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Management and efficiency of health care services in Haryana

Preeti Lamba, Rampal Singh and Vaibhav Verma

Abstract

Health is perceived as a fundamental requirement of human life. A country can't succeed without the healthy citizens of its country. Health care expenditure represents a major use of our nation's resources and has been growing rapidly. Increased pressures on health care resources have led policy makers, administrators, and clinicians to search for more efficient ways to deliver health services. Efficiency improvements in the health sector, even in small amounts, can yield considerable savings of resources or expansion of services for the community. Access to comprehensive, quality health care services is important for promoting and maintaining health, preventing and managing disease, reducing unnecessary disability and premature death, and achieving health equity for all citizens. Access and Efficiency to health services both are important for a Country. So, in order to ensure "Health for All", access and efficiency must be applied while formulating a policy/programs etc. This article is related to know about the meaning of Access and Efficiency of Health Services in Haryana and how to measure efficiency of government health services. Data is collected from secondary sources. Data Envelopment Analysis technique is used to measure efficiency of health services in Haryana.

Keywords: Data envelopment analysis, health efficiency, SGDP

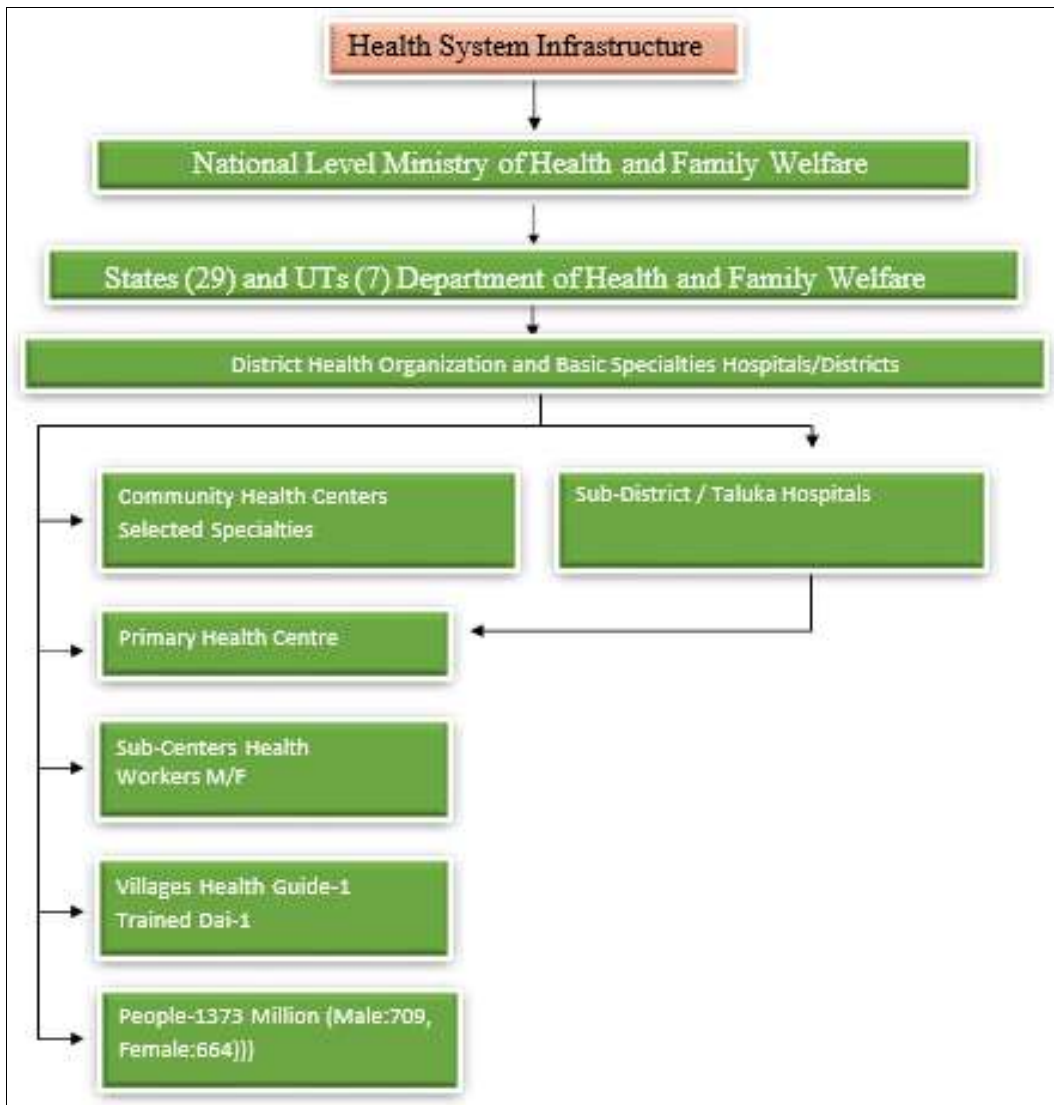
Introductions

Haryana carved out of the Punjab, basically on linguistic basis on 1 Nov. 1966. Its total area is less than 1.4 percent (44,212) of India's land area. Chandigarh is the joint capital of Haryana and Punjab. Ranked 21st in terms of area. Over the previous decades, Haryana has gained tremendous progress not only in agriculture, industry but also in other areas. With the overall development, the availability and utilization of healthcare facilities have also increased over the plan periods. We knew health is a State subject. So it is committed to provide quality health services to residents of state. Haryana has doing tremendous work in this field. Organization structure of health in Haryana is same as in other states. At state level, a Ministry of health is established which is headed by a Health Minister. All states have established directorates of health to administer public health, medical services and medical education. The directorate of health services is the overall in charge of all matters pertaining to health in the state.

Objectives of the study

The objectives of our study are:

1. To analyze the health services of Haryana.
2. To find out the relative efficiencies of various government hospitals of Haryana with a coverage period of 5 years i.e. from 2011-2012 to 2016-2017.
3. To compare the non-efficient district government hospital to the efficient one.
4. To analyze the structural organization of health services in Haryana. Under how many management types are the health services organized.



Source: Author's Compilation

Literature Review

