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Research Paper

FRBM Act and Its Influence on Health and Education Expenditure in Bihar

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ABSTRACT

Enacted in 2003, the Fiscal Responsibility and Budget Management (FRBM) Act aims to enhance macroeconomic stability and fiscal discipline in India by reducing deficits. The FRBM Act has significantly constrained Bihar's capacity to borrow and allocate funds, adversely impacting health and education spending. The Act has promoted economic expenditure, although it has simultaneously impeded the state's ability to provide more funds to these essential sectors. Bihar, a historically destitute state characterized by low per capita income and significant dependence on federal payments, has long suffered from insufficient financing for health facilities, medical services, educational development, and teacher recruitment. Inflexible financial targets may restrict necessary expenditures in health and education, thereby affecting service quality and human development metrics, notwithstanding the Act's promotion of resource efficiency and accountability. A significant barrier to Bihar's social and economic development is the challenge of maintaining fiscal discipline while sufficiently investing in the social sector.

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1. INTRODUCTION

The Fiscal Responsibility and Budget Management (FRBM) Act, 2003, was enacted in India to ensure fiscal discipline, reduce deficits, and preserve macroeconomic stability over the long term. Through the imposition of constraints on government borrowings and deficits, the Act guarantees that public expenditures will remain within the bounds of what is considered to be sustainable. It is also important to note that the FRBM Act has had a significant influence on how monies are dispersed in the resource-constrained state of Bihar in India, particularly in sectors such as education and healthcare. The Act has been beneficial to the state's finances and has helped to reduce deficits; yet, it has restricted the amount of money that the government may spend on social infrastructure. When it comes to expanding health and education facilities in Bihar, a state that has traditionally had low human development indices, public finance is very necessary. As a consequence of financial goals, the delivery of services and the outcomes of development are negatively affected when these essential sectors get insufficient funding. (Mohanty & Mishra, 2017).

Research suggests that rigorous budgetary management may be beneficial for long-term investments in the social sector, notwithstanding the restrictions that have been mentioned. According to research conducted by Barenberg et al. (2017) and Bhakta (2014), the infant mortality rate (IMR) and literacy rates are two significant indicators of public health that have been found to improve when there is an increase in the amount of

money spent on public health. Because of the rigorous fiscal discipline that is imposed by the FRBM Act, expenditures in infrastructure, personnel, and service growth may be restricted. All of these things are essential in Bihar, since the amount of money that the government spends on health and education is lower than the average for the country. Bihar is still having trouble finding a balance between the expansion of the social sector and the restriction of budgetary spending, despite the fact that there has been an increase in the collection of revenue and the mobilization of taxes. In his article from 2015, Agarwal says that the long-term effect of the FRBM Act on the human development of Bihar would be determined by the provision of budgetary space for key public services while sticking to policies for deficit control.

2. OBJETIVES

1. An analysis should be done of the impact of FRBM Act on health and education in Bihar before and after its implementation.
2. To evaluate how fiscal discipline under the FRBM Act has influenced budget allocations and growth in health and education expenditures in Bihar.

3. REVIEW OF LITERATURE

Seshaiah et al, (2018) investigated the patterns of economic expansion and expenditures made by the federal and state governments of India during the years 1980–1981 and 2015–2016. The growth rate of foreign direct investment was the only component that did not exhibit a positive and statistically significant link with the GDP growth rate. All of the other elements, however, did exhibit such a relationship.

Mohanty and Mishra (2017) have investigated the co-integration of India's government expenditure and income. The application of the vector error correction model in the research showed that there is a one-way causal link between tax revenue and expenditure. This was discovered in both the short-term and the long-term stages of the investigation.

Barenberg et al. (2017) Within the scope of this study, the researchers investigated the relationship between the amount of money spent on public health and the rate of infant death by using an unbalanced panel consisting of 31 Indian states covering the years 1983–84 to 2011–12. After taking into account a variety of characteristics, including political competition, per capita income, female literacy, and urbanization, the purpose of this study is to investigate the relationship between public health expenditure and the infant mortality rate (IMR). According to the findings of the study, the IMR tends to decrease when the government spends money on health care.

