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Methodology: A double log model was used in this study to analyze government expenditure's impact on development projects or schemes. Health-wise, less advanced states, viz. Bihar and Odisha are chosen for this purpose. The study uses the actual data on government expenditure in the social sector, mainly on health. The data on a per capita basis is used for each state to analyze the impact of the per capita government's expenditure on select social indicators. The analysis is done separately for both states.

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ABSTRACT

Purpose of Study: Regional disparities and inequality continue to be a feature of Indian economy even after seven decades of independence. Many of its social indicators need much improvement. Some states are particularly more backward with large proportions of their population being officially poor while some others are comparatively in better position. Such inter-regional disparities have compounded policy challenges of the governments in the poorer states. Against this background, the present study aims to study the dimension of inter-regional disparity for select less advanced states in India.

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Finding: It was found an inverse relationship between per capita government health expenditure and health indicators i.e., IMR, Birth Rate, Death Rate and TFR in all selected states.

Keywords: birth rate; death rate; infant mortality rate & total fertility rate.

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I. INTRODUCTION

In a developing country like India where significant part of population are poorer and living under miserable conditions and have to struggle daily for their livelihood, so it is not possible for them to access health care, education and other social services at their own. So, it becomes the duty of the government to provide effective social services at a very reasonable cost. According to (Gupta, 2002), "Health care services have high level of externalities rather than curative services, a minimum package of these services provided by the government would reduce mortality rates". Since, governments in developing countries always have scarcity of funds, so it is necessary to ensure that the funds are used effectively and the desired results are attained at social front. So, it is also important to check the effectiveness of government expenditure on the improvement of social indicators. Further, government's spending is also important to uplift the living standards of the poorer people in the society. As Gera, in her studies also found that government investments in education, health and in the provision of infrastructure can have direct effect on moving household out of poverty (Gera, 2007). Further, Ranjan and Sharma (2008) examined the effect of government development expenditure on economic growth and they discovered a significant positive of government expenditure on economic growth. A study found, educational attainment at basic levels (secondary level) and low infant mortality rates have been shown to have a positive effect on economic growth also (Barro and Lee, 1993). Studies on both developed and developing countries have indicated that sufficient amount of government spending on

education and health improves human development and lessens poverty burden as well (Barro and Lee, 1997; Swaroop, 1996). However, it is also necessary to mention that the solely the increase in public spending is not sufficient but the quality of expenditure with good public policies also required. As stated, a government could increase the public spending by a large amount but this does not ensure that it would have desired result on economic and social development as the quality of this spending also matters (Bussato and Brunori, 2011).

Despite the importance of government spending and its role on improvement of social sector, there are not sufficient number of studies have been done in India to evaluate the impact of government spending on social indicators. Thus, present study is an attempt to evaluate the impact of government spending on some selected social indicators and further it will also make a significant contribution to the present literature. As the number of social indicators are very large, so it is not feasible to assess every indicator given the time and data constraint. Hence, the study has selected four indicators i.e., Infant Mortality Rate (IMR), death rate, birth rate and total fertility rate as indicators of health. The study has chosen Bihar and Odisha states.

The following social indicators have been selected for the present study.

Infant Mortality Rate (IMR): It is the number of deaths per 1,000 live births of children under one year of age. It is considered as an indicator of maternal and infant health status.

Death Rate: The average annual number of deaths during a year per 1,000 Population at midyear; also known as crude death rate. Death rate in 2021 was 7.3 deaths/ 1000 Population in India.

Birth Rate: The average annual number of births during a year per 1,000 persons in the population. In 2021, birth rate was 19 births/ 1000 population at midyear; also known as crude birth rate.

Total Fertility Rate (TFR): It is defined as average number of children that would be born to a woman if she experiences the current fertility pattern throughout her reproductive span (15-49 years). In 2021, TFR was 2.3 in India i.e., 2.3 births per woman.