Purohit C. (2016) ^[6] examined 'Healthcare Sector Efficiency in Gujarat: An Exploratory Study using Data Envelopment Analysis', and explored on efficiency of health care system at sub- state level (i.e. district level) in India using Gujarat state and data for 2012 -2013. Techniques used was Data Envelopment Analysis. Results indicate that some of the districts have low efficiency in utilization of inputs like doctors, beds and workload per health institutions. Hence, there was a mix of both inefficiency and inadequacy of inputs, which is reflected in our results.

Gupta I and Guin P., (2015) ^[15], focused on 'Health Status and Access to Health Services in Indian Slums,' conducted a primary survey among 2000 households, covering 10,929 individuals from four cities of India. Summary Statistics and Regression (using STATA) were used for data analysis. Results showed lack of government facilities and services, and people show preference to private health hospitals because of their high quality health services.

Tolanki P., (2013) ^[18] examined 'Access to Health Services of Rural population in Karnataka', by taking the data from a population based sample of women and men (aged 18 - 98) during May- August (n= 353) and used the Multiple Logistic and Linear Regression technique. Study focused on Primary health and Mental health services. The number of days since a last healthcare visit was directly related to an

individual's age and distance from their home to the health clinic. The time since last healthcare visit was indirectly related to an individual's age and distance from their home to the health clinic.

Gupta S., Gupta V. and Gupta N., (2012) explored 'Utilization of Services rendered in Dental Outreach programs in rural areas of Haryana,' and presented a retrospective study to evaluate the types of patients, disease pattern and services rendered in outreach.

Programs in rural areas. Data was collected from the various outreach programs conducted by Swami Devi Dayal Hospital and Dental College in last 3 months (Oct, Nov, Dec. 2011), in Panchkula district. Data were analyzed using SPSS version 18. Services provided in the outreach programs should be based on felt needs of the population so that both services and utilization can be increased. Results found that common Dental carries (43.7 percent), gingivitis (27.2 percent), and periodontitis (22.9 percent) were commonly observed dental diseases.

Ghuman B.S. and Mehta A., (2009) ^[7] investigated on, 'Health Care Services in India: Problems and Prospects' and surveyed the health services in India in terms of Access and Quality of health services with a view to increase Government spending on health sector in the vicinity of 3 percent of GDP. Data largely depended upon secondary sources like reports of Union Ministry of Health and Family

Welfare, NHRM, National Health Policies etc. For improving the quality of health services, government should fill the vacant posts of medical personnel and make huge investment on infrastructure.

Bajpai N. and Dholakia R.H., (2008) [16] focused on 'Scaling up Primary Health Services in Rural India: Public Investment Requirements and Health Sector Reform,' for betterment of proper Primary Health services, what kind of policy, institutional and governance reforms were needed and what would be the associated cost of delivering services. Data was collected using Sample Survey. We found that at the last that huge investments was required for essential drugs and supplies, vaccines, medical equipment's, laboratories, and the like. State Government needed to appoint more Auxiliary Nurse Midwives (ANMs), trained birth attendants, technician, pharmacists, doctors and specialists.