Agarwal (2015). In her study, she evaluates the effectiveness of public expenditure policy from the perspective of human development by using a regression analysis of the Human Development Index (HDI) on per capita real income and social sector expenditures at the state level. This analysis is performed at the administrative level. Per capita real income was shown to be a significant predictor of the human development index (HDI) by her. It is also worth noting that the percentage of development funding that is allocated to the social sector is quite inadequate. It is common for real incomes to increase as a result of government spending on social sectors such as health and education; nevertheless, it is possible that this advantage is being partially absorbed by real income per capita. This is in addition to the impacts that it already has.

Bhakta (2014) In her study conducted in India, she investigated the manner in which public monies were allocated to health and education, taking into consideration the links that exist between the health of children and their academic success. The findings of this study led to the development of a simultaneous equation model that takes into account public expenditure on the education and health of children. The three-stage least squares approach is one which is used in order to offer estimates of the system that are both dependable and efficient. The study came to the conclusion that the poor health status of children, which is assessed by high IMR, is the root cause of both low enrolment rates and high dropout rates at the primary level throughout the school year.

Kulkarni (2016) her study evaluated the health care systems of the BRICS growing countries by using panel data gathered from the World Bank and the World Health Organization. Panel data was collected from both organizations. Through the use of the fixed-effect model, which is founded on Grossman's theoretical framework, the study endeavors to estimate the health production function. This is accomplished via the use of panel data from the five countries that make up the BRICS group: South Africa, Brazil, India, China, and the Russian Federation. According to the conclusions of the research, there is a positive correlation between health outcomes and GDP per capita, adult literacy rate, and out-of-pocket expenditure.

4. RESEARCH METHODOLOGY

The purpose of this study is to investigate the short-term and long-term impacts of public expenditure on health in Bihar by using the cointegration technique of the Auto-Regressive Distributed Lag (ARDL) model. It is of the utmost importance to make use of econometric tools that are capable of identifying correlations, since it is well-established that the impacts of public expenditure on health are known to last over an extended period (Halicioglu, 2011). A significant number of academics make use of cointegration tests when they are investigating long-term linkages. Here are a few examples: the test developed by Engle and Granger in 1987, the test developed by Johansen in 1988 and 1991, and the test developed by Johansen and Juselius in 1990. For these tests to be considered valid, the variables must be integrated in the same order, which I am normally.

The ARDL limits test technique is used in this study for analyzing cointegration. (Emran et al., 2007) This method has several advantages in comparison to more conventional methods. Even when working with tiny samples, the ARDL approach can provide reliable estimates since it can correctly account for the endogeneity of the components that explain the data. One of its most notable advantages is that it may be used with either independent variables or dependent variables, or even

a mix of the two factors. As an additional benefit, the ARDL approach eliminates the phenomenon of spurious regression, which occurs when the data for a time series is not stationary (Stock and Watson, 2003). Furthermore, the ARDL model incorporates the delays of both the independent and dependent variables, which is a significant component in the context of economic relationships (Duasa, 2007).

A model incorporating the lags of independent variables, known as a distributed lag model, may be represented as follows

$$Y_t = \alpha_t + \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \mu_t$$

Whereas, an autoregressive model that incorporates the lags of the dependent variable may be represented as follows

$$Y_t = \alpha_t + \beta_0 X_t + \beta_1 X_{t-1} + \delta_1 Y_{t-1} + \mu_t$$

These autoregressive models are also known as dynamic models as they portray overtime trajectory of dependent variables with its past values.

