Research Article

Can Low- and Middle-Income Countries Increase Domestic Fiscal Space for Health: A Mixed-Methods Approach to Assess Possible Sources of Expansion

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Abstract—There has not been a systematic effort to synthesize findings of domestic fiscal space for health (DFSH) assessments, despite the existence of a commonly applied conceptual framework. To fill this gap and provide support to policymakers designing health financing policies toward universal health coverage (UHC), this study uses both qualitative and quantitative methods to assess the scope of possible sources of DFSH in low- and middle-income countries (LMICs). First, the findings of 28 studies assessing DFSH in LMICs were reviewed. A quantitative assessment was then conducted to assess potential expansion from increased tax revenues, a greater prioritization of health in the overall budget, and improved technical efficiency of health spending in a sample of 64 LMICs. The analysis found that macroeconomic conditions and budget prioritization are the key sources of DFSH expansion in 90% of the reviewed studies. Improved efficiency was referenced as having high potential for DFSH expansion in 60% of the studies. The quantitative assessment was then conducted to assess potential expansion from increased tax revenues, a greater prioritization of health in the overall budget, and improved technical efficiency of health spending in a sample of 64 LMICs. The analysis found that macroeconomic conditions and budget prioritization are the key sources of DFSH expansion in 90% of the reviewed studies. Improved efficiency was referenced as having high potential for DFSH expansion in 60% of the studies. The quantitative analysis converged with these findings and further confirmed that an increase in tax revenues is, on average, the largest source of potential DFSH expansion (95% confidence interval [CI], 60%, 96%) in the studied countries. However, even without injecting new revenues, reprioritization of budget and technical efficiency improvements could significantly expand DFSH (95% CI, 77%, 102%). While highlighting the critical role played by fiscal conditions and tax policies, the study provides strong rationale for explicitly incorporating efficiency as a core source of DFSH in a more systematic manner in future assessments.

INTRODUCTION
Fiscal space for health is frequently discussed in health financing policy and research and is commonly associated with a government’s capacity to spend more on health.1,2

Keywords: fiscal space, health financing, technical efficiency, universal health coverage
The Sustainable Development Goals (SDGs) recognize its centrality in ending poverty by ensuring significant resource mobilization, including for the health sector, as a key target for countries to achieve. The roots of this concept can be traced back to Heller’s 2005 definition of general fiscal space as “the availability of budgetary room that allows a government to provide resources for desired public purposes without impairing fiscal sustainability.” The concept is closely associated with the general literature on fiscal sustainability and fundamentally stresses that public expenditure is primarily determined by prospects of future revenues.

Heller identified four possible sources or channels of fiscal space expansion, namely: taxation, increase in priority expenditure, borrowing, seignorage (i.e., increase in the monetary basis), and external resources. Though initially defined for fiscal space expansion for all public purposes, the approach was refined and subsequently applied directly to the health sector in the context of greater resource demands to meet the Millennium Development Goals. In this way, fiscal space for health was seen as an important factor in facilitating the ability of countries to achieve their health-related objectives.

Building on Heller’s framework, Tandon and Cashin proposed five distinct sources of fiscal space for health: (1) conducive macroeconomic conditions, (2) reprioritization of health within the government budget, (3) increase in health sector–specific resources (i.e., earmarked funds from consumption or income taxes), (4) health sector–specific grants and foreign aid, and (5) increase in the technical and allocative efficiency of existing public spending for health. Subsequent work further differentiated possible ways to expand overall fiscal space from sector-specific measures, highlighted particular aspects of the sector, and underscored the importance of differentiating short-term budget needs from long-term fiscal policy objectives.

Building on this framework, a range of analytical approaches has been used to assess actual expansion prospects across countries over the past decade. Despite efforts to review existing studies, there has not been a systematic effort to synthesize the empirical evidence in a comprehensive manner. In the context of the SDGs and decreasing growth in external health aid, there is a pressing demand from policy makers to better understand possible sources—and their actual scope—to increase domestic fiscal capacities in particular and respond better to sector needs with their own resources. This article fills this research gap and, in doing so, provides concrete evidence to inform the design of health financing and domestic resource mobilization strategies towards universal health coverage (UHC).

**STUDY DESIGN AND METHODS**

The study uses a mixed-methods approach, beginning with a literature review then followed by a quantitative, cross-country analysis of cross-sectional data. These are described below.

