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- Research Articles
- Book Reviews/Review Articles
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Editorial

It is the macro-economic policies, not poverty and underdevelopment as propagated by some, are responsible for environment deterioration in developing countries. Since 1991, the Union government of India has been pursuing policies of privatisation and liberalisation leading to India's full integration with the world economy. These policies allow private sector including transnationals into the core sector which are expediting the process of exploitation of mineral resources, due to rise in the number of mineral processing industries like iron and steel, alumina and aluminium and thermal power plants, particularly in the eastern part of India including Odisha, Jharkhand and Chhattisgarh, and consequent competition among them. This leads to air and water pollution, land degradation and destruction of forest beneath which there occur reserves of mineral resources such as iron ore, bauxite, coal and others.

Similarly, the rising price of natural resources in terms of home currency due to devaluation and continuing depreciation has encouraged the people and governments of developing countries including India towards exploiting natural resources, for example shrimp farming, etc., which is a major factor in destroying the eco-system of the coastal areas of India.

Thus, besides micro agents, the environment is affected by macro-economic factors, such as real interest rate and the real exchange rate as exchange rate depreciation has negative impact on environment and ecosystem of a developing country like India depending on export of primary products or processed primary products by raising its price in home currency, thereby encouraging excessive exploitation of natural resources. Excessive exploitation of natural resources can lead to environmental degradation and reduce the prospects of economic growth. It seems there is need for a check on the process of reckless privatisation and senseless liberalisation to save the environment of India.

On this aspect, one of the focal themes of discussion at the recently held Annual Conference of the Orissa Economic Association in 2020 was 'Environment, Natural Resources and Climate Change'. The paper by Saudamini Das in this issue was delivered as the keynote address on that theme.

This issue also includes seven papers presented (and revised subsequently) on the other focal theme of the aforesaid conference on social sector. Social Sector development leads to human development. Growth by itself does not promote human development. Education and health are most important variables for social sector development and, hence, for human development.

Basic and primary education has the highest impact on distribution of income favourable to equity while equity impact of expansion of post-graduate education may actually be negative. However, malnutrition in early childhood adversely affects school performance. Better nourished children perform better in schools.

Education helps in improvement in skill and productivity, in growth of rural non-farm sector. But in the post-liberalisation and privatisation era since 1991,school education in government sector has been neglected both in India and Odisha. Many children have "dropped out" as well as are "pushed out" from schools. Government schools are closing down in Odisha. Various problems in schools include inadequate infrastructure, vacancies of teachers, teacher burdened with non-academic government works, etc.

Privatisation trend also continues in the health sector. More corporate hospitals, private hospitals, legal and illegal nursing homes are rising with its consequent adverse effects, as they operate for profit, sometimes acting as merchant of death and exploit patients. In a country like India, that too in a poor state like Odisha, education and health should be treated as "service", not as a "commodity", and should be provided by governments free of cost, because it helps in reducing poverty.

The study by Mishra etal, in a time-series framework predicts a statistically significant positive impact of social sector development on the growth of Odisha. The article by Sahoo and Patra reveals that social sector expenditure is the leading item of expenditure of Baripada Municipality, and the municipality has been playing a crucial role in social sector development over many decades. The research paper by Sahoo and Chinara concludes that pupil-teacher ratio, student-classroom ratio, availability of female teachers, schools having girl toilets and single teacher schools are the variables that significantly determine the dropout rate at elementary school level of education in Odisha. Nayak and Rout, in their paper, have established that though there is some financing in health sector, the demand and supply gap in healthcare

services in Odisha is not at par with as it is required. The development of any state cannot be well recognized unless the importance given to its healthcare system. The paper by Jena and Nishanka observes that public healthcare system is far more caring, comforting and satisfying to an average healthcare consumer and it is always preferable to the private one.

Som and Nayak, in their paper, conclude that SNCUs are playing a major role in contributing towards child survival in Odisha; and if the state is to enhance new born survival, investments in intrapartum care and access to facilities for early intervention like caesarean sections are non-negotiable. The paper by Sahoo, Das and Rout hold that since most of the work done by the local communities are unskilled or semiskilled in nature; education does not seem to be influencing the income levels.

This issue also includes three more papers which were the Presidential Address on challenges facing agriculture in Odisha by Satyakam Mishra; Professor Baidyanath Misra Memorial Lecture on the agrarian question in India by Deepak K. Mishra; and the Professor Kshetra Mohan Pattnaik Memorial Lecture on RBI's monetary policy performance by Amaresh Samantaraya. A research note by Suravee Nayak exploring aspects of studying labour through the lens of intersectionality also forms part of this issue.

Kishor C. Samal
Editor-in-Chief

Article

Agriculture in Odisha in a Comparative Perspective*

Satyakam Mishra

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1. Introduction

It gives me immense pleasure to extend a hearty welcome to all of you on this auspicious occasion of the 52nd Annual Conference of the OEA. Our association planted as a sapling in 1968 is now all grown as a large tree. I take this opportunity to pay homage to the departed souls who had not only founded this Association but also carried forward its activities throughout their life. We always keep them close to our hearts and their ideals at the core of our initiatives.

One of the objectives of our Association was to stimulate research in economics with special reference to the pressing economic issues of Odisha. Accordingly the themes of our annual conference have been selected. The themes of this conference are (1) Economics of Natural Resources, Environment and Climate Change in Indian context, and (2) Development of the Social Sector in Odisha: Issues, Challenges and Prospects.

It is a matter of great satisfaction that the Government of Odisha has been showing keen interest in the development of non-agricultural sectors. Conclaves are being organized outside the state to invite investors, both foreign and domestic, for investment in Odisha. The state offers a wide range of fiscal initiatives and policy enablers for business. It is claimed by the Government of Odisha that the industrial sector contributed nearly 39.5 per cent whereas agriculture and service sectors contributed 18.9 per cent and 41.68 per cent, respectively, to the Gross State Value Added (GSVA) in 2018-19.

Thus, it is evident that the industrial and service sectors are expanding in the state. It is a healthy sign of economic growth. But this structural transformation

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* Main text of the Presidential address delivered at the 52nd Annual Conference of the Orissa Economics Association, Berhampur, February 8, 2020.

presents a paradoxical economic situation in Odisha. Sectoral contributions of industrial and service sectors are rising but 83 per cent of population continues to live in rural areas where the principal source of livelihood is cultivation and allied activities. About 62 per cent of workforce are still engaged in agriculture. Of them, while only 37.84 per cent are cultivators and an overwhelming 62.16 per cent are agriculture labourers (Census 2011). The percentage of workforce engaged in agriculture and the sectoral contribution of agriculture to GSVA in Odisha and four neighbouring states are presented in Table 1.

In terms of source of livelihood agriculture continued to be the principal one. Except West Bengal, the percentage of workforce engaged in agriculture varied between 60 per cent and 75 per cent in the four states including Odisha.

It may be seen in Table 1 that among the five states, the percentage of workers engaged in agriculture is the lowest in West Bengal (44.03 per cent), but the sector contributed more than 23 per cent to the GSVA in 2017-18. It is a sign of growth and a structural change in the right direction. In this regard the position of Andhra Pradesh is also satisfactory. This speaks of the level of development of agricultural sector in the two states. In comparison with West Bengal and Andhra Pradesh the contribution of agriculture to GSVA is much lower and the percentage of workforce engaged in agriculture is much higher in Odisha. If the percentage of workforce engaged in agriculture remains unchanged but the sectoral contribution of agriculture declines it cannot be termed as a welcome structural change. Agriculture in Odisha is certainly operating at a sub-optimal stage. Landless farmers constituted 16.05 per cent of its population whereas it was only 11.16 per cent in West Bengal as in 2011; this has been possible because of better implementation of land reforms in the state.

Odisha has been experiencing a consistent decline in the average size of land holding and increasing number of agricultural workforce and landless agricultural labourers over the years. The details are given in Table 2.

It is needless to mention here that in the context of a large rural sector and dependence of 62 per cent of workforce on cultivation and allied activities, agriculture is very important in promoting and sustaining higher growth of the state economy. The growth potential of agriculture needs to be exploited

to the maximum. But our performance in agriculture vis-à-vis our neighbouring states does not appear to be very satisfactory. An attempt has been made here to make a comparative study of yields of food crops in Odisha and her four neighbouring states.

The yield of kharif foodgrains, rabi foodgrains and total foodgrains in the five states during the period from 2005-06 to 2017-18 are presented in Tables 3, 4 and 5 respectively.

The yield of kharif foodgrains varies among the five states. Andhra Pradesh has the highest yield (2800 Kg/ha) in 2017-18 and West Bengal enjoyed almost the same status (2726 Kg/ha). Although Odisha has experienced remarkable improvements in the yield of kharif foodgrains and reached the peak in 2016-17 (1873 Kg/ha), it stands in no comparison to the performance exhibited by Andhra Pradesh and West Bengal. Among the five states, the average yield in Odisha (1541 Kg/ha) is little more than that of Chhattisgarh (1230 Kg/ha), but it is far below the average yield in West Bengal and Andhra Pradesh. Odisha ranks 4th among the five states.

In respect of rabi foodgrains the performance of Odisha is not up to mark too. The average yield of rabi foodgrains in Odisha is much less than that of West Bengal and Andhra Pradesh. The highest average yield during the 13 year period is seen to be 3131 kg/ha achieved by West Bengal followed by 3108 kg/ha in Andhra Pradesh. But Odisha could not exceed 1935 kg/ha during the same period. Of course, in terms of average yield Odisha ranks 3rd among the five states.

A comparison of yields of food grains (rabi and kharif combined) in Odisha and her four neighbouring states reveals the same somewhat gloomy picture of lacklustre performance of the state. States like West Bengal and Andhra Pradesh are far ahead of Odisha. Even a new state like Jharkhand performed better than Odisha. Odisha ranks 4th among the five states in respect of average yield of foodgrains.

The yields of principal crops like rice, oil seeds, groundnut, etc. have also been found to be lower in Odisha in comparison with that of her neighbouring states. The year-wise yields of rice, pulses, tur, oil seed and groundnut in the five states have been presented in Tables 6 to 11, respectively. Average yields of the above mentioned crops in the five states are given in Table 12.

Per hectare yield of rice in Odisha is observed to be extremely low when compared to that of Andhra Pradesh and West Bengal. Even it is less than that of Jharkhand. Odisha ranks 3rd among the five states in terms of per hectare yield of rice.

But the performance of Odisha in case of pulses and tur dal has been found to be much better as compared to rice, oil seeds and kharif groundnut. Among the four states of Andhra Pradesh, Chhattisgarh, Jharkhand and Odisha, the per hectare yield of pulses is the highest in Odisha.

In case of tur, Odisha falls behind West Bengal but performs much better than Andhra Pradesh and Chhattisgarh. Hence, it can be inferred that Odisha needs to exploit its growth potential in the cultivation of pulses including tur.

Performance of Odisha in oil seeds has been far from satisfactory. The per hectare yield is little more than half of the yield in West Bengal. Similarly, the position of Odisha in the cultivation of groundnut, both in kharif and rabi seasons, is much below that of the other states. However, it is better than Andhra Pradesh in case of groundnut produced in kharif season.

The most profitable segment of agriculture is horticulture. But it seems that Odisha has not capitalized the opportunities available in this sector to the maximum. Among the five states the performance of Odisha both in terms of area and production seems to be the least impressive. The area, production and yield of fruits, vegetables, flowers, aromatics, spices, plantation etc. are presented in Table 13. In the case of fruits, Odisha has the lowest yield in 2017-18. Similarly, in terms of yield of vegetables Odisha ranks third among the five states. The yield of vegetables in Andhra Pradesh is more than that of Odisha. Odisha has the lowest yield in flowers among the five. In case of spices the position of the state is little better. In plantation crops Odisha holds third position.

Production of aromatic and honey has been very low. But these two items have ample scope for growth. The agro-climatic conditions are immensely suitable for perennial fruit crops. There is a scope to convert the upland and the wastelands for horticultural crops. Backyard fruit tree plantation, vegetables cultivation, kitchen garden, etc. are to be encouraged particularly in rural areas. Steps should also be taken to augment the production of horticultural forest products.

A major hurdle for growth of horticulture and agriculture *per se* in the state has been shortage of storage capacity. The potato produced in Odisha is stored in West Bengal. Serious attention needs to be given to enhance storage capacity in Odisha.

The livestock sector has also been operating at a sub-optimal level. Both Andhra Pradesh and West Bengal are far ahead of Odisha in the production of milk, egg, meat and fish. In terms of average yield of cow and buffalo milk Odisha ranks third among the five states.

Production of inland fish is found to have increased by 30.13 per cent in Andhra Pradesh between 2016-17 and 2017-18. During the same period the corresponding rate in Odisha is a dismal 19.36 per cent only. If we measure the average yield of marine fish by dividing the total catch by the length of the coastline, the yield of marine fish per kilometer of coastline comes to be 311 kg, 621.09 kg and 1177.67 kg in Odisha, Andhra Pradesh and West Bengal, respectively. Therefore, the yield in the livestock and fishery sector can also be enhanced through proper management of the resources and by encouraging integrated farming. Marginal and small farmers need to be encouraged to undertake activities like dairy, poultry, goatery, etc. instead of depending on subsistence agriculture.

There is no gainsaying that our agricultural resources are underutilized. This sector needs focused attention of the government, both state and centre. Recently the State Government has released a farm policy in which various promises have been made to change the agricultural scenario of the state. But the basic issues in development of agriculture have not been properly addressed. The most important issue relates to institutional reforms. The land leasing policy needs a change in favour of the actual tillers. Similarly, the size of holdings must be enlarged to make it suitable for the use of modern techniques of production. The other important issue relates to the development of infrastructure particularly irrigation coverage and storage capacity. Another issue is the necessity of integrating agricultural development with rural development schemes. A holistic approach is necessary for the simultaneous development of all activities on which a rural economy can sustain. These issues should have been properly addressed in the Agricultural Policy of the Government. Development of agriculture cannot be viewed in isolation of other agro-based activities. As long as this sub-optimal status of agriculture does not change from a subsistence level to that of a profitable enterprise we cannot think of sustainable growth with social justice.

The comparison made in this study is only indicative and certainly not exhaustive. A more comprehensive comparison of the status of our agriculture with that of neighbouring states can be made by enlarging the scope of comparison to include such other variables as size of operational holdings, amount of fertilizer and electricity consumed, cropping patterns, irrigation coverage, access to institutional credit, seed replacement rates, exportable surplus, cost of cultivation, storage capacity, crop-wise value addition, etc. I take this opportunity to call upon our young researches to carry on research for identifying the factors inhibiting and these contributing to the growth of agriculture in particular and rural development in general. Before closing, I thank you all for giving me a patient hearing.

Table 1: Workers Engaged in (2011) and Contribution to GSVA of Agriculture (2017-18)

States	Percentage of workforce to population	Percentage of workforce engaged in agriculture	Percentage of cultivators in the workforce engaged in agriculture	Percentage of labourers in the workforce engaged in agriculture	Percentage share of agriculture in Gross State Value Added at current prices (2011 series)
Andhra Pradesh	46.61	59.50	27.67	72.32 (20.06)	34.37
Chhattisgarh	47.68	74.68	44.02	55.98 (19.93)	22.16
Jharkhand	39.70	63.00	46.23	53.77 (13.44)	18.94
Odisha	41.79	61.81	37.84	62.16 (16.05)	19.98
West Bengal	38.07	44.03	33.43	66.54 (11.16)	23.42

Table 2: Change in the Average Size of Landholdings and Composition of Agricultural Workforce in Odisha

Average landholding size		Agricultural workforce		Cultivators		Landless agricultural labourers	
1970-71	2015-16	2001	2011	2001	2011	2001	2011
1.89	0.95	9.2	10.8	4.2	4.1	5.0	6.7

Source: *Agricultural Census 2015* and *Census 2011*
Note: Land size in hectare and workforce in million

Table 3: Yield of Kharif Foodgrains

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	2167	2073	2630	2466	1978	2143	2449	2569	2299	2352	2387	2558	2800	2374.69
Chhattisgarh	1212	1236	1335	1100	1048	1539	1481	1633	1662	1562	1431	1994	1230	1420.23
Jharkhand	1077	1595	1772	1785	1344	1250	1881	1941	1969	1957	1592	1943	2067	1705.61
Odisha	1346	1352	1486	1342	1385	1410	1258	1575	1582	1730	1290	1873	1541	1474.61
West Bengal	2350	2356	2302	2415	2371	2487	2520	2551	2559	2495	2698	2564	2726	2489.56

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 4: Yield of Rabi Foodgrains

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	2669	2452	2590	3123	2677	3052	2622	2805	3108	2966	2744	2675	3070	2811.77
Chhattisgarh	572	661	708	702	770	786	797	857	728	1000	775	1049	860	789.61
Jharkhand	1016	1173	1162	1246	1258	1296	1389	1540	1543	1447	1302	1476	1519	1335.92
Odisha	1372	1497	1467	1520	1496	1588	1661	1713	1935	1797	1613	1727	1623	1616.07
West Bengal	2593	500	2994	2665	2855	2881	2953	3126	3098	3142	3075	3131	3072	2775.76

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 5: Average Yield of Foodgrains (Kharif and Rabi Combined)

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average Yield
Andhra Pradesh	2365	2231	2613	2744	2294	2530	2519	2670	2661	2648	2571	2611	2934	2568.53
Chhattisgarh	1111	1148	1238	1041	1008	1424	1384	1506	1523	1474	1334	1846	1178	1324.23
Jharkhand	1073	1550	1709	1720	1330	1257	1798	1876	1891	1871	1546	1856	1957	1648.77
Odisha	1349	1369	1484	1363	1262	1432	1303	1592	1625	1738	1330	1855	1550	1480.92
West Bengal	2423	1760	2525	2493	2522	2601	2645	2717	2721	2698	2819	2738	2839	2577.00

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 6: Year wise Yield of Rice (Kharif)

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	2525	2631	3171	2990	2742	2570	2980	2882	2552	2594	2934	3194	3366	2856.69
Chhatisgarh	1337	1354	1446	1176	1120	1663	1597	1746	1766	1660	1517	2101	1256	1518.38
Jharkhand	1150	1832	2024	2036	1547	1541	2131	2238	2238	2238	1814	2238	2350	1952.67
Odisha	1482	1476	1633	1455	1512	1516	1340	1715	1697	1886	1373	2075	1672	1600.15
West Bengal	2378	2386	2327	2439	2439	2396	2485	2547	2581	2612	2526	2735	2598	2496.07

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 7: Year-wise Yield of Pulses

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	772	679	803	818	740	675	637	833	928	911	848	659	870	782.53
Chhatisgarh	477	543	586	580	604	624	613	700	573	818	609	858	693	363.76
Odisha	416	445	446	481	461	486	471	513	537	532	505	548	548	491.46
Jharkhand	567	686	736	724	709	773	885	1038	1021	1004	886	1002	1065	853.53

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 8: Year-wise Yield of Tur

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	609	401	652	456	438	415	303	524	542	503	600	380	427	447.92
Chhatisgarh	445	426	522	583	510	440	433	620	614	636	458	598	601	529.69
Jharkhand	633	645	800	616	871	686	904	1034	1043	1018	903	1002	1147	869.38
Odisha	742	803	900	860	841	916	812	912	896	898	886	884	897	865.15
West Bengal	889	700	-	833	728	1423	432	1434	1429	1434	1480	1249	1300	1110.91

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 9: Year-wise Yield of Total Oil Seeds

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	698	609	1276	842	724	861	650	849	929	557	954	581	1323	834.84
Chhatisgarh	419	503	532	507	607	686	550	723	640	599	501	572	461	561.53
Jharkhand	311	422	553	560	563	625	680	787	663	664	681	732	729	613.07
Odisha	565	550	608	604	589	619	661	700	755	667	632	681	619	634.61
West Bengal	952	918	997	828	1065	1047	994	1162	1181	1161	1168	1147	1198	1062.92

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 10: Year-wise Yield of Groundnut (Kharif)

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	565	301	1357	694	385	659	361	533	644	410	877	419	1278	652.53
Chhattisgarh	1078	1142	1256	1352	1353	1462	1320	1379	1457	1412	1231	1841	1645	1379.07
Jharkhand	NA	NA	NA	836	756	914	1196	1170	1194	1013	830	1049	1151	1010.90
Odisha	835	904	982	980	968	977	830	1070	1112	1030	837	998	950	959.46
West Bengal	933	1000	909	958	916	857	864	1000	917	925	902	964	960	931.15

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 11: Year-wise Yield of Groundnut (Rabi)

Year /States	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Average yield
Andhra Pradesh	1739	1806	1925	1928	2128	2073	1848	1927	1875	2329	2183	2650	2448	2050.69
Odisha	1414	1292	1376	1279	1334	1362	1486	1345	1704	1471	1242	1533	1261	1392.23
West Bengal	1727	1744	1968	1763	1742	1690	1969	2585	2627	2324	2290	2318	2394	2087.76

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 12: Average Yield of Major Crops (2005-06 to 2017-18)

States	Average yield of					
	Rice (Kharif)	Pulses	Tur	Oil seeds	Groundnut (Kharif)	Groundnut (Rabi)
Andhra Pradesh	2856.69	782.53	447.92	834.84	652.53	2050.69
Chhattisgarh	1518.38	636.76	529.69	561.53	1379.07	-
Jharkhand	1952.67	491.46	869.38	613.07	1010.90	-
Odisha	1600.15	853.53	865.15	634.61	959.46	1392.23
West Bengal	2496.07	-	1110.91	1062.92	931.15	2087.76

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Note: Yield in kg/hectare

Table 13: Area and Production of Various Horticultural Crops in 2017-18

States	Fruits		Vegetables		Flowers		Aromatics		Spices		Plantation		Honey
	Area	Production	Area	Production	Area	production	Area	Production	Area	Production	Area	production	Production
Andhra Pradesh	618.32	15002.94 (24.26)	266.94	7378.60 (27.64)	331.35	1157.13 (3.49)	1.44	24.34	263.85	NA	246.50	1099.8 (4.46)	1.87
Chhattisgarh	229.00	2659.60 (11.61)	497.94	6827.35 (1.37)	15.24	18.04 (1.18)	61.38	12.15	47.79	179.76 (1.67)	10.60	8.30 (2.96)	0.75
Jharkhand	102.58	1075.97 (10.48)	287.79	3476.35 (12.07)	14.83	6.13 (0.41)	00	0.97	4.96	3.83 (0.77)	0	0	1.35
Odisha	341.17	2429.30 (7.12)	639.70	8766.68 (13.70)	244.90	336.17	0.61	6.61	2.92	7.36 (2.47)	146.70	202.0 (1.37)	1.35
West Bengal	260.92	3849.06 (14.75)	1405.25	27565.10 (19.61)	53.21	296.30 (5.50)	00	26.82	79.00	203.84 (2.58)	119.80	334.5 (0.58)	16.50

Source: Compiled from *Agricultural Statistics at a Glance 2018,* Government of India
Notes: Area in thousand hectares, Production in thousand metric tonnes Figures in brackets indicate yields in kg/hectare

Agrarian Questions in Contemporary India: Old Debates and New Realities*

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Abstract

This paper provides an overview of the debates on 'agrarian questions' from the perspective of the changing agrarian scenario in India. The contemporary relevance of the agrarian questions, which have a long lineage in the political economy literature, has been evaluated through the lenses of primitive accumulation and agrarian differentiation. Linking the agrarian crisis in post-reform India to the neoliberal economic policies, it is argued here that a framework that considers the different regional trajectories of agrarian change, the uneven nature of the agrarian transitions is better suited to understand the ongoing processes of agrarian change in rural India. The agrarian questions provide a broader framework, encompassing the economic, political and social processes to understand the nature of the agrarian crisis. The analysis of agrarian change in India in the broad political economy tradition brings to the forefront the questions of power relations that are typically ignored in the mainstream analysis of agriculture as another sector in a globalising market economy.

Keywords: Agrarian change, Primitive accumulation, Agrarian crisis, Capitalism, Rural transformation

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1. Introduction

At the outset, let me thank the organisers and the office bearers of the Orissa Economics Association for inviting me to deliver the Prof. Baidyanath Misra Memorial Lecture. I consider it to be a great honour and privilege. As many of you are aware, Prof. Misra was not only a distinguished scholar but also a loving teacher and an institution-builder. His critical engagements with problems faced by the economy and the society at large made him one of the influential public intellectuals of Odisha. The theme of this lecture is, at least partly, inspired by the intellectual legacy of Prof Misra. While trying to chart a broader canvas than what my limited intellectual capacities would allow, I intend to invoke a long tradition of research in political economy that was not constrained by disciplinary boundaries.

As the newly independent nations in Asia, Africa and Latin America attempted to pursue a course of development with an objective to catch up with the advanced west, economists of the generation of Prof. Misra were confronted with questions of poverty, malnutrition, underdevelopment and the alternative pathways to move out of the low-levels of development. While their preferred theoretical and empirical strategies differed widely, most of them believed in an academic world-view in which people mattered.

In this lecture, I would focus on the contemporary relevance of some of the long-enduring debates on agrarian political economy. I would like to argue that these debates, which do not feature in the mainstream of economics teaching and research today, offer fresh insights to the ongoing transformation in rural India.

2. Agrarian Question(s): The Debates

Agrarian political economy attempts to investigate the social relations and dynamics of production and reproduction, and, hence, does not separate the economic from the political or the social. In contrast to the mainstream approaches in economics, the question of power and power relations are central to the political economy perspective. Moving away from the choice-theoretic framework that is at the core of neoclassical economics, political economy approaches incorporate the structural constraints under which agents undertake actions into the analysis, and hence, open up the possibilities to endogenise social institutions into the analysis of agrarian change. Thus,

from the perspective of agrarian political economy, agriculture is not simply a sector of the economy – it is approached and analysed through the interrelated spheres of production, exchange, distribution and accumulation in the rural, agrarian economy. Agrarian change is not isolated but is embedded in the broader political economy of transformation. The debates on the contemporary agrarian question are wide-ranging, and a comprehensive overview of even the main issues is beyond the scope of this exercise. While evaluating the relevance of the classic debates in agrarian political economy for understanding contemporary rural India, I shall be selectively drawing upon my own field research as well as that by other scholars.[2]

Keeping this broad perspective in mind, it would be useful to start with the four central questions to study agrarian change, outlined by Henry Bernstein: who owns what; who does what; who gets what, and, what do people do with their share (Bernstein, 2010). While the first question is about the ownership of means of production - the agrarian structure - the questions of landlessness and the extent and forms of tenancy, the second is about relations of production and exchange. It includes the questions of labour relations - the forms through labour is employed in agriculture. The question of 'who gets what' is about the distribution of the social product. It not only addresses the question of the changing share of different factors of production, at a more micro-level, it is also about the intra-family distribution of earnings and outputs.[3] Finally, what people do with their share is concerned with the patterns of consumption, savings and investment, essentially centring around the questions of agrarian accumulation.

These four deceptively simple questions provide a framework to track the changes in an agrarian economy. Underlying these questions is an understanding that the agrarian economy, like any other part of the economy, is not homogeneous in character. There are different classes who, based on their ownership of and control over different means of production, come together as part of the social relations of production, which sustains and runs the agrarian economy. As these social interactions take place in a historical, social context, the role of social identities based on gender, ethnicity, caste and religion, in shaping the forms of the social relations of production is also an important aspect of the agrarian economy.

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[2] Some of the arguments presented here are drawn from Mishra and Nayak (2020).

[3] Social relations of production and reproduction are interlinked. Feminist critics point to the relative neglect of the gender question, and by implication, the question of social reproduction in the 'orthodox' political economy approaches (Razavi, 2009).

The 'agrarian questions'[4] has a long lineage in the political economy literature.[5] Essentially, the agrarian questions centre around the changes in the rural economies, that are considered 'necessary to the overall development of capitalism and to its ultimate dominance in a particular national social formation' (Byres, 2002). The core of the agrarian questions is often expressed as the three 'problematics' of accumulation, production and politics (Bernstein, 1996). While accumulation refers to the surplus accumulation within agriculture and its role in capitalist development[6], production refers to the ways through which capitalism restructures and transforms agriculture[7] and the rural society, and politics is about the political forces, actions and their implications for accumulation and production (Byres, 1991). The diversity of the ways through which the agrarian questions unfolded in specific contexts that was emphasised by T.J. Byres, has also led to the realisation that 'agrarian transition may occur without necessarily requiring changes within the individual spheres of accumulation, production and politics' (Akram-Lodhi, 1998: 148). Thus, a fuller understanding of the agrarian question, in any given context, requires an examination of the three *interconnected* dimensions of change (Bernstein, 2004: 198; Harriss-White, 2008). The capitalist agrarian transition has been viewed 'as a process, of the commodification of land and labour through the dispossession of the smallholder from the land, as a consequence of either forced

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[4] The 'agrarian question' has always had a central place in Marxian theories of development, although the core questions are also shared by many development theorists, particularly in the context of the contribution of agriculture to economic development (Timmer, 1988). Karl Kautsky (1889), had formulated the agrarian question in the following words: 'Is capital, and in what ways is capital, taking hold of agriculture, revolutionising it, smashing the old forms of production and of poverty and establishing the new forms which must succeed?' Nearly a century later, in the words of T. J. Byres, the agrarian question refers to 'the continued existence in the countryside, in a substantive sense, of obstacles to an unleashing of accumulation in both the countryside and more generally - in particular, the accumulation associated with capitalist industrialisation' (Byres 1996: 26).

[5] For recent surveys, see, among others McMichael (1997), Akram-Lodhi and Kay (2010a; 2010b), Lerche (2013), Oya (2013) and Mohanty (2016).

[6] In mainstream economics, this question has been dealt within the framework of dual economy models, emphasizing the role of agriculture in sustaining economic growth in less-developed economies (Lewis, 1954; Timmer, 1988, 2002).

[7] 'In exploring developments surrounding the possible emergence of agrarian capital and wage labour, this problematic [production] focuses upon issues affecting the structural transformation of petty commodity producing peasant labour into its commodified form, labour power, through both the restructuring of rural labour processes and processes of peasant class differentiation' (Akram-Lodhi, 1998: 137).

displacement or the dispossession created by peasant class differentiation and the exclusionary implications of the normal, everyday workings of land, labour and product markets' (Akram-Lodhi and Kay, 2016: 44). Both these processes identified here, namely primitive accumulation (or, accumulation by dispossession[8]) and peasant differentiation play their respective roles in the agrarian transition. These two processes are, at times, viewed as distinct processes, but their linkages are significant, too (Akram-Lodhi, 2012 and Mishra, 2011).

Interest in the agrarian question has been revived in recent years, partly because of Henry Bernstein's claim that the *classic agrarian question*, which he characterises as the agrarian question of capital, has either been resolved or bypassed[9]. What remains is 'crisis of labour as a crisis of reproduction' (Bernstein, 2006: 452–453). First of all, there is overwhelming evidence to argue that industrialisation through successful agrarian transformation has been achieved under very different circumstances in countries across the world. Although there are signs of decoupling of the capitalist accumulation from agriculture at the national scale (Lerche, 2011, 2013), there are limits to which the necessary accumulation for industrialisation in large economies, such as India, could be external (Byres, 2012). Secondly, the way rising food prices continue to destabilise economies even under the dominance of finance capital (Ghosh, 2010), and also, the continued demand for tropical food products in the advanced countries (P. Patnaik, 2012), mean that the agricultural production systems would be a key concern for global capitalism (Akram-Lodhi, 2012). Neoliberalism has further advanced the objectives of global capital by creating conditions for squeezing the agricultural produce from the developing economies (P. Patnaik, 2012; U. Patnaik, 2003, 2012). Akram-Lodhi and Kay (2010a, 2010b) have also emphasised the continued relevance of the agrarian question. The 'remarkable stability' of the absolute number of peasant farmers, the persistence of small-holder agriculture in much of the global south, the deepening of market relations under neoliberal globalisation and the ways through which peasant petty production is getting transformed, as well as

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[8] There are, however, important differences between primitive accumulation as formulated by Marx and the ways through which accumulation by dispossession has been conceptualized and applied to concrete cases by David Harvey (Glassman, 2006 and Harvey, 2003).

[9] Due to 'land reforms and other dynamics of capitalist restructuring and accumulation', Bernstein argues, '*predatory landed property has largely vanished as a significant economic and political force by the end of the 1970s*'. Hence, 'there is no longer an agrarian question of (global) capital, nor of "national" capitals (and states) in poorer countries today'(Bernstein 2006: 452-453*, emphasis in original*).

the resurgence of peasant movements in diverse contexts point to the continued significance of the agrarian questions. From the perspective of the third world peasantry, it has been argued that the agrarian question has not yet been resolved (Moyo, 2013). Carlson (2018) points to the continuing significance of the agrarian question as posed by Byres, on the ground that, although small holders increasingly produce for the market, wage labour has become more pronounced and there has been a decline in pre-capitalist production relations, the capitalist logic does not determine land possession of the independent producers. Hence, the differentiation is largely demographic, and there is hardly any dispossession via market forces.[10]

3. Primitive Accumulation and Dispossession

Among the key debates on the process of agrarian transformation has been the question of primitive accumulation as an ongoing feature of the neo-liberal, capitalist development process. In the classical literature, primitive accumulation was conceptualised a process that initiates the capitalist transformation.[11] For the successful emergence of primary or primitive accumulation of capital, three essential preconditions are to be satisfied: 'First, the direct producer, whether peasant or artisan, belonging to the pre-capitalist economy, must be dissociated from his or her means of production. Second, the means of production must come into the possession of the capitalist. Third, the dispossessed peasant or artisan must then have no option but to become a wage labourer and sell his or her labour power to the capitalist' (Chaterjee, 2017: 3).

For capitalist or socialist transformations, primitive accumulation is a necessary precondition, notwithstanding the temporal and spatial variations in its manifastations (D'costa and Chakraborty, 2017). In the backdrop of large-scale land grabbing,[12] forcible occupation of land from peasant producers for development projects of diverse kinds, the question of primitive accumulation has returned to the forefront (Akram-Lodhi, 2012; Mollett,

[10] A fuller discussion on the validity of the empirical assertions by Carlson, would require a review of the mode of production debate in India, which is not being attempted here.

[11] According to Marx '[i]n Western Europe … the process of primitive accumulation has more or less been accomplished' (Marx, 1976: 932).

[12] Land grabbing is 'the large-scale state-supported enclosure of private and non-private lands by global agro-food, industrial and financial capital, often working with domestic partners, in order to expand dramatically the production of relatively cheap food and agricultural products for domestic and world markets' (Akram-Lodhi, 2012).

2016; White et al., 2012; Wolford et al., 2013). The frequency of large-scale investment in land deals in African, Asian and Latin American countries, following Harvey, have come to be seen as a response to the crisis of over-accumulation of capital at the metropolitan centres of capitalism. On the one hand, such deals were constructed as 'foreignisation of space' (Zoomers, 2010) and, by highlighting the manifold drivers, mechanisms, and implications of this process, placed the nation-state at the centre of the debate (Kaag and Zoomers, 2014; Zoomers and Otsuki, 2017).On the other hand, it provided the opportunity to re-evaluate the ideas of primitive accumulation as an *ongoing* feature of contemporary capitalism.

Inspired by the work of Rosa Luxemburg, this strand of scholarship, brought the question of the relationship between capitalist and non-capitalist economies to the centre of the understanding of neo-liberal globalisation (Wilson, 2012). As the widespread dispossessions around the world have come to be recognised as a feature of contemporary capitalism, primitive accumulation is increasingly being viewed as a *continuing* feature of capitalism. Summarising the three different views on primitive accumulation within the Marxian political economy tradition, (Ince, 2014:107-108) points out:

> 'A major thread of Marxian interpretation originating in the 1970s has treated primitive accumulation as a concluded phase in the development of capitalism, which historically preceded the emergence of capital's autonomous expanded reproduction (Wood, 2002)…. More recent scholarship, inspired by Rosa Luxemburg, has held that ongoing primitive accumulation is indispensable for capital's expanded reproduction, which depends on the capitalist domain's assimilation of a pre- or noncapitalist outside for maintaining conditions of profitability and realisation. In this account, primitive accumulation is cast as a cyclical process that intensifies notably during times of capitalist crisis (Arendt, 1968; Harvey, 2003; and Luxemburg, 2003). Finally, a third position construes primitive accumulation as immanent and ever-present in the capital relation, and posits the capital relation itself as nothing but the quantitative extension of the original separation of direct producers from the means of production (De Angelis, 2004, 2007).

An important aspect of the debate on primitive accumulation is the question of the inter-relationship between the capitalist and the non-capitalist spheres. While, Harvey's conceptualisation of accumulation by dispossession as a feature of advanced capitalism provides an umbrella concept to understand

diverse forms of dispossession, his characterisation of the process as primarily 'economic rather than non-economic', blurs the line dividing accumulation by dispossession and the normal expanded reproduction (Levien, 2018). Further, the framing of accumulation by dispossession as an outcome of over-accumulation of capital undermines the role of class conflicts in shaping the processes of accumulation by dispossession (Das, 2017). Adnan argues that while primitive accumulation can be regarded as a 'generic capitalism-facilitating process', accumulation-by-dispossession can be regarded as a specific manifestation of it (Adnan, 2017). Levien, questioning the assumption of 'historical inevitability' of dispossession, has argued that contemporary dispossessions, signal movements within the capitalist mode of production, rather than from pre-capitalist to capitalist mode of production (Levien, 2017).

The (often violent) conflicts around land acquisition, land grabbing and displacement, through-out the developing world, frequently justified in the name of economic development, underline the significance of Luxemburg's argument that '"Sweating blood and filth with every pore from head to toe" characterises not only the birth of capital but also its progress in the world at every step' (Luxemburg, 2003: 433). The role of the non-capitalist 'other' in the process of capitalist accumulation (Sanyal, 2014), is, thus, an important question to understand the contemporary capitalist accumulation.

4. Agrarian Crisis and the Agrarian Questions

In the post-reform period, Indian agriculture has undergone a prolonged period of crisis[13] (Reddy and Mishra, 2009). Agrarian distress has been theorised both as a transient, short-term crisis as well as a long-term systematic crisis. On the one hand, it has been narrowed down to deceleration in agricultural productivity, technology fatigue, increasing instability of output prices and even as a result of a temporary decline in credit availability. On the other hand, it has been described as a long-term crisis in agrarian and rural livelihoods under neoliberalism and globalisation.

[13] Farmer suicides are often the most widely discussed indicator of agrarian distress. Critiques point to the complexity of the reasons behind farmer suicides and raise doubts regarding its reliability as an indicator of distress. However, the regularities with which farmers' suicides have been reported various states (Basu et al., 2016; Mishra, 2014), as well as the newspaper reports on the circumstances under which individual farmers have committed suicides has led researchers to investigate the linkages between farmer's suicides and agrarian distress. It is important to note that farmers' suicides are an extreme manifestation of the crisis, and the absence of suicides does not imply an absence of distress.

Undoubtedly, all these are specific aspects of the agrarian crisis, and require detailed analysis; but the structural aspects are fundamental to the understanding of the crisis (Radhakrishna, 2007). There are specific *regional* dimensions to the crisis as well. Agrarian crisis in contemporary India has diverse roots. While in some areas it is the result of agricultural backwardness, in some others agrarian crisis has been the result of the specific ways through which farmers have been incorporated into the capitalist system. Agrarian distress in rural India seems to have emerged under two different conditions, *distress under backwardness* and *distress under commercialisation* (Mishra, 2006). The crisis has been accentuated by neoliberal economic reforms since the early 1990s (Mishra, 2020a).

In large parts of India, farmers are deeply implicated in market relations. The differentiation of peasantry has not led to the polarisation of the rural society into a class of large, capitalist farms and a mass of wage labourers. Landlessness is increasing, and it is relatively higher among the marginalised social groups, such as Dalits. However, the preponderance of the small farms is the norm, albeit, with significant regional variations.[14] These small farms, using both family as well as wage labour, are deeply embedded in market relations. Most family farms, even in relatively less developed regions, cannot reproduce themselves without interacting with input and output markets. Wage labour is increasingly the norm, and permanent labour contracts are in decline. After a prolonged period of decline, during 2003-13, there has been an increase in the percentage of households leasing-in and leasing-out and also in the area under leasing-in.[15] In particular, tenancy is higher in the eastern states, and particularly in regions such as coastal Andhra Pradesh, Rayalaseema and coastal Orissa. Share cropping is gradually being replaced by fixed cash and fixed produce tenancy (Bansal et al., 2018). In areas of relatively advanced agriculture, some large farmers have started to lease-in land, although the lease market continues to be dominated by tenants who are landless or marginal farmers. By and large Indian agriculture continues to be dominated by petty commodity producers. However, a large section of the petty commodity producers are unable to survive solely within agriculture (Basole and Basu, 2011). In this sense, the agrarian crisis is the result of the neoliberal onslaught on petty commodity producers (Das, 2013). The persistence and survival of petty commodity production under global capitalism are among the fundamental challenges

[14] According to the NSS 70th round, the share of marginal holdings has increased from 53 per cent in 1971-2 to 75.41 per cent in 2013. During this period, there has been a steady decline in the share of all other size-classes; the decline has been sharper in the case of the larger sized holdings.

[15] Often, tenancy is more pronounced in irrigated agriculture than in rainfed agriculture (Mishra, 2008; and Patel and Mishra, 2019).

in understanding the implications of the ongoing transformation in rural India.[16] At the same time, there are early signs of depeasantisation from the early green revolution belt in north-western India (Singh et al., 2009).

Table 1: Distribution of Agricultural Households by Principal Source of Income

Size class of land possessed (Acres)	Cultivation	Livestock	Other agricultural activity	Non-agricultural enterprises	Wage/ salaried employment	Others*	All	SID†
< 0.01	1.6	22.9	2.7	10.8	56.4	5.5	100	0.614
0.01 - 0.40	42.1	4.8	1.2	7.5	35.2	9.3	100	0.682
0.41 - 1.00	69.2	2.3	0.9	3.6	20	4.1	100	0.478
1.01 - 2.00	83	2.5	0.9	3.2	8.6	1.8	100	0.302
2.01 - 4.00	85.9	2.4	1.1	1.6	7.1	1.8	100	0.256
4.01 - 10.00	87.9	2.7	0.5	0.9	5.9	2	100	0.223
10.00 +	89.4	5.5	1.5	1.8	1.7	0.1	100	0.197
All sizes	63.5	3.7	1.1	4.7	22	5.1	100	0.542

Source: NSS 70th Round.

Notes: * Others include pension and remittances;
† SID= Simpson's Index of Diversity.

Table 2: Distribution of Agricultural Households by Principal Source of Income by MPCE Classes

Decile class of MPCE	Cultivation	Livestock	Other agricultural activity	Non-agricultural enterprises	Wage/ salaried employment	Others*	All	SID†
1	63.2	2.1	0.7	2.8	27.6	3.6	100	0.522
2	63.8	3.5	1.1	3.3	24.4	3.8	100	0.530
3	66.2	3.1	0.6	5.3	21.7	3.1	100	0.510
4	63.6	3.6	0.6	5	22.2	5.1	100	0.540
5	63.1	2.9	0.9	3.7	24.9	4.4	100	0.536
6	64.1	4.7	0.7	3.5	22.7	4.2	100	0.532
7	65.4	3.1	0.6	5.8	18.5	6.5	100	0.529
8	63.9	3.8	0.9	5.3	21.7	4.4	100	0.538
9	65	4.2	1.5	4.5	19.5	5.2	100	0.533
10	57.8	4.9	2.4	6	20.4	8.5	100	0.610
All classes	63.5	3.7	1.1	4.7	22	5.1	100	0.542

Source: NSS 70th Round.

Notes: * Others include pension and remittances;
† SID= Simpson's Index of Diversity.

[16] Initially regarded as a transitory form, critical scholarship on petty commodity production (PCP) has increasingly focused on its relationship to capitalist transition (Jan and Harriss-White, 2019). Barbara Harriss-White has drawn particular attention to the changing linkages between PCP in agriculture and in non-agriculture to understand accumulation under capitalism in India and elsewhere (Harriss-White, 2012, 2016). For a different interpretation of PCP, see, Bhattacharya (2014).

Table 3: Distribution of Agricultural Households by Principal Source of Income in the States of India

States	Cultivation	Livestock	Other agricultural activity	Non-agricultural enterprises	Wage/ salaried employment	Others*	All	SID†
Andhra Pradesh	59.2	4.6	1.6	3.5	28	3.1	100	0.567
Assam	76.7	4.2	1.6	2.3	12.8	2.4	100	0.392
Bihar	69.7	3	0.2	5	16.3	5.8	100	0.481
Chhattisgarh	80.5	0	0.6	1.5	16.8	0.7	100	0.323
Gujarat	58.4	9	0.7	3.7	26.7	1.4	100	0.578
Haryana	60	9.1	0	4.7	23.6	2.6	100	0.573
Jharkhand	72.5	0.1	0.8	4.6	18.6	3.5	100	0.436
Karnataka	69.4	4	3.1	2.4	19.3	1.7	100	0.478
Kerala	16.1	6	16.9	13.4	29.9	17.6	100	0.804
Madhya Pradesh	75.3	2.5	0.1	0.6	20.4	1.1	100	0.391
Maharashtra	71.7	2.7	0.5	4.9	18	2.2	100	0.450
Odisha	60.2	1	1.2	7.3	25.9	4.3	100	0.563
Punjab	45.6	9.2	0.8	5.1	31.9	7.4	100	0.674
Rajasthan	45.6	6.4	0.8	5.5	33.4	8.2	100	0.667
Tamil Nadu	54.8	10.2	1.1	2.3	29.3	2.3	100	0.602
Telangana	86.8	1.8	0.5	1.8	6.2	2.9	100	0.241
Uttar Pradesh	65.2	3.1	0.2	5.1	18.7	7.6	100	0.531
West Bengal	55.8	1.2	1.7	8.3	26.8	6.3	100	0.606
All India*	63.5	3.7	1.1	4.7	22	5.1	100	0.542

Source: NSS 70th Round.
Notes: * Others include pension and remittances;
† SID= Simpson's Index of Diversity.

In many parts of rural India, increasingly agriculture is not the only source of livelihoods- both for the rich as well as for the poor peasants. This growing significance of the non-agricultural income and occupations of the rural economy, which have been noted both in the large-scale secondary data and micro-studies, calls for a nuanced understanding of the process of the agrarian transition in the regional contexts.