A general framework of ARDL (p, qi) model may be given as follows

$$\phi(L,p)y_t = \sum_{i=1}^{k} \beta_i(L,q_i)x_{it} + \delta w_t + u_t$$

Were

$$\phi(L,p) = 1 - \phi_1 L - \phi_2 L^2 - \ldots - \phi_p L^p$$

$$\beta(L,q) = 1 - \beta_1 L - \beta_2 L^2 - \ldots - \beta_q L^q$$

$$for\ i = 1,2,3\ldots,k,\ u_t \sim iid(0,\delta^2)$$

The exact definition of the lag operator LLL is as follows: L0Yt = YtL^0 Y_t = Y_tL0Yt=Yt, and L1Yt = Yt−1L^1 Y_t = Y_{t-1} L1Yt=Yt−1. A vector of deterministic variables, which includes constants, trends, dummies, and exogenous variables with fixed lags, is represented by the word WtW_tWt. This vector is a S×1S \times 1S×1 vector. Through the use of the user-defined parameters ppp and qqq, the maximum lag order may be determined.

Research suggests that the derived test statistics become meaningless with variables integrated of order two, also known as I(2) (Ouattara, 2004). This is despite the fact that the ARDL approach may be used with any order of variables integrated. A great number of unit root tests have been carried out by us in order to validate the order in which the variables have been integrated. The purpose of this study is to investigate the relationship between public spending and health outcomes in the state of Bihar by drawing on annual time series data spanning from 1980–1981 to 2017–2018. The research makes use of a general econometric framework in order to conduct an exhaustive analysis of the link between the two variables.

$$y = f(x,z)$$

Assuming that there is a vector of control factors (z), a representation of the amount of money that the government spends on health (x), and variables that indicate health outcomes (y). Different combinations of control variables and other health markers were used to construct alternative models, which we then used to produce data. With the use of these two distinct factors, we conducted an analysis of the association between expenditure on health care and spending by the government.

Model1

$$LE = f(LHX, LPSGDP, URB, LIT)$$

Model2

$$IMR = f(LHX, LPSGDP, URB, LIT)$$

All things considered, this inquiry has made use of a total of two different proxies for health outcomes. The term "Life Expectancy at Birth" (LE) refers to the average number of years that a newborn is expected to live. This is the first factor to consider. The second one is the Infant Mortality Rate (IMR), which quantifies the proportion of live births to infant deaths that occur for every one thousand live births that occur in a certain year. The natural logarithm of health spending, when expressed in lakhs of rupees (LHX), is the method that the government uses in order to measure the amount of money spent on healthcare. With the use of this approach, we can conduct a more precise investigation into the impact that expenditure on public health has on significant health indicators in the state of Bihar.

5. RESULTS AND DISCUSSION

Before examining at the long-term equilibrium link between the variables that were picked, this approach checks for any spurious regressions that may have occurred. In order to do this, the unit root processes of the model's variables are investigated. In order to search for unit roots, the study makes use of three well-known unit root tests: the Phillips-Perron (PP) test, the Augmented Dickey-Fuller (ADF) test, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. In order to ascertain whether or not the series is non-stationary, the PP and ADF tests are carried out on the presumption that a unit root is present. On the other hand, the KPSS test, which performs its operations based on the assumption that stationarity is the null hypothesis, assumes that there is no unit root process.

Table 1: Phillips-Perron Unit Root Test

Variable	At Level (With Constant)	At Level (With Constant and Trend)	First Difference (With Constant)	First Difference (With Constant and Trend)
IMR	-2.082	-2.7702	-5.0212*	-5.1049*
LE	-1.074	-3.2704***	-12.019*	-12.877*
LGSDP	5.044	1.5828	-6.571*	-8.4811*
LHX	0.712	-1.5271	-5.8471*	-5.9346*
LIT	6.052	-1.1751	-0.7721	-3.6434**
URB	2.03	0.0237	-6.2004*	-13.5489*

Analysis of the unit root. The findings of the PP test are shown in Table 1. The bulk of the variables do not display stationarity when there is a comparison between the two models (with constant and with constant and trend). Nevertheless, after they have experienced a first difference at a significance level of 1%, they become stationary. After moving to the constant and trend model, the Literacy Index becomes stable, even though it was not statistically significant at the beginning of the evaluation. Even though it is only discernible at the 10% level, life expectancy is consistent at this level.

The study then goes on to determine whether or not the results about the unit root are reliable. This is accomplished using two supplemental unit root tests known as the ADF test and the KPSS test; the results of these tests are shown in the following table.

