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In Tanzania, The Many Costs Of A Pay-For-Performance Plan Leave Open To Debate Whether The Strategy Is Cost-Effective

Abstract

Pay-for-performance programs in health care are widespread in low- and middle-income countries, but there are no studies of the programs' costs or cost-effectiveness. We conducted a cost-effectiveness analysis of a pay-for-performance pilot program in Tanzania and modeled costs of its national expansion. We reviewed project accounts and reports, interviewed key stakeholders, and derived outcomes from a controlled before-and-after study. In 2012 US dollars, the pay-for-performance pilot cost varied from $1.2 million in financial costs to $2.3 million in economic costs. The incremental cost per additional facility-based birth ranged from $540 to $907 in the pilot and from $94 to $261 as a national program. In a low-income setting, the costs of managing the program and generating and verifying performance data were substantial. Pay-for-performance programs can stimulate the generation and use of health information by health workers and managers for strategic planning purposes, but the time involved could divert attention from service delivery. Pay-for-

performance programs may become more cost-effective when integrated into routine systems over time.

Pay-for-performance programs, which provide financial rewards to health care providers based on the achievement of prespecified service coverage or quality targets, are becoming increasingly popular as a means of improving population health. The underlying hypothesis of pay-for-performance programs is that financial incentives will motivate health workers to improve the quality of the health services they provide, and the availability of better services will encourage the population to use health services.[1,2]

Pay-for-performance has been extensively used in the United Kingdom and the United States to improve health care quality.[3] In low- and middle-income countries, pay-for-performance has been identified by policy makers as a strategy to increase the coverage and quality of maternal and child health services and make progress toward UN Millennium Development Goals 4 and 5, which aim to reduce infant, child, and maternal mortality. In 2013 thirty-one low- and middle-income countries were implementing pay-for-performance programs, supported by $1.6 billion in low-interest loans from the World Bank and $410 million from the Results Innovation Trust Fund, which is cofunded by the government of Norway and the United Kingdom.[4]

Despite a growing body of evidence on the effects of pay-for-performance programs, their cost-effectiveness has been much less thoroughly

researched.[5–7] Only fifteen studies examining the cost of pay-for-performance programs have been published.[8,9] Only two of these cost studies were conducted outside of the United States and Europe.[9,10] Only nine of the studies considered costs beyond financial incentives,[10–17] and only two included the costs of developing and setting up the pay-for-performance program in their analysis.[11,13]

The costs to providers of participating in a pay-for-performance program and household costs to patients have also been omitted from previous analyses. Outcomes, if measured, are typically restricted to changes in incentivized services. Only four studies reported effects on outcomes,[12,17–19] and only one study reported effects on nonincentivized services. No study reporting on the costs or cost-effectiveness of pay-for-performance has been published from a low- or lower-middle-income country.

Consequently, further evidence of the cost-effectiveness of such programs is urgently needed to assess whether pay-for-performance represents value for money.[7,20] This article has two purposes: to estimate the cost-effectiveness of pay-for-performance, relative to current practice, as implemented in one region of Tanzania in a pilot over a thirteen-month period (January 2012 to February 2013), and to predict the cost-effectiveness of the pay-for-performance program at scale—that is, if pay-for-performance were to be expanded to the entire country.

Context Of The Tanzania Study

Despite substantial progress in reducing child mortality,[21] Tanzania is still far from achieving Millennium Development Goal 5, a 75 percent reduction in the maternal mortality ratio—that is, [please provide]—between 1990 and 2015.[22,23] Between 1990 and 2013, the maternal mortality ratio fell by only 22 percent, from 498 to 390 per 100,000 live births.[24] The majority of maternal deaths are from direct obstetric causes, with abortion and hemorrhage accounting for over half of these deaths.[24] Pay-for-performance was introduced by donors and the government as a mechanism to improve maternal and child health by enhancing access to relevant services and improving service quality.

In 2011 a pay-for-performance pilot was introduced in the Pwani region of Tanzania, which contains seven districts, by the Ministry of Health and Social Welfare. The pilot received technical support from the Clinton Health Access Initiative and financial support from the government of Norway. All health facilities in the region were eligible to join the program, including seven hospitals, twenty-one health centers, and 234 dispensaries.[25]

The program provides financial rewards to health care providers and institutions based on their achievement of nine maternal and child health service utilization coverage targets.[25] Health service performance targets are set for every six-month performance cycle based on performance in the previous cycle (for [please provide], see online Appendix 1).[26]

Incentive payments are made to health care providers if they achieve at least 75 percent of the target. If 100 percent of the target is achieved, the

provider receives full payment; otherwise, 50 percent of the potential payout is made.

