**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 (ad, 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.

**Notes**

1. Njuki R, Okal J, Warren CE, Obare F, Abuya T, Kanya L, et al. Exploring the effectiveness of the output-based aid voucher program to increase uptake of gender-based violence recovery services in Kenya: a qualitative evaluation. BMC Public Health. 2012;12:426.
2. Meessen B, Soucat A, Sekabaraga C. Performance-based financing: just a donor fad or a catalyst towards comprehensive health-care reform? Bull World Health Organ. 2011;89(2):153–6.
3. Peterson L, Woodward LD, Urech T, Daw C, Sookanan S. Does pay for performance improve the quality of health care? Ann Intern Med. 2006;145(4):265–72.
4. Vledder M. Results-based financing: a proven model for better maternal and child health [Internet]. Investing in Health [blog on the Internet]. 2013 Sep 23 [cited 2015 Jan 23]. Available from: http://blogs.worldbank.org/health/results-based-financing-proven-model-better-maternal-and-child-health
5. Maynard A. The powers and pitfalls of payment for performance. Health Econ. 2012;21(1):3–12.
6. Emmert M, Eijkenaar F, Kemter H, Esslinger AS, Schöffski O. Economic evaluation of pay-for-performance in health care: a systematic review. Eur J Health Econ. 2012;13(6):755–67.
7. Witter S, Fretheim A, Kessy FL, Lindahl AK. Paying for performance to improve the delivery of health interventions in low- and middle-income countries. Cochrane Database Syst Rev. 2012;2:CD007899.
8. Meacock R, Kristensen SR, Sutton M. The cost-effectiveness of using financial incentives to improve provider quality: a framework and application. Health Econ. 2013;23(1):1–13.
9. Tan EC, Pwu RF, Chen DR, Yang MC. Is a diabetes pay-for-performance program cost-effective under the National Health Insurance in Taiwan? Qual Life Res. 2014;23(2):687–96.
10. Lee TT, Cheng SH, Chen CC, Lai MS. A pay-for-performance program for diabetes care in Taiwan: a preliminary assessment. Am J Manag Care. 2010;16(1):65–9.
11. An LC, Bluhm JH, Foldes SS, Alesci NL, Klatt CM, Center BA, et al. A randomized trial of a pay-for-performance program targeting clinician referral to a state tobacco quitline. Arch Intern Med. 2008;168(18):1993–9.

12. Norton EC. Incentive regulation of nursing homes. J Health Econ. 1992;11(2):105–28.

13. Curtin K, Beckman H, Pankow G, Milillo Y, Green RA. Return on investment in pay for performance: a diabetes case study. J Healthc Manag. 2006;51(6):365–74; discussion 75–6.

14. Brown SE, Chin MH, Huang ES. Estimating costs of quality improvement for outpatient healthcare organisations: a practical methodology. Qual Saf Health Care. 2007;16(4):248–51.

15. Parke DW II. Impact of a pay-for-performance intervention: financial analysis of a pilot program implementation and implications for ophthalmology (an American Ophthalmological Society thesis). Trans Am Ophthalmol Soc. 2007;105:448–60.

16. Salize HJ, Merkel S, Reinhard I, Twardella D, Mann K, Brenner H. Cost-effective primary care–based strategies to improve smoking cessation: more value for money. Arch Intern Med. 2009;169(3):230–5; discussion 235–6.

17. Walker S, Mason AR, Claxton K, Cookson R, Fenwick E, Fleetcroft R, et al. Value for money and the Quality and Outcomes Framework in primary care in the UK NHS. Br J Gen Pract. 2010;60(574):e213–20.

18. Nahra TA, Reiter KL, Hirth RA, Shermer JE, Wheeler JR. Cost-effectiveness of hospital pay-for-performance incentives. Med Care Res Rev. 2006;63(1 Suppl):49S–72S.

19. Ryan AM. Effects of the Premier Hospital Quality Incentive Demonstration on Medicare patient mortality and cost. Health Serv Res. 2009;44(3):821–42.

20. Lagarde M, Haines A, Palmer N. Conditional cash transfers for improving uptake of health interventions in low- and middle-income countries: a systematic review. JAMA. 2007;298(16):1900–10.

21. Masanja H, de Savigny D, Smithson P, Schellenberg J, John T, Mbuya C, et al. Child survival gains in Tanzania: analysis of data from demographic and health surveys. Lancet. 2008;371(9620):1276–83.

22. Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, et al. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. Lancet. 2010;375(9726):1609–23.

23. Lozano R, Wang H, Foreman KJ, Rajaratnam JK, Naghavi M, Marcus JR, et al. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. Lancet. 2011;378(9797):1139–65.

