

RESULTS-BASED FINANCING'S IMPACT ON HUMAN RESOURCES FOR HEALTH IN ZAMBIA

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Abstract: Results-based financing (RBF) has been implemented in low- and middle-income countries with the aim of transforming health systems and achieving Millennium Development Goals 4 and 5. However, there is a dearth of empirical evidence on the impact of RBF-facility financing and provider incentives on performance related factors such as health workers satisfaction, motivation, productivity, and retention. This paper attempts to fill such gap by examining the relationship between RBF and health care practitioner outcomes through the case of Zambia. It uses a cluster randomized intervention/control design to evaluate before–after changes for three groups: one that received pay for performance, a counterfactual group that received additional financing not conditioned on performance, and another counterfactual group that received no enhanced financing.

Mixed methods are employed. The quantitative portion comprises a baseline and a three-year follow-up survey. The survey and sampling scheme were designed to allow for a rigorous impact evaluation of RBF and enhanced financing on several key performance indicators. The qualitative portion seeks to explain the pathways underlying the observed differences.

Econometric analysis shows that RBF led to increased satisfaction and decreased attrition, but had rather modest effects on motivation and no effects on productivity. The enhanced financing group also experienced some positive effects on motivation. These results are rather different from the qualitative assessment, which reveals very strong motivation and increased workload among the intervention group. The qualitative evidence, however, also provides possible explanations for the lack of RBF significant impact on motivation and productivity, such as workers' burnout, rigid supervision from the District Medical Office, and at times lack of true autonomy (which was intended to be part of the RBF intervention). Limitations in the survey instrument may have also contributed to some of the observed results.

Keywords: Results-based financing, performance-based financing, human resources for health, Zambia, monitoring and evaluation, mixed methods.

Key Messages:

- The implementation of results-based financing (RBF) program in Zambia has led to an increase in health workers' satisfaction and decrease in attrition. RBF has little impact on motivation and none on productivity from econometric analysis even though interview data suggest otherwise.
- Such results could stem from the study instruments used or factors not captured by the instruments such as workers' burnout, rigid supervision from the District Medical Office, lack of professional autonomy, and the reallocation of non-RBF finances by the provincial health authorities.
- Further research is needed to overcome the limitations we faced in carrying out this study, especially as RBF continues to be scaled up in Zambia and other countries.

Disclaimer: The findings, interpretations and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

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ACRONYMS

ANC	Antenatal Care
CDE	Classified Daily Employees
CSO	Central Statistical Office
DCMO	District Community Medical Office
DHMT	District Health Management Team
EHT	Environmental Health Technician
HRBF	Health Results-Based Financing
HRH	Human Resources for Health
MCH	Maternal and Child Health
MDGs	Millennium Development Goals
MOH	Ministry of Health
OPRAS	Open Performance Review and Appraisal System
P4P	Payment For Performance
PNC	Postnatal Care
RBF	Results-Based Financing
TB	Tuberculosis
WHO	World Health Organization

INTRODUCTION

1. The vision of the results-based financing (RBF) programs in low- and middle-income countries was to transform their health system to attain the Millennium Development Goals (MDGs), which are being revised as the Sustainable Development Goals (SDGs). An important node in the causal pathway from RBF interventions to desired population health status is human resources for health (HRH), recognized as an essential building block in national health systems (WHO, 2007). Countries, regardless of income, continue to face difficulties in training, deploying, and retaining health workers.
2. There is, however, a disproportionate amount of evaluation evidence focused on the impact of RBF on *health service coverage* rather than on *health workforce outcomes* (Ireland et al., 2011; Ranson et al., 2010). Supply-side RBF programs are designed to adjust financial incentives paid to health facilities based on the quality and quantity of health care services rendered, with variations in the mix of financial and nonfinancial incentives in RBF packages, payment modalities to facilities, and the discretion that facilities have to allocate the financial incentives they receive to staff bonuses and other costs. The payment incentives and the management system of public health facilities may have an additive or multiplicative effect on the performance and tenure of health care workers (Lemiere et al., 2012).
3. This study examines the impact of RBF on health workforce outcomes in Zambia. We argue that payment incentives are a *necessary* condition to change worker behaviors, but contextual factors are the *sufficient* conditions to change the same outcomes of interest. Mixed methods were used to substantiate our argument. The RBF pilot described here was adapted to the local context, but provides a basis for recommendations for RBF program design and implementation in other settings as well.

BACKGROUND TO RESULTS-BASED FINANCING

4. RBF is a strategy to address low-performance problems, and more generally, health system reform (Meessen et al., 2011). Myriad terms are commonly used to describe such interventions: performance-based incentives, pay for performance, performance-based contracting, conditional cash transfers, and cash on delivery (Daniels et al., 2015; Eichler and Levine, 2009; Fiszbein et al., 2009; Loevinsohn, 2008; Bhattacharyya, 2001). What these terms all have in common is a transfer of resources that is contingent on a predetermined set of performance criteria being met. And in this paper we adopt Musgrove's (2011) definition of RBF as "any program where the principal sets financial or other incentives for an agent to deliver predefined outputs or outcomes and rewards the achievement of these results upon verification."
5. Country-specific evidence suggests that the type and size of incentive packages are significant, but not adequate predictors of change for RBF interventions, and there is limited generalizability on existing studies because each RBF projects offers a different bundles of incentives to different categories of workers. Basinga et al.'s (2011) landmark evaluation, for example, concluded that the size of payments significantly influenced the

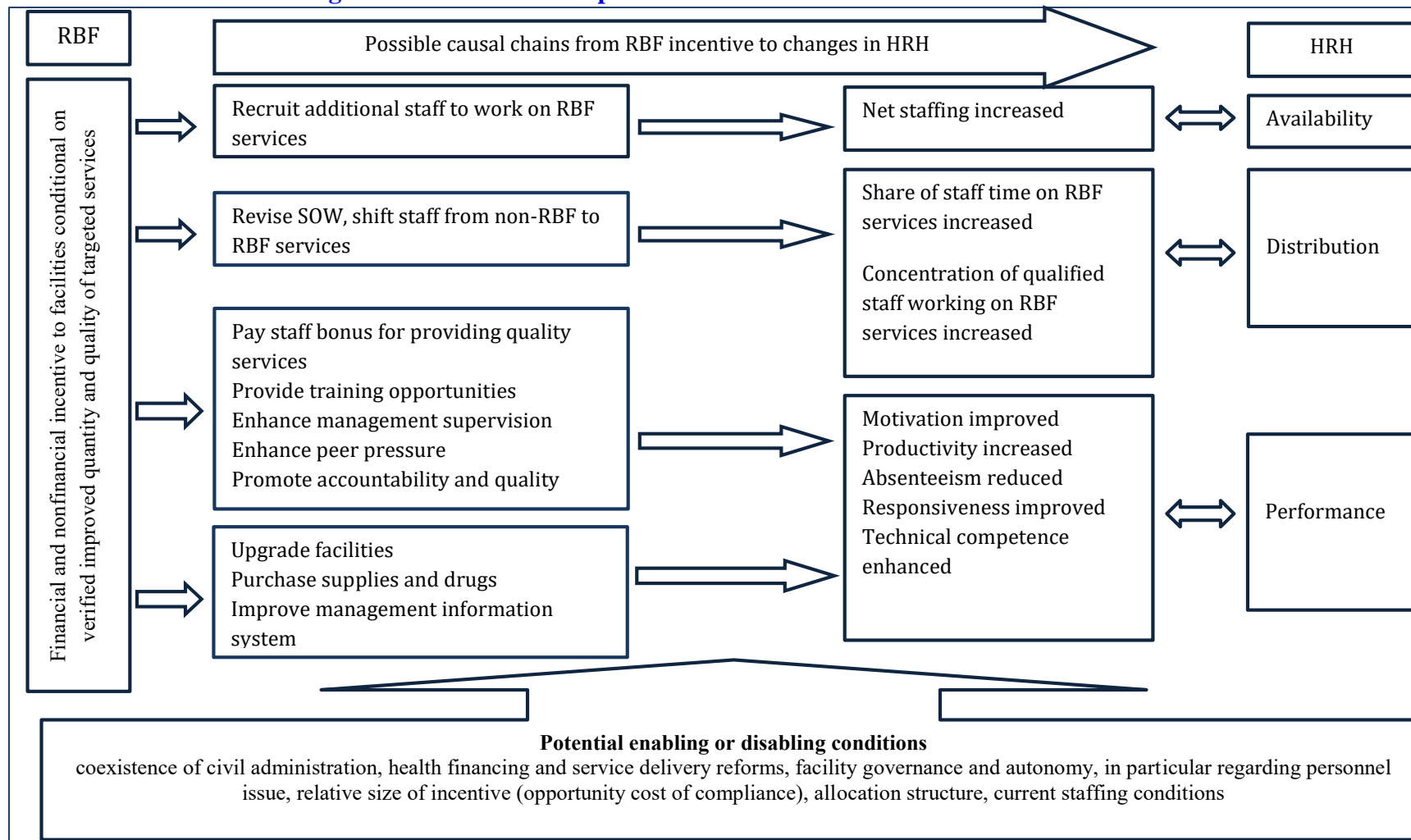
delivery of maternal and child services in Rwanda. Yet Vujicic (2009) inferred that if financial incentives in Cambodia were too high, they would not have any impact on health worker behavior. He also found that a 52% salary increase had a null effect on service quality improvements in Malawi. Even further, Ariely et al.'s (2009) experiments demonstrated that very high incentives could backfire and lead to a *decrease* in performance. Likewise, Das and Sohnesen (2007) demonstrated that higher levels of pay resulted in lower levels of physician effort in Paraguay. These two studies point to a threshold in RBF's effect on performance.

6. Crossing the threshold, the intended effect of financial incentives on health worker motivation and performance could be replaced with adverse effects such as distortion, or a shift in focus on targeted services at the expense of other services; gaming, or false reporting; selection of patients conducive to meeting targets; a focus on quantity rather than quality of services; a reward to providers and facilities that are at baseline better positioned to meet targets; and services that fade in improvement as soon as the target is lifted (Oxman and Fretheim, 2008).

7. A wide array of moderators could weigh on RBF's influence on worker performance. Beyond concerns over RBF implementation is that of financial fungibility, i.e. whether health managers have the autonomy to allocate revenue to health worker bonuses or to, say, equipment, supplies, and capital improvements to the health care facility. Toonen et al. (2009) consider autonomy, management capacity, and an understanding of RBF concepts to be important for implementing performance-based financing programs in sub-Saharan Africa's health sector. Mohammed et al. (2012) urged a closer look at the "know-do" gap, or the gap between what health workers know how to do—and actually do. RBF interventions can reduce this gap through improved accountability and supervision structures, and more generally via an improved working environment. To date, there has been too little focus on the design of RBF interventions, the circumstances in which they are implemented, and the potential to improve both health provider and facility performance.

8. The literature on RBF payments in health care delivery, especially in low- and middle-income countries, is nascent. Figure 1 is a display of the theory of change which posits that HRH—at the individual or facility level—must change for RBF programs to affect population health outcomes. At the individual worker level, the models tease apart the type of incentives, as well as the combination of incentives, that could improve the personnel shortage, low morale, and poor productivity. Introducing monetary incentives to designated health facilities could, in theory, help achieve systemic objectives to increase the availability, distribution, and performance of the workforce. At the facility level, they lay out a set of enabling and disabling conditions that are mediators of RBF and HRH. The microcosm through which health services are delivered mirrors labor market conditions and merits further research attention (Herbst et al., 2011). This conceptual framework (Figure 1) will be refined based on findings from the case of Zambia.

