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Demographic Dividend And Economic Growth: An Analytical Study In Context To Odisha

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Abstract
The study focused on the demographic dividend's future growth prospects for Odisha's economic growth and established a statistical relationship between the demographic factors (Health and Education) and economic growth in Odisha. The study is based on the descriptive and analytical of the relationship between demographic dividend and economic growth in Odisha from 2011 to 2021. The demographic dividends include Birth Rate (BR), Death Rate (DR), and Gross Enrolment Ratio (GER). The PCGDP is taken as a proxy of economic growth. The OLS regression method is mainly used to verify the statistical relationship between the variables. By employing OLS, the study found BR and DR are significantly influencing the PCGDP but negatively during the study period due to a continuous decline in BR and DR with a continuous increase in PCGDP during the study period. However, GER is significant and positively related to PCGDP in Odisha, because they are growing in the same direction.

Key Words:
Demographic Dividend, Economic Growth, Health, Education

1. Introduction
Human capital is an important source for the sustainable development of the country. A nation's economic growth is parallel with human capital growth. The working-age population has a significant influence on a nation's ability to grow sustainably. India is a second-populated country which also has a working-age population. One factor influencing the nation's economic growth is the expansion of the working-age population.

The demographic dividend including Health (birth rate, death rate, fertility rate, etc.), Education (GER, expenditure per annum, etc.), Working age population, Employment etc. have an extensive impact on the country’s economic growth and which are the key measures of the development and growth of a country (Menon et al., 2022). The increased economic growth that might arise from a country's declining birth and death rates and the ensuing shift in the age distribution of its population is known as the demographic dividend (PRB, 2012). The demographic dividend is the proportion of working age to the rest of the population (Al-Khraif et al., 2022). The changes in the population's age structure influence the country's economic growth (Tanvir Alam & Afrin Tonny, n.d.).

The demographic dividend of Odisha is one of the remarkable changes in the 20th century and the last one and half decades of the 21st century(Das, 2018). Factors like birth rate, death rate, fertility rate, gross enrolment ratio, working age population, employment, and per capita income significantly influence the country's economic growth as well as in Odisha. Most economist theorists have pioneered the importance of non-economic factors of economic growth (i.e., Health and Education). Economic growth is dependent on the regular activities goes on in society in the day-to-day life of the people (Robert E. Lucas, 1988). Welfare and sustainable economic growth depend upon the levels of improvement in health and education (Can Avcı, n.d. 2021). The development of human capital has a significant influence on economic growth.

Numerous previous studies have examined the connection between a nation's economic success and its demographic dividends, as well as cross-country. This study put emphasis on the relationship between human capital (i.e., health and education) with economic growth in the state of Odisha. Especially, the current study considers a growth pattern of the last decades under a single ruling party in Odisha. Hence, the study forth to check descriptively as well as analytically the relationship between the considered variables.

2. Literature Review

This section explains the prior studies about the relationship between the demographic dividend and economic growth. The existing literature is:

As per, **Chandrasekhar et al., (2006)** examined the impact of demographic dividend on young India's economic future. The descriptive study found poor employability in the workforce which is broadly affected by improper education and health. **Cai (2010)** studied descriptively the relationship between demographic transition, demographic dividend and Lewis turning point in China. The study found the first demographic dividend created conditions for the second demographic dividend and tapped a new source of economic growth.

Again**, Cuaresma et al. (2013)** studied Education dividends and explains the Demographic Dividend during the period from 1980 to 2005. In this study, analytical evidence on the association among changes in age structure, labour force participation, educational attainment, and economic growth. The global panel data of 105 countries with OLS and Blundell-Bond System GMM estimator is used. The study found an insignificant relationship between age structure and labour productivity. However, the improvement in skills and quality of education are the key for productivity and income growth which is a substantial portion of the demographic dividend. **Can Avc1 (2021)** examine the relationship between Health and Economic growth in Turkey during the period from 1960 to 2014. Health and education are taken as predictor variables of demographic dividend on the GDP of Turkey. By employing ARDL estimation the study found a significant long-run relationship between the demographic dividend and economic growth. The birth rate is 67% explaining the GDP in Turkey and the student per teacher in vocational and technical secondary education leads to a 21% decrease in GDP during the study period in Turkey.

Further**, Yadav (2022)** empirically studied the effect of economic growth on the death rate in India. The GDP growth rate and death rate during 2011-19 are taken for analysis. By employing regression analysis, the result found a strong negative correlation between variables and death rate is explaining 46% of the GDP growth rate in India during 2011-19. **Andrei (2022)** studied the relationship between human capital and economic growth in

Romania during the period from 1995 to 2019. An endogenous growth model is selected which includes gross fixed capital formation (GFCF) as a proxy of GDP growth, employment, life expectancy, expenditure on R&D and secondary enrolment rate as variables under study. By using Vector Error Correction Model (VECM), the study found secondary school enrolment, life expectancy, expenditure on R&D and employment have a long-run significant influence on the GDP growth of Romania during the study period. But there is no short-run causality found during the period between human capital and economic growth in Romania.

Considering, **Das (2022)** studied the demographic trends and transition in Odisha. A descriptive study based on the National Family Health Surveys (NFHS) and Sample Registration System (SRS). The demographic history of Odisha reveals a number of surprises, one being the situation of the high level of childhood mortality and low level of fertility. **Oshiokpekhai & Egbejule, (2022)** examined the relationship between unemployment and economic growth in Nigeria during the period from 1990 to 2020. The study used GDP as a dependent variable and the population rate, unemployment rate, and labour force as independent variables. The unemployment rate has a negative association with GDP, although this relationship is only meaningful over the long term, according to the study's findings using ARDL estimation. In the short term, the labour force has a major beneficial impact on GDP. Similarly, during the study period, Nigeria's population rate had a short-term, significantly beneficial influence on GDP.

Similarly, **Saleh & Yusuf (2022)** have studied the effect of demographic dividends on economic growth in Gorontalo Province during the period from 2010 to 2019. The factors of demographic dividend include dependency ratio, labour force participation rate, and total population rate on economic growth. The study's use of the F-test and multiple linear regression showed that the dependency ratio significantly boosts economic growth. However, economic growth is significantly and negatively impacted by population expansion. Despite this, Gorontalo Province's economic development over the study period is not significantly impacted by the labour force rate.
Moreover, **Akwei et al. (2022)** studied the relationship between education and economic growth in developing countries during the period from 1971 to 2018. The study used the ARDL error correction model and discovered that, while there was a strong short-term positive association between education and GDP, there was a large long-term negative link.
Most of the studies on the relationship between demographic dividends and economic growth have been done nationally as well as internationally. But this study tries to examine the relationship at the state level in India.

3. Objectives and Hypothesis

3.1. Objectives

The reviewed literature encourages the study to know the significant relationship between factors of demographic dividend and the economic growth of Odisha. In this regard following key objectives are taken into consideration:

- To explain the future growth prospects of demographic dividend on economic growth in Odisha.
- To test the demographic factors (Health and Education) statistically to determine economic growth in Odisha.

3.2. Hypothesis

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The followings are the key hypothesis developed under the study:
H_1: The Birth Rate has a significant influence on the Per Capita Gross Domestic Product (PCGDP) in Odisha.
H_2: There is a significant relationship between the death rate and Per Capita Gross Domestic Product (PCGDP) in Odisha.
H_3: Economic growth (PCGDP) has been statistically influenced by the Gross Enrolment Ratio (GER) in primary education in Odisha.

4. Methodology

The study is based on the descriptive as well as analytical of the relationship between demographic dividend and economic growth in Odisha. The descriptive study includes different statistical information and trend statistics of the factors of demographic dividend and economic growth of Odisha as well as India during the last decade and which are collected from different annual reports and survey reports of state government as well as central government. The analytical part includes the period from 2011 to 2021 and the variables under demographic dividend include Birth Rate (BR), Death Rate (DR), and Gross Enrolment Ratio (GER) at the Primary level in Odisha which is collected from the survey report of National Health Mission (NHM) and the Annual report of the Health Department Odisha. Per Capita Gross Domestic Product (PCGDP) is taken as a proxy of economic growth in Odisha, which is collected from the Handbook of Statistics (RBI database).