Tables 1-3 present the extent of diversification of agricultural households. The tables do not indicate the composition of the income of agricultural households, but the distribution of households according to their principal source of income. Nevertheless, it captures the extent of diversification of the agrarian economy. Among those having less than 1ha of land, agriculture and crop cultivation are not the main income source. A majority of landless and near-landless households derive their income mainly from wages. The share of those who have reported cultivation as their principal source of

income increases with the size of land possessed. In terms of overall diversity index, it is those at the bottom who are more diverse. Such diversity does not show a definite pattern across MPCE classes, except that the highest MPCE class is also the more diversified. Such bimodality indicates an important aspect of the double-sided nature of the rural non-farm economy, i.e. it is simultaneously distress-driven and accumulative. The state-level picture shows higher diversity in relatively developed states such as Kerala, Punjab, Haryana, Tamil Nadu and Gujarat, but also in less developed states such as Odisha and Rajasthan, indicating diversity under higher levels of development, and also distress diversification.

A macro-level characterisation of the agrarian transition in India typically overlooks some equally important dimensions of regionally embedded agrarian transformations (Harriss-White, 2017). A regionally differentiated under-standing of the agrarian transition, for example, clearly points out that in large parts of eastern, north-eastern and central India dominated by tribal populations, various forms of non-capitalist and pre-capitalist production and exchange relations coexist with increasing commercialisation and capitalist transformation. At the same time, as Jens Lerche had pointed out in the context of western and eastern Uttar Pradesh, it would be too simplistic to categorise the less developed areas as semi-feudal and the areas with advanced agriculture as capitalist (Lerche, 1998). Although there is a growing consensus that capitalism as a system can exhibit a great deal of diversity and that the semi-feudal mode of surplus extraction has largely been transformed (Harriss, 2013; Lerche et al., 2013; Reddy, 2016; and Shah and Harriss-White, 2011), some scholars have argued that Indian agriculture continues to be characterised by semi-feudalism and neoliberalism has further strengthened the pre-capitalist production relations (Kar, 2018).[17]

Conflicts over land have become ubiquitous, and these struggles are not just confined to movements against land acquisitions, but also against local moneylenders, land grabbers and landowning classes. The institutional diversity that characterises agrarian transition has probably been underestimated not only in the mainstream literature in economics but also in the political economy literature. 'Any attempt to account for regional diversity in capitalist transitions', however, 'is confronted with the problem of striking a balance between the universalising tendencies of capital on the one hand and the specific characteristics of the regions on the other. The

[17] For a critique of the semi-feudalism argument see Brass (2011: 75–103).

regional trajectories of capitalist transition are shaped by the mutual interactions of such forces at multiple spatial scales' (Mishra and Harriss-White, 2015).

Insights from field surveys in various parts of India suggest that even in the period of agrarian crisis, there are new opportunities for some to expand their scale of operations or to move into new, more profitable crops, even though small and marginal farmers get marginalised in the process (Ramachandran et al., 2010; Sen and Raju, 2006 and Sinha, 2020). This has, at times, led to the creation of new forms of production organisations and spatial linkages. In the absence of state support, and non-availability of adequate institutional credit, commission agents and input dealers have emerged as the prime suppliers of informal credit to farmers (Gill, 2016). In some cases, they are the chief source of seeds, technology and information for farmers through tied contracts that give them additional leverage in deciding output prices (Vicol, 2019). Thus, on the one hand, there is increasing misery of the petty producers, and on the other, there is greater integration of the agrarian economy with the capitalist economy. In all these cases, petty commodity production is increasingly becoming the norm, but under very diverse conditions and has different implications for the agrarian classes.

Similarly, the role of the non-farm economy for the agrarian transition needs further contextualisation. Field survey data indicates rural agrarian markets are characterised by a range of personalised and interlocked transactions (Mishra, 2008). Informal credit markets continue to play an important role in financing productive farm expenditure, consumption short-falls and also in mitigating catastrophic health expenditures. Further, the emergence of traders, input-dealers and commission agents as the key source of informal credit for small and marginal farmers has come out as a key feature in many agrarian contexts.

The agricultural surplus is being invested both within agriculture in some areas (such as vegetable cultivation, floriculture, and in the cultivation of other high-value crops), but the bulk of agricultural surplus is being invested in non-agriculture, including in transport, petty trading and education for children. The intergenerational rupture is quite clear- younger people from relatively better-off households in rural areas are not interested in continuing with cultivation. A class of non-cultivating land-owners have emerged in rural areas who are either renting out their land or are keeping it for speculative purposes (Vijay, 2012). For the labour households as well, agriculture is no longer the only or main source of their livelihoods. Rural labour households

have been found to have diversified into rural non-farm activities of diverse types, sometimes combining it with seasonal outmigration. Insights from our field survey suggest that circular migration has come to play a durable, significant role in household survival strategies in areas of rain-fed agriculture (Mishra, 2016). It is through these channels of seasonal and circular migration that labour from less developed regions of India is getting integrated with global capitalism. This outmigration of labour from rural areas and agriculture is at times being celebrated as the much-awaited structural transformation. However, it is important to note that a large section of such migrants is vulnerable migrants, working in the urban informal economy under extremely precarious conditions (Mishra, 2020b and Srivastava, 2019).

While it is tempting to club all these developments as part of the ongoing process of capitalist restructuring of Indian agriculture, there are several specificities that need to be integrated into the analysis before we do so. For example, in large parts of rural India, the continuing significance of primitive accumulation as a feature of capitalism gets manifested through the large-scale state-induced displacement of independent producers to meet the demand for land by mining, industrial, infrastructure, defence and conservation projects. This is often accompanied by the less abrupt but slow destruction of livelihoods through a variety of processes including deforestation, land degradation, pollution of water bodies, the encroachment of Common Property Resources so on and so forth.[18] There is an organic link between these gradual processes that create displacement-in-slow motion and large-scale land grabbing (Mishra, 2011). The low productivity, vulnerabilities and lack of agrarian dynamism that is created by the former often make land grabbing easier. Use of state power in these processes of accumulation-by-dispossession is of paramount significance.

Again, there are distinct elements of bondage and unfreedom that characterise labour contracts involving informal sector workers in general

[18] The forms of dispossessions vary both in terms of their key drivers as well as outcomes. Dominant classes under varied circumstances tend to dispossess the poor from collectively and privately owned property. The process of land grabbing by non-tribal landowners in scheduled areas in eastern and central India has continued despite legislative measures (Planning Commission, 2008); in Chilka lake in Odisha, the privatization of fishing rights has continued unabated (Adduci, 2009, 2020); in northeast India, tribal elites have converted the common property to private estates (Mishra, 2018); and in lower Chambal valley in Madhya Pradesh ravines have been levelled to create private land (Pani, 2016, 2018).

and seasonal and circular migrants in particular (Mishra, 2019, Prakash, 2009). The fact that they are employed in projects and enterprises linked to state-owned enterprises global multinationals have not altered the essentially precarious nature of their employment. The existence of such unfree labour under globally integrated capitalism raises further questions regarding the nature of labour relations compatible with capitalism (Brass, 2011; Guérin, 2013, Rioux et al., 2020).

In the globalised economy 'old' institutions and identities are not simply replaced by market institutions leading to institutional convergence, rather capital reworks them to facilitate surplus extraction, often giving such institutions a new salience and endurance[19] (Harriss-White, 2005). The fragmentation of the informal labour market along the lines of caste, religion, gender and ethnicity is a case in point.[20] Field survey in tribal villages in Arunachal demonstrated that along with the destruction of old institutional forms and creation of new ones facilitating the market transaction, there is ample evidence of institutional hybridity, adaptation and complexity (Harriss-White, 2009). At times, these diversities are deliberately preserved through state-action. This diversity is not simply a remnant of the past, nor simply a deviation or an unfinished business of capital - it is central to understand contemporary capitalism (Mishra 2015a). The incorporation of labour from rural India in the informal economy point to the ways through which class relations are mutually constituted with caste, tribe, gender and region-based oppression, leading to 'conjugated oppression' of labour (Lerche and Shah, 2018).

5. In Lieu of a Conclusion

The contemporary significance of the debates on the agrarian questions are not primarily based on the accuracy of the predictions on the outcomes of

[19] A different interpretation of the 'non-capitalist' sector/ institutions is found in Kalyan Sanyal's writings. He argues that this non-capitalist 'other' is a product of capitalism itself, rather than the remnants of the past (Sanyal, 2014).

[20] 'An unromantic understanding of markets needs a mode of enquiry which is open to the uniqueness of space, time and society, the richness of motivation, the non-existence either of perfect competition or of equilibrium and the pervasiveness and many forms of power' (Harriss-White, 2005: 8-9). There have been very few studies on rural markets which are informed by such a layered understanding of markets.

capitalist transformation, rather the key insights of the old debates are methodological. Against the ubiquitous assumptions of the existence of well-functioning markets, as a realm of impersonal, asocial and ahistorical space for voluntary transactions, the agrarian questions point to the intrinsic interconnections among the economic, political and social processes in determining the outcomes of economic transformation. The analysis of agrarian change in India in the broad political economy tradition not only provides scopes to relate micro level changes with the macro processes of capitalist transformation but also brings to the forefront the questions of power relations that are, more often than not, ignored in the mainstream analysis of agriculture as another sector in a market economy. A class-based approach to agrarian accumulation raises questions that are difficult to answer, particularly on the basis of micro-level empirical research, but it also keeps the analysis grounded and sensitive to the diverse forms of exploitation that characterise capitalism as a system.

The issues related to the contemporary agrarian transformation in India discussed here are by no means exhaustive, rather it points to some of the questions that deserve the attention of scholars of agrarian and rural transformation. It is important to remember that what we are witnessing are processes of *capitalist* transformation.The specific manifestations of these processes with all their departures, ambiguities and idiosyncrasies need to be studied in diverse empirical settings (Li, 2014). The persistence of peasant petty production in Indian agriculture, as well as the coexistence and interactions among capitalist and non-capitalist institutions, have raised questions regarding the defining characteristics of capitalism, particularly in relations to unfree labour. With the growing, economic and social interactions between rural and urban India, rural and urban production and consumption patterns are getting intertwined. Many rural households are not only dependent on multiple sources of livelihoods; they have also turned into multi-local households. As outmigration of labour from cultivator and rural labour households to the urban informal economy is gradually increasing, the implications of such diversification for petty commodity production remains open-ended. Along with that, the phenomenon of 'ruralisation of capital', partly in response to urban congestion, cost escalations and infrastructure development, is going to impact the agrarian and non-agrarian accumulation processes in rural India. As labour gets absorbed in the rural and urban economies under precarious conditions, the fragmented nature of labour

circulation is likely to shape the conditions of work, employment and survival of a vast segment of the labour force in India. The nature of social reproduction of labour, whether in urban or in rural India, would have a bearing on the nature of labour regimes under a globally integrated capitalism. Further, the forms of exclusion and adverse inclusion based on caste, ethnicity, race, gender, region and language would mean differentiated outcomes for labour. These questions cannot simply be compartmentalised to disciplines and sub-disciplines, nor it could be meaningfully analysed through the binaries of agriculture and non-agriculture, rural or urban. The contours of the evolving agrarian questions of the twenty-first century India would inevitably require a broader analytical frame that can link the present with its histories.

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Article

Environment–Growth Dilemma and Sustainable Development: Walking the Tightrope*

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Abstract

The debate on environment-growth trade off and how to make a balance between these two conflicting goals has been the subject matter of numerous discussions and debates since 1970s, especially after the 1972 United Nations conference on Human Environment, where the nexus between poverty and pollution was mainstreamed. Climate change, air and water pollution, soil degradation, bio-diversity loss, species extinction, etc. are some of the environmental crisis before the world community and need to be addressed to attain the Sustainable Development Goals, which require a balancing of the development and environment goals. Endogenous growth models prove that development and clean environment, particularly reduced emission, are compatible under certain circumstances. This paper argues that even in case of developmental projects involving resource use conflicts, development and environment can be made compatible provided the issue is looked at as policy balance rather than a policy dilemma. Case studies from India are used to bring home the points.

Keywords: Endogenous growth models, Environment development trade off, Poverty and pollution, Sustainable development goals, Water use conflicts, Odisha, Bhitarkanika

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1. Introduction

Healthy environment and development were considered incompatible at the initial stages of development and agricultural and industrial expansion in developing countries were feared to be environmentally damaging and bring in catastrophic loss to society as discussed in the (Limits to growth theory by Meadows et al., 1972, 2005). The much talked about Environmental Kuznets Curve (EKC) hypothesis explains this phenomenon with the assertion that the environmental quality deteriorates at the early stages of economic growth and improves subsequently at the later stages with increase in income as willingness to pay for better environmental quality increases (Dasgupta et al., 2002, Dinda, 2004). Thus, environmental damage seems to be a must if economic development has to take place, though, it may differ by how much and for how long depending on the initial conditions. This conclusion was easily established with the help of exogenous growth models that assumed economic development to be resource intensive and directly dependent on exogenous factors, e.g., natural resources, accumulation of human made capital, etc. However, subsequent work went beyond the issues of incompatibility between development and environment, and focused on the complexity of the relation (Motel et al., 2014). Beckerman's (1992) well-articulated piece argued that resource constraints not necessarily impose a 'limits to growth' and subsequently, much attention has been paid to issues like optimal rate of extraction, role of markets, etc. With the use of endogenous growth models that assumed growth to depend more on endogenous factors like investment in human capital, innovation, knowledge, etc. environment and development no longer seemed to be incompatible.

When exogenous growth models showed the short term effects of growth in terms of negative externalities, endogenous growth models had a long run perspective and were able to show the positive effect of investment on environment, e.g. abatement expenditures, on the long run growth path (Barbier, 1999). Using endogenous growth model, Xepapadeas (2005) established three important points: (i) with no investment in pollution abatement, sustained growth is suboptimal and growth and environment are not compatible, even under constant emission rate; (ii) with investment in abatement and development of clean technology, sustained growth is optimal with either no pollution accumulation or some fixed unit pollution, depending on the productivity of abatement capital; and (iii) if intellectual capital has public goods characteristics- under certain structures of preferences and

technology, output, capital, consumption and knowledge grow, pollution decreases, environmental quality improves and environmental policy supporting social optimum increases growth.

Researchers have concluded that a decoupling of environmental effects from growth is possible, just as sustainable growth is possible; this however requires a much more ambitious environmental policy than what we have seen implemented to date (Sterner and Coria, 2012). One of the best examples of environment and development compatible growth is witnessed in Norway, where economic growth has been matched with significant reductions in levels of PM 2.5, demonstrating that environmental costs are not an inevitable result of economic progress (Dang and Serajuddin, 2020). Choice of growth path and priority given to environment are important determinants of development-environment relation and development, not necessarily has to be environmentally damaging even in case of developing economies. Resources can be allocated rationally and used sustainably to ensure minimal damage to the environment as the economy grows. Natural resources are limited and have many competing uses and sometimes policy makers are coerced to choose between developmental activities vs. biodiversity conservation. However, given the political will and sound research backing, a balance can be ensured that helps maintain the environment while development takes place. The case study from Odisha explains this balance for one competing resource, fresh water.

2. Development of Brahmani-Baitarani Basin and Ecological Health of Bhitarkanika National Park

Fresh water is a critical resource giving rise to many conflicts among competing users like water supply, hydropower, environmental preservation, etc. Coastal mangrove forests need fresh water for survival and growth, but are usually treated as residual users of river water after all upstream societal water demands are fulfilled. Construction of irrigation projects, barrage, channelizing and diversion of river water has resulted in dying or serious degradation of mangrove forests as witnessed in Indus delta or Indian parts of Sundarbans (Selvam, 2003; Gopal and Chauhan, 2006; Mukhtar and Hannan, 2012; Islam and Gnauk, 2011; Giri et al., 2015). Then question comes whether Bhitarkanika mangrove region in Odisha will face similar threats if the proposed and ongoing developmental plans of Government of Odisha for Brahmani and Baitarani river basins are implemented in coming years (GoO, 2015) as both these rivers form the lifeline of Bhitarkanika.

The Bhitarkanika region, located within 20°452 N and 87°02 E, is endowed with critical ecosystems that provide lifesaving ecosystem services to people (Das and Vincent, 2009; Das and Crepin, 2013) and needs to be conserved and conserved healthy, at any cost. It is a wonderland of rich biodiversity[1] and is a sanctuary, a national park, a Ramsar site, a biosphere reserve and above all, the most famous tourist attraction for nature lovers. This sanctuary is located at the confluence of the Brahmani and Baitarani rivers and the Bay of Bengal and gets enriched from the perennial flow of fresh waters from these rivers. Mangroves of Bhitarkanika play critical role in assuring livelihood security and safety of people living in that region through the provision of ecosystem services. Mangrove ecosystem is precious, especially for the Odisha region which is the most cyclone prone region in India and as pointed out by Das and Vincent (2009), they provide lifesaving storm protection services and need to be protected at any cost.

The area has been facing threats from different sources like developmental activities, and anthropogenic pressure from excess livelihood related exploitation of both water and forest resources from the park. In recent years, there have been intensification of economic activities upstream, especially the mining and industrial activities due to proposed industrial city at Kalinga Nagar and multipurpose hydro power irrigation dams on the rivers, and these may pose a serious threat to the biodiversity of the area. This paper investigates the impact of industries and irrigation projects on ecology of Bhitarkanika through ecological modeling and simulates the effect of these developmental activities on the ecology of the park using flow of water as the competing resource. I first assess the magnitude of the problem, then establish the linkage between ecological health and water, and then provide suggestions for maintaining balance between economic objectives and ecological security.ng and ind projet will modelto beeviewed journals.

2.1 Fresh Water and Mangrove Diversity

Poor water quality in mangroves is usually caused by low fresh water flow, release of municipal effluents and industrial discharges (Lawson, 2011) and the associated impacts can be severe.

[1] http://odishawildlife.org/bhitarakanika.html, accessed on July 18, 2017.

2.1.1 Release of Effluents into Mangroves Swamps

Mangrove has natural ability to act as a sink of anthropogenic and industrial pollutions, provided the pollution level is within a threshold. Excess flow of nutrient and heavy metal pollutants can give rise to asphyxiated swamp, where dissolved oxygen (DO) falls. Accumulation and bio-magnifications of heavy metals in mangrove swamps cause reduction of photosynthesis, growth, and biomass and increases mortality of the mangroves (Maiti & Chowdhury, 2013; Banerjee et al., 2012; Saifulla et al., 2002).

Unfortunately, there has been growing evidence of metal contamination in mangroves in the world including India (Banerjee et al., 2012; Agoramoorthy et al., 2007). Behera et al. (2014) has shown that industrial and urban effluent load is fast polluting the estuary waters in the deltaic zone of Mahanadi, which feed and sustain the mangrove forests of Mahanadi delta and partially feed the Bhitarkanika National Park through Birupa River. The study shows the water quality of Mahanadi River to have higher residue of chloride, phosphate and magnesium as well as total dissolved solids (TDS) at different sites, which are a direct result of terrestrial runoff, industrial effluent, sewage, and organic and inorganic inputs being exported from agricultural land and urban areas in to the river.

2.1.2 Reduced Flow of Fresh Water into Mangroves

Upstream projects like construction of dams or other water diversion activities impede the flow of fresh water to the mangrove region. Primarily the impact of reduced fresh water flow on mangrove health comes via increased salinity and reduced flow of sediments reaching the mangroves. The regulation of river flows by a series of dams, barrages and embankments for diverting water upstream for various human needs and for flood control have resulted in large reduction in freshwater inflow to Sundarbans and have seriously affected its biodiversity due to an increased salinity and reduced sedimentation (Islam and Gnak, 2011; Gopal and Chauhan, 2006). Species like *Heritierafomes* (locally called Sundari, from which Sundarbans derives its name), *Nypa fruticans* and *Phoenix paludosa* are found to be declining rapidly. The unexplained 'top dying' in local populations of *Heritiera fomes* is also being linked to fresh water reduction (Blasco et al., 2001). Decreasing fresh water discharges from the Indus River (from 140 to 40 million acre feet in last 50 years) after the dams has caused extensive degradation of mangrove forest of Indus Delta due to similar reasons (Giri et al., 2015; Mukhtar and Hannan, 2011).

Dams and diversionary barrages affect bed load and transport of suspended sediments during the flood season by capturing the material and preventing its uniform dispersal over mangrove areas. Such activities have resulted in the surviving Indus Delta mangroves being sparse and stunted. Thus, changes in quality and quantity of fresh water supply to mangroves result in sparse and stunted growth, decreased biodiversity, decrease in flagship mangrove species that lead to decreased flow of ecosystem services from mangroves.

2.2 Anthropogenic Pressure on Bhitarkanika Mangroves

Till date, Bhitarkanika mangroves in Odisha are seen as a more or less stable ecosystem compared to the mangroves elsewhere in India and even globally. Upadhyaya and Mishra (2014), who scientifically studied the mangrove ecosystem of Bhitarkanika sanctuary in detail, observed that *Exocaria agallocha*, *Avicennia officinalis* and *Hertiera fomes,* which are some of the flagship species of mangroves' good health, accounted for more than 50 per cent of the total Importance Value Index (IVI) in Bhitarkanika sanctuary. The mangrove species of Bhitarkanika ecosystem have much higher complexity index values than other mangrove ecosystems of the world, which indicates that this ecosystem is favorable to a diversity of mangrove species. The rich mangrove ecosystem of Bhitarkanika has also been accounted for by others (Upadhyaya et al., 2008; Mishra et al., 2005). Mishra et al., (2005) observed that as *Heritiera fomes* is still a dominant species which means salinity has not increased in the region. These evidences suggest that Bhitarkanika mangrove ecosystem is rich and little damage has been done till now.

However, there are some evidence of threats to the ecosystem from anthropogenic activities like pollution and water diversion. It is observed that chemical composition of sediment and leaves in Bhitarkanika are much higher from riverine input and flood nutrients during monsoon (Sarangi et al., 2002). Though Brahmani and Baitarani rivers have extremely variable trace of element concentrations due to industrial discharge of effluents upstream (Chauhan and Ramanathan, 2008), water quality is reported to be either good or fair based on CWIQ[2] values at Pottamundai, Aul, Chandbali and Dhamra measuring stations (SPCB, 2016). Anthropogenic

[2] CWQI stands for Canadian Water Quality Index which categorizes water quality into fiver groups based on a scale of 0-100. Five categories are Excellent (95-100), Good (80-94), Fair (60-79), Marginal (45-59) and Poor (0-44).

pressure have reduced the mangrove area by 1534 ha with a corresponding increase of agricultural area by 2436 ha in Bhitarkanika region (Reddy et al., 2007). Thus, there exist anthropogenic threats to mangroves of Odisha, but the threats are somewhat marginal and the system is more or less in stable states as fresh water dependent species are present in abundance.

2.2.1 Anthropogenic threats to Bhitarkanika in future

There are 40 major irrigation projects, 60 major dams and many minor irrigation networks on Brahmani Baitarni river basin. The basin falls under the jurisdiction of three state governments and forms a development priority area, especially for the Odisha government. The construction of water dependent projects in the region, as proposed by the government, is likely to decrease the flow of fresh water to the park and increase the salinity as has happened in Sundarban and Indus Delta areas. This paper evaluates the historical changes in mangrove cover of Bhitarkanika, establishes the link between mangrove species and fresh water availability and then, tries to approximate the impact of future development of the river basins on the health of the Bhitarkanika mangroves.

3. Findings

Figure 1 shows the Bhitarkanika study area and the basin of the rivers that feed into the area. The Brahmani-Baitarani basin falls under the administrative regions of three state governments, Chhatisgarh, Jharkhand and Odisha. This study, however, was confined to only Odisha region as the other states were far from the Bhutarkanika park.

Figure 1: Study Area

3.1 Present status and Future Scenario of Fresh Water Discharge at Bhitarkanika Park Boundary

First, the present status of water discharge in the areas is talked about, which is then followed by change in species composition of the mangroves to see if Bhitarkanika has really been on a stable state. The future consequences of reduced water discharge on mangrove species is discussed afterwards.[3]

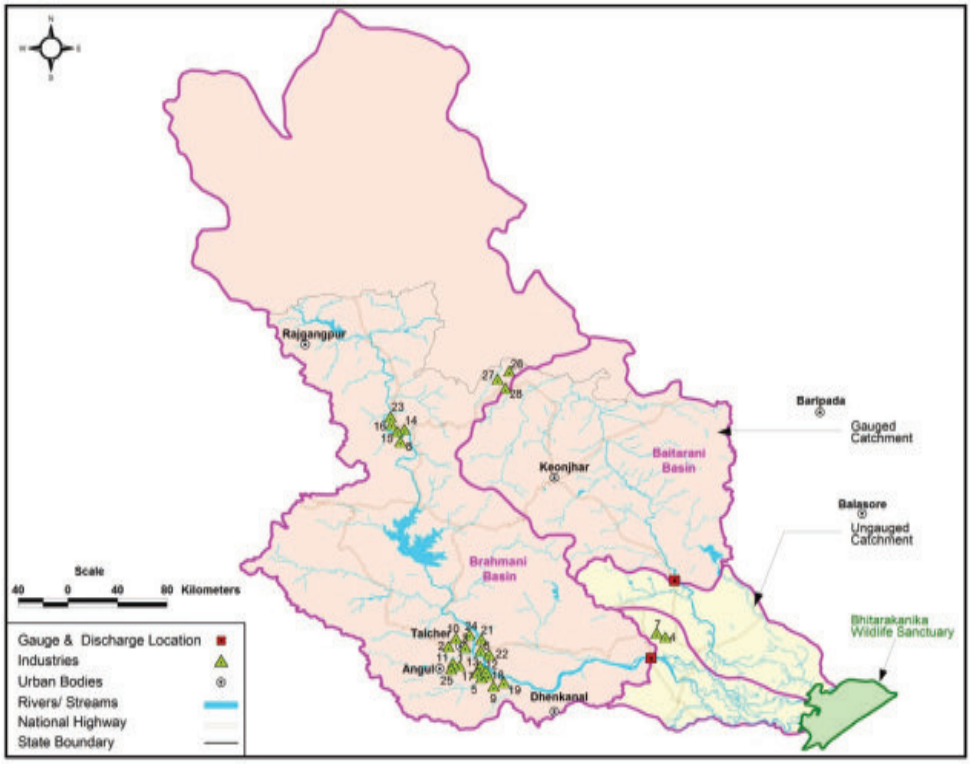
3.1.1 Present Status of Water Discharge

Bhitarkanika Park receives fresh water from Brahmani and Baitarani rivers which flows through Chhattisgarh, Jharkhand and Odisha before meeting Bay of Bengal at Bhitarkanika. The basins of both these rivers are mostly agricultural, the percentage of agricultural households being 58 in Bhahmani basin and almost 90 in Baitarani basin. Bhrahmani has few industrial units and the industrial city of Rourkela in its basin area whereas Baitarani basin has mainly agriculture surrounding its path even though it is endowed with rich mineral cover. Baitarani basin is one of the most backward regions of the state with minimum infrastructure facilities available.

There are a total number of 28 irrigation projects (13 operational and 15 proposed/work in progress) in both the river basins and these are the main water users of the area. Of the 28 operational/proposed projects, only two are hydro power projects and rest are for irrigation. There are industries being proposed, mostly in Brahmani basin (Figure 2), for the development of area and are in different stages of execution. As per the future water use plan of both the river basins, the water extraction from the rivers is going to increase many times in future. Tables 1 and 2 show the present and future water use of Brahmani and Baitarani rivers respectively. The future demand on water shows the predicted need of water as laid down through the master plan by the end of the planning horizon year 2051.

[3] Most of these work related to hydrological modelling was done with help from Foundation for Environmental & Social Research (FESR), Bhubaneswar, Odisha'

Figure 2: Industrial Activities in the River Basin



Source: Nihar Das, FESR, Bhubaneswar

Table 1: Present and Future (2051) Demand for Water in the Brahmani Basin

Irrigation (Surface)	Volume (Mm^3) in 2001	Volume (Mm^3) in 2051
	1326.75 (44.55)	7362.45 (66.03)
Major and Medium	464.20 (15.59)	1420.00 (12.73)
Minor (flow)	400 (13.43)	930 (8.34)
Minor (lift)	139 (4.67)	222 (1.99)
Minor Lift (GW)		
Drinking water & Industrial		
Surface	442.57 (14.86)	945.37 (8.48)
Ground	205.83 (6.91)	270.80 (2.43)
Total	2978.35	11150.62

Source : *3rd Spiral Study Report of Brahmani Basin Plan,* Orissa Water Planning Organization, Government of Odisha

Note: Figures in parentheses are percentage demand.

Table 2: Present and Future (2051) Demand for Water in the Baitarani Basin

Irrigation (Surface)	Volume (Mm^3) in 2001	Volume (Mm^3) in 2051
Major and Medium	1520.6 (64.6)	3704.92 (71.29)
Minor (flow)	165.31 (7.02)	620.99 (11.95)
Minor (lift)	257.74 (10.95)	270.63 (5.21)
Minor Lift (GW)	142.52 (6.06)	149.65 (2.88)
Drinking water & Industrial		
Surface	98.94 (4.2)	230.81 (4.44)
Ground	168.72 (7.17)	219.80 (4.23)
Total	2353.83	5196.80

Source : *3rd Spiral Study Report of Brahmani Basin Plan,* Orissa Water Planning Organization, Government of Odisha

Note: Figures in parentheses are percentage demand.

Comparing tables 1 and 2, the demand for water from Brahmani and Baitarani rivers in 2051 is going to increase by 274.38 per cent and 220 per cent respectively, over the present demand and the situation looks alarming. Along with this, there are industrial centres and urban bodies and with increase in population and change in life style, water demand is likely to go up much further.

3.1.2 Projection of Future Fresh Water Availability at Bhitarkanika

In order to assess the availability of fresh water flow at the boundary of Bhitarkanika, the whole of Brahmani and Baitarani catchment is subdivided into two parts each, i.e., gauged and un-gauged catchment areas, based on availability of nearest Gauge and Discharge (GD) stations to Bhitarkanika.

As observed in Figure 2, most of the industries and urban centres are located within the gauged catchment areas for which the flow estimates were obtained from the GD Stations (Jenapur in Brahmani and Anandpur in Baitarani) that maintain time series data on water flow measures. Average flow measures from these stations over the period 2002-03 to 2011-12 have been used in calculating the fresh water availability at Bhitarkanika boundary. This is done separately for monsoon and non-monsoon seasons.

For the un-gauged catchment, different runoff coefficients for different land users are used to measure the water level on the rivers. Three land uses - settlement, agriculture and forest land, are used for un-gauged area and runoff

coefficients used for these areas are 0.30, 0.45 and 0.15, respectively.[4] Using the yearly average rainfall data for monsoon and non-monsoon seasons, the water flows in the rivers have been calculated. The total runoff for the catchment is calculated as shown in Equation 1:

$$R_{river} = Rain * \sum_{i} \beta_i C_i \quad (1)$$

Where, R_{river} is runoff to river, *Rain* is average rainfall in the season, C is the catchment area under a particular land use, i is the type of land use (forest, agriculture or settlement), and β is the run off coefficient for the i^{th} land use type. Based on this formula, the flow is measured for both the rivers and then the total flow at Bhitarkanika boundary. Table 3 shows the average fresh water availability at the Bhitarkanika park boundary in a year during the monsoon and non-monsoon seasons. On average, a total volume of 23551.3 million cubic meters (mcm) reaches the park boundary in a year of which 19924.4 mcm (85%) comes during monsoon season and 3625.6 mcm (15%) during non-monsoon season.

Table 3: Average Annual Flows at Bhitarkanika Boundary at Present

	River basins and period	Flow in MCM (million cubic meter)
	Measures for Brahmani river	
1	Average Flow at Jenapur (Gauged catchment of Bhitarkanika in Brahmani basin)	
1.1	Monsoon	13209.4
1.2	Non-Monsoon	2467.4
1.3	Annual	15676.9
2	Un-gauged catchment of Bhitarkanika in Brahmani basin	
2.1	Monsoon	1084.652
2.2	Non-Monsoon	394.332
2.3	Annual	1479.939
	Measures for Baitarni river	
3	Average Flow at Anandpur (Gauged catchment of Bhitarkanika in Baitarani basin)	
3.1	Monsoon	4306.4
3.2	Non-Monsoon	237.3
3.3	Annual	4543.9
4	Un-gauged catchment of Bhitarkanika in Baitarani basin	
4.1	Monsoon	1323.929
4.2	Non-Monsoon	526.591
4.3	Annual	1850.520
5	**Total Flow at Bhitarkanika Boundary** (Brahmani and Baitarani - Gauged and Un-gauged)	
5.1	Monsoon	19924.38
5.2	Non-Monsoon	3625.623
5.3	Annual	23551.26

[4] The runoff coefficients are taken from the Fact Sheet-5.1.3, The Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment, State Water Resources Control Board, California Environmental Protection Agency, 2011.

3.1.3 Water Availability in 2051

The future water scenarios for the gauged area are taken from the government of Odisha's water department publication[5] and generated for the un-gauged area using runoff coefficients under different scenario.

3.1.3.1 Gauged Area

Table 4 shows the outflow of water at Jenapur GD station on Brahmani river. We can see that out flow of water at Jenapur decreases to 30.97 per cent of the available water in 2051 from 79.60 per cent in 2001 mainly due to higher anthropogenic usage of water resources.

Table 4: Brahmani River Water Budgeting Simulation Result for Present (2001) and Future (2051)

	Average Inflow in 2001 = 8946.01 mm^3	Average Inflow in 2051 = 17077.1 mm^3
Consumptions	% of Inflow	% of Inflow
Agriculture	10.22	30.97
PWS uses	0.90	2.42
Evaporation	3.08	4.22
Reservoir storage	0.14	0.34
Local consumption	6.07	10.77
Outflow	79.60	30.97
Total	100	100

Source: 3rd Spiral Study Report of Brahmani Basin Plan, Orissa Water Planning Organization, Government of Odisha

Table 5 shows such calculations for gauged basin areas of Baitarani river. If shows that the outflow would be reducing from 61.69 per cemt in 2001 to 35.10 per cent by the end of year 2051 at Anandpur GD station due to developmental and other anthropogenic activities, mostly agriculture and local consumption, similar to what was witnessed in case of Brahmani river basin. Next, such calculations are shown for un-gauged areas of both the rivers.

[5] The data is generated with the help of computer simulation using historical data on water uses and availability and projected uses depending on the river basin developmental plan of the government of Odisha. Water budgeting for the basin has been done using RIBASIM computer model for both present and future scenario. The system was simulated for a period of 29 years 1971-72 to 1999-2000 taking existing water resources projects and actual principal demand nodes into consideration.

Table 5: Baitarani River Water Budgeting Simulation Result for Present (2001) and Future (2051)

	Average Inflow in 2001 = 7296.3 mm^3	Average Inflow in 2051 = 7994.28 mm^3
Consumptions	% of Inflow	% of Inflow
Agriculture	16.53	36.14
PWS uses	0.27	0.67
Evaporation	0.71	3.33
Delta storage	12.85	9.35
Local Consumption	7.93	15.40
Outflow	61.71	35.11
Total	100	100

Source: 3rd Spiral Study Report of Brahmani Basin Plan, Orissa Water Planning Organization, Government of Odisha

3.1.3.2 Un-gauged Catchment Area

The river basin developmental plan of the Government of Odisha does not mention any future industrial/developmental activity inside the un-gauged catchment areas of Brahmani and Baitarani rivers. So water runoff from the area for the year 2051 is taken to be same as estimated in Table 3 for recent years. Table 6 shows the fresh water availability at Bhitarkanika boundary – in 2001 and in 2051 under the development plans as described above and in 2051 if some more constraints are witnessed.[6] Table 6 presents an alarming situation for the park as fresh water availability is going to be reduced significantly, i.e., by more than 40 per cent in future. These are also shown in Figure 3 below. The future water availability doesn't seem to be impacted much by increase in population (rural population), but less than proportionately by marginal changes in rainfall due to climate change. A 10 per cent decrease in rainfall will reduce water availability by 6 per cent in most cases as runoff from un-gauged areas constitute a small proportion compared to water discharge from gauged stations. Increase in rural population is represented by increase in agricultural areas, which have high runoff coefficients and thus, help release more water to rivers. Increase in urban population have strong detrimental effect on water availability in rivers. Developmental uses pose the maximum impact as witnessed in case of flow from Brahmani river in which basin maximum developmental activities are going to happen.

[6] I analyze water stress with constraints only for un-gauged areas as gauged area data are alll taken from secondary source.

Figure 3: Water Discharge at Gauge Stations on Brahmani and Baitarani Rivers, 2051 vs. 2001

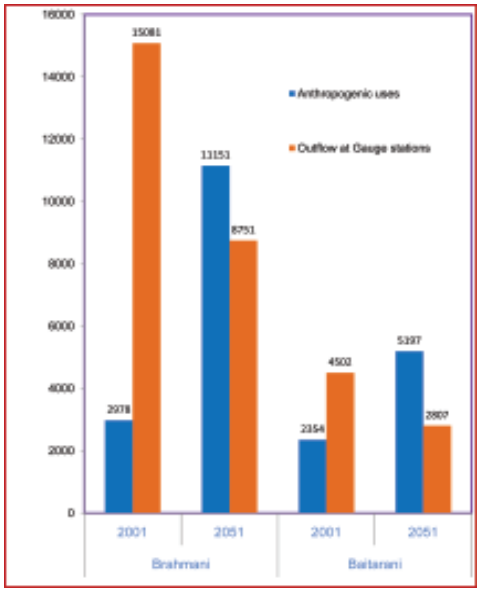


Table 6: Water Discharge at Bhitarkanika Park during Monsoon and Non-monsoon (in MCM)

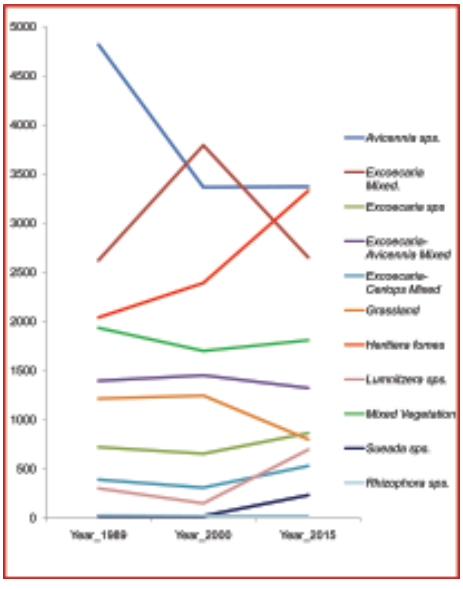
River basin and period		Water availability in 2001	Water availability in Future (2051)			
		Present (2001) (gauged + un-gauged area)	Future (2051)	Future with 10% decrease in rainfall	Future with 10% increase in settlement compensated by agricultural land	Future with 10% increase in settlement compensated by agricultural land and 10% decrease in rainfall
Brahmani	Monsoon	14294.05	8463.62 (41)	7617.26 (47)	8456.21 (41)	7610.58 (47)
	Non-monsoon	2861.73	1772.66 (38)	1595.39 (44)	1769.97 (38)	1592.96 (44)
Baitarani	Monsoon	5630.32	3984.24 (29)	3585.81 (36)	3978.47 (29)	3580.62 (36)
	Non-monsoon	763.89	673.18 (12)	605.86 (21)	670.89 (12)	603.80 (21)
Total	Monsoon	19924.38	12447.90 (38)	11203.10 (44)	12434.70 (38)	11191.20 (44)
	Non-monsoon	3625.62	2445.84 (33)	2201.26 (39)	2440.86 (33)	2196.77 (39)

Note: Figures in parentheses are percentage decline in water availability in 2051 compared to 2001.

4. Ecological Changes in Mangrove Species Composition of Bhitarkanika Park

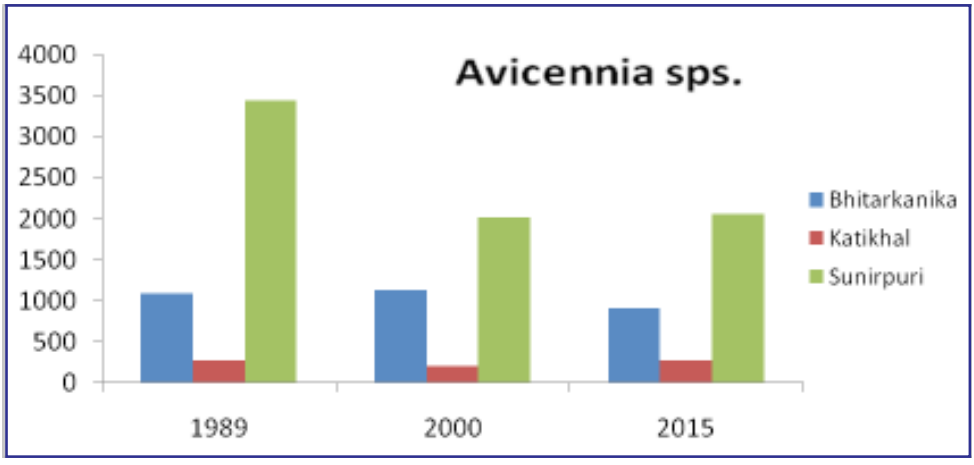
In order to establish a link between mangrove species and fresh water, the species composition of the mangroves of the park were compared over the years. Till date, fresh water supply to Bhtarkanika has not been interrupted much and hypothetically, the mangrove biodiversity should not show much changes if fresh water is a key input to mangrove health. This hypothesis is tested by making an intertemporal comparison of mangrove species following NDVI (Normalized Difference Vegetation Index) method. The NDVI of the park was developed for three different years, (1989, 2000 and 2015) and changes in species were detected. This was done using satellite data with the help of Digital Catography and Services (DCS), Bhubaneswar who are specialized in Geographic Information System (GIS) mapping and interpretation of Remote Sensing Satellite data. Figure 4 presents the temporal changes in different major mangrove species of Bhitarkanika. Its clear that only *Avicennia sps* have witnessed a decline and species like *Heritiera fomes, Lumnitzera sps* and *Sueada sps* have increased significantly with little changes in other species. Increase in growth of *Heritiera fomes* indicate increased availability of fresh water whereas the increase in the other two species indicate increased salinity meaning that different parts of Bhitarkanika Park is probably witnessing different levels of salinity and fresh water availability, though as a whole the system looks to be stable.

Figure 4: Changes in Mangrove Species Composition of Bhitarkanika Park

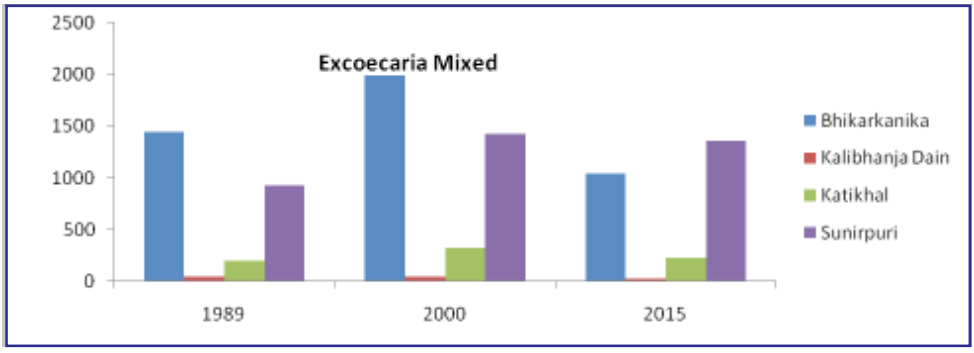


Comparing the changes in area of some of the major species present in different blocks of Bhitarkanika, one does find the micro areas to have changed quite a lot (Figures 5 (a) to (e)) though as per Figure 4, things look rather stable for Bhitarkanika Park as a whole. The Bhitarkanika block seems to be getting lot of fresh water because of which fresh water dependent species like *Heritiera Fome*s have increased and saline species like *Avicennia sps* have gone down, but the opposite is happening elsewhere, especially, Sunirpuri where salinity seem to have gone up as evident from the remarkable growth of saline species *Sueda sps*. It may be that fresh water supply has become regular, but the volume has gone down because of which the fresh water is reaching only up to Bhitarkanika block regularly, but not reaching further down and that has increased salinity in those islands close to sea.