II. LITERATURE REVIEW

Gerard F. Anderson al.et (2000), revealed that the USA spent more on health care as compare to other countries. USA spent 14% of GDP on health care in 1998 while OECD median was8% of GDP and results also suggested that Americans enjoys better health care system than other OECD countries. Shenggen Fan et al. (2002) found that government spending on agricultural R & D and irrigation, and on rural infrastructure like roads and electricity have directly contributed to reduce rural poverty. Paulo S. L. (2002), results confirmed some correlation between government spending and social indicators. While, results also asserts that per capita spending and as a percent of GDP have relevance to social outcome, but share of government spending in GDP may be misleading. Emanuele Baldacci et al. (2003) found that public spending is an important determinant of social outcomes, especially in education sector. Further, it suggests intra-sectoral allocation of spending matters rather than increase in social spending only. Niloy B. M. et al. (NA) suggest that aggregate capital expenditure of government has a positive effect on economic growth while aggregate current expenditure has no effect on growth. Gera, N. (2007) found that government spending in education, health and in infrastructure have a direct effect on moving ouseholds out of poverty. Nurudeen, A. and Usman, A. (2010), Findings reveal that government's capital expenditure, recurrent expenditure and expenditure on education have negative effect on economic growth while government's expenditure on transport and health have positive impact on economic growth. Chandra, A. (2011) found bidirectional relationship between these two. Further, study concludes that economic growth affects the level of government spending on education without any lag effects while investment in education also impact the economic

growth with time lag. Craigwell, R. et al. (2012) revealed that government expenditure on health has a significant positive effect on health status while, expenditure on education has no significant impact on either primary or secondary school enrolment. Maitra, B., and C.K. Mukhopadhyay (2012) shown that impact of education and health spending on growth is not an instantaneous but with gestation lags. Initially, expenditure on education and health improves human capital which manifests itself in the form of economic growth. Further, it is found that the gestation lag of education spending was longer than that of health-care spending. Savaş Çevik, M. & Okan Taşar (2013) found that government health spending has significant impact on under-5 child mortality rate and on infant mortality rate. Study also concludes that composition of government health expenditure also matters not only the size of expenditure. Tae Kuen Kim and Shannon R. Lane (2013) shown a negative relationship between public the health expenditure and the infant mortality rate (IMR), while positive association between public health expenditure and life expectancy is found. Thus, the study concludes that expanding public health expenditure improves overall health condition. Bhakta, R. (2014) shown that public expenditure on Supplementary Nutritional Program has positive impact on health status of children which also has indirect positive impact on education. Study also concludes that public expenditure on elementary education has direct impact on the enrolment rate. Virupakshapp a D Mulagund (2015) suggested that public health expenditure in India have increasing trend during this period. Further, study concludes that public health expenditure has positive impact on health indicators i.e, it resulted in fall in maternal mortality rate (MMR), infant mortality rate (IMR), fall in total fertility rate (TFR) and improves life expectancy. Wong Sing Yun and Remali Yusoff (2015) indicated there is a unidirectional causal relationship from GDP to education expenditure and from GDP to health care expenditure. Thus, study concludes that GDP affect both the education and health care expenditure. However, reverse causal relationship is not found between them. K. P. K. S. Lahirushan et al. (2015) exhibited a positive impact of government expenditure on GDP in Asian region. Study further concludes that there is a unidirectional causality from economic growth to government expenditure and government expenditure to economic growth. Sineviciene, L. (2015), Results show that there is an inverse relationship between economic development and government's expenditure on public order and safety, and economic affairs. While, positive relationship is found between economic development and government's expenditure on social protection and health. Study further concludes that government should pay more attention to the needs which ensure sustainable development in the long-run. Mittal, P. (2016), shown that there is a direct relationship between the social sector spending and human development index (HDI) of the Indian states. So, study recommends that the public expenditure should increase further to achieve balanced and improved human development in India. Solihin, A., et al. (2017), shown that government spending in education sector is relatively inefficient. Further, it states that government's expenditure for education has no significant impact on education index. This implies government expenditure for education sector is not effective in improving education index. Jiranyakul, K. (2007) results of Granger causality test reveal the unidirectional causality from government expenditure to economic growth. Similarly, the results of least square method with lagged variables also show that there is a positive impact of government expenditure on economic growth.

