Author's response to reviews

Title: Technical efficiency of peripheral health units in Pujehun district of Sierra Leone: a DEA application

Authors:

Ade Renner (rennera@sl.afro.who.int)
Joses M Kirigia (kirigiaj@afro.who.int)
Eyob A Zere (asbue@na.afro.who.int)
Saidou P Barry (barrys@afro.who.int)
Doris G Kirigia (dorykirigia@yahoo.co.uk)
Clifford Kamara (tarenner49@yahoo.com)
Lenity HK Muthuri (lenitymuthuri@yahoo.co.uk)

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Author's response to reviews: see over
RESPONSE TO THE TWO PEER REVIEWERS REPORTS

From: Kirigia and Co-authors

TO: Editor-in-Chief, BMC Health Services Research

REF: Technical efficiency of peripheral health units in Pujehun district of Sierra Leone: a DEA application

Thank you for second set of comments and suggestions which have helped to enhance the quality of our manuscript. We are immensely grateful for that.

Reviewer: Robert Rosenman

Comment: “I am bothered by the dismissal of promoting center use as an output, given the description of centers. I would like to see, at the very least, some discussion of how health education covers this output”

To reflect this concern, the subsection on “Limitations of the study” we have included the following limitation follows:

“Firstly, in this study we used total number of health education sessions conducted through home visits, public meetings, school lectures and outpatient department as a proxy for health promotion. By so doing we may have underestimated the health promotion work that done by health centre staff within communities, e.g. public health inspection of commercial food outlets, coaching communities on personal hygiene, advise to communities on the protection of water sources and construction of vented improved pit latrines (in rural areas and shanties), etc.”

Reviewer: Ken Stein

Comment: “In their response to date they appear to have made no change in relation to the specification of the model, particularly the lack of input variables. They justify this in their response but I believe the manuscript should include their argument”.

Response: To further justify the use of “output-orientated” model specification instead of “input-orientated” specification, we have included as advised by Ken Stein the following two paragraphs under the subsection “output orientation”:

“As one can see from the Table 3 on health indicators for Sierra Leone, there is serious population under-coverage of the various interventions. This is mainly due to critical resource constraints, e.g. per capita total expenditure on health in Sierra Leone is only US$ 7 compared to US$34 per person recommended by the WHO Commission for Macroeconomics and Health [8]. This implies that although the communities might want more of the services, budgetary pressures make it difficult to increase inputs, even assuming that PHUs had control over input (which they do not have). Even where inputs (e.g. labour) might be under utilized it is not within their power to dispose of excess inputs. We felt that output maximization is the most appropriate orientation for health centres which are given a fixed input and requested to produce as much output as possible. Thus, an output-oriented approach focused on
the amount by which health unit outputs could be expanded with the same level of inputs.

Furthermore, the output- and input-oriented models will estimate exactly the same frontier, and therefore, by definition identify the same set of PHUs (firms) as being efficient. It is only the efficiency measures associated with the inefficient firms that may differ between the two methods [16]. In fact under the assumption of constant returns to scale, even the efficiency scores will not change. We, therefore, feel that the choice of model is not going to affect the results significantly.”

Guiffrida’s Comment: Are all inputs included?
Response: Because the information on expenditure on drugs were not available, under “Limitations of the Study” we have the following limitation: “Thirdly, data on drug expenditure at many PHUs were missing; as a result we were forced to drop the variable from the analysis, which may result in shifting the frontier because of outlier figures.”

Comment: Since the originality of the manuscript lies in its application within sub-Saharan Africa it would be helpful if, in the discussion, the authors consider in slightly more detail what the implications for further applications of this technique in this important geographical setting might be.”

Response: We do greatly appreciate the abovementioned suggestion. Thus, we have added the following subsection:

**Implications for further applications of DEA in sub-Saharan Africa**

A national health system performs the functions of stewardship (oversight), health financing, creating resources/inputs (including human resources for health) for producing health, and delivering (providing) health services with a view to improving responsiveness to people’s non-medical expectations, ensuring fair financial contribution to health systems and ultimately improving health (the three being goals of health system) [6]. The World Health Report 2000 ranked the 191 Member States on the basis of their overall goal performance. Table 7 provides the ranking of the 46 countries in the WHO African Region: 3 countries were ranked between 83 and 99, 9 countries were ranked between 118 and 147; and the remaining countries were ranked between 151 and 191. The Sierra Leone health system performed the worst.

After the publication of these macro-performance results, countries in the Region have been asking what they can do to improve the performance of their health systems, or even the performance of their individual hospitals and health centres which absorb over 80% of recurrent and capital budgets of the Ministries of Health. The starting point in addressing the poor health system performance, is measuring which decision making units (tertiary hospitals, provincial hospitals, health centres, clinics/health posts, programmes) (DMU) of the present system are operating efficiently. These measurements can help identify the efficient DMUs (which can be emulated by inefficient ones), the inefficient DMUs (whose performance need to be improved), the inputs that are being wasted and the magnitude of waste, and the output increases needed to make inefficient DMUs efficient. This kind of evidence would empower the health policy makers and managers to develop concrete strategies for boosting efficiency of DMUs. As demonstrated in the current study, DEA is a versatile tool/approach for analysing the efficiency of complex DMUs (e.g. hospitals,
health centres) that employ multiple inputs to produce multiple outputs, with a view to availing the information mentioned above.

A major strategy of mobilizing more domestic resources for the massive expansion in coverage of health interventions envisaged in the Millennium Development Goals is efficiency improvement. Thus, while striving to mobilize more domestic and external resources, it is important to ensure that the available resources are optimally used, i.e. ensure that it is not possible by reallocation of available resources to make someone’s health status better off without making someone else worse off (this situation is called by economists Pareto-optimality). If it is possible to through reallocation of resources to improve at least one person’s health status without reducing health status of another person, then there is waste within the health system, health facility or programme.

Therefore, we would like to implore or urge every country in the Region to institutionalise health facility efficiency monitoring at the Ministry of Health headquarter (MoH/HQ) and at each health district headquarter. In the process of institutionalisation, there will be need to: (i) familiarize the policy makers (ministers, permanent secretaries, directors of medical services), managers (MoH/HQ departmental heads, provincial medical officers of health, district medical officers of health, hospital superintedents) and economists (and planners) at the Ministry of Health with the concepts of technical efficiency, allocative efficiency and total factor productivity; (ii) acquire computers (where they do not exist) and softwares (parametric and non-parametric) for estimating efficiency; (iii) organize hands-on training for MoH economists and planners (and where possible provincial and district health managers) in the use of the efficiency measurement softwares; (iv) adapt the available efficiency data collection questionnaires/instruments; (v) undertake a pilot study among a few different level health facilities and revise the data collection instruments accordingly; (vi) make the data collection instruments part of the national health information systems; (vii) decide on the frequency of reporting of the inputs (quantities and prices) and outputs by those incharge of health facilities; (viii) the analysis could be undertaken with at the district level (with MoH/HQ support) with a view to identifying causes of inefficiencies, developing strategies for improving efficiency and implementing them; (ix) establish efficiency database at MoH/HQ and at each health district headquarters.