Figure 1. A General conceptual framework on the effects of RBF on HRH



Sources: Authors

ZAMBIA'S HRH CRISIS

9. Progress toward attaining MDGs 4, 5, and 6 requires a certain level of human resources to deliver health care services. The 2013-14 Zambia Demographic and Health Survey shows the maternal mortality ratio (398 deaths per 100,000 live births), infant mortality rate (45 deaths per 1,000 live births), under-five mortality rate (75 deaths per 1,000 live births), and HIV prevalence (13% among adults) to be high (CSO et al., 2015).

10. Progress in improving these and other health-related statistics is hampered by several factors related to Zambia's national health system, including HRH shortages; inequalities in service provision and utilization; limited financial resources for health facilities; and low productivity and motivation among medical personnel. The total expenditure dedicated to health—5% of GDP in 2013—is low, and therefore there is a bigger imperative to focus on the allocation of these resources to the health care workforce (WHO, 2013). RBF could be one way to meet this imperative.

11. Zambia, among other low- and middle-income countries, faces severe health worker shortages across all levels of health care (Bangdiwala 2010; WHO 2006). The situation has changed little since the Zambian government, through its National Health Strategic Plan, declared that only half the required medical, nursing, and paramedical posts are filled in public health facilities a decade ago (MOH, 2005). Health worker shortage is the result of migration, poor staff morale and weak incentives (Callaghan et al., 2010; Zachariah et al., 2009). An initial wave of Zambian health workers migrated to countries in sub-Saharan Africa, such as South Africa, Botswana and Namibia (Ammassari, 2005). And health workers subsequently went to Europe, North America, Australia, and New Zealand (Ammassari, 2005). An exodus of health professionals has also been observed within Zambia from rural to urban areas, from the public to the private sector, and from curative to preventive care (Kamwanga et al. 2013; Ferrinho et al., 2011). Brain drain and workforce maldistribution are exacerbated by increased demands placed on the health systems by patients with communicable and noncommunicable diseases alike (Samb et al., 2010; Lewin et al., 2008). As a result, Zambian health workers are not evenly distributed across geographic areas within countries and across countries (Songstad et al., 2012; WHO, 2006).

12. Ways to shape the workforce dedicated to delivering care related to HIV/AIDS (e.g. Bazant et al., 2014) and maternal and child health (e.g. McPake et al., 2013) have been demonstrated in the research literature. This study is focused on adjusting financial incentives to curb attrition and poor morale.

RESULTS-BASED FINANCING IN ZAMBIA

13. The government of Zambia, with the assistance of the World Bank, adopted RBF in April 2008 with the aim to link financing to results. Its RBF upholds four principles: to increase autonomy in health facility management and planning among service providers; to be accountable to the community by involving them in managing services; to improve reporting through the usage of instruments (i.e. business plans, contracts, external

verification, investment fund) to plan for services; and to strengthen the health services by separating the functions of policy formulation, service delivery, and regulation. The conditions documented as favorable for the success of RBF are manifold, including strong leadership and management support, accurate information and reporting systems, and increased funding and training (Brenzel et al., 2009; Eldridge and Palmer, 2009; Canavan et al., 2008).

14. Zambia is a suitable context to test the implementation of a RBF program on workforce strengthening in these areas because rural health centers have the autonomy to plan and use the RBF revenue: up to 60% of their revenue can be shared among the staff as individual bonuses, and a minimum of 40% has to be invested in maintaining the working conditions of the facility itself. This RBF intervention was piloted among health centers in 10 rural districts in January 2012 (MOH, 2011). Secondary to the geographic balance was a focus on rural areas for two reasons. First, maternal and child health status is lower in rural than urban areas. Second, 72% of the poor in Zambia live in rural areas, and the rural poverty rate is reportedly 80%. The Zambia RBF pays the providers for service provision and quality of high priority maternal and child health services. The data reported at the health facility level are verified both in quantity by the District Community Medical Office (DCMO) and in quality by district hospitals before payment is made.

STUDY DESIGN AND METHODS

DESIGN

15. The study examines the RBF pilot's effects on four staff indicators: motivation, job satisfaction, productivity, and attrition. At the inception of the RBF program in Zambia in 2008, three districts each in seven provinces (Central, Copperbelt, Eastern, Luapula, Mucinga, North-Western, and Western) and six districts in two provinces (Northern and Southern) were selected with input from the government for a total of 30 triplet-matched districts (Appendix 1). The three districts in each triplet represent the median district capacity in each province on health, socioeconomic, and remoteness indicators.

16. Zambia's decentralized health system allowed for our triplet-matched randomization scheme, whereby each of the three districts was randomly assigned to an intervention group (RBF), control 1 group (additional, or enhanced, financing), and control 2 group (pure control). Health facilities in the intervention districts received RBF. Health facilities in control 1 group received financing not tied to performance that could only be used for facility upgrade, drugs, equipment, and per diem for outreach activities but not for staff incentive. For example, district managers in districts belonging to the control 1 group opted to buy medical products and motorcycles, fund mass campaigns, and gave meal allowances for district staff and volunteers. Control 1 group received on average 56% of the additional financing the RBF group received during the project period from the program itself. Facilities in control 2 group represent "business-as-usual" since they received no additional capital.

17. Although facilities in the intervention group were allowed to use a maximum of 60% of their RBF funds for staff bonus, the amount received by each staff member was dependent on a number of factors: individual performance scores taken during a performance appraisal, actual RBF income made, investment priorities, the number and composition of staff at the health facility, and individual salary levels. This resulted in an absolute increase in RBF staff bonuses, but by different margins/percentages across staff and facilities. For example, at Chinemu Health Centre in Lufwanyama District, only 26% rather than 60% of the total RBF funds was allocated for staff incentives between April 2012 and June 2014. Health workers there received in excess of 22% of their official staff salaries, on average, during each quarter the RBF incentives were paid out.

18. With the design at hand, the hypothesized magnitude and direction of RBF influence on HRH are displayed in Figure 2. We expect to see positive effects on HRH results for the intervention group against control 1 group, but the direction is expected to remain the same. The intervention group and control 1 group is each expected to compare favorably with control 2 group. Although the hypotheses in Figure 2 are rather simplistic, they reflect the expectations given the features of this 3-arm design.

Figure 2. Hypothesized magnitude and direction of financing on HRH

	Intervention (RBF) group	Control 1, or enhanced financing not conditioned on outputs	Control 2, or “business-as-usual”
Motivation	++	+	
Satisfaction	++	+	
Productivity	++	+	
Attrition	--	-	

Note: There is a greater magnitude of effect for the intervention group than control 1 group, but the direction should remain the same. Control 2 cells are left blank because no changes are expected to occur.

19. Quantitative and qualitative data were gathered from health facilities for this study. The procedures for linking findings from qualitative and quantitative research and bringing out their complementarities can be manifold (Brady & Collier, 2010; King et al., 1997). We chose to use qualitative findings to supplement quantitative findings rather than the other way around because our aim is *model testing* over *model building* (Mahoney, 2010). The interviews revealed to us why particular HRH outcomes happened in different districts, whereas the regression analysis estimated the average effects of RBF variables of interest. The details of each data source are described below. Written informed consent was collected from all respondents. This study was supported by the Ministry of Health in

Zambia and this research protocol was approved by the Institutional Ethics Committee of the University of Zambia.

QUANTITATIVE METHODS

20. The quantitative portion of the study is built on an overall impact evaluation that was designed to rigorously assess RBF impact on population health service coverage and quality of care. For health worker performance, all outcome measures were assessed by data collected from two facility surveys: at baseline (October–November 2011) and at three years into RBF implementation (September–November 2014). The surveys collected information on human resource and physical capacity, facility governance, practitioner knowledge, outreach activities and other initiatives, and quality of care and practitioner behavior through patient exit interviews. A total of 186 facilities were interviewed, including 86 in the intervention group, 49 in control 1 group, and 51 in control 2 group. Up to two health workers providing maternal and child health (MCH) services on the day of visit were selected for the interview in every facility, for a total of 683 in two rounds. Statistical power for the survey was calculated using population coverage of services as key outcomes for an impact evaluation of RBF in Zambia and not for the HRH outcomes in this study. The issue of statistical power will be revisited in the result section.

21. The outcome indicators are based on health worker responses for questions related to motivation, job satisfaction, productivity, and attrition. Attrition was assessed by the number of authorized staff who left the health facility in the previous 12 months.

22. Measures of job satisfaction and motivation each consist of several constructs, and each construct consists of several questions adapted from the Minnesota Satisfaction Questionnaire (MSQ) and Job Satisfaction Scale (JSS). The responses to these questions were collected on a five-point Likert scale where 1 was least satisfied/motivated and 5 was highly satisfied/motivated. The constructs for motivation are teamwork, autonomy, change, environment, self concept, recognition, well-being, and leadership. The constructs for satisfaction are relationship within facility, relationship outside of facility, work conditions, compensation, recognition, opportunities, and overall satisfaction. A construct was created in two steps: each variable in the construct was normalized by 100%, then a mean score of all normalized variables was estimated as the final construct score. An alternative way to construct satisfaction and motivation measures using principal component analysis was performed and yielded similar results (results not shown).

23. Productivity was estimated from the health facility survey instrument using the following two modules: services provision recorded in the Health Information Management System (HMIS) section, and staff roster. The volume of all services provided in the facility over previous six months and recorded in the HMIS tally books at the time of survey was multiplied by service-specific weights. These were derived from methods described by Vujcic et al. (2008), who took into account the level of effort (i.e. skills and time) for each service. Following Vujcic et al. (2008), a rough measure of productivity was derived by dividing the total service weights by the total number of staff in the facility. In addition, we also look at the staff-normalized service weight separately for RBF incentivized and nonincentivized services to assess the possibility of task shifting (i.e.,

whether staff focusing on incentivized services and neglect services that are not included in the RBF package).

24. We constructed a facility fixed-effects model in which a worker’s outcome is regressed against an ordinal variable, indicating the intervention or control group the facility belongs. The model also includes a year indicator as well as a series of respondent characteristics. A list of constructs created for dependent variables is included in Appendix 2. All statistical analyses were done with STATA (version 13).

25. The respondent characteristics are in Table 1. One-way ANOVA shows that at baseline, there was no statistical difference among the three groups. At endline, the intervention, control 1, and control 2 groups differ on the level of secondary education ($p<0.01$), college education ($p<0.05$), age ($p<0.1$), number of classified daily employees ($p<0.1$) and other staff ($p<0.05$) at endline. The pairwise comparisons of the three groups and statistical test results are presented in Appendix 3.

Table 1. Mean statistics of workers’ characteristics at baseline and endline in three groups (N=683)

Variable	Baseline			Endline		
	Inter- vention (n=147)	Control 1 (n=87)	Control 2 (n=92)	Inter- vention (n=166)	Control 1 (n=92)	Control 2 (n=99)
Female	0.422	0.379	0.424	0.410	0.363	0.490
Education-primary	0.062	0.081	0.054	0.042	0.011	0.051
Education-secondary	0.404	0.395	0.304	<i>0.349</i>	<i>0.489</i>	<i>0.273</i>
Education-college	0.521	0.488	0.630	<i>0.602</i>	<i>0.489</i>	<i>0.677</i>
Clinical officer	0.034	0.023	0.043	0.057	0.038	0.034
Nurse	0.248	0.256	0.250	0.326	0.350	0.449
Midwife	0.110	0.128	0.141	0.121	0.088	0.146
Environmental Health Technicians (EHTs)	0.145	0.093	0.163	0.128	0.075	0.101
Classified Daily Employees (CDEs)	0.333	0.414	0.315	<i>0.313</i>	<i>0.380</i>	<i>0.222</i>
Other staff	0.667	0.586	0.685	<i>0.687</i>	<i>0.620</i>	<i>0.778</i>
Age	37.432	38.011	36.207	<i>35.819</i>	<i>38.511</i>	<i>35.485</i>
Work-absence	1.197	1.439	1.586	1.121	1.098	1.737
Work-days	5.815	6.259	6.125	6.000	6.242	6.273
Work-hours	51.446	55.904	54.552	52.067	50.326	49.612
Supervision frequency from previous year	4.516	4.320	6.651	5.623	4.582	4.539
Work experience-total	10.060	11.037	9.763	8.028	9.025	7.946
Work experience-current facility	4.552	5.396	4.387	4.272	4.665	5.091

Note: ANOVA test of balance between 3 groups was performed separately for baseline and endline. Statistical significance is denoted by: ***bold italic*** ($p<0.01$); **bold** ($p<0.05$); *italic* ($p<0.1$).

QUALITATIVE METHODS

26. The qualitative assessment complements the quantitative component in that it brings into the fold the circumstances in which services are delivered and potential determinants of RBF's effects. The sampling goal for qualitative assessment is to reach theoretical saturation, during which all major concepts are identified and additional interviews reveal no new information. Seventeen facilities in four districts were purposely sampled based on a multitude of characteristics such as remoteness, size of catchment area, urban/rural split, performance, and staff mix. In addition, interviews were also conducted at the DCMO in each of the four districts. The district medical officer and health work interview guides were piloted and subsequently refined to minimize social desirability bias. Qualitative assessment was conducted toward the end of the program.

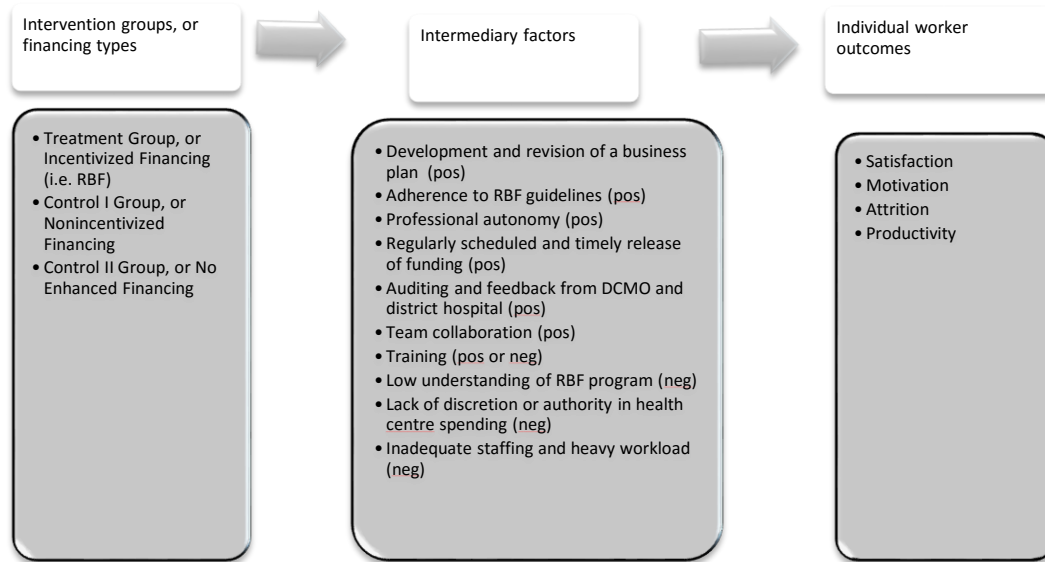
27. Organization leaders were interviewed individually, whereas staff members with similar responsibilities and in a similar level on the organization chart were interviewed in a group. A total of fifty-four individual and group interviews was conducted (the demographic information is in Table 2). F4 software was used for transcription, and NVivo 10 software (QSR International Pty Ltd, Australia) was used for thematic analysis.

Table 2. Interviewee characteristics of the qualitative sample

Facility	
Location	
Rural	38 (70%)
Remote	16 (30%)
Type	
District Community Medical Office (DCMO)	12 (22%)
Health center	42 (78%)
Worker	
DCMO	
District Community Medical Officer	2 (17%)
District Planner	2 (17%)
Nursing Officer	3 (25%)
Others	5 (40%)
Health center	
Clinical Officer	2 (5%)
Registered Midwife	1 (2%)
Registered Nurse	4 (10%)
Enrolled Midwife	5 (12%)
Enrolled Nurse	7 (17%)
Environmental Health Technician (EHT)	7 (17%)
Classified Daily Employee (CDE)	16 (28%)
Gender	
Male	27 (50%)
Female	27 (50%)
Highest academic/professional qualification	
Degree	3 (6%)
Diploma	18 (33%)
Certificate	17 (31)
Senior secondary education	9 (17%)
Junior secondary education	7 (13%)
TOTAL	
	54 (100%)
Job experience (in years)	
Mean (n; standard deviation)	9.8 (54; 8.7)
Number of years working in district	
Mean (n; standard deviation)	7.9 (54; 6.9)
Number of years working in a health facility	
Mean (n; standard deviation)	4.9 (54; 5.1)

28. Figure 3 summarizes the key themes that emerged from interviews, which we will explain with the regression analysis results.

Figure 3. Conceptual framework on the effects of RBF on HRH in Zambia



Source: Authors

RESULTS

MOTIVATION

29. We hypothesized that the RBF intervention would increase workers' motivation. Enhanced financing, too, was expected to cause the same changes, albeit to a lesser degree, thanks to the expected improvements made to working conditions. Yet we did not find support for these hypotheses for any of the eight constructs with one exception: respondents in the intervention group reported, on average, 2.418 points higher on the personal well-being scale ($p < 0.1$) than those in the control 2 group (Table 3). This aggregate finding is driven by respondents in the intervention group who felt more calm and relaxed in the two weeks prior to reporting than those in the control 1 group (9.479 higher points; $p < 0.1$) or those in the control 2 group (4.196 higher points; $p < 0.1$) (Appendix 4). These hypothesized group differences are summarized in Table 3 for the eight constructs.

30. Looking specifically at the individual questions under each motivation construct (Appendix 4), the RBF intervention also seemed to have encouraged staff to willingly give their time and help each other out when someone fell behind or had difficulties with his or her work; 3.774 higher points ($p < 0.1$) for the intervention than for the control 2 group. Finally, three of the motivation questions seemed to discern group differences, which could be used and elucidated in future RBF research. The three questions are: "I would prefer to work somewhere else than in this facility" (12.274 points lower for the intervention than for the control 1 group; $p < 0.1$); "My facility is a very dynamic and innovative place. People are willing to take risks to do a job well done" (5.057 points higher for the intervention than for the control 2 group; $p < 0.1$); and "Following procedures and rules is very important

in my facility” (1.952 points; $p < 0.1$) and 4.250 points ($p < 0.1$) higher for the intervention and control 1 group when each of them was compared with the control 2 group.

Table 3. Estimated effect of RBF and enhanced financing on motivation

	Intervention v. control 1 N=448	Intervention v. control 2 N=462	Control 1 v. control 2 N=345
	β (standard error)	β (standard error)	β (standard error.)
Teamwork	0.385 (3.132)	0.925 (1.429)	1.622 (3.511)
Autonomy	0.822 (4.311)	1.314 (1.768)	1.298 (4.488)
Recognition	-0.380 (3.282)	-0.837 (1.330)	-0.890 (2.851)
Change	-2.096 (2.664)	1.026 (1.240)	3.830 (2.640)
Self concept	-0.727 (1.866)	0.774 (1.075)	2.214 (2.359)
Work environment	-1.788 (2.597)	1.257 (1.260)	4.305 (3.028)
Leadership	-3.075 (4.885)	1.210 (2.613)	5.554 (5.151)
Well-being	1.100 (2.981)	2.418* (1.236)	3.934 (2.499)

Note: Coefficients, standard errors, and p values are for the interaction between the random assignment (intervention, control 1, control 2) and study period (baseline, endline). They are obtained from pair-wise regressions—facility fixed effect models controlling for workers’ characteristics. Robust standard errors are clustered at facility level.

* $p < 0.1$

31. The numbers in table 3 suggest that we may be underpowered to obtain precise estimates of RBF and C1 impacts as the standard errors are rather large. Still, in the RBF versus C1 comparison, the coefficients go in both directions, reflecting the lack of consistent effects of RBF over additional financing on health workers’ motivation. For RBF versus C2 and C1 versus C2 comparisons (the last two tables of table 3), we see a rather consistent and positive coefficients. However, only one among them is statistically significant (the indicator for wellbeing in RBF versus C1).

32. The RBF program guidelines set the expectation for workers to put in high levels of effort in order to receive bonuses. Respondents did endorse that earning a bonus has motivated them to enhance their performance in the workplace.

The RBF program was very key because...all those were incentivized indicators. Therefore, the facilities were motivated to work harder because they knew that if they put in so much, they will get a reward at the end of the day. —DCMO, Gwembe (intervention group)

RBF brought a lot of good things because that motivation was like a catalyst to boost the all the staff because they were eager ...to put in more so that they could earn more...By doing that, they were offering quality services which at the end of the day, not only benefited the staff themselves but also the patients. —Information Surveillance Officer, Isoka (intervention group)

33. RBF also seemed to have encouraged the adoption of professional behaviors, such as reporting for work on time or even early, wearing a uniform, or following all appropriate procedures when attending to patients.

[RBF] taught us not to report for work late. When you report for work late then you even know that you will receive less money. Therefore, we do not report late for work. Then when I go for work I shouldn't go without a uniform because even on the evaluation forms, the uniform is there. If you do not wear your uniform they will remove points from you. And when attending to a patient you should do all the vital checks like BP, weight, temperature similarly, if it is antenatal or family planning you check everything.—CDE, Kampumbu Isoka (intervention)

34. RBF enhanced teamwork and collaboration within its health facilities and districts. Health staff realized the importance of working together, with openness and strong communication, if they were to collectively meet RBF targets.

When making decision, we do not make them alone but we come together and hear each person's view before we make a decision, so I can say that we decide together. —CDE, Lukonde Gwembe (intervention group)

35. The RBF program also promoted inter- and intra-organizational collaboration. Some of the health centers in the Gwembe District reported patient referral with other health centers in the same geographic area to make sure no one would delay or fail to seek health care services. This also ensures that the network of health centers would absorb as many of the cases as possible from the same catchment population, and not lose out on earning bonuses.

36. The quantitative data did not highlight statistically significant differences between the intervention and control 1 groups. The qualitative evidence, however, highlights the prominent role that financial reward plays in service quality improvement, and beyond that workers' strong sense of serving community, working in teams, and professional obligation to nearby health facility. The mixed findings warrant further research on the relationship between RBF and health worker motivation.

SATISFACTION

Appropriation of funds

37. We hypothesized that the RBF intervention would increase workers' satisfaction. Enhanced financing might also lead to increase in satisfaction, albeit to a lower magnitude if it does than RBF, because of improvements made to working conditions. We found support for these hypotheses with overall satisfaction and compensation (Table 4).

Table 4. Estimated effect of RBF and enhanced financing on satisfaction

	Intervention v. control 1 (N=448)	Intervention v. control 2 (N=462)	Control 1 v. control 2 (N=345)
	β (standard error)	β (standard error)	β (standard error)
Relationship outside facility	1.643 (2.964)	0.427 (1.491)	-0.589 (3.123)
Relationship within facility	-4.155 (2.816)	0.477 (1.016)	4.941* (2.585)
Work conditions	6.393 (5.121)	4.366* (2.183)	2.199 (5.903)
Recognition	1.439 (2.842)	0.086 (1.324)	-1.437 (2.239)
Opportunities	4.686 (4.183)	3.641* (2.004)	2.298 (5.240)
Compensation	8.639** (4.081)	3.880* (1.994)	-0.822 (4.872)
Overall satisfaction	-0.482 (3.958)	4.751** (2.142)	10.306** (3.936)

Note: Coefficients, standard errors, and p values are for the interaction between the random assignment (intervention, control 1, control 2) and study period (baseline, endline). They are obtained from pair-wise regressions—facility fixed effect models controlling for workers’ characteristics. Robust standard errors are clustered at facility level.

* p<0.1; ** p<0.05

38. More specifically, we estimated a statistically significant increase of 4.751 points (p<0.05) in overall satisfaction for the intervention versus control 2 group. The same effect was more pronounced—10.306 (p<0.05) points higher—for control 1 group versus control 2 group. For compensation, those in the control 2 group reported an average of either 8.877 (p<0.01) or 10.845 (p<0.1) lower points for being rewarded for their hard work than their counterparts in the intervention or control 1 group, respectively. (Full results for all questions under each satisfaction construct are presented in Appendix 5.)

39. A key objective of the RBF program in Zambia was to enhance the capacity of health centers in terms of decision-making, management, service planning, procurement of supplies, and service delivery. Respondents in the qualitative analysis prized autonomy over the allocation of resources, and they said it contributed to their satisfaction as health cadres. Furthermore, the qualitative assessment revealed a marked difference in the level of autonomy between RBF and additional financing groups. In Itezhitezhi (control 1 group), we observed still the traditional protocol of determining the needs of the health center, who had to submit their requests to the local DCMO. In Isoka and Gwembe (RBF), by contrast, health cadres had high involvement in prioritizing needs without having to wait for the DCMO to approve their plans. A major difference was that in Itezhitezhi the DCMO bought some of the requested items for the health centers using government funds, whereas in Isoka and Gwembe the health centers could make purchases themselves using RBF funds.

We don’t directly receive that (RBF) money for us to buy our stuff. The district buys for us. Therefore, when we make that budget, we are human and they (district staff) are human. If we say we need a trash bin that has wheels, I think that the person receiving it on the other end would not see the importance and may just leave it out. Therefore, we should have been receiving that money directly ourselves; since we are the ones working here and we are the ones who know what we need and what we don’t need. —EHT, Nasenga Itezhitezhi (control 1 group)

40. This respondent simply did not think the Itezihitezhi DCMO honored his or her health center's needs and the needs of the wider community. In contrast, RBF funds were deposited directly into the health centers' accounts without it having to pass through the DCMO, thus giving health centers discretion on how they wanted to use the money for reinvestment.

41. RBF funds provided ring fencing to help mitigate potential risks, which provides a sense of security:

Resources in the [RBF] project were assured...and you would be able to plan very well...The challenge is that the [government] resources...don't come at the time we need them. It is either delayed funding or you are not funded at all. That compromises your planned activities...Therefore, meeting your targets is a challenge if you have no other resources for implementing the activities. For example health centers in their action plans have a monthly outreach [program] but here is a situation [where] the grant has not come; how do they conduct [outreach]? —Planner, DCMO, Gwembe (intervention group)

42. In Chipepo, for example, when there was a delay in disbursing government funds, health centers in that district used part of their RBF funds to cover activities outside the scope of their original business plan. The funds' late arrival was echoed by the respondents in the Gwembe district as a challenge in planning and implementing activities.

43. A final difference between these two funding arrangements is that health centers in the RBF scenario had access to their account balance, and could therefore plan ahead, as seen in the following contrasting statements:

When it comes to RBF [we are not involved in decision making]. I am suggesting that they pick one person to represent our center so that we know how the money is broken down. We do not believe that the things the district brings from RBF are the only ones; there are still some more. Even you yourself cannot believe that. This problem has actually been there in the whole Itezihitezhi district. Even in other centers complain about the same —CDE, Lubanda Itezihitezhi (control 1 group)

For the percentage that was there under RBF; it was not for the DCMO to plan for us. When we got that money; twenty-five percent of that money was for the center to plan what to buy since we knew the things that we did not have. This has been a plus, because we were able to buy things on our own. —Midwife, Munyumbwe Gwembe (intervention group)

44. But that does not mean health centers were not accountable to their local DCMO. Health centers have to come up with a business plan as a requirement of the RBF program. Business plans are developed primarily so the following budget items (e.g. human resources, transportation) would help the health center meet its targets. The plans are iteratively revised based on the results of the last audit, the amount of money left over from previous funding cycles, and the feasibility of activities planned for the future. Health centers also reserve the option of changing their business plan in the event of unforeseen circumstances in the organization or local community. A respondent from the Isoka District illustrates this:

If we had budgeted for a motor bike in the business plan, it means that money must be used to buy the motor bike. Once you change, then the business plan would not be

allowed. This posed a challenge because you may not have a BP (blood pressure) machine and if you decide to buy a BP machine when you planned and budgeted to construct a toilet then that becomes a problem. The BP machine may be a priority now but you had not planned for it when you made the business plan. —CDE, Isoka (intervention group)

45. Respondents in the control district, such as Itezhitezhi, said it has been challenging to stick to the financial plan submitted for government grants because of unforeseen circumstances. Respondents in the intervention districts, for the most part, revealed that there was adequate flexibility on use of RBF funds. We found further evidence of fungibility, as in Gwembe, that health center staff have sacrificed a portion of their own personal bonuses after deciding that they needed to spend more money on capital investment.

46. The manner in which RBF funds were allocated, however, could be a point of contention between health centers and DCMOs. The business plan serves another purpose: they were a planning tool for the health centers, but also a monitoring and evaluating tool for the DCMO. The DCMO would refer to a health center's business plan as a basis for ensuring that health centers followed RBF financial guidelines. The DCMO would give them feedback and advice if the funds were not spent on all the core areas, especially during auditing visits scheduled quarterly. Some of the health centers resented meddling with their internal affairs, and pushed back when their spendings were closely scrutinized by the DCMO. Some of the respondents in Isoka and Gwembe saw the guidance DCMO gave more as directives.

On paper, we had autonomy but it was not there on the ground. Even in the plans that we had, we were not allowed to include allowances whatsoever apart from the bonuses. We were told by the DCMO we could include allowances only with an authority letter from RBF. So when you look at it ...strictly speaking, autonomy was not there. —Nurse, Kampumbu Isoka (intervention group)

47. The business plans were drafted to meet health center-specific targets in the first place, and the DCMO should have let health center staff dictate, carry out, and iteratively update the terms of their plan. For example, staff from one health center in Gwembe argued that they were not allowed to buy what was not foreseen when the plan was drawn up. Similarly, staff at one health center in Isoka felt that they were being compelled by the DCMO to buy what they had not initially planned to buy, citing a blanket order from the DCMO for all health centers across the district to buy motorbikes even when health cadres neither needed nor could afford them.

We were given the freedom to use whatever we received. But I think the district somehow imposed some restrictions. Sometimes we would say that if we did certain things, we would improve but they would impose and suggest to us what we should do. For example, there was one time when all the centers were asked to buy motor bikes irrespective of how much money we had...It was very difficult because some centers had very little money...It was difficult to do other activities because the money was spent on the motor bike and therefore, other services were left out. —EHT, Bbondo Gwembe (intervention group)

48. Most respondents preferred a light truck to a motorbike because it can carry more health workers for outreach activities.

49. Countering health center-based respondents who felt that the DCMO was a hindrance to attaining their targets, respondents representing the DCMO maintained that they had the health centers and community members' best interests in mind. These respondents saw the audits as part of their role. They felt that some health centers spent outside the parameters of their business plans, and had to intervene where appropriate. The disconnect between health centers and the DCMO may also stem from DCMO officers' lack of flexibility in applying RBF guidelines, and confusion over the proper appropriation of RBF funds.

Development opportunities

50. We found mild support for work conditions, professional growth opportunities, and relationship with colleagues within the health facility (see Table 4). RBF and enhanced financing groups both had a consistently positive effect on improving working conditions and providing workers with growth opportunities, though more for the former than the latter. RBF increased satisfaction over availability of supplies relative to health facilities that received enhanced financing (7.732 higher points; $p < 0.05$) or those that did not receive additional financing (12.971 higher points; $p < 0.1$).

51. The most predictive question within the working conditions construct, and the only one that differentiates the intervention group from either of the control groups, seemed to be the perceived increase in skills and knowledge due to training (11.996 increase in points for intervention vs. control 1 group, $p < 0.05$; 7.018 increase in points for intervention vs. control 2 group, $p < 0.1$). The RBF intervention seemed to have either a null effect when compared with the control 2 group or an opposite effect relative to the control 1 group in cultivating relationships with colleagues in the same health facility—although those in the enhanced financing group, or control 1 group, had better professional relationships (4.941 higher points; $p < 0.1$) than those in the control 2 group.

52. The financing programs not only added monetary incentives, but also provided material resources to develop the workforce and health infrastructure that would indirectly increase worker satisfaction. Health centers were oriented to the RBF program in three main ways: workshops and meetings; technical support from the DCMO; and RBF-related literature and documents. However, a common problem reported since RBF's inception is the many qualified staff who quit work at a local health facility after receiving some form of training or orientation to the RBF program. Many of the staff hired to replace them were never oriented, and thus had less knowledge about RBF and sometimes struggled to implement the program. In many instances, such staff parried some of the questions on RBF during the interviews arguing that they were new to the center and did not know much about the program. For these reasons, respondents had widespread complaints about the dearth of workshops to orient health center staff to the RBF program itself, as well as continuing medical education in general—an unintended consequence of the RBF intervention.

Recognition

53. We found no support for relationships with colleagues outside of the health facility and recognition (see Table 4). In many interviews the staff acknowledged, for example, that their own efforts to increase health-seeking behavior, such as antenatal care and institutional delivery, would receive a boost from greater community engagement. The variations in what modal workers receive from their supervisors, other professionals working in the health field, and those in the community attributed to the health facility's financial arrangement merit further research.

54. Health centers received supervision and support in the form of an administrative audit (or verification of output quantity) from the DCMO once a month and a quality assessment from the hospital once a quarter. During these unannounced visits, the verifiers would look at all aspects of RBF program implementation and see how health centers were performing against standards and benchmarks. The verifiers and assessment teams used tools to guide them during their visits. After their visit, the verifiers would debrief health center staff on their strengths and weaknesses, and with the health center cadres devise potential solutions.

