



Final Results of the RBF4MNH Impact Evaluation

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List of Acronyms and Abbreviations:

AMTSL	active management of third stage labor
ANC	antenatal care
BEmOC	basic emergency obstetric care
CCT	conditional cash transfer
CemOC	comprehensive emergency obstetric care
CoM	College of Medicine (University of Malawi)
DHMT	district health management team
DiD	difference-in-differences
EA	enumeration area
EmOC	emergency obstetric care
EONC	essential obstetric and neonatal care
GIZ	Gesellschaft für International Zusammenarbeit
HD	Institute for Public Health (University of Heidelberg)
HAS	health surveillance assistant
KfW	Kreditanstalt für Wiederaufbau
L&D	labor and delivery
MoH	ministry of health
PBF	performance-based financing
PMTCT	prevention of mother-to-child transmission of HIV
PNC	postnatal care
PPH	postpartum hemorrhage
RBF	results-based financing
RBF4MNH	Results-based Financing for Maternal and Neonatal Health Initiative
RFA	request for application
RHD	Reproductive Health Department
RNE	Royal Norwegian Embassy to Malawi
RQ	research question
SBA	skilled birth attendant
SBM-R	Standards-Based Management and Recognition
SD	standard deviation
SDT	self-determination theory
SES	socio-economic status
SSDI	Support for Service Delivery Integration
TAG	technical advisory group
TRAction	Translating Research into Action
USAID	United States Agency for International Development

Executive Summary

Report Purpose: This report presents a summary of findings from an impact evaluation of the initial two implementation years of the *Results-Based Financing For Maternal and Neonatal Health* (RBF4MNH) Initiative piloted by the Ministry of Health in Malawi.

RBF4MNH Initiative: Nested in emergency obstetric care (EmOC) facilities across four pilot districts, the RBF4MNH aimed to increase the number of facility-based births and to enhance the quality of care provided to women during labor and delivery. The RBF4MNH consisted of a performance-based financing (PBF) component, which started in April 2013 in 18 EmOC facilities across Balaka, Dedza, Mchinji and Ntcheu districts, and was extended in October 2014 to a total of 28 EmOC facilities. In addition, the RBF4MNH also included a conditional cash transfer component (CCT) supporting pregnant women to use delivery services at EmOC facilities, which was fully in place and functional in late 2014.

Impact Evaluation: The findings in this report are based on quantitative and qualitative data collected during the two-year impact evaluation. The objective of this study was to assess how the RBF4MNH affected the quality of care and utilization of maternal health care services at EmOC facilities, as well as to measure changes in health care provider motivation in response to performance incentives. The evaluation employed a mixed methods approach with a controlled pre-test-post-test design. Data was collected at three time points: prior to the RBF4MNH start (March-May 2013), about one year later (June-August 2014), and about two years after implementation start (June-July 2015). Changes in quality of care and health worker motivation were assessed using facility-based survey instruments (facility inventory checklist, direct clinical observations, provider interviews, and client exit interviews); changes in utilization patterns were assessed using a household-based survey of previously pregnant women. The robustness of the study design was limited by relatively small sample sizes for some of the surveys conducted. We were also unable to isolate RBF4MNH effects resulting from performance incentives targeting district health management levels, as control facilities were located within the intervention districts.

Effects on Service Utilization: We did not observe any change in the rates of health service utilization attributable to the intervention neither for directly targeted services (i.e. facility-based delivery) nor indirectly concerned services (i.e. antenatal and postnatal care services). The inability to produce changes in the rate of facility-based delivery is largely due to high rate of service utilization (approximately 90%) already recorded at baseline across all pilot districts. The lack of an effect on non-targeted services represents a positive result, since it indicates that resources were not diverted from other maternal services to focus exclusively on delivery and childbirth. Yet, the fact that rates of utilization of other maternal services stagnated at around 40-50% for other important indicators (e.g. first ANC within first pregnancy trimester and 4 ANC completed) represents a missed opportunity and calls for a horizontal scale-up of the intervention to include additional maternal care services. Although the intervention did not produce a change in utilization rates measured at the population level, it did produce substantial changes in utilization patterns. We observed a clear shift in demand, with an increasing proportion of women “migrating” from control areas to intervention facilities to deliver their babies. We could not confirm quantitatively the initial hypothesis generated by qualitative findings that this shift was largely driven by an increase in referrals among control facilities. Length of stay after delivery increased across intervention and control facilities, but the increase was considerably larger in intervention facilities. Detailed analysis showed that the increase in length of

stay at intervention facilities was considerably larger for women who came from intervention areas and were therefore also receiving the cash transfers. This suggests that increases in length of stay were produced by a combination of supply-side and demand-side factors. The RBF4MNH was equity-neutral, i.e. it neither increased nor decreased existing inequities in service utilization among women of different socio-economic status. This is likely due to the fact that differences across groups are minimal in a context of widespread, generalized poverty.

Our study's inability to detect changes in service utilization for delivery care were mainly due to the extremely high facility-based delivery rates across intervention and comparison areas of nearly 95% at baseline, and caution against drawing conclusions related to the effectiveness of the RBF4MNH Initiative related to this indicator based on this study. However, a promising finding related to service utilization was that an increasing proportion of women from comparison areas sought care at intervention facilities. Our qualitative understanding suggests that service utilization was at least facilitated by clients' positive perception in respect to service quality in RBF facilities. In terms of our study detecting no changes in the utilization of related services such as ANC and PNC, we highlight that these services were not targeted by RBF4MNH, and while in theory they could have been affected, this hypothesis is not supported by our data.

Effects on the Quality of Service Provision and Clinical Performance: There were strong positive effects of the RBF4MNH on the availability of skilled staff due to a shift of providers from district hospitals and non-RBF facilities to RBF facilities. Health workers at RBF facilities nevertheless continued to perceive the staff situation as inadequate as they perceived persistent workload constraints following once more service users were attracted to RBF facilities. There was also a positive effect of the RBF4MNH on providers' clinical performance HIV and pre-eclampsia risk factors assessments, infection prevention during labor (but not during birth), and routine oxytocin administration during third stage labor (but not for other aspects of AMTSL performance). There was no statistically measurable overall effect of the RBF4MNH on the availability of equipment, supplies, medications, and commodities in RBF facilities, as incentives related to equipment maintenance and supply procurement improved many service inputs across both intervention and control facilities, resulting in improvements of the physical work environment. Health care providers perceived improvements in equipment and drug availability at RBF facilities generally as very positive. There was also no effect on the clinical performance of labor monitoring and partograph documentation, as these activities were most limited by the inadequate staffing numbers.

While we observed no statistically meaningful difference in overall clinical quality, improvements were detected on single quality indicators, but not necessarily on the overall process within which this indicator was placed. This situation is likely linked to the general difficulties RBF programs face in setting and verifying adequate quality indicators and targets for clinical performance. In other words, indicators that are readily measured and verified are possibly not the same factors that create differences in the process of delivery care. In addition, optimal clinical performance is dependent on a variety of optimal service inputs. Both quantitative and qualitative findings point towards the fact that the most crucial input factor – the number of qualified health workers – remain still short at many health centers. And while there were some positive changes in drug and supply availabilities, facilities still seem rather dependent on DHMTs and centrally organized supply chains in terms of procurement of service inputs. Based on the current understanding of RBF's role as a provider payment as well as systems reform approach, service-wide changes in performance quality are tied to the degree of

managerial and financial autonomy granted to facilities, which includes besides others independent contracting of suppliers and recruiting staff.

Effect on Experiences and Perceptions of Clients Using Services: Overall, client experiences and satisfaction with receiving care remained positive without a statistically measurable change due to the RBF4MNH. Still, there was an increase in the length of facility stay up to two days after delivery. However, this change occurred in both RBF and non-RBF facilities, but might be an effect that can be contributed to RBF incentives targeting performance at the DHMT level. Nevertheless, clients continued to report about abusive behavior of maternal care providers across all facilities in the pilot districts.

The assessment of client perception was mainly limited by the accuracy of available measures. Measuring changes in clients' perception of and satisfaction with service quality, we found great disparities between quantitative findings that suggest extreme satisfaction with the quality of delivery care, while our qualitative data highlight alarming instances of disrespect and abuse that merit immediate attention.

Implementation of the Cash Transfer Component: Only about half of all eligible women had enrolled in the conditional cash transfer (CCT) program in 2015. There was also a relatively large proportion of enrolled women (about one quarter) who did not receive cash reimbursements despite fulfilling all conditions. The CCT program gradually gained acceptance by target communities; however, challenges remain in terms of verification and disbursement of cash reimbursements to those enrolled.

Effect on Health Care Provider Satisfaction and Motivation: Health care workers perceived and were motivated by substantial changes in their working environment induced by the RBF4MNH, particularly in respect to infrastructure, equipment, and supplies. Low staffing levels and persisting challenges related to drugs and other supplies continued to be a source of frustration for many, however, hindering the intervention from developing its full motivating potential. Most health care workers had mixed feelings about the individual staff rewards; they welcome the salary bonuses, but remain wary of the interpersonal conflicts that the staff reward distributions sparked among individual health workers. There was no indication of a "crowding out" effect - intrinsic provider motivation did not reduce with the introduction of the intervention.

The RBF4MNH motivated health care providers to improve their performance in the presence of additional rewards, improved supervision and feedback, and in particular through significant perceived improvements to their working environment. These improvements allowed individual health workers and health care provider teams to take better care of their patients and to feel more comfortable at work. Unfortunately, however, this increase in motivation did not fully translate into improvements in clinical performance to the extent desired. Health workers primarily attributed this to an overwhelming increase in workload due to a combination of higher numbers of patients and closer adherence to clinical protocols as enforced by RBF4MNH. Overall, this finding points back to the fact that the current RBF mechanism remains too weak to overcome the overall limited human resource for health situation in Malawi. In response to the general concerns of financial incentives to erode health care providers' motivated behavior to become increasingly oriented towards rewarded performance, our study did not find any indication that the intervention affected health workers "motivational profile" in a fundamental way, i.e. we did not detect crowding out of intrinsic

motivation. Nor did we find a substantial increase in the importance placed on money or other external stimuli.

Perception of the Implementation Process: Most stakeholders spoke highly of the RBF4MNH implementation process, which was facilitated by the early inclusion of all stakeholders. Stakeholders found incentives to be a critical component of increasing provider motivation and subsequently improving quality of care. Main challenges to the implementation and operationalization of the RBF4MNH were faced in the overall understaffing of health facilities, delays in the facility upgrade component of the RBF, and the inefficient procurement processes for equipment. All stakeholders perceived the RBF4MNH pilot as a successful approach and support the idea of a RBF scale-up beyond the current facilities and districts.

Related to challenges of implementing a RBF program generally, our qualitative understanding suggests that constraints within the broader health system in terms of ensuring a sufficient degree of purchaser-provider split and decentralization. We found that it was challenging for service providers (DHMTs and facilities) to create an environment that could effectively support the provision of higher quality care to an increased influx of patients, especially in light of system-wide scarcity of supplies and particularly human resources. Emerging evidence is also suggesting that the introduction of the RBF4MNH Initiative produced an impression (among DHMT staff) that these facilities necessitate *less* attention from the DHMT in terms of resources, while in reality RBF-facilities' autonomy was probably not yet fully established to fully cope with this situation.

Conclusion: This study generated valuable knowledge regarding the RBF4MNH Initiative and towards the role of results-based financing programs in the African context. While our study did not detect widespread, statistically significant effects on service utilization or clinical quality of care – both main objectives of the intervention – we urge that these findings be viewed through the lens of contextual factors such as the timing and nature of the both the intervention and concurrent evaluation, as well as the overall economic realities at play in Malawi. In this sense, portions of our study reflect findings that may be more accurately viewed through the lens of implementation research rather than an end-line evaluation. As Malawi has experienced an overall deterioration in terms of the availability of resources to be devoted to social services, including health, decreasing health budgets obviously represented a challenge to the effective implementation of RBF in Malawi. Our findings largely suggest that in this specific context, intervention facilities managed to maintain previous standards of care, while control facilities often degenerated to lower quality. One could postulate the hypothesis, to be tested, that in circumstances of greater stability, RBF could have served to improve quality rather than maintaining standards.

1. Background

1.1. RBF4MNH Initiative

The *Results-Based Financing For Maternal and Neonatal Health* (RBF4MNH) Initiative has been implemented by the Ministry of Health (MoH) since April 2013 as a pilot program across selected basic and comprehensive Emergency Obstetric Care (EmOC) facilities in four districts (Balaka, Dedza, Mchinji, Ntcheu). The program's overall goal is to increase the proportion of pregnant women utilizing delivery services at EmOC facilities, the RBF4MNH through improvements in the quality of service provision and by financial support to pregnant women utilizing these facility-based services.

The different aspects of the RBF4MNH Initiative were designed to respond to the country's maternal and newborn health situation prior to 2012. At that time Malawi had one of the highest rates of maternal mortality in Africa with 510 deaths per 100,000 live births (UN 2010 estimate). While this rate has been declining, it has not declined in line with the increase in deliveries taken place in health facilities following the country's official ban of traditional birth attendants (TBAs) in 2007. Although this ban was officially lifted in 2010, confusion remained over the role and use of TBAs and many communities still executed by-laws promoting facility-based deliveries (over 70% facility-based deliveries according to the *2010 Demographic Health Survey*, up from 38% in 2004).

In addition, the *2011 EmOC Needs Assessment* noted poor access to emergency obstetric care with only 47% of facilities offering comprehensive services while 2% were providing basic services, with no improvements noted from the 2005 assessment. Contributing factors included widespread shortages of nurses, midwives and doctors alongside poor motivation, low staff skills and an insufficient knowledge base, together creating additional barriers to access to and quality of care.

At that time, an over-riding target for the Government of Malawi was to meet the country-specific targets set by the Millennium Development Goals (MDGs). The Ministry of Health's (MoH) primary concern was on reducing maternal and neonatal mortality as stipulated by MDG 4 and MDG 5. As part of their long-standing commitment to support the health sector in Malawi, the Governments of Germany and Norway were partaking in the System-Wide Approach (SWAp) and supported the MoH's policies in mortality reduction through the newly established "*German-Norwegian Maternal and Child Health Initiative*". This Initiative's main focus was on supporting safe motherhood and newborn care programs using result-based-financing (RBF) mechanisms.

The design of the resulting RBF4MNH Initiative was based on a feasibility study undertaken by Options (Dec. 2009-April 2010) and intended to use both RBF demand and supply side measures, but also immediate investment support for minor infrastructure and equipment in order to enable facilities to function at the required EmOC level. This new approach was piloted in four districts: Dedza, Mchinji, Ntcheu, Balaka. Due to its innovative character, the RBF4MNH was implemented as 'discrete funding' from the SWAp, with plans to fully integrate the Initiative into the SWAp once it has proven successful. The target populations of the RBF4MNH Initiative are pregnant women and their newborns in the pilot area. The Initiative was initially designed and funded for a three-year period with the possibility of further extension. The key components of the RBF4MNH are:

- ◆ Minor investments in selected EmOC facilities' infrastructure and equipment to bring maternity services up to a minimum EmOC standards;
- ◆ Performance Agreements for qualified public and CHAM facilities offering maternity services based on EmOC criteria (performance-based financing or supply-side component);

- ◆ Cash transfers to pregnant women contributing towards the costs of having an institutional delivery and remaining at the facility post-delivery (conditional cash transfer or demand-side component).

The RBF4MNH Initiative’s mission is to reduce maternal and neonatal mortality using the instrument of RBF to introduce sustainable demand and supply side mechanisms. The specific goals and objectives are outlined in **Box 1**.

Box 1: Goals and Objectives RBF4MNH Initiative¹.

Overall Goal:	To reduce maternal and infant mortality by increasing the number of women who deliver in targeted EmOC health facilities.
This overall goal is to be achieved through the following objectives:	
Objective 1:	To improve the quality of maternal and neonatal health services in targeted EmOC health facilities
Objective 2:	To provide cash reimbursements to pregnant women to reduce existing access barriers (transport, childbirth related supplies) to delivery services provided by these EmOC facilities, including reimbursement for opportunity costs resulting from staying at a health facility for at least 48 hours after childbirth.
Objective 3:	To Increase motivation of personnel and staff working at these EmOC facilities
Objective 4:	To Increase community awareness of the importance of institutional deliveries at facilities providing EmOC and the resulting health gain of women and their children

The RBF4MNH consists of two main components, a performance-based financing (PBF) approach and a conditional cash transfer component (CTT). The PBF component incentivizes facilities’ and district health managers’ performance aspects related to clinical care, quality assurance, and service management. Performance is rewarded based on met targets for each set performance indicator. The CCT component incentivizes pregnant women to use facility-based delivery services at RBF4MNH EmOC facilities by reimbursing transport and other upfront service costs. In addition, to encourage women to spend at least 48 hours after delivery at the facility, women are offered a per diem payment to cover estimated opportunity costs.

Initially (Phase I), the RBF4MNH contracted 18 EmOC health facilities (four hospitals and 12 health clinics) and was expanded in October 2014 (Phase II) to include a total of 28 EmOC health facilities (5 hospitals and 23 health clinics) across the same four districts. Selection of health facilities into the RBF program was non-random and based on facilities’ level of functionality in respect to emergency obstetric care provision, patient referral, geographical coverage, and political decision-making processes at the district levels.

¹ Based on the Inception Report Result Based Financing for Maternal and Neonatal Health (RBF4MNH Initiative) 2012 – 2014 (Sept. 2012)

At each facility, teams of maternal health workers (*not* individual health care providers) were beneficiaries of the PBF rewards. Rewards were paid as performance-based bonuses to the facilities and consisted of an additional 15-25% (depending on facility type) of each facility's total salary envelope with 70% of bonuses received by a facility after each PBF cycle to be distributed between individual health workers at each facility.

Besides performance contracts the RBF4MNH Initiative also included an initial input component to ensure basic structural and infrastructural needs (i.e. water, electricity, waste disposal, waiting shelters for pregnant women, extensions of delivery rooms, sterilizer machines, delivery beds) and minor building repairs (e.g. roof leaks, damaged window panes, broken door locks, etc.) to be addressed. A separate set of performance incentives were set up for the District Health Management Teams (DHMT) in each of the four districts. DHMT performance rewards were tied to results measured across the entire district (i.e. all facilities in each district regardless of a facility's enrollment in the PBF program). These objectives include: number of institutional deliveries across the district, supply of essential obstetric care drugs and commodities across all facilities in the district, supply/maintenance of functional equipment essential for obstetric care provision.

1.2. RBF4MNH Impact Evaluation

In response to these programmatic goals and objectives and in response to various local and international stakeholders' interests and expectations in understanding various aspects of RBF in Malawi at that time (2012), the impact evaluation was designed to respond to the objective and research questions outlined in **Box 2**.²

Box 2: Study Aim and Objectives of the RBF4MNH Impact Assessment.

Study Aim:	Impact of the RBF4MNH Initiative on the quality of care of and access to maternal and neonatal health services in Malawi
This study aim is further defined by the following study objectives:	
Objective 1:	To establish anticipated and unanticipated effects of the RBF interventions on quality of obstetric care and service utilization.
Objective 2:	To identify unanticipated effects of the RBF interventions on quality of a broader spectrum of maternal and neonatal services, including antenatal care (ANC), post-natal care (PNC), and newborn care
Objective 3:	To assess the pathways in which RBF incentives affect work-related satisfaction and motivation of health care workers.

In order to address these study objectives, the research questions (RQ) shown in **Box 3** were developed in order to allow for a theory of change to guide all scientific research activities. These questions do not match the ones that appear in the original proposal submitted to USAID|TRAction in

² Based on the Joint Proposal (Application: RFA MNCH2011-003) to USAID|TRAction and the Government of Norway in April 2012.

2011. These questions represent the set of questions agreed upon as the result of an iterative discussion with the various RBF4MNH stakeholders (in the light of how the intervention was rolled out in practice) and with the Technical Advisory Board accompanying the study along these nearly four years.

Box 3: Overall and secondary (specific) research questions of the RBF4MNH Impact study (final set).

Overall RQ:	Does a combination of supply-side and demand-side interventions improve the quality of and access to maternal care services?
This overall research question is further addressed by the following specific research questions:	
Specific RQ 1:	What is the effect of the combined RBF4MNH Initiative (namely performance contracts and conditional cash transfers) on the clinical and perceived quality of antenatal, delivery, postnatal, and newborn health care services?
Specific RQ 2:	Can the clinical quality improvements resulting from supply-side interventions (i.e. performance contracts) be maintained once demand for health services increases as a result of introducing cash transfers to women?
Specific RQ 3:	How will health care providers and clients across the range of maternal and newborn services experience quality and respond to the introduction of the planned PBF interventions?
Specific RQ 4:	How does the supply-side component change the perception and motivation of health staff?
Specific RQ 5:	How does the RBF4MNH Initiative affect client-centeredness and respectful care aspects?
Specific RQ 6:	Does the RBF4MNH Initiative change the health-seeking behavior of pregnant women in respect to maternal health service utilization?
Specific RQ 7:	Does the combination of performance contracts and demand-side interventions also contribute towards increased and more equitable access to maternal care across the range of available services?
Specific RQ 8:	How well were the conditional cash transfers (demand-side component) implemented and perceived by clients, health care providers, and programmers?
Specific RQ 9:	How do different stakeholders (namely programmers, health care providers, managers, clients etc.) involved in the RBF4MNH implementation process perceive the intervention?

The study design, study tools, and study indicators used in this impact evaluation study were therefore developed to specifically address each of these research questions. The overarching study approach follows an explanatory mixed method design with dominating quantitative research components. The quantitative component was initially planned as a controlled pre- and post-test design with independent controls relying on one pre-test and two post-test measurements. Quantitative data collection activities therefore occurred prior to the start of the RBF contracts in

April 2013 (i.e. baseline), in June/July 2014 (midterm), and May/June 2015 (endline). As control facilities, we selected the 15 EmOC facilities across the four districts that were not planned to receive the RBF intervention initially, but were planned to receive the intervention at a later program phases. During what was later defined as Phase II of the project (shortly after mid-term data collection), the RBF4MNH intervention was expanded to include five of these control facilities based on available funding at that time. Thus, these facilities switched their status within the evaluation design from control to intervention, effectively changing the design towards a stepped-wedge non-randomized study. This decision to adjust the evaluation design was explicitly discussed with all funding partners at the time the intervention scale-up was decided. Ideally, one would have liked to measure effects separately for Phase I and Phase II facilities, but a stratified analysis was not possible given the overall small facility sample size, given that an analysis on only five facilities would have not been feasible at all.

To adjust for this switch in status of these five facilities, we included a covariate to our analytical models when comparing baseline and midterm data to endline data. For the health worker survey data, this “switch” covariate controls for the potential effect of expectation on health worker satisfaction and motivation at mid-term (i.e. how knowing that one will soon receive a given intervention may already change my behavior prior to the actual event); for all other survey data, the “switch” covariate controls for the fact that some facilities only received half of the intervention when comparing baseline to endline. Still, for purposes of a sensitivity analysis, we did run all DID models also removing these five switching facilities from the analysis entirely, but results did not change considerably. However, the study’s statistical power of the already relatively small facility samples was dramatically reduced, posing a major threat to the reliability of the results yielded by this approach. Hence, this report only contains results based on the “full” sample adjusted for the switch of these five facilities.

Statistical effect estimation is based on a difference-in-differences (DiD) regression model given the quasi-experimental design. For the vast majority of indicators, we provide multiple DiD estimates, comparing baseline to midline, midline to endline, and baseline to endline. Within each section of this report, we clarify which variables have been used as covariates in our DiD regression modeling. The choice is theoretically driven and largely depends on the outcome of interest at stake within a specific section. Qualitative analysis was based on content analysis.

Quantitative assessment of service quality was conducted with the following data instruments:

- ◆ Checklist for facility assessments (facility structure and infrastructure, availability of service input factors, physical environment);
- ◆ Checklist for assessment of clinical processes during direct observations of ANC and delivery cases (routine care processes, respectful care processes);
- ◆ Questionnaires with health care providers (psycho-social environment, perception, motivation);
- ◆ Questionnaires with patients at point of exit after ANC, delivery, and PNC service use (perception related to service use).
- ◆ Quantitative assessment of service utilization was conducted with the following data instruments:
- ◆ Questionnaires at household level with mothers residing in the catchment areas of each study facility (utilization patterns of service users and non-users).

Qualitative assessments were conducted with the following data instruments:

- ◆ In-depth interviews with maternal health care providers (aspects of provider motivation, experience and perception of service provision);
- ◆ In-depth interviews and focus group discussions with service users and non-users (experience and perception of service utilization)
- ◆ In-depth interviews with RBF4MNH Initiative implementers and stakeholders (evaluation of implementation process)

1.3. Adjustments of initial design during the course of study

The Heidelberg-based study team had developed an original proposal in response to **USAID|TRAction Request for Application (RFA)** Solicitation Number MNCH2011-003 titled *“Using Performance Based Financing to Improve the Quality of Essential Obstetric and Newborn Care”* in 2011. This RFA was rooted in the understanding that *“PBF programs in developing countries have focused on expanding access and coverage of services and addressing issues of equity. Because PBF is a relatively new area of work that stresses increased utilization of services, there has been less attention paid to assessing or incentivizing quality of care, or in understanding the unintended consequences of these programs on quality or other services.”*³ Following this understanding, *“the overall research question which this solicitation is addressing is, ‘How can PBF schemes contribute to improving the quality of obstetric and newborn care (EONC) in developing countries?’.* Quality for the purposes of this research is defined as encompassing health worker compliance with national norms of care, improving outcomes of care, and meeting the needs and expectations of clients.”³

This **initial research proposal** prepared by the Heidelberg (HD) study team in response to this RFA was accepted for funding by TRAction in November 2011. This initial proposal contained the specific research questions 1-5 outlined in **Box 4** below. These research questions were in direct response to the TRAction call on different aspects of the quality of EONC services. During the following months it became known that a local research team at the College of Medicine (CoM) had also been awarded a grant by the Norwegian Ministry of Foreign Affairs (Agreement Number MWI 12/0010) to study the effect of performance based financing in the health sector. With support from the various funding agencies, the separate research teams agreed to work towards one single joint research proposal, to be co-financed by USAID|TRAction and Norway, and to include as additional partner a Norwegian institution, University of Bergen, for an additional component (economic evaluation – not directly addressed in this report).

This **joint research proposal** was submitted to all funding agencies in March 2012. As the Norwegian research agenda was – besides quality of care aspects – also focused on effects on service utilization (i.e. changes in women’s behavior and demand for maternal care services as a result of the PBF intervention), it was agreed to include repeated cross-sectional household based surveys to the initial study design. This resulted in adding the additional specific research question 6 (see **Box 4** below).

³ USAID|TRAction Request For Application, RFA Solicitation Number: MNCH2011-003, Title: Using Performance Based Financing to Improve the Quality of Essential Obstetric and Newborn Care. Date of Issue: July 31, 2011

In addition, in the joint proposal the initial research period of 36 months was reduced to 32 months in response to the delays encountered in relation to the project launch (initially intended to take place during last quarter of 2012) as well as to a wish to align funding from the two supporting agencies, Norway and TRAction. Since funds from Norway were matched to calendar years funds could only be secured for the period of May 2012 to December 2014 instead.

Box 4: Original set of research questions.

Overall RQ:	Does a combination of supply-side and demand-side interventions improve the quality of maternal care services?
This overall research question is further addressed by the following specific research questions:	
Specific RQ 1:	What is the effect of each additional interventions (namely performance contracts and conditional cash transfers) on quality of antenatal, delivery, postnatal, and newborn health care services?
Specific RQ 2:	Are the instruments used by the program to monitor quality of care applied in alignment with international quality standards?
Specific RQ 3:	Can the quality improvements resulting from supply-side interventions (i.e. performance contracts) be maintained once demand for health services increases as a result of introducing cash transfers to women?
Specific RQ 4:	How will health care providers and clients across the range of maternal and newborn services experience quality and respond to the introduction of the planned PBF interventions?
Specific RQ 5:	Are the observed effects on quality the result of enhanced monitoring & evaluation activities or of the actual link between performance and payments?
Specific RQ 6:	Does the combination of performance contracts and demand-side interventions also contribute towards increased and more equitable access to maternal care across the range of available services?

