

## **We shouldn't count chickens before they hatch: Results-based financing and the challenges of cost-effectiveness analysis**

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**Abstract:**

Results-based financing (RBF) is subject to fierce debate and the evidence-base on its cost effectiveness is scarce. To our knowledge, only one cost-effectiveness study of RBF in a lower-middle income country has been published in a peer reviewed journal. That study – in Zambia – concludes that RBF is cost-effective, which was then uncritically repeated in an editorial accompanying its release. Here we would like to warn against readily accepting the conclusion of the cost-effectiveness study of RBF in Zambia, because its conclusions are not straightforward and could be dangerously misleading, especially for those readers unfamiliar with health economics. After outlining the results from the Zambia’s RBF cost-effectiveness study, we point to important methodological issues related to cost-effectiveness analysis, showing how key assumptions produce particular results. We then reflect on how cost-effectiveness is different from efficiency and affordability – which is important, since cost-effectiveness studies often have considerable influence on national health financing strategies and policy priorities. Finally, we provide an alternative reading of the evidence on RBF in Zambia. Namely, when examined from an efficiency point of view, the study actually demonstrates that RBF is less efficient than the simpler alternative of providing more resources to health facilities, unconditioned on performance, which will be of most interest to a government with tight budget constraints. As a result, existing claims that RBF is cost-effective are overstated, requiring further and more nuanced examination with more adequate research methods.

Keywords: results-based financing; cost-effectiveness; low- and middle-income countries

## **Introduction**

Performance-based financing, pay-for-performance or results-based financing (RBF) is implemented in dozens of low- and middle-income countries (LMICs) and remains high on the donor agenda. Since 2007, the World Bank has managed the Health Results Innovation Trust Fund, a multi-donor fund aimed at disseminating RBF interventions to improve maternal and child health (Henrion, Struwig, Wedgwood Young, Guay, & Duering, 2018). The World Health Organization is now also supporting the idea that RBF is a good entry point for rendering purchasing of health services more strategic (McIsaac, Kutzin, Dale, & Soucat, 2018; Soucat, Dale, Mathauer, & Kutzin, 2017).

However, RBF is subject to significant debate. Concerns have been raised about its potential perverse effects and lack of effectiveness, equity, ownership, and sustainability (Barnes, Brown, & Harman, 2015; Ireland, Paul, & Dujardin, 2011; Paul, Albert, Bisala, et al., & Ridde, 2018; Ridde, Gautier, Turcotte-Tremblay, Sieleunou, & Paul, 2018; Seppey, Ridde, Toure, & Coulibaly, 2017; Turcotte-Tremblay, Gali-Gali, De Allegri, & Ridde, 2017). In particular, studies have pointed to the high costs of RBF (Borghi, Little, Binyaruka, Patouillard, & Kuwawenaruwa, 2015; De Allegri, Makwero, & Torbica, 2019), and little evidence exists to support its efficiency or value-for-money (Chi et al., 2018). In 2016, a systematic review was published and identified only seven articles examining value-for-money from five LMICs, none of which conducted a full economic evaluation and none was exempt from potential conflicts of interests. Moreover, the overall strength of the evidence provided by these articles was weak, with no clear connection between the costs and effects of RBF (Turcotte-Tremblay, Spagnolo, De Allegri, & Ridde, 2016).

Unfortunately, the evidence-base on the cost effectiveness of RBF has not improved much since 2016. Based on the three cost effectiveness studies of RBF carried out to date in LMICs (in Argentina, Zimbabwe and Zambia), the mid-term evaluation of the Health Results Innovation Trust Fund concluded that “evidence on cost effectiveness shows some positive results but further study is needed” (Henrion et al., 2018). Moreover, to our knowledge, only the cost-effectiveness study in Zambia (Zeng et al., 2018) has been published in a peer reviewed academic journal. In that study, Zeng et. al. conclude that RBF is cost-effective, which was then uncritically repeated in a World Health Organization editorial accompanying the study’s release (McIsaac et al., 2018).

Here we would like to warn against readily accepting the conclusion of the Zeng et. al. RBF study, as was so easily done by the World Health Organization. This is because the actual conclusions from Zeng et al. are not as straightforward as suggested in the editorial. In stronger terms, we see the editorial as a rather lackadaisical treatment of the study, which could be dangerously misleading regarding RBF’s overall effects, especially for those readers unfamiliar with health economics and who may not understand the impact of the original study’s assumptions on cost-effectiveness and/or do not fully understand the difference between cost-effectiveness and efficiency. Maintaining this last distinction is especially crucial, since cost-effectiveness studies often have considerable influence on national health financing strategies and policy priorities.

## **Materials and methods**

We proceed below by critically analysing RBF cost-effectiveness in Zambia and review it against cost-effectiveness methods. After outlining the results from Zambia’s RBF cost-effectiveness study, the bulk of our argumentation is structured around three points: (i) methodological concerns; (ii) the difference between cost-effectiveness and other

concepts needed to appropriately appraise RBF holistically; and (iii) our reading of the evidence on RBF.