24. Kassebaum NJ, Bertozzi-Villa A, Coggeshall MS, Shackelford KA, Steiner C, Heuton KR, et al. Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2014;384(9947):980–1004.

25. United Republic of Tanzania Ministry of Health and Social Welfare. The Coast Region Pay for Performance (P4P) Pilo Programme: design document. Dar es Salaam: The Ministry; 2011.

26. To access the Appendix, click on the Appendix link in the box to the right of the article online.

27. Nyamtema AS. Bridging the gaps in the Health Management Information System in the context of a changing health sector. BMC Med Inform Decis Mak. 2010;10:36.

28. Steering committee meeting costs were based on minutes from one meeting; advisory committee meeting costs were based on minutes from three meetings; Pilot Management Team meeting costs were based on minutes of all except one of the meetings; NVC and RCC meeting costs were based on minutes of three meetings.

29. Borghi J, Mayumana I, Mashasi I, Binyaruka P, Patouillard E, Njau I, et al. Protocol for the evaluation of a pay for performance programme in Pwani region in Tanzania: a controlled before and after study. Implement Sci. 2013;8:80.

30. Binyaruka P, Patouillard E, Powell-Jackson T, Greco G, Maestad O. Effect of paying for performance on utilisation, quality, and user costs of health services in Tanzania: a controlled before and after study. Unpublished paper.

31. United Republic of Tanzania. Population and housing census. Dar es Salaam: National Bureau of Statistics; 2012.

32. United Republic of Tanzania National Bureau of Statistics, ICF Macro. Tanzania Demographic and Health Survey 2010. Dar es Salaam: NBS and ICF Macro; .

33. World Health Organization. Success stories of health financing reforms for universal coverage: Burundi [Internet]. Geneva: WHO; 2011 [cited 2015 Jan 23]. Available from: http://www.anglicanhealth.org/Resources/PDF/AHN%20resources/Health%20financing%20and%20Insurance/PH4\_Burundi\_success\_story.pdf

34. Rusa L, Schneidman M, Fritsche G, Musango L. Rwanda: performance-based financing in the public sector. In: Eichler R, Levine R, Performance-Based Incentives Working Group, editors. Performance incentives for global health: potential and pitfalls [Internet]. Washington (DC) Center for Global Development; 2009 [cited 2015 Jan 23]. p. 189–214. Available from: http://www.cgdev.org/sites/default/files/9781933286297-Levine-performance-incentives.pdf

35. Alfonso YN, Bishai D, Bua J, Mutebi A, Mayora C, Ekirapa-Kiracho E. Cost-effectiveness analysis of a voucher scheme combined with obstetrical quality improvements: quasi experimental results from Uganda. Health Policy Plan. 2015;30(1):88–99.

36. Hatt L, Ha N., Sloan N, Miner S, Magvanjav O, Sharma A, et al. Economic evaluation of demand-side financing (DSF) for maternal health in Bangladesh [Internet]. Bethesda (MD): Abt. Associates; 2010 Feb [cited 2015 Jan 23]. Available from: http://reliefweb.int/sites/reliefweb.int/files/resources/Bangladesh%20DSF%20evaluation\_FINAL\_Feb%202010.pdf

37. Witter S, Dieng T, Mbengue D, Moreira I, De Brouwere V. The national free delivery and caesarean policy in Senegal: evaluating process and outcomes. Health Policy Plan. 2010;25(5):384–92.

38. Morgan L, Stanton ME, Higgs ES, Balster RL, Bellows BW, Brandes N, et al. Financial incentives and maternal health: where do we go from here? J Health Popul Nutr. 2013;31(4 Suppl 2):S8–22.

**List of Exhibits**

**Exhibit 1 (Table):**

**Caption:**

**Source/Notes:**

**Exhibit 2 (Table):**

**Caption:**

**Source/Notes:**

**Exhibit 3 (Table):**

**Caption:**

**Source/Notes:**

**Exhibit 4 (Table):**

**Caption:**

**Source/Notes:**

**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].

**Acknowledgment**

The research reported in this article was funded by the Government of Norway. The funder had no role in data collection, analysis, data interpretation, or writing of the article. The views reported in this article are those of the authors and not necessarily that of the funder. The authors thank the Tanzanian Ministry of Health and Social Welfare for commissioning the study and providing feedback to and support throughout the study and participating in interviews related to this study; the staff at the Clinton Health Access Initiative and the National Health Insurance Fund for sharing documents and for time spent during interviews; Joshua Levens for sharing information related to this study; the Government of Norway for funding the evaluation; Masuma Mamdani and Salim Abdulla for their leadership of the overall evaluation; and the pay-for-performance process researchers for inputs into the costing study.

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](mailto: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.