Quality was not monitored or rewarded other than through the explicit content of care indicators. At least 75 percent of incentive payments are distributed among health workers. The remaining 25 percent can be used by the health institution to purchase drugs or supplies or to undertake minor renovations. The maximum incentive payout per cycle is $820 for a dispensary, $3,220 for a health center, and $6,790 for a hospital (all costs are expressed in 2012 US dollars, using a conversion rate of 1,600 Tanzanian shillings per dollar). For a health worker, the incentive payment is equal to about 10 percent of his or her monthly salary.

To participate in the pay-for-performance program, primary care facilities were required to open new bank accounts. The National Health Insurance Fund, a compulsory health insurance program for public servants, is the funds holder. Before making payouts, facility performance data are verified for accuracy by national, regional, and district stakeholders. District and regional managers receive bonus payments of up to $3,000 per cycle, based on facility and district performances.

Alongside the introduction of pay-for-performance, the Ministry of Health and Social Welfare implemented a new comprehensive health management information system. Facilities capture data on paper as in the past, using patient registers and monthly tally sheets, but for a wider range of indicators. Districts started using a computerized system to enter, aggregate, and analyze data.

Study Data And Methods

Approach To Costing

We estimated the incremental provider costs of implementing pay-for-performance relative to current practice in Tanzania for the start-up period from January to December 2011 and for thirteen months of implementation (January 2012–February 2013). Health care provider costs were estimated for each of the implementing agents (the Ministry of Health and Social Welfare, the Clinton Health Access Initiative, and the National Health Insurance Fund). Time spent by staff at the funding agency's office, at the Norwegian embassy in Dar es Salaam, was also valued and included in the analysis. In addition, we estimated the costs to households of increased use of health care services resulting from pay-for-performance implementation. Research costs were excluded from the analysis.

Recurrent financial and economic costs were estimated, along with the cost per program activity (for a definition of the main intervention activities, see Appendix 2).[26] Financial costs capture all financial transactions that are a result of pay-for-performance. Economic costs include both financial costs and the time of health workers and managers undertaking activities related to pay-for-performance and the value of donated or subsidized items at market prices. Capital costs incurred by the implementers (organizational overhead and vehicle costs) were not included.

The costs of setting up the new health management information system were not included. However, we did estimate the costs associated with the

generation of performance data at facility, district, and regional levels, as this was the basis for performance measurement for pay-for-performance.

We were unable to estimate the costs of managing the health management information system data prior to pay-for-performance to assess the incremental costs of the new system. However, prior to pay-for-performance, less than half of facilities completed health management information system registers.[27] The results are therefore presented with and without these data management costs.

Data Sources

Financial accounts were used to estimate the cost of office rent, supplies, utilities, and support staff. Other resources were measured and valued through twenty-six interviews with implementers at the central, regional, or district level in two districts, Kibaha Town Council and Kibaha. For details about data sources used to estimate costs and underlying assumptions, see Appendixes 3 and 4.[26] We also interviewed health workers in primary care facilities in these districts and the regional hospital (for [please provide], see Appendix 5).[26]

In addition, data were extracted from project reports, training records, minutes of meetings,[28] and schedules of verification visits. District and facility costs were extrapolated to the region as a whole.

Household costs associated with care seeking during pregnancy and the postpartum period were obtained from a survey of 1,500 women who had delivered in the previous year from each of the seven intervention districts and a

survey of the same number of women from four comparison districts at baseline and thirteen months later.[29] We found no evidence of an effect of pay-for-performance on the household costs of health care.[30] Therefore, the household cost of pay-for-performance was defined as average baseline household costs multiplied by the additional number of deliveries due to the pay-for-performance program. Transportation costs related to seeking care for delivery were not included.

Costs For Scaling Up To The National Level

We estimated two national scale-up scenarios, based on different models of verification, fund management, and program management (for [please provide], see Appendix 6).[26] Scenario 1 (fully integrated) assumed that pay-for-performance was fully integrated into the government system, with minimum resources required to scale up pay-for-performance in relation to verification processes, fund management, and central management and with no external technical support. Scenario 2 (ongoing technical support) was based on current management structures and assumed some degree of ongoing external technical support.

