Reviewer's report

Title: Predicting the Demand of Physician Workforce: an international model based on "crowd behaviors"

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Reviewer: Ashwin N Ananthakrishnan

Reviewer's report:

Tsai and colleagues present an interesting study attempting to develop a model for predicting the physician work force that would be expected for a given country. They use an ecologic study design and include 7 variables into the multivariate regression model of which proportion under the age of 15 years and life expectancy were the only two independently significant variables. They then calculate a discrepancy between observed and predicted physician demand and categorize this as either positive or negative. They also conclude that countries with a large PD may need to survey physician work loads, and improve quality of medical performance.

While the work is certainly intriguing and thought-provoking, there are several issues that merit clarification. In addition, given the ecologic nature of their study and lack of direct correlation of the discrepancy in physician demand with any health outcomes, any conclusion stated using physician demand discrepancy should be cautiously worded and toned down.

Major compulsory revisions:

1. While I appreciate the author's dividing the countries randomly into two halves to validate their model, I feel it is more important to see if their model predicts PD equally well in countries of different economic strata and population sizes. It would be useful for them to present subgroup analysis after stratifying the countries by these parameters (GDP(economic development), population size, area).

2. Can the authors repeat the analysis including literacy in those countries where this information is available?

3. From the co-linear variables, how did the authors select the specific variables for inclusion in their model? Did they perform a preliminary analysis examining its correlation with the outcome to guide variable selection?

4. The conclusion in the abstract that countries with large PD need to survey physician workloads and urged to improve quality of medical performance is a significant overstatement of the implications of this limited research. I would suggest that the authors include some analysis examining the correlation between this discrepancy and several health outcomes (life expectancy, under 5 mortality, maternal mortality, etc.) to support some of their conclusions.
5. It is important to acknowledge that physician density itself may not be the key factor determining health outcomes. Access to care and affordability may be other drivers that could be more significant. In addition, availability of non-physician health workers may be a more important determinant of health outcomes.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests