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HEALTH FOR DEVELOPMENT: A DISTRICT LEVEL STUDY IN WEST BENGAL

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Abstract

Healthy population is considered to be the engine of economic growth. The present paper constructs composite indicators of health infrastructure and current health status for a constituent state of India using principal component method and examines the interlinkage between them as well as that between health status and economic development. Relative position of the districts within the state is explored to identify the determinants of health status using simple econometric exercise. Results indicate strong relation between primary health infrastructure and preventive & curative health achievements. Close relation between health status of a district and district domestic product underlines the role of health in determining socioeconomic situation of a region. Gaps in health infrastructure in the region need to be taken care of to tap the full economic potential of the region.

Key Words: Health, Infrastructure, Economic Growth

JEL Classification: I15, I18, P46

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Health for Development: A District Level Study in West Bengal

I. Introduction: Importance of Health in Human Development

Health is considered to be one of the key ingredients of Human Development for an economy as it helps in enhancing the quality of human capital and thereby improves the state of human development. In spite of accepting the primacy of health sector in augmenting the development process, access to basic health services has continued to remain poor in developing countries. In India, despite substantial investment in health infrastructure, both access to and use of services remain suboptimal and varies considerably across states and regions. As a consequence, yet today every second young child in India is malnourished, less than one fourth of rural population use toilets and only four out of every ten girls who enrol in formal schools complete elementary schooling. According to the Millennium Development Goal Report, the target regarding health is to reduce the Infant Mortality Ratio and Maternal Mortality Ratio to 1 per 1000 live birth by 2012. In reality however, both IMR and MMR are still way above the target. Several indicators of health status show that India is still lagging behind the global standard (Table 1). It has sometimes been argued that the lacklustre performance of India in terms of health is mainly because of poor health facilities, especially at the primary level. While India does have some world-class treatment facilities, they are way out of reach of the common people and the general level of facilities available to the common mass, especially at the countryside, are in a mess. Given this scenario, it is imperative that the status of the sector is explored in detail, examining the link between health infrastructure and health outcome, and also that between health outcome and general development level as measured by per capita domestic product. In this paper we seek to run that exercise for West Bengal, bringing out the intra-district regional variation in health infrastructure and outcome and the interlinkages mentioned above. This paper is also an exercise in application of Principal Component Analysis to the health sector where various indicators have been compressed to form composite indices. It is expected that the paper will be able to elucidate the current status of health sector in the state and shed light on the drawbacks and necessary measures.

II. Brief Review of Current Literature

Health is considered to be engine of economic growth. Researchers have tried to explore the existing health care system pattern and the health status of the people in many studies. In Indian

context some recent studies on health care system and utilization pattern of health care service include those by Datar, Mukherji and Sood(2005), Shariff and Gumber(2008). Others are found to be concentrated on health outcome only. Notable among them are Dilip and Duggal(2002), Gaudin and Yazbeck(2006), Chandhiok, Dhillon, Kambo and Saxena(2006), Vani(2010). To discuss health in international context, researchers are observed to be contributing more on health outcome. Contribution by Or (2000), Nisar and White, Buitendijk, Zeitlin, Cuttini, Langhoff-Roos and Bottu (2003) are found to be significant among those studies. Apart from that India Infrastructure Report, 2007 by Oxford University Press also discussed important issues in health infrastructure in India and Millennium Development Goals India Country Report 2005 of Government of India discussed on health outcome especially in context of achieving specific targets that are to be met according to Millennium Development Goal.

Study discussing both health infrastructure and health outcome and the interlinkage between them are sparse and the present author did not come across any study on this aspect in the Indian context. The present paper aims to fill this gap in existing literature.

III. Data Source and Methodology

The present study uses data mainly from District Level Household and Facility Survey (DLHS-3) conducted by International Institute of Population Sciences, Mumbai. Some data has also been taken from Department of Planning, Government of West Bengal and data related to Population, Literacy and Profile of Three Tier Health System has been taken from Census of India (2001 & 2011) and Department of Health & Family Welfare, Government of West Bengal.

The paper seeks to analyze the Health Infrastructure and resulting Health Outcome across all Districts of the state West Bengal. To have a proper reflection of health infrastructure in the state, the paper has considered six basic indicators – Number of Medical Institution across Districts, Availability of Equipments and Medicine in the Institutions, Operating Facility in the Hospitals/Centres, Referral Facility, Availability and Functioning of Critical Child Care Unit and lastly the Availability of Beds in the Medical Institutions. Along with that, a tabulated analysis has been carried out to have a proper representation of the three tier health infrastructure system, viz. Community Health Centre, Primary Health Centre and Sub Centre in District, Block and Village level respectively. Availability, Accessibility and the Quality of Health Service provided by the centres has been discussed using various indicators. Apart from that the paper has also focussed on to the performance of different newly introduced health awareness campaign or the

health support services, namely, Integrated Child Development Programme, Janani Suraksha Yojna, etc. Combining the discussed indicators a Composite Health Infrastructure Score is calculated using Principal Component Analysis Technique and a ranking is done for the districts as per the calculated scores. Usually it is argued that proper infrastructure results in good health of the people; hence Health Outcome across districts is discussed. Three basic indicators of health outcome has been discussed - Reproductive Care, Mortality & Morbidity to represent present health status of the districts and associated scores are also calculated by using the same statistical technique as like the earlier infrastructural score so as to develop a Composite Health Outcome Score.

A linear regression analysis has been run to identify the proximate determinants of health status of West Bengal. Apart from health infrastructure, which is supposed to be the major determinant of health outcome, we have considered urbanization and literacy as explanatory variable to health outcome.

Lastly, a rank correlation approach is followed to see the degree of association between economic status of a district and the health as well as educational status of the people of that particular district. We rank the districts according to the economic status, indicated by District Domestic Product at Constant Price on the one hand and according to the Health & Educational indicators, namely Health Outcome Score and Literacy on the other. Thereafter rank correlation coefficients are calculated between ranks according to economic status and rank according to educational and health status.

