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3 **Title:**

4 How does Performance-based Financing affect health workers' intrinsic motivation? A Self-
5 Determination Theory-based mixed-methods study in Malawi.

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32 **ABSTRACT**

33 “Intrinsic motivation crowding out”, the erosion of high-quality, sustainable motivation through the
34 introduction of financial incentives, is one of the most frequently discussed but yet little researched
35 potential unfavorable consequence of Performance-based Financing (PBF). We used the opportunity of
36 the introduction of PBF in Malawi to investigate whether and how PBF affected intrinsic motivation,
37 using a mixed-methods research design theoretically grounded in Self-Determination Theory (SDT).
38 The quantitative component served to estimate the impact of PBF on intrinsic motivation, relying on a
39 controlled pre- and post-test design, with data collected from health workers in 23 intervention and 10
40 comparison facilities before (March/April 2013; n=70) and approximately two years after (June/July
41 2015; n=71) the start of the intervention. The qualitative component, relying on in-depth interviews
42 with health workers in selected intervention facilities one (April 2014; n=21) and two (September 2015;
43 n=20) years after the start of PBF, served to understand how PBF did or did not bring about change in
44 intrinsic motivation. Specifically, it allowed us to examine how the various motivation-relevant
45 elements and consequences of PBF impacted health workers’ basic psychological needs for autonomy,
46 competence, and relatedness, which SDT postulates as central to intrinsic motivation. Our results
47 suggest that PBF did not affect health workers’ overall intrinsic motivation levels, with the intervention
48 having both positive and negative effects on psychological needs satisfaction. To maximize positive
49 PBF effects on intrinsic motivation, our results underline the potential value of explicit strategies to
50 mitigate unintended negative impact of unavoidable design, implementation, and contextual challenges,
51 for instance by building autonomy support activities into PBF designs.

52

53 **KEY WORDS**

54 Malawi; intrinsic motivation; performance-based financing; incentives; health workers; crowding out
55 effect; self-determination theory; autonomy support

56

57 INTRODUCTION

58 Performance-based financing (PBF) currently receives much attention in low- and middle income
59 countries (LMIC) as a means to strengthen effectiveness and efficiency of healthcare service provision.
60 PBF aims to improve utilization and quality of healthcare services by motivating healthcare providers
61 to better align their service provision behavior with health system interests. This is done through
62 performance contracts which financially reward the attainment of defined performance standards while
63 simultaneously improving facilities' decision autonomy on financial and productive resources
64 (Renmans, Holvoet, Criel, & Meessen, 2017). Performance is monitored through close supervision and
65 external verification. Facilities are ideally completely autonomous in how to spend their PBF surplus,
66 although most current PBF schemes prescribe that revenues generated through PBF are to be partially
67 reinvested into the facility, and partially available for bonus payments to staff members (Fritsche,
68 Soeters, & Meessen, 2014). The wish for such additional income is thought to motivate health facilities
69 and their staff to align service provision with health system interests and guidelines.

70 There are concerns that PBF might inadvertently undermine health workers' inherent willingness to
71 perform well ("intrinsic motivation") (Ireland, Paul, & Dujardin, 2011). This is referred to as "intrinsic
72 motivation crowding out". Experimental research in non-healthcare settings conducted by psychologist
73 and economists since the 1970s shows that crowding out of intrinsic motivation through performance-
74 contingent financial incentives is possible under certain conditions (Deci, Koestner, & Ryan, 1999).
75 The literature further underlines that such intrinsic motivation crowding out could have unfavorable
76 effects considering that intrinsic forms of motivation have consistently been shown to be superior to
77 other forms of motivation with regards to performance and other important work-related outcomes
78 (Gagné & Deci, 2005; Miquelon & Vallerand 2008).

79 It is unclear to which extent this body of research applies to LMIC healthcare settings and PBF schemes,
80 and whether concerns about crowding out of intrinsic motivation by PBF are therefore substantiated. In
81 the literature and discourse around how and why PBF effects change, the individual financial incentive
82 component dominates, but there is increased recognition and evidence that PBF is a much more complex

83 reform package (Renmans et al., 2017). Specifically, PBF not only includes reward payment activities,
84 but also necessitates performance contracts and verification and usually includes various other elements
85 aimed at strengthening health system functions and promoting results orientation, such as a
86 strengthening of performance monitoring, feedback systems and management structures, or capacity
87 building measures (Renmans, Holvoet, Orach, & Criel, 2016; Witter et al., 2013). Experiences across
88 different PBF schemes indicate that PBF has the potential to positively change health workers' work
89 realities in ways which might actually help them act on existing intrinsic motives rather than crowd out
90 intrinsic motivation. For instance, in Benin, PBF strengthened various health system functions such as
91 supervision and resource supply (Paul, Sossouhounto, & Eclou, 2018). Similarly, in Nigeria, health
92 workers spoke of important improvements in their working conditions, and in consequence in their
93 performance, which they experienced as very motivating and satisfying (Bhatnagar & George, 2016).
94 In Malawi, PBF had transformed health workers' working environments in various positive ways, for
95 instance by increasing the availability of equipment and supplies, introducing clear performance
96 objectives, and strengthening supervisory structures (Lohmann et al., 2018). In light of these and other
97 experiences, arguments can also be made that PBF does not erode, but rather supports and fosters
98 intrinsic motivation overall ("crowding in"; Lohmann, Houllfort, & De Allegri, 2016).