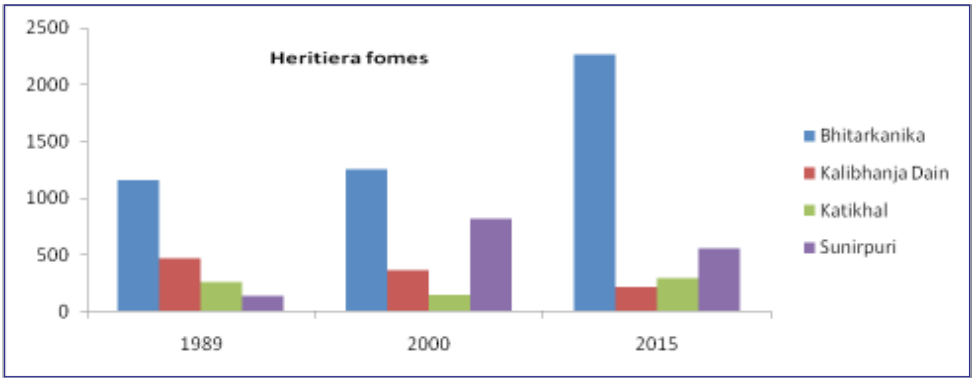
Figure 5: (a) Comparison of Changes in Area for Major Species in Different Blocks of Bhitarkanika



(b)



(c)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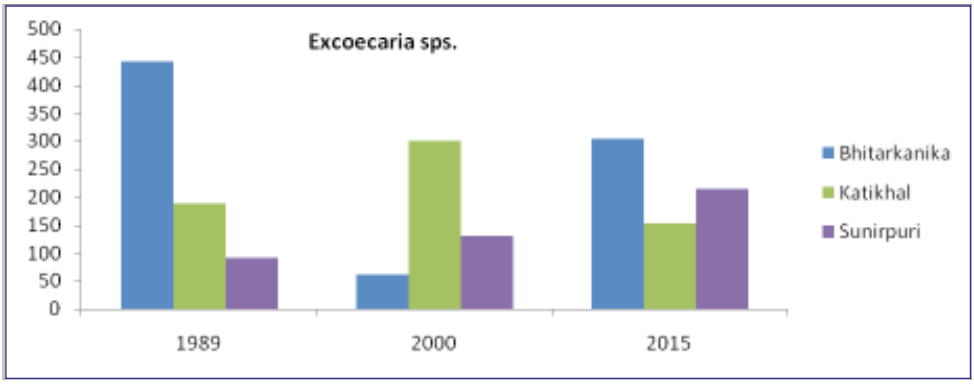
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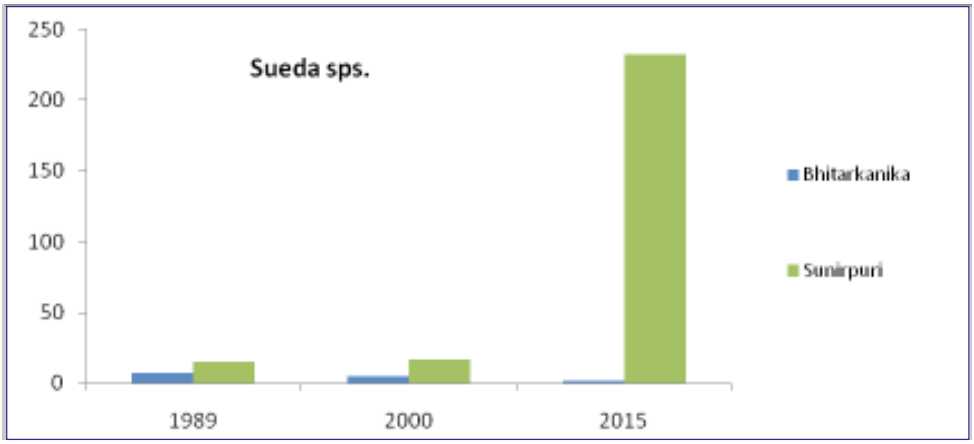
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5. Possible Impact of Future Water Scenarios on Mangrove Species

Till date, no effect of reduced fresh water supply seems to be there in the Bhitarkanika region, but the future developments may seriously constrain the growth of the area as the 2050 water scenarios show. Fresh water availability at the Bhitarkanika Park boundary will be reduced by 44 per cent on average, the specific ranges being 38 to 47 per cent during monsoon and 33 to 39 per cent during non-monsoon as explained in table 6and that may increase the salinity level to a great extent. Using the help of ecologists, the predicted salinity due to reduced fresh water is calculated for different points at Bhitarkanika Park. Table 7 shows these simulated results.

Salinity is measured at four points: Khola, Dangamal, Gupti and Ekakula (Figure 6). Salinity was measured during non-monsoon months Feb-March and then simulated for four different scenarios, 20 per cent, 50 per cent, 70 per cent and 90 per cent reduction in fresh water flow. As evident from Table 7, with 50 per cent decline in fresh water, Dangamal will experience the salinity of Gupti which means the vegetation found in Dangamal block (Bhitarkanika block) at present will be replaced by the vegetation of Sunirpuri block (location of Gupti) which, at present has maximum saline species. With near 50 per cent decline, Gupti will have the salinity of Ekakula and Ekakula will remain more or less similar as it is already a high saline point. Maximum impact will be felt at Dangamal or Bhitarkanika block and most of the fresh water species will, probably, get seriously impacted. However, a 20 per cent decline in salinity will not have that alarming effect.

Table 7: Predicted Increase in Salinity due to Reduced Fresh Water Flow

	Average salinity (February-March 2016)	20 % Reduction in fresh water flow	50 % Reduction in fresh water flow	70 % Reduction in fresh water flow	90 % Reduction in fresh water flow
Khola	10.80	15.36	22.72	27.63	32.55
Dangamal	15.50	19.17	25.11	29.07	33.02
Gupti	25.50	27.29	30.18	32.11	34.04
Ekakula	31.40	32.08	33.17	33.91	34.64

Figure 8: Salinity Measuring Points

6. How to Maintain a Balance between Development and Conservation of Bhitarkanika Biodiversity?

Odisha is a backward and poor state with some 33 per cent of population below poverty line on average, though many districts of the state have 58 to 70 per cent of people below poverty line.[7] Brahmani basin is somewhat developed, but Baitarani has high concentration of poverty and this requires that development should be a priority in the state. This justifies extraction of fresh water for developmental uses. Bhitarkanika National Park is also an important landmark of Odisha and this system is making high contribution to the economy and safety of the state in many forms and needs to be preserved at any cost. The proposed 44 per cent average increased extraction of river water for anthropogenic uses will cause a severe blow to Bhitarkanika, especially to Dangamal region and this necessitates that the proposed water diversion for developmental uses should be reconsidered. However, there seems to exist a way out to balance both the objectives as 20-25 per cent reduction in fresh water does not seem to have any perceptible impact on salinity of different places and thus, on biodiversity. The question comes if it is possible that the

[7] http://documents.worldbank.org/curated/en/484521468197097972/pdf/105874-BRI-P157572-ADD-SERIES-India-state-briefs-PUBLIC-Odisha-Proverty.pdf, accessed on 16th August 2017.

proposed 44% increased requirement can be subdivided into 24% extraction from river and 20% requirement being fulfilled from recycling or treated waste water? Depending on the priority, it can be decided which uses to be given fresh water and which ones, treated water. If such an arrangement can be made and executed, it will transform the trade-off to a synergy and development and environment of the region can be ensured simultaneously. Resource allocation is never optimal and these exists scope to go for reallocation so that economy can move closure to Pareto optimality frontier. Prioritizing sustainable development path and having a political will can make it happen and Bhitarkanika region may not witness the Environmental Kuznet Curve.

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RBI's Monetary Policy Performance under Various Governors: Individual Charisma versus Institutional Dominion*

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Monetary policy conducted by the RBI has emerged as a very powerful, popular and effective tool of macroeconomic management in India during the post-reform period. The RBI governors who assumed office during this period came from a variety of academic and professional background. Each of them is widely respected for their high scholarly intellect, profound competency as also impeccable personal and professional integrity. The present study attempts to compare the monetary policy performance in India under different RBI governors during the post-reform period. For this purpose, various criteria such as matching actual outcome of economic growth and inflation against pre-announced targets/projections, international comparison, and a comprehensive performance score index were used. It was observed that monetary policy performance was superior under one governor over another based a particular criterion. However, the comprehensive score index suggest that, except one, the monetary policy performance under different governors was largely similar. This supports the hypothesis that RBI as an institution has acquired reasonable level of critical mass both in competency and resilience in delivering desired monetary policy outcome. The differences in the academic and professional background of its Governors do not seem to be have very important bearing on the RBI's monetary policy performance.

Keywords: Monetary policy, Reserve Bank of India, Governors, Academic and professional background

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1. Introduction

The post-reform period in India, since early 1990s, witnessed a complete turn-around in the overall economic policy framework shifting from a state controlled central planning system to greater market orientation under liberalisation-privatisation-globalisation philosophy. As well-documented in the literature, such reforms broadly covered (i) industrial-foreign trade policies which promoted competition both from domestic new entrants and foreign MNCs, and adopted outward orientation encouraging exports; (ii) fiscal policy reforms strengthening the tax regime and rationalising government expenditure, within the fiscal discipline and consolidation process; and (iii) overall financial sector reforms providing operational autonomy to banks and creating/activating other key constituents of the financial sector (Joshi and Little, 1998). Due to the above reforms, monetary policy in India also undergone significant transformation, and assumed renewed importance in macroeconomic management of the Indian economy (Samantaraya, 2015). The following reform initiatives facilitated transformation of the Reserve Bank of India (RBI)'s monetary policy.

Firstly, guided by the recommendations of Chakravarty Committee, there were institutional reforms to facilitate greater fiscal-monetary coordination. Phasing out of 'automatic monetisation' by issue of *ad hoc* treasury bills by 1997 relived the RBI from massive fiscal dominance. Secondly, liberalisation of interest rate regulations for banks, reforms in developing auction-based government securities market, money market enabled use of market oriented monetary policy instruments by the RBI such as open market operations (OMOs), and setting up the liquidity adjustment facility (LAF) corridor. Thirdly, in a globalised set up and with greater interaction with other central banks and international agencies like International Monetary Fund (IMF) and Bank for International Settlement (BIS), various aspects related to conduct of monetary policy and banking sector regulation adapted to the international best practice.

The by-product of international exposure, constant scrutiny by the international credit rating agencies and its implication for cross-border capital flows ensured that government's intervention with the RBI matters kept to the minimum without creating a negative perception. Despite occasional differences between the RBI and the Ministry of Finances on setting interest rate policy, as reported in the media from time to time, largely the RBI has been independent in monetary policy decisions. However, the controversy

around the transfer of RBI profit/reserves to the Government of India, which surfaced in 2018, was widely held as an unnecessary government intervention circumventing RBI autonomy. It was believed to be the major bone of contention between Governor Urjit Patel and the Government of India. Patel resigned from the position of RBI Governor in December 2018, before completing his tenure. However, this controversy is not directly related to the conduct of monetary policy.

Recent amendments in the RBI Act in 2016 provided clear mandate to RBI on monetary policy objective, wherein the targets for inflation over a five-year horizon is explicitly assigned to the RBI under the 'inflation targeting' framework. The RBI's monetary policy committee (MPC) is given complete autonomy for setting the policy rate (*repo rate* under LAF) to pursue the inflation target, and in case RBI fails to contain inflation within the tolerance limit of ±2 per cent of 4.0 per cent target for three consecutive quarters, it needs to write a Report. This Report should encapsulate the reasons for failure in maintaining inflation within the tolerable band, as also the corrective actions contemplated, and time horizon required to tame inflation within the band.

In this backdrop, the present paper attempts to compare RBI's monetary policy performance during the post-reform period under different RBI governors. It may be noted that the RBI was established in 1935 (before India's independence), and with its long history has evolved itself as the most respected and credible body of economic management in India. As an institution it is resilient and has maintained consistent institutional view in important matters pertaining to economic policy. It is believed that despite their variety of academic and professional background, as summarised in Table 1, various governors of RBI largely confirmed to the institutional view of RBI after assuming charge. The governors of RBI have been persons of high eminence, outstanding competency, widely acclaimed scholars, and maintained great personal and professional integrity. Despite largely confirming to the institutional view on the conduct of monetary policy, each of the governors had successfully maintained reasonable balance with their individual views in the related matters of academic perceptions and applications. The present paper traces the differences in the academic

[1] RBI's official statements/documents on monetary policy has evolved over time with different nomenclature such as Monetary Policy for First/Second Half of Year, Annual Policy Statement, Monetary Policy Statement, Bi-monthly Monetary Policy Statement, etc.

and professional background of each of the governors who led RBI during the post-reform period and compared RBI's monetary policy performance under the respective governors.

Confining to the post-reform period was mainly guided by the fact that the RBI assumed considerable discretion and autonomy in conduct of monetary policy thanks to the reforms since early 1990s.

To sum up, the present paper attempts to test the hypothesis if RBI's monetary policy performance during the post-reform period is independent of the academic and professional background of its Governor. If the hypothesis is not refuted, then it will support that the RBI has assumed some critical mass in terms of institutional competency and maturity, and its monetary policy performance is not critically dependent on the individual charisma of its governor.

Information and data used in the paper are drawn from various RBI publications such as various Monetary Policy Statements[1], *RBI Annual Reports*, *Handbook of Statistics on the Indian Economy*. Data on world GDP growth and inflation were obtained from the official website of the World Bank (www.worldbank.org).

The rest of the paper is organised as below. Section 2 summarises the academic and professional background of the RBI governors who held office during 1992-2020. Performance and effectiveness of monetary policy in India under different governors is discussed in Section 3. Finally, Section 4 summarises the findings.

2. Academic and Professional Background of RBI Governors

It may be noted that comprehensive reforms were introduced in India, as a response to economic crisis of 1991. Excluding 1991-92 as a crisis year, the period since 1992-93 is widely referred as the post-reform period in India. During the first part of the financial year 1992-93 (until December 21, 1992), S. Venkitaramanan was the Governor of RBI, and C. Rangarajan took over since December 22, 1992. As Venkitaramanan's term in office was less than one year under the post-reform period, we did not include his tenure in our analysis, and RBI's monetary policy performance under various RBI Governors beginning with C. Rangarajan covered in our discussion.

A noted distinction about all the RBI governors of post-reform period is that all, except Saktikanta Das, had held doctoral degrees. But out of 18 RBI governors who held office during the pre-reform period, only I.G. Patel (1977-82) and Manmohan Singh (1982-85) with Ph.D.

It is interesting to observe that out of six RBI governors of post-reform period, three obtained their Ph.D. degree from the universities in the United States, while three others from Indian universities (Table 1). Raghuram G. Rajan is a Ph.D. in Management, while all others hold Ph.D. in Economics.

There is a considerable diversity in the professional background of these RBI governors. Rangarajan had a very long stint in academics and teaching (including as a Professor of Economics at the Indian Institute of Management, Ahmedabad), before joining as a Deputy Governor in February 1982. Similarly, Rajan also was Eric J. Gleacher Distinguished Service Professor of Finance at the University of Chicago's Booth School, before joining International Monetary Fund (IMF) as the Chief Economist and Director Research (2003 to 2006). Y. V. Reddy, D. Subbarao and Saktikanta Das were career bureaucrats under the Indian Administrative Service (IAS). Jalan, Reddy, Subbarao, Rajan and Das had worked in the Ministry of Finance in Secretary level positions before assuming charge in RBI.

It is also interesting to note that three of them prior to assuming charge as RBI Governor, already worked as a RBI Deputy Governor. This list includes Rangarajan (RBI Deputy Governor: 1982-1991), Reddy (1996-2002), and Urjit R. Patel (2013-2016). On the other hand, the rest four (Jalan, Subbarao, Rajan and Das) assumed charge as RBI Governor directly, without working previously in any regular official position in RBI. However, each of them had been part of RBI's Board of Director earlier, in their capacity as Finance Secretary in the Government of India nominated under Sect 8 (1) (d) of the RBI Act, 1934.

Thus, while the RBI governors of post-reform period had a variety of professional background, each of them had considerable exposure in the field of economic policy making and management in India in various capacities. Three of them, as indicated above, had hands on experience on central banking while working as RBI Deputy Governor before assuming the charge of RBI governorship.

Table 1: Academic and Professional Background

Name	*Educational Qualification*	*Ph.D. awarding University*	*Foreign/ Indian Ph.D.*	*Previous Positions prior to becoming RBI Governor*	*Tenure as RBI Governor*
C. Rangarajan	Ph.D. in Economics	University of Pennsylvania	Foreign (US)	Academic and Technocrat: Deputy Governor, RBI; Member, Planning Commission of India; taught at Indian Institute of Management (IIM), Ahmedabad	Dec. 22, 1992 to Nov. 22, 1997
Bimal Jalan	Ph.D. in Economics	University of Mumbai	Indian	Technocrat: Finance Secretary, Secretary (Banking) and Chief Economic Adviser, Government of India, Indian's Executive Director in IMF and World Bank, Chairman, PM's Economic Advisory Council, Member-Secretary Planning Commission of India.	Nov. 22, 1997 to Sep. 5, 2003
Y.V. Reddy	Ph.D. in Economics	Osmania University	Indian	Civil Service(IAS) and Technocrat India's Executive Director in IMF, Deputy Governor, RBI, Secretary (Banking), Ministry of Finance, Government of India, Adviser in the World Bank, Principal Secretary, Government of Andhra Pradesh	Sep. 6, 2003 to Sep. 5, 2008
D. Subbarao	Ph.D. in Economics	Andhra University	Indian	Civil Service (IAS) and Technocrat: Finance Secretary, Government of India, Secretary, PM's Economic Advisory Council, Lead Economist in World Bank, Finance Secretary, Government of Andhra Pradesh	Sep. 5, 2008 to Sep. 4, 2013
Raghuram G. Rajan	Ph.D. in Management	MIT Sloan School of Management	Foreign (US)	Academic and Technocrat: Chief Economic Adviser, Ministry of Finance, Government of India, Chief Economist and Director of Research in IMF, taught at University of Chicago (US)	Sep. 4, 2013 to Sep. 4, 2016
Urjit R. Patel	Ph.D. in Economics	Yale University	Foreign (US)	Technocrat: Deputy Governor RBI, Served in various capacities inIMF, Ministry of Finance, Government of India, various Central and State level committees	Sep. 4, 2016 to Dec. 11, 2018
Shaktikanta Das	M.A. in History	Delhi University	Indian	Civil Service (IAS) and Technocrat: Secretary, Ministry of Finance, Government of India, Member, 15th Finance Commission, G20 Sherpa of India, India's Alternate Governor, World Bank, ADB, etc.	Since Dec. 12, 2018

3. RBI's Monetary Policy Performance under Various Governors

Since the beginning of the post-reform period, price stability and supporting economic growth were stated to be two dominant objectives of RBI's monetary policy. Given the short-term conflicts between the two objectives, relative emphasis on any one of them was given depending on the prevailing economic conditions. The above had been reiterated in various official reports of the RBI and in speeches of its senior executives. Of course with formal adoption of 'inflation targeting' since 2016, the RBI has been assigned with the explicit primary objective of price stability.

Thus, given the stated objectives, the performance of monetary policy can be evaluated in terms of macroeconomic outcomes like economic growth and inflation. In the following, such performance is compared over the respective periods of holding office by different RBI governors.

Table 2 presents data on economic growth and inflation for India over different sub-periods.

Table 2: Economic Growth and Inflation in India

(Per cent)

Name of the RBI Governor	*Average GDP Growth*	*Average Inflation #*	*Variability of Growth $*	*Variability of Inflation $*
C. Rangarajan (1993-1998)	6.3	7.6	1.4	3.4
Bimal Jalan (1998-2004)	6.0	4.8	1.8	1.6
Y.V. Reddy (2004-2009)	8.4	6.1	1.4	1.5
D. Subbarao (2009-2014)	6.7	7.1	2.1	2.3
Raghuram G. Rajan (2014-2017)	7.7	5.1	0.5	0.7
Urjit R. Patel (2017-2019)	6.8	3.5	0.2	0.1

Notes: $ - Variability of growth and inflation are in terms of standard deviation
- Inflation since 2014-15 are based on Combined CPI and prior to that based on WPI.

As it can be observed from Table 2, in terms of inflation objective, the period under Urjit Patel as governor was the best with lowest inflation of 3.5 per cent followed by that under Jalan with inflation of 4.8 per cent. In fact, one may consider the period under Patel even better as the inflation since 2014-15 is in terms of consumer price index (CPI), while previously it was in terms of wholesale price index (WPI).Generally, CPI based inflation is higher as compared to WPI based inflation as the former considers retail prices while the latter takes wholesale prices for constructing the price index. Moreover, as regards variability of inflation, the period under Urjit Patel was the best with standard deviation of inflation at 0.1. On the flip side, with just two years as Governor, period under Patel may not be truly with more than five years under Jalan.

It may be noted that the period of Rangarajan, with average inflation at 7.6 per cent should not be considered as poor in terms of inflation management. It is because this period had to manage the impact of economic crisis of 1991-92. In fact, average inflation during the 5-years period preceding his tenure was very high at 9.4 per cent. Moderating the average inflation by close to two percentage points as compared to the preceding 5-years is a significant achievement.

Moreover, the monetary and credit policy statements announced under Rangarajan as RBI governor witnessed a directional change with an underlying

emphasis to price stability as the primary objective of monetary policy. For example, *Monetary Policy for the Second Half of 1993-94* (para 8) highlighted the strong inter linkages between monetary policy and exchange rate policy in an open economy set up during the post-reform period, and underscored the need for pursuing price stability to ensure foreign exchange rate stability. Hence, there was a stress on adequate fiscal discipline, setting the tone for monetary policy autonomy. *Monetary Policy for the First Half of 1996-97* provided clarity on the RBI's perspective on the link between monetary expansion and inflation control, comprehensively. It stated that "With central banks world over giving greater stress to the objective of price stability, it is important to persevere with this objective if India is to remain competitive in the international economy. Stable prices provide the most conducive environment for growth. Besides, inflation control in a country like India, is a highly desirable objective of economic policy since a large section of the population does not have any hedge against inflation. Emphasis on price stability as an important objective of monetary policy does not imply that inflation is a purely monetary phenomenon. Real growth and its composition have an important impact. However, in any scheme of inflation control, regulation of monetary expansion consistent with expected real growth plays an important role. Continuous increase in prices-which is what inflation is-cannot be sustained unless there is a continuous and disproportionate increase in money supply." (*Monetary Policy for the First Half of 1996-97,* para 3). Thus, it underscored the primacy of price stability as the objective of monetary policy and narrated that inflation cannot be sustained without a continuous and disproportionate increase in money supply, broadly confirming to the view that money matters for inflation management.

As regards economic growth, the period under Reddy recorded highest average growth rate of 8.5 per cent, while that under Jalan witnessed lowest average growth of 6.0 per cent (Table 2).

Combining both price stability and growth performance, the period under Rajan appears to be the best with second highest average economic growth, and second lowest average inflation. This period also registered greater stability in terms of both economic growth and inflation.

While comparing the monetary policy performance over the period under various RBI governors, one has to keep in mind that different periods were not uniform in terms of global economic environment and domestic economic-political conditions. For example, in the latter part of Reddy's tenure and the earlier

phase of Subbarao's period, Indian economy had to manage the adverse consequences of the global financial crisis triggered by the sub-prime crisis in the US.
Similarly, earlier phase of Jalan's period had to deal with the adverse impact of East Asian crisis. This period also witnessed a hostile external environment due to sanctions against India connected to Pokhran nuclear test conducted in 1998. The Kargil war with Pakistan also had its impact on the domestic economy. Incidents of crony capitalism as revealed in the 2G scam and coal-gate and its related negative investment environment had adverse economic consequences during Subbarao's period as RBI governor. These incidents are not under the control of the central bank, but adversely affects its ability to achieve the growth and price stability objectives.

It important to mention that for four out of seven RBI governors during the period of our study, the tenure started in September. The policy announcements until September of that financial year by his predecessor are expected to have a bearing on the outcome of economic growth and inflation for the same financial year after September. For example, Reddy assumed office of RBI governor on September 6, 2003. The outcome of economic growth and inflation during the September 2003-March 2004 period, under his tenure, will be largely influenced by the Annual monetary policy statement announced by Jalan during April 2003. This is because of the lagged monetary policy impact. Because of this the economic growth and inflation outcomes of 2003-04 are included under Jalan's tenure and not under Reddy's tenure. Same is true for others.

Similarly, Das assumed the Office of RBI Governor in December 2018. So the economic outcomes of 2018-19 were largely influenced by the monetary policy announcements by his predecessor Patel. Moreover, with data on economic growth and inflation available just for one year to assess the impact of policy announcements under Governor Das, his tenure is not included in our analysis.

3.1. Matching Actual Outcomes with Targets/Projections

As discussed in the above, the prevailing economic conditions – both at home and abroad – were not uniform over the periods under different RBI governors. So simple comparison of average growth rates or inflation across their tenure may not be adequate. We need to take into account the differences in the

operating environment.

It may be noted that setting of monetary policy objectives in terms of targets or projections for economic growth and inflation takes into account the existing and evolving economic situation. The RBI policy statements over the years announced above targets/projections after undertaking thorough and comprehensive analysis of the evolving economic situation both at home and abroad. Comparison of these targets and actual performance will be an objective way of assessing the central bank performance.

However, it may be noted that there has been variations, over the years, in terms of specifying explicit targets for growth and inflation or using some implicit diluted versions of indicative projections or assumed numbers for monetary policy formulation. The differences in nuances are explained as below.

The policy statements announced under Subbarao, Rajan and Patel explicitly stated the inflation and growth targets of monetary policy, unambiguously. For example, *Monetary Policy Statement for 2010-11* (under Subbarao) stated that "the conduct of monetary policy will continue to condition and contain perception of inflation in the range of 4.0-4.5 per cent." (para 32). Similarly, the *First Bi-monthly Monetary Policy Statement for 2014-15* (under Rajan) stated that "Reserve Bank's policy stance will be firmly focused on keeping the economy on a disinflationary glide path that is intended to hit 8 per cent CPI inflation by January 2015 and 6 per cent by January 2016." (para 9). Similarly, on economic growth this statement noted that "Contingent upon the desired inflation outcome, real GDP growth is projected to pick up from a little below 5 per cent in 2013-14 to a range of 5 to 6 per cent in 2014-15 *albeit* with downside risks to the central estimate of 5.5 per cent" (para 10).

At the other end, the monetary policy statements under Jalan were nowhere coming close to committing for numerical targets, and included assumed figures for growth and inflation for policy purposes. For example, *Statement of Monetary and Credit Policy 2000-01* stated that "For purposes of policy formulation on the basis of current trends, growth in real GDP may be placed at 6.5 to 7.0 per cent in 2000-01, assuming a normal agricultural crop and continued improvements in industrial performance. Assuming, the rate of inflation to be 4.5 per cent (i.e., close to the average of last two years), the projected expansion in M3 for 2000-01 is about 15.0 per cent."It was not clear if the

assumed figures for growth and inflation will be the resulting outcome, if the set target for M3 is achieved or the M3 target is an end in itself.
The Monetary Policy statements announced under Rangarajan as Governor were specific and explicit on inflation target while economic growth figures were largely assumed. For example, the *Monetary Policy for First Half of 1996-97* stated. "The economy is expected to achieve a real GDP growth rate of 6 per cent during 1996-97. Taking this into consideration, and with the objective of containing the inflation rate around 6 per cent, the expansion of M3 during 1996-97 is projected at 15.5-16.0 per cent." Similarly, *Monetary Policy for First Half of 1997-98* stated that "Given the real GDP growth of 6.0-7.0 per cent, monetary policy would seek to maintain the expansion of M3 in the range of 15.0-15.5 per cent to keep the inflation rate at around 6 per cent in 1997-98."

Notwithstanding the variation in tone and perceived commitment for inflation and growth targets of monetary policy under different governors, the present paper considered targets/projections/assumed figures for inflation and growth as monetary policy targets, stated explicitly or implicitly. Thus, the achievements/actual outcomes of inflation and growth over the years are accordingly compared with stated explicit or implicit targets.

Table 3 presents the stated targets/projections for economic growth and inflation over the years 1993-94 through 2016-17 along with the actual outcomes. Success in terms of performance is assigned when the actual economic growth in a particular year is not less than the target/projection for the year, and when inflation is not above the target or projection. For example, for the year 2009-10 target/projection for economic growth and inflation were 6.0 per cent and 4.0 per cent, respectively. For the same year actual economic growth and inflation were 8.6 per cent and 3.8 per cent. In comparison, it may be observed that actual economic growth is above the target for 2009-10. So, it is counted as a success. Similarly, actual inflation for 2009-10 is below the target. Thus, this also may be treated as a success. In this manner, success of achieving monetary policy objectives as regards economic growth and inflation was acknowledged for different years, and the same is marked as shaded box in the last two columns in Table 3.

Finally, the degree of success is calculated for each governor based on the number of successful achievements both as regards to objectives of economic growth and price stability during his period. For example, during Reddy's

period the number of success as regards to achieving growth objective is four and that as regard inflation objective is two. The sum is six out of ten, and hence, percentage of success is 60 per cent and similarly, for others. This percentage count is reported under the name of respective governors within parenthesis in Table 3. As per the above criteria, it may be noted that success of Rajan in achieving the monetary policy objectives is maximum at cent per cent. It appears that Rajan has done justice to the 'rock-star central banker' tag – as popularly referred to him.

Table 3: Comparison of Monetary Policy Target/Projection with Actual Outcome

Name	*Years*	*GGDP*	*INF*	*GGDP*	*INF*	*GGDP*	*INF*
		Actual Outcome		*Target/Projection*		*Achievement*	
C. Rangarajan (60.0%)	1993-94	5.7	8.4	5.0	6.8		
	1994-95	6.4	12.6	5.0	7.2		
	1995-96	7.3	8.0	5.5	8.0		
	1996-97	8.0	4.6	6.0	6.0		
	1997-98	4.3	4.4	6.0-7.0	6.0		
Bimal Jalan (58.3%)	1998-99	6.7	5.9	6.5-7.0	5.0-6.0		
	1999-2000	8.0	3.3	6.0-7.0	5.0		
	2000-01	4.1	7.2	6.5-7.0	4.5		
	2001-02	5.4	3.6	6.0-6.5	5.0		
	2002-03	3.9	3.4	6.0-6.5	4.0		
	2003-04	8.0	5.5	6.0	5.0-5.5		
Y.V. Reddy (60.0%)	2004-05	7.1	6.5	6.5-7.0	5.0		
	2005-06	9.5	4.4	7.0	5.0-5.5		
	2006-07	9.6	6.6	7.5-8.0	5.0-5.5		
	2007-08	9.3	4.7	8.5	5.0		
	2008-09	6.7	8.1	8.0-8.5	5.5		
D. Subbarao (30.0%)	2009-10	8.6	3.8	6.0	4.0		
	2010-11	8.9	9.6	8.0	5.5		
	2011-12	6.7	8.9	7.4-8.5	6.0		
	2012-13	4.5	7.4	7.3	6.5		
	2013-14	4.7	6.0	5.7	5.5		
Raghuram G. Rajan (100.0%)	2014-15	7.2	5.8	5.5	8.0		
	2015-16	7.9	4.9	7.8	6.0		
	2016-17	7.9	4.5	7.6	5.0		
Urjit R. Patel (50.0%)	2017-18	6.9	3.6	7.9	4.0		
	2018-19	6.6	3.4	8.1	4.0		

Notes: 1. GGDP: Growth of GDP during 1993-94 to 2013-14 and represents Growth of Gross Value Added during 2014-15 to 2016-17.

2. INF: Inflation based on wholesale price index (WPI) during 1993-94 to 2013-14 and based on consumer price index (CPI) during 2014-15 to 2016-17.

Sources: Various issues of *RBI Annual Report*, *Compendium of Circulars on Credit and*

Monetary Policy, and *Handbook of Statistics on Indian Economy* published by the RBI.

The performance during Subbarao as RBI governor is weakest at 30.0 per cent. One may argue that Subbarao faced a very challenging period in the backdrop of the global financial crisis and domestic subdued economic environment. But even then, setting of targets or projections for economic growth and inflation could have been more realistic. This could have reduced the chance of failure in achieving the targets.

3.2. Monetary Policy Performance in a Global Context

Another way of comparing performance of Indian monetary policy in the prevailing global environment is to compare Indian economic growth with world GDP growth, and Indian inflation with the world inflation. Year-wise data on the above is presented in Table 4. The differences in Indian GDP growth rate and world GDP growth rate and similar differences in Indian and world inflation are presented in Table 4, also. Higher economic growth and lower inflation in India as compared to corresponding global figures implies better monetary policy performance by the RBI. We have calculated the average excess/deficit economic growth and inflation during the periods of various RBI governors. These figures are presented Table 4.

Under this criteria, Rangarajan's period stands out as the best. During 1993-98 not only average economic growth in India was higher as compared to world economic growth, more importantly Indian average inflation was lower as compared to the world inflation (Table 4). Reddy's period was also notable for better monetary policy performance in India in a global context. During 2004-09 average Indian economic growth was higher by around five percentage points as compared average world economic growth. However, during this period, Indian inflation was marginally higher than world inflation (by 0.7 per cent).

It is also meaningful to compare the Indian economic growth and inflation with its peers to get better comparability. The club of BRICS are generally discussed in many economic comparisons including India. Out of four countries other than India in the club, Brazil and Russia were not appropriate to compare during some part of our period of study. It is because Brazil's inflation was very high in some years such as around 2000 per cent in early 1990s. Similarly, GDP growth rate in Russia was negative in many years

since early 1990s. To avoid the outliers in growth and inflation data, one can exclude these two countries, and compare Indian growth and inflation figures with average growth and inflation of China and South Afirca to get a comparative perspective among the peers.

Name		India		World		Difference	
	Years	GGDP	INF	GGDP	INF	GGDP	INF
C. Rangarajan (Av. GGDP Diff.: 3.4 Av. INF Diff.: **- 0.4**)	1993-94	5.7	8.4	1.6	8.0	4.1	0.4
	1994-95	6.4	12.6	3.0	10.3	3.4	2.3
	1995-96	7.3	8	3.0	9.3	4.3	-1.3
	1996-97	8.0	4.6	3.4	7.0	4.6	-2.4
	1997-98	4.3	4.4	3.7	5.6	0.6	-1.2
Bimal Jalan (Av. GGDP Diff.: 3.2 Av. INF Diff.: 1.1)	1998-99	6.7	5.9	2.5	5.1	4.2	0.8
	1999-2000	8.0	3.3	3.3	3.2	4.7	0.1
	2000-01	4.1	7.2	4.4	3.6	-0.3	3.6
	2001-02	5.4	3.6	1.9	4.0	3.5	-0.4
	2002-03	3.9	3.4	2.1	3.1	1.8	0.3
	2003-04	8.0	5.5	2.9	3.3	5.1	2.2
Y.V. Reddy (Av. GGDP Diff.: 4.7 Av. INF Diff.: 0.7)	2004-05	7.1	6.5	4.5	3.6	2.6	2.9
	2005-06	9.5	4.4	3.8	4.2	5.7	0.2
	2006-07	9.6	6.6	4.3	4.5	5.3	2.1
	2007-08	9.3	4.7	4.3	5.3	5.0	-0.6
	2008-09	6.7	8.1	1.8	8.9	4.9	-0.8
D. Subbarao (Av. GGDP Diff.: 4.5 Av. INF Diff.: 3.5)	2009-10	8.6	3.8	-1.7	3.0	10.3	0.8
	2010-11	8.9	9.6	4.3	3.6	4.6	6.0
	2011-12	6.7	8.9	3.2	5.0	3.5	3.9
	2012-13	4.5	7.4	2.4	3.9	2.1	3.5
	2013-14	4.7	6.0	2.6	2.7	2.1	3.3
Raghuram G. Rajan (Av. GGDP Diff.: 4.9 Av. INF Diff.: 3.2)	2014-15	7.2	5.8	2.8	2.5	4.4	3.3
	2015-16	7.9	4.9	2.7	1.5	5.2	3.4
	2016-17	7.9	4.5	2.4	1.7	4.2	2.8
Urjit R. Patel (Av. GGDP Diff.: 3.6 Av. INF Diff.: 1.2)	2017-18	6.9	3.6	3.2	2.2	3.7	1.4
	2018-19	6.6	3.4	3.1	2.4	3.5	1.0

Notes: 1. GGDP: Growth of GDP during 1993-94 to 2013-14 and represents Growth of Gross Value Added during 2014-15 to 2016-17 for India.

2. INF: Inflation based on wholesale price index (WPI) during 1993-94 to

2013-14 and based on consumer price index (CPI) during 2014-15 to 2018-19 for India. For the world, it is based on CPI for the entire period.

Similar to the analysis of comparing Indian performance with that of world GDP growth and inflation, we had also undertaken a similar analysis by comparing Indian economic growth and inflation with that of China and South Africa, combined over the years, under different RBI governors. Our inferences were similar to that of comparison with the world. Average inflation during Ranagajan's period was found to be 3.6 per cent lower as compared to average inflation in China and South Africa, taken together.

3.3. Comparison Based on Performance Score Index (PSI)

In the above, we observed that monetary policy performance in India under different RBI governors fared differently by different criteria. In terms of comparing growth and inflation outcomes with stated targets/projections, Rajan's period was the best. On the contrary, in global comparison perhaps Rangarajan's period was the best. To develop a summary measure based on different criteria to compare monetary policy performance under different RBI governors, we have developed a Performance Score Index (PSI) in this sub-section. This will give us a single number to objectively compare the performances.

The PSI developed for this purpose is explained as under.

We have identified several parameters/conditions based on which the score is given. These parameters/conditions are based on the previous discussion, and listed in Table 5 along with relative weights assigned to them. The weights reflect the importance of a particular factor in assessing monetary policy performance. To avoid subjectivity in assigning weights, the author conducted a small survey and collected information from select experts in monetary economics/policy drawing from a pool of academicians and technocrats. The average weights[2] for respective factors as assigned by various experts is given in Table 5.

A score of '1' is assigned for each factor, and its absence is assigned a score of 'zero'. For example, as regards Factor 1 (Table 5), if the actual inflation in a year is lower than or within the range of stated inflation target/projection, that year gets a score of '1', and otherwise it gets a score of 'zero'. Similarly, a score of '1' or '0' is assigned to a particular year based on rest of the

seven factors.

A weighted average of such scores for all the eight factors is obtained using the weights given in Table 5.

Sl. No.	*Parameter / Condition*	*Weights*
1	Achievement of inflation objective in a particular year (If actual inflation is lower or within the range as compared to stated target/projection for inflation in RBI policy statement)	39.0
2	Achievement of growth objective in a particular year (If actual GDP/GVA growth is higher or within the range as compared to stated target/projection for economic growth in RBI policy statement)	19.0
3	Lower Indian inflation as compared to world inflation in a particular year	5.0
4	Higher Indian GDP/GVA growth as compared to world GDP growth in a particular year	4.0
5	Incidence of unanticipated external shocks to the economy (like global financial crisis, international oil price, etc.)	10.0
6	Incidence of unanticipated domestic supply shocks and adverse policy decisions other than monetary policy (like deficient monsoon, fiscal indiscipline, etc.)	11.0
7	Lower average inflation during the tenure of a RBI Governor as compared to his predecessor (for 5 years)	6.0
8	Higher average economic growth during the tenure of a RBI Governor as compared to his predecessor (for 5 years)	6.0

Such weighted average scores for different RBI governors, during various years of their respective tenure is given in Table 6.

Name	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*	*Average*
C. Rangarajan	0.36	0.36	0.9	0.79	0.81		0.64
Bimal Jalan	0.79	0.79	0.06	0.54	0.71	0.69	0.60
Y.V. Reddy	0.41	0.69	0.3	0.73	0.36		0.50
D. Subbarao	0.74	0.24	0.16	0.16	0.16		0.29
Raghuram G. Rajan	0.86	0.75	0.56				0.72
Urjit R. Patel	0.49	0.49					0.49

As observed from Table 6 (last column in the right), the average PSI is highest at 0.72 for Rajan and lowest at 0.29 for Subbarao. This implies

considering multi-dimensional aspect of monetary policy, monetary policy performance of the RBI was best under Rajan.

It may be noted that other than for Subbarao, the average score for rest of the four governors vary within a narrow range, and broadly similar. In fact, if we ignore the scores for first two years (1993-94 and 1994-95), the average score for last three years under C. Rangarajan will be higher at 0.83. Similarly, ignoring the third year under Jalan's tenure, for rest of the five years, the average score is 0.70.

Curious to examine the causes for low PSI under Subbarao's tenure, we revisited its various components. It was observed that in four out of five years, inflation outcome was higher than the target, while in three out of five years, economic outcome was unfavourable. These two factors with 58 per cent weight age in the construction of PSI mainly contributed for low PSI. However, as indicated earlier, setting more realistic targets with appropriate assessment of prevailing economic conditions could have improved the matching of economic outcomes as compared to the targets.

4. Conclusions

Monetary policy conducted by the RBI has emerged as a very powerful, popular and effective tool of macroeconomic management in India during the post-reform period. The present study attempted to compare monetary policy performance in India under different RBI governors during the post-reform period. The comparison was carried out using different criteria. The RBI governors who assumed office during this period came from a variety of academic and professional background. Each of them is widely respected for their high scholarly intellect, profound competency as also impeccable personal and professional integrity. For this purpose, various criteria such as matching actual outcome of economic growth and inflation against pre-announced targets/projections, international comparison, and a comprehensive performance score index were used. It was observed that monetary policy performance was superior under one governor over another based a particular criteria. Given that different criteria suggested different levels of success for different governors, a summary measure of PSI was constructed to objectively compare monetary policy performance based on eight broad criteria/ conditions. The average PSI under the tenure of Rajan was the highest, signifying the best monetary policy performance.

However, except one, the monetary policy performance of RBI as reflected in PSI was broadly similar under different governors during the post-reform period. This is despite the fact that they came from diversified background in terms of academic and professional aspects, and led RBI with their own individual flair and charisma. This supports the hypothesis that as an institution, the RBI has attained considerable level of competency, robustness and maturity. The institutional view, its preferences, procedures and collective wisdom have become resilient to change in leadership. While the leadership of the individual RBI governor matters, the RBI as an institution with well-developed systems bestowed with very competent and committed officials at various levels has been largely successful in delivering satisfactory monetary policy outcome.

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Does Social Sector Development Foster Economic Growth? Empirical Insights from Odisha

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Abstract

The likely long-run impact of social sector development on economic growth of Odisha is studied in the time-series framework. It predicts a statistically significant positive impact of social sector development in the areas of education, sports, art & culture, family welfare, medical & public health, housing & urban development, social security & Welfare, and Nutrition on the growth of the State. Based on the larger impact coefficients, the study recommends education, sports, art & culture followed by housing & urban development and family welfare, medical and public health as priority areas for resource allocation. However the study does not purport to ignore other sub-sectors of social sector in Odisha.

Keywords: Social Sector, Government Spending; Economic Growth.

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1 Introduction

Irrespective of the stages of economic growth, the academic and policy consensus argues for the growth-fostering role of the social sector at all points in time (Becic et al. 2012). Social sector development as a way to economic growth can be analyzed through human capital approach (Schultz, 1961; Becker, 1962; Ghadei, 2016) and human development approach (Sen, 1981, 1985). The former involves the enhancement of the quality of human capital, the labour productivity and higher earnings through increased expenditure on health, nutrition and education where as the latter includes basic attainments in education, health and nutrition as an end to improve the quality of life of the people.

The social sector consists of multiple areas of development including development in education, health and nutrition, social security, basic infrastructures like housing, road and communication, water supply and sanitation that increases human capabilities and well-being (Prabhu, 1998; Panchamukhi, 2000; Linssen et al. 2011; Staveren et al. 2014; Purohit, 2014; Jana & Ghosh, 2015; Pattayat & Rani, 2017). The development literature argues that social sector development has positive impacts on economic growth (Hicks, 1979; Goldstein 1985; Baldacci et al. 2008). Social sector development enables good educational attainment that further accumulates skilled personnel through innovative knowledge and technological advancement which ultimately brings economic growth (Fogel, 1994; Lucas, 1988; Sharma & Sharma, 2017). Educational attainment also creates health awareness among the people which secures society from life risk phenomenon and thus, helps in achieving economic growth. Social sector development through health care facilities protects people from various health hazards like malnutrition, infant mortality, maternal mortality and other fatal diseases which are considered crucial for improvement in the quality of life of people and development of human resource in an economy (Arora, 2001; Bloom & Canning, 2005; Majhi & Malik, 2018). Public expenditure on transport & communication, by propagating different socio-economic activities in the easiest mode, accelerates economic growth (Esfahani & Ramirez, 2003; Hong et al. 2011). Further, sanitation and clean drinking water play a vital role in achieving health gain and improving the productivity of masses (Purohit, 2014; Pattayat & Rani, 2017). Social security provides stamina to weaker and vulnerable sections in society in enhancing their living standards by uplifting their educational and health conditions (Ohlan, 2013; Sen &

Sahu, 2017). Thus, it is inferred that the social sector contributes to the overall development of an economy through the enhancement of labour productivity by the provision of increased education, health and nutrition facilities, basic economic infrastructure, and by bringing the harmonious relationship between social and private interest.

Based on this optimistic argument, this paper empirically examines whether economic growth in Odisha State of India is fostered by the development of social sector. The results infer an affirmative contribution of education, health & nutrition, housing & urban development and social security & welfare to the long-run economic growth of Odisha. This sort of finding is a significant contribution to the development literature at least for two reasons – first, the magnitude of deprivation in the state is too large to be left to market forces alone to tackle, and second, the poor households use a higher proportion of government facilities and services as compared to richer counterparts.

In the remaining part of the paper, Section 2 presents an overview of the social sector development in Odisha, Section 3 makes a revisit of the past relevant studies, Section 4 states the variables, data and methodology of the study, Section 5 makes the analysis and interprets the findings, and Section 6 draws policy implications and concludes.

2. Social Sector Development in Odisha

The well-being of a society relies on the quality of life of its people which is manifested through improvement in education, health, employment, basic amenities, social safety, security and empowerment. Odisha, despite being an emerging state of India, with 8.4 per cent economic growth in 2018-19, is characterized by acute poverty amongst plenty. Odisha's KBK Region has been declared as the world's most deprived region. Inefficient utilization of its vast natural and human resources compels one-third of its population living below the poverty line. Researchers, planners and policy-makers emphasise the underdevelopment of human resource as the main reason for socio-economic backwardness. Freedom, opportunities and value to live in the society help in improving capabilities as well as creating suitable conditions for human development. It is, therefore, considered as an important parameter to judge development position of a state in addition to the size of the economy. Hence, in recent years, policy-makers have been giving utmost importance to the development of the social sector where private investment is relatively shy.

The State Government has been consistently striving to improve the educational standard of people of the State. Emphasis has also been given to skill development through vocational and technical education. According to *Census of India,* the overall literacy rate of the state increased from 63.8 per cent in 2001 to 72.9 per cent in 2011. For the same period, the female and male literacy rate increased from 50.51per cent to 64.01 per cent and 75.35 per cent to 81.59 per cent respectively. According to the 71st Round of NSSO survey report 2014, the overall literacy rate in Odisha was 75.5 per cent with male and female literacy rates being 83.2 and 67.8 per cents respectively. To further uplift the educational standard of the people of the state, the state government has launched several schemes like ANWESHA, AKANKHYA, Odisha Adarsha Vidyalaya, Samagra Siksh, and Mo School Abhijan etc.