IV. Health Status of West Bengal

West Bengal has nineteen districts with a population of about 91.4 million as per Census 2011. The state ranks 8th among the country's 16 major states both in terms of human development index and human poverty index. The health infrastructure of West Bengal is very wide covering even the remotest villages. There are 9 Medical College Hospitals, 16 District Hospitals, 45 Sub-divisional Hospitals, 346 Community Health Centres, 922 Primary Health Centres and 10356 Sub-Centres across West Bengal. However, the health status seems to be very poor in the state. According to a World Bank Report the average level of nutrition in the state, and especially among women, is low by several criteria. The overall Anaemia status of children in West Bengal is very poor as it ranks as low as nineteenth among 25 states. The proportion of children with Anaemia (78 per cent) is higher compared to the Indian average of 74 per cent. However, the

Table: 1
Demographic Features: A Comparative Profile

Indicators	West Bengal	India	Less Developed Countries	Developing Countries	Industrialized Countries	World
Population (in millions)	85.2	1112.2	785.4	5358.2	969.9	6577.2
Crude Birth Rate	18.4	23.5	36.0	23.0	11.0	21.0
Crude Death Rate	6.2	7.5	13.0	8.0	9.0	9.0
Infant Mortality Rate	38.0	57.0	90.0	54.0	5.0	49.0
Under 5 mortality Rate	59.6	74.3	142.0	79.0	6.0	72.0
Total Fertility rate	2.0	2.9	4.7	2.8	1.7	2.6
Life Expectancy	69.6	67.0	55.0	66.0	79.0	68.0

Source: The state of the World's children 2008 (UNICEF) and SRS, Registrar General, India

proportion of children with severe Anaemia is marginally lower, at 5.2 per cent compared to the national average of 5.4 per cent. In the rural areas, 82 per cent of children are estimated to have Anaemia, compared to 64 per cent in urban West Bengal and 60 per cent in Kolkata. The prevalence of malnutrition is possibly a major cause for certain health problems in the state. The state has a crude birth rate of about 19.8 and crude death rate of 6.3 where as the infant mortality rate i.e. number of infants dying under one year of age in a year in West Bengal per thousand live births of the same year is found to be 38, which is supposed to be bellow 30 according to National Socio-Demographic Goals for 2010. Neo-natal and Perinatal Mortality rate are also as high as 28 and 29 respectively, indicating high chances of death during first four/five weeks of a child's life. While early Neo-natal Mortality Rate i.e. infant death within one week of life per 1000 live births is 23 (SRS 2007) accounts for 81.1 per cent of Neo-natal Mortality Rate. Life Expectancy at Birth for Males is 68 years while for Females the life expectancy is 70 years which is found to be higher than the national average.

V. Availability of Health Infrastructure Across Districts

In India, Public health infrastructure in rural areas or the primary health care consists of a three-tier system, a sub centre for every 5,000 population with a male and female worker; a Primary Health Centre (PHC) for every 30,000 population with a medical doctor and other Para medical staff, and a Community Health Centre (CHC) for every 100,000 population with 30 beds and basic specialists. In urban areas, it is two tier systems with Urban Health Centre (UHC)/Urban Family Welfare Centre (UFWC) for every 1,00,000 population followed by general hospital.

1. Availability of Medical Institutions across Districts

Health infrastructure is the elementary need to have a good health condition. Unlike India, West Bengal also has a three tier system of primary health care. It was recommended in 1948 by Bhore Committee that there should be at least one bed per thousand populations. However it's been 63 year since and we still haven't been able to reach that target. This shows the infrastructural poverty of health across the states as well as for the country. Due to high population pressure in West Bengal the infrastructural facility is found to be insufficient as there is only one Community Health Centre for almost every three lakh population, which is supposed to be for every one lakh as per the national norm; Primary Health Centres and Sub Centres are also observed to be having similar kind of a situation, dealing with double or triple number of population than they are capable to handle. This reduces their efficiency and thereby causes poor health service. Situation is found to be better in hilly areas due to low population density as in Darjeeling and is found to be worse in Urban and Suburban plain areas as in North 24 Pargana. However for almost all the districts in West Bengal, there is at least one Sub Centre for every ten thousand population indicating at least one step towards a proper rural health infrastructure in near future at the grass root level. But in the secondary level of health care system district hospitals as well as the medical college hospitals are found to be overcrowded with patient pressure indicating poor service from the primary or rural health institutions, viz. CHC/PHC/SC. Huge number of patients are being referred to the Medical College as well as District Hospitals due to lack of infrastructural support in the rural health centres and this is making the hospitals crowded, unhealthy and less efficient. In many of the medical college hospitals two or three patients share a bed and some even seemed to be lying in the floor to get treatment. This may be the possible reason why people even with marginally higher financial strength prefer to go to private hospital. West Bengal also has 3568 private hospitals comprised of 10461 beds. Economically richer districts are found to be having more number of private medical institutions as there is a strong association between wealth of the people and preference to private health care. As for example Kolkata has the highest number of private medical institutions followed by Bardhaman, North 24 Parganas and Hooghly. However these hospitals are beyond the reach of the poor people because of highly expensive system of health care. Hence, still a very small percentage of total population is capable of visiting private hospitals.