55. The assessments were perceived by many respondents to confer many benefits on health centers. First, the visits were felt to increase the health center cadres' understanding of the RBF guidelines and procedures:

When they came, we usually went through some reports to see where we have not done well and where we have not done well. Where we did not do well, they asked why and we gave them reasons after which they guided us how we could tackle those problems, Where we had done well, they congratulated us and encouraged us to continue. –Nurse, Lukonde Isoka (intervention group)

56. Second, they resulted in improved health center management, namely utilization of funds, maintaining cash registers, bookkeeping, balancing budgets, bank reconciliations, and payment vouchers. The corroborating accounts for HIV/AIDS and antenatal care illustrates the thoroughness of inspection:

When they come, they make sure that they go through every department. They see where we are not doing okay and after that they sit us down and tell us to write the points and areas we think we are not doing well. I can give an example of the antiretroviral therapy (ART) department. When they come, they see if we are documenting in the patients diary and also the pre monthly ART register and the ART register. They sit us down to explain the importance of having those records. –Nurse, Chabboboma Gwembe (intervention group)

57. Third, the visits stimulated good performance because the cadres were afraid of earning a low number of bonus points.

When you constantly visit the facilities, the people will know that the DCMO comes abruptly, so let us not relax; let us do things the way they are supposed to be done. – DCMO, Gwembe (intervention group)

58. The assessment is intended to serve as supportive supervision by the DCMO and is applied not only in RBF, but all facilities in rural Zambia. In the qualitative assessment, we found that control 1 and control 2 groups received less frequent supervision visits, but also expressed positive feedback on the importance of supportive supervision, even when such supervision was not directly connected to incentive payment.

I think it makes the health center staff not to sleep, when you are supervised and someone tells you to keep it up, you will always be alert and always do well in areas that you are not doing so well. -Clinical Officer, Lubanda Itezhitezhi (control 1 group)

They usually look at the way we are performing as a centre. We sit together and look at the indicators, how we are performing in each area...how we are conducting the immunizations, how we are doing the deliveries (antenatal care), and how we are giving the services to the mothers...When they discover that we diverted a bit they would always help us do the correct thing. -Midwife, Mugoto Mazabuka (control 2 group)

59. The audits and assessments had their drawbacks as well, according to respondents. Visits happened too frequently for any observable difference to be observed:

The frequency is monthly but it is too much. At least if they came after two months so that they can at least see the progress well but then monthly it is too much. -Nurse, Lualwizi Isoka (intervention group)

60. Further, some respondents complained that the verification teams would visit—unannounced—when the staff were inundated with work, when the health facility is short of staff in the first plane, or when some staff were working outside the health center, such that the staff present, such as a CDE, might not be fully conversant with RBF issues and processes.

They come when you are busy with under-five and curative care-OPD and they were not (even) assisting...After they audit you, you remain at the centre attending to the clients. -CDE, Kapililonga Isoka (intervention group)

When we are not informed that they are coming, sometimes they find one member of staff because the rest would be away in Monze so as to collect salaries. Since they have to screen and ask questions with regards to performance, the patients end up waiting to be attended to. I think that one comes back to the same shortage of staff. -CDE, Lukonde Gwembe (intervention group)

PRODUCTIVITY

61. We hypothesized that the RBF intervention would increase productivity since monetary incentives are tied to performance. Enhanced financing was expected to cause little to no change because the payment was not tied to outputs, although improved availability of drugs and equipment may boost performance independently. We ran separate statistical tests for productivity and task-shifting. For productivity, we were interested in whether RBF makes staff produce more services in general. The question was slightly different for task-shifting: we were interested in whether RBF makes staff produce more RBF-related services and either the same or fewer services not related to RBF. (Productivity and task-shifting measures were described in the method section above.)

62. Health facilities that received additional financing seemed to have a higher patient-to-staff ratio, even though none of the productivity figures (Table 5) are statistically significant, albeit having the expected positive sign.

Table 5. Estimate effect of RBF scheme on productivity*

	Intervention v. control 1 (n=448)	Intervention v. control 2 (n=462)	Control 1 v. control 2 (n=345)
	β (standard error)	β (standard error)	β (standard error)
Staff-normalized service weights, all services	282.202 (1219.512)	582.004 (679.904)	881.806 (1461.286)
Staff-normalized service weights, RBF-incentivized services	254.097 (1067.252)	439.267 (605.885)	624.437 (1319.877)
Staff-normalized service weights, not RBF-incentivized services	28.105 (347.273)	142.737 (102.495)	257.368 (335.410)

*Note: Coefficient is the staff-normalized total service weight (total weight of all services provided divided by the total number of staff). Coefficients, standard errors, and p values are for the interaction between the random assignment (intervention, control 1, control 2) and study period (baseline, endline). They are obtained from pair-wise regressions—facility fixed effect models controlling for workers’ characteristics. Robust standard errors are clustered at facility level.

63. Closely related to productivity is the concept of patient workload. Although the quantitative survey didn’t reveal any statistically significant difference in productivity among three groups, the qualitative evidence suggests that the number of hours in each work shift and number of community outreach activities may be higher in RBF facilities. The main impetus behind working longer hours is to earn as many bonus points as possible to increase personal quarterly bonus earnings; to miss any one client or patient implies a loss of bonus points. Some health centers were also competing with one another to see who could earn the largest bonus for themselves and for their facility as a whole.

You come around 4 or 5 a.m. and work up to 18 hours... I attend to patients and have to see to it that I have even cleaned the surroundings and even cleaned the rooms. In short...it’s tiring, and that is what is demotivating. And if I want to upgrade myself in terms of knowledge I cannot because I do not have time to rest...When I work for many hours then at the end of the quarter I will have a very good percentage in terms of evaluations...meaning that at the end of the quarter I would have a good package of motivation bonus. —CDE, Isoka (intervention group)

The workload used to be there because we used to work flat out, sacrificing [other aspects of our lives] just to reach those goals, to reach somewhere. And we used to compete with other centers because you could see that “Oh! This center got so much, this one also beat us, so we should do better than them. There was that competition that used to be there. — Nurse, Isoka (intervention group)

64. Interviews with staff from control 1 and 2 groups, however, revealed that financial incentives alone do not explain the hard work exerted by health workers. Escalating commitment can stem from motivation to serve the community. Respondents at non-RBF districts such as Itezhitezhi and Mazabuka worked long hours because they were dedicated to providing quality care. Cadres mentioned, for example, the need to attend to clients to avoid fatalities and not compromise patient safety.

Even when they come for labor in the middle of the night, we attend to them. No matter how sick you would be, we still come to the clinic to attend to them. Even when it is over our working hours, we still come to the clinic and attend to our patients because we would not know what would happen; maybe the patient’s condition can be worsen if we do not attend to them early enough. —CDE, Lubanda Itzhitezhi (control 1 group)

As for me, when a mother comes, I would make sure that everything is done for this mother. And when it is done, I would make sure that the baby inside should not suffer because of me. —Clinical Officer, Lubanda Itzhitezhi (control 1 group)

65. Health center staff went out to the communities rather than wait for the patients to come to the health centers through outreach programs (e.g. childhood immunization). Isoka is more active in outreach activities than other districts. In fact, many of the health center staff in Isoka used part of their bonuses to either buy or hire means of transport, namely motorcycles and fuel or bicycles.

ATTRITION

66. Staff shortages and understaffing are problems strongly endorsed during the interviews. The main reasons for staff turnover are retirement, illness, marriage, lack of accommodation, or the need to pursue further academic studies or professional training. Some of the respondents felt that the staff level in their health center was inadequate for the population size covered. Others felt staffing was inadequate in terms of the diversity of cadre available in each health center, comprising clinical officers, midwives, EHTs, nurses and, to a lesser extent, CDEs. For example, even with two nurses, some respondents viewed staffing as too low because of the absence of a midwife in the same facility. Health center respondents blamed the staff shortage on the DCMO, while district officers felt that the same problem was beyond their control because the workforce assigned to any given district depended on the provincial and national health offices.

67. We hypothesized that the RBF intervention would lead to decreased turnover among all staff or by key positions from their affiliated health facility when compared to both enhanced financing and pure control. Enhanced financing, too, could also experience a desirable effect on attrition because of improvements in working conditions. As shown in table 5, the coefficients in the comparison between RBF and control 1 all have the expected negative sign (less staff leaving the facilities). However, the only staff category that is statistically significant was “administrator” (0.096 less staff leaving the facility on average). The RBF intervention also lowered the turnover of medical officers (-0.032; $p < 0.1$) and nurses (-0.138; $p < 0.05$) when compared with the control 2 group.

Table 5. Estimate effect of RBF scheme on attrition*

	Intervention v. control 1 (n=448)	Intervention v. control 2 (n=462)	Control 1 v. control 2 (n=345)
	β (standard error)	β (standard error)	β (standard error)
All staff	-0.028 (0.052)	-0.016 (0.019)	-0.004 (0.060)

Medical officer	-0.016 (0.035)	-0.032* (0.018)	-0.047 (0.033)
Clinical officer	-0.049 (0.052)	0.044 (0.028)	0.137* (0.079)
Administrator	-0.096** (0.046)	-0.013 (0.012)	0.070 (0.052)
Nurse	-0.185 (0.149)	-0.138** (0.064)	-0.091 (0.152)

*Note: Coefficient denotes number of staff in each category who left the facility permanently in the last 12 months. Coefficients, standard errors, and p values are for the interaction between the random assignment (intervention, control 1, control 2) and study period (baseline, endline). They are obtained from pair-wise regressions—facility fixed effect models controlling for workers’ characteristics. Robust standard errors are clustered at facility level.

* p<0.1; ** p<0.05

68. Respondents generally believed that the situation improved after the RBF program was introduced to their district. The allocation of bonuses through the program depended heavily on the availability of a qualified staff member in the health center, and therefore managers paid close attention to staffing:

Sometime back, some centers used to be manned by unqualified staff but when the [RBF] program came, management was pressured to the extent that we needed to find where we could source some qualified staff, such as from the hospitals to go to the [health] centers... Things have changed now compared to the past because every health facility now has a qualified health staff but then, they are not enough. —Information Surveillance Officer, DCMO, Isoka (intervention group)

69. Health centers have also become more attractive places to work than district hospitals due to the incentives in the RBF program:

Where there is an incentive you expect somebody to stick there (laughter)... I remember the days before RBF when a staff would stay there for only three months before you hear them say “I want to go, I want to move out”. For the past two years that we have been with this RBF, I have never heard any staff saying they want to go to the hospital (laughter)...the same people are comfortable in the health centre...nobody has requested for any transfer or even talking about it. -Nursing Officer, Isoka (intervention group)

70. RBF’s emphasis on quality services through the use of qualified staff has curtailed the shift of certain tasks from specialists to nonspecialists. Quite a number of the health centers we visited were manned by EHTs and CDEs, some of whom reported having to undertake such duties without adequate medical training. With RBF, a certain number and mix of staff in the health facilities is retained.

Before the coming of RBF, that (task shifting) used to happen. But with the emphasis on quality as in skilled personnel; that has helped us put every member of staff where they are supposed to be. There were more like restrictions and you would find that when an EHT was delivering, you question the quality, you would ask under what circumstances a pregnant woman was more at risk; being delivered by an EHT or being delivered by a midwife? This helped us to put every member of staff where they belonged. —EHT, Lukonde Gwembe (intervention group)

71. In some of the health centers, such as the three we visited in Isoka, health cadres chose to give up part of their individual bonuses to hire non-specialized yet qualified staff out of institution-wide funds. By doing so, they hoped to improve the amount of bonus

points earned the following quarter and, in turn, it would pay off in higher individual bonuses in the long run. This is a double gain in the sense that the health center is better staffed to provide services and it helped increase the amount of bonus everyone on the staff can earn. Not all health centers were able to do the same because the bonuses they earned were either inadequate or received quarterly.