An additional feature added to the overall study approach in the joint proposal was the inclusion of three local PhD students. This component of research capacity building within the CoM was added since the Norwegian agenda also included: support of each CoM research activity during each phase of the entire project, and provision of didactic courses in health economics research at the CoM. It was therefore agreed that PhD students' financial support would be secured through CoM's separate grant from the Norwegian government, Heidelberg's contribution to the above capacity building activities would only include the costs of staff time and travel related to student supervision, supervisory support of CoM research activities throughout the project, and teaching at CoM.

In response to an **early stakeholder meeting** in March 2012 including representatives of the Malawi Ministry of Health (MoH), KfW, the Royal Norwegian Embassy (RNE), OPTIONS consultancy, USAID, and the HD research team additional adjustments were made to the research design and are reflected in the joint proposal. Initially, the MoH planned to implement the RBF4MNH in six districts

(Kasungu, Nkhatakota, Ntchisi, Dowa, Salima, Lilongwe), which the evaluation design would have matched with three control districts (Thyolo, Nsanje, Blantyre). Due to changing field conditions, a number of changes were suggested to the original study design, including:

- ◆ To drop any control districts, as too many other PBF-relevant interventions were planned in the country at that time, as the cost of transport would be too high, and as the capacity to carry out complex research in many regions at once would be very limited.
- ◆ To select intervention and comparison facilities within the four newly decided intervention districts (Dedza, Mchinji, Ntcheu, and Balaka), as each district had 6-8 potential BEmOC facilities and the MoH/Options implementation team planned to target only 4 facilities in each of these districts as recipients of the PBF pilot.
- ◆ To limit selection bias that may arise from comparing facilities that differ too greatly in terms of baseline quality standards, as well as to increase the acceptability of the intervention in the light of overall ethical considerations, additional funding would be made available to upgrade targeted and comparison BEmOC facilities to actual BEmOC functionality. (Unfortunately, this upgrade process could not be realized later on).

After the joint proposal was submitted in April 2012, the study design and specific research questions were further adjusted in response to various stakeholder meetings. During the **post-award workshop** in Bethesda (June 2012) in respect to PBF evaluation priorities, it was agreed that the following aspects should be considered to the extent possible when evaluating PBF programs:

- ◆ To conduct formative evaluations that document context and process by which a PBF program is implemented;
- ◆ To include qualitative research that addresses various perspectives of programmers, health care providers, managers, researchers, and/or clients involved in PBI programs;
- ◆ To assess the effect of financial incentives on a broader range of quality measures compared to those traditionally incentivized in LMICs (e.g. client-centeredness, cost-effectiveness, care coordination);
- ◆ To examine how performance incentives may affect health worker/manager motivation over time and how financial incentives may or may not differentially influence distinct health workforce cadres (e.g., managers, doctors, and nurses);
- ◆ To evaluate more closely how PBF affects health staff's workload;
- ◆ To include questions about disrespect and abuse to both women who have and have not used the facilities for ANC or delivery.

Another design review occurred during the study's **kick-off meeting** in October 2012, which mainly included representatives of the implementation partners (i.e. MoH, Options consultancy, KfW, RNE, district managers). Main adjustments recommended by the meeting participants included:

- ◆ To further address factors related to service access besides service utilization and health-seeking behavior;
- ◆ To ensure data collection tools should be adapted and aligned with existing protocols for obstetric care;
- ◆ To assess factors related to health worker motivation and to explain moral preferences of health workers in respect to incentivized behaviors.

In response to the post-award workshop and the kick-off meeting feedback the final set of specific research questions was defined (see **Box 3** above) to reflect the highest priority question that should and would be possible to be addressed by the impact evolution.

A **Technical Advisory Group** (TAG) meeting took place in October 2013 after baseline data were collected and analyzed. The purpose of this TAG was to review preliminary baseline data with respect to priority research questions and with respect to the implementation status of the RBF4MNH Initiative at that time (i.e. implementation delay until April 2013, delayed facility structure and infrastructure upgrades). USAID|TRAction technical advisors, USAID Malawi representatives, SSDI representatives, MoH and OPTIONS representatives attended the meeting, and representatives of the HD and CoM research team.

The advisors pointed out that for some surveys (i.e. health care provider survey, clinical observations) the overall sample size might be too small to derive robust effect estimate measures in order to allow for clear impact measures. Also, the satisfaction ratings of clients surveyed on exit of services were throughout extremely positive and less likely to capture any changes in client perception of care. Another concern was the overall issue of spillover and contamination effects given intervention and comparison sites are located within the same districts.

The research team pointed out that the delay of implementation resulted in a delay of the impact research. The infrastructural upgrade component as part of the RBF4MNH required positioning the quantitative baseline component close to the end of the upgrade phase but prior to the start of the PBF program component (i.e. March/April 2013). It was pointed out to the advisors that from a scientific viewpoint, the midterm and endline data collection rounds would need to be moved at least 12 months apart from each other, in order to ensure at least two RBF cycles to occur between evaluation rounds and to allow for the sampling frame (i.e. to include women with completed pregnancy within past 12 months) used by the household-based survey.

Recommendations offered by the advisors were to find ways to increase sample sizes for the identified surveys and to match client satisfaction of services received with actual quality of these services observed through the clinical observations. Further, the TAG recommended focusing only on indicators most likely to change over short time during follow-up data collection rounds, but also prioritize those research aspects relevant to understanding the RBF implementation process. Other than that, no further changes to the design were suggested or advised by the TAG.

In response to the TAG meeting, the study team made the following adjustments to the current design:

- ◆ A change in research assistants' duration of stay at each study facility from three days during baseline data collection to five days (maximal duration feasible given budget constraints) in the hope to obtain sufficient sample sizes for health care provider interviews and case observations.
- ◆ Given that at the time of the midterm data collection the RBF4MNH implementation team was considering to expand the RBF4MNH Intervention to include all EmOC facilities (current intervention and current comparison sites) in the pilot districts, more comprehensive indicator measurements during midterm were collected in the understanding that this round might well be the end point for at least some facilities (pending a clear timeframe of program expansion).
- ◆ In light of the very high levels of health service utilization and client satisfaction measured at baseline and in light of the constrained sample size for some indicators (e.g. health care provider

interviews, direct observations of delivery cases) and in response to the TAG concerns in respect to robust quantitative effect measures, the study team changed the original design from a purely explanatory towards a triangulation mixed methods design. While in an explanatory mixed methods design, qualitative methods are used exclusively to explain quantitative findings, this was initially deemed appropriate because the research interest was to measure impact estimates and explain, at least partially, how they were produced. In a triangulation mixed methods design, qualitative methods acquire a greater value. While the focus still remains on a single phenomenon (i.e. the RBF4MNH intervention), now quantitative methods are used to capture some of this phenomenon's dimensions and qualitative methods are used to capture completely different dimensions of this phenomenon. At this stage of the impact evaluation, the triangulation design aligned better with the recommendations of the TAG to devote greater resources (i.e. more extensive qualitative methods) towards understanding the so-called "black box", i.e. process elements relevant to the implementation of PBF.

In August 2014 the TRAction technical advisors undertook a site visit to Malawi in order to further understand the context in which the RBF4MNH Initiative is implemented and evaluated. This further informed a **Study Review Meeting** held in December 2014. This meeting occurred after midterm data was collected and analyzed, after the MoH announced to extent the RBF4MNH to an additional set of facilities in the pilot districts (including some of the impact evaluation's comparison sties), and in light of the upcoming closure of the USAID|TRAction program by September 2016. Therefore the following priorities were discussed and agreed:

- ◆ Given the complexity of the study and the uncertainties that always surround field work, the research team was recommended to center their deliverables mainly on the analysis of baseline and midterm data only, if necessary. This suggestion would have left intact the commitment by the HD/Harvard team to accompany CoM also in the final round of data collection, analysis, and dissemination, but eases the task for the HD/Harvard team, should a complete analysis of endpoint data not be completed by February 2016.
- ◆ Given USAID's interest in implementation research, not necessarily in impact as such, enough could be learned by the analysis of baseline and midterm data and the related qualitative analysis. Given the difficulty of the study to justify its results in terms of a pure sufficiently powered impact evaluation, the focus on explaining effects rather than just measuring it may be more profitable when it will come to disseminate results scientifically. In spite of the team's efforts to increase the samples for all study tools, it was pointed at the fact that due to contamination across intervention and control clusters, it will still be difficult to attribute observable effects purely to the RBF4MNH intervention. Thus, presenting findings integrating quantitative and qualitative information to explain rather than just measure the effects of the intervention are more valuable.
- ◆ In the end, the research teams managed to conduct all research components planned for the endline data collection. This report includes results based on the analysis of all three data collection points (baseline, midterm, endline).

1.4. Additional background on analytical approach and presentation of findings

1.4.1. Potential limitation to effect estimation given the design of the RBF4MNH intervention:

As described earlier, the quantitative assessment of impact of the intervention on quality of care and service utilization measures relied on a series of Difference-in-Differences (DiD) estimation models. DiD estimation models calculate the effect of a treatment (in our case, the RBF4MNH Initiative) on an outcome (in our case, maternal care service input and process measures, provider and client

satisfaction scores, utilization of maternal care services, etc.) by comparing the average change over time in the outcome variable for the treatment group to the average change over time for the comparison group. Given the implementation design (i.e. the fact that the demand-side implementation process differed in length and quality from district to district and site to site), **our evaluation cannot discern the impact produced by the supply-side incentives and the impact produced by the demand-side incentives for any of the indicators included in the analysis.**

Additionally, our study design cannot account for effects the RBF4MNH Initiative had on the performance of the District Health Management Teams (DHMTs), as performance incentives directed to DHMTs affected all health facilities in each of the pilot districts, which includes both the study's intervention and comparison facilities.

1.4.2. Analytical approach in more detail:

For each effect measure included in our assessment, we computed three separate DiD models: one comparing baseline to midterm; one comparing midterm to endline; and one comparing baseline to endline. This approach is meant to provide maximum information to policy makers and implementation stakeholders, by allowing them to appraise both the overall effect of the intervention, through the comparison between baseline and endline, and the step-wise changes produced by the intervention, through the comparison between baseline and midterm and between midterm and endline.

To facilitate understanding by policy makers and implementation stakeholders, we have purposely indicated in all results tables the real means observed in our sample, instead of using the means estimated by the DiD regression models. Estimated means differ insofar as they are computed based on the regressed data and thus they might differ extensively depending on underlying sample size and variation in the data due to potential confounding variables. However, the effect estimates (i.e. the DiD values) and corresponding p-values reflect the estimators generated by the DiD regression models. As such, they are adjusted to take into account the effect of confounding variables, included as covariates in the model estimation. These estimated values provide the best possible representation of the true effect of the intervention, since in the DiD models we were able to control for both clustering (at the facility level or at health care provider level depending on data set), as well as for potential confounding factors in a way that is not possible when computing simple arithmetic means.

Given the RBF4MNH implementation expanded to include facilities previously used as comparison sites for the purpose of the evaluation, we adjusted all DiD regression models (irrespective of outcome) accordingly in order to reflect this switch in study arm for some of the study sites. In all of our models, we therefore added a covariate, which allowed us to identify those facilities, which started as comparison but joined the intervention in Phase II. We trust that adding this covariate allowed us to control for a potential expectation effect when assessing differences between baseline and midterm (since the concerned facilities were already alerted that the intervention may come to them) and to control for having received the intervention for a shorter period of time when assessing differences between midterm and endline and between baseline and endline.

1.4.3. Additional clarifications regarding study design and data analysis:

What does this study contribute in terms to RBF process evaluation?: The study design initially proposed and adjusted during the course of the study had the purpose to measure the impact of

RBF4MNH on service quality and service utilization. This design therefore does not allow any evaluation of 'good practices' in respect to RBF. An evaluation of good practices would have required a design based on case study methodologies with cases being selected to represent extreme differences at baseline and a stronger focus on aspects of implementation research. Nevertheless, as we adjusted our initial design as we proceeded through the study we attempted to enhance some process evaluation aspects by conducting interviews with various RBF4MNH stakeholders. While this study component produced some findings in respect to RBF implementation processes, it does not allow an ex-post move towards a best-practice focus.

Why are results not presented for each of the intervention facilities separately?: While we observed some differences across districts and facilities, we only report on district differences. We are reluctant to report on differences on the single facilities because due to ethical considerations, we cannot disclose information that allows the identification of single respondents, health workers, or cases. Given the fact that the differences we observed at the facility level were largely related to the performance of single health care providers, we also find them to be somewhat irrelevant when it comes to assessing the overall effect of RBF, especially in light of the large health worker turnovers we observed.

Why has there no assessment been made regarding differences or similarities between private (Christian Health Association of Malawi, CHAM) and public (government owned) facilities?: We could not compare the effect of the RBF4MNH across CHAM and government facilities because the intervention sample size only contained seven CHAM facilities, making a stratified analysis by facility ownership impossible. The limited number of non-governmental facilities included in the RBF4MNH is the result of a political decision (i.e. to target as much as possible only public facilities) and not directed by research methodology. The sample included in the evaluation study simply followed the initial list of facilities indicated by the Ministry of Health to be part of the RBF4MNH feasibility study. Still, including facility ownership in any of the DID models did not change the results of the analysis, showing that this "ownership" co-variate had little influence on overall results. However, this observation is probably more influenced by the fact that only very few CHAM facilities were included from the beginning.

Have there been any other facility characteristics that explain differences in outcomes, such as rural/urban, infrastructure (electricity, water source), etc.?: Similarly to what we described above, accounting for differential effects due to systematic differences present at baseline (since these differences served as the basis for sampling) would have required a much larger facility sample, in order to allow for more stratified DID models (by electricity level, by water source, by location). The limited sample size, which was bound to the size of the intervention, not to the research methodology, did not allow for such stratified analysis. Stratified analysis was only possible on the household sample, which served to assess the RBF4MNH impact on service utilization (not service quality). However, even in this larger sample, we found no differential effects on service utilization by distance or by socio-economic status. A number of facility characteristics, such as ownership, facility type (as proxy for infrastructural differences), were all included as co-variables in the DID models, ensuring that estimated effects were controlled for potential confounding due to such systemic characteristics and allowing identification of the net effect of the RBF intervention.

Why has there not been a before-and-after assessment of district health management performance?: Although the RBF4MNH included performance-based rewards for DHMTs for improvements across

intervention and control facilities within the same district, we did not engage in a systematic assessment of DHMT activities, mainly because this was never raised as an issue at all during the various study design review meetings that preceded our field data collection. Therefore, a before-and-after analysis was no longer possible once baseline data was collected. Furthermore, a simple before-and-after analysis would not have been sufficient to attribute any observed effect to the RBF intervention. This would have required a controlled design with DHMT controls taken from other districts, which was financially and logistically not feasible to do. However, we invested quite some efforts in interviewing district health managers of the study districts to capture their role and perceptions of the RBF4MNH to further inform and explain our facility-based findings.

Results of the RBF4MNH Impact Evaluation

In the following sections we will present the findings of the impact evaluation conducted between 2013 and 2015.

We will first present findings of the RBF impact on maternal care service utilization, followed by the impact on quality of care (divided in clinical service provision and satisfaction with service use), followed by findings on the demand-side component of the RBF4MNH, followed by health care providers reactions to the RBF4MNH, and finally followed by stakeholders' experiences during the RBF4MNH implementation process.

Each section will include a box outlining which research questions were addressed and details regarding the data sources used to answer these research questions.

2. Findings on RBF4MNH impact on service utilization

Key findings in respect to the research questions:

Specific RQ 6: *Does the RBF4MNH Initiative change the health-seeking behavior of pregnant women in respect to maternal health service utilization?*

The RBF4MNH did not produce any increase in health service utilization neither for directly targeted services (i.e. facility-based delivery) nor for indirectly concerned services (i.e. antenatal and postnatal care services).

Specific RQ 6: *Does the combination of performance contracts and demand-side interventions also contribute towards increased and more equitable access to maternal care across the range of available services?*

Our findings suggest that the RBF4MNH intervention was equity-neutral, i.e. it did neither increase nor decrease existing inequities in utilization of facility-based delivery due to socio-economic status.

2.1. Sample distribution and sample characteristics of interviewed women in intervention and comparison catchment areas for baseline, midterm, and endline data collection points

The assessment of the impact of the RBF4MNH intervention on health service utilization was conducted through analysis of household survey data. We identified women to be interviewed using a three-stage sampling strategy. First, we defined 33 clusters according to the catchment areas of the 33 facilities included in the study. Second, we randomly selected two Enumeration Areas (EAs) per rural and four EAs per urban cluster. Third, following a random route sampling strategy, in each EA, we identified and interviewed 26 women with a history of pregnancy in the prior twelve months. The survey collected information on women's use of maternal care services as well as household socio-demographic characteristics.

Table 2-1: Sample distribution of women responding to household survey.

	BASELINE		MIDTERM		ENDLINE	
Total sample:	1,887		1,889		1,844	
	n	%	n	%	n	%
District:						
Balaka	466	24.7	452	23.9	471	25.5
Dedza	473	25.1	489	25.9	455	24.7
Mchinji	477	25.2	496	26.3	457	24.8
Ntcheu	471	25.0	452	23.9	461	25.0
Level of care:						
BEmOC	1,418	75.1	1,412	74.7	1,365	74.0
CEmOC	469	24.9	477	25.3	479	26.0
Study arm:						
Intervention	1,149	60.9	1,150	60.9	1,398	75.8
Comparison	738	39.1	739	39.1	446	24.2

BEmOC = basic emergency obstetric care center; CEmOC = comprehensive emergency obstetric care center

Table 2-1 reports information on the sample distribution across the four study districts for each of the three data collection rounds. The proportion of women in the intervention arm increased at endline compared to baseline and midterm due to the step-wedge nature of the intervention, which was scaled up to include five of the facilities that had originally been identified as control facilities.

2.2. Impact estimates on service coverage (utilization) for L&D, ANC, and PNC services

To estimate the effect on service utilization, we controlled for potential confounding factors by including the following covariates in our models: woman's age, woman's literacy, woman's parity, household socio-economic status (measured using an asset-based index), distance to the official facility.

Table 2-2 reports the observed means and the DiD estimators and respective significance values for all utilization indicators included in our analysis.

- ★ The RBF4MNH did not produce any increase in the population-based rate of health service utilization for directly targeted services (i.e. facility-based delivery) or indirectly concerned services (i.e. antenatal and postnatal care services). This means that on a population-base level, the proportion of women using services did not increase substantially more in intervention compared to control catchment areas.
- ★ The absence of an effect on the rate of facility-based delivery (**indicator 5**) is largely due to the fact that utilization rates at baseline were already very high (approaching 90%), making it close to impossible to identify a statistically significant difference with the sample size at our disposal. At the same time, increasing sample size to detect significant differences was beyond the financial scope of our impact evaluation. In addition, experience from other African settings suggests that achieving beyond 90% coverage rates is extremely difficult and is unlikely to arise as a consequence of a single intervention.
- ★ Overall, our impact evaluation detected an increase in the rates of service utilization over time, but this increase was comparable across women residing in intervention and control areas. By 2015 (i.e. study endline), the proportion of women delivering in a health facility reached 95% (**indicator 5**), while the proportion of women seeking antenatal care in the first trimester of pregnancy (**indicator 2**) and the proportion of women seeking at least 4 antenatal care visits

(indicator 3) remained relatively low, at approximately 20% and 50% respectively. This indicates that ample room for improvement remains in relation to timely and adequate use of antenatal care services.

- * The absence of an effect on utilization rates for other maternal care services, such as antenatal care (indicators 1-3) and postnatal care service (indicators 6-8) is probably largely due to an inability of the intervention to produce behavioral changes in relation to maternal care services not directly targeted by the intervention. This finding represents at once good and bad news. On the one side, the absence of an effect on non-targeted services demonstrates that the intervention did not divert attention from non-targeted maternal care services. On the other side, the fact that utilization rates for other maternal care services, specifically timely first ANC and at least 4 ANC visits, stagnate at very low levels represents a missed opportunity. Policy makers should consider the potential to scale up the intervention horizontally by adding incentives targeting other maternal care services.
- * The absence of an effect on population-based rates of service utilization does not mean that the intervention did not produce an effect on demand for maternal care services. As described in section 2.4 below, our evaluation detected a substantial increase in the proportion of women migrating from control areas to intervention facilities to deliver their babies. Additional evidence that this migration from control areas to intervention facilities took place comes from analysis of routine HMIS data, confirming that the actual number of facility-based deliveries increased substantially in intervention facilities over time (see Appendix Figures A1 and A2). Similarly, the absolute number of ANC visits at intervention facilities increased substantially between 2013 and 2015. This migration from control areas to intervention facilities provides a partial explanation, together with the need to adhere to higher standards of care, as to why health care providers complain of increased workload.
- * The intervention did produce a statistically significant effect on women's length of stay at the facility after delivery (indicator 9). The number of women remaining at a health facility at least 48 hours after delivery increased in both intervention and control areas, but the increase was of proportionally greater magnitude in intervention areas. Qualitative findings indicate that this increase is largely tied to a specific supply-side incentive, which requires health care providers to maintain women for observation for at least two days after delivery.

The findings reported in Table 2 are further confirmed by the sensitivity analysis (described in the Appendix – Table A1), conducted on the sample after removing women from control areas who used intervention facilities (i.e. potential source for contamination of findings). The sensitivity analysis was conducted to check for the robustness of our analysis in light of possible contamination, given that women migrating from control to intervention facilities could have altered the overall estimation of the effect of the intervention.

Table 2-2: RBF4MNH impact estimates for reproductive health service utilization by women.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted ML-EL	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.							
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n						
1	Proportion of women reporting having attended at least one ANC clinic during their most recent pregnancy	96.9	1,147	96.2	731	98.9	1,150	98.6	738	98.9	1,117	98.7	706	<-0.1	.75	<-0.1	.09	<-0.1	.90
2	Proportion of women reporting having attended their first ANC clinic during the first trimester of their most recent pregnancy	15.1	1,111	15.1	703	18.9	1,137	18.0	728	21.8	1,105	22.2	697	<0.1	.83	<-0.1	.88	<0.1	.76
3	Proportion of women reporting having attended at least four ANC clinics during their most recent pregnancy	44.0	1,111	44.1	703	51.3	1,137	48.2	728	50.6	1,105	52.4	697	<0.1	.50	<0.1	.70	<0.1	.41
4	Proportion of women reporting current use of a modern method of family planning	57.7	1,149	60.0	738	58.2	1,140	71.7	724	58.3	1,133	59.5	711	-0.1	.44	-0.1	.62	<0.1	.76
5	Proportion of women reporting having delivered their last child in a health facility	91.1	1,100	91.4	712	94.2	1,142	97.1	730	94.9	1,117	96.7	702	<-0.1	.33	<-0.1	.81	<-0.1	.84
6	Proportion of women reporting having attended PNC clinic at least once after their last childbirth	81.9	1,090	84.9	694	80.1	1,142	79.3	724	75.7	1,123	82.6	703	<0.1	.45	<0.1	.54	<-0.1	.82
7	Proportion of women reporting having attended PNC clinic within seven days of childbirth	42.0	1,099	45.8	712	44.7	1,150	43.0	738	35.6	1,133	38.0	710	0.1	.41	-0.1	.55	<0.1	.70
8	Proportion of women reporting having attended at least three PNC visits within six weeks of childbirth	79.3	1,099	83.3	712	79.0	1,150	77.6	738	76.1	1,133	83.2	710	0.1	.23	<0.1	.78	<-0.1	.96

9	Proportion of women reporting having stayed at the health facility for at least 48 hours after childbirth	30.3	993	39.8	644	69.8	1068	58.2	701	73.8	1048	68.0	674	0.2	.00	0.1	.06	0.3	.00
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ANC = antenatal care; PNC = postnatal care; DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; ML-EL = comparison between cohorts at midterm and endline; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

2.3. Impact estimates on utilization for L&D, ANC, and PNC services by socio-economic and distance group

Table 2-3 reports findings on the main outcome indicator, facility-based delivery, stratified by district, socio-economic status (SES), and distance to the health care facility.

- ★ The analysis by district indicates that in some districts, after controlling for potential confounders, the intervention did produce a statistically relevant effect on utilization of facility-based delivery (**indicator 1**). For instance, in Dedza and Ntcheu the intervention DiD produce an increase, albeit of a small magnitude, in the proportion of facility-based deliveries when comparing midterm to endline data, while the same was observed in Mchinji, but only when comparing baseline to endline data.
- ★ The analysis by SES (**indicator 2**) and by distance (**indicator 3**) indicated no differential effects due to either variable. This finding suggests that the intervention was equity-neutral, i.e. it did not increase or decrease existing inequities in utilization of facility-based delivery due to socio-economic or distance status. Utilization rates grew consistently across intervention and control areas and across women regardless of distance or socio-economic status. This finding speaks against the inverse equity hypothesis, which postulates that universal strategies benefit the least poor first, and must be appraised against the contextual reality of rural Malawi, where real differences due to socio-economic status and distance are probably very small and relatively negligible compared to other sub-Saharan African settings.

Table 2-3: RBF4MNH impact estimates for reproductive health service utilization by women stratified by district, household socio-economic status, and distance.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted ML-EL	Sig.	DiD adjusted BL-EL	Sig.	
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.								
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n							
1	Proportion of women reporting having delivered their last child in a health facility distributed by district of residence	Balaka	87.3	252	88.0	200	92.6	242	95.1	204	92.6	257	96.7	210	<0.1	.97	<0.1	.37	0.1	.13
		Dedza	90.6	255	93.4	198	89.9	277	98.6	207	97.2	248	96.5	201	0.1	.23	0.1	.06	<0.1	.83
		Mchinji	95.0	298	92.4	157	97.0	332	96.9	160	97.1	310	96.4	138	<0.1	.69	<0.1	.19	0.1	.02
		Ntcheu	90.8	295	92.4	157	96.6	291	98.1	159	92.7	302	97.4	153	<0.1	.96	0.1	.00	<0.1	.30
2	Proportion of women reporting having delivered their last child in a health facility distributed by socioeconomic status	SES quintile 1	92.7	234	95.8	119	96.5	258	97.5	120	95.6	251	97.3	110	<0.1	.27	<0.1	.12	<0.1	.66
		SES quintile 2	93.2	220	86.8	152	94.1	219	95.4	151	95.3	214	98.0	150	0.1	.15	<0.1	.35	0.1	.06
		SES quintile 3	93.1	218	95.9	146	93.7	206	97.1	172	94.4	234	97.7	132	<0.1	.92	<0.1	.45	<0.1	.74
		SES quintile 4	87.7	212	90.5	147	93.2	234	97.3	148	94.1	219	95.0	161	<0.1	.94	<0.1	.21	<0.1	.28
		SES quintile 5	88.4	216	89.2	148	93.3	225	98.6	139	95.0	199	96.0	149	<0.1	.35	<0.1	.45	<0.1	.82
3	Proportion of women reporting having delivered their last child in a health facility distributed by distance of household to nearest health facility	Distance 0-<3 km	95.1	243	91.5	165	98.1	320	95.6	181	96.0	302	96.3	217	<0.1	.91	0.1	.11	0.1	.43
		Distance 3-<5km	93.8	241	92.8	166	93.7	222	98.5	198	91.8	194	96.1	127	0.1	.15	<0.1	.92	0.1	.24
		Distance 5-<8km	89.6	366	90.9	198	92.8	321	97.8	181	96.7	337	98.5	194	<0.1	.36	<0.1	.42	<0.1	.57
		Distance >8km	86.8	250	90.7	183	91.8	279	96.5	170	93.7	284	95.7	164	<0.1	.83	<0.1	.56	<0.1	.28

DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; ML-EL = comparison between cohorts at midterm and endline; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

2.4. Sensitivity analysis and analysis of movers (women from control areas delivering in intervention facilities)

Results of the sensitivity analysis are shown in **Table 2-4**.