2. Health Infrastructure at Community Health Centre

Health care delivery in India has been envisaged at three levels namely primary, secondary and tertiary. The Secondary level health care system constitutes of community health centres. CHC is a 30-bedded hospital providing specialist care in medicine, Obstetrics and Gynecology, Surgery and Pediatrics. The CHCs were designed to provide referral health care for cases from the primary level and for cases in need of specialist care approaching the centre directly. 4 PHCs are included under each CHC thus catering to approximately 80,000 populations in tribal / hilly areas and 1,20,000 populations in plain areas. West Bengal in total has 269 number of Community Health Centres in the state; of those 82 per cent CHCs are not designated as referral units, indicating around 197 Primary Health Centres do not have any option to refer their critical patients to CHC rather than treating at their own risk. CHCs are predicted to have a bed occupancy rate of 60 per cent throughout the year and to facilitate the patients, the centres are recommended to be well equipped with New Born Care Services, Blood Storage Facility, and also to be provided with basic level of infrastructure like water supply, electricity etc. Apart from this to cater the need of the patients, the centres are recommended to have Gynecologist, Pediatrician, Anesthetist and for overall management of the CHC, a Health Manager. Considering all the required facilities which are supposed to be there in a Community Health Centre, among all districts of West Bengal, North 24 Pargana is found to be having worse level of community level health infrastructure, followed by South 24 Pargana, Murshidabad and Uttar Dinajpur. With huge population pressure the developed districts like Hooghly, Howrah, Bardhaman, are also having poor CHC infrastructure while the Community Health Centres of the districts situated in hilly areas are found to be better equipped. However, in West Bengal almost 98 per cent CHC's doesn't have blood storage facility and 85 per cent doesn't have new born care services. Almost 99 per cent CHCs are running without any Gynecologist and only about 13 per cent CHC does have an Anesthetist in the centre. More over just five out of every hundred Centre has a Pediatrician which may be a significant explanation of high Infant Mortality across the state. The problem of availability may be more acute because of absence health manager as s/he is supposed to be responsible for proper maintenance or functioning of a centre; currently in West Bengal only 5 per cent centres has got Health Manager.

3. Health Infrastructure at Primary Health Centre

While Community Health Centres are designated to operate at District level, the Primary Health Centres are designated to operate at Block level. The central council of health at its first meeting held in January 1953 had recommended the establishment of PHCs in community development blocks to provide comprehensive health care to the rural population. According to national norm there must be at least one Primary Health Centre for every 30,000 population in plain area and for 20,000 populations in tribal, hilly and backward areas with 4 to 6 indoor/observation beds. A PHC acts as a referral unit for six Sub-Centres. In West Bengal one may find a Primary Health Centre for 90,000 and 60,000 for plain and hilly/backward areas respectively, implying a very poor availability and accessibility of PHC across the state. There are only 40 Primary Health centres for every hundred villages across the state. Availability is better in the districts of Darjeeling, Birbhum, Bankura and poor in two Mednipur, Dinajpur and some other districts, whereas overall infrastructure is poor at South 24 Pargana, Murshidabad followed by Maldah, and Uttar & Dakshin Dinajpur. In West Bengal almost 95 per cent of the villages don't have a Primary Health Centre within village and only 10 out of the 40 Primary Health Centre per hundred villages function 24 hours a day. If there is a centre in the village, the basic infrastructural facilities like water supply, electricity which are very essential for operating a health centre are yet to be provided. 65 per cent of the available PHCs in every hundred villages do not have regular electricity. For proper functioning of a Primary Health Centre, a centre must be well equipped with at least four beds, a functional Operation Theater, availability of essential drug, new born care services and off course the facilities like electricity, water supply. Apart from that a centre is supposed to have a Medical officer, a Pharmacist and an AUSH Doctor to look after the patients for twenty four hours. Considering the availability of all necessary facilities together in the Primary Health Centres across districts of West Bengal, it is observed that, out of all districts, the overall level of Infrastructure is satisfactory in the districts of Darjeeling, Purulia, Nadia, Bankura, and Birbhum. The socially excluded group dominated districts, namely, Purulia, Bankura and hilly districts, viz. Darjeeling are found to be having adequately equipped Primary Health Centres. Rest of the districts are having moderate infrastructure in terms of availability of services in the centre. However the PHC functioning across the state can be said better with 80 per cent of the centre having Medical Officer and almost half of the centres across state have the reserve of essential life saving drug. But some

issues need to be addressed immediately, such as; still three fourth of total PHC doesn't have at least four beds in the centre, not even 10 per cent of the total centres has the experience of conducting at least 10 deliveries. A PHC being the first port of call to a qualified doctor in a rural area should be open for 24 hours; only one fourth of the total PHCs in West Bengal operate 24 hours.

4. Health Infrastructure at Sub Health Centre

A Sub-health Centre is the first contact point between primary health care system and the community. Sub-Centres are designated to operate at village level to cater the health needs of people residing in the villages. In the three tier health infrastructure system, the primary level of health care system constitutes of Sub-health Centre, implying the first and foremost place where common people is supposed to visit, is a Sub Centre, if not cured then referred to a Primary Health Centre and then to a Community Health Centre. In this structure if the infrastructural facility at Sub Centre level can be made better then people may not have to come to the PHC and CHC. Health care can be classified into three sub sections – Promotive Health Care (To spread awareness among people about different diseases), Preventive Health Care (To provide vaccination so as to avoid some diseases) and Curative Health Care (To give treatment to a patient suffering from certain disease). So simple to understand that if we can prevent the diseases by promoting awareness among people and thereby convincing them to come for preventive measures then the importance of curative services becomes lesser slowly and gradually. Sub-health Centres are designated to provide all the three levels of health service with emphasizing on the first two, which are the most effective ones to maintain the proper health status in future. Whereas the PHC and CHC are basically the referral units designated to provide curative service only. Hence, if grass root level infrastructure can be made better then solely that can take care of Morbidity, ANC, PNC and also delivery care to some extent as these come under Promotive and Preventive Health Service. And if these services are good then that would definitely reduce mortality and hence reduce the importance of the secondary level of health infrastructure comprised of Primary Health Centre and Community Health Centre. So this could be taken as a policy suggestion to improve the grass root level infrastructure. Now to speak on the availability of Sub-health Centre at Rural level, currently, in West Bengal, about 94 out of every hundred villages is provided with at least one Sub-Centre. Sub Centre availability is observed to be better in Jalpaiguri, Howrah, and Bardhaman; the districts having more literate