The State government, to make healthcare services accessible and affordable, has implemented several programmes like Biju Swasthya Kalyan Yojana, Aam Admi Bima Yojana, MAMATA, SAMPURNA, Biju Sishu Surakshya Yojana, Mukhyamantri Swasthya Seva Mission, Niramaya, Nidan, Sahaya, and Daman. As a result, the state has witnessed a notable improvement in the critical health indicators such as fall in infant mortality rate from 65 per 1000 live birth in 2005-06 to 40 in 2015-16; fall in under-5 mortality rate from 104 per 1000 live birth in 1998-99 to 48 in 2015-16; rise in life expectancy at birth from 61.2 years in 2002-06 to 67.6 year in 2012-16; rise in institutional delivery from 22.6 per cent in 1998-99 to 85.4 per cent in 2015-16; reduction of anaemic women from 68.1 per cent in 2005-06 to 47.6 per cent in 2014-16; and immunization coverage among 12-23 months children increases from 43.7 per cent in 1998-99 to 78.6 per cent in 2015-16 *(Economic Survey of Odisha, 2019-20).*

The state has also witnessed notable improvement in rural housing. The total number of houses constructed under PMAY/IAY increased to 4,63,767 in 2018-19 as against 3,20,895 in 2014-15. Notable improvement has also been observed in the provision of basic infrastructure facilities like road, transport and communication. The total number of motor vehicles registered witnessed a rise of 222 per cent over a decade, i.e., 74.30 lakhs in 2017-18 as against 23.07 lakhs in 2008-09. Although, there is an improvement in road network (length of road), i.e., only 8.64 per cent during the same decade (from 2.43 lakh km in 2008-09 to 2.64 lakh km in 2017-18), it is not keeping pace with the growth of vehicle population *(Economic Survey of Odisha, 2019-20).*

In sanitation and clean drinking water provision to the people, the state has also achieved remarkable progress. About 84.5 per cent of the total households had access to toilet facility inside the house in 2011, in comparison to 14.81 per cent in 2001 *(Census of India, 2011).* So far as access to clean drinking water is concerned, the state also achieved significant progress. About 94 per cent of urban households have access to tap water in 2019 in comparison to 48 per cent in 2011, and 98 per cent rural households have access to tap water in 2019 in comparison to 7.5 per cent in 2011 *(Economic Survey of Odisha, 2019-20).* Several initiatives including AMRUT, BASUDHA, National Rural Drinking Water Programme, Construction of Individual Household Latrine (IHHL) and Swachh Bharat Abhiyan have been undertaken by both state and central governments for better provision of sanitation and water supply.

The State Government has also introduced several social security and welfare programmes to protect the interest of old age, infirm and destitute persons. These programmes include Indira Gandhi National Old Age Pension Scheme, Indira Gandhi National Widow Pension Scheme, MGNREGA, National Family Benefit Scheme, Madhu Babu Pension Yojana, OTPLP, Kalia Yojana, Welfare of persons with disabilities, and Pradhana Mantri Adarsh Gram Yojana. The Scheduled Tribes (ST) and Scheduled Castes (SC) constitute about 40 per cent of the State's total population as per 2011 Census. To eliminate all forms of exploitation and to improve their quality of life, several programmes such as Odisha Tribal Empowerment and Livelihood Programme (OTELP), PRERANA, Odisha PVTG Empowerment and Livelihood Improvement Programme (OPELIP), Dispersed Tribal Development Programme (DTDP), Micro Projects, Modified Area Development Approach (MADA), and Focused Area Development Programme (FADP) have been undertaken by the government.

In Odisha, majority of the population depend on the services provided by the government for which the budgetary allocation on various social sector programmes is increasing over the years. Table 1 depicts the 5-year average of the total social sector expenditure in the state for the period from 1985-86 to 2018-19.

Table 1: Total Social Sector Expenditure (TSSE) in Odisha

Year	Expenditure (in millions of Rs.)
1985-90	1795.40
1990-95	5905.76
1995-00	19597.12
2000-05	33199.20
2005-10	93575.65
2010-15	329668.24
2015-19	701027.44

Source: Authors' Calculation

It is observed from Table 1 that the total social sector expenditure in the State has increased consistently between 1985-86 and 2018-19, i.e., from Rs. 1795.40 million in 1985-90 to Rs. 701027.44 million in 2015-19. The growth of social sector spending is more prominent from 2000-05 onwards indicating the concern of the government towards social sector development. This indicates the State's emphasis on the development of the social sector for achieving improved well-being.

Table 2: Share of Total Social Sector Expenditure in NSDP in Odisha

Year	Expenditure (% of NSDP)
1985-90	0.51
1990-95	1.54
1995-00	4.25
2000-05	5.86
2005-10	11.02
2010-15	30.58
2015-19	46.04

Source: Authors' Calculation

Table 2 depicts the share of total social sector expenditure in NSDP in Odisha indicating an increasing trend, i.e., increased from 0.51 per cent in 1985-90 to 46.04 per cent in 2015-19. It reveals that the state government, 2005 onwards, has increased the attention towards the development of the social sector.

For analysing the composition of social sector spending in the state, Table 3 presents the shares of expenditure on Education, Sports, Art & Culture (ESAC), Medical & Public Health (MPH), Family Welfare (FW), Water Supply & Sanitation (WSS), Housing (Housing), Urban Development (UD), Welfare of SC, ST & OBC (WSSO), Labour & Labour Welfare (LLW), Social Security

& Welfare (SSW), Nutrition (Nutrition), and Relief on Account of Natural Calamities (RANC) in Total Social Sector Expenditure (TSSE). It is observed that the shares of expenditure on ESAC, MPH, WSS, WSSO and SSW are noteworthy. More than 80 per cent of total social sector spending has been allocated to these five sub-sectors over the period under study. Out of these five sub-sectors, ESAC and MPH accounted for more than 64 per cent of total social sector expenditure. However, the share of expenditure on FW, Housing, LLW, Nutrition, UD and RNAC are very minimal (less than 20 per cent). It is also observed that the share of expenditure on RANC has been very high during the abnormal years of flood, cyclone and super cyclone and low or moderate during normal years.

Table 3: Composition of Social Sector Expenditure in Odisha (% of TSSE)

Year	ESAC	MPH	FW	WSS	Housing	UD	WSSO	LLW	SSW	Nutrition	RANC
1985-90	50.00	15.99	0.00	7.75	3.32	1.91	8.57	1.96	3.39	1.52	4.36
1990-95	51.36	14.94	0.00	7.14	2.03	1.74	8.60	0.99	6.50	1.53	4.10
1995-00	50.77	10.28	2.59	7.41	1.17	1.57	7.28	0.73	5.32	2.94	8.95
2000-05	51.18	11.95	2.05	6.90	1.83	1.23	6.74	0.61	7.38	1.95	7.05
2005-10	49.31	9.15	1.52	8.75	2.35	2.14	7.83	0.68	9.28	3.35	4.85
2010-15	44.77	9.82	1.19	5.66	2.12	2.42	8.82	0.77	14.36	3.07	6.08
2015-19	41.32	13.30	0.95	9.83	1.89	4.38	7.75	0.50	13.11	0.25	5.62

Source: Authors' Calculation

Thus, it can be said that the state government has consistently maintained the shares of social sector spending in different sub-sectors in the total social sector expenditure. In recent years the social sector spending in the state is more than 40 per cent of the overall expenditure. As per budget estimates 2019-20, social sector spending was 42.5 per cent of total expenditure as against 43.3 per cent in 2018-19 *(Economic Survey of Odisha, 2019-20).* Such a tune of social sector spending in the state has resulted in substantial progress on human development indicators including long and healthy life, knowledge, decent standard of living, increasing per capita income and lower consumption inequality *(Economic Survey of Odisha, 2018-19).* All these motivated us to hypothesize a positive contribution of social sector spending on the long-run economic growth of Odisha. However, to give an empirical justification to this hypothesis, we have reviewed the past relevant studies in the following section.

3. Literature Review

Sustainable development necessitates vertical growth which is possible through increased labour productivity by improving the basic and technical knowledge, using scientifically and technologically sound know-how, reforming the production arrangements, and putting in use cost effective materials, natural and resources while caring for the environment. Such increase in labour efficiency is likely to make value additions which in turn will results in larger output and improved standard livings of masses. All these lead to an increasing recognition that the social sector is an inseparable element of an economy. The recent thrust of the development process is nested in societal well-being and human resource development. However, social upheavals such as rampant poverty, growing illiteracy, disappointed material prosperity, health-related issues and many more underpin the growth process.

The term social sector although meant for those activities related to social policies, guided by non-profit activities, the sole purpose is to provide benefits or well-being to the masses to reach their full potentials (Linssen et al., 2011; Staveren et al., 2014). The importance of social sector lies in creating the social capital that in turn contributes to the higher economic growth of a nation through the accumulation of human capital (Coleman, 1988). Social overhead capital is more pronounced in developing economies in accelerating economic growth and in enhancing public welfare (Adelman & Robinson, 1989), and its deficiency has been identified as one of the main obstacles in the development process of underdeveloped countries (Rosenstein-Rodan, 1943). Unbalanced growth theory considers investment in social overhead capital as one of the main pre-conditions for take-off (Hirschman, 1958; Rostow, 1960).

Social sector development requires improvements in the spheres of education and health which in turn contribute to enhanced quality of life of people. But disparities in healthcare facilities, educational achievements, employment opportunities, and gender disparities bring a suffocative life to people (Jana & Ghosh, 2015). Access to knowledge through education is an important pre-requisite of human development and thus, is treated as the best platform under which society will be uplifted. Better educational attainment helps in achieving good human capital (Chaudhury et al., 2009; Siddique et al., 2018). Universal and quality education increases employment opportunities thereby improving the socio-economic status of the society (Ghadei, 2016). Lack

of human capital leads to low productivity and bring a low level of economic growth (Sharma & Sharma, 2017). However, education can negatively influence the level of economic growth due to brain-drain (Lenkei et al., 2018). Therefore, the focus of the society ought not only to improve the educational attainments, but to facilitate the best use of improved brains which in turn depends on government spending on social capital.

Further, the quality of human health is the main foundation on which a community or a nation as a whole depends (Wani et al., 2013; John & Singh, 2017). It is regarded as both an end and means of the development process, and treated as the most vital social infrastructure (Bandela, 2013; Majhi & Malik, 2018). Rapid improvement in health converts the poor from 'vicious circle' of poverty to 'virtuous circle' of prosperity. Female education improves the health status of the family which helps to achieve social sector development goals that ultimately leads to economic growth (John & Singh, 2017).

Basic Infrastructural development like transport and communication acts as a key facilitator of economic growth and societal welfare (Chukwuemeka et al., 2013; Farhadi, 2015). Increase in transport facilities enhances the transition of society from a rural base to urban accommodations (Esfahani & Ramirez, 2003; Hong et al., 2011).

Social security plays a vital role in the uplifting socio-economic status of the society in fostering economic growth through safeguarding rights as well as the dignity of the nation's hardworking citizens. Social safety measures like social pension to widows, handicapped, mentally retarded, old ages have a positive bearing on life securities (Panda, 2017; Vasilyeva et al., 2018) and social insecurities hinder social progress and obstruct economic growth (Sen & Sahu, 2017; Mishra, 2017).

Economies in transition face a major public choice issue in terms of the size of social sectors expenditure and their impact on economic growth. Expenditure on health and education increases skill and productivity of labour and balances conflicts between private and social interests which ultimately lead to economic growth. To enhance their human capital, advanced countries rely more on improved health and social security measures whereas developing countries put more emphasis on educational development (Nah, 1997). Alam et al., (2010) concludes a long-run positive association between government spending on health, education & social security, and economic growth in

developing countries of Asia. Contrary to this, Eggoh et al., (2015) observe a negative impact of state spending on education and health on economic growth in African nations due to corruption, bureaucratic defects and underinvestment. The no relationship between social sector expenditure and economic growth has also been reported in the literature (Kormendi & Meguire, 1985). Few studies exist in the Indian context (such as Sen (2000), Bhat & Jain (2004), Haldar & Mallik (2006), Hooda (2013), Gangal & Gupta (2013), Mohapatra (2013), Mishra & Mishra (2015); Jaman (2016)) which also provide inconclusive evidence on this issue thereby leaving the moot point unsettled. Odisha being at the frontier of the developing states of India, the said dynamics between social sector expenditure and economic growth needs to be discussed systematically for helping in designing a holistic policy approach to resolve the issues of growth and development in the state.

4. Materials and Methods

This paper investigates into the growth contributing role of social sector in Odisha over the period from1985-86 to 2018-19. For this purpose, the social sector development of Odisha has been represented by the government expenditure on a set of indicators including Education, Sports, Art & Culture (ESAC), Family Welfare, Medical & Public Health (FWMPH), Housing & Urban Development (HUD), Nutrition (NU), Social Security & Welfare (SSW), Welfare of SC, ST & OBC (WSSO) and Relief on Account of Natural Calamities (RANC). In all these, we have clubbed together with the revenue and capital expenditure. All these variables are first deflated at the constant prices of 2004-05 and then taken in their natural logarithms. The economic growth of the state has been represented by the natural logarithm of Net State Domestic Product (NSDP) at constant prices of 2004-05. The required time-series data have been collected from the EPW Research Foundation database on the Indian economy.

In this paper, it is hypothesized that the development of the social sector due to public spending on the above-mentioned indicators lead to the economic growth of the state in the long-run. Thus, the theoretical model presumed in the paper is:

$$NSDP = f\left(ESAC, FWMPH, HUD, SSW, WSSO, RANC, NU\right) \quad (1)$$

Based on this presumption, the equation (2) is estimated using time series econometric methods discussed below:

$$NSDP_t = \beta_1 ESAC_t + \beta_2 FWMPH_t + \beta_3 HUD_t + \beta_4 SSW_t + \beta_5 WSSO_t + \beta_6 RANC_t + \beta_7 NU_t + \varepsilon_t \quad (2)$$

First, the normality of each these variables have been checked by using the Jarque-Bera test and then the stationary properties have been checked by using the first generation unit root test – ADF test as suggested by Dickey & Fuller (1979). The null hypothesis under the Augmented Dickey-Fuller (ADF) test is non-stationarity. If the ADF test is found associated with a p-value that is less than the significance level (0.01, 0.05, and 0.10), then by rejecting the null, the stationarity of the variables can be concluded. In the next step, the Johansen (1991) cointegration test has been performed to know the likely existence of equilibrium relationship between the variables under study in the long-run that are all I(1). Finally, the analysis of long-run responsiveness (elasticity) of social sector variables to the economic growth of Odisha has been estimated by using the Dynamic Ordinary Least Square (DOLS) method as suggested by Saikkonen (1992) and Stock & Watson (1993) for I(1) variables.

5. Analysis and Discussion

In the beginning, the Jarque-Bera (JB) test has been performed on each of the variables under study to check whether they are all normal or otherwise, and the results are depicted in Table 4. These results could not reject the null at the 0.05 level of significance and thus, the variables are all found distributed normal.

Table 4: Results of Jarque-Bera Normality Test

	NSDP	ESAC	FWMPH	HUD	WSSO	SSW	NU	RANC
JB Stat.	2.7269	1.6624	1.3874	2.2482	1.8154	1.6660	1.3270	2.0037
p-value	0.2557	0.4355	0.4997	0.3249	0.4034	0.4347	0.5150	0.3671
Null Hypothesis: Series is normally distributed								

Source: Authors' Estimation

After the normality of each time series is confirmed, the ADF unit root test was performed, the results of which are summarized in Table 5. These results reveal stationarity of variables at their 1st differences, the non-stationarity being indicated at their levels. Since all the variable in the study are found I(1), confirmation of the cointegrating relationship between them is an empirical necessity.

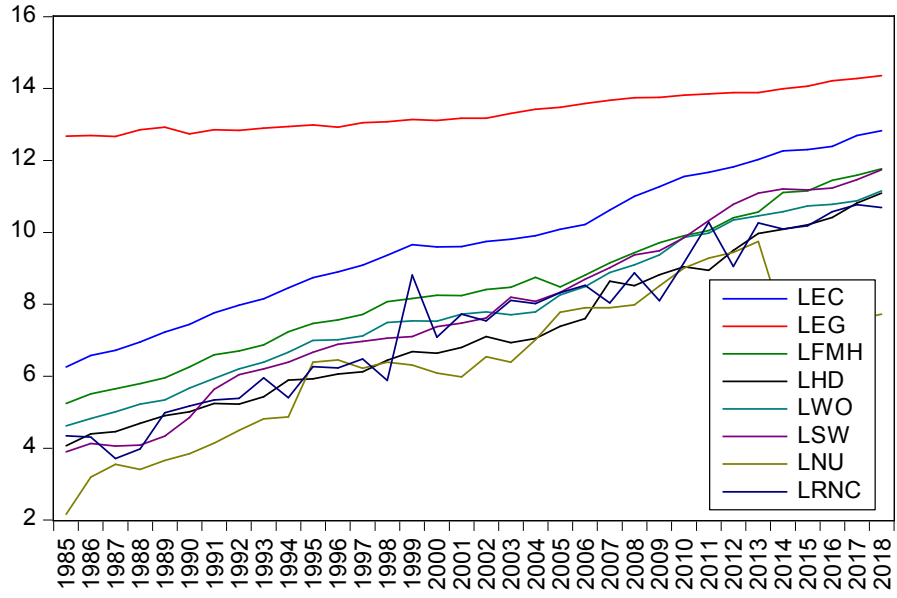
Table 5: Results of ADF Unit Root / Stationarity Test

Variables	With Intercept & No Trend		With Intercept & Linear Trend	
	At Level	At 1st Difference	At Level	At 1st Difference
NSDP	2.123 (0.99)	-7.093 (0.000)*	-1.524 (0.79)	-3.438 (0.06)***
ESAC	-0.758 (0.81)	-4.251 (0.002)*	-3.163 (0.11)	-4.234 (0.011)**
FWMPH	0.125 (0.96)	-6.720 (0.000)*	-1.723 (0.718)	-6.668 (0.000)*
HUD	1.986 (0.99)	-7.097 (0.000)*	-1.962 (0.59)	-4.501 (.006)*
WSSO	-0.369 (0.90)	-4.989 (0.000)*	-2.888 (0.18)	-4.905 (0.002)*
SSW	-0.312 (0.91)	-3.972 (0.004)*	-1.894 (0.63)	-3.906 (0.023)**
NU	-2.219 (0.20)	-5.237 (0.000)*	-1.662 (0.74)	-5.342 (0.000)*
RANC	-1.063 (0.71)	-6.121 (0.000)*	-7.466 (0.000)*	-
Null Hypothesis: Series has a unit root or Series is not Stationary				

Source: Authors' Estimation

In this case, a long-run equilibrium relationship is presumed between the variables even though the series are drifting apart or trending upward. The line graph for these variables in Figure 1 foretells the strong trend and the series are seen moving together. In other words, a cointegration between the variables is indicated. To test the existence of cointegration between them, we have used the Johansen multivariate cointegration test. Since this cointegration test is lag-sensitive, we have determined the optimal lag by AIC from the VAR framework. The optimal lag selected is 1. The results of the Johansen cointegration test are reported in the Table 6.

Figure 1: Line Graph of Time Series



Source: Authors' Construction

The trace and the maximum-Eigen tests of Johansen's cointegration approach indicate the existence of one cointegrating equation at 5 per cent level of significance. Thus, the variables in the study are cointegrated. That is, they exhibit a long-run relationship which implies the variables are related and can be combined linearly.

In the empirical literature, Stolbov (2015) argued that the cointegration test may not yield a dependable outcome when the variables under consideration are short in length of time. In order to get rid of this issue Saikkonen (1992) and Stock & Watson (1993) have suggested for using the Dynamic Ordinary Least Square (DOLS) method of estimating the cointegrating regression. In our study, the time length of variables is 34 years which is relatively shorter to establish an equilibrium relationship in the long-run. Thus, we have used the DOLS technique that gives rise to consistent estimates, and also resolves the econometric issues such as endogeneity of regressors and serial correlation. The results of DOLS estimation are depicted in Table 7 that narrates the degree of long-run responsiveness of regresors to the dependent variable.

Table 6: Results of Johansen Cointegration Test

Null Hypothesis	Eigenvalue	Trace Stat. (p-val.)	Max-Eigen Stat. (p-val)
No Cointegrating Equation	0.926299	222.11 (0.000)*	83.44 (0.000)*
At most 1 Cointegrating Equation	0.763669	138.66 (0.091)	46.160 (0.051)
At most 2 Cointegrating Equation	0.620307	92.51 (0.082)	30.98 (0.361)
At most 3 Cointegrating Equation	0.510103	61.51 (0.191)	22.83 (0.543)
At most 4 Cointegrating Equation	0.418179	38.68 (0.273)	17.33 (0.551)
At most 5 Cointegrating Equation	0.296238	21.35 (0.335)	11.242 (0.623)
At most 6 Cointegrating Equation	0.239835	10.11 (0.272)	8.77 (0.305)
At most 7 Cointegrating Equation	0.040940	1.33 (0.247)	1.33 (0.247)

Source: Authors' Estimation;
Note: * significant at 0.05 level

It is inferred from the Table 7 that 1 per cent increase in public spending on Education, Sports, Art & Culture in the State can lead to 6.79 per cent increase in NSDP; 1 per cent increase in public spending on Family Welfare, Medical & Public Health can lead to 2.88 per cent increase in NSDP; 1 per cent increase in public spending on Housing & Urban Development can lead to 4.53 per cent increase in NSDP; 1 per cent increase in public spending on Social Security & Welfare can lead to 0.94 per cent increase in NSDP; and 1 per cent increase in public spending on Nutrition can lead to 0.46 per cent increase in NSDP. Therefore, these indicators of social sector positively influence the economic growth of Odisha in the long-run. And, these findings are statistically significant.

Table 7: Results of DOLS Estimation

Dependent Variable: NSDP				
Variables	**Coefficient**	**Std. Error**	**t-statistic**	**p-value**
ESAC	6.798862*	0.573031	11.86474	0.0013
FWMPH	2.885618**	0.809809	3.563332	0.0377
HUD	4.534303*	0.350902	12.92186	0.0010
WSSO	-11.48032*	0.692842	-16.56990	0.0005
SSW	0.940533***	0.317784	2.959664	0.0596
RANC	-3.890819*	0.236377	-16.46025	0.0005
NU	0.463343**	0.129079	3.589605	0.0370
Residual Diagnostics: Normality Test: JB Stat.(p-val) = 0.418 (0.811)				
R-squared = 0.99 & Adj. R-Squared = 0.91				
Hansen's Parameter Instability Test: *Lc* Stat. (p-val.) = 0.3818 (p>0.20)				

Source: Authors' Estimation;
Note: *, **, **** significant at 1%, 5% & 10% levels

However, for two indicators viz., Welfare of SC, ST & OBC, and Relief on Account of Natural Calamities, public spending exerts statistically significant negative impact on economic growth of the State. The observed negative impact of government spending on the Welfare of SC, ST & OBC may be due to inefficiency in resource allocation or due to other reasons that could not be traced out in this research thereby leaving the issue to be addressed in subsequent research by critically focusing on it.

Furthermore, the expenditure on Relief on Account of Natural Calamities is primarily required to meet the disastrous effects of natural calamities. Higher expenditure on this head has been observed after the Super Cyclone of 1999, Cyclone Phailin – 2013, Hudhud – 2014, Titli - 2018. Since these natural calamities are responsible for fall in the NSDP of the state and results in higher expenditure on post-cyclonic rehabilitation and reconstruction activities, it is imperative to have a negative relationship between the expenditure on natural calamities and NSDP.

Lastly, we have checked whether the above found long-run relationship reveal a stable equilibrium in the state economy by using the *Lc* parameter instability test as suggested by Hansen (1992). The null hypothesis under this test is stability of the long-run equilibrium relationship. The lower portion of the table-7 indicates that the p-value of *Lc* statistic is not smaller than 0.05 thereby failed to reject the null, and made to establish the stability of the conintegrating relationship under DOLS estimation.

6. Conclusions

Social sector development has been well-acclaimed as a booster of economic growth through its positive effects on the development of human capital and common well-being. Social sector development largely depends on the pattern of government spending on health, education, housing, nutrition, social security and welfare etc. Thus, social sector development has all energy to eliminate the bottlenecks including poverty, inequality, malnutrition, unemployment etc. from the economy. Therefore, social sector development eventually contributes to the long-run growth of an economy. Based on this argument this paper examined the growth-propelling role of social sector in Odisha in a time-series framework. The results lend to support statistically significant positive impacts of public expenditure in five categories of sub-sectors viz., Education, Sports, Art & Culture, Family Welfare, Medical & Public Health, Housing & Urban Development, Social Security & Welfare, and Nutrition on the economic growth of Odisha. It is vital to mention that in three sub-sectors viz., Education, Sports, Art & Culture, Family Welfare, Medical & Public Health, and Housing & Urban Development, public spending should be prioritised as these are predicted to contribute more than proportionately to the real aggregate output of the state. Furthermore, the findings of the study reveal a statistically negative impact of public spending on Welfare of SC, ST & OBC, and Relief on Account of Natural Calamities. While the latter is quite obvious for sporadic nature of the occurrences of natural calamities, policy focus is required for effective and efficient utilization of budgetary allocations for the welfare of SC, ST & OBC may be by ensuring good governance. Despite the key implications of this study, it can further be extended to cover up all sub-sectors of the social sector for their probable impacts on economic growth and development of Odisha. Furthermore, the study can be extended to examine the short-run dynamics in the error correction framework while observing the responsiveness of growth to different shocks using the impulse response and variance decomposition analyses.

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Article

Role of Urban Local Body in Social Sector Development A Case Study of Baripada Municipality

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Abstract

Social sector plays a vital role in human development. Social sector is a complex phenomenon consisting of several interdependent components. Here we have concentrated on 'urban development'. An attempt is made to examine the situation of Baripada Municipality as a case study, with special reference to analyse the pattern of social sector expenditure during the past quarter century from 1991-92 to 2016-17. The secular behaviour of expenditure is computed by fitting semi-log as well as double-log model. The log-lin model is employed to study the growth rate and double-log model is used to compute the elasticity of expenditure. Empirical results show that for all types of expenditure, be it total or social sector or administrative, an increasing trend is observed over the period of analysis. The results of log-lin model show that per annum growth rate of total expenditure, development (social sector) expenditure and non-development expenditure are 14.38, 14.92 and 13.34 per cent, respectively, during the aforesaid period. Further the double-log model confirms that out of several types of expenditure 'Development (Social Sector) Expenditure' more particularly the expenditure on 'Public Convenience and Works' are elastic in nature. This reveals that social sector expenditure is the leading item of expenditure of Baripada Municipality.

Keywords: Urban local body; Social sector expenditure; Administrative expenditure; Baripada Municipality

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Introduction

The concept of development has undergone a sea change over time. Traditionally development meant material growth, but in due course of time there has been a shift from material growth to social development. In late 1980s 'The Endogenous Growth Model' highlighted the role of social sector to foster economic development (Romer, 1986; Romer, 1990; Lucas, 1988). Social infrastructure is as critical for human development resource as physical infrastructure. Social sector plays a vital role in human development (UNDP, 1990; Ghosh, 2006).

In fact it is difficult to come across a formal definition of the term "social sector". Generally, it is used to refer to sectors like education, health and nutrition, etc. that are concerned with the provisioning of 'merit goods' which are socially valuable. As per the Reserve Bank of India publication social service includes 'Education, Sports, Art and Culture, Medical and Public Health, Family Welfare, Water Supply and Sanitation, Housing, Urban Development, Welfare of Scheduled Caste, Scheduled Tribe & Other Backward Castes, Labour and Labour Welfare, Social Security and Welfare, Nutrition and Relief on account of Natural Calamities' (RBI, 2004). There is a symbiotic synergy among the various components of the social sector. Therefore, social sector is a complex phenomena consisting of several interdependent components. In the present article we have concentrated on 'Urban Development'.

There has been a steady increase in the country's urban population over the decades. The share of persons living in urban area rose by 3.35 per cent in the decade 2001 to 2011 from 2.10 per cent in the decade 1991 to 2001 (Government of India, 2019). Thus, demands placed by the public on urban local bodies (ULBs) for the provision of various social services have increased considerably.

Urbanisation is a job-creating process and contributes to economic and overall growth of the economy. There is a need to provide for housing, health, water supply, sanitation and education facilities to the growing urbanites. Growth of urbanization requires good transport / communication and other infrastructure facilities. The gradual increase in urban population is certain to put strain on urban infrastructure. This entails substantial expenditure for creation of urban infrastructure such as water supply, sanitation, public health, roads, transport arrangements, street light, etc. A fundamental component of

infrastructure development is the financial aspect. Considering the pace of urbanisation and the infrastructure needs, financial requirements appear to be enormous in the years to come and accordingly the focus area is how to meet the financial requirements of the urban area.

Till 1992 India functioned as a two tier structure (centre and states), although informally some amount of decentralisation below the state level existed for quite a long period (Rao, 2000). The third tier (local bodies) came into recognition after the 73rd and the 74th amendments in 1992. The 74th Constitutional Amendment Act (CAA) in India aims at a decentralization regime through devolution of functions, finances and functionaries to Urban Local Bodies (Murthy & Mahin, 2015). Decentralization can be usefully understood as a political process whereby administrative authority, public resources and responsibilities are transferred from central government agencies to lower-level organs of government (Rao & Bird, 2010).

A general notion of decentralisation's benefit is its improved potential as a means of realizing good governance. The local governments can better serve the needs and identify the preferences of their constituents than can be done at a national level. It is argued that central / state agencies lack the 'time and place knowledge' to implement policies and programmes that reflect people's 'real' needs and preferences, on the contrary, decentralization creates institutions that are more amenable to local needs and preferences (Bird & Vaillancourt, 1998). Some of the potential gains of decentralisation are: enhances the efficiency and responsiveness of governments, raises welfare by tailoring the mix and level of public goods to collective preference of local jurisdiction, improves the overall economic performance of public agencies by involving the tax payer more closely in spending decisions, introduces competitiveness among local governments in order to better satisfy the priorities of citizens and results in efficiency gains from greater voice of local constituents (Mathur, 2000).

In modern world the earliest attempt to decentralization was initiated in 1970s, gained momentum in 1980s and became accelerated after 1990s. Decentralization brings decision-making nearer to the public residing at local area. Oates (1972) asserted that given the prescribed conditions, it is always efficient for sub-national governments to provide the Pareto-efficient levels of output for their respective regions, as compared to the national authority. As the sub-national government has close connection with the

local people and are more aware about their preferences and conditions, hence they have an added advantage against their national counterparts. Oates's 'Decentralized Theorem' relies heavily on the classical writing of Tiebout (1956), which suggested that delegating power to the local authority will lead to an efficient equilibrium. In the Tiebout model, horizontal government competition is likely to lead to efficiency in the local public sector (Epple & Nechyba, 2004). Rondinelli et al., (1989) argued "Being closer to the people, local bodies can more easily identify people's needs and thus supply the appropriate form and level of public services". Decentralization has many advantages: the information revelation is in tune with the preferences of citizen at local level (Manin et al., 1999), improves accountability as local political representatives have direct interface with the local people (Peterson, 1997), coincides citizens choice with policy preferences since decision making move to local jurisdictions, improve fiscal management, and accelerates economic growth (Wibbels, 2005). These outcomes enhance efficiency and ensure participation of public in democratic process, consequently reduce corruption (Fisman & Gatti, 2002; Crook & Manor, 1998). Musgrave (1983) maintained that public services should be provided by the public authority and the cost there of be shared in tune with the preference of the citizens of the relevant benefit region.

Demands placed by the public on ULBs for the provision of various civic services have increased considerably. Water supply, sanitation and solid waste management are important basic needs affecting the quality of life and productive efficiency of people. Provision of these basic services continues to be amongst the core activities of the ULBs. Data shows that only 62 per cent of urban households have access to treated water supply, out of which only 49 per cent have access to piped water supply within their premises (IIHS, 2014). Around one third of urban households in India are connected to the sewerage system. The majority of the houses - 38.2 per cent, as per Census 2011 use toilets connected to septic tanks (Rohilla et al., 2016). Nearly 25 per cent of the total garbage remains uncollected from roads and streets. Public transport in large cities ranges from a low of 15 per cent (in Ahmedabad) to a high of 57 per cent (in Kolkatta), in small towns (population below 2 million) it is around 13 per cent (Government of India, 2019). This clearly reveals that public transport system is unable to absorb the fast growing traffic load of the urban area.

The relationship between public expenditure and economic growth has been an ongoing debate in the literature of economic development. The oretically, two basic approaches are generally adopted in the literature to address this issue. The approaches are spearheaded by Adolph Wagner and J. M. Keynes with their apparently contrasting view points on the causal relation. Wagner's 'law of increasing state activities' postulates economic growth causes public expenditure to increase. Keynes pointed out that public expenditure could be the most potent instrument of recovery during depression. Thus public expenditure causes growth. Empirical works on this issue may safely be clubbed into three compartments. Some favoured the Wagner's Law; others supported the Keynesian Approach; and third preferred none. A good number of empirical attempts have been made at international and national level.

The studies by Khan (1990), Costomitis et.al. (1993), Oxley (1994), Cheltos & Kollias (1997), Ghali (1998), Tulsidharan (2006), Verma & Arora (2010), Srinivasan (2013) and many others supported Wagner's view. Pradhan (2007), Ranjan & Sharma (2008), Magazzino (2010), Dadan (2011), Bataineh (2012), Sevietenyi (2012), Gangal & Gupta (2013), Lhoungu & Mishra (2016), etc. to name a few confirmed the presence of Keynesian proposition. Singh and Sahni (1984), Ahsan et al. (1992) and Ray and Ray (2012) supported none of the above.

Regarding the relation between Economic Growth and Social Sector Expenditure (along with its components) we have also observed divergent view. Diamond (1989), Landau (1983, 1986), Barro (1989, 1991), Grier and Tullock (1989) discovered negative whereas Ram (1986), Aschauer (1989) positive and Kormendi & Meguire (1985) found no association.

Civic infrastructure and services are critical inputs for the competitive edge of urban areas in a fast-globalizing world. However, without a commensurate enhancement of their resource-raising powers, cities are faced with fiscal stress as a result of which their capacity to contribute to national development as engines of economic growth is severely constrained.

Objectives

Against this background an attempt is made here to examine the situation of Baripada municipality as a case study. The specific objectives of the present article are: to examine the level, trend and growth of expenditure of Baripada Municipality (BM) and to analyse its the pattern of social sector expenditure.

Studies on Urban Finance

Researchers have taken holistic view of urban governance, role, responsibility and institutional capabilities of urban local bodies in provisioning of public services in concerned urban area (Vaidya, 2009; Jha & Vaidya, 2011). Cost estimation of urban services and their financial constraint was also studied by the scholars (Sridhar et al., 2006; Sridhar, 2007)

It was hoped that the urban local bodies would provide an equitable services to every segment of the urban communities including the deprived and the poor. These hopes, somehow, were belied due to a host of reasons. Most of these relate to imperfections in the Constitution Amendment Act itself, not-so-effective implementation of the Constitution Amendment Act, continued indifference of the State Government of which the ULBs are creatures even in the post-Constitution Amendment regime, and weak institutional capacity due largely to weak resource base, inadequacies in staffing, absence of even rudimentary management system (Murthy & Mahin, 2015; Pierce, 2016).

However, there is a scanty of literature on municipal finance in Odisha. Researchers have examined the municipal finance of Odisha at different points of time (Patnaik, 1969; Mishra, 1986). The financial administration of Municipal Corporations of Odisha was also attempted by scholars like Dash (1988) for Cuttack, Mohapatra & Mishra (1991) for Berhampur and Panda (2013) for Bhubaneswar.

Data Source and Methodology

The study is supported by secondary data, collected from audit report, budget documents, and published sources of Baripada municipality. The study period ranges from 1991-92 to 2016-17. By taking a case study of Baripada municipality the paper analyses the role of local government in creation of

social infrastructure for betterment of public life and to improve local service delivery. It also examines the trend of expenditure and discloses the challenges faced by it for social service delivery.

The analytical framework of the present work runs as follows: the secular behaviour of expenditure of the BM is computed by fitting both semi-log and double-log model. The semi-log (log-lin) model is employed to estimate the growth rate of expenditure and double-log model is used to calculate the elasticity of expenditure. The model we posit aregiven below

Log-lin Model: $\ln E_{it} = \alpha + \beta t + \varepsilon_{it}$ (I)

Double-log model: $\ln E_{it} = \alpha + \beta \ln X + \varepsilon_{it}$ (II)

Where, E_{it} is response variable, i.e., expenditure of the municipality on the purpose i (administrative / social sector / total / component) at time t; t is time, taking value 1 for the first year, 1991-92 to 26 for the terminal year 2016-17; X is the value of explanatory variable and ε_{it} is the error term.

Profile of the Study Area

The BM 113-year-old municipality, one of the oldest in India, has its place of pride in the history of Odisha. Utkalamani Gopabandhu Das had been its deputy chairperson for several years. This Municipality was set up by Maharaja Sriram Chandra Bhanjadeo and was constituted under Mayurbhanj State Regulation-2 of 1905 and subsequently was taken over by the Government of Odisha on January 1, 1949 after the merger of the formar state of Mayurbhanj.

Mayurbhanj Municipality Regulation Act was introduced in 1922 instead of Bihar-Odisha Municipality Act. The BM came under the Odisha Municipality Act in 1950. The residential profile of the town is given below.

Table 1: Residential Profile of Baripada Municipality

Indicator	2001	2011	Decadal Growth Rate
Number of Wards	25	28	12
Number of Households	19314	24718	27.98
Total Population	95004	116849	22.99
SC Population	9563 (10.07)	12797 (10.95)	8.8
ST Population	12995 (13.67)	20603 (17.63)	58.55
General Population	72446 (76.26)	83449 (71.42)	15.18

Source: Population section of Baripada Municipality
Note: Figure in the bracket shows percentage out of total population

It is observed from Table 1 that population of the municipality has increased to the extent of 23 per cent and the size of the residential area also increased during the decade. With the increased population demand for urban infrastructure such as water supply, sanitation, public health, roads, transport arrangements, and street light mounts.

Expenditure Pattern of Baripada Municipality

This article we are interested to examines the expenditure pattern of the BM. Whereas optimum utilisation of resource needs an examination of the availability vis-a-vis the requirement of public authority, but for the time being we have concentrated only on expenditure.

The expenditure of the BM can be classified into (a) development and (b) non-development. The development expenditure includes public safety, public health, water supply, construction and repair works, medical facilities etc. These are also called 'social sector expenditure' demands for which has been on the rise with urbanization. On the contrary, the non-developmental expenditure includes general administration, establishment expenditure, debt servicing, and various other miscellaneous works such as legal charges, bank charges, advertisements etc. which is also increasing with the pace of urbanization. These expenditures are also termed as 'administrative expenditure'.

The debate on the linkage between public expenditure and growth of the economy is inconclusive. Further, in case of ULBs welfare of the local people has an edge over the growth of the urban economy. Hence, emphasis should be given to examine all those expenditures that are having positive impact on the welfare of the citizens.

The expenditure pattern gives an indication on prioritisation of different sectors in the service delivery system of the municipality. Expenditure of urban local body includes 'Administrative Expenditure' and 'Expenditure on Social Services' and there is a trade-off. Therefore, a low proportion of expenditure on establishment or administration is desirable.

Table 2 details the expenditure pattern of the BM during the last 25 years. It discloses both development (social sector expenditure) and non-development expenditures over the study period of twenty six years that is from the year 1991-92 to 2016-17 both at current and constant prices along with the percentage value.

	At Current Prices (Rupees, Lakh)			*At Constant (2004-05) Prices (Rupees, Lakh)*			*Value (In Percentage)*	
Year	Dev. Exp.	Non-Dev Exp.	Total Exp.	Dev. Exp.	Non-Dev Exp.	Total Exp.	Dev. Exp.	Non-Dev Exp.
1991-92	53.93	45.42	99.35	120.45	101.45	221.90	54.28	45.72
1992-93	62.51	44.19	106.70	126.86	89.68	216.54	58.58	41.42
1993-94	80.13	42.26	122.39	150.08	79.15	229.24	65.47	34.53
1994-95	100.27	44.31	144.58	166.79	73.71	240.50	69.35	30.65
1995-96	108.24	47.11	155.35	166.72	72.56	239.28	69.67	30.33
1996-97	104.20	81.92	186.12	153.43	120.63	274.06	55.99	44.01
1997-98	98.32	79.77	178.09	138.67	112.51	251.18	55.21	44.79
1998-99	103.37	77.39	180.76	137.61	103.02	240.63	57.19	42.81
1999-00	139.73	167.84	307.57	180.12	216.36	396.48	45.43	54.57
2000-01	123.25	88.50	211.75	148.26	106.46	254.73	58.21	41.79
2001-02	173.82	87.41	261.23	201.84	101.50	303.34	66.54	33.46
2002-03	143.12	81.31	224.43	160.71	91.30	252.01	63.77	36.23
2003-04	133.47	101.30	234.77	142.12	107.87	249.99	56.85	43.15
2004-05	261.92	121.72	383.64	261.92	121.72	383.64	68.27	31.73
2005-06	169.15	157.11	326.26	161.87	150.34	312.21	51.85	48.15
2006-07	251.54	208.44	459.98	225.80	187.11	412.90	54.68	45.32
2007-08	390.24	212.37	602.61	334.68	182.14	516.82	64.76	35.24

2008-09	813.67	283.64	1097.31	645.77	225.11	870.88	74.15	25.85
2009-10	494.63	299.27	793.90	378.16	228.80	606.96	62.30	37.70
2010-11	761.32	356.76	1118.08	531.28	248.96	780.24	68.09	31.91
2011-12	964.85	518.84	1483.69	618.10	332.38	950.48	65.03	34.97
2012-13	964.26	630.98	1595.24	577.85	378.13	955.98	60.45	39.55
2013-14	1340.60	793.14	2133.74	763.39	451.65	1215.04	62.83	37.17
2014-15	1226.57	761.65	1988.23	689.86	428.38	1118.24	61.69	38.31
2015-16	4510.29	922.87	5433.17	2633.90	538.94	3172.84	83.01	16.99
2016-17	1982.92	1182.20	3165.11	1138.30	678.64	1816.94	62.65	37.35

Table 2: Development & Non-development Expenditure of Baripada Municipality
Source: Budget Document, Baripada Municipality

Table 2 show that total expenditure at current prices of the BM increased from 1991-92 to 2008-09 except two years 1997-98 and 1998-99. It was Rs. 99.35 lakh in 1991-92 and it increased more than ten folds in less than 20 years to reach a record level of Rs 1097.31 in 2008-09. However, in the following year it receded to Rs. 793.9 lakhs, but picked up to reach a high of Rs. 5433.17 in 2015-16.

So far as the development expenditure of the BM is concerned, it has increased from Rs. 53.93 lakh in 1991-92 to Rs. 390.24 lakh in 2007-08, with a slight decline from trend level during 1997-98 and 1998-99. There was a quantum jump of social sector expenditure or, development expenditure) in 2008-09, i.e., Rs. 813.67 lakh from previous year's level of Rs. 390.24 lakh. However, thereafter the level of expenditure was maintained and reached a high of Rs. 1982.92 lakh in 2016-17. Only exception is the year 2015-16 in which development expenditure touched a record Rs. 4510.29 lakh.

During the study period non-developmental expenditure at current prices also shows an increasing trend but in an unsteady manner. In 1995-96 it was Rs. 47.11 lakh then in its next year the amount doubled to Rs. 81.92 lakh. Similarly, the amount doubled again from Rs. 77.39 lakh in 1998-99 to Rs. 167.84 lakh in 1999-00, then in its very next year it reduced to Rs. 88.50 lakh. Thereafter the non-development expenditure witnessed an increasing trend ending up with Rs. 1182.20 lakh in 2016-17.

In constant prices the BM (base year as 2004-05). The total expenditure was with Rs. 221.90 lakh in 1991-92 and continued to rise in a fluctuating manner to end up with Rs. 1816.94 lakh in the year 2016-17, only exception year was 2015-16 with an expenditure of Rs. 3172.84 lakh.

Development expenditure at the constant prices, experiences an unstable increasing trend during the study period i.e., from 1991-92 to 2016-17. It opened with Rs. 120.45 lakh in 1991-92 and the volume of development expenditure highest in 2015-16 with Rs. 2633.90 lakh and in its very next year it ended up with a fall of more than half of its highest with Rs. 1138.30 lakh.

In Table the non-development expenditure at constant price is shown growing but in a fluctuating manner. It opens with Rs. 101.45 lakh in 1991-92. Over the study period it experienced its lowest in the year 1995-96 with Rs. 72.56 lakh and the highest in the terminal year of the study period with Rs. 678.64 lakh.

With regard to the share of development vis-a-vis non-development expenditure of the BM the former had done better.

Per Capita Expenditure of Baripada Municipality

Table 3 represents the calculations for per capita expenditure of the BM during the study period from 1991-92 to 2016-17 both at current and constant prices with 2004-05 as the base year.

