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LINKAGES AMONG HEALTH EXPENDITURE AND HEALTH OUTCOME IN INDIA

Diptimayee Samal [1] & Sudhakar Patra [2]

RESEARCH ARTICLE

Author Details: [1] Doctoral Scholar in Economics, Berhampur University, Odisha, India; [2] Professor of Economics, Berhampur University, Odisha, India

Corresponding Author:
Diptimayee Samal

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Abstract

This paper attempted to explore the trend and pattern of health expenditure and health outcomes in India from 1991-2020 and determine whether the growth patterns of health expenditure correct the health outcome over the 30 years. This study also tried to examines the nexus between health outcomes, health expenditure and economic growth in India. After the structural adjustment programme, healthcare expenditure witnessed a deceleration worldwide with the extreme situation faced by developing countries. So, given the emerging challenges of health problems in the developing world, the financing mechanism of public health services requires more attention in catering healthcare needs of the population more adequately and effectively. The structure of total health-care expenditure comprises medical and public health, Family Welfare, Water supply and Sanitation. This study is purely based on secondary sources of data from the Reserve Bank of India, the World Bank Database, and various government report. To substantiate initial two objectives, simple tables, percentages, Line Graphs and Least Square for trend analysis and CAGR for growth analysis. And for the final objectives Granger Causality Wald test and multiple Regression analysis has used. This study revealed that health expenditure has positively affected LEB and negatively affected IMR which indicates a positive sign in the development of our Economy, and Granger Causality test results that IMR has a significant effect on both LEB and HE whereas the LEB does not granger cause IMR and Health Expenditure. It is interesting to note that HE has a significant impact on LEB and IMR.

Keywords: *Health Expenditure, Health outcome, Granger Causality, IMR, LEB, Time Series, JEL Code- H51, I10, I15*

Introduction

Human capital is an inseparable element, which encompassing various sub-sectors for the economic development (Mincer and Becker, 1958). Human capital Approach came into limelight during the 1960's, after the works of Arrow (1962), Uzawa (1965), and Sidrauski (1967). Health is regarded as the most crucial aspect of Human Capital. In 1977 that the 30th world Health Assembly affirmed that health is a fundamental human right and the main social target of government should be "attainment by all peoples of the world by the year 2000 a level of health that will permit them to lead a socially and economically productive life"(WHO, 1979). A good physical and mental health increases life expectancy, reduces infant mortality rate and encourages people to perform their socio-economic responsibilities efficiently (Novick, 2001). The long-term association among income and health is studied by (Arora,1999. In India the govt. spending on health as a proportion of GDP is just above 1%, while the advanced countries like U.S.A. and U. K. it is above 7% to 8% of their GDP (Mishra and Mishra 2012).

Health expenditures in all developing countries positively contribute to health outcomes in terms of higher life expectancy and lower child mortality. Investment in healthcare is important for both short- and long-term benefits. Health, an important element of human capital, is considered one of the prerequisites for long-term sustainable economic development. This study aims to investigate the impact of health expenditures on health outcomes in India. At the very beginning, the impact of economic reforms depended on growth rates and the political commitment of state governments in the areas of the education sector, health care, and nutrition. Initially, the conditions showed a wide variation in attainment, lack of correspondence between economic performance and social conditions, low government expenditure in low attainment states, a distorted pattern of expenditure skewed towards tertiary facilities in urban areas, and under-utilization of existing infrastructure.

According to (Dreze and Sen, 1995). The social development gap must be closed, not only to improve the welfare of the poor and their income-producing capacity but also to create the pre-conditions for quick economic growth. While the economic

reforms looked for a withdrawal of the state from areas in which the private sector could do the job just as well, it was also essential for an expansion of public sector support for social segment development.

Review of Literature

There are many literatures available on health expenditure but study on health outcome are very scanty. Some relevant key literatures are discussed.

Panda, P., et al (2020) have examined a positive significant relationship between HII and LE, and a negative significant relationship between, HII and IMR. For the national level analysis, the correlation coefficient has a positive connection between HII and GSDP, HII and LE, and a negative association HII and IMR. The empirical study proposes the importance of infrastructure development in health sector for health outcome and economic growth.