i.e. aware population and are economically advanced. Whereas the low literate and economically backward districts like Maldah, Murshidabad, Bankura, Purulia are having poor Sub-Centre availability. Having Sub Centre in a village is not sufficient enough if the centre is not properly well equipped with some facilities like regular water supply, electricity, toilet, essential drug, etc. In addition to that a Sub-Centre is supposed to be equipped with a functioning Labour Room, Essential Drug Reserve and most importantly an Auxiliary Nurse to provide the health service. But unfortunately on an average, only nine out of every hundred Sub Centre is reported to have regular electricity and only twenty eight has been facilitated with water supply. To speak on the sanitary condition inside the centre, about three fourth of the centres across the state does not have toilet for the patients. Most importantly still 11 per cent of the total Sub Centres could not maintain the minimum stock of essential life saving drugs. Considering all these indicators to measure the quality of health service provided by a centre, it is observed that the so called underdeveloped districts like Purulia, Bankura, and Paschim Mednipur are found to be relatively better performing in terms of primary level of health infrastructure system, viz. Sub-health Centre. Indicating measures to improve the health system has already been started in such backward districts. However, Sub Centre infrastructure in the moderately developed districts of Bardhaman, Howrah, and Hooghly are found to be the best. West Bengal as a state has made significant improvement in providing the grass root level health infrastructure; 98 per cent of the total health centres in the state are found to be adequately equipped to provide quality health service, 90 out of every 100 Sub Centre could maintain essential drug reserve and about 89 per cent Sub Centre in the state has already been provided with a Auxiliary Nurse. This can surely be a considered as a reflection of a proper health system in the rural level.

5. Availability of Beds in Medical Institutions

Hospital Beds provide many benefits to the Patients, Medical stuffs, Patient's Family or Care Giver. But in India if you need admission in a hospital, Chances are that you might not get a bed, however unwell you are. According to a leading newspaper quote, the waiting time for a Private word under the Neuro-surgery department at India's Premiere All India Institute of Medical Sciences (AIIMS) is around four to six months. However if a patient needs to be admitted in the general bed for the same surgery, the waiting time is more than a year. The World Health Statistics say that India ranks among the lowest in this regard globally, with 0.9 beds per thousand populations which is bellow the global average of 2.9 beds. India's National Health

Profile 2010 says India has a current public sector availability of one bed per 2012 persons available in 12,760 Government Hospitals – around 0.5 beds per 1000 population. In comparison to India, our neighboring Country Srilanka has 3.1 beds per thousand person and China with 3 beds. UK and USA has 3.9 and 3.1 beds respectively.

Our study region, West Bengal has about 0.8 beds per thousand populations, better than national average of 0.5 beds as per the National Health Profile. Bed availability in Hospitals is highest in Darjeeling with 1.61 beds per thousand people and lowest in Uttar Dinajpur with 0.29 beds per thousand populations. The average bed turnover rate i.e. total number of discharge and deaths per bed in a given period for the state as a whole is calculated to be around 49. Implying an average day stay of around 7.5 days may keep a hospital bed engaged for all 365 days in a year. However Bed Turnover rate is likely to be very high in District and Medical College Hospitals because of huge patient pressure. In the present system normally it takes 7 to 10 days to diagnosing the problem and then takes the patient for surgery, which raises the length of stay and in turn causes long waiting to get a bed.

6. Village Level Health Awareness Programmes or Rural Health Support Service

Irrespective of having three tier Health Infrastructure System, to improve the health scenario at village level, Government has introduced many social awareness cum nutritional scheme or programmes so as to provide proper nutrition/health service to rural people, especially child and women. To provide proper nutrition to a child the Integrated Child Development Scheme (ICDS) has been launched and presently children of 95 per cent villages of West Bengal have been covered under this scheme, thereby getting proper nutritional support. Again JSY i.e. Janani Suraksha Yojana has been introduced to reduce overall maternal mortality ratio and infant mortality rate, by increasing institutional deliveries from the families belonging to Below Poverty Line (BPL). This scheme is found to be very useful in almost all the districts except for Purba Mednipur, however on an average, 94 out of every 100 villages in West Bengal has JSY beneficiary within the village, indicating easy availability of the programme across varied region of the state. Apart from these schemes, under the National Rural Health Mission, there is a provision of providing every village in the country with a trained female community health activist, ASHA or, Accredited Social Health Activist. Selected from the village itself and accountable to it, the ASHA will be trained to work as an interface between the community and public health system. One ASHA is supposed to cover a village with approximately 1000

population. However 87 per cent villages in West Bengal don't have any Accredited Social Health Activist within the village. According to National Rural Health Mission, the community should be taking a leadership role at the local level to address health and related issues. To cater this need of rural people a Village Health & Sanitation committee (VESC) is formed in each village under the chairmanship of Gram Panchayat member and representative from the community such as gaon budha, women's group, and SC/ST/OBC/ minority communities etc. The VHSC is responsible for the overall health of the village. It takes into consideration of the problems of the community and the health and nutrition care providers and suggest mechanism to solve it. However, only 17 per cent of total villages of West Bengal have such committee. Presence of VESC is significant in districts like Bardhaman, North 24 Pargana where as the villages/panchayats of the districts like Purulia, Maldah, Dakshin Dinajpur, South 24 Pargana are found to be inefficient in forming such committee. This may be explained in terms of dominance of Socially Backward Class Population in those districts and low level of literacy among them acts as a hindrance to form a committee to look after their own needs. Considering all the discussed rural or village level health awareness programmes in a single umbrella, in terms of Rural Health Support Service it is noticed that the highly focused districts like Bankura, Purulia, Mednipur, Dinajpur has already given attention and are now better in terms of implementation of such schemes. Implementation is not so effective in well developed districts as compared to the backward districts. However, the state has done significant improvement in the health status of its people by implementation of such schemes.