Methods

The current study includes descriptive statistics to know the behaviour of the variables under study. The Ordinary Least Square (OLS) regression analysis is used to know the explaining power of independent variables on dependent variables and the variables are converted into log values to normalize the data for the purpose of verifying the outliers and percentage change in the variables. In addition, the residual diagnostic tests are used to check the regression model is fit.

5. Descriptive Study

5.1. Economic Status in Odisha

Odisha's economy has experienced substantial structural change over the last ten years, which has helped the state move from last to first place. Odisha's GDP grew from Rs. 23098708 lakhs in 2011–12 to Rs. 39649943 lakhs in 2019–20 at constant (2011–12) base prices.

Table I reveals that the Per Capita Income (PCI) in Odisha is Rs. 55105.00 during 2012-13 which is Rs. 15878 lower than the PCI of India i.e., Rs. 70983. Similarly, PCI in Odisha is Rs. 24812 lower than PCI in India during 2020-21. But the growth in PCI of Odisha is 85.38% which is greater than the PCI growth in India (i.e., 78.87%) during the past decade.

Table I: Per Capita Income and GDP Growth of Odisha v/s India

Year	Per Capita Income (Odisha)	Per Capita Income (India)	Difference (India-Odisha)	%GDP Growth (Odisha)	%GDP Growth (India)
2012-13	55105.00	70983.00	15878.00	5.36	5.46
2013-14	61305.00	79118.00	17813.00	9.26	6.39
2014-15	64233.00	86647.00	22414.00	1.80	7.41
2015-16	65993.00	94797.00	28804.00	7.97	8.00

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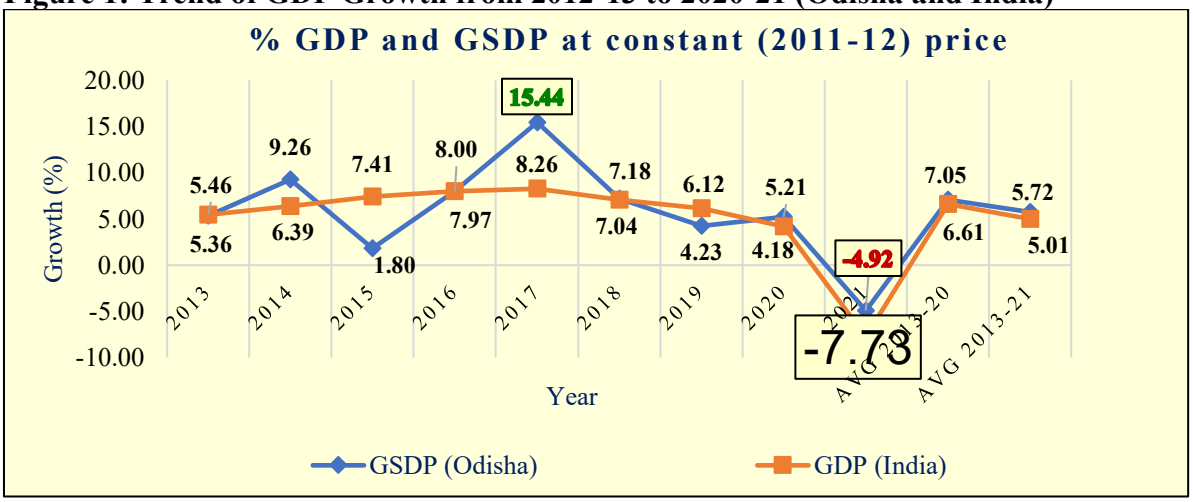
2016-17	79181.00	103870.00	24689.00	15.44	8.26
2017-18	89370.00	115293.00	25923.00	7.18	7.04
2018-19	98181.00	126521.00	28340.00	4.23	6.12
2019-20	104566.00	134226.00	29660.00	5.21	4.18
2020-21	102156.00	126968.00	24812.00	-4.92	-7.73
AVG 2013 to 2020	77241.75	101431.90	24190.12	7.05	6.61
AVG 2013 to 2021	80010.00	104269.20	24259.22	5.72	5.01