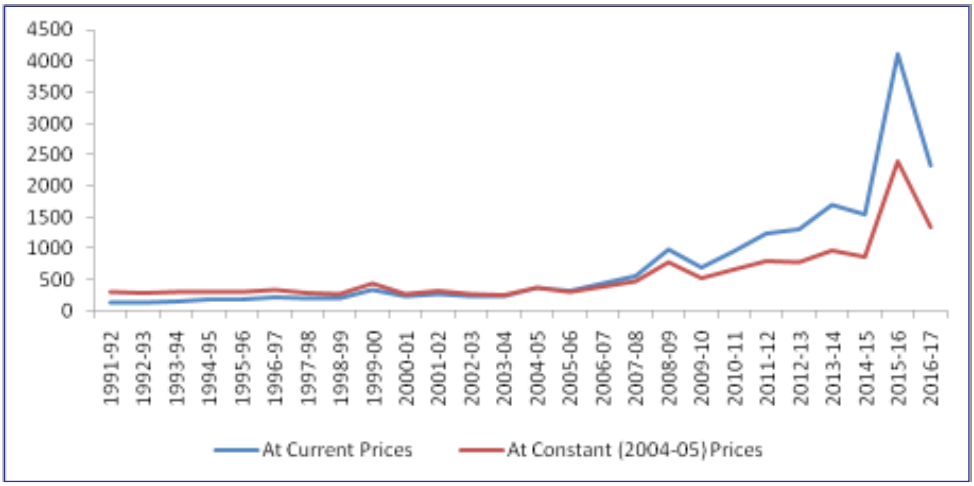
Year	*At Current Prices*	*At Constant (2004-05) Prices*
1991-92	136.50	304.89
1992-93	142.99	290.20
1993-94	159.99	299.65
1994-95	184.34	306.63
1995-96	193.20	297.58
1996-97	225.77	332.44
1997-98	210.71	297.19
1998-99	208.61	277.70
1999-00	346.22	446.30
2000-01	232.49	279.68
2001-02	279.76	324.86
2002-03	234.44	263.25
2003-04	239.20	254.70
2004-05	381.26	381.26
2005-06	316.26	302.64
2006-07	434.91	390.40
2007-08	555.75	476.63
2008-09	987.06	783.38
2009-10	696.57	532.54
2010-11	956.86	667.73
2011-12	1238.51	793.41
2012-13	1298.85	778.36
2013-14	1694.54	964.95
2014-15	1540.13	866.21
2015-16	4105.09	2397.27
2016-17	2332.59	1339.03
Average	743.56	563.42
Average (except 2015-16)	609.10	490.06

Source: Computed by the Researcher

The average per capita expenditure of the BM during the study period was Rs. 743.56 and Rs. 563.42 at current and constant prices, respectively. Data reveals that for the year 2015-16 there was an unusual increase of per capita expenditure to a very high level of Rs. 4105.13 at nominal price and Rs. 2397.27 at base price. In fact, this pushed the average per capita expenditure figure for rest of the period (25 years) to around Rs. 100 rupees more. This is clear from Chart 1, if we exclude this non-normal year (2015-16) the average figures slashed to a level of Rs. 609.10 and Rs. 490.06 at prevailing and base prices; respectively. The per capita expenditure figure

depicts an increasing trend over the period. Except the years 1997-2000, 2002-04 and 2005-06 in rest of the period it shows a continuous increase. From a modest level of per capita expenditure of Rs. 136.50 in 1991-92 it increased to Rs. 279.76 by the turn of the next decade, i.e., in 2001-02 and further to a high of Rs. 1238.51 in 2011-12 and Rs. 2332.59 in 2016-17 at nominal price. With the elimination of inflation the figures for corresponding years were Rs. 304.89, Rs. 324.86, Rs. 793.41 and Rs. 1339.03 respectively.

Chart 1: Per Capita Expenditure of Baripada Municipality at Current and Constant Prices



Composition of Social Sector Expenditure in Baripada Municipality:

Table 4 details composition of social sector expenditure in the BM both in absolute and percentage form over the past 26 years, i.e., from the year 1991-92 to 2016-17. Social Sector Expenditure constitutes public safety, public health and sanitation, public convenience and public instruction. Here public safety includes expenditures like general lighting, energy charges and fire equipment, while public health and sanitation covers medical expenses, drainage, sanitation, conservancy, waste management and water supply. The third category is mainly related to construction and repairing work. The last segment, i.e., public instruction includes expenditure on primary education, libraries and reading room, repair and improvement of monuments, improvement of data base etc.

Table 4: Composition of Social Sector Expenditure in Baripada Municipality

Year	*At Current Prices (Rupees, Lakh)*				*Value (In Percentage)*			
	Public Safety	Public Health & Sanitation	Public Conve. & Works	Public Instruction	Public Safety	Public Health & Sanitation	Public Conve. & Works	Public Instruction
1991-92	7.31	18.10	21.89	6.63	13.55	33.56	40.59	12.29
1992-93	8.17	20.93	26.80	6.61	13.07	33.48	42.87	10.57
1993-94	8.96	26.14	39.56	5.47	11.18	32.62	49.37	6.83
1994-95	9.72	30.88	50.19	9.48	9.69	30.80	50.05	9.45
1995-96	11.73	27.53	56.00	12.98	10.84	25.43	51.74	11.99
1996-97	16.04	32.94	40.51	14.71	15.39	31.61	38.88	14.12
1997-98	18.04	41.51	24.14	14.63	18.35	42.22	24.55	14.88
1998-99	16.46	51.38	24.04	11.49	15.92	49.70	23.26	11.12
1999-00	32.16	48.32	45.02	14.23	23.02	34.58	32.22	10.18
2000-01	13.70	48.93	46.73	13.89	11.12	39.70	37.91	11.27
2001-02	20.62	61.84	75.17	16.19	11.86	35.58	43.25	9.31
2002-03	10.80	57.19	62.01	13.12	7.55	39.96	43.33	9.17
2003-04	17.57	53.73	49.61	12.56	13.16	40.26	37.17	9.41
2004-05	32.98	91.27	125.83	11.84	12.59	34.85	48.04	4.52
2005-06	27.55	63.10	74.48	4.02	16.29	37.30	44.03	2.38
2006-07	41.69	85.86	121.60	2.39	16.57	34.13	48.34	0.95
2007-08	57.17	98.07	234.04	0.97	14.65	25.13	59.97	0.25
2008-09	37.52	125.11	650.98	0.06	4.61	15.38	80.01	0.01
2009-10	57.05	175.53	261.99	0.05	11.53	35.49	52.97	0.01
2010-11	42.21	186.46	532.66	0.00	5.54	24.49	69.96	0.00
2011-12	54.93	419.31	490.62	0.00	5.69	43.46	50.85	0.00
2012-13	58.01	422.95	483.25	0.05	6.02	43.86	50.12	0.01
2013-14	122.56	391.09	822.56	4.38	9.14	29.17	61.36	0.33
2014-15	76.96	452.12	687.36	10.14	6.27	36.86	56.04	0.83
2015-16	269.74	478.65	3716.07	45.84	5.98	10.61	82.39	1.02
2016-17	253.42	545.26	1101.66	82.58	12.78	27.50	55.56	4.16

Source: Computed by the Researcher

The first category of social expenditure i.e. public safety has been increasing, though not consistently, over the study period. Public health and sanitation reveals an expanding trend over the last 26 years of the analysis. Likewise expenditure on public convenience and works increased from Rs. 21.89 lakh in 1991-92 to Rs. 687.36 lakh in 2014-15 and jumped three times with Rs. 3716.07 lakh in 2015-16, however, in 2016-17 it came down to Rs. 1101.66. Therefore, the journey ups and downs. A similier trend was seen in case of public instruction.

Table 4 also portrays the component-wise share of expenditure on social sector. It may be inferred that percentage value of public safety ranges between 4.61 per cent and 23.0 per cent. The spending on public health and sanitation public convenience and works also have fluctuaed. The expenditure related to public instruction seems to be the most fluctuated category of social sector expenditure. From a peak of 14.88 in 1997-98 it persistently declined to zero in 2011-12.

From the above analysis it is clear that public convenience and works appear to be the strongest category of social sector expenditure of the BM. Around half of the total social sector expenditure was devoted towards this component. This is followed by public health and sanitation. Public instruction comes last.

Component Wise Growth Rate of Expenditure in Baripada Municipality

Table 5 displays growth rate of total expenditure, development (social sector) expenditure, non-development expenditure and various components of social sector expenditure at current and constant prices in the BM Panel I details the growth rate in money terms and Panel II portrays in real terms. It is evident that the growth rate of social sector expenditure is higher than that of the non-development and also the total. So far as the components of social sector are concerned the growth rate of public convenience is the highest – 17.23 per cent at current and 11.74 per cent in constant prices, respectively. This is followed by public health. But public instruction records negative growth both in money as well as in real terms.

Table 5: Component Wise Growth Rate of Expenditure in Baripada Municipality

Panel I: Nominal Value				
Source	Slope coefficient	P- Value	R^2	Annual Growth Rate
Total	0.1438	0.000	0.9258	14.38
Development	0.1492	0.000	0.9038	14.92
Non-Development	0.1334	0.000	0.9342	13.34
Pub. Safety	0.1200	0.000	0.8578	12.00
Pub. Health	0.1363	0.000	0.9421	13.63
Pub. Convenience	0.1723	0.000	0.8539	17.23
Pub. Instruction	-0.0583	0.283	0.0521	-5.83
Panel II: Real Value				
Source	Slope coefficient	P- Value	R^2	Annual Growth Rate
Total	0.0884	0.000	0.8176	8.89
Development	0.0943	0.000	0.7816	9.43
Non-Development	0.0785	0.000	0.8240	7.85
Pub. Safety	0.0651	0.000	0.6185	6.51
Pub. Health	0.0814	0.000	0.8594	8.14
Pub. Convenience	0.1174	0.000	0.7231	11.74
Pub. Instruction	-0.1128	0.046	0.1684	-11.28

Source: Calculated by the Researcher

Source Wise Elasticity of Expenditure in Baripada Municipality:

The expenditure elasticities of different types of expenditure of the BM are shown in Table 6 to elicit the importance of expenditure for provision different services to the residents of the ULB. It is observed that 'development expenditure', more particularly on 'Public Convenience and Works', are elastic in nature both at nominal and real terms. However, non-development expenditure and two other components of 'development expenditure' viz, 'Public Safety' and 'Public Health' are inelastic. Here, we have not computed the elasticity of 'Public Instruction' as its value is zero for two fiscal years.

Table 6: Source Wise Elasticity of Expenditure in Baripada Municipality

Panel I: Nominal Value			
Source	Elasticity	P- Value	R^2
Development	1.045	0.000	0.991
Non-Development	0.906	0.000	0.962
Pub. Safety	0.829	0.000	0.916
Pub. Health	0.914	0.000	0.915
Pub. Convenience	1.218	0.390	0.953
Panel II: Real Value			
Source	Elasticity	P- Value	R^2
Development	1.074	0.000	0.981
Non-Development	0.840	0.000	0.911
Pub. Safety	0.748	0.000	0.789
Pub. Health	0.837	0.000	0.879
Pub. Convenience	1.347	0.153	0.919

Source: Calculated by the Researcher

Comparing the elasticity of all the sources of expenditure it is revealed that all have positive elasticity and are statistically significant. The list is headed by 'Public Convenience and Works' followed by 'Development Expenditure' and 'Public Safety' is at the bottom.

Conclusion

The case study shows that the local government under takes most of the essential functions for the benefit of its residents. These functions include provision of water supply, health and sanitation, public safety, public works & convenience and waste management. Empirical result shows that both development and non-development expenditure followed an upward trend over the period of analysis. The expenditure on development sector has been more than that of non-development expenditure of the BM. This confirms that local government has been playing a crucial role in social sector development over many decades. The double-log model confirms that out of several types of expenditure 'Development (Social Sector) Expenditure' more particularly the expenditure on 'Public Convenience and Works' are elastic in nature. This clearly reveals that social sector expenditure has predominance over other expenditure at the BM.

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Understanding Gaps in Healthcare Services through Healthcare Delivery System in Odisha

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Abstract

The paper aims to explore the nature and quality of healthcare delivery system in Odisha by focusing on the gap between the demand and supply facilities. It focuses on the pattern of financing system and to analyze the determinant of healthcare expenditure in Odisha. It also discusses the governance process and transmission mechanism of service delivery in the state. It looks into the infrastructure, tools and equipments and manpower in the healthcare facilities and how these functions to improve the service delivery at the primary and secondary levels. The indicators used are chronic and non-chronic diseases, accessibility towards different services, ante-natal care, out-of-pocket expenses, etc. The study utilizes secondary sources of data and establishes that though there is some financing in health sector the demand and supply gap in healthcare services in Odisha remains a matter of concern.

Keywords: Healthcare system; Transmission mechanism; Out-of-pocket expenses; Accessibility; Financial structure

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Introduction

Healthcare system is considered crucial for improving the quality of life and social welfare of the people. According to the World Health Organisation, healthcare system has several dimensions where both physical and human resources are necessary for production of health output. But without the consideration of financial resources, these outputs cannot be utilized properly (Debi, 2011). India is a country with diverse social, economic and environmental conditions These factors play a significant role in the difference in the healthcare status and resources across states. For instance, female life expectancy in Kerala is the highest and approximately 16 years more than that in states such as Uttar Pradesh and Bihar. The female infant mortality rate in Madhya Pradesh is approximately 7.2 times more than that in Kerala. Similarly, the maternal mortality rate in Rajasthan is almost thrice that in Maharashtra. There is also a significant disparity in number of hospitals and hospital beds serving the population across states.

Health for all is the fundamental right of everyone to lead a healthy and active life. There is a strong relationship between health and economic development as human resource development is closely related to economic health. health sector of Odisha is under stress with 32.59 per cent of its total population living below the official declared poverty line (NITI Aayog); the national average is 21.92 per cent and Odisha rank as the second most poor state after Bihar. The performance of Odisha in several health status indicators is below the national average with the public spending in health sector remaining around to 1-1.5 per cent of the gross state domestic product (GSDP) as against 6 per cent recommended by the Indian Council of Social Science Research and Indian Council of Medical Research Panel (ICSSR & ICMR, 1981).

Despite high levels of poverty in Odisha, it has shown notable improvements in health outcomes. The state IMR has reduced from 112.1 in 1998-99 to 40 in 2015-16. The under five mortality rate has also declined from 131 in 1998-99 to 48 in 2015-16 (NFHS 1998-99 & 2015-16). The MMR has shown a steady decline from 258 in 2007-09 to 237 in 2011-12 (SRS, 2011 and AHS, 2011-12).

The paper draws upon secondary sources like National Health Accounts Cell, MOHFW, Outcome Budget, National Health Profile etc. and tries to figure

out the demand for health care services in the state. It also makes an attempt to focus on factors like out-of-pocket expenditure, availability of drugs towards communicable and non-communicable diseases, doctor-patient ratio, to understand gaps in healthcare services in the state. Further, the study analyzes the financing of healthcare by the state government through schemes and other policy initiatives

Review of Literature

The demand for healthcare services depends on the choice of patients towards the care they require. Mahapatro (2015) highlighted that the demand in healthcare depends on various factors like transportation, awareness among health workers at the grassroot level to provide basic amenities, role of family members towards health awareness. Phalkey et.al (2012) points to the impact of geographical factors and natural calamity on the demand for healthcare services. The perception of people towards healthcare service in Odisha and their level of satisfaction have been examined in Baron-Epel et al. (2001), Sodani (2010), Bhardwaj et al. (2013) and Rout (2015). They discuss the various reasons for selecting public or private healthcare facilities and observe that these depend on the socio-economic status of the person seeking health services. They argue that a higher proportion of patients belonging to the low socio-economic status preferred public healthcare over private healthcare. Stressing social factors Dwivedi and Pradhan (2017) hold that people in urban areas or with higher social and economic status prefer private healthcare services. Rao et al. (2006) stated that patient satisfaction with public healthcare facilities had improved through better staff and physicians with good interpersonal skills, developed infrastructure and availability of drugs which have a greater impact on health outcomes. Bharadwaj et al. (2013) assigned priority to the management of financial resources to improve hospital operations to give high quality services. Debi (2011) highlights that both physical and human infrastructure facilities are necessary for development of sound and efficient health systems.

Thomas et al. (2015), through a survey conducted between 2008 and 2012, found that there was an urgent need for innovative and prolonged provision of health services in the southern districts of Odisha where high levels of poverty lead to poor maternal and child health. The more vulnerable groups are among SCs and STs. Purohit (2016) by using 2012 district level data of Odisha compares districts as the most efficient district and least efficient and

explains the efficiency of the sub-state level health system. He also held that private health service should complement public healthcare service and the role of sanitation, rural electrification and rural population growth needs to emphasized. Behura (2003) highlighted the concept of human capital in relation to various health aspects with special reference to Odisha. By examining the indicators like infant mortality rate, under five mortality rate, institutional delivery and deliveries assisted by a health professional, he viewed that the health scenario of Odisha was not encouraging. The major share of expenditure of H&FW Department of the Government of Odisha goes to hospital and health administration. She also agreed that around 66 per cent of the total health expenditure by households is for purchase of drugs and medicines. Hooda (2015) stated that health policies turned ineffective to meet the required level of resources for providing basic health facilities whereas according to Dwaraknath (2012) efforts were being made by the centre and the state governments to provide better infrastructure facilities to improve primary health and community health services in rural areas. Das (2012) pointed that expenditure on health by the centre and states needed to increase to provide broad based healthcare in rural areas.

Objectives and Methodology

The data for the study have been sourced from Annual Health Survey, National Health Profile, Center for Monitoring Indian Economy (CMIE), Rural Health Statistics (RHS), *Economic survey* and Odisha Budget. Healthcare financing has been analysed using time series data from 1980-81 to 2014-15 and for indicators like institutional deliveries, number of health workers, health facilities, time series data from 2005-06 to 2018-19 has been considered. Different schemes and policies on health services declared by Government of Odisha have been considered to understand the preparedness for healthcare urgency.

The present paper tries to find out the urgency of demand for healthcare services and supply side gaps in Odisha. The paper also discusses the financing pattern of healthcare services in the state Odisha.

Milestones in the Development of Health Services in Odisha

There have been significant changes in the health scenario over the past two decades. Institutional deliveries have risenby of 71.2 per cent from 1992 to

2015 (NFHS-I, II, III, IV &DLHS survey) and these have been taking place taking place in better surroundings. This may be due to increased awareness of the people supported by the trained birth attendants, Anganwadi workers, and auxiliary nurse midwives (ANMs). The immunization programme is also doing well. Polio has been almost eradicated but the rate of malaria death in Odisha is still a major concern. Other diseases like diarrhoea shows significant reduction. Tuberculosis (TB) detection and treatment has shown promising trends in the last few years as per the MOHFW.

Various schemes for certain professional workers had been initiated by the state government in the past like Biju Gadi Chalak Bima Yojana (2017), Gopabandhu Sambadika Swasthya Bima Yojana (2018), and Mahatma Gandhi Bunkar Bima Yojana (2005). Several attempts had been made to improve healthcare service and making doctors available in peripheral areas. The introduction of one year's mandatory service (Mandatory Pre-PG Rural Service, 1999) in difficult areas for all doctors selected for the post graduate courses has helped in filling up positions of healthcare providers in the remote districts. Special attention had also been paid towards ther betterment of health services by enhancing the work of health personnel through schemes like Internship training (2000), Short-course training in anaesthesia administration (1999), Multi-skilling of health personnel (1998), etc. Other schemes like Drug procurement and distribution (1998), Vitamin A campaign (1998) etc had also been important initiatives by the state.

In Odisha, health and nutrition are dealt with by the Health and Family Welfare Department and the Women and Child Development Department. At the field level, their priority target groups are the same, namely pregnant and lactating women, children under six and adolescent girls. At the grassroots level, the health and Anganwadi workers function well together, especially in the western and tribal districts, where the ICDS program has been in place for several years. The concept of 'Fixed Health Day' as proposed in 1998 jointly by the Secretaries of both departments is considered a major step towards better collaboration between the departments. This envisaged that the ANMs in one area would provide comprehensive services at each of the AWCs (Anganwadi Centres) in her area once a month. If there are more than 4 AWCs in one ANM area, two AWC areas are clubbed and services delivered at each centre alternately. On this day, antenatal care, immunization for mothers and children, monitoring of growth, examination of high-risk pregnant women and malnourished children, treatment of minor ailments, as well as health

education takes place. These are supposed to be attended by the Lady Health Visitor (LHV) as well as the sector Medical Officer (MO). Operationalization of the Fixed Health Day varied from district to district. For instance, in some tribal districts this is functioning regularly but irregularity seen among the MOs who do not attend the sessions in most places even as the supervisory staff attends most of these programs. The ANMs attend the monthly sector meetings of the AWWs, and update their records. The need for strengthening the supervision and better collaboration at the block, district, and state level cannot be overemphasized.

In some of the districts as in Kandhamal, Keonjhar, Mayurbhanj and Balasore community involvement is being facilitated. The AWWs are also being trained in the use of the drug kits that are provided to them. It is done as they are mostly considered to be the first functionaries approached by the villagers for curative care. The AWWs have been selected as the Malaria Link Volunteers under the Enhanced Malaria Control Program (EMCP). This builds closer links between the staff of the two departments.

Demand and Supply of Healthcare Services in Odisha

The supply of and demand for healthcare often are influenced by the uncertainty of the time for availing the service and the benefits from availing the service.

Table 1: Health Centres Facilities Available in Odisha

Year	Sub Centre	PHC	CHC
2005	5927	1282	231
2008	6688	1279	231
2009	6688	1279	231
2010	6688	1228	377
2011	6688	1226	377
2012	6688	1226	377
2014	6688	1305	371
2015	6688	1305	377
2016	6688	1280	370
2017	6688	1280	377
2018	6688	1288	377
2019	6688	1288	377

Source: Compiled from Rural Health Statistics

Table 1 indicates the health facilities available in the state. There is a rise of 12 per cent in the number of Sub Centres and 0.47 per cent in that of PHCs during the period 2005 to 2019. A notable healthy growth of 63.20 per cent is seen in the number of CHCs during the period.

Odisha has always faced shortages of critical manpower in health services. The reasons behind this may be that persons with the required qualifications are not available or though qualified persons are available, they are not willing to work in the remote and difficult areas. Also, the government does not have resources to employ all different categories of personnel needed such as radiographers, laboratory technicians, etc. Lack of physical and social infrastructure, viz. roads, telecommunications, housing, schools, and leisure activities may be the obstacles.

Table 2: Number of Doctors and Beds Available

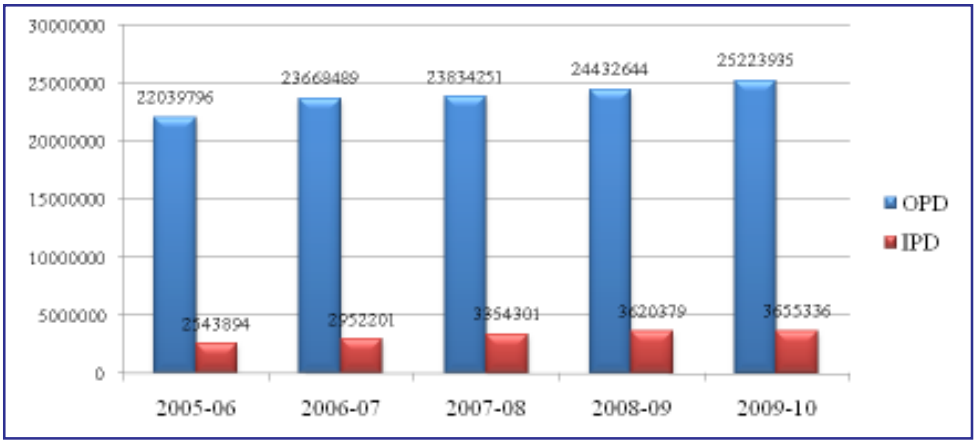
Year	Doctor per lakh Population	Bed Turnover Rate	Bed Occupant Rate
2005-06	12.88	166.90	91.40
2006-07	12.71	168.60	92.40
2007-08	12.55	169.80	93.00
2008-09	12.39	191.50	104.93
2009-10	10.56	233.39	127.84
2010-11	8.24	254.26	139.32
2011-12	10.31	260.48	142.73
2012-13	9.75	213.54	117.01
2013-14	9.96	264.58	144.97
2014-15	8.54	277.03	151.80

Source: Economic survey, 2016-17

Bed Turnover Rate (BTR) is calculated as the number of discharges (including number of deaths) to the total number of beds available in the hospital during a time period. Table 2 shows a 65.99 per cent increase in the BTR for the given time period taken. Bed Occupancy Rate (BOR) is a measure of utilization of available bed capacity. It is calculated as the percentage of beds occupied by patients of a given period of time, usually a year. The table reveals an increase of 66.08 per cent in the BOR over the period. But there has been a decrease of 33.69 per cent in the doctors available per one lakh of population.

Due to a growth in healthcare institutions there has been an increase in the number of OPD and IPD patients over the year, suggesting the dependence on the public healthcare system (Figure 1).

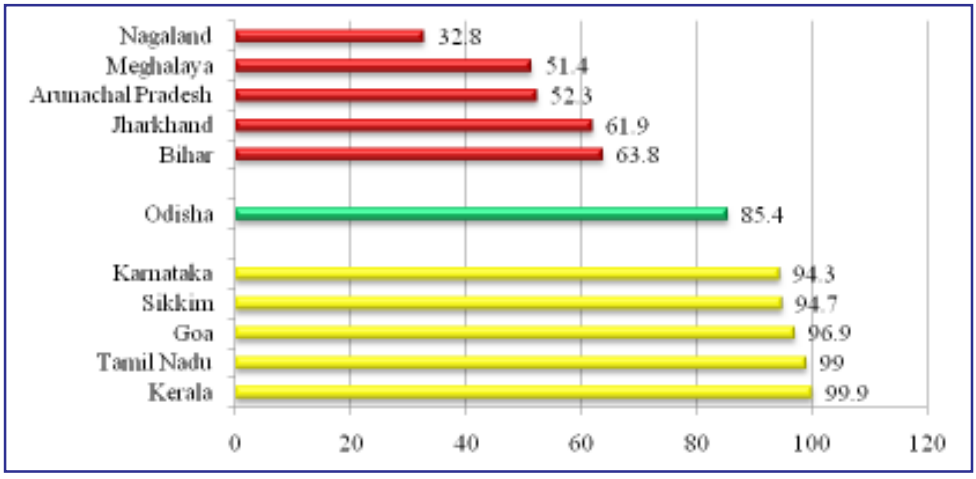
Figure 1: Number of Patients Treated in OPD and IPD



Source: Economic Survey, 2009-10

Some measures have been taken to reduce the out of pocket (OOP) expenditure like encouraging institutional delivery that not only provides safe delivery by reducing infant mortality and strengthening maternal health but also provides monetary benefits to some extent

Figure 2: Statewise Institutional Delivery (%)

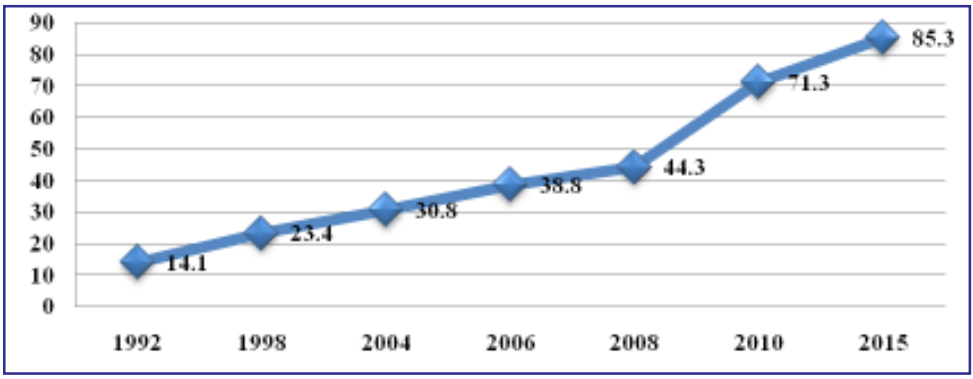


Source: National Family Health Survey, 2015-16

Figure 2 indicates that among 29 states, Kerala, Tamil Nadu, Goa, Sikkim and Karnataka extensively avail the benefits of institutional delivery, while states such as Nagaland, Meghalaya, Arunachal Pradesh, Jharkhand and Bihar are low users of institutional delivery Odisha's position in this respect

is also impressive (85.4 per cent) for any reasons. As seen in Figure 3, there has been an improvement in institutional delivery in Odisha over the years.

Figure 3: Trend of Institutional Delivery in Odisha (%)



Source: NFHS-I, II, III, IV & DLHS Survey.

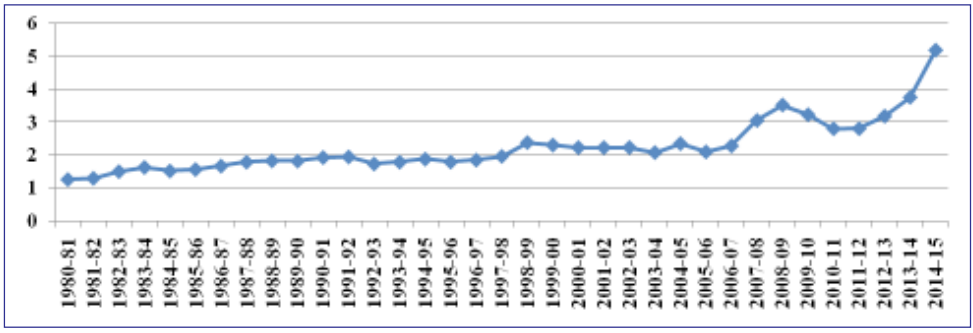
The Janani Suraksha Yojana was introduced in the year 2008 in Odisha and a growth of 92.55 per cent in the rate of institutional delivery in the public healthcare system was possible, including in rural areas. This suggests the good impact of the scheme.

Healthcare Financing in Odisha

Utilization of healthcare services in developing nation like India is a complex process. According to the National Sample Survey organization (60th Round, 2004) data highlights a perplexing scenario in India that is characterized by low rates of utilization of highly subsidized public healthcare services and greater utilization of higher priced private healthcare services. Statistics show that, out of pocket expenditure as a percentage of private expenditure (which consists of out of pocket expenditure and expenditure through other sources like insurance) on health, in India, and is as high as 94 per cent (WHO Statistics on health, 2012). A discussion on healthcare financing in Odisha has been presented in the following to comprehend broad trends.

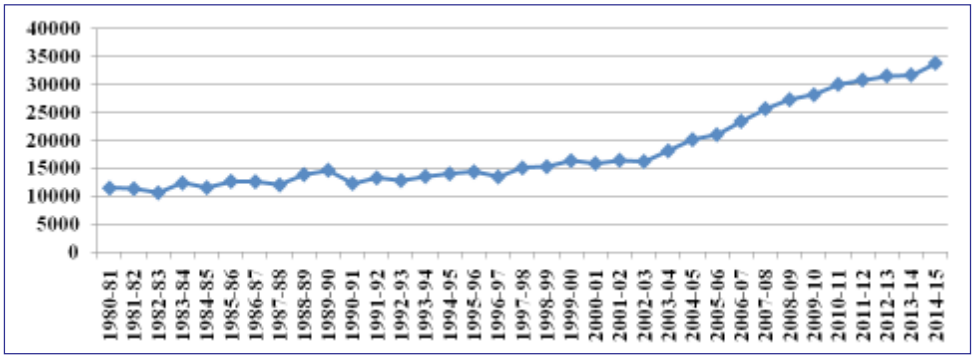
Figures 4 shows that the annual average growth of per capita healthcare expenditure in Odisha was around 4 per cent prior to economic reforms and this declined subsequently before rising, after the introduction of the National Health Mission. Despite the rise of per capita GSDP since the economic reforms (Figure 5) the share of health expenditure to total expenditure (Figure 7) and to the GSDP (Figure 8), respectively declined during the post-reform period but had risen once the National Health Mission came into effect.

Figure 4: Trends of Per Capita Health Expenditure (Constant Price)



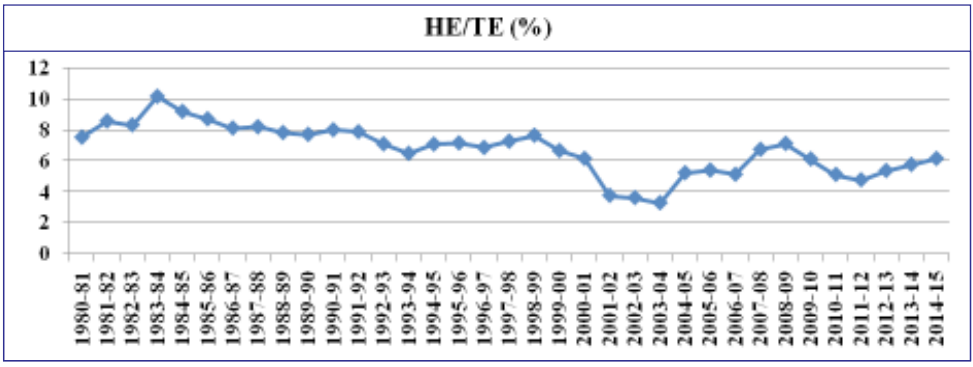
Source: Compiled by the authors from Odisha Budget

Figure 5: Trends of Per Capita GSDP (Constant Price)



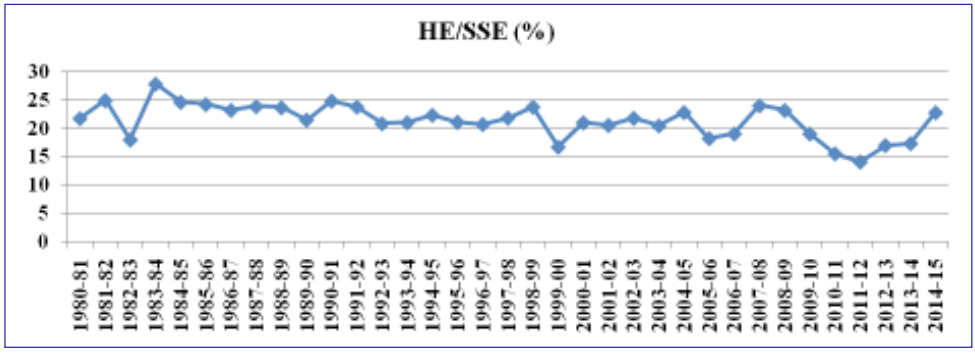
Source: Compiled by the authors from Odisha Budget

Figure 6: The Share of Health Expenditure to Total Expenditure



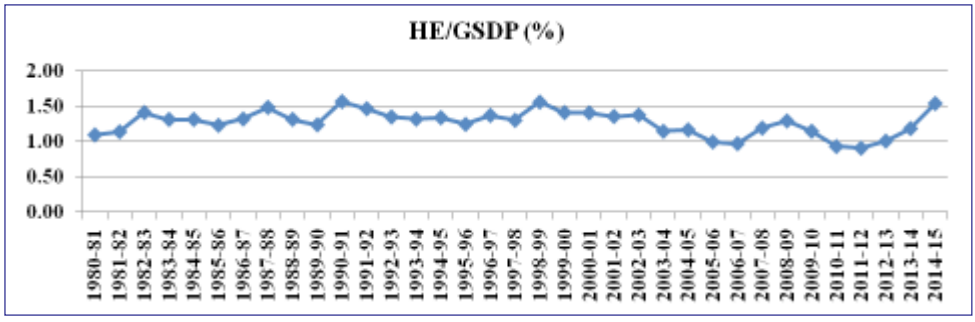
Source: Compiled by the authors from Odisha Budget

Figure 7: The Share of Health Expenditure to Social Service Expenditure



Source: Compiled by the authors from Odisha Budget

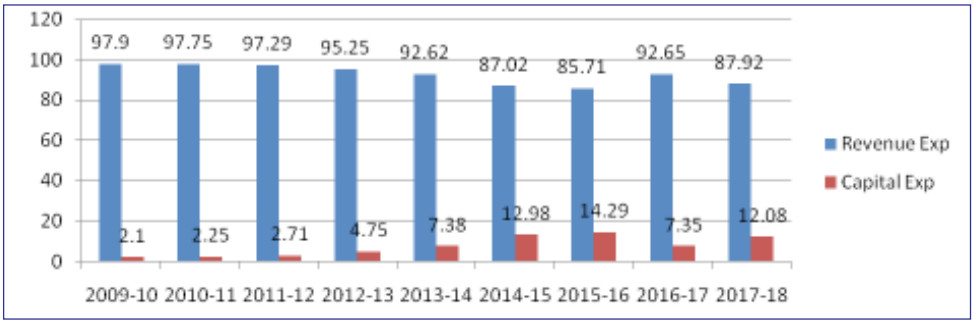
Figure 8: Share of Health Expenditure to GSDP



Source: Compiled by the authors from Odisha Budget

Figure 9 show the percentage distribution of revenue and capital expenditure in health in the state of Odisha. An increase in the share of capital expenditure over the years is noticed.

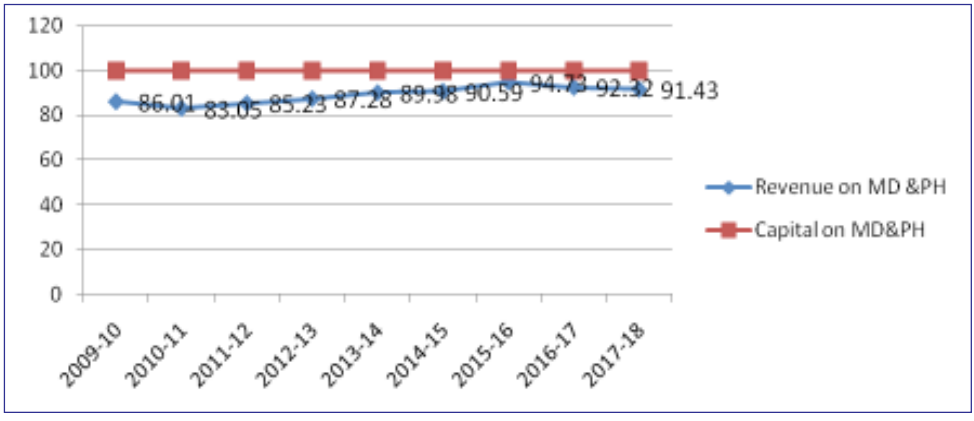
Figure 9: Distribution of Odisha Public Health Expenditure (%)



Source: National Health Accounts Cell, MOHFW, GOI

Figure 10 shows the share of revenue and capital expenditure on medical and public health to that of family welfare over the period 2009-10 to 2017-18. It is seen that out of total revenue expenditure, a major part is distributed to the medical and public health whereas the rest has gone for towards family welfare activities. The average share of medical and public health on revenue expenditure has increased over the period. In case of capital expenditure the share of medical and public health is cent per cent to that of family welfare.

Figure 10: Share of Revenue and Capital Expenditure on Medical and Public Health (%)



Source: National Health Accounts Cell, MOHFW, Govt. of India

Conclusion

In Odisha institutional arrangements for medical care have improved during the last decade or so. A rise in the cases of OPD and IPD indicates more people have been seeking healthcare in government hospitals. However, except nursing staff other medical personnel are in short supply. The number of government medical institutions has risen even as the number of beds has hardly increased. It is also found that the ratio of the number of health institutions to one lakh population and the ratio of population covered under one health institute have remained virtually unchanged. The inclination of urban population is greater than that of rural towards availing the benefits of institutional deliveries. After the implementation of JSY, the rate of institutional deliveries has increased from 38.8 per cent (2006) to 71.3 per cent (2010); cosequently the rates of MMR and IMR have declined. The maternal and child health services showed visible improvements in quality.

Even after six decades of independence no effective steps have been taken to implement the constitutional obligation to secure the health and strength of people.

Despite preferences for public health facilities there is lack of doctors, health workforce, facilities, hygiene and medical supplies, which add to the vulnerability of people depending on these services in the state. The case of rural public healthcare service is miserable. There is a noticeable mismatch seen between health resources and outcomes in different region across the state of Odisha. The districts of southern and western Odisha are worse off. Out of pocket expenditure has risen for those opting for or are forced to avail services of private healthcare system.

Though the Government of Odisha has taken various steps to minimize the gaps in IMR, MMR, U-5 MR mal nourishment but a still lot needs to be done in these areas Health finance in the state needs to improve.

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Article

Consumer Satisfaction in Healthcare Service: A Comparative Study between Government and Private Healthcare Providers in Nayagarh District of Odisha

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Abstract

The health sector in India has assumed the abominable reputation of a commercial practice, with the rich opting for private nursing homes and super speciality health systems and the poor public hospitals where medical facilities are inadequate. As a rational consumer aims at maximising satisfaction from given expense, a patient's satisfaction is a significant indicator of service quality. Consumerism in healthcare service has gained significance requiring more study to assess the satisfaction of the health consumer of health services. This paper is the outcome of an extensive empirical study carried out to assess the level of satisfaction derived from healthcare services at government vis-a-vis private hospitals in Nayagarh district of Odisha.

Keywords: Health sector, Healthcare services, Public hospitals, Private hospitals, Consumer of healthcare service

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1. Introduction

In the era of globalisation, the health sector in India has assumed the abominable reputation of a commercial practice. The burgeoning healthcare establishments in the private sector with sophisticated infrastructure, amenities, projected medical expertise and advertisement attract the healthcare consumers, even as the cost of treatment is beyond the reach of the majority of the people. The government provided healthcare system has its own limitations in terms of facilities, manpower, infrastructure and accountability. In the quest for quality healthcare at affordable price an average Indian finds it difficult to choose between the public and private healthcare providers. In the above context consumerism in healthcare service has gained a new significance, requiring more analyses to assess the concerned consumers' satisfaction. The present study is a humble endeavour in this direction with specific reference to the health scenario in the Nayagarh district of Odisha.

2. Review of Literature

A rational consumer aims at maximizing satisfaction out of minimum expenses, on goods or services. The healthcare consumer is no exception. Parasuraman et al. (1985) has suggested 10 criteria to assess the overall level of satisfaction in terms of level of quality of services provided. Ross et al. (1987) find that initial expectation by patients from healthcare service is the first element that determines satisfaction and if the perceived care and treatment fall short of their expectations, it causes dissatisfaction. A study by Bolton and Drew (1988) suggests that perceived quality by customers is the most significant variable affecting customers' perception of value and satisfaction in their intention to purchase particular goods or services. Boulding et al. (1993) finds that people are becoming more sensitive and critical of the quality of service when they experience and realize expectations or the pre-trial beliefs about a product or service. Pitt and Trout (1994) have placed emphasis on understanding the role of expectations given the fact that, consumers' expectation of quality is increasing. Tam (2007) reveals that a patient's satisfaction is a significant indicator of service quality. Lutz (2008) in his reasearch work titled "What Consumers Want" has examined the decision making process of the consumers in the changing context of healthcare cost sharing. Caroline (2010) has brought out that the intersection between the local and the global health market plays an important role in transforming healthcare services into almost a commodity. Spoerl (2012) observes that

in the United States consumerism has been on the rise since the High-Deductible Health Plans (HDHPs) and the Patient Protection and Affordable Care Act (PPACA). Websites and mobile applications are making it easier for patients to get more healthcare information, including cost and quality.

3. Objective and Research Methodology

The present study is an attempt to compare public and private providers of healthcare services having similiar number of sanctioned beds and other facilities in Nayagargh district. The objectives of the study are as follows: i. To examine the trend and pattern of health services in Nayagarh district; ii. To compare the level of satisfaction of in-patients/consumers/respondents from public and private healthcare providers; and iii. To find out the bottlenecks in the provision of healthcare services and to recommend measures for improvement. To meet these objectives, a multi-stage stratified sampling method has been adopted. As shown in Table-1 at the first stage, Nayagargh district was chosen as it occupied the middle point in HDI ranking and having Health Index score of 0.462 as per the *State Human Development Report of Odisha, 2004.*

At the second stage, out of 8 blocks in Nayagargh district, by following simple random sampling, we have selected 5 blocks Odagaon, Ranapur, Nayagargh, Dasapalla and Khandapada with proximity to healthcare units. At the third stage, four government healthcare units as Community Health Centres (CHCs) and District Head-quarters hospitals and four private healthcare units as nursing homes or private hospitals have been selected at random. At the fourth stage, as shown in Table 1, we have taken 50 respondents (patients/attendants) from every government healthcare unit and 25 respondents from every private healthcare unit at random for interviews and collection of primary data keeping in mind the greater patient-load in government hospitals.

Table 1: Sample Design

Sl. No	Name of Block	Name of Hospital	Type of Hospital	No. of Sample
1	Odagaon	CHC, Sarankul	Public	50
2	Ranapur	CHC, Ranpur	Public	50
3	Nayagargh	DHH, Nayagarh	Public	50
4	Dasapalla	CHC, Dasapalla	Public	50
Total Samples from Public/GovernmentHospitals				**200**
5	Nayagargh	Kumar Hospital, Nayagarh	Private	25
6	Khandapada	Om Nursing Home, Khandapada	Private	25
7	Dasapalla	Mahasakti NH Madhyakhanda	Private	25
8	Ranapur	Ramachandi, NH, Chandapur	Private	25
Total Samples from Private Hospitals				**100**
All Total Samples				300

Source: Field Study

Health consumer's satisfaction is an important and commonly used indicator for measuring the quality in healthcare as it affects clinical outcomes, patient retention and hospital malpractice. Consumer satisfaction is the extent to which consumers are happy with their healthcare both inside and outside the hospital. For assessing health consumer's satisfaction level, we have used 'pre-and-post treatment benefit comparison' technique and 'ordinal utility analysis' for comparing the expected satisfaction (EXP) or pre-treatment benefit and actual satisfaction or post-treatment perception (PTP) of satisfaction or benefit derived the respondents. Responses have been recorded on a five-point preference scale and using SERVQUAL method the quality of healthcare services has been assessed. The following 19 important aspects of healthcare services have been considered in the study. These are: (i) Admission procedure; (ii) Emergency responsiveness or preparedness; (iii) Alertness of staff during night hours; (iv) Doctor's empathy (empathetic listening) to patients' problem; (v) Legibility of doctor's prescription; (vi) Drug administration by the doctor; (vii) Doctor's caution against side-effects; (viii) Frequent change of drugs by the doctors; (ix) Staff behaviour; (x) Cleanliness of ward or bed used; (xi) Prior information about the type of illness and treatment; (xii) Prior information about the probable cost of treatment or financial aspect of treatment; (xiii) Post treatment financial settlement; (xiv) Cost of drugs purchased and tests conducted; (xv) Test outcomes; (xvi) Benefits from

health campaigns, (xvii) Quality of supplied diets; (xviii) Honesty and non-exaggerated nature of health awareness campaigns; and (xix) Confidence in doctors.

4. Data Analysis

As per data collected from the office of the Chief District Medical Officer, Nayagarh District, there are 12 CHCs, 36 single doctor PHCs, 32 PHCs-New and 166 Sub centres, 12 MHUs in the districttill 2010-11. There is a single speciality hospital in the form of TB hospital, at Chandpur since 1980. There are 10 private hospitals/nursing homes.

4.1 The Profile of Sample Hospitals

Table 2 suggests that the total average number of patients visiting all the four selected government hospitals per day is much higher than that for the four selected private hospitals. However, the number of doctors is found to be higher in private hospitals compared to public hospitals.