**LITERATURE REVIEW**

**Search Strategy and Selection Criteria**

The aim of the literature review was to collect and review existing assessments of fiscal space for health conducted in low- and middle-income countries (LMICs) between 2005 and 2016. We searched PubMed using the terms “fiscal space,” “fiscal AND space” (there is no ‘fiscal space’ MeSH term) and restricted the search to articles published between 2005 and 2016. The search resulted in a list of 55 articles. Given the nature of the topic, we expected a large amount of relevant literature not to be in the form of full studies in peer-reviewed journals but to include reports and presentations published elsewhere. To capture this broader literature, we searched Google Scholar using the term fiscal space in the title with the same time frame restriction as in PubMed, resulting in the selection of 219 potentially eligible studies. Only titles in English, French, or Spanish were reviewed. This review excluded papers that were duplicates; were on general macroeconomic and fiscal policies; focused on the overall concept or methodology of fiscal space; where health was not an explicit and primary focus; that were on high-income countries; that were primarily on cost-effectiveness or costing; and that dealt with a narrow set of health services or a single disease. Finally, we excluded publications that had “space” and “fiscal” in their titles but were not about fiscal space. We supplemented our search by contacting experts in the field and authors of the publications found through our two search strategies in order to collect non-published literature. The full texts of the 44 studies were then reviewed. Studies that were not based on Heller’s definition and framework of fiscal space and did not examine multiple sources of fiscal space for health expansion were also excluded from the review. This process resulted in the selection of 28 studies for final review, covering 38 countries and three cross-country analyses. The details of the study selection are provided in Figure 1.

**Data Extraction and Analysis**

We used systematic literature review based on a thematic approach. As a first step, we developed a summary table containing the following information for each study: author;
country or region; study type (stand-alone or embedded in a larger study); study date and country health financing context; methods; and key findings. We then analyzed results by source, focusing on the type of analysis conducted and the main indicators used to measure the potential for fiscal space for health expansion, and summarized the expected scope for each source (i.e., the expected magnitude of the change in public expenditure for health in absolute or relative terms). We restricted our analysis to sources of domestic fiscal space for health (DFSH), excluding external funds. Given the significant differences between the methods and metrics employed to estimate potential for expansion, we synthesized results in a descriptive narrative text (Appendix 2). As a complement, we also developed a heat map to provide a quick overview of the expected scope of DFSH from the different sources across studied countries (Figure 2).

**Quantitative Analysis**

Building on our analysis of the existing literature regarding the main sources of DFSH, we examined the following three sources: (1) mobilized tax potential; (2) budget reprioritization toward health; and (3) improved technical efficiency of total health spending. We then defined six main scenarios for
plausible expansion over the medium to long term in a sample of LMICs. The analytical steps are described below and detailed in Mathonnat et al. Variables and references of data used for the three sources are provided in Appendix 1.

The first source examined refers to tax potential. Tax potential is typically defined in the literature as the maximum amount of tax revenue a country can raise at a given point in time, conditional on the prevailing economic, demographic, and institutional factors. Using stochastic frontier analysis techniques, the stochastic tax frontier is estimated, which defines an estimated maximum tax potential assuming a maximum tax effort (i.e., tax effort = 1) and given a set of contextual factors as mentioned above. We used and updated existing tax potential analyses with gross domestic product (GDP) from 2014. We used an optimistic scenario that countries can mobilize 85% of their tax potential and assumed that the proportion of additional tax revenues devoted to health ranges from 20% to 33%.

The second source estimated possible increase in DFSH through better prioritization of public spending toward the sector. It was calculated as the difference between the existing level of public expenditure on health (2012–2014) as a percentage of total public expenditure and the Abuja target (15% of public expenditure allocated to health).

The third source assessed the capacity to improve efficiency of the existing expenditures in the health sector. It examined the extent to which the inputs to the health system are used to effectively enable the achievement of health system goals. Our estimation specifically pertains to technical efficiency and refers to maximizing health system outputs given inputs. We used data envelopment analysis, a non-parametric technique that is widely used for analyzing technical efficiency in health. The input-orientation approach used in this study estimates variation in inputs for a given level of outputs. In other words, in this approach, given the same level of outputs, we estimated what proportion of resources could be “saved” and put to a more productive use in the sector. The inputs considered are per capita public and private expenditure on health, and the outputs are maternal mortality ratio and under-five mortality rate, controlled for urbanization. The assumption was made that every country could reach 90% of its maximum theoretical technical efficiency score (which equals 1 in nonparametric methods). The difference between the actual (2014) performance of the country in terms of technical efficiency and this feasible maximum of 90% is the estimated source of fiscal space for health.

Table 1 presents six main scenarios for expanding domestic fiscal space for health and the main assumptions under each option.

### RESULTS

#### Qualitative Analysis of the Literature Review

The most frequently cited sources of expansion in the reviewed studies are macroeconomic conditions, budget

| Scenario | Scenario Description | Main Assumptions |
|----------|----------------------|------------------|
| A1       | Mobilizing tax potential | Tax-to-GDP ratio reaching 85% of tax potential and 20% additional revenues allocated to health |
| A2       | Mobilizing tax potential with more priority given to health in additional resource allocation | Tax-to-GDP ratio reaching 85% of tax potential and 33% additional revenues allocated to health |
| B        | Increasing prioritization of budget toward health | Increased prioritization of health in public expenditure according to the Abuja target (15%) |
| C        | Improving efficiency of health expenditure | Efficiency is increased to reach 90% of the maximum score of one and gains are kept in the health sector |
| D        | Doing better with the existing resource envelope: improved efficiency and better prioritization (combined scenario) | Increased prioritization of health in public expenditure according to the Abuja target (scenario B) and improved efficiency to reach 90% of the maximum score of one (gains are kept in the health sector; scenario C) |
| E        | Mobilizing additional revenues and doing better with existing resource envelope (combined scenario) | Tax-to-GDP ratio reaching 85% of tax potential and 33% additional revenues allocated to health (scenario A2), increased prioritization of health expenditure in public expenditure according to the Abuja target (scenario B), and improved efficiency to reach 90% of the maximum score of one (gains are kept in the health sector; scenario C) |