- * The sensitivity analysis brought to our attention the fact that the proportion of women migrating from control facility catchment areas to intervention facilities for delivery increased over time, with the increase being statistically significant (**indicator 2**).
- * Looking specifically at the experience of individual districts, our evaluation found that the shift from BEmOC health centers towards CEmOC hospitals was particularly pronounced in Ntcheu where in 2015 close to 30% of women coming from BEmOC catchment areas delivered in the local CEmOC facility. The opposite situation was observed in Dedza, where CEmOC deliveries among women residing in the catchment areas of BEmOC facilities decreased from 12% to 7% between 2013 and 2015. In Balaka, this proportion remained relatively stable at 10% over the three years, while Mchinji experienced a small increase from 16% to 18% between 2013 and 2015.

We used qualitative methods to understand this increase in migration, with the specific aim of detecting whether the increase was due to an expectation of receiving conditional cash transfers embedded in the intervention for women residing in intervention areas.

- * The qualitative interviews instead revealed that health care providers in control facilities who referred women to deliver in CEmOC intervention facilities largely pushed this migration.

We turned back to the quantitative data to verify the qualitative findings.

- * We found that in communities not targeted by the RBF4MNH Initiative, the proportion of women delivering at a CEmOC facility (i.e. a default RBF4MNH facility) increased from 15% to 21% while it remained stable at 15% in communities targeted by the RBF4MNH Initiative.

Table 2-4: Sample distribution of women migrating for delivery from comparison to intervention facilities.

Indicator		BASELINE		MIDTERM		ENDLINE		Difference* BL-ML	Sig.	Difference* ML-EL	Sig.	Difference* BL-EL	Sig.
1	Total sample of women residing in comparison catchment areas	651		709		427							
		n	%	n	%	n	%						
2	Proportion of women utilizing services in intervention facilities outside the residential catchment area	117	18.0	175	24.7	100	23.4	0.07	.01	-0.01	>.99	0.05	0.10
	Proportion of women utilizing services in catchment area facility	534	82.0	534	75.3	327	76.6						

* Differences and significance levels based on ANOVA, Bonferroni multiple comparison test.

BL-ML = comparison between cohorts at baseline and midterm; ML-EL = comparison between cohorts at midterm and endline; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

3. Findings on RBF4MNH impact on quality of care: service provision and clinical performance

Key findings in respect to the research questions:

Specific RQ 1: *What is the effect of the combined RBF4MNH Initiative (namely performance contracts and conditional cash transfers) on the clinical and perceived quality of antenatal, delivery, postnatal, and newborn health care services?*

The RBF4MNH produced a relatively strong increase in the availability of skilled staff at RBF facilities.

There was an increase in, but not no overall net effect of the RBF4MNH on, the availability of functional equipment and supplies in RBF facilities. This was probably due to the fact that incentivized equipment maintenance and supply procurement functions at DHMT levels also improved availabilities at control facilities (positive spill-over). Health care providers working at RBF facilities very positively perceived this change in physical work environment.

The RBF4MNH Initiative had a positive effect on health workers' clinical performance in respect to the assessment of HV and pre-eclampsia risk factors, as well as infection prevention measures during labor (but not during birth), and oxytocin administration.

There was an only minimal effect on the performance of AMTSL

There was no effect on partograph use and partograph documentation.

Specific RQ 3: *Can the clinical quality improvements resulting from supply-side interventions (i.e. performance contracts) be maintained once demand for health services increases as a result of introducing cash transfers to women?*

Supply-side indicators in general were not negatively affected by the additional introduction of the demand-side component.

To evaluate the impact of the RBF4MMNH on quality of service provision and clinical performance, we used three data sources: a quantitative assessment of service readiness at all studied facilities based on facility inventory lists, a quantitative assessment of clinical performance in respect to quality of care protocols based on direct case observations, and qualitative interviews with maternal care health workers on their experiences with clinical service delivery in the studied districts.

3.1. Quantitative sample of health facilities

The RBF4MNH impact evaluation study included a total of 33 health facilities, all of which were considered to offer emergency obstetric care (EmOC) services. Of these 33 facilities, five were hospitals providing comprehensive EmOC, and 28 were health centers providing basic EmOC.

Table 3-1 gives an overview of the distribution of these study facilities across districts, level of EmOC, and study arm at the different data collection points. Of note is that information on two facilities was unavailable to the study team during each baseline and midterm.

Table 3-1: Sample distribution of studied EmOC health facilities.

	BASELINE		MIDTERM		ENDLINE	
Total sample:	31		31		33	
	n	%	n	%	N	%
District:						
Balaka	8	25.8	8	25.8	8	25.8
Dedza	7	22.6	7	22.6	7	22.6
Mchinji	8	25.8	8	25.8	8	25.8
Ntcheu	8	25.8	8	25.8	8	25.8
Level of care:						
BEmOC	26	83.9	26	83.9	28	84.9
CEmOC	5	16.1	5	16.1	5	15.2
Study arm:						
Intervention	17	54.8	18	58.1	23	69.7
Comparison	14	45.2	13	41.9	10	30.3

BEmOC = basic emergency obstetric care center; CEmOC = comprehensive emergency obstetric care center

Table 3-2 provides a summary of some characteristics of the health centers included in this study. We only included the 28 health centers in this comparison, as the hospitals clearly differed in respect to most service characteristics due to larger overall service size and service inputs. Almost all health centers in the sample were operating on a 24/7 schedule. Total bed capacity (i.e. recovery beds, labor beds, delivery beds, examination beds) varied greatly among study groups, but increased steadily over the course of the intervention. Only some health centers had access to patient transportation. Prior to the intervention start few health centers had a functional laboratory unit available, but availability increased across all health centers over the course of the study. Most health centers had a pharmacy or dispensary unit on site.

Table 3-2: Sample characteristics of studied health centers

Characteristics	BASELINE				MIDTERM				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.	
Average service hours per day (mean/SD)	24	0	24	0	22	5	23	5	24	0	24	0
Average operating days per week (mean/SD)	7	0	7	0	7	1	7	0	7	0	7	0
Average number of staff (skilled and non-skilled providers) working at maternity unit (mean/SD)	0.5	1.3	1.8	2.3	0.4	1.1	3.6	3.1	1.1	2.0	2.6	3.6
Average total bed capacity in maternity unit (mean/SD)	10	4	15	8	15	9	17	12	17	8	17	8
Proportion of health centers with patient transport vehicle available (n/%)	21	77.8	13	61.9	12	85.7	9	75.0	54	78.3	14	73.7
Proportion of health centers with functional laboratory unit on site (n/%)	17	63.0	9	42.9	10	71.6	10	83.3	50	72.5	8	94.7
Proportion of health centers with functional pharmacy unit on site (n/%)	23	85.2	12	100	13	93.9	12	100	66	95.7	18	94.7

n = number of observations; SD = standard deviation; % = proportion in percent

3.2. Quantitative sample of observed labor and delivery (L&D) cases

To assess clinical performance of labor and delivery service provision provider-patient interactions were directly observed. Standards against which clinical performance was measured were taken from clinical guidelines and the Standards-Based Management and Recognition (SBM-R) checklists used in Malawi. Observations were conducted by research assistants with clinical training or professional backgrounds in midwifery within the Malawian health system. For maximal comparability of observed case management, only labor and delivery cases without clinical complications were included in the analysis. At each facility, cases were selected based on a convenience sampling approach.

Table 3-3 gives an overview of the distribution of observed cases across districts, level of EmOC, and study arm at the different data collection points. The increase in observed case number between baseline and midterm is due to a change in length of stay of research assistants at each facility from three to five days. For both time points the number of comparison cases was relatively small.

Table 3-3: Sample distribution of observed routine labor cases.

	BASELINE		MIDTERM		ENDLINE	
Total sample:	87		164		150	
	n	%	n	%	n	%
District:						
Balaka	24	27.6	37	22.6	37	26.7
Dedza	17	19.5	49	29.9	32	21.3
Mchinji	20	23.0	49	29.9	43	28.7
Ntcheu	26	29.9	29	17.7	38	25.3
Level of care:						
BEmOC	50	57.5	103	62.8	88	58.7
CEmOC	37	42.5	61	37.2	62	41.3
Study arm:						
Intervention	63	72.4	106	64.6	131	87.3
Comparison	24	27.6	58	35.4	19	12.7

BEmOC = basic emergency obstetric care center; CEmOC = comprehensive emergency obstetric care center

Table 3-4 provides a summary of some characteristics of the obstetric cases observed during the study periods. Skilled birth attendants attended the great majority of cases in all facility types. Number of all staff as well as number of skilled staff available at a maternity unit during the observation of a case was in average between 5-7 or 3-4 in RBF facilities, and between 2-3 or about 1 in non-intervention facilities. This difference is mainly due to almost all hospital CEmOC sites – with generally higher staffing patterns – being part of the RBF study arm. As limited numbers of skilled and support staff can affect the extent to which observed cases are taken care of in terms of the measured performance quality, we adjusted our analysis for this factor.

There was also great variability between cases in respect to the time between a laboring woman's arrival to a facility and the birth of her newborn. This is explained by the variable duration of stage 1 labor (probably in conjunction of late stage 1 presentation/admission of laboring women to the maternity unit). Processes affected by presentation of a woman close to stage 2 of labor are partograph use (i.e. detailed stage 1 monitoring) and other physical or history assessments due to the

urgency of the situation. For better comparability of cases in our analysis, we adjusted case analysis for the duration of stage 1.

3.3. Qualitative samples of maternal health care providers

Information from several qualitative interviews with different health care providers was used to further explain the quantitative findings. Qualitative interviews were conducted at different stages during the overall study period.

In 2014 a sample of 16 skilled birth attendants (SBA) at 16 different facilities were interviewed on their clinical practices and experiences in providing maternal care. SBAs from both RBF and non-RBF facilities were purposefully selected based on clinical performance scores retrieved during the baseline quantitative facility-based surveys. The sample included SBAs working at high and low performing facilities. At facilities with multiple SBAs present at the day of interview, SBAs with higher qualifications and/or longer work experience at the facility were interviewed.

In 2014 and 2015, in-depth interviews with additional samples of health care providers were conducted for different purposes (i.e. to match health worker experiences with client experiences in respect to service utilization). Details on these qualitative health worker samples are provided in sections 4.2.

Table 3-4: Sample characteristics of observed labor cases

Characteristics	BASELINE				MIDTERM				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.	
Proportion of cases attended (directly or supervised) by skilled birth attendant* (n/%)	62	98.4	24	100	95	93.1	52	94.6	126	89.3	18	89.5
Average number of staff present at maternity unit at time of case (mean/SD)	7.3	5.4	2.2	1.0	6.6	5.9	2.9	1.7	5.1	3.8	2.6	1.0
Average number of skilled staff* present at maternity unit at time of case (mean/SD)	3.6	2.8	1.2	0.4	3.1	2.5	1.4	0.9	2.7	2.0	1.2	0.5
Mean duration in minutes between woman's arrival to maternity unit until birth of child (mean/SD)	243	273	169	132	305	326	257	310	196	176	200	108

n = number of observations; *SD* = standard deviation; % = proportion in percent

*includes: obstetricians, general physicians, clinical officers, medical assistants, enrolled midwives, enrolled nurses, enrolled nurse midwives, registered nurse midwives, registered nurses, nurse midwife technicians, nurse technicians (based on Adegoke A et al. "Skilled Birth Attendants: Who is who? A descriptive study of definitions and roles from nine Sub-Saharan African Countries", *Plos ONE* 7 (7), 2012)

Table 3-5: RBF impact estimates for service readiness in respect to staff and training.

Indicator	BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
	Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
	mean	n	mean	n	mean	n	mean	n	mean	n	mean	n				
1 Proportion of facilities with at least two skilled birth attendants	70.6%	17	100%	14	94.4%	18	84.6%	13	100%	23	90.0%	10	39.8%	.02	33.0%	.03
2 Proportion of facilities with clinical EmOC guidelines available	82.4%	17	92.9%	14	88.9%	18	69.2%	13	78.3%	23	80.0%	10	30.0%	.11	16.8%	.42
3 Extent of meeting staff & training readiness	84.3%	17	97.6%	14	90.7%	18	74.4%	13	92.8%	23	83.3%	10	29.8%	.01	23.3%	.03

DiD = effect estimate based on difference-and-difference regression; *BL-ML* = comparison between cohorts at baseline and midterm; *BL-EL* = comparison between cohorts at baseline and endline; *Sig.* = significance level of effect estimate

3.4. Impact estimates on service readiness for basic obstetric care provision

Given the relatively small sample size of health facilities (section 3.1) this study component is not sufficiently powered to allow for robust impact estimates on the basis of a regression model. Hence, some caution should be applied in the interpretation of these findings. To estimate the effect of the RBF4MNH on service readiness we adjusted the difference-in-differences (DiD) regression models to control for a) the extension of the RBF intervention including some of the initial comparison facilities and b) whether a facility is a hospital or health center.

Only a portion of EmOC facilities per intervention district had been included in the RBF4MNH scheme initially. District health manager performance, however, was measured against service quality targets across all EmOC facilities in each district. Interpreting findings in this study component, one must therefore that some indicators related to equipment and drug availability or to improved supervision and coaching are expected to change in a rather parallel manner across intervention and control sites.

RBF4MNH impact measures on quality of care inputs were based on inventories collecting information on facility and service infrastructure at each data collection point to allow an assessment of changes in the availability of essential input factors for routine and emergency obstetric care over time. Input indicators used in this study component are based on indicators in the *Service Availability and Readiness Assessment* tool suggested by the World Health Organization in respect to service readiness of basic obstetric care services.⁴ Based on this framework, basic obstetric care service readiness is divided into three aspects: staff & training, equipment & supplies, medicines and commodities.

3.4.1. Staff & Training

Table 3-5 presents the findings for the staff & training readiness component, which includes the **availability of at least 2 skilled birth attendants** (SBA) per facility and the **availability of clinical guidelines** on management of pregnancy and childbirth.

- ★ Prior to the start of the intervention in 2013, only about two thirds of RBF facilities, but all comparison facilities were staffed with at least two SBAs. At endline in 2015, all RBF facilities, and all but one of the remaining comparison facilities met the SBA staffing criteria (**indicator 1**). Over the course of the study, the number of SBAs increased in RBF facilities accompanied by a SBA decrease in non-RBF facilities. This effect appears continuous throughout midterm and endline, and was statistically significant at both time points. Adjusted for facility type and phased implementation design, the effect size was about 40%-points at midterm and 33%-points at endline. One requirement of the RBF4MNH, however, was that health centers enrolled in the program needed to have at least three skilled midwives on staff in Phase I, and four in Phase II. Given that placement of health workers across districts is decided centrally, district managers could only shift skilled personnel between facilities within districts, but continued to lack authority to generate additional human resources for one facility without restricting another. While the prospect of individual bonuses through the RBF might have facilitated the process of deploying or reassigning existing health workers to RBF facilities, DHMT representatives faced challenges in “not knowing where to take staff from” given the overall human resource for health crisis in Malawi. Most additional staff deployed to RBF health centers seemed to have been

⁴ Service Availability and Readiness Assessment (SARA): An annual monitoring system for service delivery: Reference Manual; WHO 2013

moved from the district hospitals or non-RBF health centers. This shift of skilled personnel from non-intervention to intervention sites could be clearly observed by our data.

- ★ Although WHO criteria for skilled staff availability were met by most facilities, health workers' experience, based on qualitative interviews, repeatedly identified chronic staff shortage as a main obstacle to high quality performance and service delivery.

"We face critical shortage of staff. So it becomes tiresome to move from one bed to the other without having time to rest. Greatest challenge is the shortage of staff and the rate of admissions that we are having. The ratio of patient to staff is too high."
(Skilled birth attendant at a hospital)

- ★ Especially in many health centers visited, only one nurse-midwife was on duty and was not only responsible for the labor room, but for all other sections in the maternity unit (i.e. antenatal and postnatal care clinics).

"Shortage of staff, that's a big challenge here. We are second to (the district hospital) in number of deliveries, but only one person at work day and night, just imagine!"
(Skilled birth attendant at a health center)

- ★ When asked about the minimum number of staff required to provide adequate services at a health center, almost all health workers stated that at least two nurses per shift would guarantee higher levels of health care quality. Though health workers encountered shortage of staff as a general problem across all facilities included in this qualitative sample, interviewed health workers reported on the perceived inappropriate distribution of available staff across facilities regardless of a facility's individual human resource situation. In RBF facilities, interviewed health workers also experienced increases in the number of facility-based deliveries after the start of the RBF4MNH program, which created increased workload in the absence of additional staff support. For many health workers, lack of accommodation for the nurses was one of the main reasons preventing health centers from attracting personnel. Many nurses do not even consider working at rural health centers that cannot offer accommodation at the facility because renting a room outside facility premises prevents staff from being readily available to back up services in moments of increased patient volume.

- ★ Clinical guidelines were able in a majority of facilities, and availability was not significantly affected by the RBF intervention (**indicator 2**). Still, availability of clinical guidelines decreased more in non-RBF facilities, which led to an overall positive, but not statistically significant, effect size estimate.

- ★ Qualitative findings suggest that health workers feel insufficiently familiar with the clinical guidelines relevant to their clinical performance. Frameworks to support health worker competence and adherence to clinical standards are often limited or insufficient. In 2014, some respondents described concerns related to some of the clinical processes incentivized by the RBF and expected from them to be performed differently without having given the opportunity for additional training courses to refresh their clinical skills. Some health workers admitted that they had never attended any professional training since they started in-service work, as their service employment and deployment to remote facilities immediately after graduation without any real opportunities to gain a thorough clinical work experience or exposure to complicated case management required to properly providing emergency services at their posts.

"Experience is very important. I just graduated and was not exposed to management of pre-eclampsia or eclampsia. Competence and confidence are lacking because I don't have any experience." (Skilled birth attendant at a health center)

“I do not have experience of management of these complications. Sometimes, if you have these complications, you won’t know what to do before referring them to district hospital.” (Skilled birth attendant at a health center)

“I have worked here for two years, but have not gone for any training. They don’t send us. At least a refresher course!” (Skilled birth attendant at a hospital)

- ★ Interviewed health workers working at hospitals also identified frequent rotations of staff across clinical departments within the hospital as additional obstacle to quality services provision. Rotating staff from other departments are sometimes difficult to orient, do not consistently adhere to maternal care guidelines and are perceived as resistant to familiarizing themselves with prevailing standards of midwifery given that they will leave maternal care services due to the rotation system.

“Transfer of staff from one department to the other is a setback for performing these procedures because these new staff do not have the knowledge and the skills and is difficult to convince them to do certain procedures.” (Skilled birth attendant at a hospital)

When measuring the extent to which the RBF program ensured staff & training inputs toward full service readiness (**indicator 3**), there was an overall statistically significant positive effect of about 23 %-points at endline towards meeting service readiness criteria in RBF compared to non-RBF facilities.

3.4.2. Equipment & Supplies

Basic obstetric service readiness in respect to equipment & supplies includes items related to **infection prevention** (functional sterilization machine, sterile delivery kits, sterile gloves, handwashing supplies), **essential equipment related to labor and delivery** (delivery beds, partograph forms, blood pressure machines, newborn scales, suction devices), and **basic obstetric and newborn emergency equipment** (vacuum extractor, vacuum aspirator, newborn ventilation equipment).

The RBF4MNH Initiative targeted almost all of these items twofold by incentivizing facilities to identify and report broken or missing equipment and by incentivizing the DHMTs to ensure reported or missing equipment is being repaired and replaced in **RBF facilities only**. These incentives were used during both RBF4MNH phases. Given this incentive constellation, we expected – given the RBF had an impact – to observe effects in RBF facilities only for most of the measures used to evaluate the equipment & supplies component.

Table 3-6 presents changes and effect measures in respect to the equipment & supplies readiness component. An asterisk * indicates items incentivized by the RBF4MNH Initiative at facility and DHMT level.

- ★ Both functional sterilization devices (**indicator 1**, explicitly incentivized) and sterile gloves (**indicator 3**) became more frequently available in RBF facilities over the course of the intervention. However, this effect is not statistically significant. This is unexpected, especially in respect to sterilization equipment. Based on qualitative interviews, all facilities in need of functional sterilization machines, received this input. In addition, health workers interviewed at different RBF facilities reported how they are now able to procure especially infection prevention supply items (e.g. gloves, soap) with the performance rewards the facilities gained. Although effect estimates were not statistically significant, we observed overall positive trends towards increased availability for infection prevention inputs were observable in both RBF and non-RBF facilities. One explanation based on qualitative interviews related to this finding is DHMTs

eventually expected RBF facilities to procure some service supplies directly from retailers using reward money, in order for district managers to ensure that overall limited district budgets could be allocated to a greater extent towards supply procurement for non-RBF facilities.

- * Availability of sterile delivery kits (**indicator 2**, explicitly incentivized), however, followed expected trends (i.e. a more pronounced effect on intervention facilities) and became more available at RBF facilities over the course of the intervention. Statistically, this finding likely results from the RBF and continued even after the demand-side intervention was in place with an adjusted effect size of approximately 40%-points. In contrast, availability of simple handwashing supplies (i.e. any water source and soap, **indicator 4**) was not directly incentivized and – although a basic and simple measure of infection prevention that could be addressed to some degree by facilities directly – has remained low across facilities. Although health care providers reported to have purchased soap and other cleaning supplies using reward money, the effectiveness of these items was limited by the access to reliable water sources.
- * Prior to the RBF initiative in 2013 some maternity units in the study districts did not have a minimum number of beds available (**indicator 5**, explicitly incentivized). In 2015, all RBF facilities now had at least one delivery bed, in most cases was an item included in the facility upgrade component of the RBF supply-side arm. In 2013, partograph forms were readily available in all RBF facilities before the beginning of the intervention, but missing in about a third of comparison sites (**indicator 6**). While partograph availability remained low in 2014 in both RBF and non-RBF facilities, they became readily available in all facilities by 2015. Statistically, this resulted in an extreme negative effect measure, which is due to the fact that partograph availability fluctuated much more among RBF facilities over time. Given that partograph availability was only indirectly incentivized at facility level (i.e. complete partograph documentation), the fact that full availability of partograph forms was achieved in 2015 across all studied facilities may suggest a spillover effect of changes in DHMT performance in response to the RBF in general. Contrary to expected changes, the RBF did not achieve significant effects in respect to the availability of functional routine equipment (**indicators 7-10**), i.e. blood pressure machines and fetoscopes (both explicitly incentivized), newborn scales, and suction devices (explicitly incentivized), and in respect to the availability of functional emergency equipment (**indicators 11-13**) – all of which were explicitly incentivized. The negative impact estimates for some of these indicators are due to stronger positive changes in comparison to RBF facilities.
- * Qualitative findings on equipment availability in 2014 pointed mainly at problems with routine equipment like blood pressure machines. In most health centers, blood pressure machines are either unavailable or frequently malfunctioning. In some facilities, routine equipment is also temporarily unavailable as it is being shared with other clinical services or wards.

“Another challenge are Inadequate BP (blood pressure) machines. The ones we use now are old, and sometimes we work without BP monitor because it will stop working. It is a challenge.” (Skilled birth attendant at a hospital)
- * In respect to readiness for obstetric emergency care as emergent care, interventions are perceived as futile in most instances. The combination of high workload, short staffing, poorly coordinated referral systems between BEmOC and CEmOC faculties, and long delays in order to access more advanced care for emergency patients compel SBAs to refrain from initial patient stabilization. In their experience, even if they manage to refer emergency cases, these patients ultimately die in route or on arrival at the referral hospital.

“We are tired, because if we refer serious patients, the ambulance comes after one to two hours. This is late! Patients may die on transit. If I have another case, we are tired because we do not have ambulance here. Many patients we refer may die.” (Skilled birth attendant at a health center)

- * In 2015, interviewed health workers working at RBF facilities unanimously appreciated the improved infrastructure situation and the availability of most essential equipment and supplies. Further, due to the availability of equipment and supplies, infection prevention measures and standards of hygiene and cleanliness have improved tremendously. All these changes were attributed to the RBF intervention.

“So with the coming of RBF, I can say it has assisted us in improving other standards and other quality of care. Because in terms of trainings which have been there previously, and also with the services which have been improved because of enough equipment, which we are having, it has at least raised the quality of care to somewhere (...). Because previously it was an outcry, for example fetal distress without suction machines, without (suction supplies), without whatever to assist us to serve the life of somebody, was a big challenge. But with the use of equipment and skills, we are able to implement something which is good to the community.” (Skilled birth attendant at a health center)

“...and also with the help of RBF, we received a lot instruments. I can say equipment to support us in all the services we are handling here, because in the past (...) four delivery packs would have been serving a lot of mothers in a month. But as I am talking now, we have a lot of delivery packs, suturing sets - there’s a lot, just to mention a few.” (Skilled birth attendant at a health center)

“...and also other skills – like maintaining the standards of infection prevention – we are also giving pressure ourselves to clean up the labor wards, to maintain all the hygiene standards, so that whoever comes to supervise us should give us credit. So it’s like a habit now. We are still doing that and we abide that to be done on daily basis.” (Skilled birth attendant at a health center)

Overall, when estimating the extent to which the RBF program improved service readiness in terms of availability of essential service inputs (**indicator 14**), we found a small positive, but non-significant effect of about 2%-points.

Table 3-6: RBF impact estimates for service readiness in respect to essential equipment and supplies.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n				
1	Proportion of facilities with functional sterilization machine*	52.9%	17	78.6%	14	50.0%	18	61.5%	13	73.9%	23	70.0%	10	13.7%	.59	22.3%	.36
2	Proportion of maternity services with at least 1 sterile delivery kit*	58.8%	17	85.7%	14	94.4%	18	84.6%	13	91.3%	23	60.0%	10	37.5%	.06	41.2%	.08
3	Proportion of maternity services with at least 20 pairs of sterile gloves	64.7%	17	57.1%	14	61.1%	18	30.8%	13	87.0%	23	60.0%	10	22.6%	.39	18.9%	.46
4	Proportion of maternity services with a handwashing unit (water + soap)	47.1%	17	57.1%	14	66.7%	18	53.8%	13	47.8%	23	40.0%	10	23.0%	.39	13.3%	.64
5	Proportion of maternity services with at least 1 delivery bed*	94.1%	17	92.9%	14	100%	18	92.3%	13	100%	23	90.0%	10	6.8%	.55	3.5%	.77
6	Proportion of maternity services with a 1-week supply of partograph forms	100%	17	64.3%	14	66.7%	18	69.2%	13	100%	23	100%	10	-37.2%	.08	-40.0%	<.01
7	Proportion of maternity services with a functional blood pressure machine*	76.5%	17	64.3%	14	77.8%	18	76.9%	13	87.0%	23	70.0%	10	-10.5%	.65	-20.3%	.37
8	Proportion of maternity services with a functional fetoscope*	88.2%	17	92.9%	14	44.4%	18	53.8%	13	78.3%	23	90.0%	10	-4.7%	.83	-13.6%	.49
9	Proportion of maternity services with a functional newborn weighing scale	100%	17	85.7%	14	94.4%	18	61.5%	13	91.3%	23	90.0%	10	19.4%	.22	-20.9%	.16
10	Proportion of maternity services with a functional suction device*	88.2%	17	85.7%	14	66.7%	18	53.8%	13	95.7%	23	90.0%	10	10.9%	.62	8.2%	.63
11	Proportion of maternity services with a functional vacuum extractor*	82.4%	17	71.4%	14	50.0%	18	38.5%	13	91.3%	23	60.0%	10	2.1%	.43	16.1%	.47
12	Proportion of maternity services with a functional vacuum aspirator*	58.8%	17	57.1%	14	38.9%	18	15.4%	13	82.6%	23	60.0%	10	22.3%	.37	19.1%	.47
13	Proportion of maternity services with a functional bag-valve + mask for newborns*	76.5%	17	64.3%	14	22.2%	18	15.4%	13	82.6%	23	90.0%	10	-3.6%	.86	-34.4%	.13

14	Extent of meeting equipment & supplies readiness	75.0%	17	72.0%	14	65.7%	18	54.5%	13	85.9%	23	72.5%	10	8.9%	.36	2.2%	.82
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**items directly incentivized by the RBF4MNH at facility and DHMT level; DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate*

3.4.3. Essential Medicines & Commodities

Basic obstetric service readiness in respect to medicines and commodities includes **routine care drugs** (topical antiseptic to decontaminate body surfaces, tetracycline eye ointment for newborns, oxytocin injections to reduce postpartum bleeding) and **emergency care drugs** (intravenous antibiotics to manage septic infections, anticonvulsants to manage eclampsia, isotonic fluids to manage shock).

