between the DR and CHE as a percentage of GDP. In the case of LICs and LMICs, there is a significantly high negative correlation but in the case of UMICs and HICs, there is a significantly high positive correlation. That means as the CHE as a percentage of GDP increases it results in a decline in the DR in LICs and LMICs, while in UMICs and HICs, it increases the DR. Concerning IMR, it is observed from the table that, there is a significant high negative correlation exist between IMR and CHE as a percentage of the GDP of all the countries. The negative correlation was found to be relatively high in HICs and relatively lower in lower-income and LMICs. In the case of MMR, the correlation between MMR and CHE as a percentage of GDP shows that there is a significantly high negative correlation between these two variables among all the income groups of countries. The negative correlation was found to be relatively high in UMICs and relatively lower in HICs.

The correlation analysis between the BR and CHE as a percentage of GDP showed a significantly high negative correlation in all the income groups of countries. The negative correlation was found to be relatively high in the HICs and relatively lower in the LICs. The correlation analysis between the TFR and CHE as a percentage of GDP showed a significantly high negative correlation in all the income groups of countries. The negative correlation was found to be relatively high in the lower middle-income countries and relatively lower in the HICs. The correlation analysis between the LE and CHE as a percentage of GDP showed a significantly high positive correlation in all the income groups of countries. The positive correlation was found to be relatively high in the HICs and relatively lower in the lower middle-income countries. In brief, there is a significant correlation exists between all the health indicators and CHE as a percentage of GDP in all the income groups of countries. In the case of UMICs and HICs, a significant positive correlation was found between CHE as a percentage of GDP and the DR.

As compared to CHE as a percentage of GDP, CHE per capita was found to have a strong correlation with all the health indicators among all the income groups of countries except in UMICs and HICs. In UMC and HI, the BR and TFR were found to have a strong negative correlation with CHE as a percentage of GDP than CHE per capita.

Table 4 Nexus between Human Development Index (HDI) and Per capita health expenditure, Percentage of Government health expenditure, Out of Pocket Health Expenditure-2020

S.No.	Country Name	HDI Rank	Health spending per capita (US$)	Government health spending	OOPS
	Very High Human Development				
1.	Norway	1 (.959)	7704	85.7	13.9
2.	Iceland	2 (.956)	5637	83.3	15
3.	Switzerland	3 (.957)	1030	35.7	22
4.	Australia	4 (.947)	5901	75.1	13.8
5.	Denmark	4 (.947)	6438	84.9	12.8
	High Human Development				
6.	Bulgaria	64 (.802)	857	59.8	36.6
7.	Albania	68 (.794)	256	42.1	57.2
8.	Grenada	70 (.792)	491	39.3	55.8
9.	Barbados	71 (.788)	1200	52.1	40.6
10.	Antigua and Barbuda	71 (.788)	830	60.2	23.2
	Medium Human Development				
11.	Botswana	110 (.713)	363	74.7	4.6
12.	Philippines	113 (.710)	165	44.6	45
13.	Venezuela	118 (.695)	142	43.9	25.9
14.	Bolivia	119 (.694)	241	71.9	21.3
15.	Kyrgyzstan	121 (.689)	64	44.8	45.9
	Low Human Development				
16.	Tanzania	160 (.548)	39	42.8	23.1
17.	Pakistan	161 (.543)	36	35.6	54.3
18.	Haiti	162 (.540)	45	12.7	51.4
19.	Togo	163 (.535)	53	20.9	61.5
20.	Nigeria	163 (.535)	70	15	74.7

Source: Compiled from Human Development Report, 2021/2022, **Note**: Figures in brackets are values of HDI.

Table 4 illustrates the HDI rank and health expenditure pattern of the selected countries from the four classes of human development for the period 2020. From the table, it is clear that, for all the top-rank countries with very high HDIs, the per capita health expenditure is very high and the relative share of Government expenditure on health was found to be more than that of the share of OOPS. The per capita health expenditure ranges between US$ 1030 and US$ 7704. For the group of these countries, the share of public expenditure in the total health expenditure ranges between 75.1 per cent and 85.7 per cent. On the other hand, the share of OOPS in total health expenditure ranges between 12.8 per cent and 22.0 per cent.

Among the countries belonging to the high human development category, the per capita health expenditure ranges between US$256 and US$ 1200. For this group of countries, the share of public expenditure in the total health expenditure ranges between 39.3 per cent and 60.2 per cent. On the other hand, the share of OOPS in total health expenditure ranges between 23.2 per cent and 57.2 per cent. Among the countries belonging to the medium human development category, the per capita health expenditure ranges between US$ 64 and US$ 363. For this group of countries, the share of public expenditure in the total health expenditure ranges between 43.9 per cent and 74.7 per cent. On the other hand, the share of OOPS in total health expenditure ranges between 4.6 per cent and 45.9 per cent.

