

Using routinely collected data to estimate quality of care: evidence from the South African tuberculosis registry

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Abstract

The allocation of resources in the provision of health care can potentially be improved with better measures of facility quality. However, there is limited data on quality of care for reasons such as the high cost of such data collection. This paper seeks to use routinely collected data as a novel way to use big data to assess health care quality. In particular, we use the South African tuberculosis registry to link compliance to clinical guidelines to facility-level factors that can be used as a measure of facility quality.

Extended abstract

Improving the allocation of scarce resources in the provision of health care is one of the main challenges faced by developing countries. Knowing the quality of health care facility can allocate resources more efficiently to save lives and costs. Unfortunately, there is limited data on quality of care largely because of the high cost of data collection. In this paper, we propose to use routinely collected administrative data as a novel way to use big data in the provision of health care. In particular, we use the South African tuberculosis (TB) registry, which contains information on all public facilities in the country over time, to assess compliance to clinical guidelines and analyze facility-level factors to estimate facility quality.

Compliance to clinical guidelines varies across facilities, and these are attributed to a combination of patient and facility-level factors. Patient-level factors include socio-economic factors and poor health knowledge. Facility-level factors include poor infrastructure, poor personnel training, and inadequate development of community-based support for patients. The literature finds that non-compliance with TB treatment guidelines can be due to insufficient diagnostic modalities, ambiguity in guideline recommendations, poor patient documentation (Mala 2014), high patient volume, prior sensitization to TB control guidelines, and alternate medicine practices (Achanta 2013), knowledge of treatment and diagnostic guidelines, practitioner attitudes toward patients, and patient empowerment (Bell 2011). In this paper, we focus on basic tuberculosis testing, which is an important part of primary health care in high TB settings to get measures of facility quality. Guidelines are clear, and resources needed for testing are minimal so it should be possible to have high rates of compliance.

In South Africa, facility quality analysis has been done by direct assessment, workshops, and continuous monitoring and recent studies in HIV have found poor program indicators (Scott 2012; Doherty 2009; Govender 2000). We add to these studies by analyzing patterns of TB testing at the patient and facility levels and seek to isolate facility-level factors that can be used as reliable quality indicators. This paper is related to earlier work on the potential use of cancer registries to compare health system quality (Curado 2009) and recent work on analyses of TB registry data in other countries. Mabaera et al. (2008) examine 128,808 TB laboratory register records in Moldova, Mongolia, Uganda, and Zimbabwe and find that 3.9 to 6.9% had no information on sex, 56.1% had no variation of pattern in patients with more

than 3 test results. Similarly, Tafuma et al. (2014) analyze 281 patient medical records from the Botswana National Tuberculosis Program and find that 47% of patients started TB treatment without sputum smear diagnosis and 6 out of 7 clinicians started antibiotics before TB diagnosis due to the inability of patients to produce sputum and laboratory delays.

We use the South African TB registry data to analyze the patterns of testing and we disentangle the indicators to isolate facility-level factors that can be used as a proxy for facility quality. The NHLS database (National Health Laboratory Services) contains tuberculosis tests performed on patients aged 16-64 in public health facilities (hospitals and health clinics) for the period January 2004 - December 2011, which includes 2,271,538 TB-positive test records. For TB and drug susceptibility testing, the data include the type of test performed, test result, testing facility location, test date and basic patient demographics. We include TB-positive results from culture testing and smear microscopy as well as scanty positives of 3 or more acid fast bacilli (AFB) per 100 immersion fields (based on the cutoff value used in practice). Patient records are linked using unique patient identifiers created by the NHLS. Our dataset spans 8 years of frequent observations, which allows us to analyze policy changes that may affect the provision of care. Since this variation forms the basis for our identification strategy, the long time-series dimension makes it especially well-suited for this analysis.

We begin with compliance to the initial visit guidelines, followed by patterns of follow-up visits. We then analyze specific facility-level factors to generate quality indicators. At the patient level, we find that the average patient received a total of 1.7 tests over two years, which is about 50 percent lower than the clinical guideline. We find similar patterns by age group and sex, which suggests that the demand-side factors may determine adherence to TB guideline less than the supply-side factors. On the facility level, we see variation at the province level and by size. Larger facilities are more likely to conduct more follow-up tests than smaller ones. This may suggest a correlation between facility size and capacity to track patients. In terms of contamination rates, we find that clinics have a higher fraction of contamination compared to hospitals. Counterintuitively, contamination rates do not reflect quality, instead, contamination reflects the quantity of specimens processed. Our next analysis will exploit the longitudinal nature of the data set to analyze whether policy changes made a difference on quality and whether quality is consistent over time. These results will have important implications for resource allocation because these quality indicators will allow the government to better target resources to improve health outcomes and cost effectiveness.

References

Achanta, Shanta, Jyoti Jaju, Ajay MV Kumar, Sharath Burugina Nagaraja, Srinivas Rao Motta Shamrao, Sasidhar Kumar Bandi, Ashok Kumar et al. "Tuberculosis management practices by private practitioners in Andhra Pradesh, India." *PloS one* 8, no. 8 (2013).

Bell, C. A., Greg Duncan, and B. Saini. "Knowledge, attitudes and practices of private sector providers of tuberculosis care: a scoping review [Review article]." *The International Journal of Tuberculosis and Lung Disease* 15, no. 8 (2011): 1005-1017.

Curado, Maria Paula, Lydia Voti, and Ana Maria Sortino-Rachou. "Cancer registration data and quality indicators in low and middle income countries: their interpretation and potential use for the improvement of cancer care." *Cancer causes & control* 20, no. 5 (2009): 751-756.

Doherty, Tanya, Mickey Chopra, Duduzile Nsiband, and Dudu Mngoma. "Improving the coverage of the PMTCT programme through a participatory quality improvement intervention in South Africa." *BMC public health* 9, no. 1 (2009): 406.

Govender, Veloshnee, D. McIntyre, A. Grimwood, and G. Maartens. "The costs and perceived quality of care for people living with HIV/AIDS in the Western Cape Province in South Africa." (2000).

Mabaera, B., J. M. Lauritsen, A. Katamba, D. Laticevschi, N. Naranbat, and H. L. Rieder. "Making pragmatic sense of data in the tuberculosis laboratory register." *The International Journal of Tuberculosis and Lung Disease* 12, no. 3 (2008): 294-300.

Mala, George, Albine Moser, Geert-Jan Dinant, and Mark Spigt. "Why tuberculosis service providers do not follow treatment guideline in Ethiopia: a qualitative study." *Journal of evaluation in clinical practice* 20, no. 1 (2014): 88-93.

Tafuma, Taurayi A., Rosemary J. Burnett, and Diana Huis in't Veld. "National guidelines not always followed when diagnosing smear-negative pulmonary tuberculosis in patients with HIV in Botswana." *PloS one* 9, no. 2 (2014).