**Table 1. List of Scenarios for Estimating Domestic Fiscal Space for Health**
prioritization, and technical efficiency (understood as the ability to get better outputs with the same level of inputs). Based primarily on historic income elasticity of public expenditure on health, 90% of the studies conclude that macroeconomic conditions (in most cases economic growth) and budget prioritization have high potential to expand DFSH.\textsuperscript{22–28}

Technical efficiency is referenced as having high potential for DFSH expansion in 60% of the studies (Figure 2). The most frequently cited sources of technical inefficiency in these studies include, in descending order, pharmaceutical policies, provider payment systems, human resource policies, public financial management, and targeting of government subsidies. Studies that estimate the monetary value of technical efficiency improvements provide evidence that these measures can generate significant resources for the sector (see Appendix 2); the estimated scope is often considered to be larger than resources generated from the other sources.\textsuperscript{6,29}

By contrast, evidence is more scarce and mixed regarding the scope for significant DFSH expansion from earmarked funds, whether in the form of public health taxes, social health insurance contributions, or other indirect taxes such as those on natural resources or mobile phones. A limited number (nine) of DFSH studies assess gains to be derived from public health taxes, and they generally converge on the limited potential of this source relative to the other domestic sources, despite some possible financial gains in absolute terms or in niche areas (see Appendix 2). When quantified, the potential gains from tobacco tax earmarking comprise between 0.02% and 0.05% of GDP.\textsuperscript{24,30} From the eight studies that examine social health insurance contributions as a potential source of DFSH expansion, projections reveal low expected gains, mostly due to labor market informality or implementation constraints (see Appendix 2). Other types of earmarked taxes, including mobile phone levies, remittances, and health-specific lotteries, also appear to provide limited additional resources, ranging from 1% to 2.3% of actual spending on health.\textsuperscript{28,31}

Overall, the analysis has identified a few common methodological weaknesses. While focusing broadly on economic growth, very few fiscal space for health studies disentangle potential from general tax policies, and analyze the actual capacity and constraints to effectively mobilize, administer and redistribute general revenues, including for health issues. In addition, no clear distinction is made between a country’s capacity to increase DFSH (e.g., theoretical scope for more favorable budget prioritization toward health) and the actual likelihood of such a change in practice. By not directly taking into account political feasibility, most studies do not analyze whether a government would be actually willing to increase prioritization of health within the budget but rather focus on potential ability to do so.\textsuperscript{32} Similar pitfalls have been identified in relation to earmarked funds. The additivity of public health tax revenues to the health sector budget is taken for granted in most studies, despite evidence that this is not systematically the case in practice due to fungibility-related issues.\textsuperscript{32,33}

### Quantitative Analysis

We found that potential gains in DFSH are substantial in all LMICs included in this analysis (Table 2). Specifically,

| Tax Revenues | Prioritization | Efficiency | Combined Sources |
|--------------|----------------|------------|------------------|
|               | A1  | A2  | B   | C   | D   | E   |
| LMIC average  |     |     |     |     |     |     |
| (95% CI)      | (36, 58) | (60, 96) | (57, 87) | (21, 31) | (77, 102) | (109, 154) |
| n             | 64  | 64  | 123 | 108 | 108 | 64  |
| Sub-analyses  |     |     |     |     |     |     |
| Low-income average (%) | (22, 65) | (36, 108) | (40, 87) | (6, 19) | (46, 79) | (76, 147) |
| n             | 14  | 14  | 28  | 24  | 24  | 14  |
| Lower-middle average (%) | (46, 94) | (75, 154) | (68, 131) | (18, 33) | (87, 137) | (122, 229) |
| n             | 23  | 23  | 48  | 40  | 40  | 22  |
| Upper-middle average (%) | (21, 39) | (34, 64) | (31, 67) | (26, 42) | (65, 105) | (87, 133) |
| n             | 27  | 27  | 49  | 44  | 44  | 27  |