The rollout to achieve national coverage of pay-for-performance was assumed to be phased in over five years, with five regions introducing pay-for-performance each year. The rollout costs are presented as the total cost of achieving the rollout over five years discounted at 3 percent, and the annual cost of operating at the national scale.

Measurement Of Effects And Incremental Cost-Effectiveness

In a controlled before-and-after study of the pay-for-performance pilot, we measured the effects of pay-for-performance on all nine maternal and child health service coverage indicators in Tanzania over thirteen months of implementation.[29] We used difference-in-difference regression analysis to estimate the impact of pay-for-performance on the nine target indicators, including the rate of institutional deliveries and the receipt of two doses of intermittent preventive therapy during antenatal care.[30] We verified that trends in a number of outcomes were similar in the intervention and comparison areas before the introduction of pay-for-performance.

Cost-effectiveness was defined as the incremental economic cost per additional birth in a health facility. The cost per woman of reproductive age is also reported. For the pay-for-performance national-level roll-out, *cost-effectiveness* was defined in relation to the economic cost of implementing pay-for-performance at the national scale for a one-year period. Outcome effects were extrapolated to the national population on the assumption that the national program would be as effective as the pilot.

We assessed the impact on base case results of a variation of plus or minus 25 percent in salary costs, because the incentive payments are the most substantial resource input and also are subject to greatest uncertainty, since the amounts paid out depend on performance.

Limitations

There were a number of limitations to the study. Financial accounts data could be obtained from one only implementer, and they were incomplete.

Therefore, the estimation of costs also relied on interviews conducted in two of the seven districts that implemented pay-for-performance in 2013 and in a small number of facilities. Estimates of resource use associated with activities carried out earlier in the program were dependent on accurate respondent recall.

We had no baseline information on time spent compiling health management information system data. Nor did we have information from comparison sites about these activities. This made it difficult to estimate the incremental costs of performance data gathering associated with pay-for-performance. Therefore, all activities related to the generation of health management information system data were attributed to pay-for-performance. This was likely an overestimation of costs, since some routine health management information system activities would have been carried out in some facilities. Thus, we estimated costs with and without this component.

We measured the effects of pay-for-performance on health service coverage using a quasi-experimental design. However, we were unable to measure the effects of pay-for-performance on population health outcomes. Therefore, our estimates of cost-effectiveness relied on intermediate effects, which limits the comparability of our study with others.

Study Results

Costs Of The Pay-For-Performance Pilot

The financial start-up costs of the pay-for-performance pilot amounted to just under $70,000 (Exhibit 1). The economic cost, which included the value of all resources, was double that amount. The main start-up activities were the

production of documents related to the pilot (48 percent of financial start-up costs and 28 percent of economic start-up costs) and training (41 percent and 52 percent, respectively).

The recurrent financial costs of the pay-for-performance pilot implementation over thirteen months were just under $1.3 million, and the economic costs were over 75 percent more ($2.3 million; Exhibit 2). Management costs amounted to almost half of the financial costs and nearly a third of the economic costs. Thus, they exceeded the cost of financial incentive payments, which accounted for 28 percent of the financial cost and 15 percent of the economic cost.

Time associated with generating and verifying performance data for pay-for-performance was substantial. The time was equivalent to about 17 percent of each health worker's time per month at primary-level facilities (for [please provide], see Appendix Tables 7a–7c in Appendix 7).[26] The time spent by health workers and their managers to generate performance data amounted to 37 percent of the total economic costs. The cost of data verification was about 15 percent and 13 percent of recurrent financial and economic costs, respectively. Forty-six percent of the economic cost burden fell on implementers at the district and facility levels (for [please provide], see Appendix Tables 8a–8b in Appendix 8).[26]

The increased use of delivery care associated with pay-for-performance implementation resulted in an additional cost to households across the region of $7,304 (for [please provide], see Appendix 9).[26]

The estimated economic cost of the pay-for-performance pilot (start-up plus implementation costs) was just under $2.5 million, including household costs. Excluding the costs of generating performance data, it was just over $1.6 million (Exhibit 3).

There were 238,358 women of reproductive age in the pay-for-performance study area and an additional 2,746 facility-based births. The average cost per woman of reproductive age was $10 and the incremental cost per additional facility-based birth was $907 (Exhibit 3).