Among the countries belonging to the low human development category, the per capita health expenditure ranges between US$ 36 and US$ 70. For this group of countries, the share of public expenditure in the total health expenditure ranges between 12.7 per cent and 42.8 per cent. On the other hand, the share of OOPS in total health expenditure ranges between 23.1 per cent and 74.7 per cent. The above analysis is by correlation analysis. As the country's per capita and public health expenditures increase, the chance of attaining a high HDI is found to be high and vice versa. As the per capita health expenditure and share of public expenditure declines the HDI of the countries is found to be declining and vice versa. On the other hand, the share of the OOPS was found to move inversely with the category of countries from the lower human development category to the very high human development category of countries. A high per capita income and a larger share of public health expenditure in total health expenditure were found to be associated with a higher HDI and vice versa.

Regarding the HDI of India it is found that, in 2020, India stands 130th rank in HDI. India belongs to the medium human development category of countries. During the study period, the per capita health expenditure was 57$ and the share of OOPS in the total health expenditure was much higher (50.6 per cent) than that of the share of government health expenditure in the total current health expenditure.

Table 5 Correlation between Per capita health expenditure, Government Health Expenditure and Out of Pocket Expenditure

Correlations		Per capita health expenditure ($)	Government Health Expenditure (per cent)	Out of Pocket Expenditure (per cent)
HDI Value	Pearson Correlation	.668**	.728**	-.409**
	Sig. (2-tailed)	.000	.000	.000
	N	184	184	184
**. Correlation is significant at the 0.01 level (2-tailed).				

Source: WHO (2023), Global Health Expenditure Data Base, https://apps.who.int/nha/database/country_profile/Index/en

Table 5 shows the result of the correlation analysis made among 184 countries of the world about the relation between the HDI value and per capita health expenditure, Percentage of government health expenditure, and OOPS for the year 2020. It is found that there is a significant positive correlation between the HDI value and per capita health expenditure. It means the HDI value of the countries increases along with an increase in the per capita health expenditure and vice versa. On the other hand, if the per capita health expenditure of the countries is low the HDI value of the countries is found to be low and vice versa. Another correlation found in the table is between the percentage of government health expenditure and HDI value.

It shows a significant positive correlation between HDI value and the percentage of government health expenditure. It is inferred from the table that, as the share of government health expenditure in the total health expenditure increases the HDI value of these countries also increases and vice versa. Its analysis also found that there is a significant negative correlation between the HDI value and share of OOPS in the total current health expenditure of 184 countries in the world. This is inferred that as the share of the OOPS in total health expenditure increases the HDI value of the country declines, on the other hand as the share of OOPS in total health expenditure declines the value of the HDI value increases and vice versa.

CONCLUSION

The present paper tried to compare the performance of countries in selected health indicators. And it also aimed to examine the relationship between health expenditure and health indicators and also the relationship between HDI and health expenditure of countries. The analysis of the performance in the health indicators (BR, TFR, LE, DR, and IMR) among the different income groups of countries in the world showed that the BR, IMR, MMR and TFR significantly declined between the period 1960 and 2020 in all the countries. The increase in health expenditure (CHE per capita and CHE as a percentage of the GDP) was found to have a significant negative impact on these variables. About LE, it increased in all the groups of countries during this period. From the study, it is found that an increase in health expenditure (CHE per capita and CHE as a percentage of the GDP) led to an increase in LE. Regarding the DR, it is found that it significantly declined between the period 1960 and 2020 except in the High-income group from 1960 to 2020. Unlike in LMICs and LICs, in UMICs and HICs health expenditure was found to be not an effective tool to reduce the DR. It is concluded that there is a significant correlation exists between all the health indicators and CHE as a percentage of GDP in all the income groups of countries. Similar to its effect on health indicators, health expenditure was found to have a significant impact on HDI. It is found that there is a significant positive correlation between the HDI value and per capita health expenditure, in which the share of government health expenditure has a significant positive impact on HDI. But it is found that there is a significant negative correlation between the HDI value and the share of OOPS in total health expenditure. Thus, it is concluded that improving the health of the people and achieving a high HDI increase in health expenditure was found to be an effective tool. But in the case of UMNCs and HICs, concerning the DR, health expenditure was found to have a positive correlation, which calls for other policy measures to control the DR in these countries by conducting experimental research.

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