72. A limitation of this study is that data is collected for attrition from the health facilities and districts in the sample only. Future studies could therefore look at whether RBF results in a higher number of transfer requests from health centers to the district hospital, and vice versa, the reasons why. Furthermore, whether transfers result in a higher average level of qualifications among working staff even though the absolute staffing level remains low in a given health facility.

DISCUSSION

73. The RBF program in question aimed to motivate and strengthen the health workforce and to improve delivery of maternal and child health services in Zambia. Our econometric estimates suggest that RBF led to increased satisfaction and decreased attrition, but did not lead to marked effects motivation or any effect on productivity. For satisfaction, we found support for overall satisfaction and compensation, with both RBF and enhanced financing experiencing a more positive effect compared to pure control. However, we also found slightly less average satisfaction for the intervention than control 1 group, which merits further research. For attrition, we observed lower turnover for the intervention group compared to either of the control groups. Zambia raised civil servants' salaries in 2011 and in 2013, and the RBF incentives seem to have an added effect on attrition. This finding, however, is subject to change with labor policy changes that are related to retirement age, transfers within and across districts, and pursuit of higher education which, together with monetary incentives, can determine attrition. Finally, there are modest indications that RBF has an impact on motivation. Respondents in the intervention group reported higher personal well-being than those in the control 2 group. Respondents in the intervention group also felt more calm and relaxed than those in either the control 1 or control 2 group.

74. In a rather strong contrast to econometric results, the qualitative assessment shows very positive evidence on health worker satisfaction and motivation from RBF, and to some extent, control 1 group. The evidence suggests that in response to RBF, health care providers worked harder and some also increased community outreach activities in order to earn more bonuses. RBF made health centers more attractive to work in than hospitals, and with more specialized and nonspecialized positions filled, it allowed skilled providers to focus on caring for patients. Health workers appreciate working in an RBF health facility not only because of the financial incentives, but because of the greater autonomy to solve their problems, capacity to serve the community and opportunities for professional development.

75. The qualitative assessment, on the other hand, also points to a number of contextual factors that could explain the lack of remarkable difference among study groups found in

the econometric results. Among RBF facilities, there was a sentiment that the district supervision visit was too frequent and sometimes too stringent, autonomy sometimes was not there in practice, and the workload and pressure of earning points could be too high. At the same time, the positive effects of supportive supervision and the motivation to serve the community were also high in non-RBF groups, in particular control 1.

76. Fungibility of funding is another important factor which could have nullified the expected impacts of RBF and additional financing. Both the RBF performance payments in RBF districts and the RBF matching grants in C1 districts were supposed to be additional to the existing financial resources from the Zambian Government and other partners. However, administrative data suggest that health managers in the provinces stopped remitting the full amount of the government grant to RBF health facilities, and to some extent also to C1 facilities.

77. The experience in Zambia shows that incentives—if calibrated correctly—can be an important determinant of worker satisfaction and motivation, retention in their post and overall performance. Incentive strategies may influence efforts to recruit new health workers with the appropriate skills and knowledge. In contrast, poor satisfaction and motivation among health workers may lead to poor performance and higher staff turnover, disrupting continuity of care for patients and incurring higher costs for the health system. Our study highlights not only the importance of effective and sustainable incentives for health workers, but also the effects of different types of financial incentives. Both RBF and nonincentivized financing played a role in workers' strong sense of serving community, team work, and professional obligation to nearby health facility.

78. Our study overall has several limitations. With a rather small number of districts in each study group (10), the district pairing design could be somewhat compromised with “contamination” across groups. However, baseline characteristics were similar among workers across the three groups in Table 1, which lends confidence that results were not susceptible to confounding bias. Second, as this is an observational study, recall errors by the respondents surveyed and interviewed could affect the accuracy of our estimates. However, we believe such errors would be similar for the comparison groups given our sampling design. Third, the instruments used for quantitatively measuring the HRH outcomes may leave much room for improvement. Both productivity and attrition measures were rather roughly constructed. Satisfaction and motivation are abstract concepts. Although the field has made progress on this topic, it has been a common challenge for many studies to quantify health workers' satisfaction and motivation (and this could explain the observed differences between qualitative and quantitative results as reflected above).

79. Despite the limitations, this study potentially contributes to the scant literature on the effects of RBF on health worker outcomes in low- and middle-income countries. It shows that RBF, through financial incentives and other leverages such as enhanced autonomy and supportive supervision (the *necessary conditions*), can have a positive effect on health worker satisfaction and motivation, which encourages them to work harder and stay in the rural communities. It also calls for a careful examination of the contextual factors, which, as we argued upfront, form the *sufficient conditions* to make the desirable

effects happen. While some of the sufficient conditions are beyond the immediate program implementers' span of control, such as staff shortage, many are under their purview, such as the quality of supervision, communication and refresher trainings for staff. Finally, the positive experience reported from the quantitative and qualitative assessments by the enhanced financing group warrants further study. The lesson from this pilot will be helpful for Zambia in expanding RBF to other parts of the country, as well as other countries designing and implementing RBF programs.

APPENDIX 1. DISTRICT SELECTION

Districts selected for the health results-based financing (HRBF) study were intended to represent the median population health, socio-economic condition, and health governance capacity for the collection of districts in the provinces in which they are located. If the evaluation instead focused on exceptionally high (or exceptionally low) capacity or condition districts then this will in turn overstate (or understate) the estimate of a national scale-up for the RBF, and the project team naturally wants to avoid this possibility.

To select study districts, district level information was gathered on three areas of interest: district health administrative capacity, district population health service outcomes, and levels of district population living standards.

The administrative capacity of the district is measured as an index derived from principal components analysis based on the following three measures of District Health Management Team (DHMT) performance:

- The average facility level stock-out rate of key commodities over the years 2006 and 2007.
- The average supervisory visit rate from DHMT to all facilities over the years 2006 and 2007.
- The rate of under-5 population covered by immunization campaigns in 2006 and 2007.

All three of these measures reflect different aspects of DHMT capacity and are combined into an index that is then sorted into quintiles.

The population health indicator derives from the following three measures:

- The average in-facility delivery rate over the years 2006 and 2007.
- The average facility TT coverage rate over the years 2006 and 2007.
- The average facility post-natal coverage rates over the years 2006 and 2007.

These three indicators are then combined into one health index by principal components analysis and sorted into quintiles.

The socio-economic conditions prevailing in the district reflect a range of measures taken from the 2006 Living Conditions Monitoring Survey that are combined by Kaboso and Temba (2009) into a material deprivation index.

The three separate district indicators are re-combined through principal components analysis into one index that is then sorted into quintiles. Within each province, three districts at or near the provincial median index score derived from these measures are selected and then randomly assigned to either the intervention or one of the two control statuses, following the evaluation design described in the Randomization subsection.

The districts selected for the three study groups are as follows:

Intervention Group - RBF Intervention Districts		Control 1 Group— Enhanced Financing		Control 2 Group— “Business as usual”	
<i>Province</i>	<i>District</i>	<i>Province</i>	<i>District</i>	<i>Province</i>	<i>District</i>
Central	Mumbwa	Central	Kapirimposhi	Central	Chibombo
Copperbelt	Lufwanyama	Copperbelt	Masaiti	Copperbelt	Mpongwe
Eastern	Lundazi	Eastern	Nyimba	Eastern	Chadiza
Luapula	Mwense	Luapula	Kawambwa	Luapula	Milenge
Northern	Mporokoso	Northern	Chilubi	Northern	Chinsali
Northern	Isoka	Northern	Nakonde	Northern	Mpulungu
Northwestern	Mufumbwe	Northwestern	Mwinilunga	Northwestern	Chavuma
Southern	Siavonga	Southern	Namwala	Southern	Mazabuka
Western	Senanga	Western	Kalabo	Western	Shangombo

APPENDIX 2. DESCRIPTION OF OUTCOME VARIABLES

Motivation constructs*

10.01	Staff willingly share their expertise with other members.	Team work
10.02	When disagreements occur among staff, they try to act like peacemakers to resolve the situation themselves.	Team work
10.03	Staff willingly give their time to help each other out when someone falls behind or has difficulties with work.	Team work
10.04	Staff talk to each other before taking an action that might affect them.	Team work
10.05	Staff take steps to prevent problems arising between them.	Team work
10.07	Staff spend their time chatting amongst themselves about things that are not related to work.	Team work
10.08	Staff spend time complaining about work-related issues.	Team work
10.09	My job allows me freedom in how I organize my work and the methods and approaches to use.	Autonomy
10.10	I am given enough authority by my supervisors to do my job well.	Autonomy
10.11	It is important for me that the community recognizes my work as a professional.	Recognition
10.12	It is important for me that my peers recognize my work as a professional.	Recognition
10.13	Changes in the facility are easy to adjust to.	Change
10.14	Rapid changes are difficult to cope with.	Change
10.15	Changes bring opportunities to make improvements in the facility.	Change
10.16	My job makes me feel good about myself.	Self concept
10.17	I am proud of the work I'm doing in this facility.	Self concept
10.22	I complete my tasks efficiently and effectively.	Self concept
10.23	I am a hard worker.	Self concept
10.24	I am punctual about coming to work.	Self concept
10.25	These days, I feel motivated to work as hard as I can.	Self concept
10.18	I am proud to be working for this health facility.	Work environment
10.19	I am glad that I am working for this facility rather than in other facilities in the country.	Work environment
10.20	I would prefer to work somewhere else than in this facility.	Work environment
10.21	This health facility inspires me to do my very best on the job.	Work environment
10.26	My facility is a very personal place. It is like an extended family and people share a lot with each other.	Work environment
10.27	My facility is very dynamic and an innovative place. People are willing to take risks to do a job well-done.	Work environment
10.28	My facility is very formal and structured. Policies and procedures are important for doing our work.	Work environment
10.29	In my facility, we focus on achieving daily goals getting our work done. Relationships between staff are less important.	Work environment

10.35	Innovation and being first to try something new are important in my facility.	Work environment
10.36	Following procedures and rules is very important in my facility.	Work environment
10.37	Achieving results and high performance is very important in my facility.	Work environment
10.30	The head of my facility is a mentor and a role model.	Leadership
10.31	The head of my facility is willing to innovate and take risks in order to improve things.	Leadership
10.33	The head of my facility motivates staff to achieve goals.	Leadership
10.38	In the past two weeks, I have felt cheerful and in good spirits.....	Well being
10.39	In the past 2 weeks, I have felt calm and relaxed...	Well being
10.40	In the past 2 weeks, I have felt active and vigorous...	Well being
10.41	In the past 2 weeks, I woke up feeling fresh and rested...	Well being
10.42	In the past two weeks, my daily life has been filled with things that interest me....	Well being

*Note: Motivation-related questions come from Section 8 ‘WHO Well-Being Index’ and Section 10 ‘Personal Drive’ of the Health Worker Individual Questionnaire. Results for these eight constructs are reported in Table 3, and for the 39 questions in Appendix 4. The first column of the table denotes the question numbers in the questionnaire for ease of reference.