Eleme & Olisakwe (2019) have examined public health expenditure, economic growth and health outcomes and the causality among them, by using Nigeria data. They found that an increase in public health expenditure has decreased infant mortality rate while infant mortality rate is negatively correlated with economic growth. Interestingly, the direction of causality among public health expenditure, infant mortality rate and growth is unidirectional, from public health expenditure to growth

Ogun Jimi & Adebayo (2018) have examined the relationship among health expenditure, health outcomes and economic growth in Nigeria for the period between 1981 and 2017 by using Toda-Yamamoto causality framework. They analysed that health expenditure has a significant causal relationship with infant mortality, maternal mortality, and life expectancy in Nigeria. In the same vein, real GDP has a significant causal relationship with maternal mortality and life expectancy in Nigeria. This study indicates that health expenditure has a significant causal relationship with health outcomes in Nigeria and the direction of relationship is unidirectional such that causality runs from health expenditure and health outcomes.

Mohapatra, S., (2017) investigate the bidirectional causal linkage between: a) economic growth (measured by GDP) and public expenditure on health; b) public expenditure on health and IMR; and c) economic growth and IMR in the Indian context. The study used the econometric analysis namely, Panel Cointegration and Granger Causality on twenty-year panel data on sixteen major Indian states to investigate the causality. The results suggest that GDP to granger cause public expenditure on health both in the short run and in the long run, but public expenditure on health to Granger cause GDP only in the long run. Further, public expenditure on health and economic growth were found to Granger cause IMR in the long run. However, the reverse linkage from IMR to public expenditure on health and/or economic growth was not significant. This study suggests that the implication for policy makers on the time frame and application of health expenditure to achieve better results.

Rout (2010) focuses that household health expenditure studies are pertinent for India where two-thirds of all households can barely manage to sustain a two square-meal livelihood. In this connection the objectives of the book are to study the determinants of household health expenditures (HHE); to study the gender bias in HHE, and to make a comparative study of preferences for private health care and public health care provisions in Odisha. The study is fully based on primary data. The study found that (a) income has a significant influence on HHE; (b) in HHE, there are gender biases in favour of males in rural and urban areas but in tribal areas, it is gender neutral, and (c) most of the households in rural and urban areas prefer private health care but the tribal people prefer public health care. Health is a function, not only of medical care but also of the overall integrated development of socio-cultural, economic, educational, and political factors. Therefore, to uplift the health status and quality of life, a focused approach integrating the development of social, cultural, economic, and educational needs to emerge to bring about the overall transformation of society. For instance, Iran and Tajikistan have only short-run causality running from LE to GDP.

Ruby Kwak (2009) concludes that how various measures of GHE (Government Health Expenditure), PHE (Private Health Expenditure), or THE (Total Health Expenditure) affects the health of the working age population by running a free structured regression of adult mortality and health life expectancy (HALE) on GHE and PHE, and other various health determining factors such as vaccination, physician density, and population access to water and sanitation. At last, an attempt was made to test the primary assumption of my study, which was that GHE and PHE contributes to the economic growth by affecting the health of the labor.

Purohit (2008). He considered life expectancy, representing the health output produced by a health system as depending on input factors represented by per capita health facilities like hospital beds, primary health centers or sub-cetres, doctors, paramedical staff, full immunization, and skilled attention at birth. Hospitals and full immunization seemed to have positive impact on the life expectancy of the population. PHCs with adequate infrastructure and adequate supply had significant negative influences indicating inadequacy of the various inputs provided through PHCs. The efficiency scores in the districts ranged from 100 to 78.76. Inadequate availability of healthcare sector inputs is the constraining factor rather than merely efficient utilization of the inputs.

Objectives & Hypotheses

1. The study endeavoured to explore the trend, growth and pattern of health expenditure, Life expectancy at Birth and Infant Mortality in India.
2. Furthermore, the study tried to examine the nexus between LEB, IMR and health expenditure in India.

H_1: There is a declining trend in healthcare expenditure in India.
H_2: There is no decline in life expectancy over the study period in India.
H_3: There is no decline in the infant mortality rate in India.
H_4: There is no linkage between health Expenditure and Life Expectancy.
H_5: There is no linkage between health expenditure and infant mortality in India.

Database and Methodology

Data Source: This study has compiled secondary sources of data from – macro indicators of RBI bulletin and World Bank database etc.

Variables of the study: Healthcare expenditure in (Revenue and Capital), account, Health outcome (Life Expectancy, Infant Mortality).