In doing the above, the present study seeks to fill up some research gaps found in the literature. The study has used government's expenditure on per capita basis while most of the studies have taken the overall government's expenditure in their analysis (Yun and Yusoff, (2015), Mello and Pisu, (2009), Kim and Lane, (2013) and others). Further, mostly studies have considered gross enrolment rates as output Lopes, (2002), Baldacci, Guin-Siu and De Mello (2003), Craigwell, Lowe and Bynoe, (2012); however, enrolments do not reflect actual output as it does not exclude the drop outs. Present study has

covered this drawback by considering NER which is the net of Gross Enrolment Ratio (GER) and dropout rates.

III. OBJECTIVE(S) OF STUDY

1. To evaluate the impact of government expenditure on selected social indicators in less advanced Indian states.
2. To suggest policy implications for better utilization of public expenditure on social sectors.

III. METHODOLOGY

For the purpose of determining the impact of government's expenditure on social indicators, the study has applied log-log or double-log model. In case of Log-log models, the coefficients are used to determine the relative impact of independent variable(s) on relative impact of dependent variable. Here, the independent variable is government expenditure and the social indicator(s) chosen are the dependent variables. The coefficients in a log-log model represent the elasticity of dependent variable with respect to independent variable. Therefore, log-log model presents the empirical interpretation in elasticity term i.e., percentage change in dependent variable due to one percent change in explanatory variable.

Log-log model is represented as:

$$\text{In } Yi = \text{In } \beta 1 + \beta 2 \text{ In } X \text{ i} + ui$$

(1) Where In= Natural log (i.e., log to the base e, and where e = 2.718)

Equation (1) is thus:

$$\text{In } Yi = \dot{\alpha} + \beta 2 \text{ In } Xi + ui$$

The coefficients are estimated by OLS regression. Six equations will be fitted/estimated for each selected state.

The study is based on secondary data. Data on health indicators i.e., infant mortality rate (IMR), Death Rate, Birth Rate and Total Fertility Rate (TFR) is collected from various editions of Sample Registration Surveys (SRS Data, Census of India) for the period 2001 to 2022. Similarly, data on government's health expenditure were collected from RBI database on states (RBI website) for the period 2001 to 2022. Consequently, for analysis of health indicators the number of observations for each state is 18.

VI. DATA ANALYSIS AND RESULTS INTERPRETATION

Table 1: Odisha Birth Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	2.486159	0.034363	72.35068	0.0000
ln_ Per Capita Health Expenditure	-0.100182	0.005986	-16.73666	0.0000
R-squared	0.955649			
Adjusted R-squared	0.952237			
S.E. of regression	0.014214			
Sum squared residual	0.002627			
Log likelihood	43.59160			
F-statistic	280.1159			
Prob(F-statistic)	0.000000			

Table 1 provides the results of analysis showing impact of per capita health expenditure on birth rate for state of Odisha for the period 2001 to 2022. Here, the birth rate is dependent variable while the per capita expenditure on health is independent variable. From the table we can see that the explanatory variable's coefficient has a negative sign which tells there is an inverse relationship between health expenditure and the birth rate i.e., an increase in government expenditure on health causes fall in birth rate. Further, coefficient has -0.10 values which mean

if the value of explanatory variable is increased by 1 percent, then the value of dependent variable decreases by 0.10 per cent. From the analysis table we can see the R-squared value is 0.9556 which tells 95.56 percent of variation in dependent variable birth rate is explained by independent variable. The p-value is 0.0000 being less than the significant level of 5% percent which shows that the explanatory variable is statistically significant and, therefore, the null hypothesis that the coefficient of explanatory variable is zero will be rejected. It means we can say that the per capita public health expenditure on health has impact on birth rate.