**TABLE 2.** Expected Change in Public Expenditure on Health from Improved Tax Mobilization, Budget Prioritization and Efficiency among Low- and Middle-Income Countries (%)
| Author (year of publication) | Country(-ies)                                                                 | Macro-economic conditions | Budget re prioritization | Ear-marked funds | Efficiency measures |
|-----------------------------|-------------------------------------------------------------------------------|---------------------------|-------------------------|------------------|---------------------|
| Aguzzoni (2011)             | Zambia                                                                        |                           |                         |                  |                     |
| Barroy et al. (2014)        | DRC                                                                           |                           |                         |                  |                     |
| Berman et al. (2010)        | India                                                                         |                           |                         |                  |                     |
| Duran-Valverde & Pacheco (2012) | Bolivia, Botswana, Brazil, Namibia, Thailand, Costa Rica, Lesotho |                           |                         |                  |                     |
| Hagen-Zanker & Tavakoli (2012) | Nigeria                                                                    |                           |                         |                  |                     |
| Handley (2009)              | Republic of the Congo, Equatorial Guinea, Mali, Senegal                       |                           |                         |                  |                     |
| Ichoku & Okoli (2015)       | Nigeria                                                                       |                           |                         |                  |                     |
| Gupta & Mondal (2014)       | Bangladesh, Maldives, Myanmar, Sri Lanka, Timor-Leste                         |                           |                         |                  |                     |
| James et al. (2014)         | Tanzania                                                                      |                           |                         |                  |                     |
| Laita (2012)                | Caribbean region                                                              |                           |                         |                  |                     |
| Lane (2009)                 | Rwanda                                                                        |                           |                         |                  |                     |
| Mathonnat (2010)            | Cross-country LMICs                                                          |                           |                         |                  |                     |
| Matus et al. (2015)         | Peru                                                                           |                           |                         |                  |                     |
| Morisse (2013)              | Arab region (LMICs only)                                                      |                           |                         |                  |                     |
| Murray-Zmijewski (2015)     | Ethiopia                                                                      |                           |                         |                  |                     |
| Okwero et al. (2010)        | Uganda                                                                        |                           |                         |                  |                     |
| QPM (2014)                  | Morocco                                                                       |                           |                         |                  |                     |
| Regioni & Whiteside (2012)  | South Africa                                                                  |                           |                         |                  |                     |
| Saleh et al. (2014)         | Gabon                                                                          |                           |                         |                  |                     |
| Schieber et al. (2012)      | Ghana                                                                         |                           |                         |                  |                     |
| Sharma (2016)               | Bhutan                                                                        |                           |                         |                  |                     |
| Somanathan et al (2014)     | Viet Nam                                                                      |                           |                         |                  |                     |
| World Bank (unpublished)    | Liberia                                                                       |                           |                         |                  |                     |
| Vargas et al. (2016)        | Bangladesh                                                                    |                           |                         |                  |                     |
| World Bank (2009)           | Indonesia                                                                     |                           |                         |                  |                     |
| World Bank (2011)           | Nepal                                                                         |                           |                         |                  |                     |
| World Bank (unpublished)    | Chad                                                                           |                           |                         |                  |                     |
| Zine Eddine El IdriSSI (unpublished) | Republic of Guinea                                                          |                           |                         |                  |                     |

Source: authors

**FIGURE 2. Heat Map: Scope of the Expected Change in Fiscal Space for Health by Source in the Reviewed Studies (n = 28)**
based on a sample of 64 countries, we estimated that on average a country could more than double its public expenditure on health if it enhanced tax effort, technical efficiency and budget prioritization for health (Scenario E, Table 2).

Broadly, an increase in tax revenue, where at least one third of newly raised revenues is allocated to health (Scenario A2, Table 2), is estimated to be the largest source of potential DFSH. It is expected that a country on average can increase its public expenditure on health by 78% (95% confidence interval [CI], 60%, 96%) under this scenario. This is followed closely by improved prioritization (Scenario B) as a source of DFSH with an expected increase of 72% (95% CI, 57%, 87%). Improved technical efficiency (Scenario C) is estimated to provide a 26% (95% CI, 21%, 31%) increase in public expenditure on health over the baseline. When disaggregated by income group, the lower-middle-income countries appear to have the largest scope to increase DFSH, particularly through improved tax effort and prioritization (Table 2).

Another major finding of the quantitative analysis is that, even without higher revenue, actions that result in budget reprioritization and technical efficiency improvements alone could significantly expand DFSH (Scenario D), amounting to an approximate average increase of 90% (95% CI, 77%, 102%) in the sampled countries. This finding indicates that DFSH could potentially increase substantially, even in the absence of overall fiscal expansion.

**DISCUSSION**

Through this use of a qualitative analysis of existing fiscal space for health studies and quantitative data analysis, we found substantial convergence with respect to the potential main sources of DFSH expansion across LMICs. In general, the quantitative analysis confirms findings from our analysis of the existing literature and further quantifies the average potential gains realizable from each source.

The study findings have important implications for health financing policy and domestic resource mobilization toward UHC. First, they highlight the critical role played by fiscal conditions and tax policies as a dominant driver of fiscal space, including for the health sector. This has often been overlooked in past studies focusing on sector-specific interventions (i.e., earmarked funds), on the one hand, and overall economic growth, on the other. While economic growth is a recognized driver of tax revenues, our analysis highlights that gains made from improved tax collection efforts (e.g., change in tax rate and base, exemption and subsidy policy, compliance, evasion)—that are typically distinct from economic growth policies—are critical. Our findings underscore the importance to shift emphasis to revenue-based assessment, especially in contexts where there is limited capacity to translate “growth dividends” into higher public revenues.