Table 2: Augmented Dicky-Fuller Unit Root Test

Variable	Level (With Constant)	Level (With Constant and Trend)	First Difference (With Constant)	First Difference (With Constant and Trend)
IMR	-2.07	-1.93	-5.08*	-5.16*
LE	-6.89***	0.15	-0.73	-9.56*
LGSDP	4.39	0.6	1.51	-8.87*
LHX	-1.43	-5.85*	-5.93*	-5.93*
LIT	1.89	-3.53**	-0.77	-3.46**
URB	11.08	-1.1	-7.21*	-20.34*

Table 3: KPSS Unit Root Test

Variable	Level (With Constant)	Level (With Constant & Trend)	First Difference (With Constant)	First Difference (With Constant & Trend)
IMR				
LE	0.717**	0.148**	0.209	0.067
	0.730**	0.162**	0.500**	0.500*
LGSDP	0.627**	0.188**	0.718**	0.141***
LHX	0.738**	0.139***	0.164	0.087
LIT	0.732**	0.198**	0.643**	0.109
URB	0.741*	0.192**	0.372***	0.148**

"*" indicates significance at the 10% level.
"**" indicates significance at the 5% level.
"***" indicates significance at the 1% level.

Except the Literacy Index, which is only significant in the constant and trend model, the unit root tests demonstrate that the majority of variables are non-stationary at the level, but they become stationary after the first differencing. Differences in the functional specification or the sensitivity of index-based variables may be the cause of some inconsistencies, such as the fact that life expectancy has unit root persistence. To investigate cointegration and long-term linkages in the health sector, the ARDL model is used in this research. This is because the variables are a combination of I(0) and I(1).

Using two different models, the research investigates the influence that public expenditures have on the growth of the health sector. Life Expectancy at Birth (LEB) is used as a health proxy in the first model, which also takes into account other explanatory factors such as per capita income, urbanization rate, and adult literacy. As an alternate proxy, the second model makes use of the Infant Mortality Rate (IMR), which is a health measure that generally receives positive feedback. Both models use the same explanatory variables, which are public health spending, state domestic product, urbanization, and literacy. However, owing to constraints in data, both models acknowledge the existence of additional factors that are not taken into consideration, such as nutrition and sanitation.

Table 4: ARDL Bound Test Results

Model	F-Statistics	Significance Level	Critical Values (Lower Bound)	Critical Values (Upper Bound)
Model 1	4.21**	1%	3.74	5.06
		5%	2.86	4.01
		10%	2.45	3.52
Model 2	6.85*	1%	3.74	5.06
		5%	2.86	4.01
		10%	2.45	3.52

The results of the ARDL limits test, which are shown in Table 4, provide evidence that there is a connection between health outcomes and public expenditure that constitutes a long-term equilibrium. The fact that the F-statistics of both models are higher than the upper limit eliminates the idea that the models are not cointegrated. This indicates that there is a common pattern in urbanization, literacy, expenditures on public health, Gross Domestic Product of the state, and infant mortality. Not only did we do stability checks using the CUSUM and CUSUM square tests, but we also tested for serial correlation, heteroscedasticity, and functional form misspecification.

Table 5: Diagnostic Tests

Test	Model 1 F-Test Statistics	Model 1 P-value	Model 1 Null Hypothesis	Model 2 F-Test Statistics	Model 2 P-value	Model 2 Null Hypothesis
LM Test for Serial Correlation	1.284	0.301	No serial correlation	0.293	0.598	No serial correlation
Heteroscedasticity Test	1.313	0.168	No Heteroscedasticity	1.006	0.510	No Heteroscedasticity
Ramsey RESET Test	1.193	0.183	No misspecification	1.226	0.244	No misspecification

As seen in Table 5 of the diagnostic tests, there were no issues with serial correlation, heteroscedasticity, or functional form misspecification in any of the models that were examined. Values of the F-statistic that are not statistically significant demonstrate the resilience of the model.