7. Health Infrastructure Score

Primary Health Care is the essential health care; based on practical, scientifically sound and socially acceptable method and technology; universally accessible to all the community through their full participation; at an affordable cost; and geared towards self-reliance and self-determination (WHO & UNICEF, 1978). Keeping this into mind so far we have discussed the availability of health infrastructure in terms of six basic indicators – Number of Medical Institution across Districts, Availability of Equipments and Medicine in the Institutions, Operating Facility in the Hospitals/Centres, Referral Facility, Availability and Functioning of Critical Child Care Unit and lastly the Availability of Beds in the Medical Institutions so as to get an overview of health infrastructure scenario across districts (Table 2). To have a single indicator representation of health infrastructure, all the discussed indicators has been taken

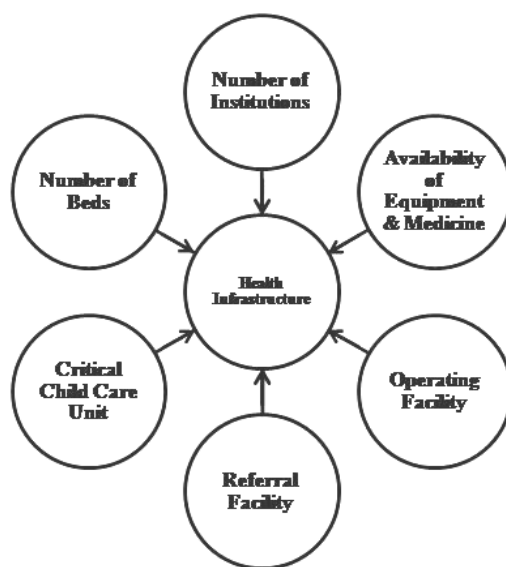


Table: 2
Combined Health Infrastructure Score

District	PHC Infrastructure		CHC Infrastructure		Composite Health Infrastructure	
	Score	Rank	Score	Rank	Score	Rank
Darjeeling	100.0	1	100.0	1	100.0	1
Jalpaiguri	65.1	7	61.3	10	61.9	8
Koch Bihar	64.2	9	65.2	6	64.4	7
Uttar Dinajpur	52.7	15	52.6	15	51.9	16
Dakshin Dinajpur	53.8	14	63.6	8	59.2	10
Maldah	52.6	16	56.5	12	54.3	13
Murshidabad	52.5	17	51.0	16	50.9	17
Birbhum	72.7	5	76.3	3	73.8	4
Bardhaman	62.3	10	62.2	9	60.9	9
Nadia	73.5	3	67.2	5	68.9	5
North 24 Parganas	64.8	8	46.8	18	53.0	15
Hugli	56.6	11	55.3	14	54.9	12
Bankura	73.4	4	76.2	4	74.7	3
Puruliya	82.0	2	79.3	2	79.9	2
Pachim Medinipur	71.3	6	64.1	7	66.2	6
Haora	54.1	12	55.6	13	53.2	14
South 24 Parganas	47.3	18	48.9	17	47.8	18
Purab Medinipur	54.1	13	58.8	11	56.4	11
West Bengal	67.7	---	63.8	---	64.5	---

Source: Author's calculation based on data from International Institute of Population Sciences and Dept. of Health and Family Welfare, Govt. of West Bengal

together to develop a Composite Health Infrastructure Score for every district as well as for the state with the help of Principle Component Analysis technique; diagrammatic expression of the score may be better to explain computation of the composite score. In terms of overall infrastructure Darjeeling is topping the list followed by Purulia, Bankura, Birbhum and Nadia. Implying backward or relatively underdeveloped districts has better overall health infrastructure as compared to the advanced districts to cater the health service to the district population. South & North 24 Pargana, Murshidabad, Maldah are among poorly infrastructured districts which are to be paid attention. Economically advanced districts like Hooghly, Howrah, Bardhaman seems to be having poor infrastructure, most likely because of huge population pressure and also due to pressure of referred patients from the nearby backward districts. But the easy access of the people of these districts to Hospitals in Kolkata helps them to have a better health outcome.

VI. Health Outcome Across Districts

So far we have discussed the health infrastructural facility across the state but we are more concerned about Health Outcome as social development depends on the health of the people. Infrastructure can act as an aid to have a good health outcome but ultimately it is health outcome which is more needed, not the health outlay. In some circumstances, the quality of health services has a relatively minor role in determining health outcome, in other circumstances, a major role. But never the less quality of health services has an impact on health outcome. In this section of the paper we have discussed some basic health outcome indicators so as to check the health status of across districts of West Bengal.

1. Mortality Indicators Across Districts

Mortality is taken to be a useful indicator of development for any society. Considering Birth Rate as fertility indicator and Death Rate as Mortality indicator, India may be in the 2nd stage of demographic transition, wherein Birth Rate remains high but death rate begins to decline rapidly. This accelerates the growth of population. This is also reflected for West Bengal where we see a high Birth Rate and a Low Death Rate. Another significant indicator of economic and social development is the Infant Mortality Rate. India has made considerable progress in reduction of Infant Mortality Rate since independence. IMR has decreased by about 50 per cent between 1961 to 1991. Though National population policy has set an ambitious goal of reducing the IMR to 30 by the year 2010, in 2008 the number of infants dying under one year of age per thousand live births is calculated to be 58 and 37 for India and West Bengal respectively. Discussing fertility

and mortality indicators across all districts of West Bengal, Maldah, Darjeeling, Murshidabad, Purulia are found to be with high Birth Rate and in Infant Mortality Rate is high in Maldah, Murshidabad, Birbhum, Dakshin Dinajpur and in the hilly areas. This may be the resultant of having poor infrastructure and most importantly awareness among people, because most of the poor performing districts are dominated by socially backward class population. Maternal Mortality is also prevalent in West Bengal. However, with a maternal mortality rate of 141 West Bengal is in a better situation as compared to the national average of 254. Though the Maternal Mortality Rate is falling but the rate of fall is not satisfactory. Illiteracy and related unconsciousness among the people is a major problem to spread awareness about child health and also about other health complications.