Source: DE&S, Odisha, CSO and Government of India Press Release of First Advance Estimates on 7 January 2021

Figure 1: Trend of GDP Growth from 2012-13 to 2020-21 (Odisha and India)



Source: DE&S, Odisha, CSO and Government of India Press Release of First Advance Estimates on 7 January 2021

Figure 1 depicts, GSDP growth in 2012-13 is 5.36% in Odisha which is slightly lower than GDP growth (i.e., 5.46%) in India. However, the average GSDP rate (5.72%) in Odisha is higher than the average GDP rate (5.01%) in India during 2020-21. During 2014-15, the GSDP growth is much lower as compared to GDP growth i.e., 1.80% and 7.41% respectively. A high rate of GSDP is found in Odisha during 2016-17 which also has high GDP growth during the last decade. In the year 2020-21, the GDP growth in Odisha, as well as India, is negative, but the growth rate in India (i.e., -7.73%) is lower than the growth rate in Odisha (i.e., -4.92%).

5.2. Health and Economic Growth in Odisha

Health is an aspect of human capital and a critical component of economic growth. The country with a higher level of health structure is wealthier than the countries with lower health trends (Can Avcı, n.d. 2021).

As per the survey report of NFHS-4 in 2016-17, Table II shows the changes in key health indicators during the period from 2005-06 to 2015-16. A gradually declining birth rate was found in the last two decades i.e., from 24.3% in 2000 to 17.7% in 2020. The decreasing birth rates tend to a declining death rate i.e., from 10.5% in 2000 to 7.3% in 2020 during the last two decades in Odisha. Similarly, the per capita state GDP is Rs. 11825.39 in 2000 which was

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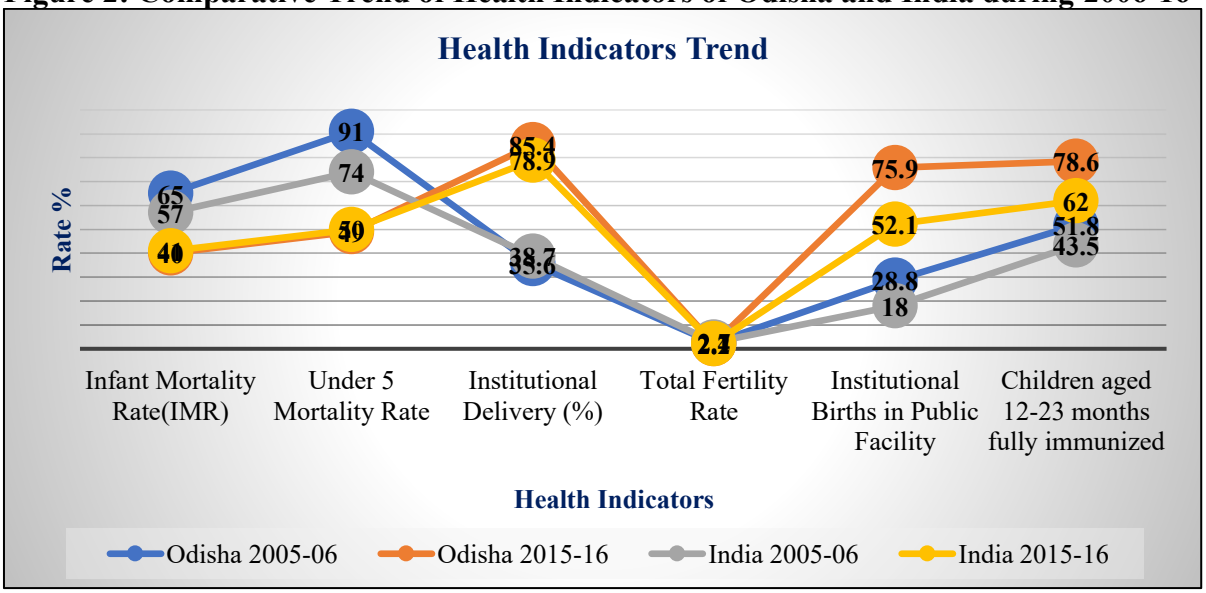
increased to Rs. 103512.00 in 2020. As per the National Family Health Survey (NFHS-4) Report 2017-18, the key indicators of the health structure of Odisha V/s India during 2005-06 to 2015-16.