Study Period: 1991-2020

Methods: For analysing the trend simple table, percentage, Line Graph, Least-Square equation and CAGR (Compound Annual Growth Rate) is utilised, and its equation is illustrated below.

$$CAGR = (V_{final} / V_{begin})^{1/t} - 1 \quad \ldots\ldots (1)$$

Where, V_{final} = Final Value, V_{begin} = Beginning Value, and **t** = Time in Years.

For the final objectives, the study has used the Granger Causality, Multiple Regression model.

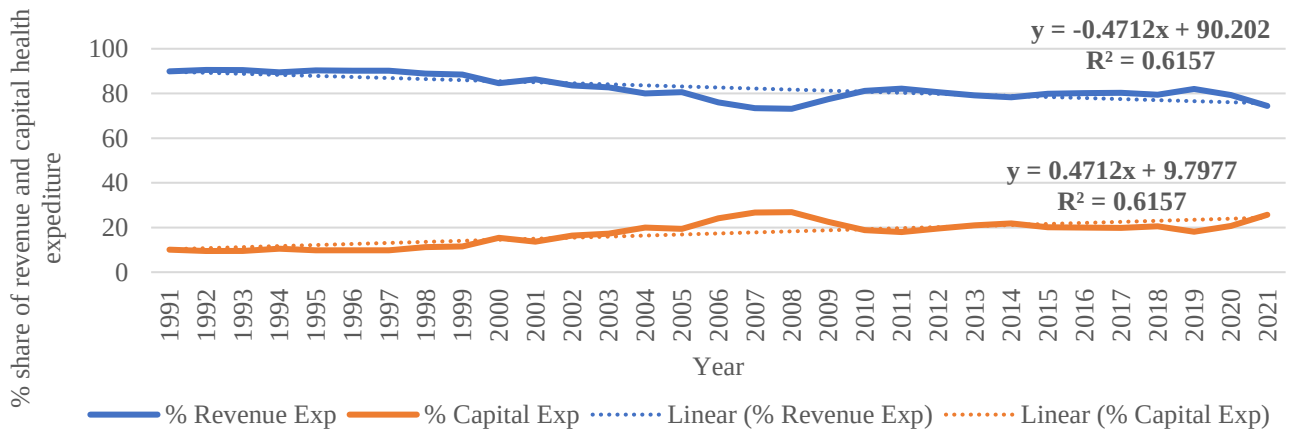
The Trend of Health Expenditure in India

After the structural adjustment programme, healthcare expenditure witnessed a deceleration worldwide with the extreme situation faced by developing countries. So, given the emerging challenges of health problems in the developing world, the financing mechanism of public health services requires more attention in catering healthcare needs of the population more adequately and effectively. Recent World Health Assembly (WHA) resolutions have emphasized the status of health-financing systems in helping countries conquer and sustain universal coverage.

Developing countries like India requires much more attention from the ground of financial protection for the poor and resource allocation challenges for the government. And, more importantly, the role of Govt. is if financing health services undertake larger significance from the perspective of social welfare, justice, and equity (Guruswamy et al., 2008). There are differences in the allocation of health components and such allocations have differential impacts on the health outcomes of the country. Some of the treatment mechanisms are different in nature (Hooda, 2013). Many studies have been conducted on the health expenditure pattern of India, some of the micro studies right from 1944 onwards show that the share of the private sector in health care expenditure has always been around 80 per cent of total health expenditure (Duggal, 1991). This could be realized from different plan documents, the expenditure on the health sector declined after the independence period. During the time of independence, investment in the health sector was at best marginal. Between independence and today, the growth of the health sector has not kept pace with the needs of its population and still health expenditure is hovering around one per cent of GDP (Hooda, 2015).

Figure – 1 indicates the category-wise % share of total health-care expenditure in India during the period from 1991 to 2021. The least-square trend equation of revenue and capital is computed parallelly and the coefficient is -0.47 and0.47 respectively, and the coefficient is positive. So, there is an increasing trend. The figure indicates that nowadays govt. Has focused more on the healthcare care sector.