99 To our knowledge, to date, only three studies have explicitly investigated the impact of PBF on health
100 workers' intrinsic motivation in LMIC, with results suggesting that intrinsic motivation might have
101 been crowded out by the respective PBF interventions at least to some extent (Aninanya et al., 2016, in
102 Ghana; Dale, 2014, in Afghanistan; Huillery & Seban, 2014, in the Democratic Republic of Congo).
103 Unfortunately, none of these studies included an explanatory component. Further research is therefore
104 urgently needed to understand how PBF interventions act on intrinsic motivation and can be designed
105 in a way to preserve or even foster rather than erode important pre-existing motivational capacities.

106 Against this background, we used the opportunity of the introduction of PBF in Malawi, the Results-
107 Based Financing for Maternal and Newborn Health (RBF4MNH) Initiative, to estimate the impact of
108 PBF on intrinsic motivation, and to explore how and why PBF did or did not bring about change, using
109 a mixed-methods research design theoretically grounded in Self-Determination Theory (SDT; Ryan &

110 Deci, 2017). In alignment with our above-outlined understanding of PBF as a complex intervention
111 package, in which financial rewards constitute one of several elements, we did not attempt to isolate
112 the effects of the individual rewards, but rather investigated RBF4MNH's impact on intrinsic
113 motivation in a holistic way.

114 **Conceptual framework**

115 Our understanding of intrinsic motivation is grounded in Self-Determination Theory (Ryan & Deci,
116 2017). At the heart of SDT is the idea that a sense of volition in one's behavior and a congruency of
117 behavior with own values, goals and needs is central to individual wellbeing, well-functioning, and
118 growth. In particular, SDT considers the fulfillment of three fundamental psychological needs as
119 central. In the context of work, the need for autonomy refers to the desire to endorse and believe in
120 one's actions at work, and to be able to act according to one's beliefs and professional opinions, within
121 professional borders. The need for competence refers to the inherent desire to do well and feel effective
122 in one's job. The need for relatedness refers to a desire for successful, respectful, and caring
123 interpersonal relationships and interactions at work.

124 SDT posits that people are naturally inclined to perform behavior which they find inherently enjoyable
125 or which contributes to the fulfillment of the basic psychological needs. Such behavior is termed
126 "autonomously motivated". SDT's autonomous motivation is very closely related to what is commonly
127 understood as intrinsic motivation in the public health and economics literature and discourse (e.g.
128 Leonard, Serneels, & Brock, 2013; Romaniuc, 2017): a willingness to act resulting from inherently
129 satisfying characteristics or consequences of behavior, not necessitating specific external inducement.
130 In this study, we operationalize intrinsic motivation as autonomous motivation, and use the terms
131 interchangeably throughout the text.

132 SDT-based research from a vast range of domains and settings has demonstrated that basic needs
133 satisfaction determines autonomous motivation, and has consistently related autonomous motivation to
134 better work performance and other important work outcomes such as higher job satisfaction,
135 organizational commitment, and well-being, compared to non-autonomous motivation (Gagné & Deci,

136 2005). Autonomous motivation has also been found more robust and stable over time than non-
137 autonomous motivation. The SDT-based literature therefore underlines the importance of preserving
138 and fostering autonomous motivation in the introduction of PBF and other interventions.

139 With the concept of basic needs satisfaction, SDT offers an explanatory framework of how and why
140 external interventions aimed at behavior change impact autonomous motivation. As a complex external
141 stimulus, PBF is likely to alter health workers' objective and subjective work realities and work
142 behaviors in numerous needs-supportive but possibly also needs-thwarting ways. Depending on health
143 workers' perceptions of and experiences with the specific intervention design, implementation, and
144 results, and the extent to which these positively or negatively affect basic needs satisfaction, PBF might
145 therefore both crowd in and crowd out autonomous work motivation (Lohmann et al., 2016).

146 **Our prior work on the motivational effects of RBF4MNH**

147 In a previous publication, we described the motivational mechanisms of RBF4MNH in detail (Lohmann
148 et al., 2018). RBF4MNH motivated health workers to improve their performance by acting as a wake-
149 up call to previous substandard performance; by providing direction and goals to work towards; by
150 strengthening perceived ability to do well at work; by making health workers feel more recognized in
151 their work; by triggering motivating changes in social dynamics at work; and by providing an
152 opportunity to earn additional income. At the same time, various challenges were identified which
153 negatively impacted motivation, thereby attenuating RBF4MNH's potential motivating effect. Such
154 challenges included overly ambitious targets given low staffing levels and persisting shortages in drugs
155 and supplies, perceived unfairness of the verification process, and diverse frustrations and interpersonal
156 conflict related to the amount and use of the PBF reward payments.

157 This article builds directly on this previous work, analyzing through a Self-Determination Theory lens
158 how the various positive and negative motivational effects of RBF4MNH affected the satisfaction of
159 the basic needs for autonomy, competence, and relatedness, to explain how and why RBF4MNH did or
160 did not impact autonomous motivation.