Table 2: Odisha Death Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1.526188	0.048452	31.49869	0.0000
ln_ Per Capita Health Expenditure	-0.117343	0.008440	-13.90293	0.0000
R-squared	0.936982			
Adjusted R-squared	0.932135			
S.E. of regression	0.020043			
Sum squared residual	0.005222			
Log likelihood	38.43740			
F-statistic	193.2915			
Prob(F-statistic)	0.000000			

Table 2 provides the results of analysis between per capita health expenditure and the death rate. Here, the death rate is dependent variable while the per capita expenditure on health is independent variable. From the table we can see that the coefficient has a negative sign which tells there is an inverse relationship between health expenditure and the death rate. The explanatory coefficient value is -0.11 which means an increase in per capita health expenditure causes 0.11 percent fall in death rate. The R-squared value is 0.936 which tells 93.6 percent of variation in dependent variable is explained by independent variable. As we can see that the p-value is 0.0000 which is appearing against the explanatory variable is statistically significant because the p-value being less than the significance level of 5 percent (0.05), hence the null hypothesis of that, the explanatory variable is statistically insignificant and being rejected.

Table 3: Odisha Infant Mortality rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	2.267239	0.077929	29.09365	0.0000
ln_ Per Capita Health Expenditure	-0.336219	0.013575	-24.76789	0.0000
R-squared	0.979248			
Adjusted R-squared	0.977652			
S.E. of regression	0.032236			
Sum squared residual	0.013509			
Log likelihood	31.30917			
F-statistic	613.4486			
Prob(F-statistic)	0.000000			

Table 3 provides the results regarding the impact of government's expenditure on health on infant mortality rate (IMR). Here, infant mortality rate is a dependent variable. The squared-R is 0.97 which tells that around 97 percent of the variation in dependent variable is explained by the independent variable. As we can see that the p-value is 0.0000 being less than the significant level of 5% percent which shows that the explanatory variable is statistically significant and, therefore, the null hypothesis that the coefficient of explanatory variable is zero will be rejected. Apart from this, the negative symbol with explanatory variable shows that there is negative relationship between the dependent variable and explanatory one. The explanatory coefficient value is -0.336 which indicates that 1 percent increase in per capita may lead to 0.336 percent fall in IMR.

Table 4: Odisha Total Fertility Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.020812	0.072761	0.286029	0.7794
ln_ Per Capita Health Expenditure	-0.147003	0.012675	-11.59828	0.0000
R-squared	0.911876			
Adjusted R-squared	0.905098			
S.E. of regression	0.030098			
Sum squared residual	0.011777			
Log likelihood	32.33842			
F-statistic	134.5201			
Prob(F-statistic)	0.000000			

Table 4.8d provides the results of analysis between per capita health expenditure and total fertility rate (TFR). Here, the total fertility rate is dependent variable while the per capita expenditure on health is independent variable. From the table we can see that the coefficient has a negative sign with value of -0.14 which tells there is an inverse relationship between health expenditure and the TFR i.e., an increase in per capita health expenditure results in 0.14 percent fall in TFR. The R-squared value is 0.911 which tells 91.1 percent of variation in dependent variable TFR is explained by independent variable per capita expenditure on health. The p-value is 0.0000 which is appearing against the explanatory variable is statistically significant because the p-value being less than the significance level of 5 percent (0.05), hence the null hypothesis of that, the explanatory variable is statistically insignificant and being rejected.