Table 2: Profile of Sample Hospitals

Type of Hospital	Name of Hospital	No. of Doctor	Staff	Bed	Average No. of Patient visiting per day	Intake of Out-patient
Public	CHC, Sarankul	1	5	30	230	65
	CHC, Ranpur	1	5	30	215	55
	DHH, Nayagarh	2	9	60	570	121
	CHC, Dasapalla	1	6	30	245	56
	Total	5	**25**	**150**	**315**	**74**
Private	Kumar Hospital, Nayagarh	2	8	40	154	63
	Om Nursing Home, Khandapada	3	6	32	110	42
	Mahasakti NH Madhyakhanda	1	6	36	123	46
	Ramachandi, NH, Chandapur	1	6	35	118	39
	Total	7	**26**	**143**	**126**	**47**
All Total		12	51	293	220	60

Source: Field Survey

4.2 The Profile of Sample Respondents

The age group-wise distribution of respondents suggests that a 26 per cent of the respondents belonged to the age group of 20-30 years, followed by 24 per cent to age group of 30-40 years, 22 per cent to the age group of 40-50 years and only 10 per cent of respondents were below 20 years.

As per data 18 per cent of respondents are above 50 years of age who are frequently susceptible to illness and diseases. In public hospitals 32.50 per cent of respondents belong to the age group of 20-30 followed by 28 per cent in the age group of 30-40 years. In private hospitals 25 per cent of respondents are found in the age group of 20-30 followed by 24 per cent in the age group of 40-50 years. Over 50 per cent of respondents were female in both the public and private hospitals.

In terms of educational levels, 37.67 per cent of respondents are matriculate followed by 31.33 per cent respondents having secondary level education, 24.67 per cent having below Matric level qualification. Further, 23.67 per cent respondents are graduates and 16 per cent are post-graduates.

It appear from the survey data that the highly educated respondents prefer to go to private hospitals, might be due to their affluent position.

Distribution of respondents according to income groups Table-3 reveals that 61.20 per cent are having income below Rs. 50,000, followed by 20.33 per cent in the income range of Rs. 50,000 - Rs. 1 lakh. Only 3.67 per cent respondents were in the range of > Rs. 5 lakh.

Table-3: Distribution of Respondents by Income Groups

Type of Hospital	Name of Hospital	Total	< Rs. 50000	Rs.50000-Rs.1 Lakh	Rs.1 - 2.5 Lakh	Rs.2.5 - 5 Lakh	> Rs. 5 Lakh
Public	CHC, Sarankul	50	78.00	12.00	4.00	4.00	2.00
	CHC, Ranpur	50	74.00	14.00	6.00	6.00	0.00
	DHH, Nayagarh	50	70.00	16.00	8.00	4.00	2.00
	CHC, Dasapalla	50	54.00	36.00	4.00	6.00	0.00
	Total	200	69.00	19.50	5.50	5.00	1.00
Private	Kumar Hospital, Nayagarh	25	36.00	24.00	12.00	12.00	16.00
	Om Nursing Home, Khandapada	25	48.00	20.00	16.00	8.00	8.00
	Mahasakti NH Madhyakhanda	25	32.00	28.00	20.00	16.00	4.00
	Ramachandi, NH, Chandapur	25	64.00	16.00	8.00	4.00	8.00
	Total	100	45.00	22.00	14.00	10.00	9.00
All Total		300	61.00	20.33	8.33	6.67	3.67

Source : Field Survey

The table indicates that respondents in higher income group might have preferred private hospitals to public hospitals.

Settlement-wise distribution of respondents suggests that 59.33 per cent are from rural areas. Out of total rural respondents, 62.5 per cent of respondents are found in public hospitals compared to 53 per cent in private hospitals. It might be because of their poor economic conditions that majority of rural folks go to public hospitals whereas due to their relatively better economic condition most of the affluent urban people go to private hospitals.

Distance covered to hospitals is also one of the determining factors in choosing the hospital. As high as 71.33 per cent of respondents cover less than 10 km from their home to reach hospitals, followed by 16.67 per cent respondents cover above 20 km from their home to hospitals and 12 per cent respondents cover 10-20 km from their home to hospitals. Of the total rural respondents covering below 10 km, 74 per cent are found in public hospitals in comparison to 66 per cent in private hospitals. It might be due to the close proximity to public hospitals as CHCs located in almost all rural areas, rural folks prefer to go to these health centres immediately.

4.3 Assessment of Health Consumers' Satisfaction

As mentioned earlier, for assessing health consumers' satisfaction level, we have used EXP and PTP values based upon 19 aspects of healthcare services. An attempt has been made to bring out a comparative statement of both public and private hospitals with consumers' perception on expected and actual level of satisfaction in the light of statistical analysis, particularly mean, median, mode and standard deviation.

We have calculated the data with 95 per cent value within two tailed variation to find that expected perception of consumer is 0.94 per cent, but actual perception is 0.83 per cent in private hospital. However, in public hospital, it is observed that the expected perception is 0.82 per cent and actual perception is 0.92 per cent which indicate that public hospital has good efficacy in the management of healthcare as shown in Table 4 in government hospitals, the median of the response is 3, in both EXP and PTP and, hence, is inconclusive with regard to net satisfaction. A small difference of 0.14 is found between them in their means which are 2.86 and 2.72, respectively indicating net dissatisfaction. The standard deviation of the responses is higher in EXP than that of the responses in PTP indicating higher inconsistency at EXP level.

Table 4: Statistical Summary with Respect to Satisfaction Level in Government Hospitals

		EXP	PTP
N (Observations)	Valid	3800	3800
	Missing	0	0
Mean		2.86	2.72
Median		3	3
Mode		3	3
Std. Deviation		0.935	0.830

Source : Computed from Primary Data Collected

It is clear from Table 5 that in private hospitals, the median of responses at EXP level is 3 and that of PTP level is 2. This difference indicates the difference in pre- and post-treatment benefits, respectively, giving a net difference of -0.63 which is much higher that the net dissatisfaction in government hospitals i.e; -0.14. The standard deviation among the responses at PTP is higher than that of EXP indicating higher inconsistency at PTP level.

Table 5: Statistical Summary with Respect to Satisfaction Level in Private Hospitals

		EXP	PTP
N (Observations)	Valid	1900	1900
	Missing	0	0
Mean		3.10	2.47
Median		3.00	2.00
Mode		3.00	2.00
Std. Deviation		0.823	0.923

Source : Computed from Primary Date

5. Findings of the Study

Our findings suggest that in government hospitals, out of 3800 responses 1752 (46.1 per cent) responses have been in the 'satisfactory' category and 625 (16.4 per cent) in 'highly satisfactory' category. This is a good level of satisfaction the study finds. Our findings suggest that in private hospitals, out of 1900 responses 620 (32.6 per cent) responses have been in the 'satisfactory' category and 244 (12.7 per cent) responses in 'highly satisfactory' category. This indicates quite a low level of satisfaction among the patients of private hospitals. A summary of findings of assessment of satisfaction from our empirical study in respect of

19 aspects of health services is given in Table-6.

Table-6: Summary Findings of Assessment of Satisfaction in Respect of 19 Aspects of Health Services

Sl No	Aspects of Healthcare	Overall Performance of Govt Hospitals	Overall Performance of Private Hospitals
1	Admission Procedure	50% of respondents say easy and very easy in reality after treatment i.e. at PTP level	Only 38% respondents say easy and very easy in reality after treatment i.e. at PTP level
2	Emergency Responsiveness & preparedness	47.5 % of respondents say organised & much organised after treatment at PTP level	Only 27% of respondents say organised & much organised after treatment at PTP level
3	Alertness of staff at night	66 % of respondents say alert & highly alert	Only 37 % of respondents say alert & highly alert
4	Doctor's Empathetic listening to Patient's problem	92 % of respondents say doctors listen carefully & very carefully at PTP level	97 % of respondents say doctors listen carefully & very carefully at PTP level
5	Legibility of Doctor's prescription	64 % of respondents say not at all legible	74 % of respondents say not at all legible
6	Drug administration by Doctors	90 % of respondents say better performance by doctors	only48 % of respondents say better performance by doctors
7	Doctor's caution against side effect	More consistency between EXP (expectation) & PTP value (realisation)	Wide gap between EXP (expectation) & PTP value (realisation)
8	Frequent change of drugs by doctors	66 % of respondents opine quite often	88 % of respondents opine quite often
9	Perception on Staff behaviour	87 % of Respondents say satisfactory and pleasing in reality after treatment	76.67 % of Respondents say satisfactory and pleasing in reality after treatment
10	Cleanliness of ward or bed used	89.5 % of Respondents say satisfactory and pleasing in reality after treatment	69.5 % of Respondents say satisfactory and pleasing in reality after treatment
11	Providing Prior information about illness or treatment	78.5 % of Respondents say govt hospitals are more responsible	51 % of Respondents say private hospitals are more responsible
12	Providing Prior information about probable cost of treatment	65.5 % of Respondents say govt hospitals are more responsible	Only 37 % of Respondents say private hospitals are more responsible
13	Post treatment financial settlement	64 % say more satisfactory at PTP level	36% say more satisfactory at PTP level
14	Cost of drugs purchased & tests conducted	55 % respondents say costly (at PTP) high cost	84 % respondents say costly (at PTP) too High cost
15	Test Outcomes	69 % respondents say satisfactory at PTP level	56% say satisfactory at PTP level
16	Benefits from Healthcare campaign	75.5 % of respondents say that they are really benefitted	58% of respondents say that they are really benefitted
17	Quality of supplied diet to patients	59% of respondents say better	44% of respondents say better
18	Honesty in non-exaggerated nature of Health Awareness Campaign	67.5% of respondents say honest and satisfactory	54% of respondents say honest and satisfactory
19	Confidence of Patients in doctors	83.5% of respondents repose more confidence in doctors	62% of respondents repose more confidence in doctors

Source : Field Survey

In view of the above observations and findings, an attempt has been made to find out the bottlenecks, if any, in the provision of the healthcare services provided by the public vis-a-vis private hospitals in Nayagargh district, the summary of which has been presented in Table-7.

Table-7: Bottlenecks in Providing Health Service and Consumer Satisfaction (Percentage)

Type of Hospital	Name of Hospital	No. of Respondent	Lack of awareness on Healthcare	Unable to get Free Medicine	Not Access to admission	Cost effective	Uncertainty Cure	to cover distant place
Public	CHC, Sarankul	50	60.00	82.00	42.00	36.00	44.00	24.00
	CHC, Ranpur	50	68.00	76.00	38.00	34.00	48.00	32.00
	DHH, Nayagarh	50	52.00	56.00	36.00	42.00	40.00	36.00
	CHC, Dasapalla	50	76.00	84.00	50.00	32.00	54.00	38.00
	Total	200	64.00	74.50	41.50	36.00	46.50	32.50
Private	Kumar Hospital, Nayagarh	25	52.00	68.00	32.00	56.00	32.00	64.00
	Om Nursing Home, Khandapada	25	60.00	60.00	24.00	68.00	40.00	60.00
	Mahasakti NH Madhyakhanda	25	44.00	72.00	28.00	72.00	44.00	68.00
	Ramachandi, NH, Chandapur	25	52.00	56.00	36.00	64.00	48.00	72.00
	Total	100	52.00	64.00	30.00	65.00	41.00	66.00
All Total		300	60.00	71.00	37.67	45.67	44.67	43.67

Source: Field Survey
Note: Percentages do not add up to 100 per cent as these are multiple responses.

The study reveals that the major bottlenecks in the healthcare provisionig in the study area are "unable to get free medicine", "lack of awareness on healthcare programme"; and "cost effective in private hospitals". Other constraints include uncertainty over the cure, travelling long distances, and difficulty in availing admission in both the public and private healthcare units.

6. Concluding Observations

The study deals with the choice-making decision to be taken by the healthcare consumers and the associated satisfaction or dissatisfaction. Apart from income, education and distance covered to the hospital by the respondents, and many other issues like cleanliness of beds, staff behaviour, financial planning and out-of-pocket expenses of the consumers have been tested in relation to their

association with satisfaction and choice. Out of the 19 primary points of various aspects of healthcare services, the government-run healthcare institutions far exceed their counterparts in the private sector with reference to 18 aspects of healthcare service in our study. Only in one aspect, i.e, doctor's empathy to patients' problems, the private healthcare institutions are somewhat better. On the whole, it is evinced that the public healthcare system is far more caring, comforting and satisfying to an average healthcare consumer and it is always preferable to the private one. The finding of the study further suggests that for the health awarness programmes propagated by the government have helped boost public health awarness. Hence, in the larger interest of the society the government should look seriously into the areas of deficiencies of government-run healthcare institutions and take appropriate infrastructural, administrative and financial measures to augment the facilities for 'the greatest good of the greatest number' in our society.

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Article

Morbidity Profile of Newborns admitted to SNCUs in Odisha

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Abstract

Odisha has the highest newborn mortality in the country at 32, while Kerala stands at 6 per 1000 live births. Establishment of Special Newborn Care Units is a key strategy to strengthen newborn survival in the state. During 2015 and 2017, 128838 newborns were admitted in 30 SNCUs across the state. The present paper aims at assessing the morbidity profile and characteristics of the newborns admitted. It was heartening to note that higher proportion of newborns from socially disadvantaged groups were accessing SNCUs and their proportion was higher than their representation in the population. Birth asphyxia was the leading cause of admission in the units followed by jaundice and sepsis. If Odisha is to enhance newborn survival, investments in intrapartum care and access to facilities for early intervention like caesarean sections are non-negotiable.

Keywords: Special Newborn Care Units, Morbidity, Admission characteristics, Neonatal survival

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1 Introduction

The rate of neonatal survival is an important indicator of maternal, neo-natal and perinatal health and wellbeing in a country. Neonatal deaths across the globe accounted for about 46 per cent of all under-five deaths in 2016, which has increased from 41 per cent in 2000. Newborns are at a higher risk of death as compared to the later infancy period. The decline in the newborn mortality has been slower than that in the children among the age group of 1–59 months. Majority of the under-five deaths is due to conditions which can be easily prevented or can be treated by easily implementable interventions (UNICEF, 2017). Southern Asia contributes to 39 per cent of neonatal deaths followed by Sub Saharan Africa at 38 per cent. More than 50 per cent of the global neonatal deaths took place in only five nations, viz., Nigeria, Ethiopia, Democratic Republic of Congo, India and Pakistan; of which India alone accounted for nearly a quarter of the neonatal deaths (UNICEF, 2018). It is also to be noted that the newborn deaths in countries adjoining India are less than that in India.

About 963,000 under-five deaths take place in India annually, of which, 592500 (61.5 per cent) are neonates (Registrar General of India, 2016). The neonatal mortality rate of India is 24 per 1000 live births with a rural-urban divide of 27 and 14. Within India, neonatal mortality rate varies across states from 6 to 32 per 1,000 live births in Kerala to Odisha, respectively. As per NITI Aayog's *Healthy States Progressive India Report*, Odisha ranks 18th among 21 states. The Report compares 24 indicators in the thematic areas of health outcomes, health systems and service delivery. Only Bihar, Rajasthan and Uttar Pradesh rank lower than Odisha. Further, in the state, 19 per cent of newborns are low birth weight which is the second highest among all states after Rajasthan (UNICEF, 2018).

The Government of Odisha has already introduced several proven interventions for newborn survival like complete antenatal care, skilled attendance at birth, resuscitation at birth, essential newborn care for small and sick newborns, which includes provision of critical care at health facilities through Special Newborn Care Units (SNCUs) and Newborn Stabilization Units (NBSUs), Home Based Post-natal and Newborn Care, Integrated Management of Childhood Illnesses, etc. The SNCUs have been established in Odisha in a phased manner between 2007 and 2014 with a view to manage preterm, extremely low birth weight and sick newborns. A total of 30 SNCUs are

functional across 25 districts in the state. As per the guidlines of the Ministry of Health and Family Welfare (MoHFW) SNCUs are not established at lower level facilities like PHCs and CHCs. Newborns with complications are referred to the SNCUs for treatment. The NBSUs are established at identified CHCs for stabilising the newborns.

The SNCUs, across all states in the country, function and provide services as per the operational guidelines defined by the Child Health Division of the MoHFW. They are guided by the same quality and service standards. Towards the last quarter of 2014, a nationwide online SNCU system (supported by UNICEF) was initiated by the Child Health Division of the MoHFW.

Among the multitude of causal factors for neonatal deaths, several conditions can be addressed through the facility-based care and follow up community-based care. Strengthening facility-based newborn care through investment in SNCUs is a major strategy in the state. Significant investments have been made in establishing SNCUs across the state to ensure care of "small and sick newborns". In order to analyze the functioning of the SNCUs and the morbidity profile of admitted newborns, this paper aims at understanding the morbidity characteristics of newborns admitted in the SNCUs. This question considers various characteristics of the newborns like type of admission, age, sex, social category, birth weight, cause of admission, place of delivery, etc., which have a bearing on the survival of the newborns.

2 Review of Literature

There is not much literature on newborn care in Odisha. Sen et al. (2005) have given credit to the pioneering "Purulia model" in 2003, which took specialized newborn care from the tertiary facilities to the district level and demonstrated the first nurse based SNCU, leading to a reduction in newborn mortality. The success of the Purulia model led to the scaling up of specialised newborn care services at health facilities across the country leading to increased access. A study on the timings of neonatal deaths by Baqui et al. (2006) found that almost all deaths (97.8 per cent) within the first week of birth occurred because of birth asphyxia, and (70 per cent), occurred within the first day of life. Nearly (75 per cent) of deaths were caused by prematurity occurring within one week of birth, 30 per cent in the first day after birth and half of deaths were due to complications of sepsis taking place within seven days after birth. Access to safe and hygienic practices, especially during delivery at

the hospitals, is crucial for preventing deaths and sickness among mothers and newborn babies (UNICEF, 2008). Saxena et al. (2013) found that women from certain communities were disadvantaged with respect to access and utilisation of reproductive, maternity and child health services.

Modi et al. (2015) studied 825 newborns admitted in a tertiary hospital in Gujarat with rural and semi-urban poor patients as the main beneficiaries. While 67 per cent of the admissions were of inborn babies, 72 percent were with low birth weight. The major morbidities were respiratory distress syndrome (31.64 per cent), followed by meconium aspiration syndrome (24 per cent), jaundice (16.73 per cent) and infections (11.64 per cent). Two thirds of the deaths occurred in the low birth weight cohort. Further, inadequate and unskilled human resources, poor governance, inadequate funding and weak infrastructure are major challenges for provision of equity based low cost or free of cost health care. Due to these concerns families from low socio-economic groups incur high health expenses of questionable quality (Sankar et al., 2016). This study also concluded that the daily risk of mortality in the first four weeks of life was 30 times higher than that in the period after the first month.

Baghel et al. (2016) covering 1502 neonates in Chattisgarh found that the major reasons of mortality were prematurity (55 per cent), hypoxic ischaemic encephalopathy (32 per cent) and sepsis (10 per cent). Mortality among out born babies (32 per cent) was twice as high as compared to inborn babies (16 per cent). Shah et al., (2018) conducted a two-year study in Gujarat covering 69662 neonates admitted in 37 SNCUs in 2015 and 40 SNCUs in 2016 and found that respiratory distress syndrome (22 per cent) and infections (21 per cent) were the leading causes of admission and death. Higher proportion of out born babies died as compared to the inborn babies. The study concluded that strengthening of the facility based maternal care services and other facility and community based newborn care services with strong referral mechanisms was necessary to enhance newborn survival.

Pandya and Mehta (2018) studied the disease and death profile of 1037 neonates admitted in NICU of a teaching hospital in Gujarat and found that the major reasons for admission were sepsis (23.8 per cent), respiratory distress syndrome (16 per cent) and asphyxia (15 per cent). As regards Odisha, Som et al. (2018) found that the reduction in neonatal deaths had been slow as compared to the faster decline in the infant deaths. Though births in the hospitals had risen to more than 85 per cent in the state, the neonatal mortality

has not declined proportionately. Apart from this study, there has been no statewide analysis on Odisha to identify the causes of morbidities among newborns which would enable policy actions to improve survival outcomes.

3. Database and Methodology

This study is based on secondary data extracted from the online SNCU database. For an overlook of neonatal death rates in Indian states, we have examined database of Sample Registration System. For neonatal morbidity, data were extracted for a period of three years from the SNCU online database for all the 30 SNCUs functioning in government health facilities in the state using the routine SNCU programme reports of Odisha. The population of the study constituted all of 128838 newborns who were admitted between January 1, 2015 to December 31, 2017. This entire cohort was taken as subjects for the study to ensure that the findings were robust and valid for the district and unit level comparisons.

For the current study, classification of variables, categorisation and the case definitions of diagnosis and mortality were done as per the *"Facility based Newborn Care Operational Guide: Guidelines for Planning and Implementation 2011"* by the MoHFW.

The data from the SNCU online database was extracted to Microsoft excel sheets 2016 version. Detailed records pertaining to the information of the mothers were not fully available and hence this aspect was not analysed for this study. All individual entries were checked for missing variables, incorrect and inconsistent entries.

Tabulation of descriptive statistics and statistical analysis including significance tests were done using Epi-info software version 7.0 and required ethical clearances were obtained.

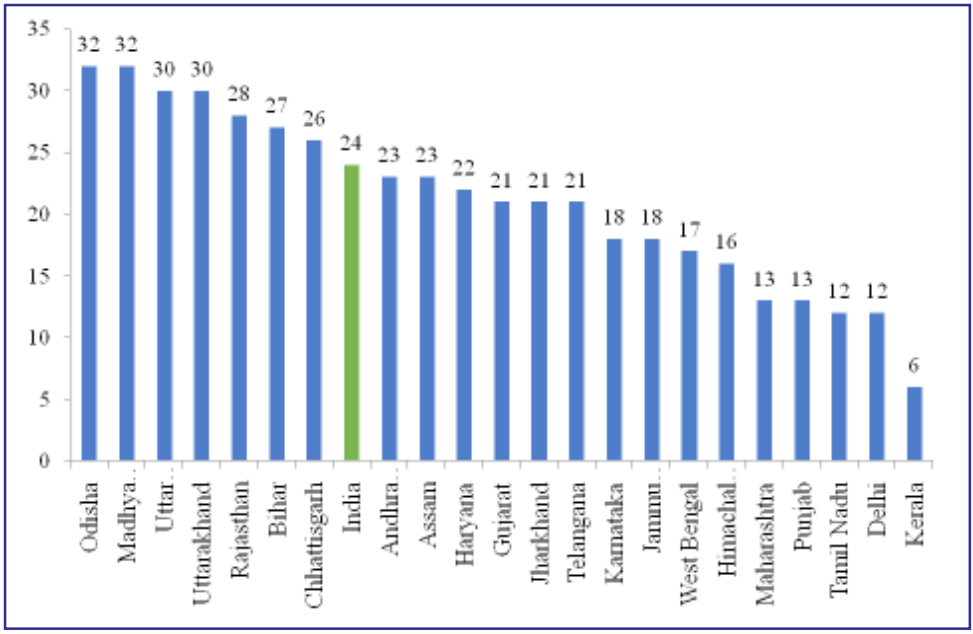
The analysis is limited to the data available from the SNCU online database of Odisha and other states.

4 Results and Discussion

4.1 Neonatal Mortality in Odisha vis-à-vis Other States

As per SRS-2016, the neonatal mortality rate (NMR) in India was 24, which is one of the worst as per global comparison. As shown in Figure 1, among the Indian states, Odisha and Madhya Pradesh are the worst performers having NMR at 32. The performance of low income states like Bihar, Chhattisgarh and Assam is better than Odisha in NMR. Almost all the southern states have been able to contain NMR at lower rates. Kerala's NMR 6 per thousand live births, comparable to any developed country of the world.

Figure 1: Statewise Neonatal Mortality Rate in 2016



Source: SRS 2016

A deeper scrutiny of neonatal morbidity in Odisha attempted in the succeeding sections.

4.2 Admission Characteristics of Newborns

The patterns of morbidities among the SNCU-admitted newborns and their outcomes for all the SNCUs in the state for a three-year period was examined.

4.2.1 Types of Admission

As shown in Table 1 amongst the total admissions in SNCUs, the proportion of inborn and outborn admissions was similar. Of the total of 128838 newborns admitted, 65454 (50.8 per cent) were inborn. Of the outborn babies, 48369 (37.54 per cent) were referred from other health facilities while 15015 (11.65 per cent) were referred from the community. Nearly an equal proportion of inborn and outborn admissions indicated that in Odisha, families of babies who were born in any of the health facilities or at home were able to access the SNCUs for specialized newborn care.

Table 1: Morbidities vs Type of Admission

	Admission type			
Morbidities	**Inborn**	**Percentage**	**Outborn**	**Percentage**
HIE/moderate- severe birth Asphyxia	21944	**33.5**	15555	**24.5**
Jaundice requiring phototherapy	12434	**19.0**	8092	**12.8**
Sepsis/Pneumonia/Meningitis	5994	**9.2**	12723	**20.1**
Hypoglycaemia	776	1.2	397	0.6
Hypothermia	1507	2.3	758	1.2
Low birth weight	6063	9.3	7000	11.0
Major Congenital Malformation	684	1.0	1036	1.6
Meconium aspiration syndrome	1431	2.2	492	0.8
Other causes of respiratory distress	1	0.0	6	0.0
Others	9657	14.8	11393	18.0
Prematurity	3693	5.6	4610	7.3
Respiratory distress syndrome	1270	1.9	1322	2.1
TOTAL	65454	100.0	63384	100.0

Source: SNCU online data, Child Health Division, Ministry of Health and Family Welfare, Government of India

It was observed that the proportion of HIE / birth asphyxia of inborn babies was higher by 9 percentage points and jaundice by 6 percentage points as compared to outborn babies. The proportion of Infections (sepsis, meningitis, pneumonia) was 11 percentage points higher amongst the outborn babies. Further, it was seen that the preponderance of infections was nearly 30 per cent amongst newborns who were referred from home as compared to those referred from other health facilities. Other minor or uncommon conditions, or circumstances when a clear diagnosis was not possible, were recorded as "Others" in the case sheets as per the guidelines by the Government of India.

4.2.2 Profile of the Admitted Babies

The profile of the admitted newborns has been shown in Table 2.

Table 2: Profile of Admitted Newborns in Odisha

Description	Number (%)
Age	
1 day	80706 (62.64)
2 - 7 days	34054 (26.43)
8 - 14 days	6368 (4.94)
15 - 28 days	6550 (5.08)
> 28 days	1160 (0.90)
Social category	
GEN	29604 (22.98)
OBC	40318 (31.29)
SC	24596 (19.09)
ST	34320 (26.64)
Sex	
Ambiguous	35 (0.03)
Female	51273 (39.80)
Male	77530 (60.18)
Weight	
< 1000 gm	2383 (1.85)
>2500 gm	49322 (38.28)
1000 gm-1500 gm	17295 (13.42)
1501 gm - 2500 gm	59838 (46.44)

Delivery Place	
District Hospital	59426 (46.12)
CHC	27419 (21.28)
Medical College	10886 (8.45)
Unknown	10691 (8.30)
Private clinic	7567 (5.87)
Home	5101 (3.96)
SDH	2802 (2.17)
PHC	2558 (1.99)
Sub Centre	1164 (0.90)
Govt. Ambulance	634 (0.49)
Other Vehicle	590 (0.46)

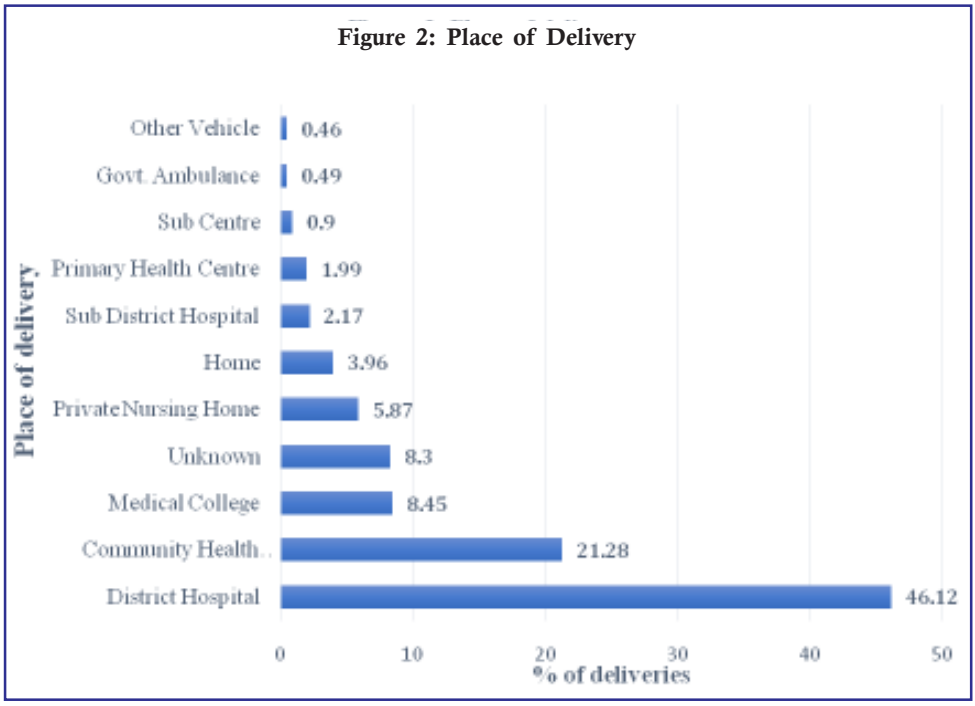
Source: Same as in Table 1

Majority of the admitted newborns were one-day old, followed by 2-7 days of age, 15-28 days of age and 8-14 days of age. It was also seen that about 1 per cent of babies who have crossed the newborn period had also been admitted to these units. The newborns in the age groups of 8-14 days and 15-28 days were around 5 per cent in Odisha as compared to 3 per cent or less in the other states. Considering the spread of the age, Odisha needs to invest in facility and community based follow up programmes on newborn released from SNCUs.

Going by social categories, a higher proportion of newborns belonging to the disadvantaged populations (as compared to their representation in the total population) was availing services at the SNCUs. As regards, sex characteristic, the percentage of male babies admitted to SNCUs was higher at 60 per cent. However, the reason for this sex difference could not be ascertained in the present study.

More than 80 per cent of the babies admitted in SNCUs were delivered in the public facilities. Amongst them, 46 per cent were born at district hospitals, while 21 per cent were born in CHCs and 8.45 per cent were born in medical colleges. Only about 6 per cent of babies were born in private hospitals while 4 per cent were home deliveries. The place of delivery of 8.30 per cent was mentioned as 'Unknown'. As shown in Figure 2 the highest number of deliveries was at district hospitals followed by CHCs with SINCU services.

Figure 2: Place of Delivery



Source: Same as in Table 1

4.2 Major Causes of Admission

Table 3: Type of Morbidities among Admitted Newborns

Description	Number (%)
Final diagnosis	
HIE / moderate- severe birth asphyxia	37499 (29.11)
Others	21050 (16.34)
Jaundice requiring phototherapy	20526 (15.93)
Infections	18717 (14.53)
Low birth weight	13063 (10.14)
Prematurity	8303 (6.44)
RDS	2599 (2.02)
Hypothermia	2265 (1.76)
MAS	1923 (1.49)
Major congenital malformation	1720 (1.34)

Source: Same as in Table 1

About 29 per cent of the newborns were admitted in SNCUs with hypoxic ischaemic encephalopathy / moderate to severe birth asphyxia while the proportion of those admitted due to infections (sepsis / pneumonia / meningitis) was 14.53 per cent and jaundice requiring phototherapy was about 15.93 per cent (Table 3). Other causes of admission included low birth weight, prematurity, respiratory distress syndrome, hypothermia, meconium aspiration syndrome, major congenital malformations and hypoglycaemia.

4.3 Gestational Age

As shown in Table 4, the major causes of admission in the cohort who were less than 34 weeks of gestational age were prematurity followed by low birth weight and infections (sepsis/ pneumonia/ meningitis). Nearly 44 per cent of babies admitted had a gestational age of 34-37 weeks, followed by 39.42 per cent with more than 37 weeks of gestational age. Though SNCU services are useful for sick babies less than 34 weeks of gestational age, it was seen that large numbers of gestationally stable newborns were admitted in the SNCUs. Birth asphyxia was the overwhelming reason for admission among newborns more than 34 weeks.

Table 4: Major Causes of Admission Among the Gestational Age

Cause of admission	< 34 weeks Number (%)	34-37 weeks Number (%)	> 37 weeks Number (%)	Total
HIE/moderate- severe birth Asphyxia	1455 (6.66)	16092 (28.63)	19952 (39.29)	37499
Others	6149 (28.15)	9230 (16.42)	5671 (11.17)	21050
Jaundice requiring phototherapy	1091 (4.99)	8113 (14.43)	11322 (22.29)	20526
Infections (Sepsis/Pneumonia/ Meningitis)	1494 (6.84)	9031 (16.07)	8192 (16.13)	18717
Low birth weight	4171 (19.09)	6803 (12.10)	2089 (4.11)	13063
Prematurity	6393 (29.27)	1903 (3.39)	7 (0.01)	8303
Respiratory distress syndrome	744 (3.41)	1074 (1.91)	781 (1.53)	2599
Hypothermia	64 (0.29)	1554 (2.76)	647 (1.27)	2265
Meconium aspiration syndrome	60 (0.27)	884 (1.57)	979 (1.93)	1923
Major Congenital Malformation	154 (0.70)	778 (1.38)	788 (1.55)	1720
Hypoglycaemia	69 (0.32)	749 (1.33)	355 (0.70)	1173
Total	**21844 (100)**	**56211 (100)**	**50783 (100)**	**128838**

Source: Same as Table 1

From amongst the full-term newborns in the SNCUs, 39 percent were admitted because of birth asphyxia, while 22 percent were admitted due to jaundice.

4.4 Gender Distribution

Among the newborns admitted to the SNCUs, (Table 5), 60.18 per cent were males while 39.80 per cent were females. A negligible proportion, 0.03 per cent of admitted babies had ambiguous genitalia.

Table 5: Gender Distribution Among the Type of Admission

Sex	Inborn Number (%)	Outborn (facility referred) Number (%)	Outborn (Community referred) Number (%)
Male	38507 (58.85)	29846 (61.70)	9177 (61.13)
Female	26927 (41.15)	18511 (38.30)	5835 (38.87)
	65434 (100)	48357 (100)	15012 (100)

Source: Same as in Table 1
Note: Ambiguous data was removed

Table 6: Distribution of Morbidity Across Gender

	Sex					
Final Diagnosis	Ambiguous	Female	Percentage	Male	Percentage	Total
HIE/moderate- severe birth Asphyxia	11	13328	35.55	24160	64.45	37499
Jaundice requiring phototherapy	0	8566	41.73	11960	58.27	20526
Prematurity	3	3696	44.53	4604	55.47	8303
Low birth weight	4	6041	46.26	7018	53.74	13063
Sepsis/Pneumonia/ Meningitis	4	6982	37.31	11731	62.69	18717
Hypoglycaemia	0	426	36.32	747	63.68	1173
Hypothermia	0	914	40.35	1351	59.65	2265
Major Congenital Malformation	5	709	41.34	1006	58.66	1720
Meconium aspiration syndrome	0	752	39.11	1171	60.89	1923
Other causes of respiratory distress	0	3	42.86	4	57.14	7
Others	6	8895	42.27	12149	57.73	21050
Respiratory distress syndrome	2	961	37.10	1629	62.90	2592
TOTAL	35	51273		77530		128838

Source: Same as in Table 1

Further, the analysis of gender preference among admissions revealed that among the outborn babies admitted, referral of female babies for admission at the SNCUs was 23 per cent points lower than the male newborns from both health facility and community referrals. This appears to indicate a bias against female referrals to the SNCU.

As seen in Table 6 the proportion of common causes of admission was higher among male babies as compared to female babies. It was also noted that the admissions due to birth asphyxia among males was twice the proportion of those recorded among female babies. The admissions due to low birth weight and prematurity were 10 and 6 percentage points lower, respectively, amongst female admissions.

4.5 Duration of Stay

Of the more than two thirds of the admitted newborns staying less than a week 45.51 per cent stayed for 1-3 days and 29.41 per cent stayed for 4-7 days. About 9.5 per cent of newborns were admitted only for a day while 15.58 per cent babies stayed for more than seven days. Examination of the proportion of discharged babies indicated that 54 per cent of newborns were discharged within three days; this calls for a review of reasons for admission. These babies may have needed stabilisation support only. The reasons for admissions for less than three days has been presented in Table 7. The reasons for admissions of babies with duration of 1-3 days was HIE / moderate to severe birth asphyxia, jaundice requiring phototherapy and infections (sepsis/pneumonia/meningitis).

Table 7: Reasons of Admissions of Newborns and Duration of Stay at SNCU

Cause of admission	Duration of stay (%)	
	<1 day	1-3 days
Birth Asphyxia	42.71	24.12
Others	14.83	16.76
Infections	13.32	14.76
Prematurity	7.24	3.96
Low Birth Weight	7.34	8.27
Jaundice requiring phototherapy	3.41	24.37
Major Congenital Malformation	3.58	1.29
Meconium aspiration syndrome	1.90	1.30
Hypothermia & Hypoglycaemia	1.16	3.42
RDS	4.51	1.75

Source: Same as in Table 1

4.6 Causes of Admission in Various Categories of Birth Weights

Majority (46.44 per cent) of the newborns admitted were between 1500 gm and 2500 gm while 38.28 per cent babies weighed more than 2500 gm. About one sixth 13.42 per cent babies had birth weight of 1000-1500gm and 1.85 per cent weighed <1000gm. This indicated that about 84.72 per cent of admitted babies were relatively stable birth weight newborns.

As per Table 8, birth asphyxia is the single largest reason for admission of newborns weighing more than 1500 gm. More than 43 per cent of newborns in the birth cohort who weigh more than 2500 gm and 25.68 per cent of the newborns weighing between 1500 to 2500 gm were suffering from birth asphyxia. Addressing this single largest cause of morbidity among the stable newborns would contribute to enhance survival.

Table 8: Morbidity among Various Categories of Birth Weights

Cause of admission	Birth Weight				
	<1000 gm Number (%)	1000 - 1500 gm Number (%)	1500- 2500 gm Number (%)	>2500 gm Number (%)	Total
HIE/ moderate- severe birth asphyxia	42 (1.76)	868 (5.02)	15366 (25.68)	21223 (43.03)	37499
Others	311 (13.05)	4955 (28.65)	10444 (17.45)	5340 (10.83)	21050
Jaundice requiring phototherapy	28 (1.17)	744 (4.30)	9343 (15.61)	10411 (21.11)	20526
Sepsis/ pneumonia/ meningitis	70 (2.94)	1461 (8.45)	9148 (15.29)	8038 (16.30)	18717
Low Birth Weight	999 (41.92)	3956 (22.87)	8092 (13.52)	16 (0.03)	13063
Prematurity	842 (35.33)	4411 (25.50)	3012 (5.03)	38 (0.08)	8303
RDS	79 (3.32)	590 (3.41)	1263 (2.11)	667 (1.36)	2599
Hypothermia	3 (0.13)	36 (0.21)	818 (1.37)	1408 (2.85)	2265
Meconium aspiration syndrome	2 (0.08)	64 (0.37)	880 (1.47)	977 (1.98)	1923
Major congenital malformation	5 (0.21)	131 (0.76)	920 (1.54)	664 (1.35)	1720
Hypoglycaemia	2 (0.08)	79 (0.46)	552 (0.92)	540 (1.09)	1173
Total	**2383 (100)**	**17295 (100)**	**59838 (100)**	**49322 (100)**	**128838**

Source: Same as in Table 1

Approximately 80 per cent of the newborns admitted with commonest morbidities, were born at public facilities at various levels. About 82 per cent of the birth asphyxia and jaundice were seen among babies born at

government facilities. The home births contributed to three to five per cent of the conditions while private nursing home contributed about six to seven per cent (Table 9).

Table 9: Place of Delivery with Respect to the Common Morbidities

Place of delivery	Morbidities				
	HIE/ moderate severe birth Asphyxia Number (%)	Jaundice requiring phototherapy Number (%)	Prematurity / LBW Number (%)	Sepsis/ Pneumonia/ Meningitis Number (%)	Others Number (%)
Govt. health facilities	30658 (81.76)	16964 (82.65)	25880 (79.42)	14910 (79.66)	8084 (82.25)
Transit	296 (0.79)	140 (0.68)	470 (1.44)	133 (0.71)	89 (0.91)
Private nursing home	2100 (5.60)	1284 (6.26)	1783 (5.47)	1141 (6.10)	565 (5.75)
Home	1197 (3.19)	634 (3.09)	1654 (5.08)	824 (4.40)	413 (4.20)
Unknown	3248 (8.66)	1504 (7.33)	2801 (8.60)	1709 (9.13)	677 (6.89)
Total	**37499 (100)**	**20526 (100)**	**32588 (100)**	**18717(100)**	**9828 (100)**

Source: Same as in Table 1

As seen in Table 10 of the birth asphyxia newborns, about 60 per cent were from OBC and ST categories, while General and SC categories contributed to nearly 20 per cent each. Among all the caste categories, Low Birth Weight admissions at 15 per cent were the lowest from General category, while ST category contributed to 36 per cent. Infections were highest from the OBC category at 32 per cent, while jaundice was lowest in the ST category.

Table 10: Morbidities vs Caste

Final Diagnosis	Category								
	GEN	%	OBC	%	SC	%	ST	%	Total
HIE/moderate/ severe birth Asphyxia	7843	20.92	11758	**31.36**	7125	19.00	10773	**28.73**	37499
Low birth weight	2022	**15.48**	3616	27.68	2653	20.31	4772	**36.53**	13063
Prematurity	1965	23.67	2614	31.48	1469	17.69	2255	27.16	8303
Sepsis/Pneumonia/ Meningitis	4069	21.74	5965	**31.87**	3702	19.78	4981	26.61	18717
Hypoglycaemia	278	23.70	385	32.82	154	13.13	356	30.35	1173
Hypothermia	419	18.50	823	36.34	354	15.63	669	29.54	2265
Jaundice requiring phototherapy	6407	31.21	7168	34.92	3982	19.40	2969	**14.46**	20526
Major Congenital Malformation	394	22.91	516	**30.00**	297	17.27	513	**29.83**	1720
Meconium aspiration syndrome	513	26.68	584	30.37	326	16.95	500	26.00	1923
Other causes of respiratory distress	2	28.57	2	28.57	2	28.57	1	14.29	7
Others	4905	23.30	6063	28.80	4069	19.33	6013	28.57	21050
Respiratory distress syndrome	787	30.36	824	31.79	463	17.86	518	19.98	2592
TOTAL	**29604**		**40318**		**24596**		**34320**		**128838**

Source: Same as in Table 1

4.7 Causes of Admissions Across Various Districts

As shown in Table 11, 16 out of the 30 units had more than 25 per cent of admissions due to birth asphyxia. This indicates serious concerns about the quality of delivery processes and delay in interventions like caesarean sections. A total of 23 units have more than 10 per cent infection rates which is a preventable cause. This calls for better infection control measures in the labour rooms across the various facilities.

Table 11: Causes of Admissions Across Various Units

SNCU Name	HIE Number (%)	Prematurity Number (%)	Sepsis/ Meningitis Pneumonia/ Number (%)	Jaundice Number (%)
CH BBSR Khordha	1235 (45.09)	396 (14.46)	307 (11.21)	334 (12.19)
DH Angul	1886 (46.36)	594 (14.60)	259 (6.37)	208 (5.11)
DH Balangir	3017 (38.03)	1459 (18.39)	1453 (18.31)	699 (8.81)
DH Balasore	2288 (29.85)	1050 (13.70)	1197 (15.62)	778 (10.15)
DH Bargarh	1436 (31.29)	524 (11.42)	898 (19.57)	1330 (28.98)
DH Bhadrak	2165 (34.86)	885 (14.25)	647 (10.42)	1018 (16.39)
DH Boudh	301 (16.27)	260 (14.05)	302 (16.32)	669 (36.16)
DH Deogarh	314 (22.61)	210 (15.12)	118 (8.50)	446 (32.11)
DH Jharsuguda	428 (24.24)	236 (13.36)	120 (6.80)	214 (12.12)
DH Kalahandi	1713 (35.59)	835 (17.35)	915 (19.01)	434 (9.02)
DH Kandhmal	1085 (31.72)	617 (18.04)	276 (8.07)	610 (17.83)
DH Keonjhar	1762 (29.70)	1050 (17.70)	891 (15.02)	645 (10.87)
DH Koraput	892 (22.95)	759 (19.53)	369 (9.49)	836 (21.51)
DH Malkangiri	404 (11.63)	853 (24.56)	697 (20.07)	253 (7.28)
DH Mayurbhanj	2743 (23.60)	2335 (20.09)	1820 (15.66)	736 (6.33)
DH Nabarangpur	822 (30.68)	797 (29.75)	125 (4.67)	151 (5.64)
DH Nayagarh	254 (9.76)	456 (17.52)	434 (16.68)	1085 (41.70)
DH Nuapada	1230 (30.94)	770 (19.37)	600 (15.09)	203 (5.11)
DH Puri	1087 (18.53)	794 (13.54)	1116 (19.03)	1919 (32.72)
DH Rayagada	804 (20.62)	666 (17.08)	863 (22.13)	546 (14.00)
DH Sambalpur	765 (30.12)	281 (11.06)	336 (13.23)	602 (23.70)
DH Sonepur	472 (30.01)	226 (14.37)	254 (16.15)	305 (19.39)
DH Sundargarh	1019 (34.07)	495 (16.55)	398 (13.31)	461 (15.41)
MKCG MC Ganjam	2947 (39.72)	775 (10.45)	1217 (16.40)	860 (11.59)
RGH Rourkela	1211 (37.12)	516 (15.82)	415 (12.72)	509 (15.60)
SCB MC Cuttack	1372 (23.04)	832 (13.97)	331 (5.56)	2104 (35.33)
SDH Jeypore	783 (23.15)	617 (18.24)	549 (16.23)	589 (17.42)
SDH Umerkote	481 (20.49)	219 (9.33)	275 (11.72)	726 (30.93)
SVPPGIP Cuttack	574 (15.69)	1282 (35.05)	446 (12.19)	250 (6.83)
VSS MC Sambalpur	2009 (37.72)	577 (10.83)	1089 (20.45)	1006 (18.89)
TOTAL	37499 (29.11)	21366 (16.58)	18717 (14.53)	20526 (15.93)

Source: Same as in Table 1

One-third or more admissions in SNCUs of Bargarh, Boudh, Deogarh, Puri, Nayagarh, Umerkote and SCB Medical College were due to Jaundice.