161

162 **METHODS**

163 **Setting: Health workforce in Malawi.** Malawi relies on a predominantly public, three-tier health
164 system which provides essential healthcare services free of charge at point of service. Service utilization
165 is high (NSO, 2016), but quality often poor for various reasons including a severe health worker
166 shortage leading to high workload levels particularly for mid-level cadres who provide the vast majority
167 of essential services, frequent but unsupportive and low-quality management and supervision, and
168 frequent stock-outs of drugs and supplies (Bradley et al., 2015; Manafa et al., 2009; MoH, 2014).
169 Beyond these aspects, previous research has found health workers dissatisfied and frustrated with low
170 income levels; delays in salary payments; lack of transparency and perceived unfairness of salary top-
171 ups and per diems; seniority- rather than merit-based progression on salary scales; limited training and
172 career opportunities; and a general lack of recognition of their efforts by managers and other health
173 system actors (Chimwaza et al., 2014; Manafa et al., 2009). Despite often dissatisfying and
174 demotivating work environments, Malawian health workers expressed high levels of pride and feelings
175 of achievement and importance in relation to their job in previous research (Goldberg & Ron Levey,
176 2012). Health workers in rural areas in particular stated to be motivated because of the opportunity to
177 serve communities in need, by a sense of patriotic duty, and by the opportunity to learn and grow on
178 the job (Manafa et al., 2009).

179 **The RBF4MNH Initiative.** RBF4MNH was introduced in April 2013 by the Malawian Ministry of
180 Health (MoH) with financial support by the governments of Norway and Germany and technical support
181 by Options Consulting, initially in 14 primary- and 4 secondary-level health facilities in the Balaka,
182 Dedza, Ntcheu, and Mchinji districts (Phase I), and extended to 10 additional facilities in 2014 (Phase
183 II). RBF4MNH combines PBF with conditional cash transfers (CCT) to pregnant women to increase
184 the quantity and quality of delivery services. The PBF component includes performance contracts
185 targeting health facilities and District Health Management Teams (DHMT). Health facilities were
186 selected into the intervention in a non-random way based on their ability to serve as emergency obstetric
187 care centers. In most selected facilities, this necessitated substantial unconditional start-up support in
188 the form of infrastructure upgrades, provision of essential equipment, refresher trainings, and additional

189 staff postings. Health facilities are rewarded for the attainment of performance targets which reinforce
190 adherence to treatment standards for maternal care (e.g. correct use of partographs, HIV testing in
191 pregnancy). All rewards are monetary; maximum rewards as pre-set and discounted depending on target
192 attainment. Performance verification was initially done half-yearly in a peer-to-peer arrangement. At
193 the end of 2014, an external agency was contracted to verify every three months. Facilities are required
194 to invest 30% of their performance rewards into the facility, and can distribute 70% to staff as bonus
195 payments. They are autonomous in their decisions how to divide the staff portion between staff
196 members and how to invest the facility portion. The latter is with the exception of drugs, which health
197 facilities are not allowed to purchase but continue to request from the DHMTs. Individual bonus
198 payments amounted to an average of about 34 USD in the first quarter of 2015, with large variations
199 between facilities and cadres, which is equivalent to about 6 % of health workers' basic salary
200 (Lohmann et al., 2018).

201 **Study design.** This study took place in the context of a broader impact evaluation of the RBF4MNH
202 Initiative (Brenner et al., 2014). We used a prospective mixed-methods design, with the quantitative
203 component serving to estimate the impact of RBF4MNH on autonomous motivation, and the qualitative
204 component serving to shed light on how RBF4MNH did or did not bring about such change in
205 autonomous motivation.

206 All 18 intervention facilities included in Phase I of RBF4MNH were included in the impact evaluation.
207 As comparison facilities, 15 facilities in the four districts were selected which did not receive the
208 intervention initially, but were to receive it after completion of the impact evaluation. However, due to
209 early availability of additional funding, scale-up was advanced to shortly after the midterm data
210 collection and included 5 of the original comparison facilities. At endline, the facility sample therefore
211 included 23 intervention facilities (5 secondary-level and 18 primary-level), 5 of which had received
212 RBF4MNH only for the latter half of the two-year impact evaluation period, and 10 comparison
213 facilities (all primary-level).

214 Ethical approval was granted by the ethical commissions of Heidelberg University's medical faculty
215 (protocol S-256/2012) and the University of Malawi's College of Medicine (protocol P.02/13/1338).

216 **Quantitative study component**

217 The quantitative study component relied on a controlled pre- and post-test design. Data was collected
218 with a structured health worker survey just before (March/April 2013; baseline) and approximately two
219 years (June/July 2015; endline) after the start of the intervention.

220 **Sample.** Within the 33 facilities, health workers providing maternal health care services (i.e. clinical
221 officers, medical assistants, registered/enrolled nurse/midwives, nurse-midwife-technicians) who had
222 worked at the health facility for at least one year were eligible for participation in the survey to allow
223 for sufficient exposure to PBF and/or the current work environment. At primary level, all eligible staff
224 available during the stay of our interviewer teams were interviewed; at secondary-level, at least five
225 health workers from the maternity department were sampled. Table 1 contains demographic
226 characteristics of the resulting sample. Differences were not statistically significant, except for level of
227 care due to all secondary-level facilities being part of the intervention group.