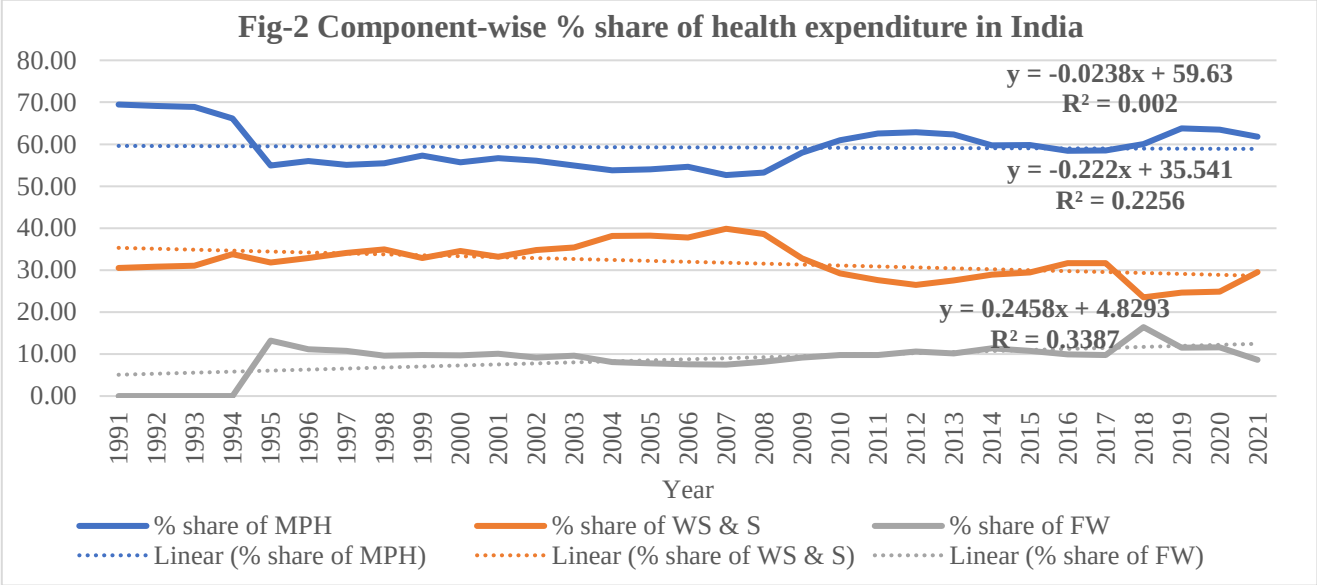
Fig-1 Trend of Percentage Share of Revenue and Capital Health Expenditure



Source – Authors own calculation

The Growth and Pattern of Health Expenditure in India

The structure of total health-care expenditure comprises medical and public health, Family Welfare, Water supply and Sanitation. The capital expenditure, which is considered the determinant of creating physical infrastructure, is a low amount. The declining trends in capital expenditure are an indication of low priority, in terms of providing physical infrastructure and purchasing new medical equipment. Declining the share of capital expenditure, however, will not be problematic if the state(s) have fulfilled the proscribed norms of health infrastructure. (Hooda, 2013).



Source – Authors own calculation

Figure 2 indicates the component-wise percentage share of total health expenditure in India during the period 1991-2021. It is an increasing trend and the least-square trend equation on Medical and Public health, Water supply and Sanitation and Family-welfare are computed and the coefficient is (-0.2, - 0.22) and 0.24 respectively, and it is positive, which shows an increasing trend over 30 years.

Table No – 1 Category-wise percentage growth of health expenditure in India

Year	MPH as a % of GDP	WS & S as a % of GDP	FW as a % of GDP	Health as a % GDP	Year	MPH as a % of GDP	WS & S as a % of GDP	FW as a % of GDP	Health as a % GDP
1991	0.87	0.38	0.00	1.25	2006	0.56	0.39	0.08	1.03
1992	0.84	0.38	0.00	1.22	2007	0.55	0.42	0.08	1.05
1993	0.84	0.38	0.00	1.22	2008	0.56	0.41	0.09	1.06
1994	0.79	0.41	0.00	1.20	2009	0.60	0.34	0.09	1.03
1995	0.62	0.36	0.15	1.13	2010	0.58	0.28	0.09	0.96
1996	0.61	0.36	0.12	1.10	2011	0.58	0.26	0.09	0.93
1997	0.63	0.39	0.12	1.15	2012	0.57	0.24	0.10	0.91
1998	0.66	0.42	0.11	1.19	2013	0.57	0.25	0.09	0.91
1999	0.67	0.39	0.11	1.17	2014	0.65	0.32	0.12	1.09
2000	0.69	0.43	0.12	1.23	2015	0.68	0.33	0.12	1.13
2001	0.65	0.38	0.12	1.14	2016	0.70	0.38	0.12	1.19
2002	0.63	0.39	0.10	1.12	2017	0.73	0.40	0.12	1.25
2003	0.65	0.42	0.11	1.18	2018	0.75	0.29	0.20	1.24