Sankar D. and Kathuria V., (2000) [13] worked on 'Health System Performance in Rural India: Efficiency Estimates across States,' and attempted to analyze the performance of rural health systems of 16 states in India. Data was taken from 1986 to 1997 for 16 major states of India and from Bulletin on Rural Health Statistics. To Measure Performance, the study used techniques from the Stochastic Production function and Panel data estimation used data for the period 1986- 97. It was found that not all states with better health indicators had sufficient health systems.

Varatharajan D., (1999) [12] attempted on 'Improving the Efficiency of Public Health Care Units in Tamil Nadu', and focused on why public health care services was unutilized in Tamil Nadu despite so much facilities and also how to improve the efficiency of public health care units. Secondary Data was used. Results was found that it was

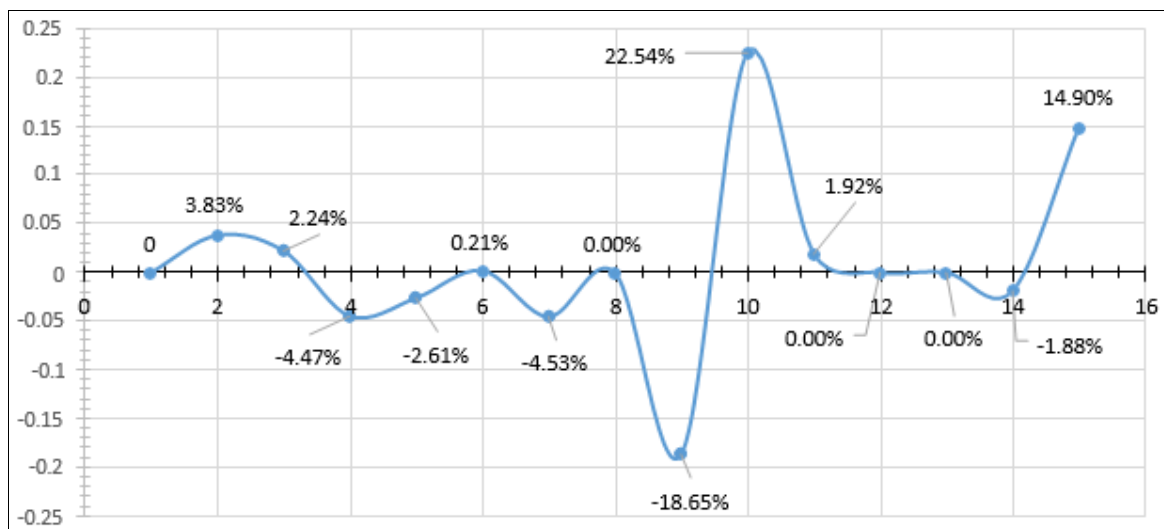
better to use health care system which suited the local community even while retained the basic structural framework of the public sector. Manpower was the major Sunk cost and was crucial to improve its productivity, if efficiency has to be achieved.

Haryana Health Scenario

At present, the quality health services is provided through a network of 60 hospitals, 124 Community Health centers, 500 Primary Health centers and 2,630 Sub - Health centers, 8 Trauma centers, 3 Burn units and 64 Urban Dispensaries/ Polyclinics. There are 5 Government Medical Colleges, 6 Private Medical Colleges. There are also Dental, Ayurveda, and Homeopathy College etc. Right now, Government is constructing three new Sub - Divisional Civil Hospitals, 12 CHCs, 29 PHCs, and 12 Sub - Health centers. Recently, Haryana Government has established a separate Department of Medical Education and Medical Research on 4 Sept. 2014, which carved out of Health Services on 8 Jan. 2009. Its functions are to regulate all schools, colleges and Universities in Government, Semi Government, Autonomous and Private sector relating to Health and Medical Education.

Growth Rate of Medical Staff in State

Number of Medical staff in State has been continuously increasing in the state. Like in terms of Doctors, it was 1605 in 2001-2002, it increased to 1844 in 2006-2007. Further, it came down to 1593 in 2011-2012 and reached 1862 in 2015-16. There was upward trend in Nurses also, like in 2001-2002 it was 1387, but in 2009-2010 there was drastic decrease in nurses i.e. 499 in 2012-2013. And a further increased to 1478 in 2015-2016.