228 **Autonomous motivation measure.** Autonomous motivation was measured with six items from the
229 SDT-based Work Extrinsic and Intrinsic Motivation Scale (WEIMS; Tremblay, Blanchard, Taylor,
230 Pelletier, & Villeneuve, 2009). The WEIMS follows the measurement rationale that individuals reveal
231 their locus of causality for behavior in the reasons for their actions they provide. Following the guiding
232 question "Why do you do your work?" (WEIMS), a list of potential reason for why people are engaged
233 in their job is provided. Reasons pertaining to autonomous motivation include for instance "I work in
234 this job for the satisfaction I experience from taking on interesting challenges" or "I work in this job
235 because my work has become a fundamental part of who I am". Respondents are asked to indicate their
236 degree of agreement on a scale from 1 to 5.

237 A Confirmatory Factor Analysis (CFA) confirmed that the six items measured autonomous motivation
238 well ($\chi^2(9)=9.748$, $p=.371$; RMSEA=.024; CFI=0.990; SRMR=.044; item-factor loadings were of
239 similar magnitude). Cronbach's α (i.e. average inter-item correlation) was .72 overall and consistent

240 across data collection time points and study groups, supporting the CFA results. Tests for measurement
241 invariance showed equal measurement properties of the items in the intervention and comparison
242 subsamples, confirming that autonomous motivation scores can be compared across study groups
243 (Borghi et al., 2018).

244 **Data collection procedure.** Data was collected by trained research assistants using tablet computers.
245 Interviewer teams spent three days at each health facility at baseline, and five days at endline. The
246 survey was administered in English as a face-to-face interview. All data collection activities started with
247 an extensive explanation of the data collection purpose and reassurance on confidentiality concerns,
248 seeking respondents' written informed consent.

249 **Data analysis.** For each respondent, we combined the autonomous motivation items into a composite
250 score by calculating the unweighted mean of responses to the six items.

251 We used a Difference-in-Differences (DID) approach to estimate the impact of RBF4MNH on
252 autonomous motivation. The linear regression model was specified as

$$253 \quad Y_{fit} = \beta_0 + \beta_1 \cdot EL_t + \beta_2 \cdot [PBF_f * EL_t] + \theta_f + \beta' \cdot X_{it} + \epsilon_{fit}$$

254 where Y_{fit} is the level of autonomous motivation for individual i from facility f at time t with $t = \{\text{baseline}$
255 $\text{endline}\}$; EL_t is a dummy variables indicating endline observations; PBF_f is a dummy variable
256 indicating individuals from intervention facilities (phase I and II); and X_{it} is ϵ_{fit} the error term. In the
257 absence of a panel at health worker level, we used facility fixed effects (θ_f) to control for unobserved
258 and potentially motivation-relevant time-invariant facility characteristics, and further controlled for a
259 number of individual characteristics (sex, cadre, years at current facility, years in health care service;
260 X_{it}). We clustered standard errors at the facility level (i.e. level of intervention assignment). Coefficient
261 β_2 gives the DID estimate for the effect of PBF on autonomous motivation. As all secondary-level
262 facilities were part of the intervention, we performed the DID regressions both on the overall sample
263 and on a subsample of only primary-level facility staff.

264

265 **Qualitative study component**

266 The qualitative study component consisted of in-depth interviews with nurse/midwives, medical
267 assistants, and clinical officers from intervention facilities approximately one (April 2014, midterm)
268 and two years (September 2015, endline) after the start of the intervention. We purposely selected 12
269 and 14 facilities at midterm and endline, respectively, to represent the four districts, both levels of care,
270 different facility sizes, and varying performance levels in the intervention. At each facility, we then
271 purposely selected between 1 and 4 health workers, depending on facility size and staff availability and
272 to represent both sexes and all seniority levels. Only health workers who had worked at the facility for
273 at least one year were sampled to ensure sufficient exposure to RBF4MNH. In total, 21 and 20 health
274 workers were interviewed at midterm and endline, respectively. Table 1 shows key characteristics of
275 the sample.

276 Data collection, management, and analysis procedures for the qualitative component are described in
277 Lohmann et al. (2018). This article relies on the same material and general analytical procedures,
278 including analyst triangulation, but applied a different, SDT-based analytical lens and framework,
279 examining how the various positive and negative motivational mechanisms of RBF4MNH impacted
280 health workers' basic psychological needs for autonomy, competence, and relatedness, and thereby
281 autonomous motivation.

282 **Triangulation of quantitative and qualitative findings**

283 Quantitative and qualitative data were collected and analyzed independently. Triangulation occurred at
284 the interpretative level, with the final appraisal on the impact of RBF4MNH on autonomous motivation
285 relying jointly on the quantitative and qualitative findings. Quantitative findings allowed a
286 quantification of the impact of RBF4MNH on autonomous motivation. Qualitative findings were used
287 to elucidate these quantitative findings.

