

Reviewer's report

Title: Health Worker Densities and Immunization Coverage in Turkey: a panel data analysis

Version: 1 **Date:** 11 January 2008

Reviewer: Till Barnighausen

Reviewer's report:

Minor essential revisions

1. Page 9, para 2 - and page 10, para 1

One of the strengths of this study is that it uses data from only one country. Methods of collecting data on human resources for health and vaccination coverage are less likely to differ across provinces of one country than across countries, possibly eliminating one source of measurement error that is likely to be present in cross-country studies. Some of the previous articles investigating the effect of human resources on vaccination coverage have used cross-country data. It would add value to the article, if the authors described in more detail how the human resources data and the data on vaccination coverage are collected for the Primary Health Care statistics published by the Turkish Ministry of Health. What are the reporting structures in Turkey? Is data quality monitored? Are there incentives in place that could have motivated provincial agencies to over- or under-report health worker numbers or vaccination coverage, or to distort changes in these variables over time?

2. Page 9, para 2 - page 9, footnote

I assume that the authors mean 'tetanus toxoid' when they use the term 'tetanus thypoid'. The typhoid vaccine is not routinely included in most EPI programs; in most countries the tetanus toxoid vaccine is routinely used to vaccinate against tetanus.

3. Page 12, para 1

Please explain the abbreviation TT2 in the text (tetanus toxoid 2?).

4. Tables 5 and 6

Please indicate in the tables the meaning of * and ** (significant at the five percent confidence level and significant at the one percent confidence level?).

5. Page 6, para 2; page 7, para 1; page 11, para 1

Please replace 'Baernighausen' with 'BÃ¶rnighausen'.

6. References 7 and 8

Please replace 'Barnighausen' with 'BÃ¶rnighausen'.

Discretionary revisions

7. Page 9, para 2

WHO estimates that in the year 2002 27percent of the world-wide 1.4 million deaths due to vaccine-preventable diseases among children under 5 years were due to infections with Haemophilus influenzae type b (Hib). The Hib vaccine has been available in 2000. It would be useful if the authors commented on why they did not include data on Hib vaccination coverage in their analyses (for instance, a reference to a policy decision by the Turkish government not to include the Hib vaccine in the Turkish EPI program, 2000-2005).

Source: http://www.who.int/immunization_monitoring/diseases/en/

8. Page 9, para 2, and results section

The authors use as their dependent variable 'the mean vaccination rate of the six component immunizations of all vaccinations provided by the national EPI program (i.e., measles, BCG, Hepatitis B, polio (3 doses), DPT (3 doses), and tetanus typhoid (2 doses))'. They argue that a 'composite EPI indicator therefore adds greater variability and information to the outcome in a way that does not fundamentally alter relationships between individual vaccinations and HRH densities'. However, the prima facie case for similar effects of human resources on coverages with different vaccines seems weak. The vaccination schedules and therefore likely the effect of human resources on vaccination coverage differ widely between the vaccines included in the composite EPI indicator. For instance, BCG is given once at birth and measles is given once around 9-11 months of age in countries where measles is highly endemic, and even later in countries with low levels of measles mortality. It is thus likely that BCG and the measles vaccine are administered by different human resources (e.g. midwives versus physicians) and that in countries where most births take place in the formal health care sector the availability of human resources matters more for measles than a mother has to take the child to a health care provider specifically for the vaccination than for BCG coverage the vaccine is given at a time when mother and child are already receiving other health care.

The authors state that they 'find empirically that results from EPI analyses do not differ qualitatively from those examining HRH densities and individual vaccination rates (results available from authors upon request)'. Could these results be made available, for instance, in an online appendix to the article?

9. Page 10, para 1

The authors include adult female illiteracy and per capita gross domestic product (GDP) as time-invariant independent variables (measured in 2000) in their random effects panel regressions. The reason that these variables are assumed not to change over time seems to be that information on their values at the provincial level is only available once within the time period of observation chosen by the authors. Could the authors strengthen their argument that the two variables can indeed be safely considered time-invariant by including some

evidence from Turkey at the level of the entire country, e.g. by showing that adult female illiteracy and per capita GDP have moved quite sluggishly in Turkey between 2000 and 2005?

If the assumption of time invariance does indeed hold reasonably well for female adult illiteracy and per capita GDP, the authors could consider focusing the presentation of their results on the fixed effects models by making a few changes to their results section: start (the table, the description of analytical strategy and results) with the fixed effects models, add new random effects models without the additional time-invariant variables (i.e. without female adult literacy, per capita GDP, and land area), end with the current random effects models that include the time-invariant variables.

What next?: Accept after minor essential revisions

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.