2. Antenatal Care

Antenatal care is a kind of medical supervision given to a pregnant woman and her baby starting from the time of conception up to the delivery of the baby. It includes regular monitoring of the woman and her baby throughout pregnancy by various means including a variety of routine regular examinations and a number of simple tests of various kinds. Antenatal care is important because it helps to maintain the mother in good health during pregnancy. Rural/Local level Sub-health centres have been given the responsibility of providing such Antenatal Care to the Pregnant Mothers. But this substantially requires literacy among women and their family as knowledge of effectiveness of Antenatal Care during the time of pregnancy will motivate them to go for such regular check up. Availability of rural level infrastructure to provide the check-up coupled with female literacy may lead to proper Antenatal care. Econometric exercise shows that Antenatal Check-up is directly proportional to Literacy among Women; one standard increase in the level of education of a woman leads to around 0.55 percentage point increase in Antenatal Check up. Female literacy alone as an explanatory variable in the model can explain 57 per cent variation in the explained variable indicating the strong influence of literacy among women to determine whether to go for ANC check-up or not. However in West Bengal out of every 100 pregnant women, 4 does not go for any kind of Antenatal Check-up and 30 women goes for first but doesn't go for 2nd or 3rd check-up and 47 women completes 1st, 2nd and 3rd but do not complete full check-up before delivery. Only about 20 of every 100 pregnant women in West Bengal Completes full Antenatal Care Check-up. Percentage of women receiving at least one Titenus Toxoid Injection and iron tablet is also considered as an indicator of proper care before

delivery. Though about 94 per cent pregnant women receives Titenus Toxoid injection but three fourth of the total pregnant women still does not receive the iron tablet. Lastly, using the above mentioned indicators to reflect the Ante Natal Care Hooghly is observed to be best in providing Antenatal Care to pregnant women followed by Howrah, Dakshin Dinajpur and Nadia. It can be noticed that for most of districts, having a good Ante Natal Care is directly proportional to having a good Sub Centre Infrastructure care across the district, this is because Sub Centres are designated to provide this particular service.

3. Delivery Care

It is well known to all of us that giving birth in a medical institution under the supervision of trained health care providers promotes child survival and reduces the risk of maternal mortality. Each year in India over one million newborns die before they complete their first month of life (Neonatal Mortality). India's current neonatal mortality rate of 44 per 1000 live births whereas for West Bengal this figure stands at 33 per 1000 live births; Kerala has the lowest Neonatal mortality of 10 per 1000 live birth. Despite the many benefits associated with institutional delivery, India's maternal and child health programmes have not aggressively promoted institutional deliveries and this seems to be true for West Bengal also. Still being in twenty first century in West Bengal 50 out of every 100 deliveries are conducted at home, most significantly in Maldah only 29 out of every 100 pregnant women goes for institutional delivery, rest prefer to deliver at home. Similar high percentage of home delivery owing to high risk of maternal mortality can be observed for Purulia, Purba & Paschim Mednipur and Dinajpur. Apparently it seems to be because of high illiteracy among poor and marginalized in those areas and dominance of socially excluded group population is also likely to act as a major explanation because they do opt for home delivery as a part of their traditional belief. To represent the delivery care we have considered four types of indicators, namely, percentage of women having institutional delivery, percentage having home delivery, Percentage of delivery assisted by skilled person and percentage of safe delivery. However in terms of totally safe i.e. institutional delivery by skilled person Hooghly is topping the list followed by Darjeeling, Nadia, Howrah, and North 24 Pargana. Whereas the relatively backward districts are found to be having low level of delivery care, notable among them are Maldah, Uttar Dinajpur, South 24 Pargana and Dakshin Dinajpur.

4. Post Natal Care

The Post natal period is defined as the first six weeks after birth. This period is critical to the health and survival of a mother and new born. Lack of care in this time period may result in death or disability as well as missed opportunities to promote healthy behaviours, affecting women, newborns, and children. Immunization has been a major focus of Health Care System in India since 1970. Different immunization programmes has been launched; notable among them are Expanded Programme on Immunization (EPI) in 1978, Universal Immunization Programme (UIP) since 1985. In 1995, Govt. has initiated Pulse Polio Immunization, which seemed to be highly successful throughout the country. In West Bengal almost 84 per cent child receives three doses of polio, which can be considered to be a grand success. However the districts like Maldah, Murshidabad still has a low vaccination rate. This is due to the traditional beliefs of the dominant socially excluded group population. The coverage of Non-polio vaccines like BCG, DPT, and Measles also seemed to be moderate in West Bengal. Rather it can be called limited as the success in expanding full coverage of vaccine preventable diseases in West Bengal could not reach to the backward districts. Along with immunization of the child, proper nutritional support is also required. As a part of Antenatal Care along with all type of vaccination, to provide nutritional support dose of vitamin A is also given to the child. Apart from Sub-health Centres, these facilities are also provided by the newly introduced Anganwari and the ICDS centres under the Integrated Child Development Scheme. Taking all these indicators into consideration Post natal care is found to be the best in Hooghly, followed by Bankura, Nadia, Dakshin Dinajpur, Darjeeling. Bankura with 45 out of every 100 population belonging to socially excluded group has shown significant improvement in terms of post natal care. However, the minority population dominated districts like Maldah and Murshidabad which are often discussed for negligence of Polio and other vaccination are statistically tested to be in the last three or four districts in terms of ranking according to best Post Natal Care by the districts. To get a universalized immunization an awareness campaign in backward districts may help to provide proper Antenatal Care to a newborn baby. This kind of campaigning would have an effective influence to spread awareness about health care and that would definitely help in providing attention to the districts which are having poor ante natal care. Effective utilization of the service will surely help the state to reduce the Maternal Mortality across districts.

5. Morbidity

The term Morbidity refers to sickness due to any particular disease. Here we have discussed the prevalence of two most important diseases- Diarrhoea and Acute Respiratory Infection (ARI) among children. Diarrhoea is the 2nd most important killer of children under age five worldwide, following Acute Respiratory Infection. Diarrhoea is a frequent occurrence among children under 5 years of age. Diarrhoea diseases are basically associated with poor drinking water quality and poor sanitation. Lack of knowledge on prevention and control is also responsible for this. However in West Bengal prevalence of Acute Respiratory Infection among children is more as compared to prevalence of Diarrhoea. Roughly seven per cent of children found to be suffered in Diarrhoea during the last two weeks preceding the DLHS-3 survey, whereas around 25 per cent suffered from Acute Respiratory Infection. As expected, the incident of Diarrhoea is less in sub urban capital centric districts like Howrah, North 24 Pargana, etc. as they do have a system of safe drinking water supply system and proper sanitation system across the districts. Whereas the far reaching districts like Paschim Mednipur, Koch Bihar, etc., are found to be Diarrhoea prone. Apart from Diarrhoea, Respiratory problem is also very frequent among children. Acute Respiratory Infection (ARI) is the most common childhood illness throughout the world. It continued to be the major cause of death among children under five years of age in the developing countries. In west Bengal out of every 100 child 25 suffer from respiratory problem. People residing in industrially developed districts are found to be prone to respiratory issues. As for example, the number of children suffering from ARI in Bardhaman, Birbhum is more in comparison to Darjeeling, Jalpaiguri. It is significantly observed that the more the industrial development of a district, more is the prevalence of the disease among child. This may act as an alarm to control pollution and to ensure sustainable economic development. Another indicator of Morbidity may be taken as percentage of populations admitted to total populations to the hospital. The recent data on hospital information system of Department of Health and Family Welfare, Govt. of West Bengal Shows that nearly four per cent of the total population in West Bengal is admitted in hospital during the time period January 2009 to December 2009. If we name this patient admission percentage as the Critical Morbidity Percentage then that seems to be highest in Bankura with around 7 per cent followed by Nadia, Darjeeling, Birbhum. However prevalence of disease among people and related admission is found to be low in Howrah, Purba

6. Health Outcome Index



Table: 3
Composite Health Outcome Score

District	IMR	Percentage of Women Who/Had		Percentage of		Composite Health Outcome Score	Rank
		Received Full ANC	Safe Delivery	Child Received Full PNC	Morbidity		
Darjiling	40.2	30.3	73.9	85.5	5.3	88.3	2
Jalpaiguri	40.2	17.9	49.2	78.6	4.2	70.2	9
Koch Bihar	40.2	13.6	47.2	77.2	5.1	63.8	13
Uttar Dinajpur	41.5	8.2	30.3	54.1	2.9	40.4	18
Dakshin Dinajpur	41.5	27.3	42.4	87.9	4.7	79.1	6
Maldah	41.5	14.5	29.8	68.8	3.6	54.2	17
Murshidabad	41.5	18.2	43.7	63.0	4.7	54.6	16
Birbhum	41.5	15.6	50.5	63.6	5.3	56.2	15
Barddhaman	30.8	21.1	58.3	66.7	3.9	65.3	12
Nadia	41.5	25.9	70.6	89.2	5.8	86.2	3
North 24 Parganas	30.8	24.6	65.8	81.6	3.1	82.5	4
Hugli	30.8	32.6	84.9	98.0	3.6	100.0	1
Bankura	40.2	17.5	64.4	92.7	6.3	82.0	5
Puruliya	40.2	14.5	46.9	78.4	5.0	68.0	11
Pachim Medinipur	41.5	21.3	49.6	83.0	3.5	69.7	10
Haora	30.8	27.8	69.8	72.2	2.4	77.2	7
South 24 Parganas	30.8	20.5	36.7	70.8	2.7	63.6	14
Purab Medinipur	38.8	22.0	45.0	84.6	2.4	72.4	8
West Bengal	38.0	19.6	51.5	75.7	3.7	68.2	---

Source: Author's calculation based on data from International Institute of Population Sciences.

Mednipur, South 24 Pargana, and Uttar Dinajpur. Others are having an admission percentage between three to five per cent of total population in the district. Considering the three dimension of health outcome – Reproductive Health Care, Mortality & Morbidity to get a single indicator reflection of health status of the people across districts, Composite Health Outcome Score is calculated using the Principal Component Analysis technique (Table: 3). The score is a combined representation of the five indicators, viz. Ante Natal Care, Delivery Care, Post Natal Care, Mortality & Morbidity. According to this composite score Hooghly, Howrah, Nadia, North 24 Pargana are observed to be better in terms of health outcome. Whereas far reaching districts with more rural and backward class population like Maldah, Murshidabad, Birbhum, Koch Bihar are among those districts for which outcome score is very poor. Most Importantly, Bankura being dominated by SC/ST population with low level of literacy among them has shown significant improvement in both health infrastructure and health outcome. However, Urbanization is likely to be acting as a major factor to determine good health as we can see districts with more urban population are having good health status. Especially the districts surrounding Kolkata are better even though they do have a poor infrastructure in terms of per capita infrastructural availability due to huge population pressure in those districts. With easy access to capital with multi specialty hospitals, people of the surrounding districts has the option to go for better treatment, this results in better health status. In comparison to that, the people staying in far reaching areas except for one or two districts do not have that sort of ease of access. More over economic condition of the people in backward districts is not sufficient enough to go for such Multi Specialty Clinic/Hospital as like the other districts. Being resided in capital surrounding districts people have more job opportunity and thereby earning scope, hence better affordability to go for proper health care. Thus, economic condition, literacy as well as geographical disadvantage is working as retarding factors to achieve proper health status of the people and thereby causing hindrance to social development.

VII. Health Infrastructure & Health Outcome: A Causal Relationship

Health outcome along with proper infrastructure to improve that outcome in a particular region may signify the level of health status in that region. As told earlier health infrastructure acts as an aid to have a good health status of the people. In that way Health status is likely to be directly proportional to health infrastructure available. Positive correlation can be observed between ranks of the districts according to health infrastructure and health outcome, indicating strong

dependency of health status of the people on the infrastructure. However notable exception is there for two advanced districts; North 24 Pargana and Hooghly being poor in Infrastructure have a good health outcome. This may be because of the geographical advantage of being situated near to Kolkata with easy access to multi specialty hospitals in the capital city. And another notable exception is found to be for two nearly backward districts; Birbhum and Purulia with a satisfactory level of health infrastructure are having a poor health outcome. This may be the resultant of lack of awareness about health caused by the prevalence of illiteracy among the dominant socially backward class population in those districts. To be precise, still in twenty first century, in West Bengal as like economic development, development of health infrastructure is also capital centric as in centre-periphery theory of development economics. Except for one or two districts the districts surrounding Kolkata are always found to be better performing in comparison to far filling districts. To get rid of this problem decentralization procedure has to be emphasized and priority should be given to the highly focused districts which has both geographic and economic disadvantage.