288

289

290 **RESULTS**

291 **Quantitative results**

292 Table 2 shows summary statistics as well as the model-estimated DID estimate for the impact of
293 RBF4MNH on autonomous motivation, for the overall sample as well as the primary-level subsample.
294 Health workers consistently indicated high levels of autonomous motivation at baseline, which
295 remained stable over time. No impact of RBF4MNH on autonomous motivation could be detected.

296 **Qualitative results**

297 The qualitative findings offer possible explanations as to why no RBF4MH impact on autonomous
298 motivation was apparent. Specifically, results suggest that the intervention did not simply leave health
299 workers' autonomous motivation unaffected. Rather, it appears that the intervention both positively and
300 negatively affected the satisfaction of health workers' basic psychological needs. In the following, we
301 describe the most commonly mentioned effects. Important to note is that while all respondents
302 experienced both positive and negative impact on their basic needs satisfaction, there was substantial
303 individual variation in which effects were mentioned and in the extent to which positive or negative
304 effects appeared to predominate.

305 *Need for competence*

306 Our analysis suggests that RBF4MNH contributed in mostly positive ways to the satisfaction of health
307 workers' need for competence – an inherent desire to do well in the various dimensions of one's job and
308 to have an impact on one's work environment and outcomes –, although many respondents also alluded
309 to a few negative aspects attenuating this overall positive impact.

310 Our findings indicate that RBF4MNH enhanced satisfaction of the need for competence by improving
311 health workers' perceived ability to do their job. Many health workers expressed their appreciation for
312 how RBF4MNH helped them develop their clinical skills and feel more confident at work through
313 training measures and better on-the-job training as a result of the intervention. Almost all reported how
314 the improved infrastructure, equipment, and resource situation resulting from RBF4MNH made them

315 feel more effective in translating their skills into practice. Many health workers further described how
316 they felt that their work teams had improved service delivery routines, working together more
317 efficiently, as a consequence of RBF4MNH.

318 Our results further suggest that RBF4MNH contributed to satisfying the need for competence by
319 reminding health workers of the standards of care they had promised to deliver when joining the
320 profession and helping them better understand performance expectations towards them. Health workers
321 reported how the continuous performance feedback through enhanced supportive supervision and
322 verification in the context of RBF4MNH provided new opportunities to critically evaluate their
323 performance against these standards. Many described how by stimulating critical reflection on
324 performance shortfalls, by guiding them in proactively developing strategies for improvement, and by
325 enabling them to implement such solutions at least to some extent, the intervention helped them feel
326 more effective in their work.

327 The majority of respondents perceived that the quality of their work had improved as a result of
328 RBF4MNH, some even improvements in patient outcomes, instilling in them a new sense of
329 competence and pride in their accomplishments at work.

330 *I just have the morale because I know what am doing and with RBF4MNH, the fact that*
331 *we have almost everything now. [...] It was very different. Before, we were like 'Aah, what*
332 *am I going to do with the patient?' [...] But now we can treat them and you know the*
333 *patients are getting well, you know 'Aah, I've managed the sepsis and she is ok, she is*
334 *going home.' You feel good. (Nurse/midwife, endline)*

335 Although the vast majority of respondents perceived primarily positive effects of RBF4MNH on
336 feelings of competence, many also reported aspects which weighed in negatively. Many health workers
337 explained that RBF4MNH opened their eyes to their substandard level of performance and their non-
338 enabling and non-supportive working environment. While almost all respondents seemed to appreciate
339 this 'wake-up call', it was not necessarily conducive to the satisfaction of the need for competence. The
340 continued substandard working conditions keeping them from delivering truly high quality care – a

341 situation which with RBF4MNH many saw with new clarity – negatively weighed on health workers’
342 feelings of self-efficacy. Particularly in the second year of the intervention, interviews revealed a
343 growing frustration with the fact that RBF4MNH had increased workload and resource consumption,
344 which were not met adequately with increases in staff and resources in many facilities.

345 The vast majority of respondents seemed to be effective in externalizing their continued shortfalls from
346 ideal performance standards, attributing it to the mismatch with between performance standards and
347 working conditions rather than to own incompetence, and thereby containing negative impact on the
348 satisfaction of the need for competence. Many also indicated that they were effective in focusing their
349 attention on the improvements they did manage to achieve, rather than on shortfalls from the absolute
350 performance ideals reflected in the RBF4MNH targets, thereby attenuating negative impact on basic
351 need satisfaction.

352 *I think most of [RBF4MNH is] helpful, and if we had all resources that are required,*
353 *human resources, material, equipment, we would really improve the mortality and*
354 *morbidity rates among the mothers and the newborn babies. (Nurse/midwife, endline)*

355 However, a few respondents seemed less successful in ‘blaming the context’ and focusing on
356 improvement rather than absolute achievement.

357 *I am proud being a nurse. In the morning, I go to the hospital to take care of the patients.*
358 *At the end of the day I did nothing. So I feel as a failure. (Nurse/midwife, endline)*

359

360 ***Need for autonomy***

361 Our analysis indicates that RBF4MNH both positively and negatively contributed to health workers’
362 satisfaction of the need for autonomy – the desire to be able to shape one's experiences and behavior
363 according to one's own goals and values, to believe in and endorse what one does at work, and to be
364 able to, within professional borders, to decide and do as one thinks best.