Table 5: Bihar Birth Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	3.066362	0.060341	50.81755	0.0000
ln_ Per Capita Health Expenditure	-0.047210	0.009447	-4.997567	0.0002
R-squared	0.657676			
Adjusted R-squared	0.631343			
S.E. of regression	0.031945			
Sum squared residual	0.013266			
Log likelihood	31.44520			
F-statistic	24.97568			
Prob(F-statistic)	0.000244			

Table 5 provides the results of analysis showing impact of per capita health expenditure to birth rate for state of Bihar. Period of the study is from 2001 to 2022. Here, the birth rate is dependent variable while the per capita expenditure on health is independent variable. From the table we can see that the explanatory variable's coefficient has a negative sign which tells there is an inverse relationship between health expenditure and the birth rate i.e., an increase in government expenditure on health causes fall in birth rate. Further, coefficient has -0.0472 values which mean if the value of explanatory variable is increased by 1 percent, then the value of dependent variable decreases by 0.0472 per cent. From the analysis table we can see the R-squared value is 0.6576 which tells 65.76 percent of variation in dependent variable birth rate is explained by independent variable. The p-value is 0.0002 which is appearing against the explanatory variable is statistically significant because the p-value is being less than the significance level of 5 percent (0.05), hence the null hypothesis of that the explanatory variable is statistically insignificant and being rejected. It means we can say that the per capita public health expenditure on health has impact on birth rate.

Table 6: Bihar Death Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1.466497	0.116643	12.57247	0.0000
ln_ Per Capita Health Expenditure	-0.081164	0.018261	-4.444628	0.0007
R-squared	0.603111			
Adjusted R-squared	0.572581			
S.E. of regression	0.061753			
Sum squared residual	0.049574			
Log likelihood	21.55844			
F-statistic	19.75472			
Prob(F-statistic)	0.000661			

Table 6 gives the results relating to the impact of government's expenditure on health on death rate in Bihar. Here the death rate is dependent variable. From the table we can see that the per capita health expenditure coefficient has a negative sign which tells there is an inverse relationship between health expenditure and the death rate i.e., an increase in government expenditure on health causes fall in death rate. The coefficient has -0.081 value which means 1 percent increase in per capita health expenditure causes 0.081 percent fall in death rate. The R-squared value is 0.6031 which tells 60.31 percent of variation in dependent variable death rate is explained by independent variable. Further, we can see that the p-value is 0.0007 which is appearing against the explanatory variable is statistically significant because the p-value is being less than the significance level of 5 percent (0.05), hence the null hypothesis of that the explanatory variable is statistically insignificant and being rejected here also.

Table 7: Bihar Infant Mortality Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	3.117815	0.217910	14.30779	0.0000
ln_ Per Capita Health Expenditure	-0.132202	0.034115	-3.875217	0.0019
R-squared	0.536001			
Adjusted R-squared	0.500309			
S.E. of regression	0.115365			
Sum squared residual	0.173018			

Log likelihood	12.18402			
F-statistic	15.01731			
Prob (F-statistic)	0.001914			

Table 7 provides the results regarding the impact of government's expenditure on health on infant mortality rate (IMR) in Bihar. Here, infant mortality rate is a dependent variable. The squared-R is 0.5360 which tells that around 53.60 percent of the variation in dependent variable is explained by the independent variable. As we can see that the p-value is 0.0019 being less than the significant level of 5% percent which shows that the explanatory variable is statistically significant and, therefore, the null hypothesis that the coefficient of explanatory variable is zero will be rejected. Apart from this, the negative symbol with explanatory variable shows that there is negative relationship between the dependent variable and explanatory one. The coefficient has -0.132 value which means 1 percent increase in per capita health expenditure results in 0.132 percent fall in death rate.