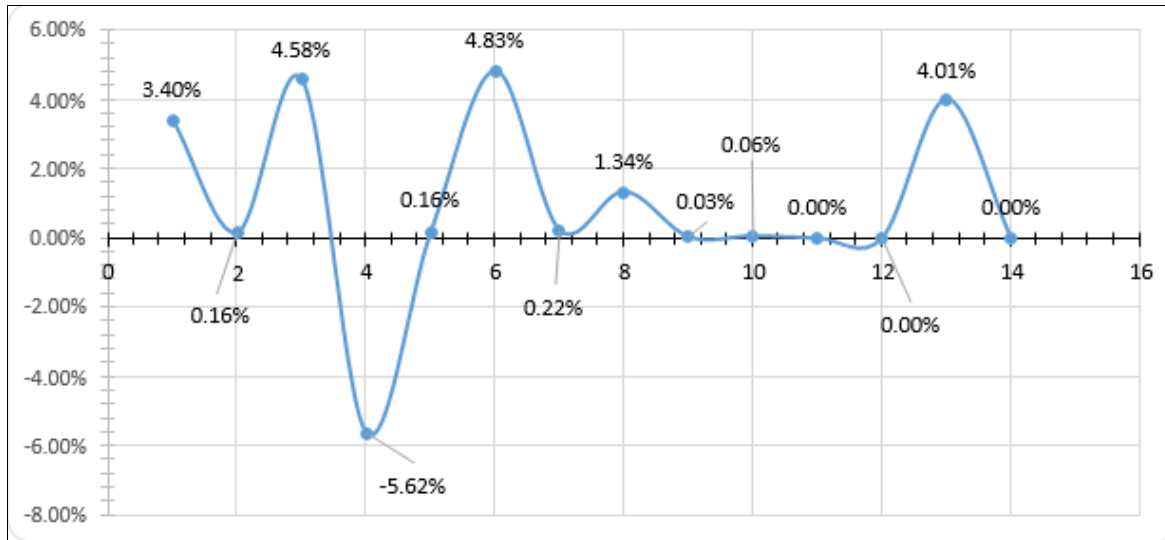
Source: Author's Compilation

Fig 1: Percentage Growth Rate of Medical Staff in State

Total health staff which was 13735 in 2001-02, went to 14864 in 2015-16. Percentage Growth rate was 4 percent in 2002-03, in 2007-08 it was -5 percent in 2007-08 and most shocking was in 2009-10 when growth rate was -19 percent in 2009-10, but afterwards, there was positive growth rate in 2010-11 and in 2015-16. (Annexure 1)

Growth Rate of Health Institution in State

By going through the table (Annexure 2), there is a continuously decreasing health institutions in rural like in 2001-2002 it was 2647 and in 2013-14 it was just only 291 in 2013-14. In contrast to urban institution, in 2001-01 it was 326 and in 2013-14 it was 2953.



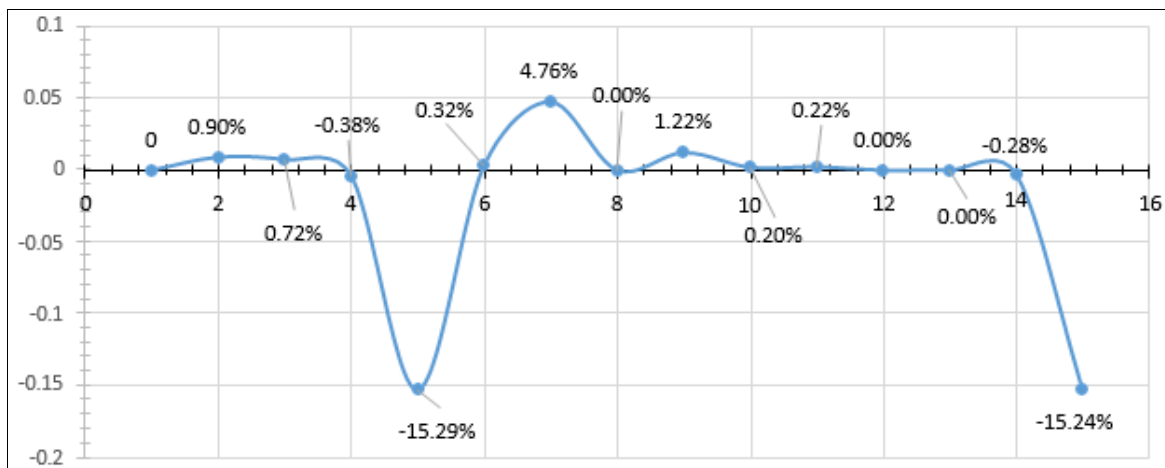
Source: Author's Compilation

Fig 2: Percentage Growth Rate of Health Institution in State

So, in terms of total health institutions it was 2973 in 2001-2002 and it reached to 3374 in 2015-16. Percentage growth rate was 3 percent in 2002-03, it was -6 percent in 2005-2006, 0 percent in 2008-2009, but it became positive in 2014-2015 (4 percent).