Table II: Health Indicators Rate of Odisha and India during 2005-06 to 2015-16

Health Indicators	Odisha			India		
	2005-06	2015-16	Change	2005-06	2015-16	Change
Infant Mortality Rate (IMR)	65	40	-25	57	41	-16
Under 5 Mortality Rate	91	49	-42	74	50	-24
Institutional Delivery (%)	35.6	85.4	49.8	38.7	78.9	40.2
Total Fertility Rate	2.4	2.1	-0.3	2.7	2.2	-0.5
Institutional Births in Public Facility	28.8	75.9	47.1	18	52.1	34.1
Children aged 12-23 months fully immunized	51.8	78.6	26.8	43.5	62	18.5

Source: National Family Health Survey (NFHS)-4 report 2017-18

Figure 2: Comparative Trend of Health Indicators of Odisha and India during 2006-16



Source: National Family Health Survey (NFHS)-4 report 2017-18

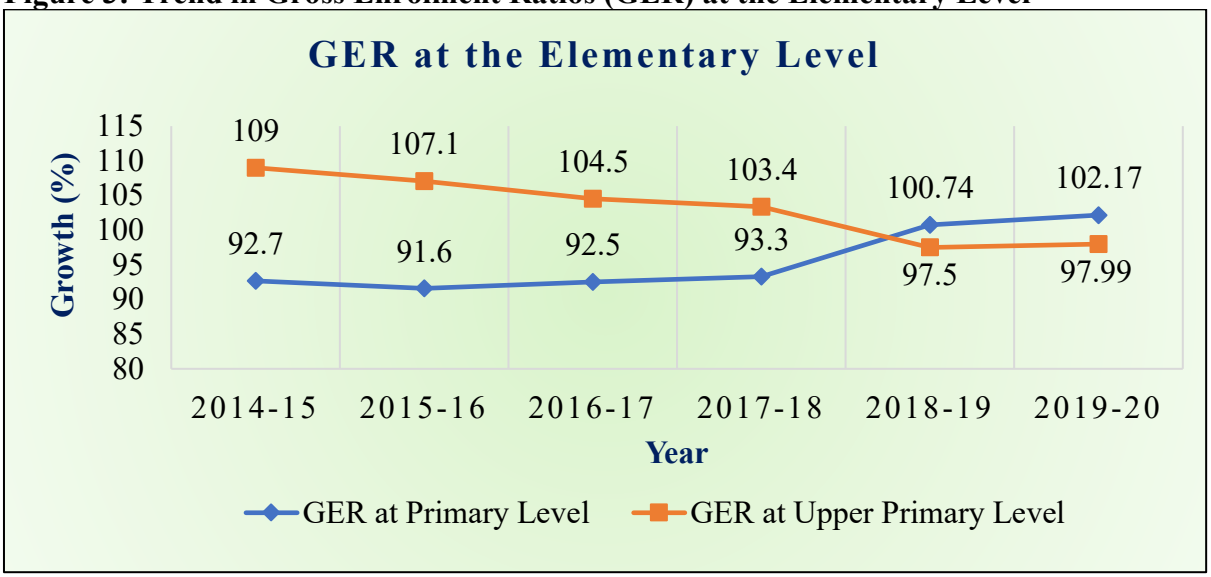
Figure 2 reveals the IMR 65% in the state and 57% in India during 2005-06 which was 40% and 41% during 2015-16, but the percentage change in the state is greater than the nation. Similarly, the performance of Under 5 Mortality Rate, Institutional Delivery (%), Total Fertility Rate, Institutional Births in Public Facilities, and Children aged 12-23 months fully immunized are better in Odisha than the performance in India.

5.3. Education and Economic Growth in Odisha

The skilled and more qualified workforce not only increases productivity but also creates a productive environment within the group which leads to increased total productivity (Başak Karşıyakalı 2008). In the words of Eric A. Hanushek and Ludger Wössmann (2007), the higher rates of education in an economy increase working productivity and total output through human capital.