Varying salary costs by plus or minus 25 percent resulted in a 12 percent change in financial costs and a 19 percent change in economic costs (inclusive of household costs). The incremental economic cost-effectiveness ratio varied from $466 to $1,074 (excluding and including data generation and start-up costs, respectively).

Costs Of A National Rollout Of Pay-For-Performance

The cost of setting up a nationwide pay-for-performance program over a five-year period amounted to just over $760,000 (financial costs) and $2.2 million (economic costs; for [please provide], see Appendix 10).[26] The major cost driver was training costs, which accounted for 86 percent of the total financial costs and 76 percent of the total economic costs.

The discounted financial costs of a phased rollout over five years in the fully integrated scenario would be $51.5 million ($131.8 million in economic costs; Exhibit 4). In the ongoing technical support scenario, these amounts would increase to $95.7 million and $184.4 million, respectively. The annual financial

costs of operating at the national scale would be $18.4 million in the fully integrated scenario ($47.3 million in economic costs) and $34.5 million in the ongoing technical support scenario ($66.5 million in economic costs).

The projected management costs associated with the national pay-for-performance rollout were between 2.0 and 2.4 times greater in the ongoing technical support scenario, compared to the fully integrated scenario, for economic and financial costing, respectively. There was some reduction in management costs as an overall share of costs due to economies of scale, especially in the fully integrated scenario. However, this was partly offset by the creation of pay-for-performance management roles at the regional level. The costs of paying incentives were estimated to be the most substantial share of financial costs in the fully integrated scenario (44 percent of total costs).

The costs of data gathering accounted for 50 percent of the economic costs in the fully integrated scenario (36 percent in the ongoing technical support scenario). The fund administration costs in the fully integrated scenario were less than a third of the same costs in the ongoing technical support scenario.

A verification model that relied on lower-level verification from zones, instead of at the regional and national level, would reduce verification costs substantially. Indeed, the national financial costs of undertaking verification would be 59 percent less in the fully integrated scenario than in the ongoing technical support scenario (and costs would be 45 percent less under economic costing). The costs to those being verified are 1–5 percent of financial costs in the two scenarios.

The projected incremental cost per additional facility-based birth when operating at the national scale varied from $94 to $186 in the fully integrated scenario (without data generation and start-up costs and with them, respectively). In the ongoing technical support scenario, the cost varied from $158 to $261.

Discussion

We believe that this study represents the first published assessment of the costs of setting up and implementing a pay-for-performance program in a low-income context. The cost of running a pay-for-performance program over thirteen months in one region with a population of just over a million[31] varied from $1.2 million (the financial cost) to $2.3 million (the economic cost). Variations in staff salary levels in the sensitivity analysis had little impact on estimated total costs.

Managing the pay-for-performance program was the most costly component of ongoing implementation and exceeded the costs of financial incentives by between 1.4 times (in financial costs) and 1.8 times (in economic costs). Few previous studies have measured the costs of pay-for-performance management. Although the setting and program design are very different, Rachel Meacock and coauthors found that management costs in the United Kingdom exceeded incentive payments by a slightly lower magnitude than the current study (1.4 times, compared to 1.9 times in our study).[8] Incentive payments were found to exceed administration costs in a program to incentivize performance in hospitals in the United States.[18] However, it is unclear if these costs include performance assessment and verification or are restricted to the administration of funds themselves.

An effective pay-for-performance program depends upon complete and timely health information systems for performance assessment. The time costs associated with performance data generation and verification for pay-for-performance were substantial for the Tanzania pilot program. Some data generation activities would have happened before the implementation of pay-for-performance. However, before that implementation less than half of the facilities were compiling such reports, and these data were rarely reviewed or used for planning purposes.[27]

Pay-for-performance served to motivate and stimulate the generation and use of data, but this process took time. When these costs were included, the total implementation costs doubled. Ideally, instead of relying on health workers to undertake data gathering and reporting, dedicated part-time staff members at lower-level facilities would be used. This would ensure that adequate staffing capacity remained for routine health service delivery.

By fully integrating the pay-for-performance program into routine health management information systems, substantial economies could be made in gathering and verifying performance data. Integration of the pay-for-performance program could also contribute to strengthening the health system by improving data completeness and the use of data for strategic planning purposes. Burundi and Rwanda have succeeded in rolling out pay-for-performance programs nationally in a fully integrated approach, by integrating pay-for-performance into routine government systems.[33,34]

The cost-effectiveness of the rollout depends critically on how fully integrated into government systems the program is.