The RBF4MNH Initiative targeted almost all of these items twofold by incentivizing facilities to avoid stock-outs of these items and by incentivizing the DHMTs to ensure these essential items are procured and available to **all facilities** in the districts (i.e. RBF and non-RBF). These incentives were used during both RBF4MNH phases. Given this incentive constellation, we expected – given the RBF had an impact – to observe effects in RBF and non-RBF facilities within the pilot districts for most of the measures used to evaluate the medicines & commodities component.

Table 3-7 demonstrates the changes and effect measures on the medications & commodities readiness component. An asterisk * indicates items incentivized by the RBF4MNH Initiative at facility and DHMT level.

- ★ Although explicitly incentivized, availability of PMTCT medications increased minimally over the course of the study period (**indicator 1**). However, the changes in RBF and non-RBF facilities are statistically not significantly different, which suggests a possible effect of the DHMT performance incentives on PMTCT drug availability at facilities across the study districts. Topical antiseptic solutions (**indicator 2**) became more frequently available at all facilities during the course of the RBF as well, although not explicitly incentivized by the RBF4MNMH. This may be the results of a general effect of the RBF on DHMT performance in respect to drug and supply procurement (negative effect measures are due to stronger increases in comparison sites for this indicator). In contrast, there was a statistically significant negative effect on the availability of tetracycline ointments (**indicator 3**), meaning a negative effect of the RBF4MNH on this indicator. A possible explanation might be that tetracycline ointment is not part of the list of incentivized essential medications and thus might have received lower priority by facilities and DHMTs in respect to stock keeping and procurement processes. In contrast, the RBF program seemed to have had a more supportive effect on the availability of oxytocin in RBF facilities (**indicator 4**), but less so on non-RBF facilities. This observed pattern might be a result of RBF facilities using their own funds in addition to purchase oxytocin (routine oxytocin use is additionally incentivized at level of RBF facilities) and thus procured independently of the DHMTs.
- ★ Emergency medications evaluated here were all explicitly incentivized. Broad-spectrum antibiotics were readily available at most facilities prior to the RBF and full availability was achieved/maintained over the course of the intervention across all study facilities (**indicator 5**). The overall effect sizes of the RBF are thus relatively small. Statistical non-significance might point out the intended DHMT effect across facilities in the study district. For both anticonvulsant medications (**indicator 6**) and intravenous fluids (**indicator 7**) availability across studied facilities was relatively high throughout with only relatively narrow fluctuations over time. Again, the absence of statistically significant effect measures points to the overall DHMT-enacted processes with respect to procurement of essential medicines across study districts.
- ★ By and large, during qualitative interviews in 2015 health workers working at RBF facilities expressed that they now have a mostly reliable stock of essential drugs, especially in regards to routine care medications, such as oxytocin and painkillers. However, drug stocks were still facing stock-outs in non-RBF facilities.

Estimating the overall extent to which the RBF program affected service readiness in respect to the availability of essential medication & commodities (**indicator 8**), the RBF4MNMH induced a negative, but non-significant effect of about -8 percent points.

Table 3-7: RBF impact estimates for service readiness in respect to essential medicines and commodities.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n				
1	Proportion of maternity services with at least 1 dose of PMTCT treatment# available	47.1%	17	64.3%	14	22.2%	18	23.1%	13	73.9%	23	60.0%	10	15.9%	.51	14.8%	.59
2	Proportion of maternity services with at least 1 bottle of topical antiseptic solution	64.7%	17	50.0%	14	72.2%	18	61.5%	13	95.7%	23	90.0%	10	-2.6%	.91	-28.9%	.16
3	Proportion of facilities with at least 1 tetracycline eye ointment	64.7%	17	64.3%	14	72.2%	18	61.5%	13	60.9%	23	100%	10	10.3%	.65	-67.6%	.01
4	Proportion of facilities with at least 1 vial of injectable oxytocin*	94.1%	17	92.9%	14	61.1%	18	76.9%	13	91.3%	23	60.0%	10	-16.6%	.39	24.8%	.16
5	Proportion of facilities with at least 1 vial of injectable broad-spectrum antibiotics### *	94.1%	17	100%	14	94.4%	18	92.3%	13	100%	23	100%	10	7.9%	.47	4.5%	.51
6	Proportion of facilities with at least 1 vial of magnesium sulphate or diazepam*	100%	17	85.7%	14	83.3%	18	84.6%	13	82.6%	23	80.0%	10	-15.4%	.36	-3.8%	.84
7	Proportion of maternity services with at least 1 bag/bottle of isotonic intravenous fluid### + infusion system*	100%	17	92.9%	14	100%	18	92.3%	13	100%	23	90.0%	10	0.9%	.92	-1.1%	.91
8	Extent of meeting medication & commodity readiness	80.7%	17	78.6%	14	72.2%	18	70.3%	13	86.3%	23	82.9%	10	0.1%	.99	-8.2%	.28

*Items directly incentivized by the RBF4MNH at facility and DHMT level

PMTCT = prevention of mother-to-child transmission of HIV; DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

#5A ART regimen AND nevirapine syrup; ##ampicillin/gentamycin OR penicillin/gentamycin OR ceftriaxone; ###normal saline OR Ringer's lactate OR 5% dextrose saline

3.5. Impact estimates on clinical performance quality during labor & delivery care provision

We assessed changes in clinical performance in direct relationship to performance indicators and targets set for maternal care provider teams at facilities. The difference-in-differences (DiD) regression models were adjusted for the number of staff available in the maternity unit during the time of an observed case, the type of facility wherein a case occurred (CEmOC hospital vs. BEmOC health center), the duration of stage 1 labor (i.e. more or less than 60 minutes), and whether the health workers involved had received any recent in-service training as part of the safe motherhood program provided to some study facilities independent of the RBF intervention. Given that 3- or 5-day facility visit during data collection, multiple cases observed during the same visit were commonly attended by the same maternal care provider. We therefore adjusted the regression model for clustering effects at the individual health worker level. Given the switch of five control facilities into intervention sites prior to the last data collection, we assumed that health care providers' clinical performance might still be of lower quality given the more recent exposure to the RBF scheme. Our statistical models were adjusted for this fact in order to account for this switch in intervention status.

3.5.1. HIV-status

Table 3-8 shows the effect of the RBF in response to the performance incentive: *"Percentage of pregnant women who arrive at the facility for delivery with unknown HIV status tested and treated with PMTCT medicines, according to the national standards"*. This effect was measured by comparing the case frequency in which health care providers ask or verify a patient's HIV status.

- ★ The finding shows that there was a positive effect of the RBF4MNH on this clinical activity and this effect became even statistically significant during the second phase of the implementation (effect size of about 45%-points - after model adjustment). This increase in the clinical process is aligned with the improved availability in PMTCT treatments.
- ★ In respect to adequate patient assessment and risk factor identification in general, health workers in qualitative interviews reported that incomplete patient assessment performed by colleagues pose challenges to ensuring a sufficient level of quality and patient safety. Sometimes, patient documentation is incomplete or missing, sometimes health workers document findings in medical charts or partograph forms without actually having checked or examined the patient. Given that existing medical records and clinical documentation are perceived as incorrect, incomplete, and unreliable, risk assessments and identification of likely complicated cases remained of poor quality. Interviewed health workers also perceived that personal attitudes of some individual colleagues make it difficult for the teams to fully adhere to clinical standards. Even in situations where all needed equipment and supplies are available, some health workers still might not perform according to care standards due to the lack of a sense of responsibility.

"We feel, we don't have to follow the process. There is no challenge, only that we choose not to do it most of the time." (Skilled birth attendant at a hospital)

"Attitude of health workers is another problem. They do not check it (physical danger signs) accordingly even when the labor ward is not busy." (Skilled birth attendant at a hospital)

"There is also this negative attitude of co-workers because the procedure is time consuming." (Skilled birth attendant at a hospital)

"We have many registers to fill. A lot of documentation after delivery. So, after delivery you will like to sit and document what was done without remembering to

go back to check the patients. We have RBF registers and maternity registers".
(Skilled birth attendant at a hospital)

3.5.2. Partograph documentation

Table 9 shows the effect of the RBF in response to the performance incentive: **"Percentage of partographs completely and appropriately filled in according to national standards for all women who deliver in the facility."** We measured the effect in response to this incentive alongside two different processes: the frequency of partograph use, and the frequency of complete partograph documentation when used.

- ★ There was no effect on the proportion of obstetric cases observed with partograph during stage 1 labor (**indicator 1**) even after adjustment for variations in stage 1 duration. Although in both RBF and non-RBF facilities, in the majority of observed cases a partograph was used, about 15% of cases in RBF facilities have not been monitored by partograph, despite the availability of partograph forms at most facilities (see Table 6, indicator 6). There was an increase in the frequency of correctly documented partograph forms in RBF facilities (**indicator 2**). This increase occurred during the initial phase of the RBF intervention from about 20% of correctly documented partographs to about 50%, which was statistically very likely to be in response of the RBF. However, no further improvement occurred during the second phase of the intervention.
- ★ While a majority of health workers indicated that monitoring the labor of women was a core RBF indicator, others were quick to highlight that most clients are nevertheless not closely monitored. Qualitative evidence pointed at general staff shortages as a main challenge to adequate partograph monitoring during labor.

"Sometimes our labor ward is too busy and you can find only two nurses managing almost nine patients in labor and two or more in 2nd stage. It prevents us from managing them properly." (Skilled birth attendant at a hospital)

- ★ In one instance a nurse-midwife on duty alone was attending women in the antenatal clinic while a first-time mother was in active labor in the delivery room and the birth had to be attended by a non-skilled maternal care provider without direct supervision of an SBA. Especially with the onset of RBF an influx of women to RBF facilities occurred, resulting in crowded labor wards. In the process of coping with an increased number of laboring women, some laboring women were not closely monitored and sometimes (not often) women even had to give birth on their own in the absence of a SBA.

"Workload is the major problem because many women are delivering and only two nurses on duty. You were here today and saw what happened. This is what we see every day so we do only what we can manage to do". (Skilled birth attendant at a hospital)

- ★ In 2014 most of the structural and building upgrades were yet underway, the relatively small sizes of most delivery rooms continued to hinder quality delivery care provision, as space limitations and high occupancy rates made it more difficult to monitor mothers and newborns. In some RBF facilities, labor room reconstructions also required that laboring women had to be moved around constantly between different wards or sections of wards were closed off temporarily. This situation not only negatively affected labor monitoring, but also inhibited monitoring of postpartum mothers and newborns. Most mothers and newborns were therefore transferred to postnatal wards outside of the maternity unit within a few minutes after delivery, without additional staff available to monitor them further.

"We are supposed to observe these women for two hours before transferring them to the postnatal ward. But due to lack of space, this is not possible. After delivery, we are forced to remove her from the labor ward." (Skilled birth attendant at a health center)

- * In some facilities, deliveries must be conducted on the floor of the delivery room because of inadequate bed capacity or space in the delivery room. Especially for cases occurring in the evening or at night, adequate clinical care is further challenged in the absence of reliable electricity and lighting. Unavailability of light hinders health workers from performing proper clinical assessments and partograph documentation.

"How can you think about checking a woman when she is on the floor bed. It is not possible to do that. This is what we usually do, we take the delivery on the floor bed, no other space here." (Skilled birth attendant at a health center)

"There is no electricity here. I perform all the deliveries with a torchlight. We tell the patients to bring their light, we use candlelight. We can't do anything and most women deliver in the night." (Skilled birth attendant at a health center)

Table 3-8: RBF impact estimates on performance of HIV status verification.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
		mean	n	mean	n	mean	n	mean	n	Mean	n	mean	n				
1	Proportion of cases with provider verifying HIV status of patient	67.3%	49	77.8%	18	66.7%	93	57.4%	54	79.2%	125	71.4%	14	19.9%	.22	44.6%	.01

DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

Table 3-9: RBF impact estimates on partograph use and documentation.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n				
1	Proportion of obstetric cases with stage 1 labor monitored using partograph	82.5%	63	75.0%	24	78.3%	106	77.6%	58	86.3%	131	94.7%	19	-13.6%	.30	-6.2%	.73
2	Proportion of partograph monitored cases with complete partograph documentation*	21.2%	52	15.4%	13	54.2%	83	20.5%	44	52.2%	113	29.4%	17	24.4%	.10	-3.7%	.83

DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

3.5.3. Routine oxytocin administration

Table 3-10 shows the effect of the RBF in response to the performance incentive: ***"Percentage of women who deliver in the facility and who receive uterotonic in third stage of labor"***. The effect of this incentive was measured in respect to the overall performance of active management of third stage labor (AMTSL), which we consider as the combination of uterotonic use (oxytocin) and controlled cord traction.

- ★ Oxytocin administration was already routinely performed in most observed cases before the start of the intervention with a frequency of about 90% (**indicator 1**). Still, there was an increase in the routine use of oxytocin as part of AMTSL in both RBF and non-RBF facilities. The effect, however, was statistically stronger during the second phase of the RBF4MNH Intervention with an effect size of about 11%.
- ★ Since the incentive was directed toward oxytocin administration (as one clinical process within AMTSL) in the context of a highly frequently performed process prior to the intervention, we expected to find an additional effect on other clinical AMTSL processes – namely controlled cord traction and assisted delivery of the placenta (**indicator 2**). However, this was not the case, as we could not detect any statistically supported effect of the RBF4MNH on other, non-incentivized aspects of AMTSL.
- ★ During qualitative interviews, health workers pointed out that the already established consistent availability of oxytocin was the main reason for its regular administration already before the start of the RBF4MNH. In addition, both health workers and patients appreciate the benefit of the oxytocin administration as it shortens the duration of third stage of labor and reduces incidence of post-partum hemorrhage (PPH).

"In Malawi it is a standard that is set that each and every client receives oxytocin before you actually remove the placenta, being a recommendation which has been put in black and white. People can easily follow that, looking at the benefit to the client, and most people are willing to do that." (Skilled birth attendant at a hospital)

3.5.4. Infection prevention

Table 3-11 shows the effect of the RBF in response to the performance incentive: ***"Each facility uses the Infection Prevention and Delivery Quality Checklist and decides on at least one action to be taken to improve safety and quality delivery in each reporting period. On the day of verification the facility can demonstrate that they have taken at least two actions resulting from the application of the check list during the reporting period"***. The effect of this incentive was measured in respect to a number of clinical performances related to basic infection prevention measures during the management of labor and delivery.

- ★ There was an increase in observed cases in which the health workers set up sterile equipment and supplies in a sterile manner prior to progression to stage 2 labor (i.e. birth of newborn) (**indicator 1**). Initially, there was no observable effect; while during the second phase of the RBF4MNH a statistically significant positive effect occurred (effect size of about 26%).
- ★ A similar effect pattern was observed in the frequency of cases in which health workers applied sterile measures during patient examination (**infection 2**). There was no effect, and no obvious change, in the frequency of cases in which infection preventive measures were applied during the assistance of the birth of the newborn.

- * A major challenge to basic infection prevention measures, such as hand hygiene, was seen in the lack of running water at some health centers. In instances where water sources are unreliable, qualitative findings explained how health workers generally tend to be cautious in using water for infection prevention and other purposes. In qualitative interviews, health workers also reported that supplies such as sterile gloves are commonly unavailable in health centers. Provides cope with this situation by using non-sterile gloves instead, even for aseptic procedures. Most health centers also do not have sufficient stocks of antiseptic solutions for skin cleansing, which makes routine topical decontamination impossible at times.

"We lack chlorhexidine and use normal saline instead. Sometimes we use plain water at the health centers. There is no gauze, no cotton wool. So we clean the perineum at first time and subsequently we just do the vaginal examination without cleaning again" (Skilled birth attendant at a health center)

Table 3-10: RBF impact estimates on Active Management of Third Stage Labor (AMTSL).

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n				
1	Proportion of cases with provider administering oxytocin during stage 3 labor.	90.5%	63	70.8%	24	93.4%	106	89.7%	58	100%	131	94.7%	19	0.8%	.94	11.4%	.02
2	Proportion of cases with provider performing controlled cord traction and assisted placenta delivery	73.0%	63	63.2%	19	76.4%	106	77.2%	57	87.0%	131	72.2%	18	-9.7%	.62	17.3%	.43

DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

Table 3-11: RBF impact estimates on infection prevention measures.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n				
1	Proportion of case with provider setting up sterile equipment* prior to birth process (stage 2 labor)	76.1%	63	78.7%	19	80.4%	106	87.6%	57	87.9%	131	69.9%	18	-4.1%	.76	26.4%	.03
2	Proportion of cases with provider performing infection prevention measures during physical examination**	50.5%	63	54.1%	19	57.6%	106	65.3%	57	72.5%	131	47.9%	18	-8.5%	.49	34.8%	.02
3	Proportion of cases with provider performing infection prevention measures during birth assistance**	54.7%	63	57.6%	19	57.2%	106	66.4%	57	64.6%	131	55.3%	18	-6.8%	.66	13.3%	.50

*sterile delivery kits, sterile gloves, and sterile cord clamps

**hand hygiene, use of sterile gloves, perineal cleansing prior to vaginal examination

DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

3.5.5. Eclampsia management

Table 3-12 shows the effect of the RBF in response to the performance incentive: *“Percentage of women who deliver in the facility and show signs of pre-eclampsia or eclampsia who received methyldopa to control pre-eclampsia and magnesium-sulphate to control eclampsia”*. This study component drew from observations of routine care processes in clinically uncomplicated labor and delivery cases. To evaluate this specific incentive we measured the effect to which health workers routinely assessed women’s risk for pre-eclampsia.

- * There was a statistically strong effect of the RBF4MNH on health workers’ assessment of pre-eclampsia risk factors during both the patient interview (**indicator 1**) and patient examination (**indicator 2**).
- * In respect to routine risk assessment of obstetric emergencies in general, interviewed health workers said their experiences of emergency cases occur frequently in women presenting to facilities late in labor. Usually, these women did not or only irregularly attend ANC, have high-risk pregnancies due to previous C-section scars, abnormal placentation, or fetal malposition. Many of these high-risk women present in the second stage of labor when it becomes more difficult to initiate preventive measures, stabilize mother and fetus, and organize timely transfer to higher-level care.

“A woman has come in the second stage of labor and the baby is coming out. You will hurry because there is not much time, so we quickly do it without thoroughly delivering the baby.” (Skilled birth attendant at a health center)

“Sometimes, a woman will come late in second stage when you are not well prepared with no cloth for baby, no perineal pad. She may have the symptoms since three days ago, but will remain at home.”

- * In addition, most emergency cases present with complications such as hemorrhage, retained product of conception, or obstructed labor – all presentations that require more attendance at CEmOC facilities. For emergencies suitable to be managed at BEmOC level, for example forms of pregnancy-induced hypertension, even basic antihypertensive drugs are commonly scarce so that the stabilization of mothers with hypertensive symptoms during pregnancy or labor is not guaranteed.
- * In 2015, the majority of interviewed health workers stated that they generally examine their patients adequately. Health workers working at RBF facilities attributed these changes in routine patient care to the fact that a number of shortcomings have been minimized since the start of the RBF. They said they felt compelled to provide more systematic patient examinations since facilities were explicitly assessed based on the content and documentation of examinations. Still, some health workers mentioned that detailed clinical assessments might not always be possible due to high workload. Clinical assessments are therefore kept short. By and large, most health workers expressed that they now feel very competent when conducting examinations compared to before the RBF. This was attributed to a series of BEmOC trainings the RBF project offered.

Table 3-12: RBF impact estimates on assessment of eclampsia risk.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.					
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n				
1	Proportion of cases with provider assessing symptoms of pre-eclampsia*	11.1%	63	28.1%	19	23.3%	106	18.7%	57	43.8%	131	25.9%	18	19.5%	.15	22.2%	.19
2	Proportion of cases with provider assessing signs of pre-eclampsia**	36.5%	63	52.6%	19	57.5%	106	55.3%	57	58.4%	131	38.9%	18	18.0%	.15	42.5%	.01

*assessment history of headache, convulsions, or pregnancy-induced hypertension

**blood pressure check, check for edema

DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; BL-EL = comparison between cohorts at baseline and endline;

Sig. = significance level of effect estimate

4. Findings on RBF4MNH impact on quality of care: client perceptions and experiences

Key findings in respect to research questions:

Specific RQ 1: *What is the effect of the combined RBF4MNH Initiative (namely performance contracts and conditional cash transfers) on the clinical and perceived quality of antenatal, delivery, postnatal, and newborn health care services?*

Overall, client perception of maternal care service provision is very positive. There is no statistically significant effect of the RBF4MNH on client's satisfaction in receiving and using labor and delivery services.

At RBF facilities, waiting times for ANC consultations increased. Health care providers contributed this to higher caseloads during ANC clinics once CCT program enrollment was started.

Client experiences with PNC service quality at RBF health centers worsened over the course of the study.

Specific RQ 3: *How will health care providers and clients across the range of maternal and newborn services experience quality and respond to the introduction of the planned PBF interventions?*

Overall, client experiences with receiving care are positive; there is no statistically significant effect of the RBF4MNH on clients' experiences in receiving maternal care services.

Specific RQ 5: *How does the RBF4MNH Initiative affect client-centeredness and respectful care aspects?*

There are ongoing reports of clients receiving disrespectful care or even negligence across all types of facilities included in this study.

4.1. Sample distribution and sample characteristics of clients attending labor & delivery services at intervention and comparison facilities for baseline and endline data collection points

Table 4-1 reports information on the sample distribution across the four study districts for baseline and endline data collection rounds. The proportion of women in the intervention arm increased at endline compared to baseline and midterm due to the step-wedge nature of the intervention, which was scaled up to include five of the facilities that had originally been identified as control facilities. Increases in sample sizes from baseline to endline are due to a change in the field data collection approach. During baseline, data collection teams spent only 3 days per facility compared to endline with 5 days per facility.

Table 4-1: Sample distribution of clients interviewed after delivery service utilization.

	BASELINE		ENDLINE	
Total sample:	203		230	
	n	%	n	%
District:				
Balaka	36	17.7	45	19.6
Dedza	64	31.5	52	22.6
Mchinji	59	29.1	76	33.0
Ntcheu	44	21.7	57	24.8
Level of care:				
BEmOC	121	59.6	147	63.9
CEmOC	82	40.4	83	36.1
Study arm:				
Intervention	136	67.0	190	82.6
Comparison	67	33.0	40	17.4

BEmOC = basic emergency obstetric care center; CEmOC = comprehensive emergency obstetric care center

Table 4-2 provides an overview of some characteristics of the women included in this study component. Women were on average between 22-25 years of age and married. Between 60-76% of women reported to be literate. On average, women had between 2-3 pregnancies throughout their lives and between 2-3 living children. The proportion of women reporting ever having experienced a miscarriage slightly decreased from baseline to endline, while there was no major difference between the proportions of women reporting ever having experienced a stillbirth or premature births. The vast majority of women reported to have had an uncomplicated delivery while at the facility. Whereas during baseline all newborns were alive at the point of facility exit, during endline a few women lost their newborn while hospitalized. On average, women had to travel one and a half hours to reach the facility prior to giving birth. Main considerations for choosing a facility were based on distance and expected service quality provided.

Table 4-2: Sample characteristics of clients interviewed after delivery service utilization.

Characteristic	BASELINE				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.	
	n = 136		n = 67		n = 190		n = 40	
Average age in years (mean/SD)	24.3	6.0	25.1	6.0	23.9	5.9	22.6	4.3
Proportion of married women (n/%)	128	94.1	61	91.0	188	99.0	39	97.5
Proportion of literate women (n/%)	83	61.0	51	76.1	123	64.7	24	60.0
Average number of pregnancies (mean/SD)	2.6	1.8	3.1	1.7	2.2	2.1	1.8	2.0
Average number of living children (mean/SD)	2.4	1.6	2.8	1.6	3.2	1.2	3.1	0.9
Proportion with previous miscarriage (n/%)	14	10.3	9	13.4	18	9.5	2	5.0
Proportion with previous stillbirth (n/%)	5	3.7	1	1.5	6	3.2	1	2.5
Proportion with previous premature birth (n/%)	7	5.2	5	7.5	10	5.3	2	5.0
Proportion of clients reporting uncomplicated vaginal delivery (n/%)	130	95.6	62	92.5	180	94.7	40	100.0
Proportion of clients reporting delivery of a live newborn (n/%)	136	100	67	100	185	97.4	39	97.5
Average travel time to L&D unit in minutes (mean/SD)	99.0	67.5	96.6	75.9	87.9	104.2	85.7	78.0
Proportion of clients who attended L&D services at this facility because it is the nearest to reach (n/%)	63	46.3	28	41.8	65	34.2	15	37.5
Proportion of clients who attended L&D services at this facility because services are perceived of better quality than compared to other alternatives (n/%)	40	29.4	26	38.8	66	34.7	13	32.5
Proportion of clients who attended L&D services at this facility because services are less expensive as compared to other alternatives (n/%)	6	4.4	2	3.0	6	3.2	3	7.5

L&D = labor and delivery service; n = number of observations; SD = standard deviation; % = proportion in percent

4.2. Sample of clients and health care providers responding to qualitative study component during midterm and endline.

Qualitative interviews with clients and health care providers were conducted to further explain and understand quantitative findings related to service utilization and service quality. Table 3 provides an overview of the different interviews conducted. Purposive sampling of clients and health care providers occurred in two stages. First, a set of facilities was selected based on the quantitative results from the client surveys. We purposefully identified those facilities with best and poorest quality measures based on client experiences.

Table 4-3: Number of in-depth interviews and focus group discussions performed per district and data collection round

	MIDTERM	ENDLINE
Client interviews:		
Balaka	9 interviews in 3 facilities	None
Dedza	9 interviews in 3 facilities	None
Mchinji	9 interviews in 3 facilities	None
Ntcheu	9 interviews in 3 facilities	None
Health care provider interviews:		
Balaka	3 interviews in 3 facilities	3 interviews in 3 facilities
Dedza	3 interviews in 3 facilities	3 interviews in 3 facilities
Mchinji	3 interviews in 3 facilities	3 interviews in 3 facilities
Ntcheu	3 interviews in 3 facilities	3 interviews in 3 facilities
Focus group discussions (FDGs) with women in the community:		
Balaka	3 FDGs in 3 communities	3 FDGs in 3 communities
Dedza	4 FDGs in 4 communities	4 FDGs in 4 communities
Mchinji	3 FDGs in 3 communities	4 FDGs in 4 communities
Ntcheu	4 FDGs in 4 communities	4 FDGs in 4 communities

In 2014, both RBF and comparison facilities were included. The final facility sample included eight RBF facilities and four comparison facilities. In 2015, only RBF facilities were included with a final sample size of twelve. In these facilities we used a convenience sampling approach to identify clients and health care providers with whom we conducted in-depth interviews. In addition, we visited communities within the catchment areas of 20 of these facilities. In each catchment area one community was identified based on convenience criteria (i.e. community size, geographical accessibility). In each community, we conducted one focus group discussion with 10-15 residential women. Participating women were identified by community leaders based on their pregnancy status (i.e. currently pregnant or recent childbirth).