2004	0.57	0.41	0.09	1.07	2019	0.74	0.28	0.13	1.16
2005	0.57	0.40	0.08	1.05	2020	0.88	0.34	0.16	1.38

Source – Computed by the Authors

Table – 1 indicates the category-wise % share of total health expenditure to its share of GDP in India context from the period 1991 to 2021. The % share of medical and public healthcare expenditure to GDP in the period 2021 is around (1.00) per cent in water supply and Sanitation is only (0.49) % and in family welfare which is very low (0.14) per cent to its GDP. The total healthcare expenditure as a percentage share of GDP is around (1.67) %. Which is not a satisfactory result for achieving the target of a 5% level of GDP on Health for all.

The Trend of Health Expenditure and Health Outcome in India

India has made substantial progress in reducing infant mortality. Due to the rapid strides that India has taken in social, economic, health, and educational development, the infant mortality rate decreased from 81 to 34 per 1,000 live births according to the National Family Health Survey-5 conducted in the period 2019 to 2021, the IMR has declined from 41 to 35 as per 1,000 live births.

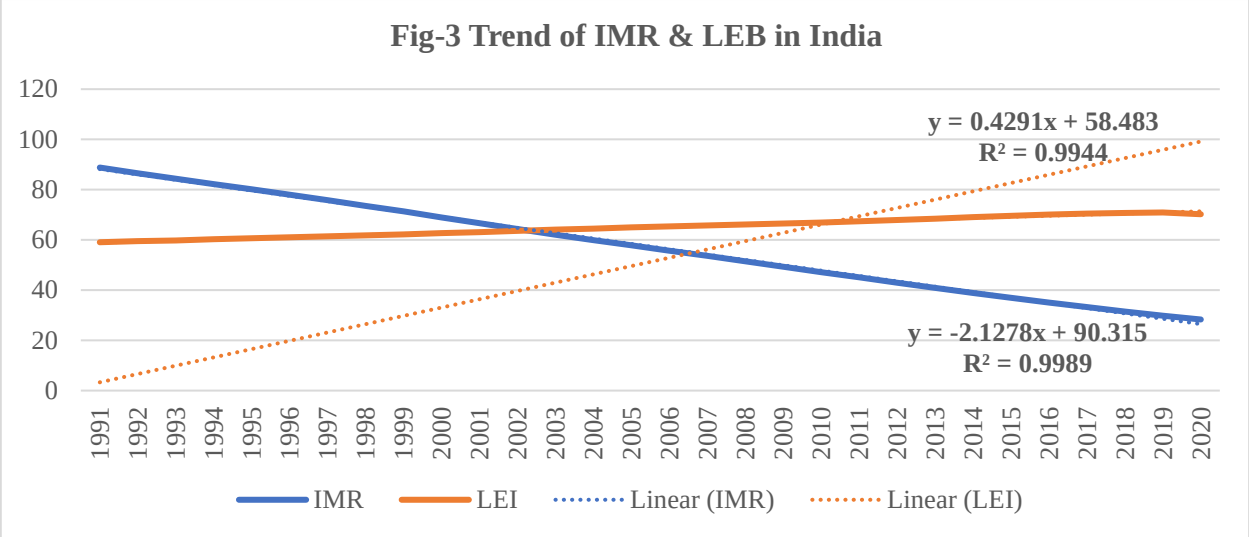
Table No – 2 Trend of Total Health Expenditure and Health Outcome in India