Satisfaction constructs*

9.02	Working relationships with District/ Ministry of Health staff	relationship outside facility
9.12	The relationships between the health facility and local traditional leaders	relationship outside facility
9.01	Working relationships with other facility staff	relationship within facility
9.03	Working relationships with Management staff within the health facility	relationship within facility
9.05	Quantity of medicine available in the health facility	work condition
9.07	Quantity of equipment in the health facility	work condition
9.08	Quality and physical condition of equipment in the health facility	work condition
9.09	Availability of other supplies in the health facility (compresses, etc.; office supplies)	work condition
9.10	The physical condition of the health facility building	work condition
9.11	Your ability to provide high quality of care given the current working conditions in the facility	work condition
9.13	Your level of respect in the community	recognition
9.16	Your immediate supervisor's recognition of your good work	recognition
9.14	Your opportunities to upgrade your skills and knowledge through training	opportunities
9.15	Your opportunity to discuss work issues with your immediate supervisor	opportunities
9.18	The opportunities to use your skills in your job.	opportunities
9.21	Your opportunities for promotion	opportunities

9.17	Your opportunity to be rewarded for hard work, financially or otherwise.	compensation
9.19	Your salary	compensation
9.20	Your benefits (such as housing, travel allowance, bonus including performance bonus, etc)	compensation
9.25	Overall, how satisfied are you with your job?	overall satisfaction

*Note: Satisfaction-related questions come from Section 9 ‘Health Worker Satisfaction’ of the Health Worker Individual Questionnaire. Results for the six constructs are reported in Table 4, and for the 20 questions in Appendix 5. The first column of the table denotes the question numbers in the questionnaire for ease of reference.

Productivity weights*

Indicator	Weight
Curative care	1
ANC	4
Voluntary counselling and testing for HIV and AIDS	1
Prevention of mother to child transmission of HIV and AIDS	1
Tetanus	0.5
Institutional delivery	5
PNC	2
Family planning	1
Fully immunized under 1	2
Growth monitoring	1
Malaria treatment	1
TB diagnosis	1
TB treat	1
Sexually transmitted diseases	1
Anti-retroviral therapy	1

*Note: We derived the weights for each individual conditions following the method described by Vujicic et al. (2008). Specific productivity weights were given based on the complexity of the effort, in terms of skills and time.

APPENDIX 3. MEAN STATISTICS OF WORKERS' CHARACTERISTICS AT BASELINE AND ENDLINE IN TWO GROUPS (N=683)

Table of comparison of treatment group and control 1 group characteristics

Variable	Baseline			Endline		
	Control 1 mean	Intervention mean	P-value	Control 1 mean	Intervention mean	P value
Female	0.379	0.422	0.525	0.363	0.410	0.463
Education-primary	0.081	0.062	0.568	0.011	0.042	0.166
Education-secondary	0.395	0.404	0.896	0.489	0.349	0.028
Education-college	0.488	0.521	0.638	0.489	0.602	0.080
Clinical officer	0.023	0.034	0.632	0.038	0.057	0.530
Nurse	0.256	0.248	0.899	0.350	0.326	0.721
Midwife	0.128	0.110	0.690	0.088	0.121	0.450
Environmental Health Technicians	0.093	0.145	0.253	0.075	0.128	0.228
Classified Daily Employees	0.414	0.333	0.218	0.380	0.313	0.276
Other staff	0.586	0.667	0.218	0.620	0.687	0.276
Age	38.011	37.432	0.675	38.511	35.819	0.042
Work-absence	1.439	1.197	0.685	1.098	1.121	0.957
Work-days	6.259	5.815	0.054	6.242	6.000	0.228
Work-hrs	55.904	51.446	0.324	50.326	52.067	0.586
Supervision	4.320	4.516	0.801	4.582	5.623	0.157
Work experience-total	11.037	10.060	0.483	9.025	8.028	0.392
Work experience-current facility	5.396	4.552	0.265	4.665	4.272	0.546

Note: Statistical significance is denoted by: bold italic (p<0.01); bold (p<0.05); italic (p<0.1).

Table of comparison of treatment group and control 2 group characteristics

Variable	Baseline			Endline		
	Control 2 mean	Intervention mean	p-value	Control 2 mean	Intervention mean	p-value
Female	0.424	0.422	0.974	0.490	0.410	0.206
Education-primary	0.054	0.062	0.817	0.051	0.042	0.753
Education-secondary	0.304	0.404	0.121	0.273	0.349	0.197
Education-college	0.630	0.521	<i>0.097</i>	0.677	0.602	0.227
Clinical officer	0.043	0.034	0.725	0.034	0.057	0.428
Nurse	0.250	0.248	0.976	0.449	0.326	<i>0.060</i>
Midwife	0.141	0.110	0.481	0.146	0.121	0.578
Environmental Health Technicians Classified Daily	0.163	0.145	0.705	0.101	0.128	0.545
Employees	0.315	0.333	0.772	0.222	0.313	0.111
Other staff	0.685	0.667	0.772	0.778	0.687	0.111
Age	36.207	37.432	0.372	35.485	35.819	0.796
Work-absent	1.586	1.197	0.462	1.737	1.121	0.219
Work-days	6.125	5.815	0.183	6.273	6.000	0.132
Work-hrs	54.552	51.446	0.516	49.612	52.067	0.375
Supervision	6.651	4.516	0.257	4.539	5.623	0.155
Work experience-total	9.763	10.060	0.820	7.946	8.028	0.944
Work experience-current facility	4.387	4.552	0.810	5.091	4.272	0.213

Note: Statistical significance is denoted by: bold italic (p<0.01); bold (p<0.05); italic (p<0.1).

Table of comparison of control I group and control II group characteristics*

Variable	Baseline			Endline		
	C2 mean	C1 mean	p value	C2 mean	C1 mean	p value
Female	0.424	0.379	0.546	0.490	0.363	<i>0.078</i>
Education-primary	0.054	0.081	0.475	0.051	0.011	0.118
Education-secondary	0.304	0.395	0.205	0.273	0.489	<i>0.002</i>
Education-college	0.630	0.488	<i>0.057</i>	0.677	0.489	<i>0.008</i>
Clinical officer	0.043	0.023	0.458	0.034	0.038	0.895
Nurse	0.250	0.256	0.929	0.449	0.350	0.190
Midwife	0.141	0.128	0.795	0.146	0.088	0.242
Environmental Health Technicians	0.163	0.093	0.166	0.101	0.075	0.554
Classified Daily Employees	0.315	0.414	0.172	0.222	0.380	<i>0.017</i>
Other staff	0.685	0.586	0.172	0.778	0.620	<i>0.017</i>
Age	36.207	38.011	0.216	35.485	38.511	<i>0.061</i>
Work-absent	1.586	1.439	0.844	1.737	1.098	0.318
Work-days	6.125	6.259	0.497	6.273	6.242	0.873
Work-hrs	54.552	55.904	0.788	49.612	50.326	0.829
Supervision	6.651	4.320	0.312	4.539	4.582	0.955
Work experience-total	9.763	11.037	0.361	7.946	9.025	0.454
Work experience-current facility)	4.387	5.396	0.215	5.091	4.665	0.611

Note: Statistical significance is denoted by: bold italic ($p < 0.01$); bold ($p < 0.05$); italic ($p < 0.1$).

**APPENDIX 4. REGRESSION RESULTS FOR MOTIVATION FOR
EACH INDIVIDUAL QUESTION**

		Intervention v. control 1 N=448	Intervention v. control 2 N=462	Control 1 v. control 2 N=345
		β (standard error)	β (standard error)	β (standard error.)
Teamwork	10.01	0.53 (0.53)	0.758 (1.646)	0.907 (3.133)
	10.02	6.308 (6.308)	2.724 (1.906)	-0.441 (5.326)
	10.03	3.717 (3.717)	3.774** (1.476)	3.528 (4.312)
	10.04	-0.311 (-0.311)	0.669 (2.803)	2.218 (5.308)
	10.05	2.119 (2.119)	1.448 (2.459)	0.96 (3.687)
	10.07	-1.976 (-1.976)	-0.543 (3.565)	0.761 (8.484)
	10.08	-7.99 (-7.99)	-2.401 (3.796)	3.629 (9.212)
	10.09	3.055 (3.055)	1.051 (2.535)	-1.55 (6.342)
Autonomy	10.10	-1.23 (-1.23)	1.63 (1.438)	4.137 (3.905)
	10.11	-0.68 (-0.68)	-0.689 (1.197)	-0.343 (2.971)
Recognition	10.12	-0.211 (-0.211)	-1.064 (1.649)	-1.438 (2.953)
	10.13	0.783 (0.783)	-0.26 (2.113)	-1.45 (3.708)
Change	10.14	-4.638 (-4.638)	3.01 (3.715)	9.794 (7.343)
	10.15	-2.433 (-2.433)	0.329 (2.05)	3.145 (4.019)
	10.16	-1.07 (-1.07)	0.839 (1.795)	2.605 (2.735)
Self concept	10.17	-2.26 (-2.26)	0.565 (1.254)	3.242 (2.862)
	10.22	-3.422 (-3.422)	0.689 (1.401)	4.557 (4.16)
	10.23	-4.204 (-4.204)	-0.23 (0.628)	3.569 (2.425)
	10.24	0.337 (0.337)	-1.211 (1.721)	-2.792 (3.486)
	10.25	7.184 (7.184)	4.086 (2.448)	1.457 (5.112)
	10.18	-3.145 (-3.145)	1.664 (1.723)	6.506 (4.756)
	10.19	-8.728 (-8.728)	-2.254 (2.702)	4.867 (6.59)
Work Environment	10.20	-12.274* (-12.274)	-3.452 (2.691)	5.267 (6.802)
	10.21	-0.246 (-0.246)	3.098 (3.252)	6.428 (7.156)
	10.26	1.156 (1.156)	1.752 (3.084)	2.818 (6.175)
	10.27	2.92 (2.92)	5.057* (2.652)	7.222 (7.12)
	10.28	1.906 (1.906)	2.238 (1.759)	2.562 (3.971)
	10.29	-2.728 (-2.728)	0.041 (2.714)	2.543 (6.221)
	10.35	-1.088 (-1.088)	1.106 (1.851)	3.333 (3.52)
	10.36	-0.713 (-0.713)	1.952* (1.018)	4.260* (2.092)
	10.37	1.24 (1.24)	1.32 (1.046)	1.062 (2.306)
	10.30	-4.268 (-4.268)	0.171 (2.586)	4.788 (6.045)
Leadership	10.31	-1.745 (-1.745)	2.464 (2.702)	6.459 (5.939)
	10.33	-3.211 (-3.211)	1.016 (3.102)	5.402 (5.11)
	10.38	-1.728 (-1.728)	1.892 (1.669)	5.656 (4.383)
Well-being	10.39	9.479* (9.479)	5.686** (2.378)	1.864 (4.463)
	10.40	-3.6 (-3.6)	-1.037 (1.608)	1.817 (4.968)
	10.41	2.229 (2.229)	1.351 (2.418)	0.342 (5.466)
	10.42	-0.882 (-0.882)	4.196* (2.263)	9.993 (5.958)

*Note: The question numbers in Appendix 4 are the same as those that appear in Appendix 3. Coefficients, standard errors, and p values are for the interaction between the random assignment (intervention, control 1, control 2) and study period (baseline, endline). They are obtained from pair-wise regressions—facility fixed effect models controlling for workers’ characteristics. Robust standard errors are clustered at facility level.