In 2014, we conducted in-depth interviews with 36 clients and 12 health care providers, as well as 14 focus group discussions. In 2015, we conducted in-depth interviews with 12 health care providers, as well as 15 focus group discussions.

The age range of women participating in interviews and focus groups during both rounds was 15-43 years. The majority of the women were married, literate (i.e. able to read and write), and had between 1 and 3 children. All had utilized care at the sampled facilities.

Sampled health care providers were all midwives, except for one clinical officer. Years of working experience ranged from 2-6. Most of these providers had attended additional trainings or refresher courses in maternal health care besides their basic trainings.

4.3. RBF4MNH impact on clients' experiences with labor & delivery service utilization

To estimate the effect of the RBF4MNH on client experiences and client satisfaction, we adjusted the difference-in-differences (DiD) regression models to control for the following additional client-specific factors: age, literacy, number of previous pregnancies, and socio-economic status group. In addition, we adjusted for clustering at the facility level.

Tables 4-4 and 4-5 report how clients experienced the care received during their facility stay and the impact that the RBF4MNH had on clients' experiences. Given that service quality differs depending on facility size and level of care, we present the findings for health centers (BEmOC facilities) and hospitals (CEmOC facilities) separately.

- * As shown in **Table 4-4**, the RBF4MNH did not produce statistically significant effects on any of the measured experience indicators at the level of the BEmOC facilities. Overall client satisfaction with available services received during facility-based delivery was extremely positive already at baseline. There was no negative change observed in client satisfaction (**indicator 1**). The intervention DiD produced an effect (significant at the 10% level) in the proportion of women being willing to recommend a facility to others. This can be interpreted as an increase in overall satisfaction and/or perceived quality of service delivery in intervention facilities.
- * While not statistically significant, we did observe some interesting trends in improved service delivery, as reported by women. For instance, RBF appeared to affect health care providers' behavior in relation to blood pressure taking (**indicators 16 & 17**) and information sharing on specific topics (**indicators 18 & 19**).
- * Furthermore, we observed some changes which do not allow us to discern a secular effect from the RBF externality, meaning these changes occurred either independently of the RBF4MNH intervention or due to RBF effects on the DHMT (again, the study design is not able to differentiate this). In general, pregnant women arrived on average about 2 additional days earlier prior to delivery at health facilities during endline as compared to the start of the study in 2013 (**indicator 6**), and also stayed in average at least 2 days at facilities before being discharged after delivery (**indicator 7**). In respect to clinical performance based on client reports, far fewer women reported having received explanations in regard to physical examinations at endline compared to baseline (**indicator 9**), whereas they reported having been asked for some form of consent prior to conducting medical procedures (**indicator 12**). Also, more women who delivered at health centers reported having received information on reproductive health messages (**indicators 18-24**) in 2015 compared to 2013. Based on qualitative information, women recognized improvements in the overall efficiency of services over the course of the study period.
- * Other observed changes cannot fully be explained by the available data, e.g. why the average waiting time in both RBF and comparison facilities increased from less than half an hour to more than an hour in RBF facilities during the course of the study (**indicator 5**), or why some form of user fees had to be paid by some women delivering in health centers of the comparison arm, whereas no fees were charged at health centers enrolled in the RBF program (**indicator 4**).

Table 4-4: RBF4MNH Impact on L&D service quality indicators per client experience (health centers only):

Indicator		BASELINE				ENDLINE				DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.			
		mean	n	mean	n	mean	n	mean	n		
1	Average satisfaction with services received during facility-based delivery (score: 1=very satisfied, 5=very unsatisfied)	1.1	68	1.1	53	1.1	85	1.0	62	<0.1	.68
2	Proportion of women who would recommend this health facility to other women for facility-based delivery	98.5%	68	98.1%	53	100%	85	98.4%	62	4.4%	.06
3	Average cost of transport getting to this facility for childbirth (in Kwacha)	538	41	404	31	455	55	416	31	-496	.13
4	Proportion of women reporting having paid user fees for facility-based delivery	0%	68	11.3%	53	0%	85	6.5%	62	-8.0%	.35
5	Average waiting time before being seen by a health worker after arrival at this facility (in minutes)	14	63	21	51	79	70	539	50	226	.36
6	Average time women arrived at the facility prior to the actual day of delivery (in days)	3.0	67	2.0	53	4.9	84	3.8	62	1.7	.41
7	Average time spent at the facility after having delivered (in days)	1.4	60	1.5	47	2.3	85	2.2	62	0.2	.67
8	Proportion of women reporting the health worker having introduced herself/himself to her	36.8%	68	26.4%	53	49.4%	85	40.3%	62	-4.1%	.82
9	Proportion of women who underwent a clinical exam reporting the health worker having explained the purpose of this examination	100%	31	100%	30	58.4%	77	54.4%	57	-2.4%	.85
10	Proportion of women who received medications reporting the health worker explained the purpose and use of these medications	62.5%	48	59.2%	49	73.1%	67	56.1%	41	12.5%	.54
11	Proportion of women who had been taken a blood sample reporting the health worker explained the purpose of this blood specimen	75.0%	32	92.9%	14	64.5%	31	64.3%	14	10.3%	.65
12	Proportion of women who underwent a medical procedure reporting the health worker obtained her consent prior to this procedure	51.5%	66	52.8%	53	68.8%	77	68.3%	60	15.6%	.36
13	Proportion of women reporting the health worker having encouraged her to ask questions related to the childbirth process	48.5%	68	35.8%	53	57.6%	85	45.2%	62	2.2%	.89
14	Proportion of women reporting having been offered to have a guardian with her during childbirth	57.4%	68	41.5%	53	55.3%	85	50.0%	62	3.0%	.87

15	Proportion of women reporting the health worker ensuring confidentiality in respect to private aspects of care	95.6%	68	96.2%	53	96.5%	85	90.3%	62	7.9%	.55
16	Proportion of women reporting their blood pressure being checked at least once prior to the delivery of the baby	51.5%	68	52.8%	53	64.7%	85	61.3%	62	19.4%	.26
17	Proportion of women reporting their blood pressure being checked at least once after the delivery of the baby	29.4%	68	30.2%	53	56.8%	81	46.6%	58	27.9%	.11
18	Proportion of women reporting to having received information on the use of insecticide-treated bed nets prior to discharge from the facility	73.5%	68	71.7%	53	80.0%	85	83.9%	62	18.0%	.35
19	Proportion of women reporting to having received information on early and exclusive breastfeeding prior to discharge from the facility	89.7%	68	86.8%	53	92.9%	85	98.4%	62	7.8%	.25
20	Proportion of women reporting to having received information on nutritional aspects during the breastfeeding period prior to discharge from the facility	88.2%	68	84.9%	53	89.4%	85	96.8%	62	6.1%	.46
21	Proportion of women reporting to having received information on danger signs of the mother that would prompt immediate care seeking prior to discharge from the facility	77.9%	68	67.9%	53	92.9%	85	91.9%	62	11.1%	.29
22	Proportion of women reporting to having received information on danger signs of the newborn that would prompt immediate care seeking prior to discharge from the facility	83.8%	68	69.8%	53	90.6%	85	91.9%	62	11.9%	.37
23	Proportion of women reporting to having received information on their next postnatal care visit prior to discharge from the facility	77.9%	68	84.9%	53	94.1%	85	93.5%	62	9.4%	.34
24	Proportion of women reporting to having received information on modern methods of family planning prior to discharge from the facility	82.4%	68	67.9%	53	87.1%	85	88.7%	62	6.4%	.63

DiD = effect estimate based on difference-and-difference regression; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

Table 4-5 presents the same experience indicators for clients exiting labor and delivery services at CEmOC facilities. In this table we do not present a counterfactual given that all district hospitals received the RBF4MNH intervention. In the absence of a suitable comparison, we estimated only the before and after effect of the RBF between baseline and midterm using independent sample t tests.

- ★ There was a significant increase in transport costs of women attending hospitals (**indicator 3**). This might be an effect of the increased CemOC service use identified in the household sample (see Section 2.4). There was also a statistically significant increase in the proportion of women reporting health care workers introduced themselves (**indicator 8**) or encouraged them to ask questions (**indicator 13**). Although there was a significant decrease in women receiving explanations of the purpose of examinations (**indicator 9**), there were significant increases in women receiving explanations of the purpose of medications and medical procedures (**indicators 10 and 12**). There was also a strong increase in women reporting their blood pressures having been checked after delivery (**indicator 17**). In respect to most aspects of patient education (**indicators 18-24**), strong trends or significant increases in women receiving different aspects of health information could be observed.
- ★ Although very few strong changes could be measured and clearly attributed to the RBF4MNH Initiative, one of the main RBF objectives (Objective 2 related to 48-hour postpartum facility stay) was met. The length of stay after delivery changed from less than two, to two or more days between baseline and endline. This is most likely a combined effect of supply-side mechanisms incentivizing health care providers to keep clients longer after delivery before discharge (Phase II) and of demand-side mechanisms lowering women's need to return home as soon as possible after delivery for economic or other reasons is unclear (Phases I and II). The effect of the demand-side component on facility stay was reflected in qualitative interviews with women suggesting that due to conditional cash transfers, more women were willing or able to stay longer in facilities as they were less concerned about having sufficient funds to purchase food and other essential delivery-related items.

To further understand the findings on client experiences, we conducted **qualitative interviews** with clients and health care providers to obtain additional information on contextual aspects in relation to service utilization and service provision.

- ★ In respect to **provider introduction**, most interviewed women confirmed that health care providers usually do not introduce themselves in person to clients. However, most women perceive this is not a central determinant in terms of how they evaluate the service provision experience. Only few respondents said that knowing the name of a health care provider might be useful for identification purposes in situations where clients are mistreated. A more diverse result was seen in regards to **consent seeking prior to clinical procedures**. Although there was some quantitative increase in the frequency of women reporting health workers' seeking their consent in both RBF and non-RBF facilities, women in focus groups agreed that in their experience, health care providers rarely sought consent. Regardless, during focus group discussions, women wondered why consent should be sought from them for certain procedures as they consider they already provided general client consent by virtue of their attendance at a facility. Aside from this more general understanding of consenting medical interventions, interviewed women strictly excluded aspects of HIV testing from this form of general consent. In their opinions, the current compulsory HIV testing for pregnant women (especially during ANC clinics) is considered inappropriate and should require a more detailed consenting procedure that also allows the option to opt out.

"In the case of HIV testing, it's compulsory for every pregnant mother to undergo an HIV test. So after they (health care providers) have explained (the purpose of

HIV testing), *they don't seek our consent, we just go to the testing room*". (Woman in focus group discussion)

"It (HIV testing) is not good at all, because others (women attending ANC) don't want to know their status. So, people like these develop fear and they do not want to go to the facility. They fear that if they go there, they will undergo the HIV test. At least, if they (the health care providers) could ask those who want to have their blood tested, and that those who don't want to should be allowed not to. Because others fear embarrassment after they are found with the virus." (Woman in focus group discussion)

"HIV testing is a challenge because it is mandatory every woman is tested. So, after reaching the HTC (HIV testing and counselling) they are counseled. So, they are counseled and they accept the situation, but not with full heart. (...) Without doing that (compulsory testing) most of women would run away. Most women who fear a test, look back to their past lifestyle and they fear the HTC results. And normally the results are positive." (Skilled birth attendant at a health center)

- ★ In respect to **client privacy and confidentiality of personal information**, almost all women expressed that their privacy and confidentiality was protected. There were few reports on instances with a specific group of health workers that commonly discussed confidential patient information outside the facility setting with outsiders (in this case at a market during market day). Regarding patient privacy and confidentiality, many health care providers in RBF facilities experienced that they were able to improve visual privacy due to the use of screens between patient beds. Still, there are challenges in avoiding fellow patients overhearing confidential information during consultations.

"The other women on the other beds can clearly hear this (confidential information) and will know the status of their friend even though it was meant to be a private thing in the first place." (Skilled birth attendant at a health center)

- ★ In respect to **encouraging women to have a guardian at her side** during delivery, health care providers reported that unfortunately in the current set-up of labor wards and delivery rooms, it is almost impossible for every woman to have a guardian with her, especially in respect to male guardians.

"...the current conditions make it difficult to invite guardians." (Skilled birth attendant at a health center)

- ★ Regarding **explanations in relation to examinations, clinical procedures, or medications** many women felt sufficiently well informed by health care workers. For example, many women recalled during the interviews that they received an injection after childbirth and were told that this will prevent them from bleeding excessively. In few instances, mainly in reports obtained in Balaka district, women were told that the purpose of additional pelvic examinations after delivery of the newborn was to "mop the uterus". Clients consequently wondered whether some of these clinical procedures were actually always indicated. When exploring this topic more during interviews with health care providers, that this particular procedure – which purpose is "to clean the uterus" – is now incentivized by the RBF program and has not been performed routinely in the past. Hence, women seem now to experience additional procedures that were not commonly done during previous deliveries.

"In the previous deliveries, they were not cleaning our womb and the remaining things (placenta) were coming out without cleaning us. They were only giving us injection after delivery. So I complained to them that the process is painful and the health worker responded to me that this is going to help me to have good health when I get home." (Woman in focus group discussion)

“The management of third stage of labor is the same. Only that in the past we were skipping some of the things, but the management is the same (...). We are removing the clots, but we are also cleaning. So, we insert a gauze with chlorhexidine in it just to clean.” (Skilled birth attendant at a health center)

Table 4-5: RBF4MNH Impact on L&D service quality indicators per client experience (hospitals only):

Indicator	CemOC Hospitals				t	Sig.	
	BASELINE		ENDLINE				
	mean	n	mean	n			
1	Average satisfaction with services received during facility-based delivery (score: 1=very satisfied, 5=very unsatisfied)	1.1	68	1.1	77	0.3	0.77
2	Proportion of women who would recommend this health facility to other women for facility-based delivery	98.5%	68	98.7%	77	-0.0	0.99
3	Average cost of transport getting to this facility for childbirth (in Kwacha)	377	52	942	65	-2.0	0.04
4	Proportion of women reporting having paid user fees for facility-based delivery	0%	68	0%	77	0	0
5	Average waiting time before being seen by a health worker after arrival at this facility (in minutes)	27	59	33	68	-0.7	0.50
6	Average time women arrived at the facility prior to the actual day of delivery (in days)	3.3	68	6.2	77	-1.7	0.10
7	Average time spent at the facility after having delivered (in days)	1.6	67	2.0	77	-0.6	0.55
8	Proportion of women reporting the health worker having introduced herself/himself to her	26.5%	68	40.3%	77	-2.1	0.04
9	Proportion of women who underwent a clinical exam reporting the health worker having explained the purpose of this examination	100%	38	66.2%	74	4.8	<0.01
10	Proportion of women who received medications reporting the health worker explained the purpose and use of these medications	71.9%	57	83.3%	66	-2.0	0.04
11	Proportion of women who had been taken a blood sample reporting the health worker explained the purpose of this blood specimen	71.0%	31	77.1%	35	-1.4	0.15
12	Proportion of women who underwent a medical procedure reporting the health worker obtained her consent prior to this procedure	70.6%	68	81.3%	75	-2.0	0.05
13	Proportion of women reporting the health worker having encouraged her to ask questions related to the childbirth process	30.9%	68	53.2%	77	-3.0	<0.01
14	Proportion of women reporting having been offered to have a guardian with her during childbirth	48.5%	68	39.0%	77	1.0	0.32
15	Proportion of women reporting the health worker ensuring confidentiality in respect to private aspects of care	95.6%	68	94.8%	77	0.4	0.71
16	Proportion of women reporting their blood pressure being checked at least once prior to the delivery of the baby	75.0%	68	83.1%	77	-1.0	0.30
17	Proportion of women reporting their blood pressure being checked at least once after the delivery of the baby	61.5%	65	77.0%	74	-2.0	0.05
18	Proportion of women reporting to having received information on the use of insecticide-treated bed nets prior to discharge from the facility	76.5%	68	72.7%	77	-0.0	0.96
19	Proportion of women reporting to having received information on early and exclusive breastfeeding prior to discharge from the facility	86.8%	68	90.9%	77	-1.7	0.10

20	Proportion of women reporting to having received information on nutritional aspects during the breastfeeding period prior to discharge from the facility	73.5%	68	85.7%	77	-2.4	<i>0.02</i>
21	Proportion of women reporting to having received information on danger signs of the mother that would prompt immediate care seeking prior to discharge from the facility	80.9%	68	90.9%	77	-2.1	<i>0.04</i>
22	Proportion of women reporting to having received information on danger signs of the newborn that would prompt immediate care seeking prior to discharge from the facility	83.8%	68	88.3%	77	-1.6	<i>0.12</i>
23	Proportion of women reporting to having received information on their next postnatal care visit prior to discharge from the facility	76.5%	68	88.3%	77	-2.7	<i>0.01</i>
24	Proportion of women reporting to having received information on modern methods of family planning prior to discharge from the facility	83.8%	68	84.4%	77	-0.2	<i>0.80</i>

4.4. RBF4MNH impact estimates on clients' perception of labor & delivery service quality

As an additional aspect of client perceptions of service use, we measured the level of client agreement to different service-related statements using a scale on perceived quality of care. Respondents to this study component were also clients exiting labor and delivery services. **Table 6** provides an overview of the different dimensions of agreement used in the survey tool, and how these dimensions were summarized into three perception scores (**Scores 1-3**).

Table 4-6: Overview of variables used for composite scores for each perception aspect of receiving L&D care:

Score:	Experiential dimensions measured:	
1	Perception of interpersonal aspects of received care	Level of client agreement with whether the health worker's overall impression
		Level of client agreement with the health worker's ability to listen and respond to patient questions
		Level of client agreement with health worker's attentiveness towards patient needs
		Level of client agreement with the health worker's gentleness in behavior
		Level of client agreement with the health worker's gentleness in speaking and verbal communication
		Level of client agreement with the health worker's overall respectfulness towards patients
		Level of client agreement with the health worker's overall sensitivity
		Level of client agreement with the health worker's overall friendliness towards patients
		Level of client agreement with the health worker's overall patience
		Level of client agreement with health worker's overall honesty
		Level of client agreement with health workers explanation of the process of labor and delivery
		Level of client agreement with the health worker's reassurance concerning their worries during labor and delivery
		Level of client agreement with the extent to which the health worker ensured mother's and newborn's well-being
2	Perception of clinical aspects of received care	Level of client agreement with the health worker's ability to assist patients
		Level of client agreement with the health worker's overall competency
		Level of client agreement with health worker's availability during delivery
		Level of client agreement with health worker's attention paid towards the well-being of the newborn
		Level of client agreement with health worker's support in initiating breastfeeding after delivery
		Level of client agreement with health worker's concern for patients' pain and pain control during labor and delivery
		Level of client agreement with the health worker's physical attendance during labor and delivery
3	Perception of organizational and structural aspects of received care	Level of client agreement with the ease of finding the way to the delivery room.
		Level of client agreement with equipment in the delivery room
		Level of client agreement with comfort in the delivery room
		Level of client agreement with cleanliness and hygiene of the delivery room
		Level of client agreement with the size/space of the delivery room
		Level of client agreement with the calmness of the delivery room
		Level of client agreement with the lighting of the delivery room
		Level of client agreement with the health worker's overall coordination
		Level of client agreement with the distance from their home to the health facility
		Level of client agreement with health worker's overall efficiency in attending the labor and delivery process
		Level of client agreement with the temperature in the delivery room

Each item in Table 4-6 was presented to surveyed women. Women were asked to rate their agreement with this item in respect to their recent service use. Women were guided on how to use a hand-held scale, which represented the degree of agreement/disagreement along a continuous grey color gradient from black to white. Resulting shades of grey were then transferred into a 10-point Likert scale for further analysis. To measure RBF4MNH effects on client perception, the measured dimensions in Table 7 were further summarized into scores 1-3, with each score ranging from 1 (full disagreement) to 10 (full agreement). These scores were then used as effect measures to enter into the DiD regression models in order to estimate the impact of the RBF4MNH Initiative on client perception in terms of receipt and use of labor and delivery care. Given that perception of service utilization can differ greatly between services received at health centers and services received at hospitals, we only included the information from women exiting labor and delivery services at health centers in this analysis (given the absence of comparisons for hospitals in our sample).

As shown in **Table 4-7**, already prior to the RBF4MNH intervention clients perceived services offered to them extremely well.

- ★ This was found for each aspect of service delivery – interpersonal, clinical care received, and service organization and structure.
- ★ Although there were mild declines in the perception scores measured among clients attending labor and delivery services at RBF facilities, this negative effect of the RBF was not statistically significant and thus should rather be attributed to chance.

Table 4-7: RBF4MNH Impact on client perception of receiving L&D care (health centers only).

Indicator	BASELINE				ENDLINE				DiD adjusted BL-EL	Sig.
	Intervent. mean	n	Compar. mean	n	Intervent. mean	n	Compar. mean	n		
1 Average of women’s perception of interpersonal aspects of received care*	9.2	68	9.3	51	8.9	85	9.2	62	-0.1	.86
2 Average of women’s perception of clinical aspects of received care*	9.3	68	9.4	52	9.1	85	9.4	62	-0.1	.69
3 Average of women’s perception of organizational and structural aspects of received care*	9.3	68	9.2	51	8.8	85	9.1	62	-0.2	.57

*Score: 10=very satisfied, 1=very dissatisfied

These quantitative findings sharply contrast data from qualitative interviews with women who had given birth at study facilities. Among the more common themes that emerged in these in-depth interviews and focus group discussions are reports of quite disturbing experiences with disrespectful and abusive care. We attribute this difference in findings between positive perceptions during exit interviews (conducted at the facility premises shortly after delivering a baby) and negative perceptions in community-based qualitative interviews (focus group discussions in village communities weeks or months after childbirth) to two factors: a) the fact that women might be intimidated to express their disagreements while being surveyed in the vicinity of health facility personnel or in rush to actually return home with their newborn child; and b) limitations inherent to

the measurement of perception along a scale among rural women in Malawi. Using the same scale in household surveys in Malawi (women interviewed within the community context weeks/months after childbirth), the resulting perception scores were similarly positive across respondents).

- ★ **Clinical aspects of care:** Based on in-depth interviews and focus group discussions, women delivering at facilities (irrespective of district, RBF intervention arm, or facility level) experienced giving birth without the attendance of a skilled health care provider, but rather with assistance from cleaners, guardians, fellow laboring women, or alone. Women also reported how maternal care providers sent women in labor back to maternal waiting homes without having them first examined them to assess their status (experienced in two RBF facilities in Dedza and Mchinji in 2015). Consequently, some women had to give birth outside or were rushed back into the labor ward and gave birth in a relatively chaotic setting with newborns being dropped on the floor. Even in these situations, health care providers did not seem to pay more attention and never rushed to the scene to assist, but rather scorned women. When asked how they perceived the involvement of health care providers, women frequently reported that health care providers were often busy with other duties, or preoccupied with their mobile phones, or too tired and hungry, or simply just sitting around while these women were giving birth (mainly based on experiences in RBF facilities). Women who were attended by a health care provider often reported that they did not feel sufficiently encouraged and supported during childbirth. Instead there was verbal abuse and in few cases even physical abuse (experienced in the form of slapping in two RBF facilities in Mchinji and Ntcheu).

“They were busy passing us and shouting, using obscene language, telling me to dress up, saying, ‘go away, don’t show us your dirty and stinking (...)’. They speak such kind of languages. We have no choice but to endure such abuse, since there is nothing we can do (...). When we are in the labor room, what we need is just to be assisted. So, we put up with their actions because we know we can’t talk back since they are doctors. We fear that if we answer back they may never help us (...)”
(Woman in focus group discussion)

“The next time she moved out of the bed, she suddenly delivered on the floor. When she was calling the health worker the baby was already out. Of course the health worker came for assistance, but she slapped the patient before assisting her. (...) I blamed the patient. She was the one who disobeyed the health worker. That is why she was slapped.” (Woman in focus group discussion)

- ★ **Interpersonal aspects of care:** Many interviewed women also pointed out that in general they feel well cared for and that not every health care provider portrays bad attitudes and behaviors. In their experience, however, such incidents were generally more common when attended by female health care providers or nursing students. There was still some consensus by most interviewed women, that birth attendance by male health care providers is preferable to female providers. Further, fewer experiences with disrespectful care were reported during 2015 compared to interviews in 2014. When asked about factors leading to negligence or bad attitudes of birth attendants, interviewed health care providers highlighted that there are no strong policies in place and no one feels knows how to contend with or reprimand misbehaving colleagues.

“Because some people have got the skills, but the attitude is the problem. Others have a good attitude, but if they are lacking skills you find that it’s a gap as well.”
(Skilled birth attendant at a hospital)

Negative attitudes or negligence of duty are also perceived as linked to a lack of supervision and of clearly established sanctions by facility management. Health care providers experienced that facility staff performs as they are supposed to only when closely supervised by management.

Especially in respect to patient centeredness, some health care providers felt that single aspects of interpersonal care are not really necessary or relevant to their clinical performance.

“It disturbs our minds, but if we happen to have some in-service trainings like now (...) it also gives encouragement like empowering us to stand alone although other complications we cannot stand alone. We need other support from the DHO, so we need their support fully...” (Skilled birth attendant at a health center)

- ★ **Structural and organizational aspects of care:** Most women perceived improvements in respect to hygiene and cleanliness, especially in RBF facilities. Women also noticed that the availability of equipment, drugs, and other supplies seemed to have increased in RBF facilities in 2015. While these experiences were shared among women attending services at both RBF and comparison facilities, it became evident that in 2014 women reporting on service quality in comparison facilities were more likely to complain about poor hygiene, lack of equipment and drugs. Thus, it seems that this change can be attributed to the district-wide effects of the RBF4MNH.

On the other hand, many clients perceived the size of many delivery rooms to be too small, and the labor wards to have too few beds. In 2015 more clients reported that labor wards and delivery rooms were congested, with some women ultimately giving birth on the floor. In some health centers, women even had to share a bed or sleep on the floor in the postnatal rooms. This situation was created by the increase in women coming for delivery combined with the fact that renovation and extension work in labor wards as part of the infrastructure upgrade component of RBF4MNH – planned to be completed before rollout of the PBF component - was still on-going through most of the study period. Clients and health care workers thus experienced a situation where space was not only not yet increased to accommodate the increased patient numbers, but at times effectively even reduced compared to baseline due to the on-going construction work. Likely longer-term improvements in the infrastructure situation as a result of the intervention were thus not yet captured by our study.

“In labor ward, as much as possible to keep it always clean and it’s clean. Though very small because we have three beds, but we actually have most of the times seven, six, five women delivering at one time – three on the bed, two or three or four on the floor. So when helping a woman while on the floor, somehow we risk and it’s so tiresome. That’s the challenge.” (Skilled birth attendant at a health center)

“We are increasing the institutional deliveries, but we don’t have the space to accommodate all of them (...) and I think that’s the biggest challenge.” (Skilled birth attendant at a hospital)

4.5. Sample distribution and sample characteristics of clients attending ANC and PNC services

Tables 4-8 and 4-9 summarize the sample distribution of women surveyed after exiting antenatal care (ANC) and postnatal care (PNC) services. Sample sizes increased slightly from baseline to endline; however, sample sizes were mainly defined by the frequency of ANC or PNC clinics held at a given facility during a facility stay (i.e. 3 days during baseline, 5 days during endline).

Table 4-8: Sample distribution of clients interviewed after ANC service utilization.

	BASELINE		ENDLINE	
Total sample:	388		405	
	n	%	n	%
District:				
Balaka	77	19.8	98	24.2
Dedza	102	26.3	115	28.4
Mchinji	74	19.1	89	22.0
Ntcheu	135	34.8	103	25.4
Level of care:				
BEmOC	280	72.2	269	66.4
CEmOC	108	27.8	136	33.6
Study arm:				
Intervention	221	57.0	305	75.3
Comparison	167	43.0	100	24.7

BEmOC = basic emergency obstetric care center; CEmOC = comprehensive emergency obstetric care center

Table 4-9: Sample distribution of clients interviewed after PNC service utilization.