Year	IMR	LEI	HE	Year	IMR	LEI	HE
1991	88.8	59.06	53304.00	2008	51.5	66.149	297927
1992	86.5	59.45	59246.90	2009	49.3	66.513	365402.2
1993	84.3	59.82	68801.80	2010	47.2	66.909	423650.8
1994	82.2	60.22	75773.10	2011	45.1	67.359	489520
1995	80.1	60.60	69476.00	2012	42.9	67.887	567139.7
1996	78	60.98	79893.90	2013	40.9	68.46	640126.1
1997	75.8	61.39	91672.50	2014	38.8	69.074	811104.5
1998	73.5	61.79	109932.90	2015	36.9	69.636	951007.7
1999	71.3	62.21	124733.40	2016	35	70.117	1166646
2000	68.9	62.67	132314.10	2017	33.2	70.467	1254676
2001	66.7	63.09	135473.90	2018	31.5	70.71	1414628
2002	64.4	63.62	140662.60	2019	29.8	70.91	1498936
2003	62.1	64.09	150380.60	2020	28.3	70.15	1734454
2004	59.9	64.52	162385.80	**Avg.**	**57.33**	**65.13**	**457932.63**
2005	57.8	65.00	192641.40	**S.D.**	**18.74**	**3.79**	**496721.04**
2006	55.7	65.41	222965.90	**C.V.**	**32.69**	**5.82**	**108.47**
2006	55.7	65.412	222965.9	**CAGR**	**-0.04**	**0.01**	**0.12**
2007	53.6	65.788	253102				

Source – Compiled by the Authors

Table No – 2 presents the trend of IMR, LEI and Health Expenditure in India from 1991 after economic reform to 2020. The IMR has declined from 88.8 per thousand in 1991 to 55.7 in 2006 and 28.3 in 2020. It implies that there has been a significant decline of 60.5 in thirty years in the post-reform period. This significant decline may be due to the establishment of more health centers, more primary health centers in rural areas, the development of effective medicine, and the privatization of the healthcare sector. The CAGR shows that the health, expenditure is around 0.12 % and (0.01 and -0.04) for LEB and IMR respectively.

Figure 3 indicates the trend of IMR and LEB in India during the period post-reform period 1991-2020. Here the LEI has an increasing trend slowly over the period whereas IMR has a declining trend due to many national schemes like- Mamta Yojana. The improved medical facility leads a better longevity for birth. Advanced protection of children from infection ensuring nutrition along with mother and child care. It gives a satisfactory result for our economy.



Source – Computed by Authors

Linkage between Health expenditure and Health Outcome

The Granger-causality Wald test is conducted to establish whether health expenditure affects GDP and vice-versa.

Table – 3 Results of the Granger Causality Test

S N	Null Hypothesis	Chi-square	P Value	Decision	Direction
1	IMR does not granger cause LE**B**	4.01	0.135	Accepted	--
2	IMR does not granger cause HEXP	2.03	0.31	Accepted	--
3	IMR does not granger cause LEB and HEXP	26.65	0.00	Rejected	Bidirectional
4	LEB does not granger cause IMR	0.474	0.78	Accepted	-----
5	LE does not granger cause HE	11.36	0.003	Rejected	Bi-directional
6	LE does not granger cause IMR and HE	14.11	0.007	Rejected	Unidirectional
7	HE does not granger cause IMR	2.91	0.23	Accepted	------
8	HE does not granger cause LE	11.76	0.003	Rejected	Bi-directional
9	HE does not granger cause IMR and LE	18.53	0.001	Rejected	Unidirectional

Source – Computed by Authors

In this study, both the null hypotheses were rejected. Since the p-value is (0.00). It implies that health expenditure is significantly granger cause to GDP and vice-versa.

The Granger causality Wald test results are presented in table – 3 explain the directions of the relationship among 3 variables and the significance of the relation. IMR has a significant effect on both LEB and HE whereas the LEB does not cause IMR and Health Expenditure. It is interesting to note that HE has a significant impact on LEB and IMR. It is concluded that HE can be taken as independent variable in a Regression model to know the degree and extent of relationship with LEB and IMR**.**

Table – 4 Regression Analysis of Health Expenditure and Life Expectancy in India

	Multiple R	**R^2**	**Adj- R^2**	**Standard Error**
	0.77	0.59	0.57	2.44
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0.00	3.59	-9.09	0.00
HEXP	72.26	2.40	30.09	0.00

Source- Computed by the Authors Regression Equation Y = 72.26 – 0.00 X
Where Y=LEB, X = Health Expenditure

The regression analysis shows that health expenditure is positively affected by life expectancy. The R2 value is 0.59. Which indicates a good-fit regression equation but not a best-fit regression. It indicates that the increase in health infrastructure has

automatically led to the expansion of LEB. Here the P-value is zero (0.00) and significant at a 1% level.