5. Concluding Observations

Our study reports on specific morbidities of the neonates admitted to SNCUs in Odisha. This data added to the limited literature on these important determinants of neonatal survival. The SNCUs are playing a major role in contributing towards child survival in the state. From an equity perspective, it is important to note that higher proportion of newborns from socially disadvantaged groups including SCs and STs were accessing the SNCUs and their proportion was higher than their representation in the population. Admissions from both the Scheduled Tribe and Scheduled Caste categories, are higher than their representation in the population. Higher referral of male babies to tertiary facilities and higher admissions of male babies indicated preferential behavior favouring male babies.

Unlike many other studies, the proportion of inborn and outborn admissions was nearly same, indicating equal access to babies born at the same facility and elsewhere. However, of the outborn babies only 12 per cent were referred from the community; this implies that there is a need to focus on early identification of danger signs at the community level through frontline workers and referral. Birth asphyxia was the reason for nearly one third of newborn admissions in the SNCUs, followed by infections; access to emergency obstetric care like caesarean sections, prompt resuscitation and appropriate skilled birth attendance are key interventions required. It is imperative that these interventions are implemented urgently across the labour rooms in the state prioritising the District Hospitals and CHCs.

Availability of functional newborn stabilisation units at lower level facilities would help to stabilise these babies and prevent unnecessary admissions and congestion at the SNCUs. Further, nearly 40 per cent of the newborns in the cohort of more than 37 weeks were admitted due to birth asphyxia. Birth asphyxia continued to be the leading cause of admission among the newborns in the cohort of 34-37 weeks as well. Admission criteria if followed strictly, would reduce the overload in the SNCUs. SNCUs are primarily meant for treating small and sick newborns.

Of the babies who were admitted for a period of one to three days, 25 per cent were for jaundice. Physiological jaundice had a 94 per cent survival rate. Establishing phototherapy units at other lower level facilities and in the postnatal wards to manage jaundice needing phototherapy, would decongest the SNCUs which would be able to focus on the sicker babies. Interventions addressing maternal nutrition with a focus on vulnerable caste categories would impact on the higher low birth weight admissions. A review of the protocols being followed and closer monitoring of the units through a supportive supervision mechanism would lead to better outcomes.

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Article

What Drives Dropout Rate at Elementary Education? Results from a Panel Data Regression for Odisha

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Abstract

Odisha is regarded as one of the least developed states in India in terms of social sector development and specifically in terms of educational outcomes. The dropout rate at elementary level of education has increased over the years in the state, which is a matter of concern. Research on predictability of dropout rate in Odisha is less, as the literature is dominated by district specific studies. Therefore, this paper examines the factors that influence dropout rate at elementary level for a panel of 30 districts of Odisha over a 15 year period from 2002-03 to 2016-17. The empirical analysis is carried out through panel data regression technique in order to explicitly account for the role of pupil teacher ratio, student classroom ratio, single classroom schools, single teacher schools, female teachers, schools with girls' toilets as the predictability factors that drive up dropout rate in this present paper. This study makes use of Pooled OLS regression model, Fixed effects model and Random effects model and the Hauseman Test has been applied to determine the best suited model. The estimated results show that pupil teacher ratio, student classroom ratio and single teacher schools are the variables that drive up dropout rate at elementary level of education in Odisha. Thus, the policy implications of the study are to recruit more teachers at the elementary level, fill up the vacant posts and invest in the infrastructure of the schools.

Keywords: Dropout rate, Elementary Education, Panel data, Hauseman Test

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1. Introduction

Education is one of the key aspects of social sector development that lays the foundation on which one builds one's life and livelihood and contributes to the wellbeing of the society. As per the *Census 2011,* India has 37.29 crore children in the age group of 0-14 years which constitutes 30.76 per cent of total population. Elementary education (Class I-VIII), which includes both Primary (Class I-V) and Upper Primary (Class VI-VIII) plays a crucial role in shaping the future of children in the age group of 6 to 14 years. According to the United Nations Children's Fund (UNICEF), providing children with primary education decreases poverty, decreases child mortality rate, encourages gender equality and increases environmental understanding. Similarly, every extra year of schooling typically raises an individual's earnings by 8-10 per cent. *(World Development Report- 2018).*

Realizing the importance of education and its relevance to governments at various levels are adopting measures to universalize education. Imparting education to all children has been the prime concern of the government. Steps such as opening of residential schools, Mid-Day Meal scheme, provision of free textbooks and uniforms, etc., have been adopted with this purport. India has certainly taken significant steps towards its goal of achieving universalization of elementary education.

By launching two initiatives such as the Sarva Shiksha Abhiyan and the Right to Education (RTE) Act, Odisha, undoubtedly, has achieved near universalisation of enrolment of children at elementary level. However, the fact remains that even after the enforcement of the RTE Act since 2010 in Odisha there are children in homes, in fields and on the streets. Therefore, the worrisome issue now is children dropping out of school than children who were never enrolled.

The dropout rate, defined as the proportion of students failing to complete a particular level of education, has witnessed an upward trend over the years in Odisha which is a matter of concern. The Dropout rate for primary level increased from 0.40 per cent in 2012-13 to 4.20 per cent in 2016-17 and 5.81 per cent in 2017-18 after consistently declining from 34.40 per cent in 2002-03 *(Economic Survey of Odisha,* 2010-11 and 2018-19). The trend at the upper primary level is also similar. It increased from 2.36 per cent in 2012-13 to 5.15 per cent in 2016-17 and 5.45 per cent in 2017-18 after declining

from 59.10 per cent in 2002-03. As per the data in the *Status of Elementary and Secondary Education in Odisha 2017-18* (U-DISE) the annual average dropout rate for primary level for the state is 5.81 per cent. It is the highest in the districts of Malkanagiri (13.68 per cent) followed by Rayagada (10.95 per cent), Kandhamal (10.52 per cent), and Gajapati (9.94 per cent). Similarly, the annual average dropout rate at the upper primary level is 5.45 per cent for Odisha. It is the highest in Nabarangapur (13.64 per cent) district followed by Malakangiri (11.89 per cent), Rayagada (11.33 per cent), and Kandhamal (09.67 per cent).

The above data is reflective of the fact that the number of dropouts continues to be high and has been increasing despite all endeavours by the government. This dropout problem adds to child labour, illiteracy, incidence of crime and other issues across the state.

The purpose of this paper is to examine factors that have driven the dropout rate at elementary level of education across districts of Odisha for the period 2002-03 to 2016-17 by using panel data regression technique.

The remainder of this paper is organised as follows: Section 2 presents the review of relevant literature; Section 3 describes the methodology adopted and Section 4 contains the data analysis and presents main findings. Section 5 concludes the study with relevant policy implications.

2. Literature Review

The main thrust of discussion in this study is about why children drop out from school. Review of relevant literature shows that there are several factors responsible for this at the household level, student level, as well as at the school level.

The family related factors that influence dropout from school are the following. Banerji (1997) attempted to highlight why children did not complete primary school. A case study of a low–income neighbourhood in Delhi revealed that poverty in the family was the main cause of children not completing primary school. Sengupta and Guha (2002) examined the determinants of school enrolment, grade completion and school dropouts in selected areas of West Bengal. They concluded that maternal schooling, father's occupation, and family income were the major factors influencing

girl's school participation and grade attainment. Choudhury (2006) used data from a dropout focused survey conducted by the department of statistics, Gauhati University, India during 2001-03 in and around the city of Gauhati. Using logistic regression technique it found that familial duties and parental bonding influences dropout behaviour. Sateesh and Sekhar (2014) analysed data from the National Family Health Survey (NFHS-3) conducted in 2005-06 using multivariate analysis technique. They found that household size, number of living children and parental education were the most important predictors of school dropouts in India. A research by Ahir (2015) on the magnitude of dropout rate of school children from 2005-06 to 2013-14, using a report released by MHRD (2014), observed that lack of financial resources, perception of parents related to access of education and its repercussion or expectations, taking care of siblings were the major reasons for dropouts.

With respect to school related factors, Basumatary (2012) found that school dropout across Indian states and UTs could be explained by factors such as distance of school from home, transport facilities and quality of teachers. Sikdar and Mukherjee (2012) using unit level data of the NSSO 64th Round 2007-08 on participation and expenditure in education, pointed out that when the language/medium of instruction is unfamiliar, children were not interested and unable to cope with studies. This is also a factor responsible for dropout in rural areas. Pattanaik and Gundemeda (2016) carried out an empirical study based on two villages of coastal Odisha and found that one factor determining dropout for girls is non-availability of secondary schools in the same village or nearby village. Moreover, single or double teacher schools too play a crucial role on child's attendance (Bhatty et al., 2017).

Studies have been conducted on student related factors that influence dropout from school. Soren (2016) examined the relevance of education and dropout among tribal students in Mayurbhanj district of Odisha and found that reason for dropout among tribal students related to the language problem. Dash (2014) analysed the causes of girls' dropout from the schools in Odisha and concluded that non-availability of books and teachers in their own language were the main cause of concern and early marriage and frequent child birth were also responsible. Jayachandran (2007) examined the reason of dropout using the NSSO 52nd Round data and found that 'child not interested in studies' accounts for highest proportion of dropouts. Joy and Srihari (2014) did a case study on Scheduled Tribe students who had

dropped out of school in Wayanad district of Kerala. Analysing data from 2007-12 academic year, they came to the conclusion that high dropout rate was due to the lack of awareness on the value of education among the tribal students and their households.

Levy (1971) examined determinants of primary school dropouts in developing countries. From the regression analysis, he found that reasons for dropouts from primary school in developing countries were mainly related to socio economic factors. Colclough et al (2000), from a study in Africa, stated that poverty, opportunity cost of schooling, poor quality of education, inadequate school facilities, overcrowded classrooms, inappropriate language of instruction, teacher absenteeism and lack of toilet facility for girls were common factors associated with dropout from school. UNESCO (2006) in their Advocacy Brief titled, "Impact of Women Teachers on Girls' Education" reported that the presence of women teachers in schools have positive impact on girl's retention and their achievement. Hunt (2008) in a cross country review of literature goes a step forward and argues that children are dropping out from school not because of single cause rather several factors influences. Therefore, dropout is a process rather than an event. Hanushek et al (2008) found that a student attending a lower quality school is more likely drop out from it. Zhao and Glewwe (2010) focused on what determined basic school attainment in developing countries on the basis of evidence from rural China. Using a probit regression, they showed that mother's education and household income have strong positive impacts on years of schooling. A study by Ngwakwe (2014) presented a comparative review of causes of school dropouts in Brazil, Russia, India, China and South Africa (BRICS countries) and came to the conclusion that school dropout in BRICS countries were related particularly to poverty, disability, lack of effective teaching method, poor academic performance and child labour. Shahidul and Karim (2015) in a review of literature investigated factors contributing to school dropout among girls and held that inadequate sanitation facilities and female teachers increase girl's dropout from school. Subrahmanyam (2016) from a gender perspective studied causes and effects of school drop outs in developing countries and found that lack of female teachers and a non-inclusive language of instruction induced children to drop out from school. Momo et al (2019) while carrying out a systematic review of the literature on the causes of early school leaving in Africa and Asia, found that children left school early without completing a particular level of education on account of some push factors as inadequate school facilities, unavailable and unskilled teachers, student-teacher conflict, unsuitable school timing, distance from school, lack of leisure activities and

poor academic performance. The study also printed to some pull factors like house work, wage labour, age and ill health.

Taking a cue from these studies, the present study has used variables like pupil-teacher ratio, student-classroom ratio, single-classroom schools, single-teacher schools, female teachers, schools with girl's toilet and attempted to determine their influence on the dropout rate at the elementary level of education (Class I-VIII) in the context of state of Odisha using panel data regression technique. It covers all the 30 districts of the state

3. Data and Methodology

Data

The empirical investigation has been carried out in the 30 districts of Odisha with a dataset for the period 2002-03 to 2016-17. Secondary data used has been obtained from District Report Card of Unified-District Information System for Education (U-DISE) and Odisha Primary Education Programme Authority (OPEPA). This source provides comprehensive district specific data on elementary education in India. The study uses panel data that is a combination of both cross section and time series data. The selection of the time period is largely based on the availability of comparable and relevant data.

Variables Used

The variables used in the present study are drop out rate (DOR), which is the dependent variable and the explanatory variables are pupil-teacher ratio (PTR), student-classroom ratio (SCR), single-classroom schools (SCS), single-teacher schools (STS), female teachers (FT), and schools with girls' toilets (SGT). It is important to know the significance of the independent variables, included in the model, though they have been derived from the literature review.

Pupil-Teacher Ratio (PTR): A higher pupil-teacher ratio ensures that each teacher has to be responsible for a large number of pupils while a lower pupil-teacher ratio enables the teacher to give more attention to individual students that would reflect a better performance of the pupils.

Student-Classroom Ratio (SCR): This indicator represents average number

of students per classroom in a school and a lower SCR indicates a better infrastructure.

Single-Classroom Schools (SCS): Single-classroom schools, taken as a percentage, are expected to influence drop out rate, since a higher SCS is indicative of lack of infrastructure.

Single-Teacher Schools (STS) and Female Teachers (FT): Both of these, taken as percentages, are also likely to influence drop out rate, since a higher STS is indicative of lack of adequate teachers in schools and a high FT shows the availability of female teachers.

Schools with Girls' Toilets (SGT): Schools with girls' toilets, taken as a percentage, is also an infrastructural variable which is expected to affect drop out rate.

Methods

The present study uses the technique of panel data regression to explore factors that drive the drop out rate. The panel data has advantages over both cross section and time series data. It can take heterogeneity explicitly into account by allowing for subject specific variables. It is more informative, exhibits greater variability, shows less collinearity, and makes more degrees of freedom available. The panel data regression technique has been deployed using three approaches: pooled OLS regression approach, fixed effects approach and random effects approach. The paper utilizes the Hausman Test in order to find out whether fixed effects or random effects approach is more suitable for realising the objectives of the study. The entire analysis is done through E views software package.

4. Data Analysis and Findings

Our data set is a balanced panel in which each panel member (district) is observed every year. In our baseline model, panel member (N) =30 and periods (T) = 15, yielding the 450 (=n) number of observations.

Table: 1 Summary Statistics

	DOR	PTR	SCR	SCS	STS	FT	SGT
Mean	12.15842	27.76000	28.92889	7.138889	10.06200	39.24600	49.36356
Median	6.720000	27.00000	28.00000	5.900000	8.900000	38.25000	39.65000
Maximum	61.07000	61.00000	85.00000	30.90000	52.50000	82.90000	100.0000
Minimum	0.000000	11.00000	17.00000	0.000000	0.000000	14.70000	1.800000
Std. Dev.	13.33461	8.214019	7.322924	4.795797	7.737843	10.43441	34.67037
Skewness	1.704040	0.663084	2.050794	1.316391	1.320911	0.531266	0.207864
Kurtosis	5.327584	3.177309	12.14864	5.975174	5.882163	3.137356	1.443681
Jarque-Bera	319.3624	33.56555	1884.761	295.9351	286.6141	21.52203	48.65546
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000021	0.000000
Sum	5471.29	12492.00	13018.00	3212.500	4527.900	17660.70	22213.60
Sum Sq. Dev.	79837.50	30294.08	24077.72	10326.85	26883.52	48885.78	539713.5
Observations	450	450	450	450	450	450	450

Source: Authors' calculation from U-DISE and OPEPA data

The summary statistics (Table 1) shows that during the period under observation, the drop out rate in the state has hovered around 12 with the maximum being 61 (in Nawarangpur, in 2002-03) and the minimum zero (in districts like Angul, Balasore, Cuttack, Ganjam, Kendrapara, Puri, Sonepur and Sundargarh in 2014-15 or 2015-16). The PTR has remained at 27:1 on an average, better than the norm (35:1) laid down by the RTE Act, though in the KBK district of Koraput it is much higher at 61:1 (in 2003-04). At the same time 10 per cent of the primary schools on an average were STS and in one of the backward districts, Gajapati, the percentage of STS was as high as 52.5 per cent (in 2002-03). Around 39 per cent of the primary schools had FT, the highest (83 per cent) being observed in Sambalpur (in 2010-11) and the lowest (14.7 per cent) observed in Nuapara (in 2002-03). Around 49 per cent of primary schools had the facility of separate toilets for girls. In most of the districts the percentage of primary schools with this facility was very high (nearly cent per cent) after 2015-16. The variation in terms of the provision of SGT was the highest among all the chosen variables.

Table 2: Correlation Matrix

	DOR	PTR	SCR	SCS	STS	FT	SGT
DOR	**1.000000**	0.665564	0.5834465	-0.145266	0.471558	-0.29102	-0.646710
PTR	0.665564	**1.000000**	0.8130781	-0.217364	0.467522	-0.26127	-0.71256
SCR	0.583447	0.813078	**1.000000**	-0.158090	0.284738	-0.320480	-0.564140
SCS	-0.145266	-0.21736	-0.158090	**1.000000**	0.171906	-0.1519	0.176656
STS	0.471558	0.467522	0.2847375	0.1719059	**1.000000**	-0.241000	-0.44582
FT	-0.291021	-0.26127	-0.320480	-0.151901	-0.241000	**1.000000**	0.184511
SGT	-0.646710	-0.71256	-0.564140	0.1766562	-0.44582	0.184511	**1.000000**

Source: Authors' calculation from U-DISE and OPEPA data

A look at the correlation matrix (Table 2) shows that the relationship between variables is in the same direction in each case as expected and as seen from the literature.

Pooled Regression Model:

The foremost step of the panel data regression analysis is to apply the pooled OLS regression approach. Here we pool all the 450 observations together and run the following regression model:

$$DOR_{it} = \hat{a}_1 + \hat{a}_2 PTR_{2it} + \hat{a}_3 SCR_{3it} + \hat{a}_4 SCS_{4it} + \hat{a}_5 STS_{5it} + \hat{a}_6 FT_{6it} + \hat{a}_7 SGT_{7it} + u_{it} \quad (1)$$

i =1,2,……..30 (where i stands for the i^{th} cross sectional unit, which in this case are the districts)

t = 1,2,……..15 (where t for the t^{th} time period)

Table 3: E views Output for Pooled Regression Model

Dependent Variable: DOR

Method: Panel Least Squares				
Periods included:15				
Cross-sections included:30				
Total panel (balanced) observations: 450				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	4.325460	3.950892	1.094806	0.2742
PTR	0.292243	0.112795	2.590914	0.0099
SCR	0.300457	0.104793	2.867147	0.0043
SCS	-0.204393	0.098549	-2.074023	0.0387
STS	0.330077	0.069149	4.773442	0.0000
FT	-0.126718	0.044606	-2.840812	0.0047
SGT	-0.118721	0.017939	-6.618187	0.0000
R-squared	0.545566	Mean dependent var		12.15842
Adjusted R-squared	0.539412	S.D. dependent var		13.33461
S.E. of regression	9.049755	Akaike info criterion		7.258786
Sum squared resid	36280.84	Schwarz criterion		7.322707
Log likelihood	-1626.227	Hannan-Quinn criter.		7.283980
F-statistic	88.63998	Durbin-Watson stat		0.373464
Prob(F-statistic)	0.0000			

Based on the output reported in Table 3, we can say that all explanatory variables are significant as their p values (PTR=0.0099 SCR=0.0043 SCS=0.0387 STS=0.0000 FT=0.0047 SGT=0.0000) are less than 5 per cent. R^2 is 0.54 and adjusted $R^2$is 0.53 implying that the model is not a very good fit to the data. The main problem with this model is that it does not take into consideration the typical issues of the individual districts. In other words, by pooling or combining 30 districts, we deny the heterogeneity or individuality that may exist among 30 districts as it assumes that all districts under study are the same. But the reality may be far from this.

We now proceed to look at the fixed effects model estimation results which are reported in Table 4. Here, five of the explanatory variables are found to be significant and they are PTR, SCR, STS, FT and SGT. The only variable not significant is SCS. R^2 is 0.65 and adjusted R^2 is 0.62; these are higher

than what was observed in the previous pooled data model, indicating that this model is a better fit than the previous one.

Fixed Effects Model

$$DOR_{it} = \hat{a}_{1i} + \hat{a}_2 PTR_{2it} + \hat{a}_3 SCR_{3it} + \hat{a}_4 SCS_{4it} + \hat{a}_5 STS_{5it} + \hat{a}_6 FT_{6it} + \hat{a}_7 SGT_{7it} + u_{it} \quad (2)$$

Table 4: E views Output for Fixed Effect Model

Dependent Variable: DOR

Method: Panel Least Squares				
Periods included: 15				
Cross-sections included: 30				
Total panel (balanced) observations: 450				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	7.617733	5.662943	1.34519	0.1793
PTR	0.500248	0.112841	4.433222	0.0000
SCR	0.339199	0.109632	3.093995	0.0021
SCS	0.024508	0.109917	0.222964	0.8237
STS	0.207792	0.077267	2.689262	0.0075
FT	-0.445729	0.087696	-5.082637	0.0000
SGT	-0.079644	0.017908	-4.44734	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.650091	Mean dependent var		12.15842
Adjusted R-squared	0.620509	S.D. dependent var		13.33461
S.E. of regression	8.214497	Akaike info criterion		7.126297
Sum squared resid	27935.88	Schwarz criterion		7.455036
Log likelihood	-1567.417	Hannan-Quinn criter.		7.255865
F-statistic	21.97612	Durbin-Watson stat		0.438945
Prob(F-statistic)	0.0000			

Table 5: E views Output for Random Effects Model

Dependent Variable: DOR

Method: Panel EGLS (Cross-section random effects)				
Periods included: 15				
Cross-sections included: 30				
Total panel (balanced) observations: 450				
Swamy and Arora estimator of component variances				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.870837	4.358552	0.429234	0.6680
PTR	0.394046	0.107979	3.649270	0.0003
SCR	0.354943	0.101300	3.503875	0.0005
SCS	-0.103651	0.099085	-1.046077	0.2961
STS	0.264672	0.069411	3.813138	0.0002
FT	-0.202254	0.055904	-3.617907	0.0003
SGT	-0.099359	0.017154	-5.792100	0.0000
Effects Specification				
			S.D.	Rho
Cross-section random			2.711920	0.0983
Idiosyncratic random			8.214497	0.9017
Weighted Statistics				
R-squared	0.579241	Mean dependent var		7.490273
Adjusted R-squared	0.573542	S.D. dependent var		12.99933
S.E. of regression	8.489046	Sum squared resid		31924.31
F-statistic	101.6433	Durbin-Watson stat		0.401974
Prob(F-statistic)	0.0000			
Unweighted Statistics				
R-squared	0.535890	Mean dependent var		12.15842
Sum squared resid	37053.36	Durbin-Watson stat		0.346331

When looking at the random effects model estimation results reported in Table 5, we note similar results as in the fixed effect model, that PTR, SCR, STS, FT and FGT are significant while SCS is not significant. But the R^2 value at 53 per cent is less than what we observed in the previous case. But as we know, merely a high R^2 is not sufficient to decide as to which model is the best fit to the data. We have to verify it statistically. And the standard method to apply is the Hausman Test.

Hausman Test

This is used as a test to determine whether fixed or random effect model is appropriate.

Null hypothesis (H_0): Random effects model is appropriate.

Alternative hypothesis (H_1): Fixed effects model is appropriate.

Table- 6 E views Output for Hausman Test

Correlated Random Effects - Hausman Test

Test cross-section random effects				
Test Summary		**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**
Cross-section random		36.107190	6	0.0000
Cross-section random effects test comparisons:				
Variable	**Fixed**	**Random**	**Var(Diff.)**	**Prob.**
PTR	0.500248	0.394046	0.001073	0.0012
SCR	0.339199	0.354943	0.001757	0.7073
SCS	0.024508	-0.103651	0.002264	0.0071
STS	0.207792	0.264672	0.001152	0.0938
FT	-0.445729	-0.202254	0.004565	0.0003
SGT	-0.079644	-0.099359	0.000026	0.0001
Cross-section random effects test equation:				
Dependent Variable: DOR				
Method: Panel Least Squares				
Periods included: 15				
Cross-sections included: 30				
Total panel (balanced) observations: 450				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	7.617733	5.662943	1.345190	0.1793
PTR	0.500248	0.112841	4.433222	0.0000
SCR	0.339199	0.109632	3.093995	0.0021
SCS	0.024508	0.109917	0.222964	0.8237
STS	0.207792	0.077267	2.689262	0.0075
FT	-0.445729	0.087696	-5.082637	0.0000
SGT	-0.079644	0.017908	-4.447340	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.650091	Mean dependent var		12.15842
Adjusted R-squared	0.620509	S.D. dependent var		13.33461
S.E. of regression	8.214497	Akaike info criterion		7.126297
Sum squared resid	27935.88	Schwarz criterion		7.455036
Log likelihood	-1567.417	Hannan-Quinn criter.		7.255865
F-statistic	21.97612	Durbin-Watson stat		0.438945
Prob(F-statistic)	0.0000			

In Table 6, the Chi Square statistic is 36.107190 with a p value of (0.0000). Hence, we reject the null hypothesis (H_0) and accept the alternative (H_1) to conclude that the fixed effect model is more appropriate to the data.

5. Conclusion and Policy Implications

This paper empirically investigates factors that drive the drop out rate at elementary level of education for a panel of 30 districts over the period 2002-03 to 2016-17 using pooled regression model, fixed effects model and random effects model. The estimation results support that PTR, SCR, availability of FT, SGT and STS are the variables that significantly determine the drop out rate at the elementary level of education in Odisha, whereas, SCS is not a statistically significant variable.

The concern for universalization of elementary education has been voiced from time to time in India which is also reflected in the National Education Policy 1968, 1986, District Primary Education Programme 1993-94, Sarva Shiksha Abhiyan – 2002 and the Right of Children to Free and Compulsory Education (RTE) Act-2009. Undoubtedly, Odisha has made significant progress in educational attainments particularly at the elementary level though still a lot remains to be done. On the basis of the finding of the study, the following policy implications may be drawn.

The most critical variable is the PTR in which the state's performance is satisfactory going by the standard of RTE norms. Hence, the way forward may be making trained teachers available and rational deployment of teachers according to the student strength which can be critical to reducing drop outs from schools.

Considering the SCR variable, increased enrolment may overcrowd classrooms and lessen interest among students and teachers by making classroom transactions unattractive. The number of classrooms are to be increased with growing enrolment. This would make the school environment attractive for the children to complete a basic level of education instead of dropping out.

According to U-DISE database 2015-16, the STS in Odisha is 3.6 per cent, which is well below its value at the national level (7.5 per cent). The proportion of STS in states like Assam (2.0 per cent), Gujarat (1.5 per cent), Kerala (2.2 per cent), Maharashtra (3.1 per cent), Mizoram (2.5 per cent), Nagaland (1.7 per cent), Sikkim (0.2 per cent), Tamil Nadu (2.2 per cent), and Tripura (0.2 per cent) is much better than that in Odisha. Despite the decline in the percentage of STS in the state, their number in absolute

terms is significant, which needs immediate intervention. Similarly an increase in the number of female teachers and girls' toilets in schools will favourably affect the drop out rates in the state.

Dropping out from schools not only is a waste of children's potential but also has long term adverse consequences on the economy. It will negatively impact future workforce and economic competitiveness. Therefore, eliminating drop out from schools must be a priority, just like ending child labour, hunger and extreme poverty. Universalization of elementary education and ensuring quality education can become a reality only by eliminating drop outs. In particular, our findings suggest that it is the right time to review the implementation of the Right to Education Act (RTE), almost a decade after its enactment, as the future of our children depends on it.

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Article

Mining, Livelihood, and *Adivasis*

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Abstract

This paper has attempted to assess the economic implications of mining operation on the lives of adivasis and other local communities. This is done through a survey in the mining regions of the Keonjhar district of Odisha which is one of the largest mineral producing districts of the country. A total of 257 households from different social categories were surveyed from the core mining zone by using a snowball sampling method. The findings of the study raise concerns over the present model of the mining operation. The major finding of the study is that workers in the public sector mines have higher household income than that of private sector. Since most of the works done by the local communities are of unskilled or semiskilled nature education does not seem to be influencing income levels.

Keyword : Mining Worker, *Adivasis*, Livelihood, Income, Mine Ownership

1. Introduction

The expansion of mining operation generates massive revenue and foreign exchange reserves for the economy and strengthens the pecuniary status of a nation (Hilson, 2002; Roopnarine, 2006; Mishra, 2009). It is

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held that mining has a significant spillover effect on poverty reduction at both the local and national levels. It has potential to create large scale direct and indirect employment opportunities for both mining and non-mining sectors (Dorian, 1989; Mishra, 2009; Imbun, 2000; Black et al., 2005).

Tipically, minerals in India are endowed in forest areas that are homes to *adivasis* or Scheduled Tribes (STs) in terms of social classification. In more than half of the top 50 mineral producing districts in India, the majority of the population is *adivasis*. The average forest cover in these districts is 28 per cent which is more than the national average of 20.9 per cent. For *adivasis,* nature is not merely a source of sustainable livelihood as they share a harmonious and spiritual relationship with it (Areeparampil, 1996). However, due to the increasing demand for minerals, both government and private mining companies are acquiring forest lands mostly inhabited by the *adivasis* for mineral extraction (Nathan, 2009). Against the land acquisition, less than one-third of households get physical compensation like job against land and those who opt for monetary compensations do not get anything even after long years of displacement (Areeparampil, 1996). Permission to a private company for mineral extraction and adoption of mechanization process in mining operation lead to the rise of serious problems like a casual job contracts, joblessness, and various social security issues for those who work in mines (Dorian, 1989; Fieldhouse & Hollywood,1999; Dutt,1999). Due to the extractive activities the local agriculture faces severe damage due to large scale land acquisition by mining firms and reduction in fertility caused by pollution of unacquired land in the precinct of minins (Imbun, 2000). Further, the regulations and legal provisios related to the environment, income and social security provision for workers, infrastructural development in the locality, and price of minerals are not followed properly often adversely affecting the local *adivasis* (Das, 2005).

In this context, this paper investigates how mining activities are impacting the livelihood of *adivasis* and whether the Mining Act,1952 and Director General of Mines Safety (DGMS) guidelines are followed properly to provide adequate economic support for the local people. Whether the local people are satisfied with the economic support given by mining firms? The broad objective of this study is to examine the role of mining companies in providing economic benefits to mining workers and the local community. Specifically, the study addresses four main branches of economic gains viz., basic economic condition and wealth, household occupation, wage/income from mines, and the role of mines in the economic

change of *adivasis*. The paper is structured as follows. Data and analysis are discussed in Section 2. Section 3 discusses the economic condition of *adivasis* and local people and the impact of mines on economic changes. Finally, Section 4 offers concluding observations.

2. Data and Approaches

The study is based on primary data collected from Keonjhar, the highest iron ore and ferro-alloy metals producing district in Odisha. It occupies second position in the overall mineral production of the state; the major minerals include iron, manganise, choromite, quarezite and tyrophyllite. At the time of the primary survey in May 2019, only four public sector mines were working and the rest 32 were private sector mines. Data for this study has been collected from eight mines (four each from public and private sector). The four private working mines are selected randomly which are situated in the same corresponding blocks. These mines are situated in five administrative blocks, namely, Banspal, Jhumpura, Keonjhar Sadar, Joda, and Hatadihi (Appendix Fixure 1). The eight sample villages from eight mines were selected from within 3 km from the mining lease area. A total of 257 households with atleast one mining worker were surveyed from the selected eight villages following snowball sampling technique and structured questionnaire. The workers are 18 years of age or above, employed in mines directly or through any agent/agency. The study has a balanced sample of 129 and 128 from the public sector and private sector mines, respectively.

Table 1: The Sample Details

Number of Households from Different Social Groups Surveyed				
Ownership	**Mines Covered**	**Blocks**	**Villages**	**Total**
Public	OMC- Bangore	Hatadihi	Bangore	61
Public	OMC-Gandamardan: Hill Top Quarry	Banspal	Ichinda	26
Public	OMC- Roida-C	Joda	Roida	22
Public	OMC-Gandamardan: Putulpani Quarry	Banspal	Uparjagar	21
Private	TISCO Mines	Joda	Bichakundi	26
Private	TP Mohanty Mines	Jhumpura	Naibuga	16
Private	PMP Mines	Joda	Palsa	42
Private	Utkal Minerals Pvt. Ltd.	Sadar	Tikarpada	43
Total				**257**

Source: Field Survey.

Statistical methods such as frequency, average, cluster analysis, and a linear regression model are used to address the research questions. The variables coverd include income, expenditure, education, skill, work type, nature of work, nature of job contract, household saving, and so on.

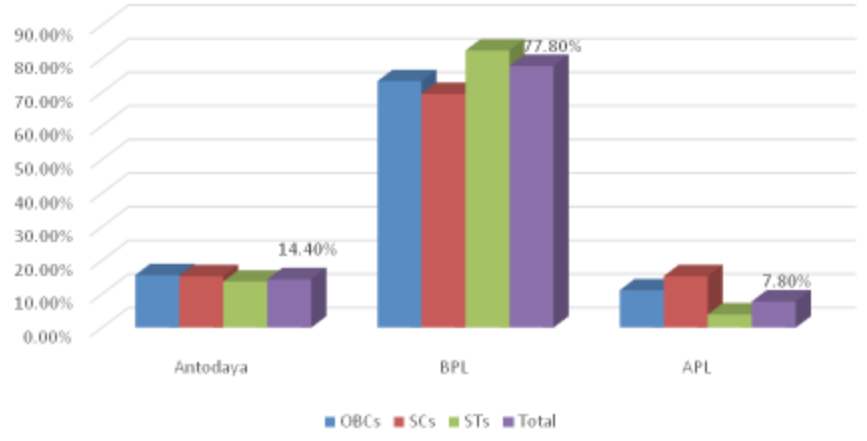
3. Discussion on Economy, Occupation, Income/Wage and Economic Impact of Mines

In this section, the household economy, occupation, income/wage, and the impact of mines on the overall economic condition of the family are analyzed.

3.1 Basic Economic Condition and Household Capital

As shown in Figure 1 among the surveyed households 78 per cent of the households fall Below Poverty Line (BPL) and 14 per cent come under the very poor (*Antodaya)* category.

Figure 1: Economic Condition of Surveyed Household



Source: Field Survey

Among the 153 ST households 82.4 per cent are BPL and 13.7 per cent are very poor. Similarly, among the 59 SC households 70 per cent are BPL, 15 per cent are very poor. Of the 45 OBC households 73 per cent are BPL and 16 per cent are very poor. Thus, among the surveyed households STs has a higher incidence of poverty (96 per cent) compared to SCs (85 percent) and OBCs (89 percent).

National and state-level data show the disadvantaged position of the ST population in landholding as compared to other communities. As shown in Table 2, 70 per cent (table 2) of the sample households possess less than one acre of land inclusive of the homestead. Further 20 per cent have a landholding size of 1 to 2 acres and about 5 per cent households have 2 to 3 acres and 3 to 5 acres.

Table 2: Land Ownership among Different Social Categories

Total Land (agricultural + homestead + other lands) holding by different social category								
Caste	**Frequency**	**Landless**	**Less than 1 acre**	**1 to 2 acres**	**2 to 3 acres**	**3 to 5 acres**	**> 5 acres**	**Total**
OBCs	Number	-	34	9	1	1	0	45
	%	-	75.6	20.0	2.2	2.2	0.0	100
SCs	Number	-	38	15	4	2	0	59
	%	-	64.4	25.4	6.8	3.4	0.0	100
STs	Number	-	108	27	7	9	2	153
	%	-	70.6	17.6	4.6	5.9	1.3	100
Total	Number	-	180	51	12	12	2	257
	%	-	70.0	19.8	4.7	4.7	0.8	100
Agricultural landholding by different social category								
OBCs	Number	27	14	2	2	0	0	45
	%	60.0	31.1	4.4	4.4	0.0	0.0	100
SCs	Number	17	34	6	2	0	0	59
	%	28.8	57.6	10.2	3.4	0.0	0.0	100
STs	Number	67	69	6	6	4	1	153
	%	43.8	45.1	3.9	3.9	2.6	0.7	100
Total	Number	111	117	14	10	4	1	257
	%	43.2	45.5	5.4	3.9	1.6	0.4	100
Non-agricultural and non-homestead landholding by different social category								
OBCs	Number	44	1	0	0	0	-	45
	%	97.8	2.2	0.0	0.0	0.0	-	100
SCs	Number	48	11	0	0	0	-	59
	%	81.4	18.6	0.0	0.0	0.0	-	100
STs	Number	127	23	1	1	1	-	153
	%	83.0	15.0	0.7	0.7	0.7	-	100
Total	Number	219	35	1	1	1	-	257
	%	85.2	13.6	0.4	0.4	0.4	-	100

Source: Field Survey.

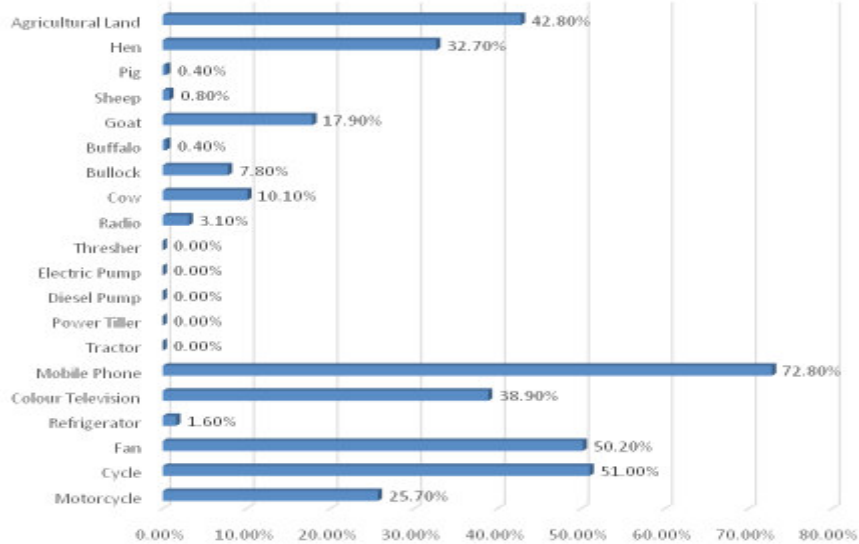
Less than 1 per cent of households have more than five acres of land. About 43 per cent of the total surveyed households do not have any agricultural land. Among the ST population 44 per cent do not have agricultural land as compared to 60 per cent among the OBCs and 29 per

cent among the SCs population. Around 46 per cent of all households have agricultural land less than one acre.

About 85 per cent of households do not have any non-agricultural and non-home plots and about 14 per cent of households have such land of less than one acre. Only about 1 per cent of households have land more than one acre. All households have less than one acre of the home plot. Most of the agricultural lands are un-irrigated. As a result, a very negligible proportion of the surveyed population is found engaging themselves in agriculture. The majority of households having small landholdings is due to land acquisition for mines.

Figure 2 shows 72 per cent of households own mobile phones, 50 per cent have an electric fan, 39 per cent have color television and 51 per cent have a cycle. Only 1.6 per cent of households have a refrigerator and 26 per cent have a motorcycle. Farm machineries and implements like threshers, electric pumps, diesel pumps, power tillers, and tractors are not available with any of the sample households. Generally, it is considered that livestock assets are the major socio-economic security for adivasis. But the number of livestock population is very less in the sample area as compared to other tribal areas. The asset position of households shows that mining activities has not impacted much on improving their economic condition.

Figure 2: Household Assets

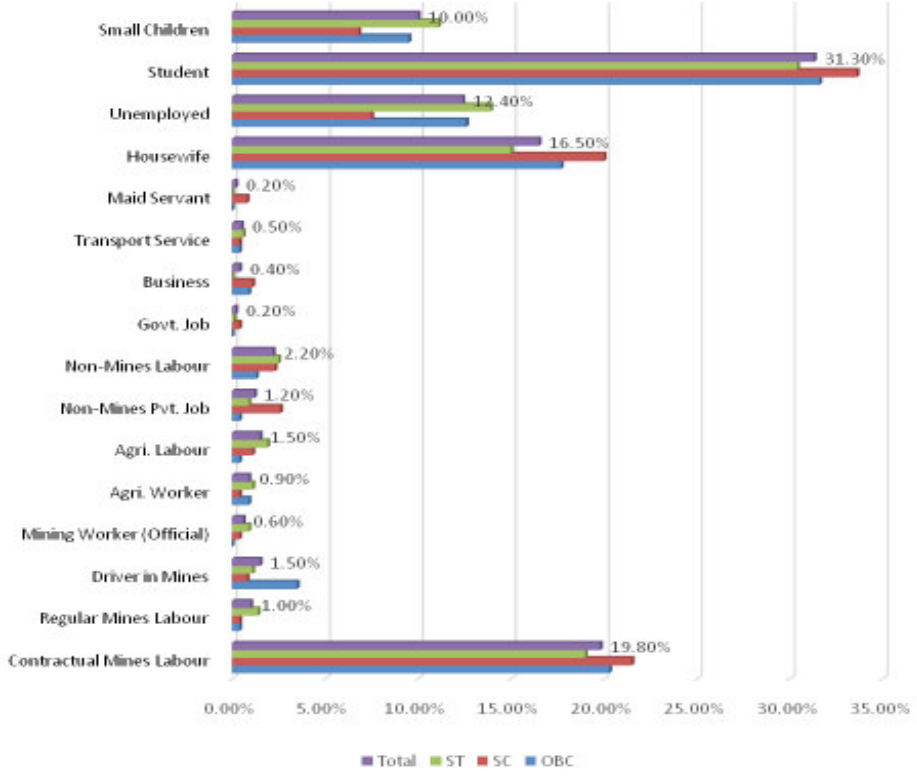


Source: Field Survey.

3.2 Nature and Types of Occupation

Most of the people who are engaged in mines, work as contractual labourers. Very few people work as regular employees in mines both at higher and lower ranks. Of the 1295 surveyed population, about 20 per cent work as contractual mines labour (Figure 3). Only 1 per cent of people work as regular mines labour, 1.5 per cent as drivers in the mines, and 0.6 percent work as non-manual workers (officials) in the mines. Less than 1 per cent of people reported having cultivation as the principal occupation. This might be due to either unavailability of agricultural land or degradation of agricultural land due to mining operations. Very few people (1.5 per cent) are engaged in agriculture as agricultural labourers.

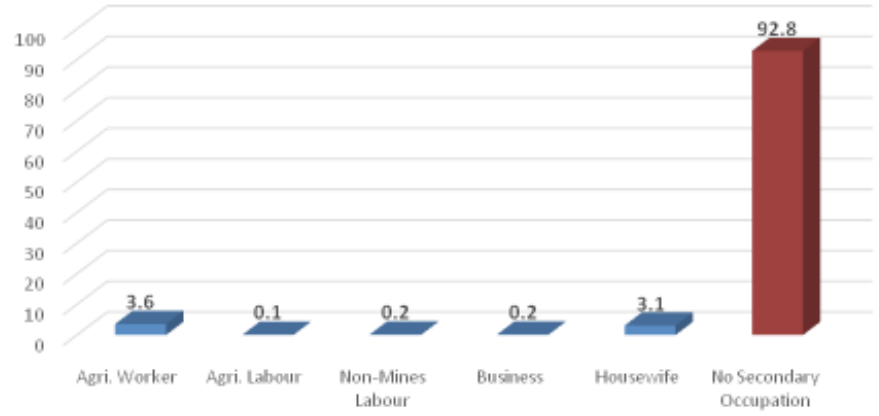
Figure 3: Principal Occupation of the Surveyed Households



Source: Field Survey.

Women are more vulnerable to mining activities not only in India but across the world. In the world, 65 countries have restricted women to work in mining (World Bank, 2019). In the study area degradation of forest and agricultural land by the mining operation and changing mining law with restriction of women workers has squeezed the work opportunities for women. Of the 12.4 per cent people reported being unemployed ST youths have found it difficult to be absorbed due to low literacy levels. High unemployment has laid to large scale out migration. In terms of secondary occupation about 93 per cent households reported no such activities (Figure 4).

Figure 4: Secondary Occupation of the Surveyed Households in %



Source: Field Survey.

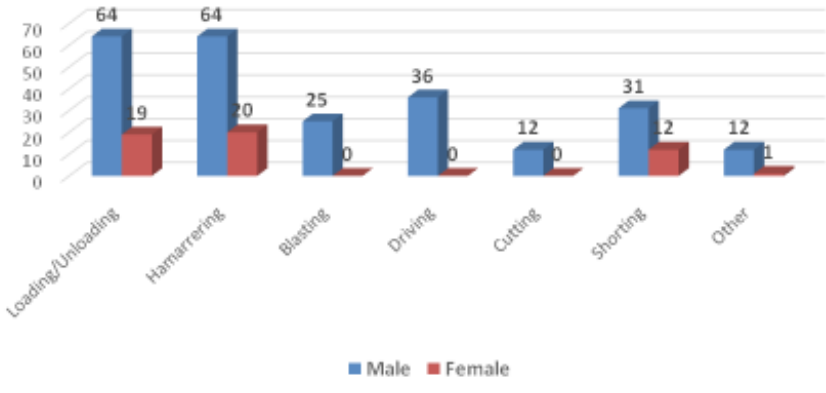
Of the total population covered under the study, the maximum (about 23 per cent) of people are engaged in mining activities (Table 3). In mines the workers are mainly engaged for loading/unloading of ores, hammering mineral ores, blasting, cutting, and sorting of mineral ores, and driving work. The highest (60 per cent) of SC/ST workers are engaged in loading/unloading work and followed by those doing the hammering work (54.9 per cent). Generally, loading/unloading and hammering of mineral ores involves much physical labour. More over, in some mining areas upper caste people do not opt for such type of work. In mines, blasting is considered as a male's work. About 14.5 per cent of female workers are engaged in sorting activity.