	BASELINE		ENDLINE	
Total sample:	230		307	
	n	%	n	%
District:				
Balaka	59	25.7	90	29.3
Dedza	75	32.6	87	28.3
Mchinji	47	20.4	70	22.8
Ntcheu	49	21.3	60	19.5
Level of care:				
BEmOC	169	73.5	212	69.1
CEmOC	61	26.5	95	30.9
Study arm:				
Intervention	150	65.2	230	74.9
Comparison	80	34.8	77	25.1

BEmOC = basic emergency obstetric care center; CEmOC = comprehensive emergency obstetric care center

Table 4-10 displays some characteristics of the sampled women exiting ANC services. The mean age of the respondents was 24-25 years with almost everyone being married. On average, women had a total of two previous pregnancies and two living children. Around 10% of women experienced a miscarriage in the past. The proportion of women who reported previous ANC visits in the same pregnancy ranged between 40-50%. Main reasons for attending ANC clinics at a particular facility were distance and quality.

Table 4-10: Sample characteristics of clients interviewed after ANC service utilization.

Characteristic	BASELINE				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.	
	n = 221		n = 167		n = 305		n = 100	
Average age in years (mean/SD)	24.2	5.8	25.3	6.5	25.0	6.0	24.5	5.4
Proportion of married women (n/%)	216	97.7	163	97.6	231	92.4	146	94.8
Proportion of literate women (n/%)	146	66.1	111	66.5	192	63.0	52	52.5
Average number of pregnancies (mean/SD)	2.8	1.8	3.2	2.1	1.8	1.7	1.9	1.6
Average number of living children (mean/SD)	1.5	1.6	1.9	1.9	1.7	1.6	1.8	1.5
Proportion with previous miscarriage (n/%)	32	14.5	23	13.8	30	9.8	12	12.0
Proportion with previous stillbirth (n/%)	8	3.6	9	5.4	13	4.3	1	1.0
Proportion with previous premature birth (n/%)	14	6.3	9	5.4	7	2.8	3	1.9
Average travel time to attend ANC clinic in minutes (mean/SD)	83.7	56.6	89.9	64.2	67.0	57.0	76.5	68.0
Proportion of clients who attended ANC services at this facility because it is the nearest to reach (n/%)	115	52.0	74	44.3	117	38.4	52	52.5
Proportion of clients who attended ANC services at this facility because services are perceived better of better quality than compared to other alternatives (n/%)	64	29.0	50	29.9	89	29.2	24	24.2
Proportion of clients who attended ANC services at this facility because services are less expensive as compared to other alternatives (n/%)	15	6.8	4	2.4	12	3.9	2	2.0

ANC = antenatal care; n = number of observations; SD = standard deviation; % = proportion in percent

Table 4-11 displays characteristics of the sampled women exiting PNC services. The mean age of women attending PNC services was 23 and 25 years with almost all of them being married. On average, women had 3 to 4 previous pregnancies and identical numbers of living children. The main reason to attend PNC services at this facility was distance. Second to this were service costs (described at baseline) and quality considerations (described at endline).

Table 4-11: Sample characteristics of clients interviewed after PNC service utilization.

Characteristic	BASELINE				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.	
	n = 150		n = 80		n = 230		n = 77	
Average age in years (mean/SD)	24.7	5.6	25.5	6.4	23.7	5.6	24.8	6.1
Proportion of married women (n/%)	139	92.7	78	97.5	220	95.7	73	94.8
Proportion of literate women (n/%)	91	60.7	50	62.5	148	64.4	43	55.8
Average number of pregnancies (mean/SD)	2.7	1.9	3.1	2.1	3.2	1.4	3.7	1.8
Average number of living children (mean/SD)	2.4	1.5	2.7	1.7	3.1	1.3	3.6	1.7
Proportion with previous miscarriage (n/%)	19	12.7	13	16.3	14	6.1	3	3.9
Proportion with previous stillbirth (n/%)	4	2.7	5	6.3	7	3.0	2	2.6
Proportion with previous premature birth (n/%)	11	7.3	4	5.0	10	4.4	6	7.8
Average travel time to attend PNC clinic in minutes (mean/SD)	69.4	57.3	80.5	58.6	57.4	52.1	64.9	57.9
Proportion of clients who attended PNC services at this facility because it is the nearest to reach (n/%)	72	48.0	31	38.8	89	38.7	46	59.7
Proportion of clients who attended PNC services at this facility because services are perceived better of better quality than compared to other alternatives (n/%)	1	0.7	5	6.3	51	22.2	12	15.6
Proportion of clients who attended PNC services at this facility because services are less expensive as compared to other alternatives (n/%)	36	24.0	28	35.0	9	3.9	1	1.3

PNC = postnatal care; n = number of observations; SD = standard deviation; % = proportion in percent

4.6. Impact estimates on clients' experience with ANC, and PNC service utilization

Effects of the RBF4MNH Initiative on clients' experiential measures related to ANC service utilization at health centers are shown in **Table 4-12**. There were no statistically significant effects on clients' experience indicators measured in response to the RBF4MNH intervention.

- ★ The RBF4MNH appeared to produce a positive effect on overall client satisfaction with ANC services (**indicator 1**). However, this is due to a relatively small change in the satisfaction score used for this measure and probably not relevant as general satisfaction remained high among clients attending ANC clinics in both RBF intervention and comparison health centers.
- ★ Transportation costs (**indicator 3**) doubled for both clients attending ANC clinics at RBF and at comparison health centers, which might be a reflection of the overall fluctuations in petrol prices in Malawi over time.
- ★ Although not significant, the average waiting time (**indicator 5**) declined in comparison health centers compared to RBF intervention facilities, with the absolute difference in the difference estimated at more than 20 minutes. Qualitative findings confirmed that in RBF facilities, waiting times for ANC service increased as a result of having to integrate registration for the CCT.
- ★ The RBF4MNH intervention was observed to bear an effect (significant at the 10% level) on the proportion of women reporting that their blood pressure was taken during ANC (**indicator 14**). Health care providers working at RBF health centers confirmed this observation as they reported that due to increased workload during ANC clinic days, they tend to skip time-consuming procedures to keep up with the pressure they experience at work.

Table 4-12: RBF4MNH Impact on ANC service quality indicators per client experience (health centers only):

Indicator	BASELINE				ENDLINE				DiD adjusted BL-EL	Sig.
	Intervent.		Compar.		Intervent.		Compar.			
	mean	n	mean	n	mean	n	mean	n		
1 Average satisfaction with services received during this ANC visit (score: 1=very satisfied, 5=very unsatisfied)	1.1	128	1.2	152	1.2	135	1.1	135	0.2	.06
2 Proportion of women who would recommend this health facility to other women for ANC	99.2%	128	98.7%	152	97.8%	135	100%	133	-1.8%	.31
3 Average cost of transport getting to this facility for this ANC visit (in Kwacha)	45	120	39	116	228	60	230	60	27	.71
4 Proportion of women reporting having paid user fees for this ANC visit	2.3%	128	9.2%	152	2.2%	135	9.0%	133	3.4%	.54
5 Average waiting time before being seen by a health worker after arrival at this facility (in minutes)	86	125	46	145	81	134	20	134	21	.49
6 Proportion of women reporting the health worker having introduced herself/himself to her	50.8%	128	34.2%	152	61.5%	135	42.9%	133	-9.4%	.56

7	Proportion of women who stated to have undergone a clinical exam reporting the health worker having explained the purpose of this examination	84.1%	126	71.8%	149	82.6%	132	80.5 %	128	0.9%	.94
8	Proportion of women who stated to have received medications reporting the health worker having explained the purpose and use of these medications	85.7%	119	84.2%	146	93.7%	126	89.5 %	124	2.2%	.71
9	Proportion of women who stated to have been taken a blood sample reporting the health worker having explained the purpose of this blood specimen	94.3%	87	94.7%	113	90.2%	92	95.7 %	92	-1.0%	.84
10	Proportion of women who stated to have undergone a medical procedure reporting the health worker having obtained her consent prior to this procedure	76.6%	128	68.5%	149	91.1%	135	82.0 %	133	2.8%	.72
11	Proportion of women reporting the health worker having encouraged her to ask questions related to the pregnancy and ANC consultation	71.1%	128	61.2%	152	80.0%	135	72.9 %	133	6.4%	.57
12	Proportion of women reporting having been offered to have a guardian with her during the consultation	60.9%	128	53.3%	152	70.4%	135	79.7 %	133	-6.9%	.60
13	Proportion of women reporting the health worker ensuring confidentiality in respect to private aspects of care	99.2%	128	96.7%	152	94.1%	135	94.0 %	133	2.8%	.72
14	Proportion of women reporting their blood pressure being checked at least once during the ANC visit	82.0%	128	53.9%	152	71.1%	135	69.2 %	130	-27.9%	.10
15	Proportion of women reporting to having received information on the use of insecticide-treated bed nets during pregnancy during this ANC visit	79.7%	128	82.9%	152	100%	115	100%	113	4.7%	.49
16	Proportion of women reporting to having received information on early and exclusive breastfeeding during this ANC visit	70.3%	128	57.2%	152	100%	105	100%	94	-13.5%	.17
17	Proportion of women reporting to having received information on nutritional aspects while being pregnant during this ANC visit	74.2%	128	76.3%	152	100%	118	100%	105	5.6%	.52
18	Proportion of women reporting to having received information on birth preparedness and/or emergency plan during this ANC visit	82.8%	128	83.6%	152	100%	124	100%	116	2.0%	.82

19	Proportion of women reporting to having received information on pregnancy danger signs that would prompt immediate care seeking during this ANC visit	82.0%	128	82.2%	152	100%	124	100%	113	2.7%	.74
20	Proportion of women reporting to having received information on modern methods of family planning during this ANC visit	84.4%	128	89.5%	152	100%	126	100%	126	2.1%	.73
21	Proportion of women reporting to having received information on the possibility of having a guardian at her side when delivering in a facility during this ANC visit	64.8%	128	65.8%	152	100%	98	100%	96	-1.4%	.87

ANC = antenatal care; DiD = effect estimate based on difference-and-difference regression; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

Effects of the RBF4MNH Initiative on clients' experiential measures related to PNC service utilization at health centers are shown in **Table 4-13**.

- * There were few statistically significant effects measured on experiential measures related to PNC service utilization in response to the RBF4MNH intervention. Overall satisfaction remained stable at baseline and endline and across comparison and intervention facilities (**indicator 1**).
- * The RBF4MNH produced a negative effect on the proportion of clients who reported that they had received any explanation on the purpose of clinical exams and medications given to them during PNC consultations (**indicators 6 and 7**). Qualitative interviews with clients exiting PNC clinics confirmed this finding. During interviews in 2014 and 2015, most women reported that during PNC consultations their newborns were examined, but health care providers usually only checked the umbilicus. Women's physical condition was never examined. This finding might reflect that services perceived as of lower relevance (e.g. PNC) might be the first to be neglected if not included by the incentive scheme.

Table 4-13: RBF4MNH Impact on PNC service quality indicators per client experience (health centers only).

Indicator	BASELINE				ENDLINE				DiD adjusted BL-EL	Sig.
	Intervent.		Compar.		Intervent.		Compar.			
	mean	n	mean	n	mean	n	mean	n		
1	Average satisfaction with services received during this PNC visit (score: 1=very satisfied, 5=very unsatisfied)									
	1.1	106	1.2	63	1.1	103	1.2	109	-0.1	.41
2	Average cost of transport getting to this facility for this PNC visit (in Kwacha)									
	138	30	96	21	109	103	73	109	21	.77
3	Proportion of women reporting having paid user fees for this PNC visit									
	0%	106	0%	63	0%	103	5.5%	109	-5.7%	.18

4	Average waiting time before being seen by a health worker after arrival at this facility (in minutes)	55	101	32	54	65	96	50	95	-9	.66
5	Proportion of women reporting the health worker having introduced herself/himself to her	49.1%	106	39.7%	63	49.5%	103	33.9%	109	2.3%	.92
6	Proportion of women who stated to have undergone a clinical exam reporting the health worker having explained the purpose of this examination	69.0%	71	71.9%	57	63.2%	76	70.4%	71	-24.5%	.10
7	Proportion of women who stated to have received medications reporting the health worker having explained the purpose and use of these medications	91.1%	45	71.0%	31	62.2%	37	62.5%	48	-48.6%	.04
8	Proportion of women who stated to have been taken a blood sample reporting the health worker having explained the purpose of this blood specimen	95.2%	21	93.8%	16	85.7%	21	83.3%	12	3.1%	.83
9	Proportion of women who stated to have undergone a medical procedure reporting the health worker having obtained her consent prior to this procedure	68.4%	79	68.4%	57	77.4%	84	80.8%	73	1.7%	.94
10	Proportion of women reporting the health worker having encouraged her to ask questions related to the pregnancy and PNC consultation	49.5%	105	65.1%	63	61.2%	103	53.2%	109	22.8%	.25
11	Proportion of women reporting having been offered to have a guardian with her during the consultation	39.2%	102	46.8%	62	33.0%	103	39.4%	109	-1.8%	.92
12	Proportion of women reporting the health worker ensuring confidentiality in respect to private aspects of care	96.2%	106	95.2%	63	89.3%	103	88.1%	109	7.4%	.54
13	Proportion of women reporting their blood pressure being checked at least once during the PNC visit	38.7%	106	50.8%	63	56.3%	103	52.3%	109	10.0%	.74
14	Proportion of women reporting their newborn's weight having been checked at least once during the PNC visit	73.6%	106	90.5%	63	74.8%	103	68.8%	109	23.4%	.27
15	Proportion of women reporting to having received information on the use of insecticide-treated bed nets during infancy during this PNC visit	71.7%	106	77.8%	63	77.7%	103	72.5%	109	13.7%	.42
16	Proportion of women reporting to having received information on early and exclusive breastfeeding during this PNC visit	85.8%	106	88.9%	63	85.4%	103	89.0%	109	-4.9%	.68

17	Proportion of women reporting to having received information on nutritional aspects while breastfeeding during this PNC visit	72.6%	106	79.4%	63	82.5%	103	80.7%	109	4.2%	.78
18	Proportion of women reporting to having received information on newborn danger signs that would prompt immediate care seeking during this PNC visit	68.9%	106	84.1%	63	64.1%	103	75.2%	109	6.6%	.68
19	Proportion of women reporting to having received information on when to return for a follow-up visit during this PNC visit	67.0%	106	85.7%	63	78.6%	103	85.3%	109	12.4%	.36
20	Proportion of women reporting to having received information on modern methods of family planning during this PNC visit	71.7%	106	73.0%	63	69.9%	103	83.5%	109	-4.0%	.81
21	Proportion of women reporting to having received information on vaccinations for the child during this PNC visit	67.0%	106	82.5%	63	55.3%	103	72.5%	109	2.8%	.83

PNC = postnatal care; DiD = effect estimate based on difference-and-difference regression; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

5. Findings on the demand-side component (CCT)

Key findings in respect to Conditional Cash Transfer component:

Specific RQ 8: *How well were the conditional cash transfers (demand-side component) implemented and perceived by clients, health care providers, and programmers?*

Only about half of all eligible women were enrolled into the cash transfer program in 2015. There is still a relatively large proportion of enrolled women (about one quarter) who didn't receive cash reimbursements after fulfilling the conditions.

After some initial resistance, the conditional cash transfer program gained acceptance by target communities; however, there remain challenges in regards to verification and disbursement of cash reimbursements to enrolled clients at the facility level.

5.1. Enrollment and overall performance of conditional cash transfer program

As part of the RBF4MNH Initiative, a demand-side mechanism consisting of conditional cash transfers (CCT) to women delivering in facilities was introduced. The CCT were composed individually based on the distance a woman needed to travel to reach a facility (transport costs reimbursement), fixed expenses related to facility-based deliveries (women are required to bring certain items with them when delivering in a facility which the facilities cannot/do not provide), and an opportunity cost reimbursement component for each additional day a women stays at the facility after childbirth up to a total of two days. Enrollment into the CCT program occurred early in pregnancy during a woman's ANC attendance. Only women residing in catchment areas of RBF facilities were considered eligible. The CCT program implementation began in late 2013, but faced a number of difficulties and delays in some of the study areas.

To accommodate the delay in the implementation of the demand-side component of the RBF4MNH Initiative, the assessment of the effectiveness of the distribution of CCTs was based exclusively on endline household survey data. This decision ensured the ability to capture an effect since by the time household survey data was collected in 2015 all health facilities had implemented the CCT component for a sufficient period of time. The analysis of transfers was restricted to women who were eligible for the transfers, i.e. women residing in catchment areas of RBF facilities.

Table 5-1 reports findings on both the effectiveness of the registration and the actual disbursement procedures. Across districts, only just above 50% of all eligible women were registered in the program. Of those, only about three out of four women received the cash reimbursements (**Table 5-2**).

- ★ These findings clearly point at a major difficulty in the implementation of this component.
- ★ Qualitative findings indicate that difficulties with the registration and the verification system, partly due to the complexity of the system itself and partially due to the fact that the Health Surveillance Agents did not cooperate as expected, were responsible for the lack of efficacy of this component. Our evaluation cannot assess if and to what extent, sub-optimal CCT registration and delivery rates were due to actual gaming and fraud.

- ★ Among those who reported receiving the transfer, the average sum received was 4,600 Malawian Kwacha (USD 10.50). The amount was larger than the average out-of-pocket expenditure on delivery (MKW 3,500), providing women with the opportunity to also recover from some incurred productivity loss.
- ★ Registration rates appeared to be highest in Balaka (70% of all eligible women registered) and lowest in Dedza (40% of all eligible women registered). Dedza also displayed the lowest proportion of women receiving the transfer once registered (55%) while Ntcheu displayed the highest proportion of women receiving the transfer once registered (84%).
- ★ Beyond the obvious differences due to district of reference, our analysis revealed that registration followed an equity-oriented pattern, with urban women and least poor women (third and fourth wealth quartile) being the least likely to be registered in the program.

Table 5-1: Performance of Conditional Cash Transfers program at endline time point.

	n	%
Total of women eligible for CCT program	1296	100
Proportion of women registered in CCT program	658	50.8
Proportion of women registered in CCT program actually receiving the CCT	485	73.7

CCT = conditional cash transfer

Table 5-2: Average amount of conditional cash rewards at endline time point (among women who received any)

	mean	SD	n
Amount of CCT rewards (in Malawi Kwacha)	4,673	1,146	485

CCT = conditional cash transfer

5.2. Clients' understanding of the demand-side intervention

As stated above, the CCT was fully in place by the third trimester in 2014. In 2015 we therefore surveyed women exiting labor & delivery services about their experiences in taking part in the CCT program. We assessed how well the purpose of the CCT program is understood by enrolled women as a measure of how well the CCT program was introduced into the communities. As shown in **Table 5-3** only about two thirds of enrolled women indicated a sufficiently thorough understanding of the purpose of the CCT program as a measure to lower financial access barriers in respect to facility-based deliveries. These proportions were relatively similar when compared across districts, but lowest in Ntcheu district (at less than 60%).

Table 5-3: Understanding the purpose of the reimbursements among clients who received cash reimbursement (L&D client sample at ENDLINE only, all facilities):

Clients' understanding purpose of cash transfers*		
	Number of surveyed clients having received cash transfers	Proportion of these clients expressing understanding of cash purpose (n/%)
Full sample	77	48 61.5
Balaka only	13	9 69.2
Dedza only	10	7 63.6
Mchinji only	28	17 60.7
Ntcheu only	26	15 57.7
*based on responses to questions regarding the registration process, the conditions related receiving cash, and the intended purpose of the cash reimbursement.		

We appraised quantitative findings on the CCT program with responses from **qualitative interviews** with women, health workers, and RBF4MNH stakeholders (for details on composition and sampling of these qualitative information sources, see sections 4.2, 6.2, and 7.1)

- ★ In 2015, most interviewed women seemed to have a good understanding of the **purpose of CCTs** and of the program's eligibility and enrollment criteria. This solid understanding is in contrast to findings from 2014 interviews when most women enrolled in the CCT program were unfamiliar with or even confused regarding the purpose of CCTs and CCT eligibility criteria. In 2014, some respondents described negative associations with the cash transfers in targeted communities (e.g. in Balaka district, a myth arose that the money that was given to women at health centers was for these women selling their blood for satanic rituals). Particularly during the later data collection period, most women perceived CCTs as an approach to enable women to stay in facilities after childbirth without worrying about the costs of food and childbirth items. Especially in 2015, women perceived the CCT program as useful particularly among pregnant women in extreme financial need.

"The main positive thing regarding CCT is that it is assisting women, especially those that cannot afford to prepare for delivery items. Especially the very needy who can hardly afford a wrapper (cloth). This is a welcome initiative." (Woman in focus group discussion)

"I feel the money is very helpful, because sometimes you may find that you have been referred to the district hospital and your husband doesn't have any money, the situation becomes bearable because of the money." (Woman in focus group discussion)

- ★ Interviews with health care providers at intervention facilities further supported the change in awareness about the CCT program in 2015 and contend that this was mainly accomplished by RBF4MNH implementers' increased efforts in **community awareness** campaigns. Key stakeholders within the Ministry of Health also reported significant improvement in addressing earlier misunderstandings of the CCTs through sensitization programs, which they believe have now led to more women delivering at facilities. It was also recognized that the CCT and awareness campaigns encouraged not only facility deliveries, but also emphasized the importance of timely ANC attendance. Many health care providers reported that the CCT program encouraged women to attend ANC clinics earlier in pregnancy and to deliver in the presence of a skilled birth attendant. Health care providers noticed that the stronger awareness of skilled care during delivery resulted in more women arriving several days prior to their due dates to facilities in order to stay in the waiting homes until the onset of labor. This was interpreted as women trying to avoid the risk of deliveries occurring at home or on the way to the health facility.

“They are coming here because of the support we are giving them. At the same time, they are also attracted because of the cash. They know that the cash will assist them in buying A, B, C. This is because previously women had problems, they had to go back home, saying ‘I cannot afford to stay here because I do not have the required items, so I better go back home and deliver there where items will not be demanded’. But with the RBF in place, a lot of mothers are motivated to stay, yeah.” (Skilled birth attendant at a health center)

“Previously other mothers were coming here and would run away, saying that the hospital was demanding to have birth preparation things: a basin, a wrap, and whatsoever. So, myself I cannot manage because I am poor. I cannot manage to buy those things. That’s why we have been experiencing a lot of home deliveries. But with the help, the aid of that cash, mothers are able to buy food. They are able to buy birth preparation things.” (Skilled birth attendant at a health center)

“The cash incentive is the one which binds people to wait 48 hours. Otherwise – probably without that – people would abscond. It’s a necessary evil, and to the advantage of the women to be checked within 48 hours. But honestly, most of them if asked, they would prefer not to wait because there is completely no room for them to wait.” (Skilled birth attendant at a hospital)

- ★ Interviewed health care providers as well as some representatives within the Ministry of Health perceived the shortcomings of the CCT program in respect to current **family planning policies**. Based on their experience, stakeholders initially viewed CCTs as encouraging women to become pregnant; a concern that was later not substantiated as the CCT program was underway. In relation to this concern, stakeholders in later interviews stated that CCT amounts were not high enough for women to attempt to become pregnant for financial gain.
- ★ Still there were some shortcomings and problems with the CCT program as currently implemented in relation to **program enrollment**. Some women experienced that not all eligible women are being enrolled into the program, especially those presenting to ANC clinics during their first pregnancy trimester. Women also perceived facility personnel as biased in enrollment-favoring enrollment among friends or relatives. Many stakeholders also critiqued the CCT eligibility criteria wherein only women residing in catchment areas of RBF facilities can be enrolled. Stakeholders said it would have been better to be more lenient in this regard.
- ★ Also, the majority of interviewed women enrolled in the CCT program reported not having received **cash reimbursement** after facility delivery, and felt health workers deliberately kept these cash funds for themselves. Corruption was also perceived to play a role wherein the health care providers did not pay out reimbursement amounts indicated on a woman’s CCT card in full. In other instances, women were told that their CCT cards went missing during the verification process. Women interviewed across all four districts reported such experiences and perceptions. Members of the Reproductive Health Department and those specifically working with the intervention’s financial aspects confirmed that there were initial delays in transferring cash to women. This was attributed to difficulties in managing the financial flows at district and facility levels. Although the delivery of money to facilities later improved, these earlier and ongoing delays led women to question health care provider misuse of money.
- ★ In respect to the **verification process**, health care providers at facilities faced challenges in so far as health surveillance assistants (HSA) – responsible for verifying enrolled women’s residence in a facility catchment area – were not satisfied with the amount of rewards attributed to them from the supply-side RBF arm, which in turn led them to neglect their tasks in relation to the CCT program verification process, resulting in late arrival or disappearance of CCT cards. Furthermore, health care providers experienced desk officers struggling to handle the registration and cash handout process in addition to their increased clinical workload, which at times resulted in

delayed cash disbursement to women. RBF implementers also commented on the difficulties encountered with HSAs involved in the verification process, and rather would have preferred community leaders and chiefs to lead efforts to verify women's residential status.

“There have been planning problems and facilities could run out of cash because we did not plan properly. Sometimes, it's not the planning, but the actual process to get the monies from the assembly guys. You find their system is not so simple and straight forward, but with time we have improved on that. Again, the other challenge is with the registration process. The women are supposed to be registered with the antenatal department, verified by HSAs (Health Surveillance Assistants), and then finally put in planning by the desk officer.” (Skilled birth attendant at a hospital)

6. Findings on health care providers' understanding, views, and reactions to RBF

Key findings in respect to research questions:

Specific RQ 3: *How will health care health care providers and clients across the range of maternal and newborn services experience quality and respond to the introduction of the planned PBF interventions?*

In BEmOC facilities, health workers were overall highly satisfied with the implementation process, despite a number of implementation challenges. In CEmOC facilities, initial satisfaction was mixed, but improved markedly during the second year of implementation.

Health care health care providers were particularly satisfied with the infrastructure and equipment component, the facility portion of the reward payments, as well as the supervision and feedback entailed in the intervention.

Most health care workers had mixed feelings about the individual rewards, welcoming the supplement to their salary from the individual rewards, but being wary of the conflict they created at facility level.

Specific RQ 4: *How does the supply-side component change the perception and motivation of health staff?*

Health care workers reported a very positive effect of the RBF4MNH intervention on their working conditions during the first phase of the intervention, in particular at BEmOC facilities and in the areas of infrastructure, equipment, and supplies, compensation for hard work, recognition of effort, performance feedback, collaboration, and influence on what happens at the facility. In the second phase of implementation, however, perceptions of change were less positive.

Health care workers were motivated by the substantial changes in their working environment induced by the intervention. In addition, health workers were motivated by the close supervision and performance feedback inherent in the intervention. Most health workers reported that despite mixed feelings about the individual rewards, they did motivate them to keep their performance up to standard.

There was no indication of a crowding out effect of intrinsic health care provider motivation.

6.1. Sample distribution and sample characteristics of health care workers

Tables 6-1 and 6-2 show the distribution of the health care provider samples – both reduced and full sample – used in this study.

In line with the intervention focus, at baseline, our sampling approach included only skilled health care workers performing maternal health care services at the time of our study team's facility visit. This sample we refer to as the 'reduced sample'.

At midterm and endline, we were able to almost double our sample by changing the sampling strategy to include non-maternity staff as well as Health Surveillance Assistants (HSAs) due to their important role in the intervention, and by increasing the days of stay at the facility from 3 to 5. This sample we refer to as the ‘full sample’.

Table 6-1: Sample distribution of reduced health care worker sample (excluding non-maternity staff and HSAs).