365 In positive terms, RBF4MNH appeared to support satisfaction of the basic need for autonomy in that
366 virtually all health workers expressed strong endorsement of the overall intervention goals and feelings
367 of ownership of the program. Even though very few respondents had been consulted in the intervention
368 design stage, respondents also expressed strong endorsement of the indicator set, particularly its good
369 alignment with existing standards of care they had committed themselves to when joining their
370 profession.

371 *We feel good about being [part of RBF4MNH]. When the patients come in large numbers,*
372 *we feel okay. This brings a lot of workload, but we are happy when they are here and we*
373 *know that we are improving the livelihood of women and children, and on top of that, we*
374 *will be rewarded.* (Medical assistant, midterm)

375 About half of the sample revealed how RBF4MNH helped them be more purposeful and effective in
376 their work by stimulating awareness for and the development of locally tailored solutions to diverse
377 challenges. Health workers described how the financial rewards further allowed facilities to implement
378 at least some of these solutions in fast, non-bureaucratic, and effective ways, in stark contrast to what
379 they were used to previously. By thereby not only passively improving working conditions and service
380 delivery routines in a top-down, one-fits-all approach, but by rather allowing facilities to actively bring
381 about desired positive change themselves through the PBF reward payments, it appears that RBF4MNH
382 further positively contributed to the satisfaction of many health workers' need for autonomy.

383 *[RBF4MNH] is good because it gives us power at the health center level to decide what's*
384 *good for us and what's lacking for us instead of relying for everything on the district level.*
385 (Nurse/midwife, midterm)

386 At the same time, almost all respondents made clear that the decentralization of financial management
387 autonomy did not go far enough, with solutions to many problems such as the availability of staff and
388 drugs remaining beyond their control. They described this as frustrating, particularly having
389 experienced the advantages of procurement autonomy. In light of this, perceptions about the targets
390 attached to the indicators were much more mixed than perceptions about the indicators themselves.

391 Although respondents were in general agreement that high performance standards should be attained,
392 many did not feel like this was currently possible given the contextual constraints and the high workload
393 they were faced with, at least for certain indicators. RBF4MNH thereby put at least some health workers
394 in a position where they perceived their freedom or scope of action as even further restricted, asking
395 them to pursue targets that they did not feel they could attain, at least not without compromising other
396 aspects of their work or their personal wellbeing. At the same time, the high stakes (i.e. reputational
397 aspects, reward payments; individual ‘opting out’ difficult given implementation at team level)
398 associated with performing well in the intervention appeared put pressure on at least some health
399 workers. A few respondents reported that they had witnessed colleagues coping with this situation in
400 undesired ways, such as by forging register entries, although nobody admitted to having done so
401 themselves.

402 *The picture that people have outside [is] that we are not doing anything, yet to us, it’s not*
403 *deliberate, it’s just that the situation is not allowing us. It’s hard. We can’t do what we are*
404 *required to do, but there is nothing I can do about it. I still come to work normally, but*
405 *deep down, I feel things are not working. (Nurse/midwife, endline)*

406 ***Need for relatedness***

407 In regards to the satisfaction of health workers’ need for relatedness – the desire for positive
408 relationships and interactions with, for feeling fairly treated, respected, and valued by, for feeling
409 recognized by, and for feeling cared for and supported by clients, community, colleagues, direct
410 superiors, and the broader health system – our results suggest that RBF4MNH also had both positive
411 and negative effects, but negative effects seemed more pronounced for the majority of respondents.

412 On the positive side, RBF4MNH appears to have led to more attention being paid to health workers by
413 their managers, the broader health system, and also clients. This is substantiated by about a third of the
414 respondents describing how with RBF4MNH, they felt more visible and appreciated. They also
415 perceived a growing recognition of their difficult working conditions, and respect for their effort and
416 performance despite these difficult working conditions. They experienced this as generally positive

417 compared to the pre-RBF4MNH situation, where many felt that nobody cared about them and their
418 circumstances except in cases of serious underperformance. Respondents expressed high appreciation
419 of the material and immaterial support by RBF4MNH and the small improvements in DHMT support
420 experienced by some facilities, which alleviated some of their hardships at work and in their private
421 lives.

422 *We feel good because [the DHMT now] comes and recommends us that we are doing a*
423 *very good job. Like the water system, we actually decided ourselves to do it [with*
424 *RBF4MNH money]. They appreciate that that's very good. And the toilet too, we told them*
425 *that we are building this. They said, you are doing a very good job. They really appreciate*
426 *us and recognize the role we are playing. (Medical assistant, endline)*

427 Respondents further described how RBF4MNH stimulated improvements in team work in many
428 facilities as staff members worked towards the common goal of achieving RBF4MNH targets. In many
429 facilities, this resolved previous frustrations and interpersonal conflict in service delivery routines,
430 thereby contributing to the satisfaction of the need for relatedness.

431 On the other hand, respondents also revealed that RBF4MNH led to substantial interpersonal challenges
432 by allowing health facilities to freely decide over how to share money among staff members. The
433 ensuing tension and fighting was a source of frustration for almost all respondents, particularly in the
434 first year of implementation, negatively impacting the satisfaction of their need for relatedness. Some
435 health workers ended up receiving very small absolute incentive amounts. They described how against
436 the expectation that they should feel motivated by these small amounts, the incentives offended them
437 rather than making them feel recognized and respected. Compromises in sharing incentives led to many
438 health workers feeling undervalued, as they did not think their share of the rewards fair in relation to
439 the effort they had contributed to their facility's performance.