## **Results**

The sole academically published cost-effectiveness study on RBF has been that of Zeng et. al. (2018), which aimed to evaluate the cost-effectiveness of RBF against the ability of input-based financing to increase the use and quality of maternal and child health services in rural areas of Zambia. Although labelled a cost-effectiveness study by the research team, it was actually more attuned to a cost-utility analysis, since the benefits were measured in terms of quality-adjusted life years (QALYs). As a means of comparison, the study was based on a cluster-randomized trial having allocated health districts to three test groups:

- (1) RBF: increased funding tied to performance on pre-agreed indicators. Health facilities under this scheme were required to use at least 40% of the incentive payment for operational activities, and the rest for incentives payment to personnel. Over the 2.25 years of the programme, 7.91 United States dollars (US\$) per capita was used in the RBF districts;
- (2) Input-based financing: increased funding not tied to performance. The payment received was used only for operational activities. Over the 2.25 year, 2.16 US\$ per capita was used in the input-based financing districts;
- (3) A pure control group: no additional funding, no indicators.

Based on a number of research assumptions (see details below), the study found that incremental cost-effectiveness ratios (ICER) were 809 US\$ per QALY gained through RBF, and 413 US\$ per QALY gained for the control group receiving input-based financing, when compared to the pure control group. From this Zeng et. al. conclude that

“compared with the control, both results-based financing and input-based financing were cost-effective [...]”, because the ICERs were “less than 1.5 times the [gross domestic product (GDP)] per capita in 2013 in Zambia” (Zeng et al., 2018).

## **Discussion**

### ***Cost-effectiveness analysis of RBF and important methodological issues***

Before accepting the conclusion of Zeng et. al. it is important to highlight a number of contentious methodological issues regarding cost-effectiveness studies. First, by definition, cost-effectiveness analysis ideally aims to compare the full costs and the full effects of an intervention, and thus it requires particularly robust modelling assumptions for the identification, measurement and valuation of those costs and effects (Chi et al., 2018). The appropriateness of those models is crucial, since these assumptions have a considerable influence on the results. Moreover, this need for sophisticated modelling is acknowledged in the World Bank’s assessment toolkit for cost-effectiveness of RBF interventions, recommending the further use of sensitivity analyses to test whether changes in assumptions change results in a significant manner (Shepard, Zeng, & Nguyen, 2015). In the case of the RBF evaluation in Zambia, a number of the assumptions used remain highly contested and problematic. The potential effects are that the RBF total costs were underestimated along with further assumptions about whether the indicators were independent. If this is so, then this has considerable implications for how to understand the results.

Second, the ICER of a single intervention cannot tell us much on its own. It is only when compared to the ICER of other interventions, or to a given threshold, that it becomes meaningful. The World Bank’s toolkit uses the World Health Organization’s “CHOICE”

categorisation and reckons that an intervention is cost-effective when its ICER ranges between one and three times the country's GDP per capita (Shepard et al., 2015). However, there are known problems with using thresholds based on a country's GDP per inhabitant. On one side, if thresholds are set too high they will lead to the inclusion of unaffordable interventions (Chi et al., 2018). On the other side, if rough average national income measures are used, then this could also result in effective or crucial health interventions being withheld from LMICs (The Equitable Access Initiative, 2016). In the case of Zambia, RBF could only be judged as cost-effective based on the particular GDP threshold chosen by Zeng et. al., but would not have been judged as cost-effective had another threshold, which reflected actual budget constraints, been chosen.

Third, cost-effectiveness analysis has been developed to assess simple health interventions or technologies, but its application to complex interventions like RBF remains a well-recognised challenge. Unlike targeted interventions, RBF is a system-wide intervention that is subject to system constraints, which will have dynamic impacts on various components of the health system. Because of this many scholars have argued the need to develop new analytic models to comprehend such system effects (Vassall, Bozzani, & Hanson, 2019; Verguet et al., 2019) as well as better modelling to understand impacts from other contextual moderators of RBF delivery (Borghi, Singh, Brown, Anselmi, & Kristensen, 2018).

### ***Cost-effectiveness is not to be equated with efficiency and affordability***

As noted above, cost-effectiveness analysis is difficult to apply to complex interventions. These difficulties complicate assigning importance to what cost-effectiveness means, since it is crucial not to have claims of cost effectiveness confused with conclusions of programme efficiency. Unlike cost-effectiveness, efficiency is a broader concept