	BASELINE		MIDTERM		ENDLINE	
Total sample:	77		102		100	
	n	%	n	%	n	%
District:						
Balaka	22	28.6%	25	24.5%	28	28.0%
Dedza	21	27.3%	35	34.3%	26	26.0%
Mchinji	15	19.5%	17	16.7%	20	20.0%
Ntcheu	19	24.7%	25	24.5%	26	26.0%
Level of care:						
BEmOC	44	57.1%	68	66.7%	68	68.0%
CemOC	33	42.9%	34	33.3%	32	32.0%
Study arm:						
Intervention	52	67.5%	64	62.8%	74	74.0%
Comparison	25	32.5%	38	37.2%	26	26.0%

BEmOC = basic emergency obstetric care center; CemOC = comprehensive emergency obstetric care center

Table 6-2: Sample distribution of full health care worker sample (including non-maternity staff and HSAs at midterm and endline).

	BASELINE		MIDTERM		ENDLINE	
Total sample:	77		156		140	
	n	%	n	%	n	%
District:						
Balaka	22	28.6	25	16.0	30	21.4
Dedza	21	22.3	60	38.5	29	20.7
Mchinji	15	19.5	46	29.5	46	32.9
Ntcheu	19	24.7	25	16.0	35	25.0
Level of care:						
BEmOC	44	57.1	107	68.6	100	71.4
CemOC	33	42.9	49	31.4	40	28.6
Study arm:						
Intervention	52	67.5	103	66.0	106	75.7
Comparison	25	32.5	53	34.0	34	24.3

BEmOC = basic emergency obstetric care center; CemOC = comprehensive emergency obstetric care center

Tables 6-3, 6-4 and 6-5 display the sample characteristics for the full sample and reduced sample. For the purpose of this study component, health care workers are considered maternity staff if they

report performing maternity-related health care services in the last 3 months, irrespective of cadre or training.

Table 6-3: Sample characteristics of full health care worker sample (including non-maternity staff and HSAs at midterm and endline).

Characteristics	BASELINE				MIDTERM				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.	
	n	%	n	%	n	%	n	%	n	%	n	%
Clinical officer	3	5.8	0	0.0	3	2.9	0	0.0	2	2.3	2	3.7
Medical assistant	4	7.7	2	8.0	8	7.8	4	7.6	9	10.5	9	16.7
Nurse/midwife	43	82.7	2	92.0	50	48.5	32	60.4	54	62.8	31	57.4
HSA, others	2	3.9	0	0.0	42	40.8	17	32.1	21	24.4	12	22.2

n = number of observations; *SD* = standard deviation; % = proportion in percent

Table 6-4: Sample characteristics of full health care worker sample (including non-maternity staff and HSAs at midterm and endline).

Characteristics	BASELINE				MIDTERM				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.	
Proportion of male providers (n/%)	18	65.4	8	32.0	46	44.7	28	52.8	48	45.3	15	44.1
Average age of providers in years (mean/SD)	38.1	13.3	40.9	13.3	34.1	9.0	36.1	11.1	33.9	9.9	35.6	11.7
Average number of years working experience as health care worker (mean/SD)	11.5	11.5	15.8	14.4	9.2	8.7	10.4	11.0	8.8	9.5	11.0	12.9
Average number of years working at this specific facility (mean/SD)	4.9	5.8	4.9	5.6	4.9	5.8	3.9	4.6	5.4	6.1	2.9	2.3

n = number of observations; *SD* = standard deviation; % = proportion in percent

Table 6-5: Sample characteristics of reduced health care worker sample (excluding non-maternity staff and HSAs).

Characteristics	BASELINE				MIDTERM				ENDLINE			
	Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.	
Proportion of male providers (n/%)	18	65.4	8	32.0	27	42.2	17	44.7	31	41.9	12	46.2
Average age of providers in years (mean/SD)	38.1	13.3	40.9	13.3	32.9	10.3	35.5	12.2	33.2	11.1	35.7	13.1
Average number of years working experience as health care worker (mean/SD)	11.5	11.5	15.8	14.4	7.3	9.2	10.4	12.4	7.7	10.4	11.4	14.6
Average number of years working at this specific facility (mean/SD)	4.9	5.8	4.9	5.6	2.9	3.9	3.0	4.4	4.3	6.3	2.6	2.1

n = number of observations; *SD* = standard deviation; % = proportion in percent

6.2. Sample of health care workers responding to qualitative study component during midterm and endline.

We conducted a total of 24 (midterm) and 20 (endline) in-depth interviews with clinical officers, medical assistants, and nurses in intervention facilities. Health facilities were sampled to represent both levels of care and all levels of performance in the intervention (determined from implementation records).

At endline, the sample also included several facilities scaled up in the second phase of the intervention. Interview partners at the sampled health facilities were selected according to availability and to represent sexes as well as all age groups and seniority levels. A number of in-charges and RBF focal persons were also included in the health care worker sample.

Table 6 summarizes the number of qualitative interviews conducted with health care providers at RBF facilities across the four study districts.

Table 6-6: Number of in-depth interviews performed per district and data collection round

	MIDTERM	ENDLINE
Balaka	6 interviews in 3 facilities	5 interviews in 4 facilities
Dedza	6 interviews in 3 facilities	4 interviews in 3 facilities
Mchinji	4 interviews in 2 facilities	6 interviews in 4 facilities
Ntcheu	8 interviews in 3 facilities	5 interviews in 3 facilities

6.3. RBF4MNH impact estimates on health care workers' perception on their working environment

At midterm and endline, health care workers were asked to recall whether they perceived changes in certain aspects of their working environment in the year prior to the survey, e.g. "Compared to one year ago, would you say that drugs, equipment, and other resources you need to do your job well are more available, less available, or have remained the same?" In line with the formulation of the questions, the section was only administered to health care workers who had already been at the facility for at least one year at midterm and endline, respectively.

Figure 6-1 and **Table 6-6** give an overview of the quantitative results for health care workers at health centers. Results for the full sample are similar, but not quite as pronounced. This is in line with findings from the qualitative study component, which indicated that while the intervention had an overall large positive impact on the perceived working environment at BEmOC health centers, effects were less clear and of lower overall magnitude at CEmOC hospitals. DHMTs and the RBF secretariat attributed this to the complexity of the hospital setting, which renders implementation and change processes slower than at the comparatively less complex health center level.

Figure 6-1: Perceived changes in the working environment in the first and second year of the intervention (health center staff only, HSAs and non-maternity staff included)

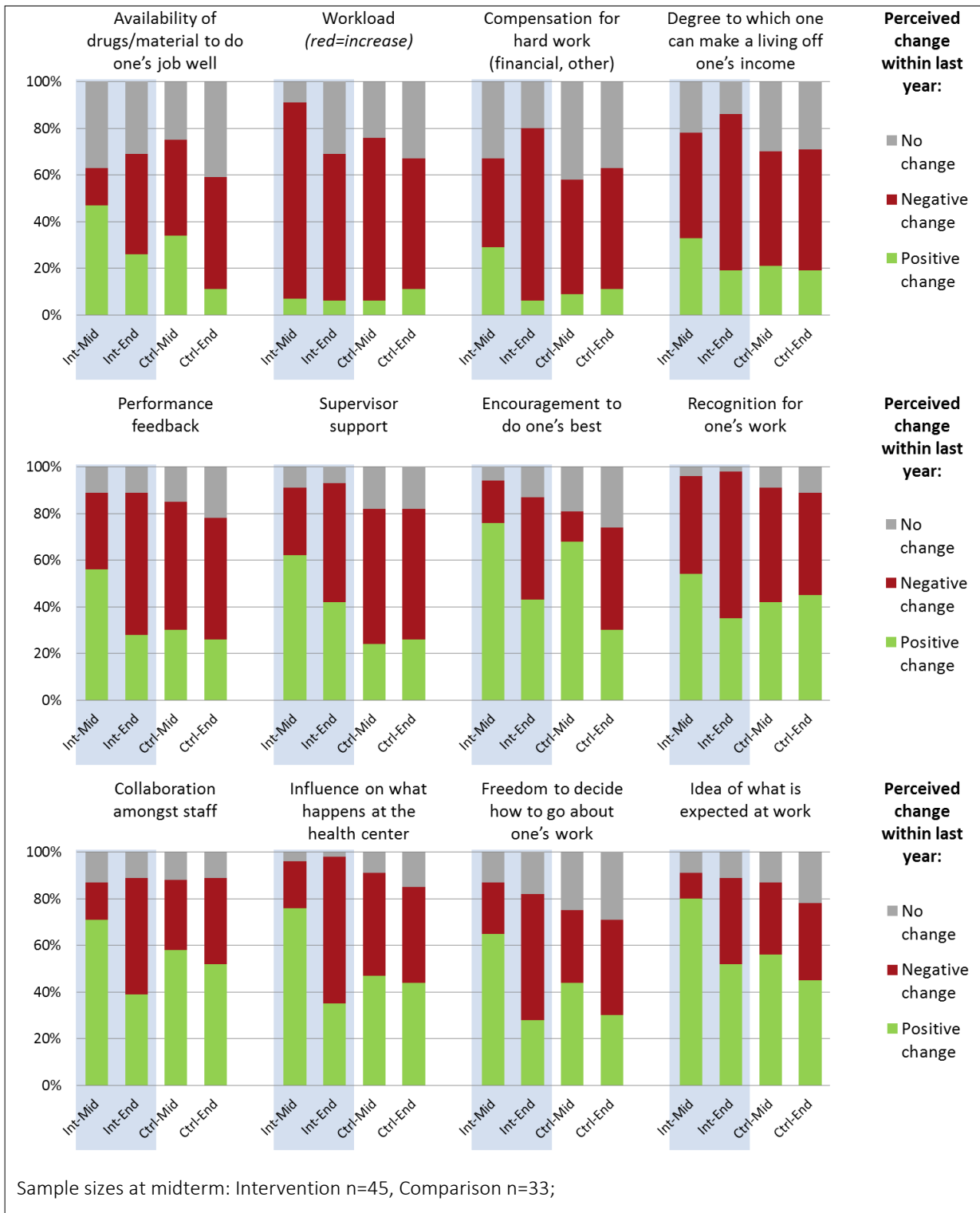


Table 6-6: Differences in aspects of work environment perception at midterm and endline (health center staff only, HSAs and non-maternity staff included)

Indicator		MIDTERM (changes in year 1)		ENDLINE (changes in year 1)	
		chi ²	Sig.	chi ²	Sig.
1	Availability of drugs/material to do one's job well	6.15	.05	2.45	.29
2	Workload	3.46	.18	0.93	.63
3	Compensation for hard work (financially, otherwise)	4.58	.10	4.01	.14
4	Degree to which one can make a living off one's income	1.54	.46	2.64	.27
5	Performance feedback	4.97	.08	1.79	.41
6	Supervisor support	11.05	.00	3.19	.20
7	Encouragement to do one's best	2.79	.25	2.54	.28
8	Recognition for one's work	1.27	.53	4.62	.10
9	Collaboration amongst staff	2.46	.29	1.36	.51
10	Influence on what happens at the health center	6.65	.04	6.90	.03
11	Freedom to decide how to go about one's work	3.42	.18	1.63	.44
12	Idea of what is expected at work	5.63	.06	1.77	.41

Sample sizes at midterm: Intervention n=45, Comparison n=33;

Sample sizes at endline: Intervention n=54, Comparison n=27.

chi² = chi square test statistic, sig. = significance level

Two general trends are apparent from the quantitative data:

- ★ In line with the RBF program theory, health care workers in intervention facilities perceived relatively more positive change than health care workers in comparison facilities, particularly with regard to the physical conditions of the workplace, supportive supervision, performance expectations, and feedback, as well as influence on what happens at the health facility. However, positive changes in perceptions of the workplace were largely limited to the first year of the intervention, and partially even reversed in the second year.
- ★ Most notably and counterintuitive to the intervention logic, a substantial share of respondents stated that the availability of material to do one's job well, compensation for hard work, recognition of effort, performance feedback, collaboration, and influence on what happens at the facility had changed for the worse in the second year of the intervention.

The results of the **qualitative component** corroborate these findings, and offer explanations as to the reasons as follows:

- ★ Regarding the **availability of drugs and other material to do one's job well**, health care workers perceived substantial positive changes at their workplace particularly in the first year due to the combination of the initial infrastructure and equipment upgrade, the startup funds facilities received to compensate for delays in equipment delivery, and the introduction of the RBF rewards. Compared to this large influx of funds and material in the first year, the intervention contributed relatively little in terms of material resources in the second year, with only the RBF rewards operational. In addition, the general economic crisis in Malawi affected the supply situation in the Malawian health system more and more in the second year of the intervention. By trend, DHMTs resorted to prioritizing non-RBF facilities in terms of supplies, asking RBF facilities to buy their own supplies. As a result, health care workers perceived comparatively less positive

or even negative perceived change in the availability of materials and supplies in the second year. Most health care workers expressed understanding for the DHMTs' difficult situation and willingness to use their own funds to buy routine supplies.

- * Regarding **performance feedback and recognition of effort**, health care workers reported substantial improvements in supervision and performance feedback, both in quality and quantity, which were perceived as helpful and supportive rather than controlling. In the first year, the indicator set and verification process were perceived as non-transparent and unfair by a number of health care workers. Changes in processes (e.g. indicator set revisions, external verification teams, quarterly verification) during the second project phase were thus welcomed by all respondents, and led to greater acceptance and perceived usefulness of the verification results. However, health workers reported that the performance verification process had not taken place since March 2015 – at the time of the interviews (October 2015), two rounds of verification had thus been missed. While facilities continued to receive bonus payments based on the last conducted performance verification, health workers were not happy with this as they missed an opportunity for feedback, which would have permitted them to further improve their performance. As a result, many health care workers perceived negative change in the area of feedback and recognition of effort in the second year.
- * Particularly in the second year of the intervention, health care workers reported a significantly higher increase in **workload** than health care workers from comparison facilities. The increase is attributed to an increase in the number of patients (see 2.2), the time spent per patient as treatment protocols were more closely observed, and the administrative tasks linked to the CCTs (patient registration, cash disbursement). Although the intervention had set minimum levels of skilled birth attendants as an inclusion requirement, and DHMTs had deployed additional staff members to many facilities in response, these additional postings were not sufficient to buffer the increase in workload from many health care workers' perspective. Additionally, due to turnover, not all intervention facilities still met the minimum staffing requirements at endline. At endline, a substantial number of health care workers thus complained that the workload had reached levels that were unsustainable at high levels of quality. In light of the above, in the second year, health care workers perceived a reversal of the very positive trend in terms of perceived impact on what happens at the facility and **autonomy** in going about one's job in the first year. Rather, several respondents felt caught in an increasingly impossible-to-handle situation:

"Honestly, I feel like the project is there to bring a burden on us. They are just trying to get more customers in, but the staff and resources to attend to those customers are few." (Nurse, Mchinji)
- * Regarding **compensation for hard work**, health care workers generally appreciated the addition to their salaries through RBF rewards, although many respondents did not consider the individual reward amounts appropriate to the effort required by the intervention given the above described situation in regards to workload, particularly in the second year.
- * While the intervention introduced common goals and incentives, leading to higher perceived levels of **collaboration and cooperation**, it also introduced serious conflict at the health facility as staff members fought over the distribution of the staff portion of the RBF rewards. Particularly in the first year of the intervention, this led to dissatisfaction particularly among HSAs and staff from adjunct departments at hospital level, with negative effects on work performance. Through mediating interventions by the DHMTs and RBF secretariat, open conflict around money could be somewhat reduced, but continued to be an issue at endline. Health care workers expressed high levels of wariness of this unintended effect of RBF, which

"... is bringing us together, but [...] is also driving us apart." (Nurse, Balaka)

6.3. RBF4MNH impact on health care providers' job satisfaction

To estimate the effect of the RBF4MNH on health worker satisfaction and motivation, we adjusted the difference-in-differences (DiD) regression models to control for the following additional health care provider-specific factors: age, sex, type of health worker cadre, years of work experience, years worked at this facility. In addition, we adjusted for clustering at the facility level.

Health care workers' satisfaction with diverse aspects of their work and workplace was measured with a list of 23 direct questions ("How satisfied are you with ...?"). Questions were thematically grouped, supported by principle component analysis. For each thematic group, scores were calculated as the unweighted arithmetic means of all questions pertaining to the thematic group.

Table 6-7 shows the Baseline-Endline-DiD results for the maternity health care worker subsample (excluding non-maternity staff and HSAs), as well as internal consistency estimates of the combined scores (Cronbach's alpha) over the pooled baseline and endline samples. Results for the full sample do not differ substantially.

Table 6-7: RBF impact estimates on health worker job satisfaction (excluding HSAs and non-maternity staff)

Indicator (1=high level, 5=low level)		BASELINE				ENDLINE				DiD adjusted BL-EL	Sig.	α*
		Intervent.		Compar.		Intervent.		Compar.				
		mean	n	mean	n	mean	n	mean	n			
1	Overall job satisfaction	2.6	52	2.0	25	2.1	74	2.0	26	-0.5	.21	**
2	Satisfaction with ability to provide high quality care given current working conditions	3.2	52	2.8	25	2.5	74	2.5	26	-0.3	.45	**
3	Satisfaction with opportunities to be rewarded for hard work	3.8	52	4.0	24	3.1	74	3.3	26	0.6	.25	**
4	Satisfaction with material condition of the workplace	3.9	52	3.1	25	2.6	74	2.9	26	-0.9	.02	.83
5	Satisfaction with salary and benefits	4.6	52	4.5	25	4.1	74	3.9	26	0.3	.39	.73
6	Satisfaction with opportunities for professional development	3.9	52	3.6	25	3.5	74	3.0	26	0.4	.28	.53
7	Satisfaction with demands of the job	3.4	52	3.0	25	2.8	74	2.6	26	0.0	.93	.60
8	Satisfaction with relationship to the community	2.0	52	2.1	25	2.0	74	1.9	26	0.2	.59	.64
9	Satisfaction with health facility management	2.5	43	2.1	23	2.3	66	1.9	21	-0.5	.17	.77
10	Satisfaction with working relationship with DHMT, MoH, CHAM	1.7	51	1.7	25	1.7	74	1.7	26	-0.1	.78	**
11	Satisfaction with working relationship with other staff members	2.4	52	2.4	25	2.3	73	2.2	26	-0.3	.54	**

* Internal consistency of multi-item measure (Cronbach's alpha) ** single-item measures

DiD = effect estimate based on difference-and-difference regression; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

Our quantitative results indicate:

- * A statistically significant positive intervention effect only on health care workers' satisfaction with the material conditions of the workplace, which includes aspects of infrastructure, equipment, drugs, and other supplies.
- * The somewhat surprising absence of further intervention effects on satisfaction might be explained in lines of the above presented findings; Health care workers perceived relatively positive changes in the first year of the intervention, but these positive changes in perceptions partially reversed in the second year, resulting in stable levels of overall satisfaction between baseline and endline.

6.4. RBF4MNH impact on health care providers' motivation

- * Most health care workers reported that the intervention generally motivated them to improve their performance, despite diverse implementation-related frustrations throughout the study period.
- * However, the qualitative interviews at endline revealed that structural challenges related to the health care system might well become a major threat to the continued success of the intervention. As discussed, health facilities struggled to manage the increased workload. In addition, a lack of adequate resources persisted in respondents' perception. As a result, many felt that they have no chance of achieving the targets set by the intervention, leading to them to lose out on reward payments which would have been important to the facility and them personally, and leaving them frustrated, helpless, and tired.
- * As a consequence of this situation, qualitative interviews revealed that cheating occurred quite regularly throughout the study period, with health workers forging register and labor graph entries in order to avoid appearing low-performing and losing out on reward money as described in more detail in section 3.5.

6.5. RBF4MNH mechanisms in changing health care providers' motivation

Health care workers described the following specific motivational mechanisms of the intervention:

- * **The improved resource situation:** As discussed, health care workers reported that the intervention had its most important impact on the infrastructure, equipment, and supplies situation. Health care workers described how this improved situation made them feel more effective, less limited in terms of what they could do and better positioned to put their skills and education to good use. The enhanced working environment was described as tremendously gratifying and a seminal source of motivation:

"For me, it's especially the infrastructure and equipment part of it that has made a big difference. I feel good to work in an environment which is ok infrastructure-wise, with enough equipment, so I can assist the women better than before."
(Nurse, Mchinji)

- * **Monetary rewards:** Health care workers described how anticipation of the RBF rewards motivated them to strive to fulfill the indicators and targets set by the intervention. The motivating potential of the intervention, however, was limited by a number of challenges, most importantly: as previously mentioned health facilities' complete autonomy in sharing the staff portion among staff members led to serious and lasting conflict in many health facilities, which outweighed positive feelings toward individual rewards for many respondents. Many interview partners called for fixed guidelines in reward sharing. In the initial stages of the intervention, this was exacerbated by poor understanding of the performance verification process, leading to unrealistic expectations of the reward payments, and subsequent disappointment and frustration. At CEmOC

level and particularly in the first year, many health workers did not perceive the reward amounts to be high enough to have motivating potential, particularly in relation to the effort required by the intervention and to other sources of additional income such as locum.

- ★ **Reputational rewards:** Health care workers described that a healthy, constructive competition between facilities and districts had developed, and that the wish to be recognized as a high performing facility acted as a major motivator to further improve performance. In the first year of the intervention, this effect was limited by the peer review verification process, which led to “foul play” in most health care workers’ perceptions.
- ★ **Performance targets, feedback, and supportive supervision:** Health care workers reported being motivated by the performance targets and feedback inherent in the PBF scheme. Health workers, especially following revisions after year one, very well accepted the indicator set. Health workers were motivated by its function as a clear and focused reminder of good clinical practice. They further described how the feedback and the interest in and appreciation of their work motivated them to improve their performance. Several implementation challenges dampened the positive impact of the performance feedback and supervisory aspects of the intervention; most importantly, many health workers found the verification results unfair and not reflecting their true performance, particularly in the first year, primarily due to dissatisfaction with the verification process. While changes in the verification process following the first year were appreciated, health workers’ satisfaction with the process was dampened by delays in verification incurred toward the end of the second year, which led them to miss out on opportunities for further performance improvement.

6.6. RBF4MNH effect on motivation composition (crowding out of intrinsic motivation)

We measured health care worker motivation composition with a psychometric scale adapted from Tremblay et al. (2009), which is based on Deci and Ryan’s (1985) Self-Determination Theory (SDT) and includes sub-measures of different types of motivation. On a 5-point Likert scale, respondents were asked to indicate their degree of agreement with 11 statements such as “I work in this job for the income it provides me.” or “I work in this job because I want to make a difference in people’s lives.” Statements were grouped according to the different types of motivation postulated by SDT, and scores were calculated as the unweighted arithmetic means of all questions pertaining to the respective type of motivation. Cronbach’s alphas over the pooled baseline and endline samples were .59 (intrinsic motivation), .72 (integrated/identified motivation), and .68 (introjected motivation). External motivation was measured with a single item. **Table 6-8** shows the Baseline-Endline-DiD results for the maternity health care worker subsample (excluding non-maternity staff and HSAs). Results for the full sample do not differ substantially.

- ★ Our study provided no evidence that the financial incentives or any other element of the intervention had eroded health workers’ intrinsic motivation over the study period. Health workers’ intrinsic and integrated/identified motivation (i.e. motivation derived from the importance of activities for one’s fundamental values and goals, e.g. health care work as a ‘mission’, wish to make a difference) did not change with the introduction of the intervention.
- ★ The quantitative results indicate a small but statistically significant negative impact on introjected motivation (i.e. motivation derived from performance-contingent self-worth such as reputation or pride). This is somewhat contrary to the qualitative study component results, which underlined the important motivating function of the reputational effect of the performance verification process. The quantitative results also indicate no intervention effect on external motivation.

★ This is in line with the results of the qualitative study component: As discussed, despite stating that they were motivated by the individual rewards, many health workers had mixed feelings about them due to the conflict they introduced. In addition, many perceived the reward amounts as inadequate in relation to their effort dispensed in the context of the intervention. While the individual rewards thus seemed to play a role in motivating provider behavior change as one component of the overall intervention, there is no indication that they were powerful enough to fundamentally alter the relative importance of intrinsic and extrinsic motivations in driving health workers' behavior at work:

"I feel like this is my job, I just better give the best I can to these [...] patients, but not in considering that at the end, RBF will give something which I will benefit more on top of it, no." (Nurse, Mchinji)

Table 6-8: RBF impact estimates on health care worker motivation (excluding HSAs and non-maternity staff)

Indicator (1=high level, 5=low level)		BASELINE				ENDLINE				DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.			
		mean	n	mean	n	mean	n	mean	n		
1	Intrinsic motivation ¹	2.1	52	1.9	24	2.0	74	1.8	26	0.1	0.79
2	Integrated/identified motivation ²	2.1	52	2.0	24	2.0	74	1.8	26	0.2	0.29
3	Introjected motivation ³	1.7	52	1.6	24	1.8	74	1.5	26	0.3	0.03
4	External motivation ⁴	3.2	51	2.9	23	2.9	74	2.8	26	-0.1	0.86

¹ Motivation derived from interest in and enjoyment of the task or activity itself

² Motivation derived from the importance of activities for one's fundamental values and goals (e.g. health care work as a 'mission', wish to make a difference)

³ Motivation derived from performance-contingent self-worth such as reputation or pride

⁴ Motivation derived from rewards or punishment

DiD = effect estimate based on difference-and-difference regression; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

7. Findings on stakeholder opinions and perception of RBF implementation process

Key findings on RBF4MNH implementation process:

Specific RQ 4: *How does the supply-side component change the perception and motivation of health staff?*

The inclusion of stakeholders early in the design and implementation process was recognized as a key component contributing to the acceptability, adoption, and ownership of the intervention.

Successes of the implementation process included an increase in health worker motivation, improvement of infrastructure and resource availability, and increase in autonomy seen among facility staff.

Challenges occurring during the implementation process included short staffing, sharing of rewards, delays in infrastructure upgrades, procurement of equipment, and the performance verification process.

Stakeholders expressed positive views of the scale-up and would like to see the intervention expand to more facilities. Although sustainability remains a concern, all stakeholders wish to see the intervention continue.

BF4MNH was perceived as highly motivated, which was attributed to better resource availability and the introduction of additional incentives.

Specific RQ 9: *How do different stakeholders (namely programmers, health care providers, managers, clients etc.) involved in the RBF4MNH implementation process perceive the intervention?*

Stakeholders positively perceived the implementation process of the RBF4MNH Initiative in the four districts.

Main challenges to the implementation and operationalization of the RBF4MNH were faced in the overall understaffing of health facilities, delays in the facility upgrade component of the RBF, and the inefficient procurement processes for equipment.

All stakeholders perceive the RBF4MNH pilot as a successful approach and support the idea of a RBF scale-up beyond the current facilities and districts.

7.1. Description of qualitative samples used in this study component

This study component consisted of two rounds of qualitative in-depth interviews with stakeholders of the RBF4MNH Initiative. An initial round of interviews was conducted in May 2014 exploring the acceptability and adoption of the RBF4MNH implementation during the early phase of the RBF. A follow-up round of interviews was conducted from October-December 2015 to further explore implementation processes during the second RBF phase which started in October 2014, and to record the experiences with the local scale-up that occurred during this phase.

The initial round included a total of 24 in-depth interviews with the following respondents: five central-level members of the Ministry of Health (MoH), seven representatives of the implementation team to include one member of the Department for Reproductive Health (RHD) and six members of the technical support team consulted by the MoH for the RBF implementation process; three members representing the two funding agencies of the Phase I of the RBF4MNH (i.e. KfW Germany and Royal Norwegian Embassy); eight members of the District Health Management Teams (DHMTs) of the four pilot districts; and one external consultant working on maternal health quality improvement in Malawi (GiZ Germany).