Second, our study provides strong evidence that DFSH can be expanded, even in the absence of new revenue (i.e., gains generated through a better allocation and use of public resources). This result confirms the findings of existing literature, suggesting, for example, that efficiency enhancements can by themselves generate additional resources that can be retained and reemployed within the sector. This finding is particularly important in the context of unfavorable macroeconomic contexts, allowing policy makers to turn their attention to what can be done to finance progress toward UHC within their available resource envelopes. It also encourages health policy makers to examine how resources are currently allocated and used in the sector (e.g., distribution of resources by level of care, types of provider payment mechanisms and incentives, public financial and expenditure management practices and bottlenecks), with a view toward expanding the financial margin of the sector. Such a process can also support advocacy for greater budget prioritization and provide an opportunity for productive dialogue with finance authorities.

Third, this study has implications for future research. The first aspect highlights the need for additional thinking on how to approach and measure technical efficiency from a fiscal space perspective. Though the study provides strong rationale to orient future fiscal space for health assessments around efficiency gains, there is a gap in the existing literature on the approach’s conceptualization, metrics, and actual implications for policy development. More research is needed to enable future assessments to incorporate technical and allocative efficiency more systematically. The second aspect relates to the inclusion of Public Financial Management (PFM) issues as part of the fiscal space for health framework. As our study demonstrates, fiscal space for health can be expanded not just by tapping into additional resources but by optimizing the way existing resources are planned, allocated, and utilized in the sector. It is technically possible to systematically identify improvements in health budgeting and execution practices and measure the possible fiscal gains to be expected. Though some recent inputs on the links between health financing and PFM could be plugged in to the future assessments, there
is a need to further develop the analytical framework to support the inclusion of PFM aspects as possible drivers for DFSH expansion in a more systematic manner.

This article has some limitations, in both scope and methods. To be consistent with the existing definition of DFSH, the literature review only included studies that looked at multiple sources of expansion and that considered the health sector as a whole, thereby excluding studies specifically focused on a single source (e.g., tobacco tax) or a specific disease (e.g., HIV/AIDS). Variations in study methods and metrics used in the reviewed studies did not allow for a quantitative assessment of each source or a meta-analysis. Though our quantitative approach did make it possible to provide further estimations across a sample of LMICs for three main sources of expansion, the lack of data for earmarking limited our ability to provide estimates for this source and to complement the findings from the literature review in this respect. In addition, differences in sample sizes make cross-factor comparison difficult. The quantitative analysis was also done as a hypothetical exercise and does not account for the political feasibility of implementing policies to improve macroeconomic conditions, budget prioritization, or technical efficiency. Lastly, non-tax revenue sources are not considered in the estimates, and this affects particularly resource-rich countries.

In conclusion, by using qualitative analysis of a literature review with quantitative analysis of a data set on sources related to fiscal space, this study was able to assess the potential sources of DFSH and provide a cross-country comparative analysis of the scope of expansion in LMICs. More research and continued refinement in the analytical methods used to operationalize the fiscal space for health concept are needed to facilitate a greater understanding of how countries can feasibly increase and maximize the use of domestic resources for the health sector as they seek to make progress toward UHC in the SDG era.

DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST

No potential conflicts of interest were disclosed.

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REFERENCES

1. Heller P. Understanding fiscal space. Washington (DC): International Monetary Fund; 2005.
2. Heller P. The prospects of creating “fiscal space” for the health sector. Health Policy Plan. 2006;21(2):75–79. doi:10.1093/heapol/czj013.
3. Secretary General of the United Nations. Indicators and a monitoring framework for the Sustainable Development Goals. New York (NY): United Nations; 2015.
4. International Monetary Fund. Assessing fiscal space: an initial consistent set of considerations. Washington (DC): International Monetary Fund; 2016.
5. Tandon A, Cashin C. Assessing public expenditure on health from a fiscal space perspective. Washington (DC): World Bank; 2010.
6. Mathonnat J. Availability of financial resources for health in sub-Saharan African countries. Paris (France): French Development Agency Department of Research; 2010.
7. Roy R, Heuty A, Letouze E. Fiscal space for what? Analytical issues from human development perspectives. Istanbul (Turkey): United Nations Development Programme; 2007.
8. Roy R, Abu-Ismail K, Almeida Ramos R. Is there fiscal space for financing an Arab development transformation? Brazil: International Policy Centre for Inclusive Growth; 2012.
9. Powell-Jackson T, Kara Hanson. Di McIntyre fiscal space for health: a review of the literature: London (UK): RESYST; 2012.
10. McIntyre D, Meheus F. Fiscal space for domestic funding of health and other social services. London (UK): Chatham House; 2014.
11. Dieleman, J, Campbell M, Chapin A, Eldrenkamp E, Fan VY, Haakenstad A, Kates J, Liu Y, Matyas T, Micah A, et al. Evolution and patterns of global health financing 1995–2014:
development assistance for health, and government, prepaid private, and out-of-pocket health spending in 184 countries. Lancet. 2017;389(10083):1981–2004. doi:10.1016/S0140-6736(17)30874-7.