Growth rate of Beds in Health Institutions

Beds availability in the state has not been impressive so far like in 2001 -02 (Annexure 3), it was 10946 and in 2005-2006 it reached to 9338 and percentage growth rate was -15 percent and it increased to 10028 in 2011-12 but it came down to 8476 in 2015-16.



Source: Author's Compilation

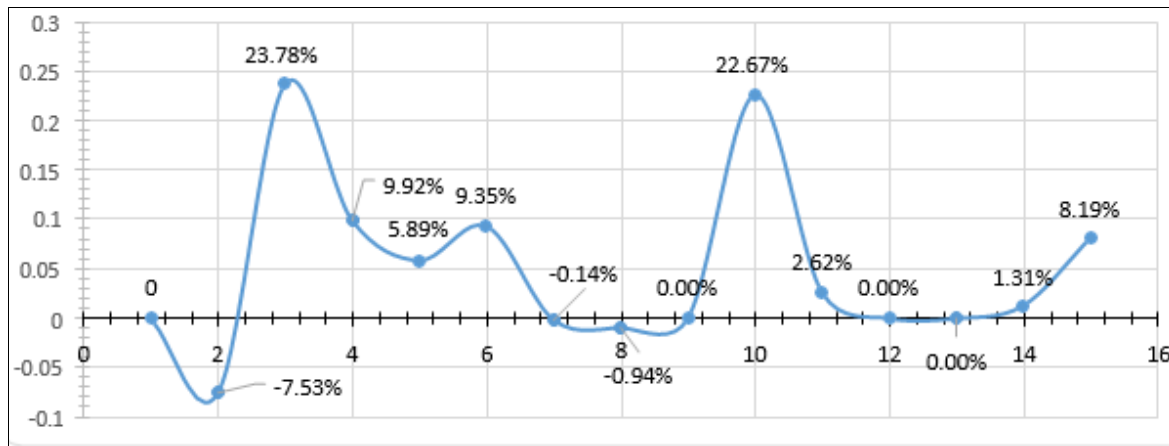
Fig 3: Percentage growth rate of Beds in Health Institutions

So, there was drastic decrease in Beds institutions in state and percentage growth rate was 0 percent from 2010-11 to 2014-15 and -15 percent in 2015-16.

Growth of Patient visited in Medical Institutions of State

As clearly shown from the table (Annexure 4) the indoor patients has been continuously increasing over the years.

Like in 2001-01 was 374,568 and it increased to 482,939 in 2006- 07 and it went to 904542 in 2014-15. In terms of outdoor patients in 2001-01 was 8263761 and it reached to 11077973 in 2005-06, 14517238 in 2010-11 and 16,276,839. So, it is clearly shown that there is great divergence between indoor and outdoor patient treated in Haryana.



Source: Author's Compilation

Fig 4: Percentage Growth of Patient visited in Medical Institutions of State

The percentage growth rate was -7.53 percent in 2002-03 because of divergence between indoor and outdoor patients. In 2005-2006 growth rate became positive in 5.89 percent, 22.67 percent in 2010-11 but it came down in 8.19 percent.

Per Capita Expenditure on Health

Haryana State government health expenditure is 1.9 percent of GDP. Households has its largest share of health financing (74 percent), followed by the government (23 percent) and corporations (3 percent). By going through various plans of Haryana, it was found that per capita expenditure of health in Haryana has been continuously increasing over the years.

Table 1: Per Capita Expenditure on Health

Sr.	Year	Expenditure
1.	1966	1.92
2.	1976-1977	11.23
3.	1981-1982	22.73
4.	1991-1992	69.50
5.	1996-1997	94.81
6.	2000-2001	166.83
7.	2005-2006	199.40
8.	2008-2009	271.00
9.	2010-2011	442.08
10.	2012-2013	642.00
11.	2014-2015	1042.75
12.	2015-2016	1082.31
13.	2016-2017	1209.23

Source: An Analysis of State Finances (Various Reports).

Table 1 is relate to per capita expenditure of Haryana from 1966 to 2016 -17. It shows that per capita expenditure has been increasing over the years. For e.g. per capita expenditure in 1966 was Rs 1.92, increased to Rs 69.50 in 1991 -92, further to 199.40 in 2005-06 and it again grew to 1209.23 in 2016-17.

Efficiency of Health Care Services in Haryana

Inputs effectively model is applied to compare the Health Institution efficiency within the State. So, the data has been collected from secondary sources like use of various

Economic Survey from 2011-12 to 2016-17, the Statistical Abstract of Haryana from 2011-12 to 2016-17, Haryana Health Accounts Report, Haryana Health Finances Report. For a detailed study the selection of inputs and outputs are most important. The Inputs and Outputs, which we selected, are:

Inputs: Doctors, Nurses, Other Staffs, Number of Medical Institutions in Rural and Urban, Beds.