The question remains as to whether pay-for-performance is cost-effective relative to alternative maternal and child health interventions, such as demand-side financing. No cost-effectiveness studies using the same outcomes could be identified in Tanzania. Nonetheless, the international literature suggests that the cost-effectiveness of a voucher scheme to promote maternal health through the coverage of institutional deliveries with vouchers varies from $33 per additional institutional delivery in Uganda[35] to $91 in Bangladesh.[36] The removal of user fees for delivery care was estimated at $25 per additional delivery[37] in all cases lower than our estimates of pay-for-performance in Pwani, Tanzania ($479).

However, such comparisons should be handled with caution due to differences in data sources, birthrates, and the scope of costs included in the studies. Ultimately it may desirable to tackle both the demand and the supply side to improve maternal and child health services, so that demand- and supply-side incentives are introduced simultaneously.[38]

Our study of effects was highly robust. Nonetheless, we were unable to estimate pay-for-performance effects on population health outcomes resulting from increased coverage of maternal health services. The modeling of mortality effects is complex because the effectiveness of services depends critically on the content and quality of the care provided. Furthermore, we found evidence of a reduction in nontargeted health service use resulting from pay-for-performance in

lower-level health facilities.[30] It is unclear how to integrate such results within a cost-effectiveness framework.

There is limited evidence internationally about the long-term effects of pay-for-performance, as staff get used to incentive payments.[8] However, it is conceivable that to maintain their motivating effects, incentive payments may have to increase over time. The rollout of pay-for-performance initiatives in low-income countries is being funded by IDA concessional loans from the World Bank. Ultimately, governments would need to create the fiscal space in domestic budgets to sustain the costs of pay-for-performance programs.

Conclusion

In a low-income setting, the costs of managing a pay-for-performance program, which include performance data reporting and verification, are substantial and greatly exceed the costs of incentive payments themselves. Pay-for-performance programs can serve to stimulate the generation and use of health management information system data by health workers and managers. In lower-level health facilities with limited staff, however, attention to data requirements could divert attention from health service delivery unless dedicated staff can be recruited to meet the data requirements.[30] The pay-for-performance pilot program in Tanzania was successful in improving two out of nine targeted service utilization outcomes, but its effect on health outcomes is unclear. Pay-for-performance may become more cost-effective if it is scaled up to the national level, as it becomes integrated into routine systems over time, and it may help strengthen the health system. Further research is needed to assess the

cost-effectiveness of different management and verification systems and to compare pay-for-performance to other interventions to improve maternal and child health.

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List of Exhibits

Exhibit 1 (Table):

Caption:

Source/Notes:

Exhibit 2 (Table):

Caption:

Source/Notes:

Exhibit 3 (Table):

Caption:

Source/Notes:

Exhibit 4 (Table):

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EXHIBITS

Exhibit 1 : Start-Up Costs Associated With A Pay-For-Performance Pilot Program In Tanzania

	Financial costs		Economic costs	
Activity	**2012 US $**	**Percent**	**2012 US $**	**Percent**
Production of pilot design documents	33,831	48	38,765	28
Training	28,368	41	71,521	52
Target setting	1,753	3	3,380	2
Contracting with the National Health Insurance Fund	623	1	1,058	1
Establishing steering and advisory committees	2,298	3	2,762	2
Launch of the pilot	3,032	4	19,849	14
Total	69,906	100	137,335	100

SOURCE Authors' analysis of financial accounts data, project documents, and interviews. NOTES Financial costs capture all financial transactions that are a result of pay-for-performance. Economic costs capture both financial costs and the time of health workers and managers undertaking activities related to pay-for-performance and the value of donated or subsidized items such as [please provide] at market prices.