As per the economic survey report 2020-21, figure 3 depicts the Gross Enrolment Ratios (GER) at primary and upper primary levels stood at 102.17% and 97.99% from 92.70% and 109% during 2014-15 to 2019-20. The diagram depicts that GER performance at the primary level is better than GER performance at the upper primary level. The dropout rates for primary education improved to 9.47% during 2014-15 to 2019-20. In 2019–20, the primary and upper primary Pupil Teacher Ratios (PTRs) were 18:1 and 20:1, respectively. These ratios are significantly higher than the 30:1 and 35:1 PTRs that are required by the Right to Education (RTE).

Figure 3: Trend in Gross Enrolment Ratios (GER) at the Elementary Level



Source: Odisha Economic Survey Report 2020-21

The Per Capita Gross Domestic Product (PCGDP) increased to Rs. 103512 from Rs.60687 during 2014-15 to 2019-20, which means 70.57% changes during the period. The existing figure explains that the PCGDP is increasing simultaneously with GER in primary education. The GER in primary education has a significant positive influence on economic growth (Guesmi & Boutayeba, 2022).

5.4. Future Growth Prospect of Demographic Dividends on Economic Growth in Odisha

5.4.1. Health and Human Development

According to several National Health Surveys, important health indicators significantly increase when policies are developed, implemented, and monitored at every level. The improvement of health care in Odisha was also greatly aided by 5T initiatives in the areas of infrastructure, supply chain management, human resource management, and e-governance. The followings are some initiatives taken by the state government with the support of NHM during the last decade are:

➢ **Biju Swasthya Kalyan Yojana (BSKY)**: launched on 15th August 2018 to accelerate free health service to all. The annual health coverage of Rs. 5 lakhs per annum (Rs. 10 lakhs for women members) for single families.

➢ **Maternal Health Interventions**: Various steps are taken to reduce the Maternal Mortality Ratio under NHM. Those includes:

✓ Large number of delivery points.
✓ Janani Surakya Yojana (JSY).
✓ Janani Shisu Surakshya Karyakram (JSSK) etc.

➢ **Child Health:** The state government has taken several initiatives toward the child mortality rates through different policies and strategies. The Major interventions are:

✓ New Barn Care Corner (NBCC)
✓ New Born Stabilization Units (NBSU)
✓ Special Newborn Care Units (SNCU) etc.

➢ **Rashtriya Bal Swasthya Karyakram (RBSK)**: Launched in March 2014 in Odisha, this National Flagship Program under NHM intends to serve 1.07 crore children from birth to age 18.

➢ **Free Transportation Service**:

✓ Emergency Medical Ambulance Service (EMAS)
✓ Referral Transport Ambulance Service (Janani Express/102)
✓ 104 Health Helpline

➢ **Other Key Initiatives:**

✓ Nidaan Scheme (Free Diagnostic Services)
✓ Sahay Scheme (Free dialysis services)
✓ ANMOL (ANM On Line Service)
✓ SAMMPurNA Scheme
✓ Khusi (Free sanitary napkins to school girls from Class 6 to 12), etc.

5.4.2. **5T and Mo Sarkar initiatives:** To maintain transparency and make the MAMATA scheme more citizen-centric, hassle-free, and paper-free, the 5T project under e-Government launched an app-based MIS connected with a mobile application on August 1, 2020.

5.4.3. Education and Skill Enhancement

Odisha is dedicated to reaching the SDGs by 2030 and is leading the way in their adoption and implementation. Particularly at the primary level, the state has achieved notable advancements in metrics of educational infrastructure and educational attainment. Over the past ten years, the state government of Odisha has made the following steps to improve the quality of education in the state.

➢ **Scholarship/ Incentive Programmes**: The State Government launched the Odia Bhasa Bruti, Mukhyamantri Medha Bruti, and Best School Award in 2018–19, among other initiatives, to improve the quality of Odia Medium.

➢ **Skill-in-Odisha Initiative**: Established to provide both technical and vocational education to the youth of the state for the purpose of employment generation under this programme.

➢ **Chief Minister's Employment Generation Programme (CMEGP)**: Under this scheme, skilled youths are employed in different sectors since 2014-15.

➢ **SUDAKHYA:** to encourage an increased number of enrolments of girl students into ITIs.