12. Barroy H, Kutzin J, Tandon A, Kurokvisi C, Lie G, Borowitz M, Sparkes S, Dale E. Commentary: assessing fiscal space for health in the SDG era: a different story. Health Sys Ref. 2018;4(1):4–7.

13. Creswell JW, Plano Clark VL, Gutmann ML, Hanson WE. Advanced mixed methods research designs. In: Tashakkori A, Teddie C, editors. Handbook of mixed methods in social and behavioral research: Sage Publications; 2003. p. 209–240.

14. Mathonnat I, Petitfour L, Tapsoba Y. Budgetary space and public spending for health – measures, evolutions and determinants; 2016.

15. Langford B, Ohlenburg T. Tax revenue potential and effort—an empirical investigation. London (UK): International Growth Centre, 2015.

16. Fenochietto R, Pessino C. Understanding countries’ tax effort. Washington (DC): International Monetary Fund; 2013.

17. African Union. Abuja declaration on HIV/AIDS, tuberculosis and other related infectious diseases. Abuja, Nigeria: African Union; 2001.

18. Cylus J, Papanicolas I, Smith PC. Health system efficiency. Copenhagen (Denmark): European Observatory on Health Systems and Policies; 2016.

19. Cazals C, Florens J-P, Simar L. Nonparametric frontier estimation: a robust approach. J Econ. 2002;106(1):1–25. doi:10.1016/S0304-4076(01)00080-X.

20. Simar L, Wilson PW. Estimation and inference in two-stage, semi-parametric models of production processes. J Econ. 2007;136(1):31–64. doi:10.1016/j.economet.2005.07.009.

21. Daruio C, Simar L. Advanced robust and nonparametric methods in efficiency analysis: methodology and applications. United States of America: Springer Science & Business Media; 2007.

22. Sharma J. An assessment of fiscal space for health in Bhutan. Int J Health Plann Manage. 2015;31(3):296–308.

23. Barroy H, Andre F, Mayaka S, Samaha H. Investing in universal health coverage: opportunities and challenges for health financing in the Democratic Republic of Congo. Washington (DC): World Bank; 2016.

24. Matus M, Prieto L, Cid C. Evaluating fiscal space for health in Peru. Washington (DC): Pan American Health Organization/WHO Regional Office for the Americas; 2015.

25. Gupta I, Mondal S. Health spending, macroeconomics and fiscal space in countries of the World Health Organization South-East Asia Region. Geneva (Switzerland): World Health Organization; 2014.

26. Aguzzoni L. The concept of fiscal space and its applicability to the development of social protection policy in Zambia. Geneva (Switzerland): International Labor Organization; 2011.

27. Hagen-Zanker J, Tavakoli H. An analysis of fiscal space for social protection in Nigeria. United Kingdom (London): Overseas Development Institute; 2012.

28. James C, Lievens T, Murray-Zmijewski A, Aikaeli A, Booth P. Fiscal space for the Tanzanian health sector. United Kingdom (Oxford): Oxford Policy Management; 2014.

29. Novignon J, Nonvignon J. Fiscal space for health in sub-Saharan African countries: an efficiency approach. Munich (Germany): Munich Personal Research Papers in Economics Archive; 2015.

30. Saleh K, Couttolenc BF, Barroy H. Health financing in the Republic of Gabon. Washington (DC): World Bank; 2014.

31. Federal Ministry of Health of the Federal Democratic Republic of Ethiopia. Ethiopia health financing strategy: resource mobilisation—fiscal space and innovative financing. Federal Ministry of Health of the Federal Democratic Republic of Ethiopia; 2015.

32. Barroy H, Sparkes S, Dale E. Assessing fiscal space for health in low and middle income countries: a review of the evidence. Geneva (Switzerland): World Health Organization; 2016.

33. Cashin C, Sparkes S, Bloom D. Earmarking revenues for health: in theory and in practice. Geneva (Switzerland): World Health Organization; 2017.

34. Rajan D, Barroy H, Stenberg K. Budgeting for health. In: Schmets G, Rajan D, Kadandale S, editors. Strategizing national health in the 21st century: a handbook. Geneva (Switzerland): World Health Organization; 2016.

35. Cashin C, Bloom D, Sparkes S, Barroy H, Kutzin J, O’Dougherty S. Aligning public financial management and health financing. Geneva (Switzerland): World Health Organization; 2017.

36. World Health Organization. Public financing for health in Africa: from Abuja to the SDG. Geneva (Switzerland): World Health Organization; 2016.

37. World Health Organization. Global Health Expenditure Database. [cited 2016 Dec 6]. http://apps.who.int/nha/database/Select/Indicators/en.

38. World Bank. World Development Indicators. [cited 2016 Dec 6]. http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators.