440 *I think the [RBF4MNH secretariat] should decide [who gets how much], because this*
441 *money is creating a lot of enmity. [...] Wherever there is money, people always disagree.*
442 (Nurse/midwife, midterm)

443 Most health workers further perceived other elements and dynamics of the intervention as unfair,
444 weighing negatively of the satisfaction of their need for relatedness. Particularly in the first year of
445 implementation where the peer-to-peer verification model was applied, many health workers felt that
446 evaluators were unfair in their evaluations, leading to results which they felt did not reflect their true
447 performance, and to reward amounts below what they felt was appropriate. Several respondents further
448 complained that the DHMTs and the RBF4MNH secretariat did not adequately reciprocate their own
449 effort in making the project a success. Finally, particularly at endline, as contextual challenges became
450 more pronounced, several health workers voiced that they felt disrespected by an intervention
451 benefitting women without regard for health workers' already challenging working conditions and at
452 the expense of their health and wellbeing.

453

454 **DISCUSSION**

455 Our Self-Determination Theory-based study investigated whether and how the Results-based Financing
456 for Maternal and Newborn Health Initiative in Malawi affected health workers' intrinsic motivation.
457 We thereby contributed to closing an important gap in knowledge regarding one of the most frequently
458 discussed potential unfavorable consequences of PBF, namely an erosion of high-quality, sustainable
459 motivation, "intrinsic motivation crowding out".

460 Results suggest that overall, RBF4MNH did not impact health workers' intrinsic motivation. This
461 finding is somewhat different from the findings of the three previous studies on the impact of PBF on
462 intrinsic motivation, all of which conclude that some crowding out of intrinsic motivation appears to
463 have occurred (Aninanya et al., 2016; Dale, 2014; Huillery & Seban, 2014). As neither of the previous
464 studies systematically examined how PBF effected changes in intrinsic motivation, reasons for the
465 differences between our and their results remain unclear.

466 In Malawi, our qualitative findings support the hypothesis that PBF does not have a generally adverse
467 effect on intrinsic motivation as feared by some, but that it rather has the potential of both crowding in
468 and crowding out intrinsic motivation, depending on the specific intervention design, implementation,

469 and results, and health workers' experiences thereof (Lohmann et al., 2016). Specifically, our findings
470 suggest that the different motivational mechanisms triggered by RBF4MNH both positively and
471 negatively affected health workers' basic psychological needs satisfaction. We found substantial
472 individual variation in the extent to which respondents perceived positive and negative effects. For most
473 respondents, however, positive and negative effects appeared to have counteracted each other to some
474 extent, offering at least a partial explanation for the overall null impact of RBF4MNH on intrinsic
475 motivation. Although our study did not set out to disentangle the effects of the individual rewards – to
476 which fears of crowding out primarily relate – from all other intervention elements, it does appear that
477 the individual rewards were primarily associated with negative effects on basic needs satisfaction. In
478 summary, RBF4MNH appeared conducive to intrinsic motivation in many ways, but it also clearly fell
479 short of its intrinsic motivation-enhancing potential due to various challenges.

480 These challenges will not come as a surprise to the PBF implementing and academic community, as
481 many of them are well-known from other settings (e.g. Sierra Leone, Bertone, Lagarde, & Witter, 2016;
482 Nigeria, Bhatnagar & George, 2016; Tanzania, Chimhutu et al., 2016; Benin, Paul et al., 2014; Burkina
483 Faso, Ridde, Yaogo, Zongo, Somé, & Turcotte-Tremblay 2018; Zambia, Shen et al., 2017), and neither
484 will the straightforward recommendations implied by our research to avoid or contain negative impact
485 on intrinsic motivation, such as: to maximize transparency in the verification and reward allocation
486 process as well as in the reward use and distribution process; to adhere to planning, timing, and made
487 agreements, and communicate effectively in case of delays or changes; and to set achievable PBF targets
488 or employ a fee-for-measure logic.

489 At the same time, many intrinsic motivation-relevant challenges encountered in Malawi and elsewhere
490 might be beyond what can realistically be counteracted by clever PBF design and implementation. For
491 instance, it seems that dissatisfaction with and feelings of unfairness regarding the individual rewards
492 are not necessarily directly related to the actual reward amounts and distribution modes. In Malawi,
493 neither the increase in overall reward amounts in the second year, nor various distribution modes
494 negotiated locally (e.g. equal shares for all, higher shares for higher qualified staff) appeared to make
495 much of a difference in terms of satisfaction and fairness perceptions. Many respondents expressed a

496 wish for RBF4MNH to prescribe a reward distribution mode. Although in some countries with such
497 fixed modes, complaints appear less pronounced (e.g. Bertone et al., 2016, in Sierra Leone; Paul et al.,
498 2014, in Benin), reasons might lie elsewhere, and serious injustice perceptions around incentive
499 distributions have been encountered in fixed-mode countries as well (e.g. Ridde et al., 2018, in Burkina
500 Faso). In Tanzania, the distribution mode based on health workers' level of involvement in the
501 intervention was also perceived as unjust by many health workers (Chimhutu et al., 2016). Other issues
502 difficult to counteract with PBF design and implementation include for instance resource challenges
503 related to the broader health system and the setting of PBF targets attainable yet aligned with national
504 performance standards which often are overly ambitious given contextual constraints.

