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Technical efficiency and its relation to health providers' competence and scale of production of HTC services in Africa: A multi-country cost and quality of care study

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Background

Despite the considerable returns in health obtained by ART scaling-up in low and middle-income countries (LMIC), no available funds are able to bear the financial pressure imposed by the HIV/AIDS "lifecycle" model of care and the recent changes of WHO treatment guidelines.[1] In 2012, the estimated number of new infections in the same year was 2.3 million, and 1.6 million people died of AIDS-related health conditions.[1] In the same year, committed contributions from donors and governments to finance HIV services decreased for the first time, and donor assistance did not grow compared to previous years.[2]

This situation of shrinking assistance for HIV/AIDS calls for countries to make coordinated efforts to meet national and regional targets, which include increasing the *value-for-money* of available resources. Economic efficiency for HIV healthcare requires rational allocation of funds to the set of proven, cost-effective interventions that deliver the greatest returns in health (allocative efficiency), and by minimizing waste of essential resources (technical efficiency) while maintaining consistent levels of quality.[3,4]

The scarce body of literature addressing how efficient are health systems to provide HIV/AIDS services has shown that there remains substantial heterogeneity in terms of the average cost per service among facilities within the same region, and that the difference between the best performing facilities and the least efficient units reaches several orders of magnitude. The production scale — the number of services provided within a given period — is strongly correlated with lower average costs, however, increasing service utilization is not always feasible or even economically desirable, specially in contexts of low prevalence or concentrated epidemics.

ORPHEA

The ORPHEA project produced new empirical evidence on the unit costs of HIV interventions in Africa and which facility's characteristics were more likely to have an influence on them. During 2011-2012, information on costs, output indicators and determinants of efficiency were collected across more than 240 sites providing HIV Testing and Counseling (HTC), Prevention of Mother-to-Child Transmission (PMTCT) and Voluntary Medical Male Circumcision (VMMC) services in Kenya, Rwanda, South Africa and Zambia. To measure quality of care, exit interviews and clinical vignettes were administered to clients and providers, respectively.

ORPHEA revealed that while scale remains as a strong determinant of costs efficiency, there is huge variation in facility average costs not only among countries but also within units of the same country. Staff is the main cost driver, around 70% of the average cost per HTC client tested and 80% in the case of PMTCT client tested. Moreover, our data show that in sub-Saharan Africa, a myriad of staff combinations are used to produce the same services, reflecting that a considerable proportion of health facilities are shifting tasks to other types of staff than doctors or medical officers. Given this heterogeneity in programs implementation, an important question is whether there are variations in terms of the content of the HIV prevention services provided by the health personnel at the facility, which we dub as variations in quality of care.

Objectives

The present study's objectives are to:

- Describe the variation of staff composition in the production of HTC and PMTCT services at the facility level.
- Assess the relationship between a measure of task shifting and two outcomes: cost per client tested and the health providers' competence score.

Methods

The health providers' time allocation to each intervention were measured at each facility with a time-motion approach, in order to estimate staffing levels adjusted by full-time-equivalent. This breakdown of staff was used to distinguish facilities with task shifting (=1 in facilities where no doctors, medical officers or clinical officers provide the interventions). The measure of quality was estimated using Polychoric Principal Component Analysis (PCA) and rescaled to be bound between 0,1. To achieve comparability of cost estimates across countries, non-international tradable goods were adjusted for purchasing power parity (PPP). The methodology for the estimation of unit costs has been described elsewhere.

The association between task shifting and the outcome measures was tested via seemingly unrelated equations (SURE), assuming an unstructured correlation structure between the error terms and small-sample adjusted statistics, given the relatively low sample size.

Results

Mean average costs for HTC were US$31.9 (IQR: 6.0-35.2) and US$136.8 (IQR: 21.8-146.9) for PMTCT. Figures 1 and 2 depict the total full-time-equivalent staffing levels to provide HTC and PMTCT, and each color represents a different type of provider.