* $p < 0.1$; ** $p < 0.05$

APPENDIX 5. REGRESSION RESULTS FOR SATISFACTION FOR EACH INDIVIDUAL QUESTION

		Intervention v. control 1 (N=448)	Intervention v. control 2 (N=462)	Control 1 v. control 2 (N=345)
		β (standard error)	β (standard error)	β (standard error)
Relationship outside facility	9.02	1.659 (5.412)	1.958 (2.077)	2.672 (5.389)
	9.12	1.627 (4.645)	-1.104 (1.945)	-3.85 (5.314)
Relationship within facility	9.01	-6.761** (3.228)	-0.474 (1.253)	5.508 (3.372)
	9.03	-1.697 (3.349)	1.504 (1.612)	4.707 (3.605)
Work conditions	9.05	7.418 (7.433)	2.438 (3.361)	-2.626 (8.636)
	9.07	2.184 (7.262)	4.417 (3.247)	6.462 (7.021)
	9.08	8.905 (7.015)	5.041* (2.835)	1.371 (6.986)
	9.09	12.971* (7.43)	7.732** (2.992)	2.037 (8.287)
	9.10	7.063 (8.4)	4.978* (2.77)	2.478 (8.906)
Recognition	9.11	-0.184 (7.093)	1.59 (3.547)	3.472 (6.962)
	9.13	5.782 (4.248)	0.088 (2.087)	-5.731* (3.235)
	9.16	-2.904 (3.75)	0.084 (2.367)	2.858 (4.111)
Opportunities	9.14	11.996** (4.977)	7.018* (3.663)	1.659 (7.475)
	9.15	1.852 (5.37)	1.322 (2.479)	0.032 (5.821)
	9.18	-2.23 (4.556)	3.358 (2.702)	8.909 (6.194)
	9.21	6.73 (6.937)	2.341 (2.947)	-2.094 (7.553)
Compensation	9.17	6.882 (5.46)	8.877*** (2.886)	10.845* (6.13)
	9.19	6.594 (5.184)	1.328 (2.301)	-3.719 (6.226)
	9.20	12.815* (6.403)	1.685 (3.071)	-9.506 (7.8)
Overall satisfaction	9.25	-0.482 (3.958)	4.751** (2.142)	10.306** (3.936)

Note: The question numbers in Appendix 5 are the same as those that appear in Appendix 3. Coefficients, standard errors, and p values are for the interaction between the random assignment (intervention, control 1, control 2) and study period (baseline, endline). They are obtained from pair-wise regressions—facility fixed effect models controlling for workers’ characteristics. Robust standard errors are clustered at facility level.

* p<0.1; ** p<0.05

REFERENCES

- Ammassari, S. 2005. *Migration and Development: New Strategic Outlooks and Practical Ways Forward—The Case of Angola and Zambia*. Geneva.
- Ariely D, Gneezy U, Loewenstein G, and Mazar N. 2009. Large Stakes and Big Mistakes. *Review of Economic Studies*, Vol. 75: 1-19.
- Bangdiwala SI, Fonn S, Okoye O, Tollman S. 2010. Workforce Resources for Health in Developing Countries. *Public Health Reviews* 32(1):296–318.
- Basinga P, Gertler PJ, Binagwaho A, Soucat ALB, Sturdy J, Vermeersch CMJ. 2011. Effect on Maternal and Child Health Services in Rwanda of Payment to Primary Health-care Providers for Performance: An Impact Evaluation. *Lancet* 377: 1421-8.
- Bazant, E., Sarkar, S., Banda, J., Kanjipite, W., Reinhardt, S., Shasulwe, H., ... and Kim, Y. M. 2014. Effects of a performance and quality improvement intervention on the work environment in HIV-related care: a quasi-experimental evaluation in Zambia. *Human resources for health*, 12(1), 73.
- Bhattacharyya K, Winch P, LeBan K, Tien M. 2001. Community Health Worker Incentives and Disincentives: How They Affect Motivation, Retention, and Sustainability. Published by the Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development. Arlington, Virginia, October. Available <http://www.chwcentral.org/community-health-worker-incentives-and-disincentiveshow-they-affect-motivation-retention-and>. Arlington, Virginia.
- Brady, H. E., & Collier, D. (Eds.). 2010. *Rethinking social inquiry: Diverse tools, shared standards*. Rowman & Littlefield Publishers.
- Brenzel L, Measham A, Naimoli J, Batson A, Bredenkamp C, Skolnik R. 2009. Taking Stock: World Bank Experience with Results-based Financing (RBF) for Health. Washington, DC: The World Bank.
- Callaghan M, Ford N, Schneider H. 2010. A Systematic Review of Task-shifting for HIV Treatment and Care in Africa. *Human Resources for Health* 8:8.
- Canavan A, Toonen J, Elovainio R. 2008. Performance-based Financing: An International Review of the Literature. Amsterdam: KIT (Royal Tropical Institute).
- Daniels K, Odendaal W, Nkonki L, Hongoro C, Colvin C, Lewin S. 2015. *Incentives for Lay Health Workers to Improve Recruitment, Retention in Service and Performance* [Cochrane Protocol]. PROSPERO. CRD42015019480. http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015019480
- Das J and Sohnesen P. 2007. Variations in Doctors' Effort: Evidence from Paraguay. *Health Affairs* Vol 26(3): 324-37.
- Eichler R, Levine R. 2009. *Performance Incentives for Global Health, Potential and Pitfalls*. Washington, DC: Center for Global Development.
- Eldridge C, Palmer N. 2009. Performance-based Payment: Some Reflections on the Discourse, Evidence and Unanswered Questions. *Health Policy Plan* 24: 160.

- Ferrinho, P., Siziya, S., Goma, F., and Dussault, G. 2011. The Human Resource for Health Situation in Zambia: Deficit and Maldistribution. *Hum Resour Health*, 9(1), 30.
- Fiszbein A, Schady N, Ferreira F, Grosh M, Kelleher N, Olinto P, et al. 2009. Conditional Cash Transfers, Reducing Present and Future Poverty. Washington, DC: World Bank. Policy Research Report.
- Herbst, C. H., Vledder, M., Campbell, K., Sjöblom, M., and Soucat, A. 2011. *The Human Resources for Health Crisis in Zambia: An Outcome of Health Worker Entry, Exit, and Performance within the National Labor Health Market*. Working Paper 214, World Bank, Washington, DC.
- Ireland, M., Paul, E., and Dujardin, B. 2011. Can Performance-based Financing be Used to Reform Health Systems in Developing Countries? *Bulletin of the World Health Organization* 89(9), 695-698.
- Kamwanga J, Koyi G, Mwila J, Musonda M, Bwalya R: 2013. *Understanding the Labour Market of Human Resources for Health in Zambia*. Geneva: Department for Health Systems Policies and Workforce, World Health Organization.
- King, G., Keohane, R. O., & Verba, S. 1994. *Designing social inquiry: Scientific inference in qualitative research*. Princeton University Press.
- Lemiere C, Herbst C, Torsvik G, Maestad O, Soucat A, Leonard K. 2012. Evaluating the Impact of Results-based Financing on Health Workers Performance. Unpublished. World Bank, Washington, DC.
- Lewin S, Lavis JN, Oxman AD, Bastías G, Chopra M, Ciapponi A, ... and Haines A. 2008. Supporting the Delivery of Cost-effective Interventions in Primary Health-care Systems in Low-income and Middle-income Countries: An Overview of Systematic Reviews. *Lancet*, 372(9642), 928-939.
- Loevinsohn B. 2008. *Performance-based Contracting for Health Services in Developing Countries: A Toolkit*. Washington, DC: World Bank.
- Mahoney, J. 2010. After KKV: The new methodology of qualitative research. *World Politics* 62(01), 120-147.
- McPake, B., Witter, S., Ensor, T., Fustukian, S., Newlands, D., Martineau, T., and Chirwa, Y. 2013. Removing Financial Barriers to Access Reproductive, Maternal and Newborn Health Services: The Challenges and Policy Implications for Human Resources for Health. *Human Resources for Health* 11(1), 46.
- Meessen B, Soucat A, Sekabaraga C. 2011. Performance-based Financing: Just a Donor Fad or a Catalyst Towards Comprehensive Health-care Reform? *Bull World Health Organ* 89: 153-6 doi: 10.2471/BLT.10.077339 pmid: 21346927.
- MOH (Ministry of Health). 2011. Operational Implementation Manual for Results Based Financing (RBF) in Pilot Districts in Zambia. Lusaka, Zambia.
- MOH (Ministry of Health). 2005. Human Resources for Health Strategic Plan (draft): 2006–2010. Lusaka, Zambia.

- Mohammed RL, Herbst C, Leonard K, and Goldberg J. 2012. Crossing the Three-Gap Divide with RBF. Unpublished. World Bank, Washington, DC.
- Musgrove P. 2011. *Rewards for Good Performance or Results: A Short Glossary*. Washington, DC: World Bank.
- Oxman AD, Fretheim A. 2008. An Overview of Research on the Effects of Results-based Financing. Oslo: Norwegian Knowledge Centre for the Health Services.
- Ranson, M. K. et al. 2010. Priorities for Research into Human Resources for Health in Low- and Middle- income countries. *Bulletin of the World Health Organization*. 88: 435–443.
- Samb B, Desai N, Nishtar S, Mendis S, Bekedam H, Wright A, et al. 2010. Prevention and Management of Chronic Disease: A Litmus Test for Health-systems Strengthening in Low-income and Middle-income Countries. *Lancet* 376(9754): 1785–97.
- Songstad NG, Lindkvist I, Moland K M, Chimhutu V, Blystad A. 2012. Assessing Performance Enhancing Tools: Experiences with the Open Performance Review and Appraisal System (OPRAS) and Expectations towards Payment for Performance (P4P) in the Public Health Sector in Tanzania. *Global Health* 8(1):33.
- Toonen, J., A. Canavan, P. Vergeer and R. Elovainio. 2009. *Performance-based Financing for Health: Lessons from Sub-Saharan Africa*. Royal Tropical Institute, Cordaid and the World Health Organization. Amsterdam: KIT
- Vujcic M. 2009. *How to Pay Health Workers Matters: A Primer on Health Worker Enumeration Methods*. RBF Technical Brief, World Bank, Washington/DC.
- Vujcic M, Addai E, Bosomprah S. 2008. *Measuring Health Workforce Productivity: Application of a Simple Methodology in Ghana*. Washington, DC: World Bank.
- WHO (World Health Organization). 2006. *The World Health Report 2006: Working Together for Health*. http://www.who.int/whr/2006/whr06_en.pdf?ua=1.
- . 2007. *Everybody's Business: Strengthening Health Systems to Improve Health Outcomes*. WHO's Framework for Action. Geneva: World Health Organization.
- . 2013. Global Health Expenditure database (<http://apps.who.int/nha/database>).
- Witter S, Toonen J, Meessen B, Kagubare J, Fritsche G, and Vaughan K. 2013. Performance-based Financing as a Health System Reform: Mapping the Key Dimensions for Monitoring and Evaluation. *BMC Health Services Research* 13(1): 367.
- Zachariah R, Ford N, Philips M, Lynch S, Massaquoi M, Janssens V, et al. 2009. Task Shifting in HIV/AIDS: Opportunities, Challenges and Proposed Actions For Sub-Saharan Africa. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 103(6):549–58.