VIII. Determinants of Health Status in West Bengal

So far the paper have discussed the availability of health infrastructure across districts and associated outcome as indicated by Reproductive & Child Health Care, Mortality, and Morbidity. Having proper Health Infrastructure is necessarily a key determinant of having good health status of the people. However, infrastructure alone will definitely not be capable of improving the health outcome of a region. In this section of the paper we are to find out the probable determinants of health status. It is expected that along with infrastructure literacy as represented by percentage of literates across districts and Urbanization, represented by percentage of people residing in urban area may explain the variation in health outcome.

$$\text{Health Outcome} = f(\text{Composite Health Infrastructure, Urbanization, Literacy})$$

Explanatory Variables	Coefficients	t Stat	Sig.
(Constant)	-5.86	-3.21	0.006
Composite Health Infrastructure	0.36	2.14	0.050
Literacy	0.07	2.85	0.012
Urbanization	0.01	0.99	0.334
Dependent Variable: Health Outcome (Adjusted R ² = 0.50)			

Literacy is required to gather knowledge on preventive and curative diseases whereas urban population has the privilege of being treated by good doctors of urban area as well as they have

the ease of access to the hospitals/doctors. All the three explanatory variables are found to be directly affecting the Health Outcome but as seen before, Health Infrastructure, is again observed to be the major determinant of Health Outcome or Health Status of the people. Apart from Health Infrastructure, the other two explanatory variables are also found to be significantly affecting the health status of the people and are directly proportional. Literacy has a greater influence as compared to Urbanization, indicating irrespective of place of dwelling, rural/urban, literacy among people helps to spread awareness about health consciousness and thereby results good health. However the coefficient of urbanization signifies that “more the people in the urban area, better is the Health Outcome”. This is simply because people residing in the urban area can avail the urban hospitals and as well as they have accessibility, availability & affordability to private doctors.

These three explanatory variables are capable of explaining 50 per cent variation in the dependent variable; Health Outcome. It can be summarized that coupled with some external economies or diseconomies these are the basic three factors which are acting as the determinant of health status across districts of West Bengal.

IX. Health Outcome and Economic Status

A healthy population acts as an engine for economic growth. Substantial improvement in health status of the people will increase populations’ well being and contribute to long term economic growth. In order to understand the relation between health and economic status, it is necessary to understand the concept of health in a broader sense. Health is not only the absence of sickness; it is also about developing potential. Health may impact economic development in a number of ways – it may lead to production loss due to worker illness, it may lead to an increase in the productivity of the worker as a result of better nutrition and it may also lead to learning capability among school children, thereby helping to create human capital to strengthen future economic growth. In order to validate the result Rank Correlation technique is used. Since our contention is that health outcome does have a direct impact on the economic status of the district, we rank the districts according to the economic status, indicated by District Domestic Product at Constant Price on the one hand and according to the Health & Educational indicators on the other.

Table-5
Association between Health & Educational Attainments and Economic Status
Rank Correlation Coefficients

<i>Variables</i>	<i>Rank according to</i> Per capita District Domestic Product at Constant Prices
<i>Ranks according to</i>	
Health Outcome Score	0.50
Literacy	0.75
Female Literacy	0.70

Source: Author's Calculation based on data from IIPS, Mumbai and
 Bureau of Applied Economics & Statistics, Govt. of West Bengal.

Thereafter rank correlation coefficients are calculated between ranks according to economic status and rank according to educational and health status. It is observed that the districts ranking higher in terms of both education and health are also ranked higher in terms of economic status, supporting our hypothesis. Thus it appears that analysis based on secondary data quite clearly brings out the fact that districts having more educated and healthy population are having a strong economic growth.

To summarize, health affects economic growth directly through labour productivity and economic burden of illness. Whereas education affects economic growth by providing skilled labour and thereby provides the way to increase productivity. When a family is healthy and educated, both the mother and father can go for a job, which affords them to feed, protect and send their children to school. Healthy and well-nourished child can perform better in school and better performance in school will positively impact their future income. Aggregation of this will lead to higher economic growth in the region.

X. Conclusion

It may be thus inferred from our exploratory analysis that health acts as an important factor influencing the level of development of an economy. Analytical discussion of Health Infrastructure and Health Outcome, it is found that infrastructure across districts of West Bengal is not up to the mark and as a consequence health status of the people is affected. In West Bengal with a population density of 1029 per square kilometre the existing health infrastructure is handling two to three times patient pressure than they are capable to handle. This in turn reduces the quality of health service and increases the risk of Mortality as well as the prevalence of disease, Morbidity in other words. To speak on outcome, despite having relatively poor per

capita infrastructural availability in some economically developed districts, health status of the people is better as compared to the districts with better availability of health infrastructure, perhaps because of the ability of the people to avail private health care facilities in the metropolitan centres. To focus on backward and far reaching areas, availability is not a major issue but poor literacy and thereby lack of awareness about health acts a retarding factor to let people visit health centres for health check up. However linear regression analysis shows health outcome not only depends on health infrastructure as factors like literacy and urbanization affects health outcome significantly. Poor health status is also found to be affecting the economic condition of the district as measured by per capita District Domestic Product. Good health as we know generates a number of positive outcomes, ranging from demographic dividend to more productive workforce, thereby reducing poverty by enhancing the earning potential of the people. Given the variation in health facilities and the close link between it and health outcome and general development level, several measures can be suggested. The primary facilities must be strengthened to provide proper and effective preventive and curative services at the grassroots level. This would release the immense pressure presently exerted on the referral, secondary and tertiary institutions, which they are finding hard to cope. Additional manpower is also urgently needed, especially at the countryside. These steps may not be the panacea, but will go a long way in 'curing' the ailing health sector in Bengal.

Note

Detail tables have not been included in this text. Those are available with the author on Request.

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