Outputs: Indoor Patients and Outdoor Patients. For each DMU (Decision Making Unit) we have to compute a ratio:

$$\text{Efficiency} = \frac{\text{Output}}{\text{Input}} = \frac{\text{Virtual Output}}{\text{Virtual Output}}$$

$$\text{Score (K)} = \frac{\sum_{j=1}^s V_j R_{kj}}{\sum_{j=1}^m W_j C_{kj}} \rightarrow \text{MAX, for each DMU } K = 1, \dots, N$$

Subject to constraints for each DMU i including (K):

$$\text{Score (i)} = \frac{\sum_{j=1}^s V_j R_{ij}}{\sum_{j=1}^m W_j C_{ij}} \leq 1$$

Here:

N= the number of DMU

M= the number of inputs

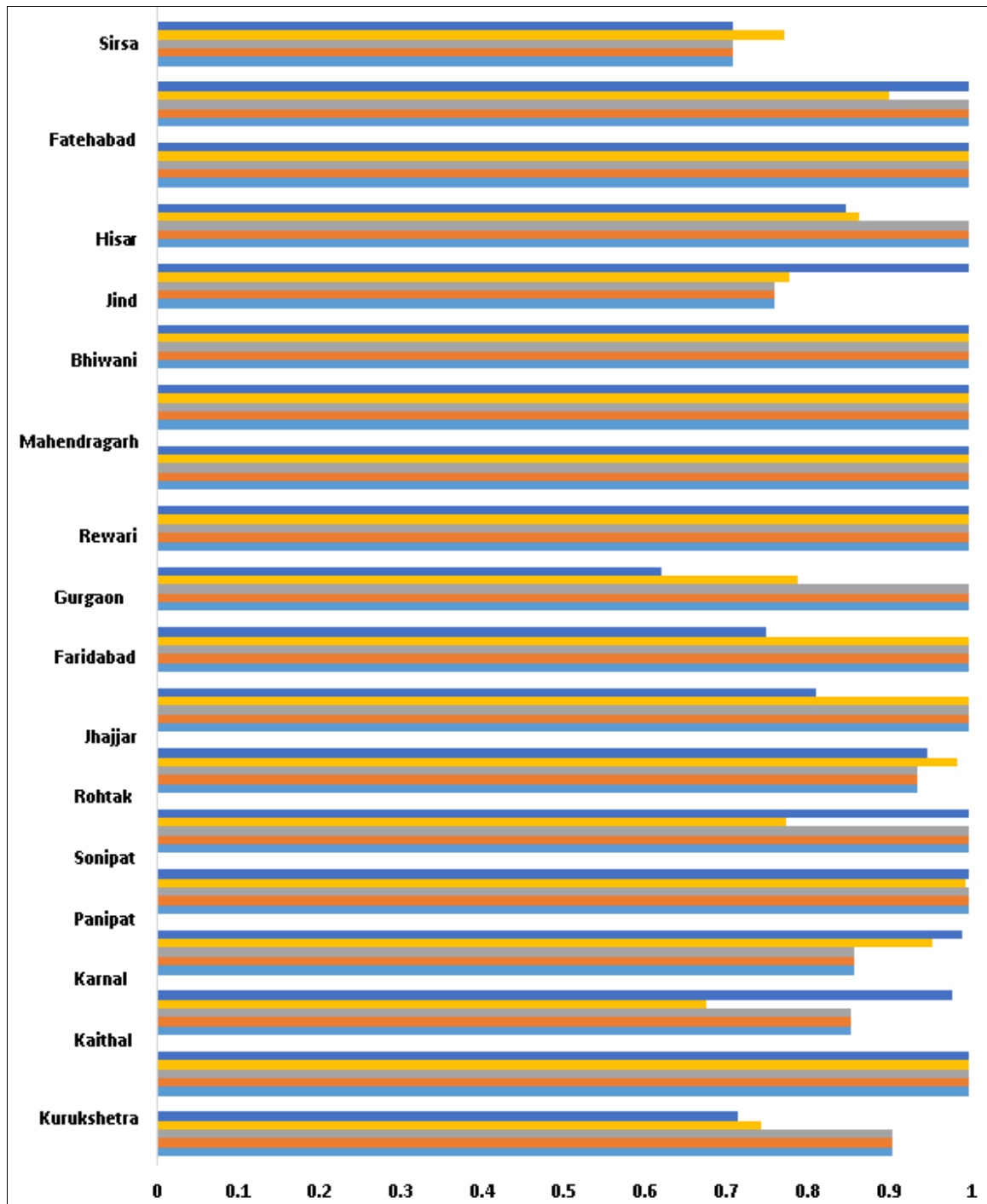
S= the number of output Observed data:

Cij = j-th input for unit i

Rij = j-th output for unit i Decision Variable (Solution vector of the motel)

Wj = weight for the j-th input

Vj = weight for the j-th output



Source: Author's Compilation and Statistical Abstract of Haryana (2011-16).