encompassing several dimensions: technical efficiency, productive efficiency, and allocative efficiency (Reidpath, Olafsdottir, Pokhrel, & Allotey, 2012). Efficiency is a concept that describes whether overall programme outcomes (consequences) contribute more than the programme costs. Efficiency can be assessed using different tools. The ideal one is a cost-benefit analysis that incorporates and weighs all costs and consequences – whether related to health or not. In principle, this includes political and social consequences as well as more direct effects. Usually, these costs and consequences should be quantified in monetary terms. In turn, cost-effectiveness analysis is a narrower (but often more pragmatic) tool that focuses on a limited range of measurable consequences (mainly mortality in the past, but now broader health effects are taken into account through measures such as disability-adjusted life years), which are usually limited to the sector impacts only (in this case health impacts). Furthermore, this technique can only determine whether something is more efficient than something else (on the basis of the narrow range of consequences already mentioned), *and not whether it is absolutely efficient in contributing more than it costs*. Another method to measure efficiency is frontier analysis (e.g. Data Envelopment, Stochastic Frontier Analysis), which seeks to position various programmes along or below an “efficiency frontier”. However, neither cost-effectiveness analysis nor frontier analysis allow for the ranking of programmes which are judged equally efficient based on the method’s standard (i.e. being judged cost-effective against a given threshold, or being located on the efficiency frontier). In other words, while cost-effectiveness analysis and frontier analysis are pragmatic tools to measure efficiency, they do it in a rather limited way that *do not allow assessment of broader costs and consequences to analyse overall value-for-money*. New techniques enabling researchers to rank policies or programmes, from low to high value, are only developing – see for instance the health-adapted super-efficiency data



envelopment analysis (Shrime, Mukhopadhyay, & Alkire, 2018). However, to our knowledge, it has not been applied to RBF. This would be the only way to help assess the value of RBF compared to other interventions such as input-based accrued financing.

Moreover, even if an intervention or policy is deemed efficient or cost-effective, it may not be affordable due to budget constraints. “Cost effective but unaffordable” interventions are “an emerging challenge for health systems” in rich countries (Charlton et al., 2017), but it is even more of a challenge in LMICs, where health spending is incomparably low (World Health Organization, 2017). Hence, there is a need to complement cost-effectiveness analysis with budget impact analysis, so as to make sure that prioritised interventions are actually affordable from the payer perspective (Bilinski et al., 2017).

### ***Revisiting RBF in Zambia***

Given the methodological limitations discussed, we believe that the cost-effectiveness analysis of RBF in Zambia (Zeng et al., 2018) as well as the editorial accompanying its release (McIsaac et al., 2018) overlooked crucial contradictory evidence due to an overreliance on unquestioned methodological assumptions and an oversimplified analytical framework. When examined from an efficiency point of view, the study actually demonstrates that RBF is less efficient than the simpler alternative of providing more resources to health facilities, unconditioned on performance. Indeed, in Zambia, a moderate, unconstrained input-based payment made available at operational level made it possible to gain a QALY for 413 US\$, compared to 809 US\$ through RBF. At almost double the cost per QALY gained, the Zambian RBF mechanism mirrors concerns about proportionally high transaction costs associated with RBF in other contexts (Antony, Bertone, & Barthes, 2017; Borghi et al., 2015; De Allegri et al., 2019; Kalk, 2011). To

any policymaker, this is an important consideration when deciding on optimal balances within mixed provider payment systems. Particularly so for a government faced with limited finances for health.

As a result, the claim that RBF is cost-effective is in our view overstated and requires further and more nuanced examination in light of other measures. This lack of holistic nuance is further compounded by the fact that there is actually no consistent evidence on RBF effectiveness and efficiency in LMICs (Henrion et al., 2018; Turcotte-Tremblay et al., 2016; Wiysonge et al., 2017) – not to mention the growing evidence indicating the mixed results and unintended consequences of pay-for-performance in high-income countries (Eijkenaar, Emmert, Scheppach, & Schoffski, 2013; Ryan, Krinsky, Kontopantelis, & Doran, 2016; Ogundeji, Bland, & Sheldon, 2016; Mendelson et al., 2017; Forbes, Marchand, Doran, & Peckham, 2017; Gabel, Chambers, Cox, Listl, & Maskrey, 2018).

## **Conclusion**

Our aim here has been threefold. First, to highlight that there is limited published evidence on RBF cost-effectiveness, which underscores the need for a better evidence base. Second, to argue that existing research suffers from a number of methodological concerns that should temper more enthusiastic generalisations about RBF's ability to strengthen health systems in an affordable way. Most importantly, it is crucial to distinguish claims of cost-effectiveness from efficiency, with the latter being a particularly important consideration in resource constrained settings. Relatedly, this is particularly the case concerning research findings in Zambia, where there is evidence to suggest that input-based interventions are actually more efficient than RBF. Finally, we wish to conclude by noting that it is important to keep these methodological considerations in mind, and to

be modest in our epistemic claims about RBF, particularly in cases where contested evidence is positively echoed within editorials from authoritative institutions like the World Health Organization. What is more prudent regarding RBF, in our opinion, is to recognise that our research designs and evidence-bases are still evolving, that our research methods often remain inadequate or constrained in complex contexts, and that it is never good to count your epistemological chickens before they empirically hatch.

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