505 In light of this, designing a PBF intervention fully free of intrinsic motivation-compromising challenges
506 is likely a futile endeavor. Rather, PBF designers might want to pay more attention to 'secondary
507 prevention' of inadvertent negative impact on intrinsic motivation. One concept much discussed and
508 researched in the SDT and organizational change literature is that of "autonomy support" (e.g. Gilbert
509 & Kelloway, 2014). It refers to leader behavior which supports employees in behavior change processes
510 so that the satisfaction of the basic psychological needs is supported rather than thwarted, and so that
511 employees are able to internalize and therefore perceive new behavior as self-determined rather than
512 controlled. Three general principals of how managers can support employees' autonomy are to provide
513 rationale for behavior change, helping employees understand why decisions were taken and change is
514 necessary; to offer employees maximal choice in how to go about implementing change and
515 reorganizing their work processes, within technical limits; and to acknowledge employees' feelings
516 about the change process and supporting them in coping with these feelings. Offering maximal
517 autonomy in implementing change along with technical and managerial support as well as activities to
518 help health workers understand the meaningfulness, benefits, and costs of PBF are already part of good
519 PBF design practice (Fritsche et al., 2014). In contrast, specific training for health facility, district, and
520 PBF management staff in how to support health workers in cognitively and emotionally processing and
521 coping with the introduction of PBF to preclude or resolve diverse intrinsic motivation-adverse
522 frustrations is usually not part of standard PBF intervention packages. Such systematic autonomy

523 support training for managers in the context of PBF might be valuable in maximizing positive
524 motivational impact of PBF for health workers.

525 Unfortunately, our study did not allow to explore potentially important heterogeneity in PBF impact on
526 autonomous motivation, or to quantify and detect individual variation in how the different elements of
527 RBF4MNH contributed to changes in basic needs satisfaction, how basic needs satisfaction in turn
528 impacted autonomous motivation, and which other variables might have played a relevant role. Further,
529 the period of observation was limited to only two years, which might be too short for fundamental
530 changes in motivational structures to occur. Finally, we cannot fully exclude the possibility that PBF
531 differentially affected turnover of staff with different levels of intrinsic motivation, and that baseline
532 and endline samples are therefore not perfectly comparable. However, a sensitivity analysis limiting the
533 quantitative endline sample to only those health workers who had worked at their endline facility at
534 baseline already supported the robustness of the quantitative findings. Future research with a panel
535 design and closer alignment of the quantitative and qualitative study components allowing such linkages
536 will be very valuable for an even more in-depth understanding of the motivational impact of PBF, as
537 well as potential risk and mitigating factors.

538

539 **CONCLUSION**

540 We found no effect of RBF4MNH in Malawi on health workers' intrinsic motivation; neither crowding
541 in nor crowding out of intrinsic motivation could be observed overall. Health workers described
542 experiencing various positive and negative intervention effects on the satisfaction of their basic
543 psychological needs, which appeared to counteract each other at least partly. To achieve crowding in of
544 intrinsic motivation, PBF designers and implementers should contain avoidable intrinsic motivation-
545 compromising challenges and mitigate unintended negative impact of unavoidable challenges by
546 explicitly building strategies such as autonomy support activities into PBF designs.

547

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642 **Table 1: Sample characteristics**

643

	Quantitative sample								Qualitative sample	
	Intervention				Comparison				Intervention	
	Baseline		Endline		Baseline		Endline		Midterm	Endline
	n	%	n	%	n	%	n	%	n	n
Total	60		51		10		20		21	20
Sex										
Female	41	68	29	57	6	60	10	50	11	11
Male	19	32	22	43	4	40	10	50	10	9
Health worker type										
Clinical officer, medical assistant	7	12	12	24	1	10	5	25	5	2
Nurse/midwife	53	88	39	76	9	90	15	75	16	18
Level of care										
Primary	27	45	29	57	10	100	20	100	10	11
Secondary	33	55	22	43	0	0	0	0	11	9
	mean	sd	mean	sd	mean	sd	mean	sd	median	median
Years at facility	5.3	6.0	6.1	6.9	4.2	3.9	3.3	1.9	3.0	3.5
Years in service	12.3	12.7	10.0	11.5	17.2	10.3	14.3	15.5	-	-

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653 **Table 2: Impact of RBF4MNH on health workers' autonomous motivation (1=high level; 5=low**
 654 **level)**

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	Intervention				Comparison				Difference- in- differences	
	Baseline		Endline		Baseline		Endline			
	mean	sd	mean	sd	mean	sd	mean	sd	DID	p
Full sample	2.01	.50	1.95	.49	1.85	.51	1.71	.43	-.035	.833
Primary care level subsample	1.95	.42	1.91	.52	1.85	.51	1.71	.43	.022	.910

656