Table 8: Bihar Total Fertility Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.769332	0.142379	5.403411	0.0001
ln_ Per Capita Health Expenditure	-0.091269	0.022290	-4.094599	0.0013
R-squared	0.563256			
Adjusted R-squared	0.529661			
S.E. of regression	0.075377			
Sum squared residual	0.073863			
Log likelihood	18.56790			
F-statistic	16.76574			
Prob(F-statistic)	0.001266			

Table 8 provides the results of analysis between per capita health expenditure and total fertility rate (TFR) in Bihar. Here, the total fertility rate is dependent variable while the per capita expenditure on health is independent variable. From the table we can see that the coefficient has a negative sign with value of -0.091 which tells there is an inverse relationship between health expenditure and the TFR i.e., an increase in per capita health expenditure results in 0.091 percent fall in TFR. The R-squared value is 0.5632 which tells 56.32 percent of variation in dependent variable TFR is explained by independent variable expenditure on health. The p-value is 0.0013 which is appearing against the explanatory variable is statistically significant because the p-value being less than the significance level of 5 percent (0.05), hence the null hypothesis of that the explanatory variable is statistically insignificant and being rejected.

The results of this study are consistent across all variables considered for the study. Our principal conclusion can be summarized as per capita government expenditure on health helps to reduce infant mortality rate, birth rate, death rate and total fertility rate in Bihar and Odisha states. These results indicate that the government should increase its budgetary allocations on health and family welfare as well. These results are also important in considering the fact that there should be the commitment of more funds health. Although only commitment of funds to social sector is not sufficient, better utilization of funds right direction in effective manner is most important. Thus, it is also essential for the government to look after the efficiency and transparency of its budgetary allocations to ensure that these funds are fully utilized (Yun and Yusoff, 2015). Thus, analysis of this study can pave way in determining the optimal mix of government's expenditure and good governance.

VII. FINDINGS AND SUGGESTIONS

It was found an inverse relationship between per capita government health expenditure and health indicators i.e., IMR, Birth Rate, Death Rate and TFR in all selected states. Findings reveal that,

- One percent increase in per capita government health expenditure decreases IMR by 0.13 percent, Death Rate by 0.08 percent, Birth Rate by 0.047 percent and TFR by 0.09 percent in Bihar state.
- And, in Odisha, one percent increase in per capita government health expenditure decreases IMR by 0.33 percent, Death Rate by 0.11 percent, Birth Rate by 0.10 percent and TFR by 0.14 percent.
- At 5 percent level of significance, p-values indicate that government expenditure has significant impact on the selected social indicators.

It indicates that increase in government spending results in fall in IMR, Birth Rate, Death Rate and TFR. Therefore, the government should further increase its expenditure in health and family welfare. However, merely increasing the allocation of funds to the social sector is not sufficient, effective utilization of funds also necessary. Thus, it is also essential for the government to look after the efficiency and transparency of its budgetary allocations to ensure that these funds are fully utilized. Therefore, policy-makers should address other important factors also apart from allocating public expenditure like the effectiveness of the government schemes in health and family welfare, and proper implementation of such schemes.

VIII. CONCLUSION

From various studies, it can be intuitively explained by the fact that because of extreme poverty and deprivation in India the welfare of the society can be increased by greater involvement of government. At the policy level, the present study recommends that public expenditure should increase further to have a balanced and improved human development of the concerned states. So, an increase in social sector expenditure should also be considered as one of the priorities to promote efficiency in growth and development. Hence, sufficient amount of government funds is recommended to provide support to policies and programs necessary to achieve welfare, growth and development of these states in particular, and the country in general. Therefore, the study is an attempt to analyze the relationship between the public spending on health sector and the selected health indicators in Bihar and Odisha. The study has used the state - level data for the selected states to estimate the direct and indirect effects of government's expenditure on social indicators. The findings clearly indicate that government expenditure does have impact on selected social indicators. The results of the study shows that per capita expenditure on health is inversely related with all the four selected health indicators i.e., increase in per capita expenditure leads to fall in Birth Rate, Death Rate, Infant Mortality Rate (IMR) and Total Fertility Rate (TFR) in both states, however, the amount of decrease will depend on their respective coefficient values.

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