

# Data Envelopment Analysis of Components of Comprehensive Index for Community Health Assessment of Maharashtra

Sir,

Secondary data are very useful in deriving standards of health care in a resource-scarce system. District and decentralized health planning initiatives call for development plans which require inputs in terms of indicators. Too many indices have been built in complicated ways to assess and compare the status of health of people by international agencies. It is indeed a laudable effort by Doke<sup>[1]</sup> to try and develop an index for comparing divisional achievements in health-care services. The Indian state of Maharashtra has been subjected to human development index calculations and indeed the districts added to the state after independence have fared worse in meeting the goals of health development. The weightage for health outcomes, health systems, other determinants of health, and utilization of services was thus prefixed by the number of items under each head considered even though the method of classification deviated from conventional ways. While a list of 68 indicators were considered, the final index comprised the above ten selections weighed by the items included per category. This is a welcome move from the earlier precedence of looking at only infrastructure and using the same for allocation of financial resources to the various districts. Doke, however, has shed light on the performance aspect to provide more for least-scoring districts, and in the bargain, the tribal districts have shown sufficient demand for resource allocation. The utilization of the resources is a totally different aspect involving health professional, people, and politicians.

In this scenario, it would be wiser to consider the efficiency of the districts in dealing with the resources provided as and when the same are made available. Linear programming methods are useful to calculate efficiencies of a system in a nonparametric frontier fashion. Technical efficiency means for the given input one produces the maximum output. Charnes *et al.*<sup>[2]</sup> adapted the idea of this to data envelopment analysis (DEA) in a method which was input reduction oriented given a constant return to scale (CRS). CRS assumes that the units in the problem are working optimally which is not always the case.

The inputs in a classical scenario could be the number of doctors, number of hospital beds, and public health expenditures as percentage of gross domestic product, etc., and the outputs could be life expectancy at birth, health-adjusted life expectancy, and infant mortality rate (IMR) as exemplified by Asandului *et al.*<sup>[3]</sup> Also, some inputs have been used in other models such as hospital beds, immunization rate, and median age even though these are results of a functioning health-care system and could be considered as surrogate outputs.<sup>[4]</sup> We

**Table 1: Summary of efficiencies**

Technical efficiency (E) range	Real outputs*		Surrogate outputs**	
	No.	%	No.	%
$0.5 \leq E < 0.6$	1	2.7	3	8.1
$0.6 \leq E < 0.7$	3	8.1	5	13.5
$0.7 \leq E < 0.8$	4	10.8	6	16.2
$0.8 \leq E < 0.9$	6	16.2	5	13.5
$0.9 \leq E < 1$	4	10.8	2	5.4
$E=1$	19	51.4	16	43.2

\*Real outputs: IMR, MMR, TFR, \*\*Surrogate outputs: Proportion of water contamination, age at marriage for girls, proportion of fully immunized infants, proportion of under-five children having malnutrition. IMR: Infant mortality rate, MMR: Maternal mortality ratio, TFR: Total fertility rate

used inputs such as doctor population ratio, nurse population ratio, bed population ratio; the real outputs [Table 1] such as IMR, maternal mortality ratio, total fertility rate; proportion of water contamination, age at marriage for girls, proportion of fully immunized infants, and proportion of under-five children having malnutrition as surrogate outputs [Table 1] in estimating efficiency and in achieving standards of health in the districts of Maharashtra (excluding two metropolitan districts of Mumbai).

In this context, if one were to analyze the model which Doke has proposed, it will be seen that the index could add more public health inputs rather than the number of doctors, nurses, and beds per population to see whether the district in question can shoulder the developmental initiatives' thrust on them. The reason is that DEA analysis of the set of indicators segregating them into inputs, surrogate outputs, and real outputs indicates a gap between the inputs and outputs. It is clear that number of doctors, nurses, and beds would not help achieve the surrogate outputs and thereby fail to achieve the real outputs. What is needed is sufficient strength of public health personnel and the infrastructure for the public health personnel to bring about real changes in the surrogates such as under-five malnutrition which author claimed had been stagnating for a long time.

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## Conflicts of interest

There are no conflicts of interest.

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An innovative video competition was conducted for World Health Day 2017 under the aegis of IAPSM to ensure that the message of depression awareness be spread widely across the country through the creativity of medical students, by using YouTube as the medium. It received 154 videos from 20 states with a cumulative 2 million views over the month of April which enabled the students to provide health education to grass root level netizens. This initiative gained widespread acclaim from the global medical fraternity and helped in popularizing IAPSM as a brand by using its unique hashtags & logos in the videos.

Winners in Under and Post graduate categories, respectively, were Mr Aayush Majumdar and Team, Maulana Azad Medical College, New Delhi [<https://www.youtube.com/watch?v=5KsWOW1LcXg>] and Dr Amith Meettu, Department of Psychiatry, Vinayaka Mission's Kirupananda Variyar Medical College, Salem, Tamilnadu [[https://www.youtube.com/watch?v=Gye36sJU\\_Vc](https://www.youtube.com/watch?v=Gye36sJU_Vc)].

*Reported by IAPSM Secretariat*

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