Fig 5: Efficiency of Government Health Institution 2011-16

Efficiency is judged by the BCC model of Data Envelopment Analysis, the efficiency level should be between 0 and 1. So, by going through the table of efficiency, the efficiency of government hospitals can be found. Ambala never touch the efficiency level of 1, it remain inefficient from 2011-12 to 2015-16. Panchkula is efficient till 2015-16. So inputs are efficiently utilized in Panchkula, Kaithal, Karnal, Mahendragarh, Faridabad, Gurgaon, Rewari, Fatehabad, Rohtak, Hisar, Kurukshetra, Jhajjar found absolutely efficient. Sirsa, Jind, Bhiwani, Panipat, Yamunanagar found inefficient. Average productivity was 0.948674 in 2011-12 because of many efficient hospitals. In 2014-15 it slightly decreased to 0.907111, and in 2015-16 it reached to 0.914568 due to increase in efficiency of hospitals. In 2015-16 average

efficiency was 0.914568 because of Rohtak, Jind inefficient hospitals.

Recommendations

- The findings of the present study have been giving immense knowledge to governments, professionals, health researcher who wants to do efficiency related work. Here they can find the efficiency of hospitals by using DEA technique.
- Though there has been significant improvement in the health services of the state from 1966 onwards, yet many important areas have to be covered to improve the health services further.
- The overall expenditure on health has been continuously increasing over the years but the efficient

utilization of money has not been happening. Like the money which was meant for infrastructure purposes, not been spent on for this purpose.

- Regarding the provision of health facilities. Rural areas must be paid greater attention like the advanced and sophisticated medical equipment must reach the rural areas also.
- Capacities of health department officers needs to be enhanced so they will be able to tackle the challenging problem of improving access and quality of services.
- Government should do huge investments for essential supply of drugs, vaccines, medical equipment, laboratories and the like. Government needs to appoint more ANMs, trained birth attendants, technician, pharmacists, and doctors.
- Government should open government hospitals in the far flung areas of the state to cover maximum population.

Conclusion

With Haryana health scenario in terms of infrastructure, expenditure and found that infrastructure play a major role in terms of efficiency of health services. Rural infrastructure was less as compare to urban in terms of hospitals, dispensaries, but greater than urban in terms of PHCs and Sub-Centers and other infrastructure like medical staff, nurses had been continuously increasing over the years. Despite this, there was shortfall of labour room, laboratory facility and cold chain facility, low availability of test facilities etc. Study found that those district where infrastructure level was good performed poorly in efficiency levels and those who are poor in infrastructure level, performed better in efficiency levels. In terms of expenditure of Haryana related to health. It was found that expenditure of health has been continuously increasing over the years but the efficiency levels has not been increased. The budget which was allocated for health services had not been efficiently utilized over the years. So health services suffered due to this.

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Annexure 1: Medical Staff in Haryana

Year	Doctor	Nurses	Other Staff	Total health staff	Growth rate	Percentage Growth Rate
2001-02	1605	1387	10743	13735	0	-
2002-03	1770	1511	10980	14261	0.038296	3.83%
2003-04	1837	1596	11147	14580	0.022369	2.24%
2004-05	1828	1415	10686	13929	-0.04465	-4.47%
2005-06	1829	1272	10464	13565	-0.02613	-2.61%
2006-07	1844	1280	10470	13594	0.002138	0.21%
2007-08	1441	1081	10456	12978	-0.04531	-4.53%
2008-09	1441	1081	10456	12978	0	0.00%
2009-10	1560	447	8550	10557	-0.18655	-18.65%
2010-11	1528	485	10924	12937	0.225443	22.54%
2011-12	1593	499	11093	13185	0.01917	1.92%
2012-13	1593	499	11093	13185	0	0.00%
2013-14	1593	499	11093	13185	0	0.00%
2014-15	1541	485	10911	12937	-0.01881	-1.88%
2015-16	1862	1478	11524	14864	0.148953	14.90%

Source: Author’s Compilation and Statistical Abstract of Haryana (2001 -16)