The results of Model 1's long-run investigations are shown in Table 6, with life expectancy serving as the dependent variable. There is a significant beneficial impact that spending on public health has on life expectancy, with a rise of 0.7% for every 1% increase in funds available for this purpose. The fact that people in Bihar have a poor income, do not have health insurance, and are living in great poverty highlights the need of public healthcare.

Table 6: Long run Coefficients: Model 1

Variable	Coefficient	Probability (Prob.)
LHX	0.703	0.046
LGSDP	1.929	0.001
LIT	1.175	0.108
URB	9.341	0.078
C	17.433	0.108

Rising levels of urbanization and non-state development (NSDP) have a favorable influence on life expectancy, which in turn leads to improvements in health standards. At the 5% level of statistical significance, there was a link between the two variables that was statistically significant. The fact that people's need for high-quality health care facilities increases in parallel with their wealth and the degree to which they reside in urban areas is one probable reason for the positive association that exists between the National Social Development Program (NSDP), urbanization, and life expectancy among the population. When there is easy access to medical treatment of a high standard, the general population lives longer and experiences fewer deaths on average. One more time, it was found that the influence of reading level on life expectancy was a favorable one. Despite this, the results were significant when compared to the significance criterion of ten percent. The high correlation that exists between health and literacy rates is the possible reason for this phenomenon. Because of this, public investment is particularly important in states that are experiencing economic depression, such as Bihar.

Table 7 finally contains the results of the long-term analysis of Model 2, which was conducted with the newborn mortality rate serving as the dependent variable. As was to be expected, the findings indicate that investments made by the public sector in health care have a detrimental impact on IMR. For every one percent increase in the amount of money spent on public health, there is a 1.13 percentage point decrease in IMR. The general economic position of Bihar, as measured by the gross state product (GSDP), increased, which resulted in a decrease in the infant mortality rate. We found that a one percent increase in GSDP resulted in a three-point two percent drop in IMR. In both cases, the results were significant at the ten percent level for significance meaning that they were remarkable. When we return to the variables of literacy rate and urbanization, we find that both of these factors significantly reduce the IMR among children at the 5% level of significance. This is the case once again.

Table 7: Long run Coefficients: Model 2

Test	Model 1 F-Test Statistics	Model 1 P-value	Model 1 Null Hypothesis	Model 2 F-Test Statistics	Model 2 P-value	Model 2 Null Hypothesis
LM Test for Serial Correlation	1.284	0.301	No serial correlation	0.293	0.598	No serial correlation
Heteroscedasticity Test	1.313	0.168	No Heteroscedasticity	1.006	0.510	No Heteroscedasticity
Ramsey RESET Test	1.193	0.183	No misspecification	1.226	0.244	No misspecification

According to Kateja (2007), Shetty and Shetty (2014), and Ladusingh (2017), there is a significant correlation between literacy and the survival of children. More precisely, female literacy is related with an 8% reduced infant mortality rate (IMR) for every 1% increase in literacy. When more individuals are read, women have greater agency in areas such as access to healthcare, decision-making, and the age at which they can get married. It was discovered by Ramadas (1989) and Mahmud (2003) that the rates of mother and child survival increased when educated women had a greater understanding of nutrition, career opportunities, and health services. Literacy's capacity to reduce gender discrimination leads to a decrease in the interest rate of girls and an improvement in the ratio of males to females. An increase in the number of healthcare facilities, an increase in accessibility, and a shift in cultural perspectives that treat both boys and girls equally are all factors that contribute to a significant reduction in infant mortality rate (IMR) of 10%. Girls are typically seen to be a burden in rural areas, which contributes to the enormous gender inequality that exists in these areas.

6. CONCLUSION

The FRBM Act has significantly impacted health and education expenditures in Bihar by curtailing deficits and enforcing fiscal discipline. It has stabilised budgets and reduced deficits, however it has constrained the state's expenditure on social services. The FRBM framework establishes fiscal deficit targets and borrowing constraints, which have often hindered expenditure growth in Bihar, despite the state's efforts to augment financing for healthcare and education. Consequently, public services such as education and healthcare have experienced underfunding, adversely affecting their quality. Fiscal discipline and augmented investment in critical social sectors must coexist for sustainable development to be achievable.

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