➢ **Other Schemes**:

✓ Odisha Adarsh Vidyalaya

- ✓ Mo School Abhijan
- ✓ Garima Award (Best Performing Schools)
- ➢ **Major initiatives for ST/ SC education**
- ✓ ANWESHA (To provide quality education to SC and ST students)
- ✓ PRERNA (PostMatric scholarship to eligible SC /ST students)
- ✓ SUVIDYA (To spread the joy of literacy and numeracy to tribal children in Odisha) etc.

6. Data Analysis and Interpretation

6.1. Summary Statistics

The many characteristics of variables are defined by descriptive statistics. Mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera, and normality probability are all listed in Table III. With the exception of PCGDP, the mean value of every variable is significantly closer to the median. The difference between the skewness and kurtosis of the series and those from the normal distribution is measured by the Jarque-Bera test statistic. The likelihood that, under the null hypothesis, a Jarque-Bera statistic will surpass the observed value (in absolute value). Each variable has a probability value larger than 0.05, indicating that the variables are normally distributed and the null hypothesis is accepted.

Table III: Descriptive statistics of considered variables during the period

	BR	DR	GER	PCGDP
Mean	18.9000	7.7800	99.9300	70211.12
Median	18.9000	7.7000	101.4550	64090.00
Maximum	20.1000	8.5000	109.6500	103512.0
Minimum	17.7000	7.1000	91.6000	44016.22
Std. Dev.	0.8472	0.5308	6.9147	20510.95
Skewness	0.0346	0.3055	0.0110	0.4094
Kurtosis	1.5556	1.5973	1.4521	1.8664
Jarque-Bera	0.8712	0.9753	0.9984	0.8148
Probability	0.6468	0.61405	0.6069	0.6653
Sum	189.0000	77.8000	999.3000	702111.2
Sum Sq. Dev.	6.4600	2.5350	430.3286	3.79E+
Observations	10	10	10	10

Source: EViews output by authors

6.2. Regression Analysis

Table IV reveals the significant relationship between the variables and how much the independent variables explain the dependent variables. The null hypothesis of BR and DR is rejected and these have a negative significant relationship with the PCGDP. However, GER is significantly influences PCGDP but positively related. The R-square value is 99%, which means the independent variables (i.e., BR, DR, and GER) are highly regressing the PCGDP during the study period. The Durbin-Watson statistic is 2.18 which is nearer to 2.0, hence can say the model is the best fit.

Table IV: Regression statistic of considered variables during the period
Dependent Variables: lnPCGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.0243	1.3807	16.6754***	0.0000
lnBR	-3.9192	0.6334	-6.1871***	0.0008
lnDR	-2.2694	0.4611	-4.9209***	0.0027
lnGER	0.9264	0.1968	4.7070***	0.0033

R-squared	0.6926	Mean dependent var	11.1212
Adjusted R-squared	0.6889	S.D. dependent var	0.2905
S.E. of Regression	0.0305	Akaike info criterion	-3.8488
Sum squared resid	0.0056	Schwarz criterion	-3.7278
Log Likelihood	23.2443	Hannan-Quinn criterion	-3.9816
F-statistic	269.2141	Durbin-Watson statistic	2.1789
Prob (F-statistic)	0.0000		

Source: EViews output by authors

6.3. Residual Diagnostic

6.3.1. Serial Correlation

The Breusch-Godfrey Serial Correlation LM Test is used to know the presence of serial correlation in the model by using the hypothesis:

H_0: No presence of autocorrelation.

H_1: Presence of autocorrelation.

Table V: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.2658	**Prob. F (2,4)**	**0.7791**
Obs. R-squared	1.1732	Prob. Chi-Square (2)	0.5562

Source: EViews output by authors

Table V reveals that the probability value is 0.77 which is greater than the significant level at 5%, which means the null hypothesis is accepted and there is no autocorrelation in the model.