39. United Nations Department of Economic and Social Affairs. Population Division. World Urbanization Prospects: The 2014 Revision. [cited 2016 Dec 6]. https://esa.un.org/unpd/wup/.

40. World Health Organization. Global Health Observatory data repository. [cited 2016 Dec 6]. http://apps.who.int/gho/data/node.home.
| Variable | Time Period for the Data | Reference |
|----------|--------------------------|-----------|
| Public expenditure on health (% of total public expenditure) | 2012–2014 (three-year average) | (World Health Organization 2016a)37 |
| Public expenditure on health per capita, PPP (international $) | 2014 | (World Health Organization 2016a)37 |
| Private expenditure on health per capita, PPP (international $) | 2014 | (World Health Organization 2016a)37 |
| GDP per capita | 2014 | (World Bank 2016)38 |
| GDP | Latest available year available for the country in the period between 2008 and 2012 | Authors’ calculations based on Fenochietto and Pessino16 and Langford and Ohlenburg15 |
| Tax potential | 2014 | (World Bank 2016)38 |
| Tax-to-GDP ratio | 2014 | (World Bank 2016)38 |
| Urbanization | 2014 | (United Nations Department of Economic and Social Affairs Population Division 2014)39 |
| Maternal mortality ratio | 2014 | (World Health Organization 2016b)40 |
| Child mortality rate | 2014 | (World Health Organization 2016b)40 |

**APPENDIX 1. List of Key Variables and References for Quantitative Analysis**

| Author (year of publication) | Country(-ies) | Macroeconomic conditions | Budget reprioritization | Earmarked funds | Efficiency measures |
|------------------------------|---------------|--------------------------|-------------------------|----------------|---------------------|
| Aguzzoni (2011) Zambia       | High. Additional resources to social protection as a share of GDP increasing from 0.3% in 2010 to 1.5% in 2015 & onwards, largely driven by increased tax revenue | High, "key priority", not quantified separately | Not mentioned | Moderate, focus on overall public sector measures such as reducing the size of the public administration, not quantified separately |
| Barroy et al. (2016) DRC     | High. 1.1% of GDP from a baseline value of 0.7% of GDP, through better tax revenue collection | High, due to low current prioritization. 1% GDP | Not mentioned | High. 1.3% of GDP from a baseline value of 0.7% of GDP. Through better budget execution first. |
| Berman et al. (2010) India   | Low, given historical elasticity of government health spending to GDP. | Low | Not mentioned | Stated as important but no systematic analysis |
| Duran-Valverde & Pacheco (2012) Bolivia, Botswana, Brazil, Namibia, Thailand, Costa Rica, Lesotho | Moderate overall, varied by country | Moderate overall, varied by country | High overall (social contributions specifically) | Moderate overall, varied by country |
| Hagen-Zanker & Tavakoli (2012) Nigeria | High, projected GDP growth at 6-7% p.a. & high growth in oil revenues, which equal 22% of GDP | Moderate, not quantified | Low, "exact savings ... difficult to quantify" | Moderate, will take time and "difficult to quantify" |
| Handley (2009) Congo, Republic, Equatorial Guinea, Mali, Senegal | Moderate for the sub-region. Higher in Gulf of Guinea. For social sectors, including health. | High, due to low current prioritization (Gulf of Guinea) | Not mentioned | Not mentioned |
| Ichoku & Okoli (2015) Nigeria | High. $2.1 b in additional resources to health | Low. No expected change in prioritization at the federal level | Not mentioned | Stated as important but not systematic analysis |