Table 3: Type of Work Done in Mines by Social Category

Type of work done in mines	Frequency	Caste			Total
		OBC	SC	ST	
Loading/Unloading	Number	13	19	50	82
	%	23.2	31.1	27.9	27.7
Hammering	Number	9	12	63	84
	%	16.1	19.7	35.2	28.4
Blasting	Number	5	5	15	25
	%	8.9	8.2	8.4	8.4
Driving	Number	12	4	21	37
	%	21.4	6.6	11.7	12.5
Cutting	Number	1	2	9	12
	%	1.8	3.3	5.0	4.1
Sorting	Number	10	15	18	43
	%	17.9	24.6	10.1	14.5
Other work	Number	6	4	3	13
	%	10.7	6.6	1.7	4.4
Total	Number	56	61	179	296
	%	100.0	100.0	100.0	100.0

The mining industry is less favourable for women's employment and some countries have completely banned women workers in the mining sector. However, in our study area women workers are allowed to carry out certain activities with restrictions. Not even a single woman working in the sample area was found in the job category of cutting, driving, and blasting (Figure 5). As these works are considered the most hazardous at the mining pit employers do not allow women to work here to reduce the frequency of accidents. Most women workers are found in less accident-prone jobs like loading/unloading, hammering, and sorting of mineral ores.

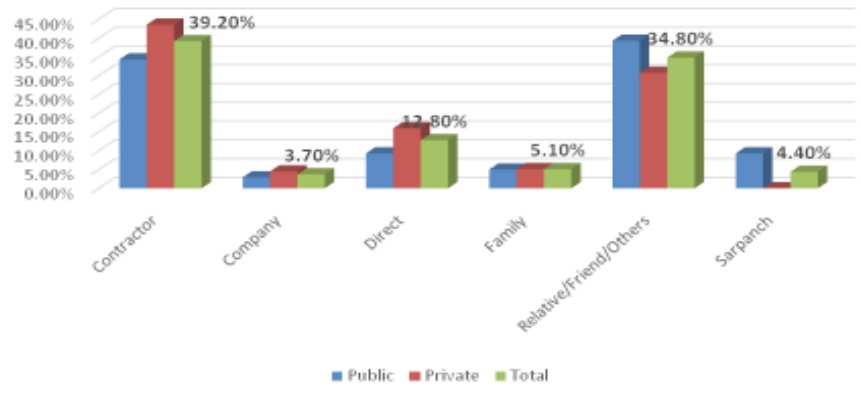
Figure 5: Sex and Type of Work



Source: Field Survey.

For selecting and recruiting workers in mines, most of the government mining companies are engaging third-party profesional agencies on a tender basis. But it is hardly followed by the private mines as they decide their entire administration and human resources (HR) on their own. While analysing the recruitment processes followed by both public and private mines, hardly any proper procedures were follow as per mines rules and regulations. The influence of local dominant people, political interference and bribery practices make the recruitment system a corrupt one. Local sarpanch, petty politicians and local goons play a crucial role during recruitment in mines irrespective of ownership; more than 39 per cent of workers' recruitment is done through them, it was reported (Figure 6). For 39.2 per cent of workers, both individual contractors and legal recruiting agencies are involved. Surprisingly, recruitment through the company or direct recruitment of workers is very low. In order to avoid legal issues, generally, mining companies prefer to outsource the recruitment to other agencies.

Figure 6: Through which Workers Get Job in Mines



Source: Field Survey.

Only 1 per cent of workers from the entire study population is signing a job contract to work in mines. In private mines, no worker is signing a job contract. Table 4 shows out of total mining workers 2.9 per cent sign job contracts in public mines and are posted in higher management.

Table 4: Provision and Nature of Job Contract in Mines

Ownership of Mines	Frequency	Sign job contract for work		Total	Nature of job contract		Total
		Yes	No		Permanent	Temporary	
Public	Number	4	136	140	15	125	140
	%	2.9	97.1	100.0	10.7	89.3	100.0
Private	Number	0	156	156	5	151	156
	%	0.0	100.0	100.0	3.2	96.8	100.0
Total	Number	4	292	296	20	276	296
	%	1.4	98.6	100.0	6.8	93.2	100.0

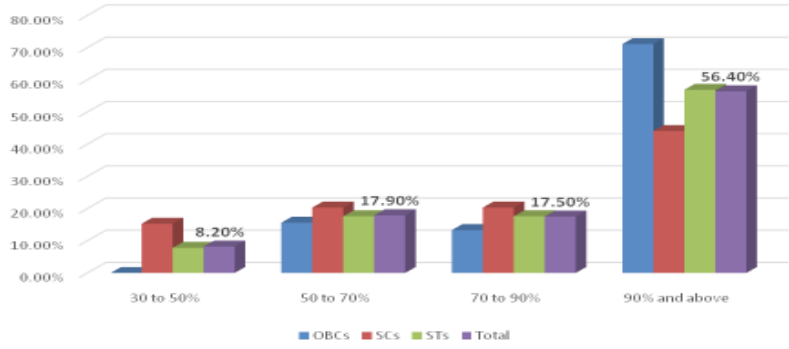
Source: Field Survey.

Most of the workers are not aware of signing a job contract. Coming to the nature of the job, 10.7 per cent of workers in public mines and 3.2 per cent of workers in private mines consider that they are permanent workers as some workers are regularly working in mines. The tendency of working regularly for a long time is more in case of public mines than private mines. Public mines pay timely wages, bonus, and provide better medical facilities.

3.3 Wage/Income of Mining Worker

Around 56 per cent of the households reported that mining employment contributed to 90-100 per cent of total household income (Figure 7). For about 18 per cent of households this figure was 70 to 90 per cent. Most of the households reported that after the mining operations, total income of the households had increased. However, this has not translated into increase in saving. 56 per cent of the households' report that there is no saving even during the mining operations. This could be due to a significant rise in alcohol consumption and a rise in expenses due to the demonstration effect. Ill health and increase in health expenditures could be a major reason for low savings.

Figure 7: Contribution of Mining Related Income in Total Income of the Households



Source: Field Survey.

Different mines follow discrete methods of wage payment as per their suitability, convenience, and benefits. The wages for works like sorting, sizing, hammering and grading of mineral ores are generally calculated on a piece-rate basis as this is profitable for the mining companies. There is some form of works like blasting which is performed occasionally. Hence, in these cases, the mines prefer to pay the blaster by hours of work done or daily attendance for such activity. The monthly salary or wages which should be common among mining workers is rarely found. As a result, one out of five mine workers gets monthly payments (Table 5). The practice of paying monthly salary or wages is higher among public mines than the private ones.

Table 5: Basis of Income/Wage Calculation for Mine Workers

Ownership of Mines	Frequency	Basis of wage calculation				Total
		Piece Rate	Hours of Work	Daily Attendance	Monthly Salary	
Public	Count	2	4	97	37	140
	%	1.4	2.9	69.3	26.4	100
Private	Count	24	3	102	27	156
	%	15.4	1.9	65.4	17.3	100
Total	Count	26	7	199	64	296
	%	8.8	2.4	67.2	21.6	100

Source: Field Survey.

Although the Government of India has made law on timely payment of wages for workers in all sectors, still many mining companies are taking advantage of the law due to poor monitoring and enforcement. Among the

sample mining workers, more than 78 per cent of workers reported that their wage was calculated on either piece-rate basis or hours of work basis, or daily attendance basis (Table 5). However, 82.4 per cent (Table 6) of workers said that they received monthly remuneration. The practices of wage payment across ownership of mines do not show much difference as more than 92 per cent of public mines pay a wage at the end of the month even by calculating wages on piece rate/hourly/daily basis.

Table 6: Period of Wage Payment in Different Mines

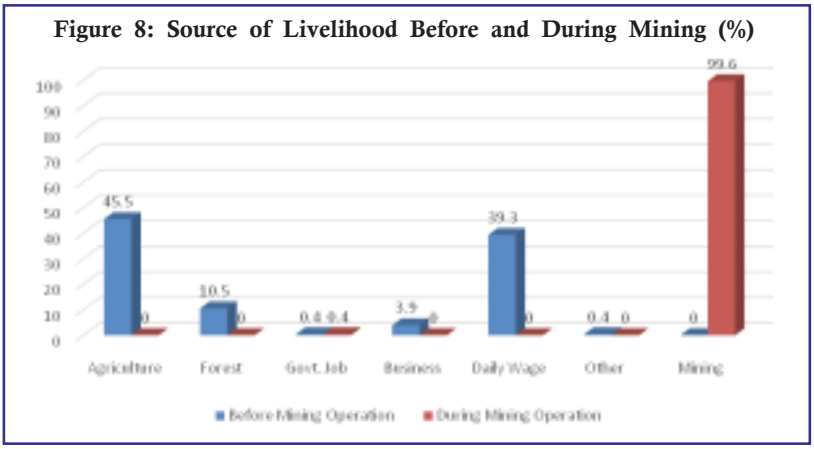
Ownership of Mines	Frequency	Period of wage payment				Total
		Daily	Weekly	Fortnightly	Monthly	
Public	Count	1	9	0	130	140
	%	0.7	6.4	0.0	92.9	100
Private	Count	2	39	1	114	156
	%	1.3	25.0	0.6	73.1	100
Total	Count	3	48	1	244	296
	%	1.0	16.2	0.3	82.4	100

Source: Field Survey.

3.4 Economic Condition of Local People During Mining Operation

As shown in Figure 8, before the mining operation, 45.5 per cent of households relied upon agriculture for their livelihood followed by daily wage (39.3 per cent) and collection of forest products (10.5 per cent). However, since the beginning of mining operation, all households are directly or indirectly dependent upon mining (99.6 per cent) for their livelihood. The majority of workers engaged in mines are low paid or underpaid due to lack of skill or limited skill. Poor education has resulted in such a situation.

Figure 8: Source of Livelihood Before and During Mining (%)



Source: Field Survey.

Out of the 257 surveyed households five households have surrendered their land to government mines and three households have surrendered to private mines. Even though the large majority of the households have not surrendered their land to mines, they have lost the common property resources which they used to rely upon for their livelihood or are affected by production loss caused by land degradation. Most of the households used to grow crops in the open accessible fallow land, collect fuelwood and non-timber forest products. Scheduled Tribe households used to collect a variety of spinach, mushrooms, roots, fruits, berries from the forest which are their primary sources of nutrition. However, due to mining activities and degradation of forests and common lands their food and nutrition security are under threat. The perception about the impact of mining on agricultural production suggested loss of productivity across respondents.

More than 70 per cent of households have reported that some of their household assets have increased during the mining operation. The assets like a motorcycle, cycle, electric fan, refrigerator, colour television, mobile phone have increased at the time of mining work. However, the number of domestic animals like cattle, goats, sheep, and poultry has declined significantly, which could be due to pollution, and scarcity of feed and fodder.

Some respondents consider that has been an increase of banking habit due to growing mining activities. In fact, most of the mining companies are paying wages through online bank account. Table 7 gives an idea abut sample households' banking transactions in the survey area.

Table7: Households' Access to and Utilization of Banking Service

Attributes	Response	Frequency	Caste			Total
			OBC	SC	ST	
Households having a bank account	Yes	Number	38	52	132	222
		%	84.4	88.1	86.3	86.4
	No	Number	7	7	21	35
		%	15.6	11.9	13.7	13.6
Total		Number	45	59	153	257
		%	100	100	100	100
Type of bank	Public Sector Bank	Number	36	36	97	169
		%	94.7	69.2	73.5	76.1
	Private Bank	Number	2	16	35	53
		%	5.3	30.8	26.5	23.9
Total		Number	38	52	132	222
		%	100	100	100	100
Households response on saving in the bank	Yes	Number	29	30	91	150
		%	76.3	57.7	68.9	67.6
	No	Number	9	22	41	72
		%	23.7	42.3	31.1	32.4
Total		Number	38	52	132	222
		%	100	100	100	100

Source: Field Survey.

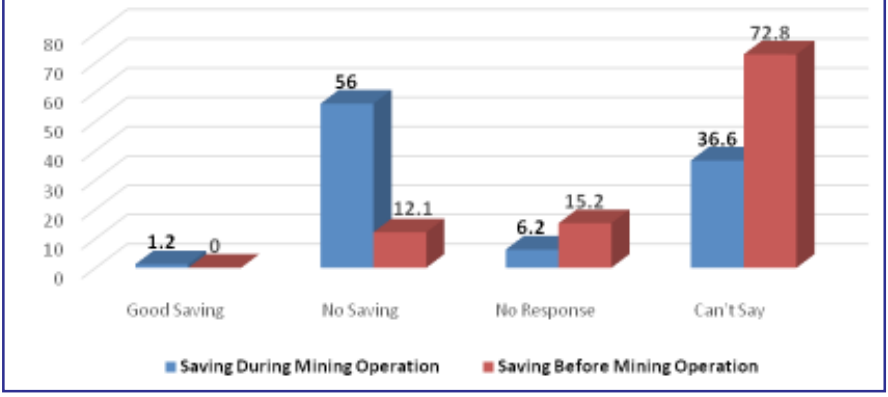
Most of the mining workers' households in the locality still borrow from various informal sources of finance. While only 8.9 per cent of households said that they borrowed money from the bank, 53.6 per cent borrowed from friends and relatives, 35.7 per cent from money lenders, and 1.8 per cent from other sources as contractor/co-workers/supervisors.

The basic reason for borrowing by the workers' households are for children's education (10.7 per cent), health expenditure of household members (21.4 per cent), marriage (7.1 per cent), social function (1.8 per cent), day to day expenditure of family (41.4 per cent). The households' borrowing for healthcare and daily household expenditure has been high as mining activities cause pollution and there has been a gradual shift to modern lifestyles due to urbanization.

The mining operation has very little impact on the saving of the workers' households in the survey area. The comparison between the saving of households before and during mining operations shows that only 1.2 per cent of households are having good savings during mining operation. The workers who get regular work contracts in mines normally get a good salary

and are able to save. Among other workers while 15.2 per cent have no response about household saving 72.8 per cent could not say anything about their saving before mining operation (Figure 9). The percentage of households having no saving has increased from 12.1 per cent before mining operation to 56.0 per cent during mining operation. Mining activities cause an increase in household expenditure through the effect of modernization, urbanization, environmental degradation, and frequent health issues. As a result, more than half of households were unable to save even after earning more money during the mining operations.

Figure 9: Households Saving Before and During Mining in %

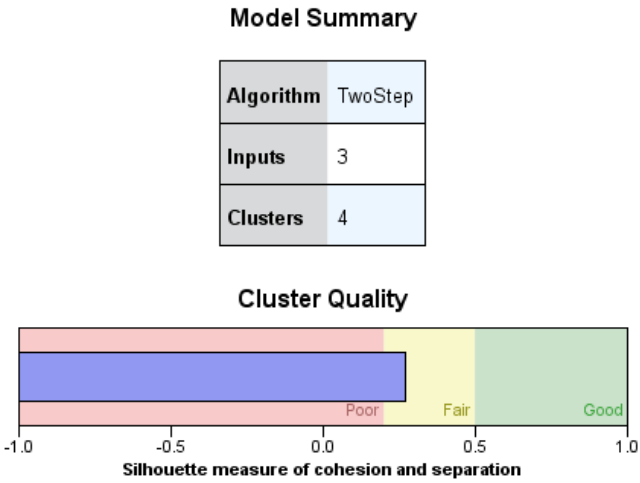


Source: Field Survey.

3.5 Cluster Analysis of Income, Education and Type of Work Done in Mines

To find the common characteristics of the households we have done a cluster analysis using income, education and type of mining job. Income has been taken as a continuous variable, education with 7 categories, and mining job with six categories. Using SPSS 23 version we ran two-step cluster analysis with automatic clustering option using Akaike's Information Criterion. We got four clusters. The Silhouette measure of cohesion and separation (Figure 10) shows fair grouping. Figure 11 and Table 8 show the characteristics of the four groups.

Figure 10: Cluster Model Summary Analysis of Income, Education and Work



Source: Field Survey.

Table 8: Clustering of Workers Education, Income and Work Done in Mines

Education_Income_Work type Clustering		
The key finding from cluster analysis	**Frequency**	**Valid percent**
Primary Education, Median Income Rs. 8515 and Loading/Unloading job in mines	94	31.8
Highschool Education, Median income Rs. 11012, Loading/Unloading Job in mines	63	21.3
Illiterate, median income Rs. 6028 and Hammering Job in mines	81	27.4
Illiterate, median income Rs 6504, Loading unloading job in mines	58	19.6
Total	**296**	**100.0**

Source: Field Survey.

Following the cluster analysis, we carried out a log-linear regression analysis to check whether education, type of work, and ownership of mines have any association with the total income of the household of the mains workers. Table 9 provides the results of the regression analysis. A description of the variable included in the model is provided in the note of the regression table. The standardised coefficients indicate that mine ownership has the maximum effect on the household income followed by the number of working days in a month and education of the individual. The households that get a greater number of days to work in mines earn higher income. Households that have workers in the public sector mines earn more income than those in private sector mines. The higher level of education also positively influences the income levels. Workers engaged in hammering earn more than any other job. Compared to STs other workers earn less.

Figure 11: Cluster Analysis of Income, Education and Type of Work.

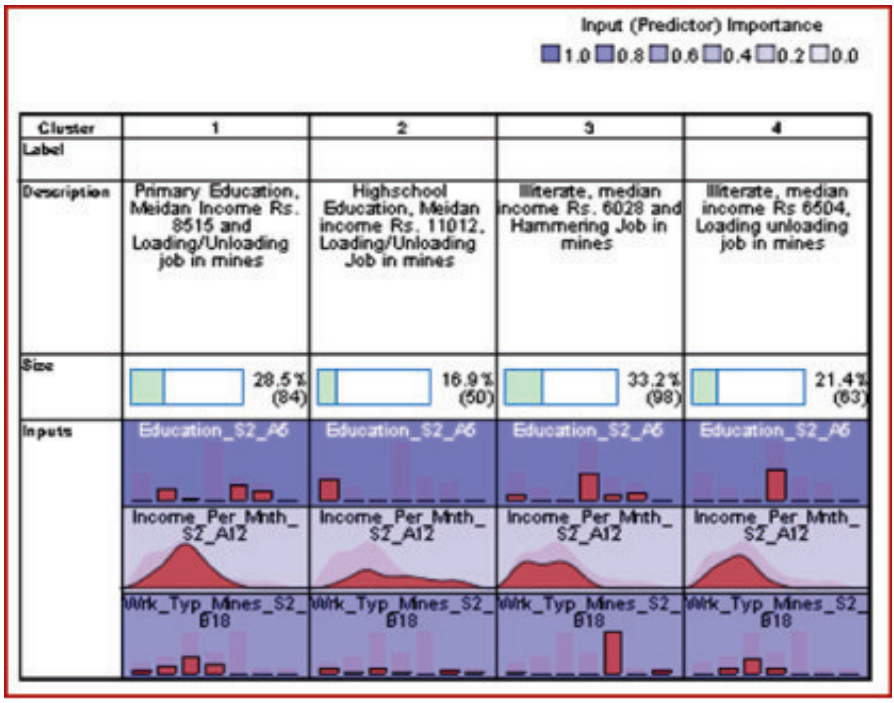


Table 9: Regression Results - Income of the Household, Education of the Mines Worker, Nature of Work and Mines Ownership

Dependent Variable: LnIncomeHH					
Independent Variable	Unstandardized Coefficients	Standard Error	Standardized Coefficients	T statistics	P-Value
Constant	8.258	0.138		59.853	0.000
Mine Ownership	-0.287	0.039	-0.321	-7.356	0.000
AverageHourWork	0.038	0.012	0.159	3.322	0.001
DaysWorking Month	0.036	0.005	0.345	7.166	0.000
Caste	-0.126	0.041	-0.138	-3.081	0.002
Work_Loading	-0.138	0.047	-0.138	-2.952	0.003
Work_Hammering	-0.148	0.047	-0.149	-3.118	0.002
Education	0.194	0.047	0.181	4.106	0.000
N	257				
R^2	0.49				
Adjusted R^2	0.48				
Durbin Watson Statistics	1.52				

Note: Variable Construction
LnIncomeHH: Log Total Income of the Household
Education: HighSchool or above=1, Otherwise=0
Work Loading= Loading/Unloading job=1, Otherwise =0
Work Hammering= Hammering job=1, Otherwise=0
Ownership of Mines: 1=Public Sector, 0=Private
Caste: ST=1, Otherwise=0
Average hour work: On average how long (in hours) the person works in mines daily
Days Work in Month: Approximately how many days the person works in the mines

Source: Field Survey.

Table10 shows that the mean household food expenditure of the sample family is 46.61 per cent of total household income. However, the food expenditure percentage ranges from 3 per cent to 160 per cent, showing vast gap among different households. The average expenditure on education is 10 per cent of income, which is due to the strong preference of the people to educate their children in private schools.

Table 10: Annual Household Expenditure as a Proportion of Annual Income

	Food Expenditure %	Education Expenditure %	Health Expenditure %	Interest Payment %	Other Expenditure %	Non-Food Expenditure %	Total Expenditure %
N	257	257	257	257	257	257	257
Mean	46.61	10.50	6.03	3.56	20.64	40.7373	87.52
Std. Deviation	26.91	20.41	9.62	19.17	15.19	36.15350	54.75
Range	156.91	200.00	64.29	250.00	119.05	334.43	467.79
Minimum	3.09	0.00	0.00	0.00	0.00	3.57	20.21
Maximum	160.00	200.00	64.29	250.00	119.05	338.00	488.00

Source: Field Survey.

The mean healthcare expenditure of mining workers' families is 6.03 per cent. It could be for two reasons. Some mines are providing all primary treatment free of cost and the majority of people could not afford healthcare expenditure in case of any severe diseases. Some people are spending a lot on interest payment, which is mostly borrowed to finance the big social events or healthcare of any family member. As a result, more than 20 per cent of their income is being spent on other purposes. The total mean expenditure from annual income is 87.52 per cent. This indicates only 12.48 per cent of people can save money from their income.

6. Conclusion

Mining operations have completely changed the life of *adivasis* in the locality. Before mining operations, they were dependent upon agriculture, forest produces and worked as casual labourers in the locality for their livelihood. However, after the beginning of mining operations, they are directly and indirectly depending upon mines for their livelihood. Due to illiteracy and low level of education, most of the workers work as casual labourers without having any permanent job contract. Mining now contributed 90-100 per cent of the total income of the majority of the households. Mining

operations have taken over the common property resources which were used for farming, and collection of food and fodder. Consequently, the scope of agriculture and allied activities has reduced drastically. The increase in household assets is much impressive. Even though income has risen due to mining operations, saving has not increased. This could be explained due to the increase in household expenditures. Due to the increasing mechanisation of mining operations employment opportunities in mining are also declining. Loss of traditional sources of livelihoods induces local youth to migrate to far off places for earning some income.

The high prevalence of casual workers suggests that mining companies are not seriously following the rules under the Mining Act and workes has lost out on social security benefits.

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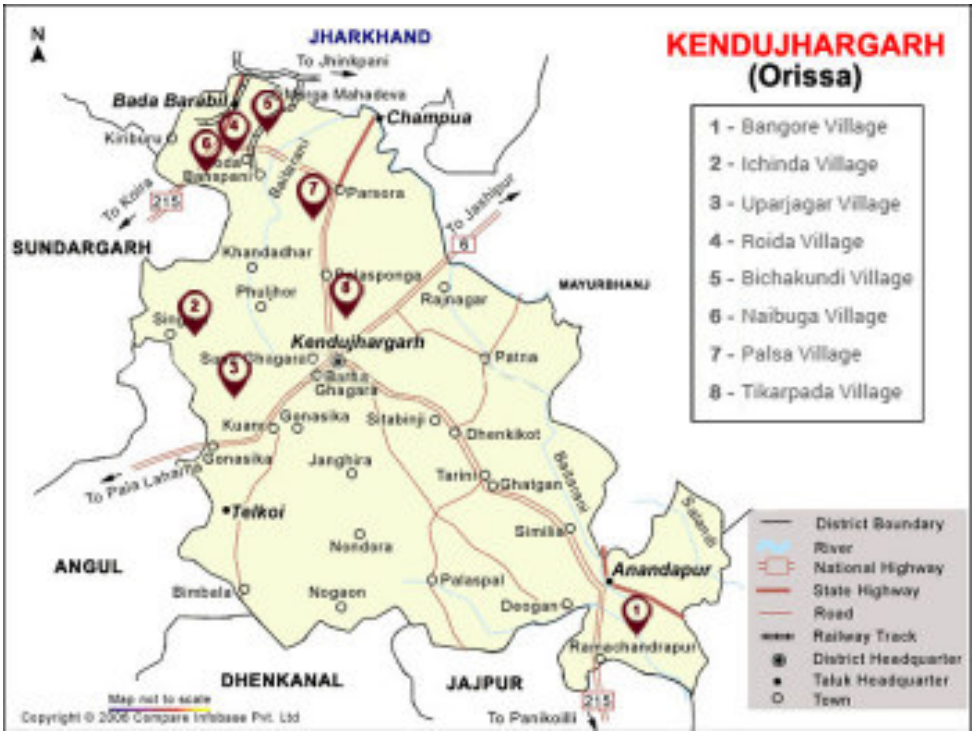
Appendix Figure 1: The Location of Selected Villages in Keonjhar District



Research Note/Commentary

Understanding Labour through the Lens of Intersectionality: A Case of Mining Labour in Odisha

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Abstract

Different enquiries on labour have extensively engaged with its class dynamics, drawing heavily from global north contexts as its main reference point. This note calls for an intersectional approach in studying labour and emphasizes how such critical lens can be employed through interdisciplinary engagement within the framework of political economy. It is argued that Intersectionality as a self-reflexive analytical tool helps us to understand the complexities of interrelations between different power relations and interlocking or overlapping systems of power relations shaping labour. Illustrating a case of coal mining labour in Odisha, it demonstrates how 'intersectionality' enhances our understanding of different labouring conditions.

Keywords: Political economy, Labour, Intersectionality, Coal mining

1. Introduction

Different enquiries on labour have extensively engaged with its class dynamics, drawing heavily from global north contexts as its main reference point.

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[1] Political economy framework is a critical mode of enquiry, where the material, social and political are not separate aspects of how the society organizes its economic life (Chandhoke, 1994: 23). The economic relations are not mere technocratic outcomes but shaped by social relations (power relations). Such understanding of political economy is interdisciplinary in practice and offers a wide range of scope for the use of intersectional lens.

Research emerging from varied geographical context has widely acknowledged that labour is shaped by social relations such as class, caste, race, gender, and ethnicity (Carswell and Neve, 2014; Pattenden, 2016; Shah et. al, 2018). While research galore on various issues includes labour market discrimination, labour force participation, labour processes, labour relations and labour agency, these analyses focus on individual effects of structure(s) of oppression. In this context, there have been fewer attempts at engaging with power relations which manifest intersection of social structures such as class, caste, gender, ethnicity that make for the everyday experiences of labour. In such exercises, using the lens of '*intersectionality*'- an epistemological stance (that goes beyond the standpoint theories), in researching labour could potentially create new understandings which have received little scholarly attention so far.

This note calls for an intersectional approach in studying labour and emphasizes how such critical lens can be employed through interdisciplinary engagement, for which political economy sets the fertile ground[1]. Illustrating a case of coal mining labour in Odisha, I attempt to show how 'intersectionality' helps enhance our understanding of different labouring conditions.

2. Intersectionality: Potential and Challenges

'Intersectionality' as a term was first used by Kimberlé Crenshaw (1989 and 1991), where she argued the ways black women vulnerabilities get 'multiplied' through intersecting oppression of race and gender. For instance, Crenshaw explains the multiplied marginalization of black women in labour markets. She cites an example of a firm where black men were hired for manual labour and white women were recruited for secretarial jobs. Black women were

[2] For instance, Collins'*matrix of domination* based on such similar intersectional paradigm engages in understanding how intersecting axes of oppressions are organized across time and space. It shows the diverse forms of oppression and inequalities that emanate from all possible forms of intersections. However, in this study, intersectionality as an analytical tool is more useful as the study attempts to identify and assess the intersecting power relations that shapes the experiences of workers at a given situation.

[3] Intersectionality has gained profound scholarly attention from researchers who have understood and used it from many different perspectives. All these perspectives have contributed to the dynamic nature of intersectionality and have strengthened its foundation (Collins, 2019).

altogether denied any employment in the firm, and, here, legal theories failed to understand their exclusion since both black men and white women were recruited. Hence, legal frameworks could not see it as a problem of race or gender. However, black women's experiences were different based on their marginalization at the intersections of race and gender. While neither race nor gender could explain their experiences, by bringing together the overlapping impact of both threw light on their multiple vulnerabilities and identified them as the most excluded. Though the coining of the term 'intersectionality' starts with Crenshaw, such thinking has been carried out in several works earlier by anti-racist feminist researchers in the 1980s (Collins, 2019)[2] and has been considered one of the most significant contributions in under-standing the social world. Intersectionality has been conceptualised as paradigm, critical theory, concept, framework and method (Nash, 2008; Collins, 2019; and Collins and Bilge, 2020)[3]. Nevertheless, it challenges the over-generalized findings and provides us with a new lens to look at the subject of analysis where different structures mutually constitute their life experiences (Collins, 2019).

There are also several challenges to carrying out intersectional research. There are debates on whether intersectionality is a theory of marginalized subjects or a general theory of identity (Collins and Bilge, 2020). How many categories can be added to intersectional research? Some also view it as a tool to be employed only in women's studies. Here one needs to be cautioned about additive frameworks to be misunderstood as intersectionality (Crenshaw, 1989; Nash, 2008). For instance, the logic of adding categories such as caste, class, and gender does not provide an intersectional under-standing of the subject of analysis, where all the categories are treated differently and their impacts analysed individually (McCall, 2005). It should be noted that the use of the master category is not intersectional research (Collins, 2019) as, for instance, gender does not help to explain the overlapping subjectivities as argued and illustrated through the intersecting race and gender relations in labour market outcomes (Browne and Misra, 2003). Based on the master category observations, generalization could exclude women's experiences shaped by the intersecting axis of oppression, such as caste, class, and gender in the Indian context.

There are three key ways or approaches to carrying out intersectional research. These are anticategorical approach, intercategorical approach, and intra-categorical approach (McCall, 2005). Anticategorical approach refers to

research deconstructing the analytical categories. Intercategorical approach looks into the relationship between different categories and, hence, is very much grounded in relationality principles. Intracategorical approach analyses the differences within a particular analytical category. While empirically exercising these approaches one may often find that the boundaries between these are blurred. By carrying out intersectional thinking in research the significant contribution is in analyzing the multiplied effects of the intersections of power relations and investigating the process of such dynamics (Collins, 2019). Depending on the focus of the research and context of the study, careful identification of relevant categories of power relations needs to be done (Collins, 2019). However, such identification of the relevant structures of power relations and the ways they intersect with each other in different situations cannot be done beforehand. Identification of relevant axes of oppression and the ways they intersect with each other would emerge from the empirical investigation of field materials (Nash, 2008).

3. Self-reflexivity and Intersectionality in Researching Labour

Intersectionality as an analytical tool helps us understand the complexities of power relations and different axes of oppression which shape our subject of analysis. However, such a need to carry out intersectional research emerges only through the self-reflexivity of one's research and critical understanding of disciplinary boundaries[4]. Self-reflexivity is generally understood in terms of the positionality of the researcher and the subject of research (Davies, 1998; and Van Maanen, 2011). This positionality is referred to as the socio-economic differences (also, similarities in case of organic researcher) between the researcher and the subject of research, which brings out the embeddedness of the researcher and the subject within the wider context of power relations. However, self-reflexivity is also understood as a process of thinking and rethinking on the ways one carries out research, raising questions on the existing practices and scholarship in one's discipline, and finding ways to improvise the process of knowledge production. In this direction, researchers from different disciplines have called for carrying out self-critical examination of their disciplines and move towards intersectional research (Hopkins, 2019; McBride et al., 2015; Valentine, 2007; and Simien, 2007) or at least include an intersectional sensitive understanding in their research (McBride et al.,

[4] Intersectionality is a tool of self-reflexive analysis that helps us in challenging the dominant research practices and findings, and enhances our understanding of the interlocking or overlapping systems of power relations.

2015). Labour scholars from different disciplines such as sociology, economics, political science, geography, management, organization studies, environmental studies and international business and marketing have employed the lens of intersectionality in studying labour in the context of different countries. In the Indian context, feminist scholars have engaged in critical thinking in understanding intersecting relationships between caste and gender (Rege et al., 2013). For instance, several scholarships have emerged on the vulnerabilities of labouring Dalit women in the varied context of dispossession and informal labour (Gopal, 2013; Ayyar, 2013; Mehrotra, 2017; Raman, 2020; and Nayak, 2020).

We often understand labour as a mere factor of production in economics, overlooking the wider social relations that are entangled in the making of labour. Such understanding leads to the overemphasis on analyzing product standards rather than enquiries on labour processes and exploitative work arrangements (Das, 2016). It is widely recognized in the political economy domain that labour is not a homogenous category (Parry, 2020; and Lerche, 2010), and production relations do not take place in a vacuum, rather these are intertwined with the wider social-political-geographical dynamics (Campling et al., 2016). Labour has its subjectivities shaped by caste, class, gender, ethnicity, and other social structures (Shah et al., 2018). This kind of nuanced understanding of labour provides a promising scope for inter-disciplinary research in the political economy where labour is an intersectional subject of analysis. By bringing different disciplinary understanding of power relations and using the lens of intersectionality, the over simplification of labour by controlling various variables through the logic of segregation and the assumption of '*ceteris paribus*' can be challenged.

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[5] The illustration is based on my on-going PhD project titled "Dispossession, Labour Process and Production of Space: A Study of Coal Mines in Talcher, Odisha" at the Centre for Development Studies (CDS), Trivandrum.

[6] In my PhD project, dispossession is a process that intersects with the social structures that are class, caste and gender and plays an important role across space and time. Strikingly, dispossession also becomes a structure at the workplace that operates in determining the labour arrangements and shaping the bargaining power of the workers.

[7] As mentioned earlier, identification of these categories was done based on the emprical analysis of field materials, which pointed out the different ways these structures of oppression intersected and played out in the shaping of the experiences of coal mining workers.

4. Understanding Mining Labour through Intersectionality[5]

In this backdrop, I illustrate how the complex case of coal mining labour in Odisha could be captured through intersectionality. The study focuses on the 'national coal economy' produced by the public sector company - Coal India Limited (CIL), which has a hidden informal economy booming underneath (Lahiri-Dutt, 2016). The fieldwork focused on the formal workers and various informal workers working through subcontracted private companies and labour contractors. The coal mining labour in Odisha is found to be quite heterogeneous. Here, the heterogeneity is attributed to the segmentation of labour in different formal and informal sectors and the social structures that are, class, caste, gender, ethnicity, and dispossessed[6] as categories shaping the subjectivity of the workers in the field[7]. Such a complex nature of the mining labour demanded the understanding of intersecting power relations operating in the making of labour in Talcher.

This challenging research project started with interdisciplinary readings on labour in different contexts, including engagement with literatures from labour history, ethnography of labour, sociology of labour, and geography (including labour geography). Drawing from this literature, I could get a holistic understanding of the political economy of labour. Mixed methods[8] were employed to collect data of both quantitative and qualitative nature. The data collected was triangulated to have a nuanced understanding of the findings. For instance, the process of labour fragmentation among coal mining workers was explored: firstly, the worker statistics in coal mines was collected from various government reports which indicated the increasing number of informal workers in CIL coal mines, including Talcher coal mines. This led to collection of mine level permanent worker statistics and contract worker statistics from Talcher coal mines offices which showed the various caste, gender, ethnic composition of workers in formal and informal works of the coal mines. Interviews were conducted with workers, trade union leaders and coal mining management at Talcher to understand the everyday experiences of formal and informal coal mining workers involved in different work processes of producing coal which threw light on the intersecting structures of power relations that played out in their experiences and contributing to the labour fragmentation.

[8] It includes survey questionnaire, ethnographic interviews, oral history and participant observation.

For the purpose of this note, I demonstrate two cases of intersectional analysis to understand different labouring conditions. In the first case, the process of dispossession intersects with the social structures of class, caste, and gender and determines the recruitment process of labour into the formal regular jobs of coal mines and, thence, their working conditions. Almost 85-90 per cent of the permanent workers are from land-owning communities in Talcher recruited as part of the compensation packages in exchange land for coal mines. The majority of upper caste and Other Backward Classes (OBCs) men from land-owning communities are working as permanent workers. Dis-possessed women across caste and class are adversely included in different labouring conditions. The majority of women from land-owning households (majorly upper-caste Hindus and OBCs, and a small minority of Dalits and Adivasis) are primarily restricted to domestic duties for the social reproduction of the coal miners,and few of them work in the coal mines. Women are not encouraged to work in the coal mines; however, in the absence or inability of the male household member to work, women join the formal workforce. Women are employed in specific work categories that help facilitate coal production and they are not considered as coal miners. Among them, Dalit women face multiple vulnerabilities in the formal workforce. Dalit women within the regular workforce are excluded from the majority of coal mining works due to their gender because of the industry's hyper-masculine nature, and, this exclusion multiplies when they are further restricted from work spaces such as canteens because of the caste prejudices. Landless Dalits are altogether excluded from getting regular employment despite being dispossessed of their livelihoods and are pushed into precarious informal labour and coal collection which puts them on the margins of the coal industry.

The second case, the intersections of ethnicity, caste, class, and gender, shape migrant workers' labouring conditions, a prominent part of the informal workforce of the coal mines. There are many migrant workers from within the state and outside the state who are working as contract and casual labourers. It has been found that their exploitation is not only shaped by ethnicity, which is a dominant understanding of their labouring condition but an outcome of layered vulnerabilities because of the intersections of their ethnicity, caste, class and gender. For instance, the migrant women workers from different parts of western Odisha are hired as casual workers

[8] A Scheduled Tribe community majorly residing in Sundargarh, Keonjhar and Sambalpur districts of Odisha.

by different labour contractors. They are exploited in many ways, including through wage differentials and long working hours. Here, one needs to understand that they are distress-driven migrants from lower class and caste communities. They are not the migrants who are physically displacing themselves for improving the standards of their households but out of necessity. Their marginalization is amplified not only because they are migrants but for being migrants from a particular geographical region. Hence, all the migrants from this geography who are mostly OBCs and Adivasis are considered as 'munda'[9] by the contractors. Also, labour contractors successfully create a discourse around women workers as not desired for long hours of work in coal mines and other allied industries, which minimises their scope for any negotiation by showing that recruitment is a mere act of generosity. On the other hand, many migrant women workers are hired for hard manual labour as 'coal cleaner' in coal handling plants, increasing their precarity.

The above two cases illustrate the relationship between different axes of oppression and point out how the intersections of such power relations shape the labouring conditions of the formal and informal workers in Odisha's coal mines. These intersections plays out in their everyday experiences and struggles of workers, fragmenting the mining labour, creating wage disparities and weakening the possibilities of an emergence of collective labour agency.

5. Conclusion

'Intersectionality' as a lens provides a nuanced understanding of labour and their labouring conditions, as shown through the case of mining labour in Odisha. Whether research uses the term 'intersectionality' or not, employing intersectional understanding of labour can potentially advance existing scholarship and create new knowledge projects. This nuanced understanding of the intersecting axes of oppression in shaping the labour conditions and their variegated experiences might lead to policy innovations in favour of the worker that researchers strive to do through their research.

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Inclusive Innovation: Evidence and Options in Rural India

by Rajeswari S. Raina and Keshab Das (Eds.), Springer Nature India Private Limited, 2020, ISBN 978-81-322-3929-1 (eBook), pp. xv + 275.

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Hastimal Sagara

Focusing on the 'excluded rural' this edited volume bases its arguments on the evidence of innovation in the context of skewed or limited livelihood options and multiple knowledge systems. It holds that if inclusive innovation is to happen the actors and the nature of the innovation system need to be reformed substantively. It presents cases of important technological changes and institutional reforms enabling inclusive innovation in rural manufacturing, sustainable agriculture, health services; and the processes of technological learning in traditional informal networks as well as in formal modern commodity markets. These cases bring up lessons to enable learning and change within the state and formal science and technology (S&T) organizations. By focusing on these actors central to development economics and innovation systems framework, the book bridges the widening conceptual gaps between these two parallel knowledge domains, and offers options for action by several actors to enable inclusive innovation systems.

The book is broadly divided into three parts that are subdivided into twelve chapters. Part I -, *The Problem* - attempts to explore spaces, forms and norms of exclusion mainly in rural India. The editors argue that changes in the nature of the state and formal organized knowledge systems are absolutely necessary for realization of inclusive innovation. Further, they reflect on the nature and magnitude of state sponsored poverty eradication programmes, welfare schemes and other state initiatives inducing inclusive development

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in the country.It engages in raising pertinent questions on various social, institutional and developmental aspects of inclusive innovation. This opening part of the book lays down a strong and polemical context and sets the agenda for the interesting chapters that follow in the next part.

Part II - *The Evidence* - is a collection of 10 intense chapters providing evidence to substantiate presence of inclusive/exclusive innovation prevailing in various subsectors and institutions across India's rural economy. The well-argued and cogent chapters by several scholars, policy specialists and practitioners from civil society organisations offer a variety of real-life dynamics on inclusive innovation in practice and with nuances. This part of the book focuses on factors determining innovations incorporated by firms located in industrial clusters, opportunities and challenges before the firms adopting innovative practices in their respective fields and institutional support for inclusive innovation in India. Each chapter, centred on a particular theme, attempts to map the extent of inclusiveness in the process of innovation adopted by a firmor subsector or an activity and identifies factors responsible for exclusion.

The field research based chapter titled, 'Inclusion and Innovation Challenges in Handloom Clusters of Assam' explores how enterprises involving poorer entrepreneurs survive and grow in the face of challenges for inclusive innovation. It identifies reasons behind the state's policy-making mechanism remaining indifferent to the innovation and growth potential of these clusters. The authors suggest technological upgradation in sync with the dynamics of expanding markets and seek need for better access to incentives not only for growth and innovation but also to improve inclusion outcomes.

Another field-based study on terracotta cluster in Rajasthan makes a case for empowering rural clusters through state intervention and holds that looking for newer markets would act as a catalyst not only for innovations but potentially develop useful networks in learning. Another chapter, based on field surveys of leather clusters of Kolkata, textile clusters of Jaipur and Kolkata and foundry clusters of Ajmer and Kolkata surmises that human skills, market expansion and market sophistication are the primary drivers of innovation in microenterprise clusters. However, the chapter underscores social and environmental innovations as essential for ensuring inclusion in the backward linkages.

The chapter titled 'Inclusion Problems and Prospects: Introducing Gender in Agricultural Research and Education' critiques initiatives in gender inclusion as part of capacity building and curriculum programmes in academic courses in agriculture, and research in technology development. An interesting chapter on maternal and child healthcare documents the turnaround of the basic healthcare system through institutional innovation and participatory system particularly after the launch of the National Rural Health Mission (NRHM) in India. It is argued that the institutional and policy changes would build a quality healthcare system in rural India only if there is an active and meaningful participation of the local community.

A thought-provoking chapter titled, 'Social Innovation and Entrepreneurship: Nurturing the Institutional sine qua non for the Informal Sector', argues that social enterprises (SEs) or social entrepreneurship can potentially transform social norms and the value system that would be more inclusive and just. Three case studies are presented to emphasize that SEs deepen and strengthen democracy. The author also suggests that social entrepreneurs have to work with the state towards creating, fostering and scaling up a sustainable SE ecosystem. Despite being context and location specific, SEs may contribute commendably in addressing flaws in the most well-intentioned government schemes for rural entrepreneurship and employment generation for inclusive development. SEs can also effectively engage with the state in dealing with other social and economic problems of exclusion in India.

A chapter on a coir cluster in Kerala observes that most of the firms operate with traditional production methods or 'intermediate' technologies at the best, and even as advanced technologies are available, majority of the workers cannot cope up with new technologies. It argues that formal/state knowledge generation mechanisms must be in congruity with informal knowledge transfer mechanisms. Another chapter on marketing and price formation of cardamom with e-auctions in Kerala indicates historical presence of varied spaces of 'institutional' exclusion and mere introduction of an online system would not suffice as an appropriate institutional innovation. The chapter on modern genetics describes biotechnology as an opportunity for inclusive and sustainable agriculture and argues that it would help address crop diseases and drought situations effectively. For greater success and more inclusiveness, two key suggestions are made: first, to integrate the Hybrid Rice Technology (HRT) and genomics-based Marker-Assisted Selection (MAS) technology; and, second, to interlock technological and institutional innovations. However, the concern regarding appropriation of genetic material by the vested interests remains.

Referring to the Chinese experiences of public intervention in S&T and transforming its institutions of knowledge and learning another chapter identifies gaps in India's policy responsiveness aimed at fostering inclusive and responsive innovation including lack of coordination between economic and S&T policies, inadequacies in the organization and management of R&D and a strategic vision. It makes a case for devising an innovation policy that corresponds well with its economic policies, to develop an innovation system that responds to the needs of the industry and to frame relevant syllabi.

Part III - *The Options* - of this book presents an array of options for the state and the formal S&T system to address the derelict policy learning capacities for inclusive innovation in India. There are options for rural industrial policy, including for clusters, to devise strategies not only to infuse an innovative ethos in the productive sphere but also to broad-base skills and productivity improvement. It is interesting to note that this book does not make policy prescriptions or recommendations for the decision makers. In the epilogue, the editors make the readers hopeful with their optimism that India would achieve greater degree of inclusiveness in innovations for and of rural India in times to come.

Looking at the composition of the society in rural India, an important lapse in the volume relates to an absence of discussions reflecting the extent to which the socially deprived sections, mainly the Scheduled Castes and Scheduled Tribes have been excluded or have benefitted from inclusive innovation.

Despite several diverse perspectives on inclusive innovation discussed in the volume by learned contributors the most remarkable thing about this book is the editors' knack of bringing together these views into a well-knit common argument or proposition on inclusive innovation; this stands a testament to their thorough expertise on the subject. The text in the book is rich, the language is lucid and arguments are constructed on authentic references and/or field surveys, which have made it a valuable source of knowledge particularly for research scholars and development economists. The content of the book would be of value to a wider audience including researchers, policy makers, civic society professionals and industry observers interested in rural development, inclusive innovation and industrial cluster studies.

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Book Chapter

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Levien, M. (2018). Dispossession without development: Land grabs in neoliberal India. New York: Oxford University Press.

Website

Rao, M. G. (2017).Central transfers to states in India: Rewarding performance while ensuring equity. Report prepared for the NITI Aayog. Retrieved from https://niti.gov.in/writereaddata/files/document_ publication/ Final%20Report_25Sept_2017.pdf[Date of last access Month Date Year)

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