6.3.2. Heteroscedasticity Test

The robustness of OLS output is checked by using the Heteroscedasticity test. The Hypothesis is:

H_0: No Heteroscedasticity

H_1: Presence of Heteroscedasticity

Table VI: Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.2064	**Prob. F (3,6)**	**0.8883**
Obs*R-squared	0.9358	Prob. Chi-Square (3)	0.8168
Scaled explained SS	0.1258	Prob. Chi-Square (3)	0.9886

Source: EViews output by authors

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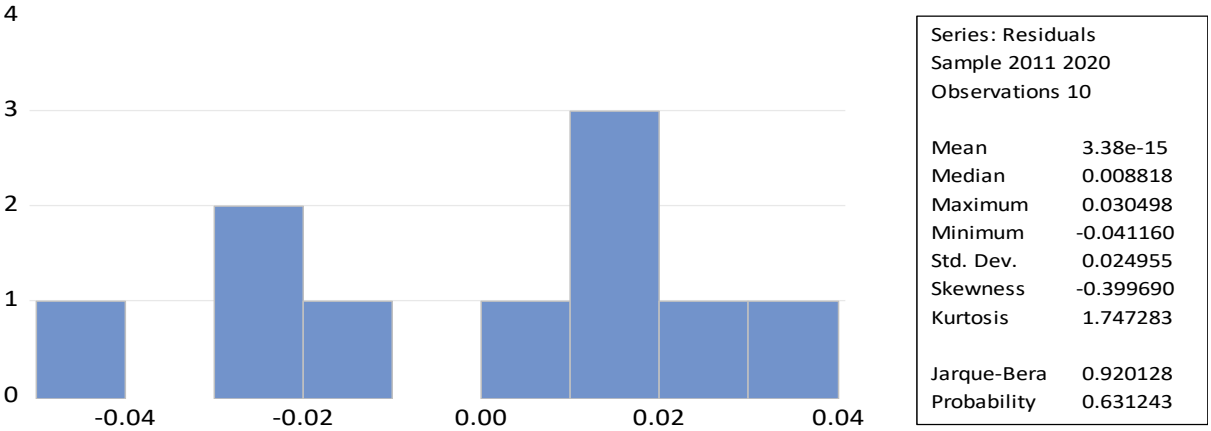
Table VI shows that the probability value is 0.89 which is greater than the significant level at 5%, which means the null hypothesis is accepted and we can conclude that homoscedasticity is present in the model. Hence, the model can be trusted.

6.3.3. Normality Test

To find out whether the error term follows the normal distribution and hypotheses are:
H_0; Residuals are normally distributed
H_1: Residuals are not normally distributed

Figure 4: Histogram of residuals and Jarque-Bera Test



Source: EViews output by authors

Figure 4 depicts the residual normality test of variables together. The probability value of residuals is 0.63 which is greater than the value of 0.05, which means the null hypothesis is accepted and the residuals are normal.

7. Discussion and Conclusion

The current study is based on the relationship between the demographic dividend (Health and Education) and the economic growth of Odisha in the last decade. The result from the descriptive study found the per capita income of Odisha is lower than the per capita income of India, but the growth of per capita income (i.e., 85.38%) in Odisha is greater than the growth of per capita income (i.e., 78.87%) in India during the last decade. Similarly, the average GDP growth performance of Odisha is better than the average GDP growth performance of India during 2013-2021. In the case of health indicators, Odisha is in a better position as compared to the health indicators of India. Similarly, as per the Odisha Economic Survey Report 2020-21, the GER at the primary level is increasing in the past decade**.** Hence, health and education are the major factors influencing employability, leading to economic growth (Chandrasekhar et al., 2006).

The outcomes from the regression analysis reveal that the BR and DR are significantly influencing the PCGDP but negatively during the study period due to a continuous decline in BR and DR with a continuous increase in PCGDP (Can Avc1, 2021). However, GER at the primary level is significant and positively related to PCGDP in Odisha, because they are growing in the same direction **(**Akwei et al., 2022). The study concludes that there needs to be an investment in the health sector to improve the birth rate which has a statistically negative impact on economic growth. The government should respond to reach the plan and policies of Health and Education properly to the rural as well as to the tribal area.

Despite all, the study has considered a few years of data with limited numbers of demographic factors to judge economic growth. Hence the study has further scope for considering the optimum number of demographic dividends to judge the economic growth with a long period of data set.

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