Annexure 2: Health Institution in Haryana

Year	Number of Health Institutions in Rural	Number of Health Institutions in Urban	Total Number of Health Institutions	Growth Rate	Percentage Growth Rate
2001-02	2647	326	2973	0	0
2002-03	2735	339	3074	0.033972	3.40%
2003-04	2740	339	3079	0.001627	0.16%
2004-05	2871	349	3220	0.045794	4.58%
2005-06	2747	292	3039	-0.05621	-5.62%
2006-07	2750	294	3044	0.001645	0.16%
2007-08	292	2899	3191	0.048292	4.83%
2008-09	291	2907	3198	0.002194	0.22%
2009-10	291	2950	3241	0.013446	1.34%
2010-11	291	2951	3242	0.000309	0.03%
2011-12	291	2953	3244	0.000617	0.06%
2012-13	291	2953	3244	0	0.00%
2013-14	291	2953	3244	0	0.00%
2014-15	-	-	3374	0.040074	4.01%
2015-16	-	-	3374	0	0.00%

Source: Author's Compilation, Statistical Abstract of India (2001 -16) and various reports of Health Statistics

Annexure 3: Beds in Health Institution

Year	Beds	Growth rate	Percentage growth rate
2001-02	10946	-	-
2002-03	11044	0.008953	0.90%
2003-04	11124	0.007244	0.72%
2004-05	11082	-0.00378	-0.38%
2005-06	9388	-0.15286	-15.29%
2006-07	9418	0.003196	0.32%
2007-08	9866	0.047568	4.76%
2008-09	9866	0	0.00%
2009-10	9986	0.012163	1.22%
2010-11	10006	0.002003	0.20%
2011-12	10028	0.002199	0.22%
2012-13	10028	0	0.00%
2013-14	10028	0	0.00%
2014-15	10000	-0.00279	-0.28%
2015-16	8476	-0.1524	-15.24%

Source: Author's Compilation, Various Reports of Health Information and Various Statistical Abstract of Haryana

Annexure 4: Patients visited in Health Institution

Year	Indoor Patient	Outdoor Patient	Total patient	Growth rate	Percentage growth rate
2001-02	374,568	8263761	8,638,329	0	0
2002-03	379,564	7608345	7,987,909	-0.07529	-7.53%
2003-04	373,886	9513571	9,887,457	0.237803	23.78%
2004-05	397,817	10470298	10,868,115	0.099182	9.92%
2005-06	429745	11077973	11,507,718	0.058851	5.89%
2006-07	482,939	12100991	12,583,930	0.093521	9.35%
2007-08	488106	12077943	12,566,049	-0.00142	-0.14%
2008-09	540211	11907674	12,447,885	-0.0094	-0.94%
2009-10	N.A.	N.A.	N.A.	0	0.00%
2010-11	752305	14517238	15,269,543	0.226678	22.67%
2011-12	829071	14839934	15,669,005	0.026161	2.62%
2012-13	N.A.	N.A.	N.A.	0	0.00%
2013-14	N.A.	N.A.	N.A.	0	0.00%
2014-15	904542	14970136	15,874,678	0.013126	1.31%
2015-16	898,577	16,276,839	17,175,416	0.081938	8.19%

Source: Author's Compilation, Various Reports of Health Information and Various Statistical Abstract of Haryana

Annexure 5: Efficiency of Health Services in Haryana

Sr.	Districts	2011-12	2012-13	2013-14	2014-15	2015-16
1	Ambala	0.9062	0.9062	0.9062	0.7444	0.7162
2	Panchkula	1	1	1	1	1
3	Yamunanagar	0.8545	0.8545	0.8545	0.6756	0.9789
4	Kurukshetra	0.859	0.859	0.859	0.9552	0.9905
5	Kaithal	1	1	1	0.9955	1
6	Karnal	1	1	1	0.7736	1
7	Panipat	0.9351	0.9351	0.9351	0.9851	0.949
8	Sonipat	1	1	1	1	0.8117
9	Rohtak	1	1	1	1	0.7495
10	Jhajjar	1	1	1	0.7881	0.6221
11	Faridabad	1	1	1	1	1
12	Gurgaon	1	1	1	1	1
13	Rewari	1	1	1	1	1
14	Mahendragarh	1	1	1	1	1
15	Bhiwani	0.7612	0.7612	0.7612	0.7781	1
16	Jind	1	1	1	0.8642	0.849
17	Hisar	1	1	1	1	1
18	Fatehabad	1	1	1	0.9019	1
19	Sirsa	0.7088	0.7088	0.7088	0.7734	0.7099
20	Average	0.948674	0.948674	0.948674	0.907111	0.914568