The follow-up round included a total of 21 in-depth interviews with the following respondents: five central-level members of the MoH; six representatives of the implementation team to include one member within the RHD and five members of the technical support team consulted by the MoH for the RBF implementation process; two members representing the Royal Norwegian Embassy; one member representing KfW Germany, two District Commissioners; five members of the DHMTs of the four pilot districts.

7.2. Stakeholder experience, views, and practices in respect to RBF implementation process

7.2.1. Implementation process during Phase I:

- ★ The initial **implementation design** was a result of close collaboration among the RHD, the technical support team, and the central MoH department based on a feasibility study specifically conducted in the pilot districts to inform the RBF design process. This feasibility study further informed the MoH and specifically the RHD on the selection of the initial RBF intervention facilities and on the development for the first set of performance indicators and performance targets.
- ★ **Performance indicators and targets** were further identified in relation to their relevance to Malawi's overall health agenda and usefulness for the DHMTs and district reporting processes. During this process there were concerns that the final set of performance measures included too many indicators. Further concerns were raised in regard to certain targets, which were felt to be too ambitious in order to be achieved by the facilities in the districts. Main disagreement in respect to the final set of performance indicators was the fact that service performance on family planning topics was not considered at that time, which was of particular importance to the RHD and the DHMTs.
- ★ The **performance assessment** and reimbursement component of the RBF was organizationally divided with the implementation team being responsible for performance validation at the facility level and the calculation of resulting rewards. The DHMTs in contrast were responsible to guide and support facility staff in how to assign and distribute facility rewards at the facility level.
- ★ The experience of close **collaboration between central and local ministry levels** in designing and introducing the RBF4MNH was generally perceived very positively and increased the acceptability of the RBF intervention over time. In addition, the flexibility of the RBF4MNH implementation process to adapt to changes needed to overcome obstacles was well received. Most stakeholders perceived a trend toward greater ownership among the RHD and DHMT who provided needed inputs, shaped the intervention, and developed action plans to fit existing needs.

"The MoH is talking about RBF in their plans. When they are going out for supervision [...] they can also see the positive affect of it already. So yes, there is ownership now." (RHD member)

7.2.2. Scale-up process during Phase II:

- ★ The **RBF4MNH scale-up** to include an additional 15 facilities in the pilot districts was strongly supported by all involved stakeholders. Although intended, it was not financially feasible to include all facilities in these districts at that time. Hence, an additional selection process for Phase II intervention facilities had to be conducted based on staffing, infrastructure, and geographical criteria. The resulting Phase II facility selection was well supported by most stakeholders; however, some stakeholders admitted that they would have chosen a different set of facilities if these criteria had not been in place. As the selection process was transparent and based on obvious criteria, the result was also accepted by most facilities not yet involved and provided an additional incentive for non-RBF facility teams to work and perform harder in order to achieve enrolment in the future. At the same time however, DHMTs experienced difficulties in encouraging staff to stay at non-RBF facilities after the Phase II selection results became public.
- ★ The second phase of the RBF4MNH Initiative also included a few changes to the set of **performance indicators** initially chosen, most notable being the removal of an indicator increasing number of deliveries at the facility and the addition of a family planning indicator., which was initiated due to input from the DHMTs and RHD. Although the RHD together with the DHMTs were involved in the discussion leading to these changes, some newer DHMT members remained unaware of these changes.

7.3. Perceived success of RBF

Most respondents experienced an improvement in **health worker motivation** across both phases of RBF4MNH and attributed this to the subsequent improvement in the quality of care observed at RBF facilities.

- ★ A few stakeholders stated that the reward payments had enabled facilities to create a better work environment and improved living conditions for staff, which encouraged staff to stay at RBF facilities and to work harder.
- ★ DHMTs are now also visiting all facilities regularly as supervision is supported financially through the intervention. The closer supervision, in form of district review meetings and supervisory visits, was already experienced during the initial interview rounds and also contributed to an improvement in communication between facilities and district level agencies.

“They (health workers) are motivated and able to work. At the end of the day, they are able to give quality care because they are motivated to work.” (DHMT member)
- ★ During follow-up interviews, most stakeholders commented that they have noticed an increase in the number of women delivering at facilities, which they attribute to the **conditional cash transfers** (CCT). The CCT program was now fully implemented since the previous interview round.
- ★ The initial **structural and infrastructural inputs** provided to RBF facilities independent of performance were felt to have contributed heavily to the acceptability of the RBF intervention during the initial interview round. During follow-up interviews, respondents stated they used facility rewards to assist in improving facility infrastructure and resource availability. These improvements were perceived to have led to better staff morale and community satisfaction. RHD members also described that both the MoH and the communities showed more involvement and acceptance of the RBF intervention.

- ★ Several stakeholders stated that the RBF4MNH intervention led to greater **autonomy** for facility staff. Staff was now able to use the facility portion of rewards to buy items really needed by their facilities. This additional autonomy was experienced during both interview rounds, with some DHMT members considering this as positive effect compared to other programs, appreciating the flexibility that RBF allows. Facilities are now less reliant on DHMTs to resolve problems and obtain resources. Adjusting to this new autonomy, however, is challenging, as decentralization of processes such as financial management requires substantial administrative assistance.

“We have seen facilities becoming less reliant on the DHMT, because when they get the rewards and facility portions they can buy cleaning supplies, medicines, and the like.” (DHMT member)

7.4. Perceived challenges to RBF:

Several challenges were reported throughout the RBF implementation, mainly in respect to short staffing, sharing of rewards, delays in infrastructure upgrades, procurement of equipment, and the performance verification process.

- ★ All stakeholders reported that short **staffing** and high staff turnover continued to remain a significant challenge. During initial and follow-up interviews, staff shortage and high turn-over were found to be problematic at all levels and required significant efforts in order to maintain continuity of the implementation at RBF facilities. This was even more complicated by an increase in women delivering at facilities, and the fact that facility staffing is still managed centrally, which caused delays in deploying additional personnel to RBF facilities. Although RBF4MNH attempted to mitigate short staffing through a minimum staffing requirement at participating facilities, this was not always able to be followed due to nation-wide staffing shortages and, therefore, beyond the scope of the intervention.
 - ★ During both RBF implementation phases’ **infrastructure upgrades** and equipment support was delayed, which resulted in facilities being given additional financial start-up portions to obtain needed supplies directly. All financial transfers were complicated initially by the fact that facilities could not manage their own bank accounts, but stakeholders have since noted significant improvement in the intervention’s financial flow despite persistent challenges. Although the MoH and DHMTs greatly appreciated the infrastructure upgrades, difficulties in the approval process for these upgrades and the procurement of equipment continued to be reported. Some stakeholders reported the delays negatively affected both staff morale and community satisfaction.
 - ★ During both RBF implementation phases’ **infrastructure upgrades** and equipment support was delayed, which resulted in facilities being given additional financial start-up portions to obtain needed supplies directly. All financial transfers were complicated initially by the fact that facilities could not manage their own bank accounts, but stakeholders have since noted significant improvement in the intervention’s financial flow despite persistent challenges. Difficulties in the approval process for infrastructure upgrades and the procurement of equipment continued to be reported, and some stakeholders pointed out that the resulting delays negatively affected both staff morale and community satisfaction.
- “Most of the infrastructure upgrade has not been completed on time. We are still not able to use the new maternal labor ward. I think that is the major setback.”* (DHMT member)

- ★ DHMTs also experienced the shorter **verification** cycles during Phase II, with a reduction from 6 months to 3 months, to have positively affected facility staff as they now received bonuses more frequently. However, this also meant that for the past two cycles no actual verification processes

were performed, and facilities were rewarded based on the last verified cycle and not on their actual performance. Difficulties in finding a suitable verification agent were the main reason for this delay. So far, this seemed to have not yet resulted in a demotivation of staff, but there are concerns that this might easily lead to deterioration of staff morale if this situation is not resolved.

7.5. Overall stakeholder perception:

Overall, stakeholders perceive the RBF4MNH intervention positively based on the successes they experienced, particularly the improvement of quality of care.

- ★ Although stakeholders acknowledge the strong influence of the initial infrastructure upgrades, they still identify the incentives as being essential to increasing provider motivation and patient satisfaction.
- ★ The inclusion of stakeholders early in the design and implementation process was recognized as a key component contributing to the acceptability, adoption, and ownership of the intervention. In addition, the flexibility of the intervention allowed for inputs from all stakeholders, which led to critical changes to overcome challenges throughout the implementation process.
- ★ Sustainability of the program still remains a major concern, but this finding was less salient in the second round of interviews and may be due to the commitment the government expressed toward the intervention. The majority of stakeholders wish to see this program expand to all facilities and to include other health services beyond maternal and neonatal health.

“Changes are always discussed before with all partners on all levels. Because of this, they (local stakeholders) really feel involved and that it is their initiative.” (RBF implementation team member)

8. Concluding remarks in regard to the findings

Our study has generated knowledge regarding the RBF4MNH Initiative that has meaningful implications for not only those directly engaged with the RBF4MNH Initiative (and other PBF programs in Malawi), but also for policymakers, quality improvement specialists, facility-level supervisors and health systems specialists (including researchers) engaged in efforts to improve the functionality and impact of similar health interventions in low-income settings. As highlighted throughout the results section, our research found that while actors throughout the health system are generally supportive of the RBF4MNH Initiative and eager to see it continue and/or expand, the program is nevertheless challenging to implement in the context of severe health system limitations, especially in respect to human resources, infrastructure and equipment.

While our study did not detect widespread, statistically significant effects on service utilization or clinical quality of care – both main objectives of the intervention – we urge that these findings be viewed through the lens of contextual factors.

Service Utilization: In relation to our study's inability to detect changes in service utilization for delivery care, we highlight that major shifts in patterns of care seeking for delivery have been occurring within Malawi in the past decade. The country experienced an unprecedented increase in rates of skilled birth attendance (from 56% in the 2004 MDHS to 71% in the 2010 MDHS). This increase may be linked to a 2008 ban of traditional birth attendants, which – despite being rescinded in 2010 – could have laid the foundation for attitudinal shifts in favor of delivery in facilities. Results from our baseline survey in 2013 showed universally high rates of skilled attendance approaching 90% across all facility catchment areas. Considering that utilization of facility-based delivery increased across intervention and comparison areas to reach nearly 95%⁵, absent a very large study sample, it is near impossible to detect statistically significant difference in practices that are (near) universally practiced. We therefore caution against drawing conclusions related to the effectiveness of the RBF4MNH Initiative related to this indicator based on this study. A promising finding related to service utilization was our finding that an increasing proportion of women from comparison areas sought care at intervention facilities; our qualitative understanding suggests that service utilization was at least facilitated by clients' positive perception in respect to service quality in RBF facilities. In terms of our study detecting no changes in the utilization of related services such as ANC and PNC, we highlight that these services were not targeted by RBF4MNH, and while in theory they could have been affected, this hypothesis is not supported by our data.

⁵ There is one bias intrinsic to our sampling strategy that needs to be noted here and which might have led to a systematic overestimation of the rate of maternal care service use in our study. As indicated in the methods section of this report, we defined our clusters as a direct function of the catchment areas of the 33 facilities indicated by the MoH as official EmOC providers. Having plotted the geographical distribution of our sample, however, we have reason to believe that the current delineation of catchment areas provided by the MoH does not correspond to the facilities' actual radius of action for provision of EmOC services. We have reason to believe that in several cases, the actual radius of action for provision of EmOC services is wider than the delineation of catchment area, reaching to communities residing further away from the concerned facility. Assuming that distance plays a role in access to care, this would likely lead to an overestimation of the rate of utilization for all maternal case services, as presented in this report. Given the absence of relevant information from comparable community-based surveys, however, we cannot test whether our sampling strategy actually led to such an overestimation or not. In any case, since the sampling strategy did not change over the three rounds of data collection, it does not in any way represent a threat to the validity of the effect estimation.

Service Quality: In terms of quality of care, we highlight that while we observe no statistically meaningful difference in overall clinical quality, improvements were detected on single quality indicators (just not on the overall process within which this indicator was placed). This situation is likely linked to the general difficulties RBF programs face in setting and verifying adequate quality indicators and targets for clinical performance. In other words, indicators that are readily measured and verified are possibly not the same factors that create differences in the process of delivery care.

In this regards, it needs to be further highlighted that the problem of accurate measures affects the evaluation in a similar way. For example, in respect to measuring changes in clients' perception of and satisfaction with service quality, we found great disparities between quantitative findings that suggest extreme satisfaction with the quality of delivery care, while our qualitative data highlight alarming instances of disrespect and abuse that merit immediate attention.

In addition, optimal clinical performance is dependent on optimal service inputs. Both quantitative and qualitative findings point towards the fact that the most crucial input factor – the number of qualified health workers – remain still short at many health centers. And while there are some changes in drug and supply availabilities, facilities still seem rather dependent on DHMTs and centrally organized supply chains in terms of procurement of service inputs. Based on the current understanding of RBF's role as a provider payment as well as systems reform approach, service-wide changes in performance quality are tied to the degree of managerial and financial autonomy granted to facilities, which includes besides others independent contracting of suppliers and recruiting staff.

We also posit that an absence of significant differences could be linked to contamination. Our intervention and comparison facilities were located geographically near to one another (within the same districts), and all facilities in the districts rest beneath the influence of DHMTs which were themselves incentivized to engage in district-wide endeavors (that affected both intervention and comparison facilities). In addition, several comparison facilities switched into intervention facilities as part of the evolving RBF4MNH Initiative's implementation plan. Although this 'contamination' of potential positive RBF effects (mainly through DHMTs) to non-RBF facilities was intentional from the perspective of the implementation (i.e. to ensure that not only pilot facilities, but also facilities not enrolled in the pilot might have at least some benefit), this contaminating effect could not be sufficiently accounted for by the evaluation design.

It is further plausible to consider that the intervention produced externalities to comparison facilities. For example, our qualitative findings pointed out that even in instances when comparison facilities knew they would not become an intervention facility in the next RBF implementation phase, they changed their behavior towards meeting RBF eligibility criteria in hopes that eventually a switch may occur.

RBF4MNH Implementation Process: Related to challenges of implementing a RBF program generally, our qualitative understanding suggests that constraints within the broader health system in terms of ensuring a sufficient degree of purchaser-provider split and decentralization. We found that it was challenging for service providers (DHMTs and facilities) to create an environment that could effectively support the provision of higher quality care to an increased influx of patients, especially in light of system-wide scarcity of supplies and particularly human resources. Emerging evidence is also suggesting that the introduction of the RBF4MNH Initiative produced an impression (among DHMT staff) that these facilities necessitate *less* attention from the DHMT in terms of resources, while in reality RBF-facilities' autonomy was probably not yet fully established to fully cope with this situation.

Because the RBF4MNH facilities were resting beneath the gaze of other, more singularly focused stakeholders, DHMT staff could shift their efforts to meet the health service deficits in other facilities throughout their districts. Yet, as an emerging finding, this vein of probing merits further exploration.

Provider motivation: In terms of provider motivation, we noted RBF4MNH motivated health care providers to improve their performance in the presence of additional rewards, improved supervision and feedback, and in particular through significant perceived improvements to their working environment. These improvements allowed individual health workers and health care provider teams to take better care of their patients and to feel more comfortable at work. This positively reinforcing cycle is particularly valid in reference to the initial stages of the program when the largest portion of (non-conditional) infrastructure improvements occurred.

Unfortunately, however, as discussed above, evidence from our study suggests that this increase in motivation did not translate into improvements in quality of care to the extent desired. Health workers primarily attributed this to an overwhelming increase in workload due to a combination of higher numbers of patients and closer adherence to clinical protocols as enforced by RBF4MNH. While our study did not include elements to quantify such changes, health workers from intervention facilities gave detailed accounts of how RBF4MNH increased their workload substantially, and how improvements in the staffing and resource situation were not sufficient to meet this increase, particularly at hospital levels. Overall, this finding points back to the fact that the current RBF mechanism remains too weak to overcome the overall limited human resource for health situation in Malawi.

In response to the general concerns of financial incentives to erode health care providers' motivated behavior to become increasingly oriented towards rewarded performance, our study did not find any indication that the intervention affected health workers "motivational profile" in a fundamental way, i.e. we did not detect crowding out of intrinsic motivation. Nor did we find a substantial increase in the importance placed on money or other external stimuli.

Design and Contextual Realities: Finally, we urge that findings be interpreted through the lens of characteristics of the timing and nature of the both the intervention and concurrent evaluation, and economic realities at play in Malawi. On the former point, intervention and evaluation timelines would have ideally been perfectly matched for 24 months and in close alignment with the reward cycles. Or, the non-conditional inputs (such as equipment provision as well as infrastructure construction) would have been completed *before* the intervention was evaluated for impact. Or, the CCT portion of this study would have been introduced in a more consistent way across intervention areas. In this sense, portions of our study reflect findings that may be more accurately viewed through the lens of implementation research rather than an end-line evaluation. Specific to this point, one may note the need to interpret our findings pertaining to indicators of clinical quality of care as suggestive of the need to constantly reflect and improve the definition of the indicators on the basis of which performance rewards are paid to health care providers. Similarly, one may wish to reflect on the role and the likely cost-benefit ratio of tying conditional cash transfers to a service whose utilization rates are already very high.

In terms of the economic situation within Malawi, we highlight that the country has experienced an overall deterioration in terms of the availability of resources to be devoted to social services, including health. Decreasing health budgets obviously represented a challenge to the effective implementation of RBF in Malawi. Our findings largely suggest that in such a context, intervention facilities managed

to maintain previous standards of care, while control facilities often degenerated to lower quality. One could postulate the hypothesis, to be tested, that in circumstances of greater stability, RBF could have served to improve quality rather than maintaining standards.

9. Appendix: Additional Results

Table A-1: RBF4MNH impact estimates for reproductive health service utilization by women within catchment area of residence.

Indicator		BASELINE				MIDTERM				ENDLINE				DiD adjusted BL-ML	Sig.	DiD adjusted ML-EL	Sig.	DiD adjusted BL-EL	Sig.
		Intervent.		Compar.		Intervent.		Compar.		Intervent.		Compar.							
		mean	n	mean	n	mean	n	mean	n	mean	n	mean	n						
1	Proportion of women reporting having attended at least one ANC clinic during their most recent pregnancy	96.9	1,147	95.9	681	98.9	1,150	98.5	680	98.9	1,117	98.7	667	<-0.1	.67	<-0.1	.09	<-0.1	.89
2	Proportion of women reporting having attended their first ANC clinic during the first trimester of their most recent pregnancy	15.1	1,111	14.7	653	18.9	1,137	16.3	670	21.8	1,105	22.3	658	<0.1	.44	<-0.1	.72	<0.1	.77
3	Proportion of women reporting having attended at least four ANC clinics during their most recent pregnancy	44.0	1,111	44.7	653	51.3	1,137	47.0	670	50.6	1,105	52.4	658	<0.1	.27	<0.1	.76	<0.1	.37
4	Proportion of women reporting current use of a modern method of family planning	57.7	1,149	60.6	688	58.2	1,140	71.7	667	58.3	1,133	59.2	672	-0.1	.51	<-0.1	.63	<0.1	.69
5	Proportion of women reporting having delivered their last child in a health facility	91.1	1,100	89.7	595	94.2	1,142	96.2	555	94.9	1,117	96.2	602	<-0.1	.26	<-0.1	.80	<-0.1	.85
6	Proportion of women reporting having attended PNC clinic at least once after their last childbirth	81.9	1,090	84.5	677	80.1	1,142	78.2	685	75.7	1,123	82.2	685	<0.1	.40	<0.1	.52	<-0.1	.91
7	Proportion of women reporting having attended PNC clinic within seven days of childbirth	42.0	1,099	45.6	695	44.7	1,150	41.8	699	35.6	1,133	37.1	692	0.1	.35	-0.1	.60	<0.1	.58

8	Proportion of women reporting having attended at least three PNC visits within six weeks of childbirth	79.3	1,099	83.0	695	79.0	1,150	76.4	699	76.1	1,133	82.8	692	0.1	.17	<0.1	.80	<0.1	.96
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ANC = antenatal care; PNC = postnatal care; DiD = effect estimate based on difference-and-difference regression; BL-ML = comparison between cohorts at baseline and midterm; ML-EL = comparison between cohorts at midterm and endline; BL-EL = comparison between cohorts at baseline and endline; Sig. = significance level of effect estimate

Figure A-1: Shift in utilization of delivery services from control towards RBF facilities

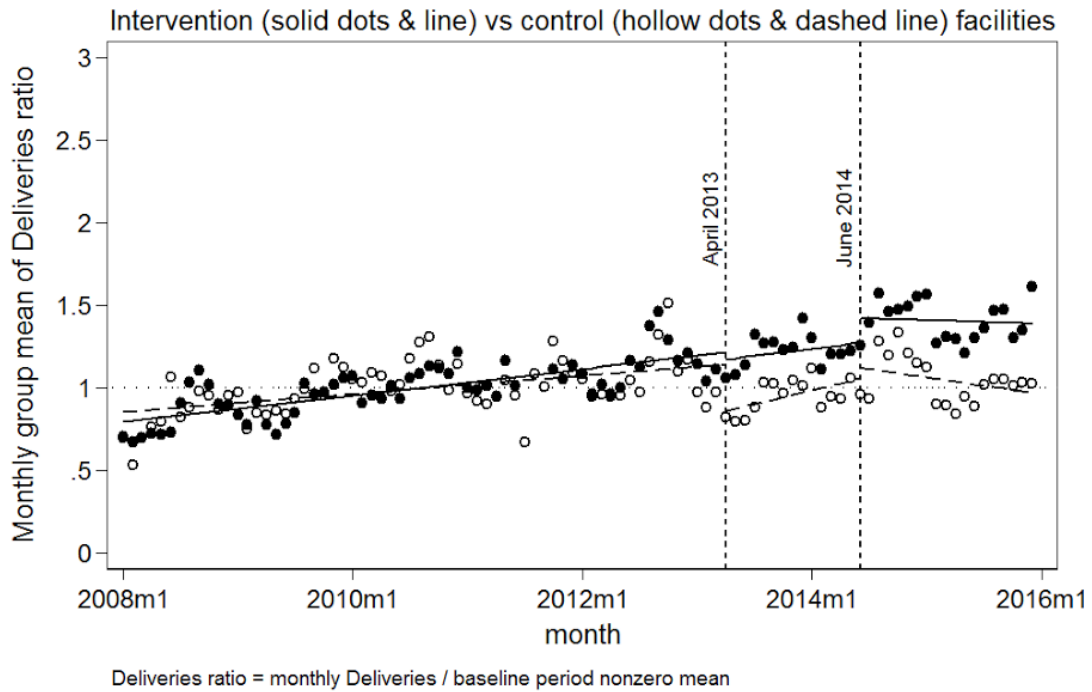
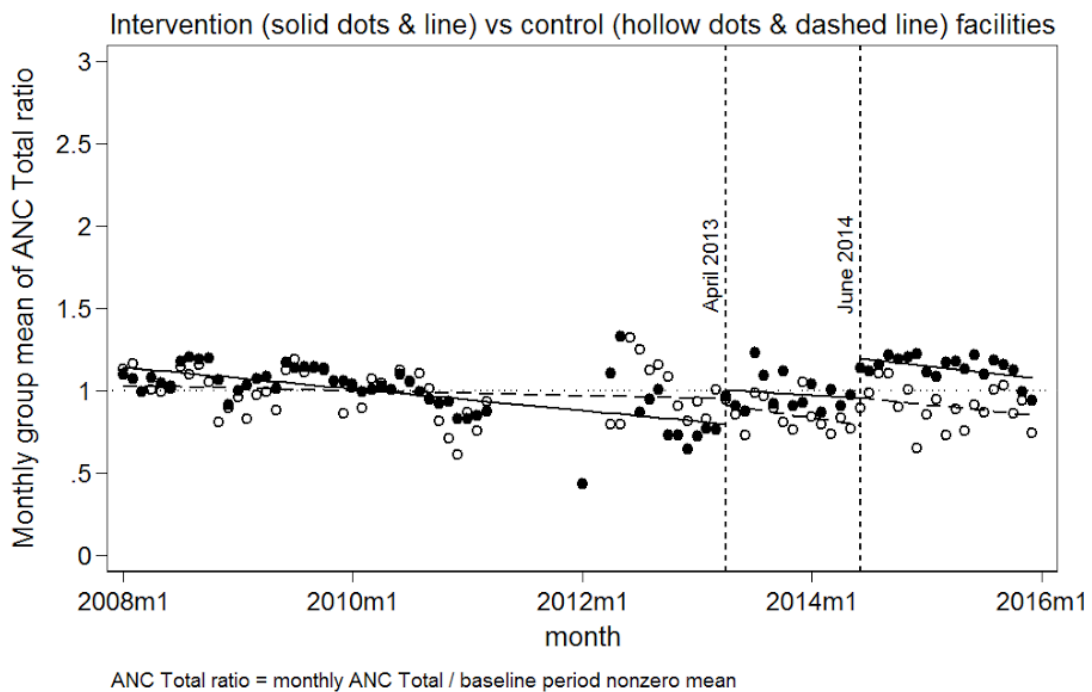


Figure A-2: Shift in utilization of ANC services from control towards RBF facilities



10. Annex: List of publications and dissemination products

10.1. Peer reviewed journal articles

Brenner et al. (2014) **Design of an impact evaluation using a mixed methods model—an explanatory assessment of the effects of results-based financing mechanisms on maternal health care services in Malawi.** BMC Health Services Research

Kambala et al. (2015) **How do Malawian women rate the quality of maternal and newborn care? Experiences and perceptions of women in the central and southern regions.** BMC Pregnancy & Childbirth

Mazalale et al. (2015). **Factors associated with delivery outside a health facility: cross-sectional study in rural Malawi.** Tropical Medicine & International Health

Brenner et al. (2015) **The quality of clinical maternal and neonatal health care - a strategy for identifying 'routine care signal functions'.** PLoS One

Wilhelm et al. (under review) **A qualitative study assessing the acceptability and adoption of implementing a results-based financing intervention to improve maternal and neonatal health in Malawi.** (BMC Health Services Research)

10.2. Results dissemination at national and international scientific conferences and workshops

3rd Global Symposium on Health Systems Research, Cape Town, South Africa.

Development of a tool to investigate the “intrinsic motivation crowding out effect”

Experiences and perceptions of women using maternal care services

Perspectives on using performance based initiatives to improve quality of care

Global Maternal Newborn Health Conference, Mexico City, Mexico

Health workers' perspectives on performance-based incentives

22nd Canadian Conference on Global Health, Montreal, Canada

Health workers' perspectives on performance-based incentives

How do implementers think about the design and implementation of the RBF4MNH Initiative

9th European Congress on Tropical Medicine & International Health, Basel, CH

How do women in rural Malawi perceive the quality of maternal and newborn care services provided in public facilities

Jahrestreffen Deutsche Gesellschaft für Gesundheitsökonomie (Annual Meeting of the German Society for Health Economy)

RBF4MNH Impact Evaluation – Preliminary Findings

Payment for Performance: a health systems perspective – Workshop for scientists and practitioners, Dar Es Salaam, TZ

What is the effect of RBF on the work environment – mixed methods results from Malawi

10.3. Policy Briefs

- Brief 1: RBF effect on service utilization
- Brief 2: RBF effect on Respectful Maternal Care
- Brief 3: RBF effect on health worker perception
- Brief 4: Effect of demand-side RBF (Conditional Cash Transfer)
- Brief 5: Performance Indicators

10.4. List of dissemination and stakeholder engagement events

Dissemination of study findings among RBF4MNH stakeholders

- Baseline Results Report (July 2014)
- Midterm Results Report (June 2015)

Review meetings with selected RBF4MNH Implementation Team members

- RBF4MNH TAG (November 2013, Lilongwe)
- Meetings with Options Consulting (January 2014, Heidelberg, May 2015, Heidelberg; October 2015, Heidelberg)
- Meetings with KfW (November 2013, Frankfurt)
- National Steering Committee on PBF in Malawi (July 2014, January 2015, October 2015)