Exhibit 2: Ongoing Costs Of The Pay-For-Performance Pilot Program In Tanzania

	Financial costs		Economic costs	
Activity	**2012 US $**	**Percent**	**2012 US $**	**Percent**
Management				
Meetings	26,421	2	33,864	1
Other management activities	452,468	36	514,600	22
General administration	115,404	9	115,404	5
Total management	594,293	48	663,867	28
Payouts				
Incentives	351,013	28	351,013	15
Fund administration	56,328	5	65,663	3
Feedback meetings	52,032	4	90,953	4
Total payouts	459,373	37	507,629	22
Performance data				
Generation of the data	—[a]	—[a]	869,325	37
Verification				
Doing verification	192,848	15	217,122	9
Being verified	—[a]	—[a]	87,431	4
Total verification	192,848	15	304,553	13
Total ongoing costs	1,246,514	100	2,345,373	100

SOURCE Authors' analysis of financial accounts data, project documents, and interviews. NOTES Verification activities essentially involved checking the reported performance data against facility registers or monthly tally sheets. For a fuller explanation of these activities, see Appendix 2 (see Note 26 in text). Financial and economic costs are explained in the notes to Exhibit 1. Ongoing and start-up financial costs totaled $1,316,421; ongoing and start-up economic costs totaled $2,482,708. [a][Please provide].

Exhibit 3 (Table): Incremental Cost-Effectiveness Of The Pay-For-Performance Pilot Program In Tanzania

Description	**Scope of costs (2012 US $)**		
	Start-up activities included	**Start-up activities excluded**	**Start-up and data management activities excluded**
Costs (including household costs)	2,490,013	2,352,678	1,483,353
Cost per woman of reproductive age	10	10	6
Cost per additional facility-based delivery	907	857	540

SOURCE Authors' analysis of data listed in exhibit notes. NOTES Cost data were based on estimates in Exhibits 1 and 2 and include household costs estimated by the authors with reference to the baseline and end-line household survey data (see Note 30 in text). Outcomes data were derived from the authors' analysis of household survey data. Population data were derived from the 2012 population census (see Note 31 in text).

Exhibit 4 (Table): Ongoing Costs Of National Rollout Of Pay-For-Performance In Tanzania

	Financial costs (1,000s of 2012 US $)				Economic costs (1,000s of 2012 US $)			
	Fully integrated		Ongoing technical support		Fully integrated		Ongoing technical support	
Activity	**5-year rollout costs**	**Annual cost**	**5-year rollout costs**	**Annual cost**	**5-year rollout costs**	**Annual cost**	**5-year rollout costs**	**Annual cost**
Management								
Meetings	4,159	1,503	15,920	5,758	8,668	2,871	16,807	5,811
Other management activities	13,865	5,009	27,377	9,891	17,527	6,593	34,251	12,635
General administration	—[a]	—[a]	638	136	—[a]	—[a]	638	136
Total management	18,025	6,512	43,936	15,784	26,195	9,464	51,697	18,582
Payouts								
Incentives	22,421	8,100	22,421	8,100	22,421	8.100	22,421	8,100
Fund administration	856	306	3,037	1,097	876	311	3,050	1,100
Feedback meetings	1,423	426	4,748	1,715	1,590	320	8,071	2,916
Total payouts	24,701	8,832	30,206	10,913	24,887	8,732	33,542	12,116
Performance data								
Generation of the data	—[a]	—[a]	—[a]	—[a]	66,199	23,916	66,199	23,916
Verification								
Doing verification	8,772	3,169	21,513	7,772	12,977	4,688	23,882	8,628
Being verified	—[a]	—[a]	—[a]	—[a]	1,493	539	9,095	3,286
Total verification	8,772	3,169	21,513	7,772	14,470	5,207	32,978	11,914

Total ongoing costs	51,498	18,415	95,655	34,469	131,751	47,339	184,416	66,528

SOURCE Authors' analysis of interview data and assumptions indicated in Appendix 4 (see Note 26 in text). NOTES Five-year costs are discounted at 3 percent. Financial and economic costs are explained in the notes to Exhibit 1. Verification activities are explained in the notes to Exhibit 2. "Fully integrated" is scenario 1; "ongoing technical support" is scenario 2. Both scenarios are defined in the text. "Annual cost" is at the national scale. [a][Please provide].

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Bios for 2014-0608_Little

Bio 1: Richard Little is a consultant health economist in Cambridge, England.

Bio 2: August Kuwawenaruwa is a research scientist at the Ifakara Health Institute, in Dar es Salaam, Tanzania.

Bio 3: Peter Binyaruka is a research scientist at the Ifakara Health Institute.

Bio 4: Edith Patouillard is a lecturer in the Department of Global Health and Development at the London School of Hygiene and Tropical Medicine, in England.

Bio 5: Josephine Borghi (jo.borghi@lshtm.ac.uk) is a senior lecturer in the Department of Global Health and Development at the London School of Hygiene and Tropical Medicine.