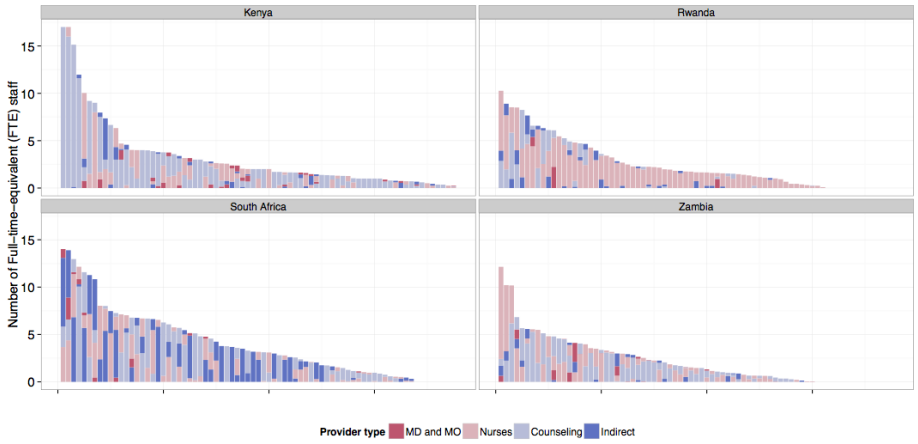

Figure1.
An average of 0.07 full-time-equivalent doctors or medical officers and 1.4 nurses are used to provide HTC services. In Kenya, the intervention is mainly provided by counselors, while in Rwanda nurses predominate in terms of staffing levels.

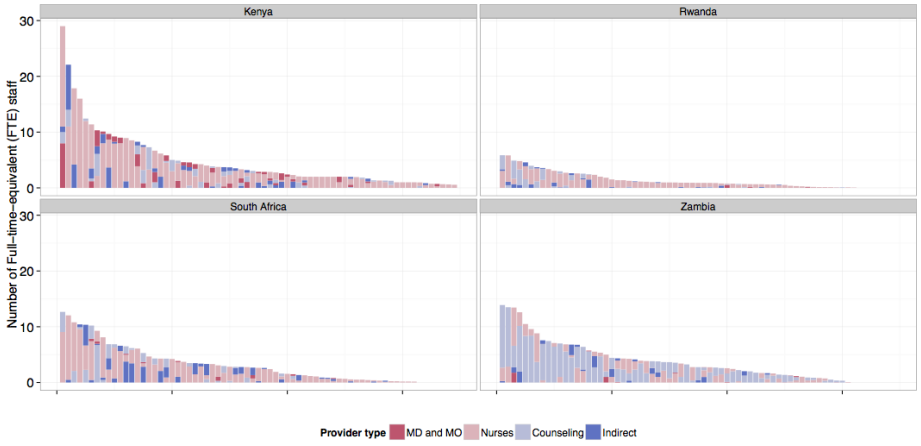

Figure 2.

To provide PMTCT services, facilities employ an average of 0.15 doctors or medical officers, and 1.7 nurses. It is evident that Rwanda is the country that uses less staff to provide this intervention.

The estimated effect of staff composition on log average costs, reported in Table 1, shows that those facilities that have shifted activities away from medical doctors have significantly lower average costs. In HTC services, facilities with full task shifting correlate with 25% lower unit costs. Average cost per PMTCT client tested is 70% lower for the group of facilities with task shifting. In regard to the quality measures for both interventions, the correlation with staff composition is indistinguishable from zero. Additionally, scale has a positive effect on the PMTCT vignettes score, around 3 percentage points higher per each 1% increment in the annual number of PMTCT clients tested.

Table 1. Multivariate relation between unit costs, quality scores and facility operation characteristics.

Covariates	Cost per HTC client tested (log)	HTC vignettes score	Cost per PMTCT client tested (log)	PMTCT vignettes score
Annual number of clients tested (log)	-0.615***	-0.005	-0.710***	0.029**
Annual number of total facility clients (log)	0.120*	-0.012	0.108	-0.009
=1 facility has full task shifting	-0.253*	-0.027	-0.703***	0.042
Constant	6.339***	0.733***	7.921***	0.366***
Observations	179	179	158	158
Adjusted R-squared	0.391	0.033	0.287	0.049

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Discussion

These results demonstrate the need to understand the mechanisms that curb efficiency in the provision of HIV prevention interventions. Our results suggest that even though task shifting substantially reduces average costs, there are no evident differences in the content of the HIV services between models operated solely by nurses and those that rely on a combination of nurses and medical staff. We provide evidence of the possibility to achieve higher quality of care without escalating the budget, provided that service utilization is increased.

Acknowledgements

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