Table – 5 Regression Analysis of Health Expenditure and Infant Mortality Rate in India

	Multiple R	**R^2**	**Adj- R^2**	**Standard Error**
	0.84	0.71	0.70	10.49
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	6.65	7.06	9.41	0.00
HE	62.09	0.47	131.32	0.00

Source – Computed using EXCELL Data Analysis Regression Equation Y = 62.09 – 6.65 X
Where Y= IMR, X = Health Expenditure

In table – 5 indicates that health expenditure is negatively associated with the infant mortality rate. It is interesting to note that due to better medical facilities, the IMR has declined randomly, which indicates a good sign for our economy. The R^2 value is 0.71. It is significant at a 1% level.

Validity of Hypotheses

H1: **Rejected**- The trend of total health expenditure is increasing over the study period.
H_2: **Rejected** The Trend of Life Expectancy at Birth (LEB) has been increasing for over 30 years.
H_3: **Rejected** Infant mortality rate shows a declining trend in India.
H_4: **Rejected** - Health expenditure is positively affected by life expectancy. The R^2 value is 0.59. the P-value is zero (0.00) and it is significant at a 1% level. The result shows that the increase in health infrastructure has automatically led to the expansion of LEB.
H_5: **Rejected** Health expenditure is negatively affected to the infant mortality rate. The p-value is zero. It is also significant at a 1% level. It indicates that the expansion of health expenditure automatically helps to correct the IMR.

Major Findings

1. The category-wise percentage share to total health expenditure in India during the period 1991-2020 is computed and the coefficient is -0.47 and 0.47 respectively. Since, there is an increasing trend, which is a positive.
2. In the period 1991 to 2020, LEB shows an increasing trend but very slow over the period. On the other hand, IMR has indicated a declining trend, gives a satisfactory result for our economy
3. The component-wise percentage share to total health expenditure in India indicates a positive trend over the 30 years.
4. The category-wise percentage share of health expenditure as a percentage of GDP in India is around (1.00) per cent. The categories like water supply and Sanitation are only (0.49) % and in family welfare is very low (0.14) per cent of its GDP. The total health expenditure as a percentage share of GDP is around (1.67) %. Which is not a satisfactory result for achieving the target of a 5% level of GDP on Health for all.
5. The trend of IMR and LEI in India during the period 1991-2020. Here the LEI has increased slowly over the period and IMR has indicated a declining trend, giving a satisfactory result for our economy.
6. The Result Granger-causality Wald test indicates that both the null hypotheses were rejected. Since a p-value is (0.00). It implies that health expenditure is significantly granger cause to GDP and vice-versa.

The result of regression analysis indicates that health expenditure is positively associated with life expectancy over the study period. Which indicates a good sign. The R^2 value is 0.59. Which indicates a good fit regression equation. The P-value is zero (0.00) which clearly shows the coefficient is significant at a 1% level. It means the life expectancy at birth is increasing day by day due to better medical facilities, and nutritious food. On the other hand, health expenditure has been negatively associated with the infant mortality rate over the study period. Which indicates a good sign The R^2 value is 0.71. Which indicates a good fit regression equation. The P-value is zero (0.00). It clearly shows that the coefficient is significant at a 1% level.

Conclusion

Public health expenditure in our country is inadequate and inefficient because the health expenditure allocated by the Government does not provide significant health-related benefits for most people. Total Expenditure related to preventive and elementary healthcare accounts for a smaller proportion of the total health budget of the country. The Central Government provides a large contribution to expenditure on public health and family welfare activities in the state. For better planning and utilization of funds, the less developed state needs to incur more health care-related expenditures. The allocation for total health sector expenditure needs to be improved in the union budget 2024-25 to achieve the Government's commitment to increase the health expenditure from 2 to 5 per cent of GDP. In India, the expenditure on healthcare sector has increased in every financial year. Due these outcomes - life expectancy at birth has increased over the years. On the other hand, the infant mortality rate does diminish, which indicates a positive sign. It is only possible because of the better medical facilities and infrastructure development in every govt. hospital.

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