(continued on next page)
| Author (year of publication) | Country(-ies) | Macroeconomic conditions | Budget reprioritization | Earmarked funds | Efficiency measures |
|-----------------------------|--------------|--------------------------|-------------------------|----------------|-------------------|
| Gupta & Mondal (2014)       | Bangladesh, Maldives, Myanmar, Sri Lanka, Timor-Leste | High (Bangladesh, India, Indonesia, Nepal, Sri Lanka) | High (Thailand and Maldives, Timor-Leste) | Not mentioned | Not mentioned |
| James et al. (2014)         | Tanzania     | Moderate. $7 million per year in the near term rising to around $35 million per year in the longer term | High. $773 million per year if Abuja target is achieved | Low for public health taxes (3% of the "basic" gap). Moderate for social health insurance contributions | High: saving of 1.1 billion TzSh per year (~$660,000) |
| Lalita (2012)               | Caribbean region | Moderate | Low | Moderate through social health contributions | High, but no quantitative analysis |
| Lane (2009)                 | Rwanda       | Moderate. | Moderate. Share expected to double. Mixed political signal | Not mentioned | High, but no quantitative analysis |
| Mathonnat (2010)            | Cross-country LMICs | Moderate | Moderate | Moderate, through HIPC funds | High, $8 per capita for sub-Saharan African countries |
| Matus et al. (2015)         | Peru         | High. 0.5-1% GDP | Low, given already high prioritization | Moderate. 0.2% of GDP through public health taxes | Moderate. 0.16% GDP |
| Morisse (2013)              | Arab region (LMICs only) | Low for LMICs based on historical macroeconomic trends, not quantified | Low for LMICs, not quantified | Not mentioned | Moderate for LMICs, not quantified |
| Murray-Zmijewski (2015)    | Ethiopia     | Low, not a focus of the study, focuses on special earmarked levies and taxes | Moderate. 10% of funding gap | Moderate. 10% of funding gap, or $1.7 b through social health contributions | High. 12% of the funding gap, or $4.9 b |
| Okwero et al. (2010)        | Gabon        | High. Income elasticity for domestically financed health spending (excluding external grants) is <1 (e=0.95), but given high economic growth projections government per capita health expenditure were expected to double between 2007 and 2015. | Moderate, for its income level, the amount Uganda spends on health is about the norm, and it is not clear which other sectoral allocations should be cut to increase allocations to health. Reaching Abuja target would have added only US$4 per capita in 2006. | Limited for social health insurance contributions due to large informal sector, does not examine public health taxes | High, total waste is estimated at 13% of total health expenditures |
| OPM (2014)                 | Morocco      | High | High, given low current prioritization | Not mentioned | High, through better drug, HR management and allocation policies, and refined provider payment systems |
| Regondi & Whiteside (2012) | South Africa | Limited, due to macro-fiscal contraction | High; high political priority | Moderate. Already high tax on alcohol. Considering sugar tax | High, due to integration challenges |
| Saleh et al. (2014)         | Gabon        | Moderate, slowing economic growth | High, due to current low prioritization | Low, due to recent introduction of earmarked taxes for health. Potential gains from tobacco tax could be 0.05% of GDP. | High, through refined provider payment systems |

(continued on next page)
| Author (year of publication) | Country(-ies) | Macroeconomic conditions | Budget reprioritization | Earmarked funds | Efficiency measures |
|------------------------------|--------------|--------------------------|--------------------------|----------------|---------------------|
| Schieber et al. (2012)       | Ghana        | Moderate, two separate scenarios are given. Real government health expenditure could increase by up to 45% by 2015 from the starting point in 2009, if economic growth (6–7% a year) is accompanied by improved revenue collection; otherwise, real government health spending declines 13%. | Low, due to current prioritization level | Low, due to existing earmarked 2.5% VAT to health; "may be scope (albeit limited) for including earmarked taxes on tobacco products" | High, estimates vary by source of inefficiency however and not all sources are quantified in monetary terms, although magnitude of particular inefficiency is demonstrated (eg. absenteeism rate among health workers) |
| Sharma (2016)                | Bhutan       | High. 1.3% of GDP        | Moderate                 | Low, scope of revenue generation through tobacco taxes is limited, earmarking alcohol taxes could be considered, earmarking tax on sugary drinks and foods with high salt or fat content could be considered given high rate of obesity in urban population | High, as demonstrated by variation in performance in terms of health outcomes among various geographic units, not quantified. |
| Somanathan et al (2014)      | Viet Nam     | Moderate: 0.3% of GDP, reaching 2.2% of GDP by 2015 | Moderate, given current prioritization | "Sin taxes", especially on cigarettes. VND 4.5 trillion could be raised as additional revenues if tobacco taxes are increased by one-third. This is 0.7% of total government health expenditure in 2010 (VND 648 trillion). | High, estimates vary by source of inefficiency however and not all sources are quantified in monetary terms, although magnitude of particular inefficiency is demonstrated (eg. absenteeism rate among health workers) |
| World Bank (unpublished)     | Liberia      | High                     | Moderate, given current prioritization | Low. Weak tax collection system; no VAT in place | Moderate, given current health system and EVD associated challenges |
| Vargas et al. (2016)         | Bangladesh   | High, if economic growth translated into higher government revenue | High, given current low prioritization | Low, for social health insurance contributions given high level of labour informality | Moderate, given very low level of sectoral allocations |
| World Bank (2009)           | Indonesia    | Moderate, due to financial crisis | High, due to current low prioritization | Moderate, through public health taxes | Moderate; not quantified |
| World Bank (2011)           | Nepal        | Moderate. 0.3% of GDP    | Low, due to relatively high current prioritization | Low, especially through social health insurance contributions and public health taxes (already in use) | High. Estimates vary by source, not all are quantified or given monetary value |

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| Author (year of publication) | Country(-ies) | Macroeconomic conditions | Budget reprioritization | Earmarked funds | Efficiency measures |
|-----------------------------|--------------|--------------------------|-------------------------|----------------|-------------------|
| World Bank (unpublished)    | Chad         | Low, due to oil prices volatility. | Moderate, high given current prioritization, but limited political window for a change | Not estimated | High. Better execution and public financial management. |
| Zine Eddine El Idrissi (unpublished) | Guinea     | Low, due to economic contraction following EVD crisis | High, due to current low prioritization | Moderate. $67m per year through two new telecom taxes | High |

APPENDIX 2: Literature review findings: scope of expected change in domestic fiscal space for health in the reviewed studies (n=28)