EVALUATION OF MALAWI'S SUPPORT FOR SERVICE DELIVERY INTEGRATION PBI INTERVENTION

BRIEF 1: EFFECT OF INCENTIVES ON SERVICE QUANTITY AND QUALITY

THE CHALLENGE

Performance-based incentives (PBI) are commonly used as a financial measure to improve health service provision, either by targeting service outputs (e.g. number of patients seen) or service content or quality (e.g. number of patients treated according to protocol, availability of essential service inputs). Effects of PBI programs on service provision differ depending on initial service performance, health worker and facility capacities, PBI design and reward size, and other contextual factors. This brief provides a summary of the effects of a set of performance incentives used in Malawi on the quality of a range of essential health services (maternal and newborn care, child health, HIV/AIDS).

The design of the Support for Service Delivery Integration-Performance Based Incentives (SSDI-PBI) program began in 2012, and implementation started in September 2014. The evaluation of the program drew on a mixed-methods approach using quantitative and qualitative methods, and primary as well as secondary data.

This brief summarizes the results of quantitative analyses on data from 17 PBI facilities and 17 control facilities, including five hospitals and 12 health centers each. To assess eight dimensions of service provision (namely antenatal care, labor and delivery, child health, PMTCT, HIV, family planning, and postnatal care services, and general service management and quality assurance) we used routine data as well as primary data sources. Where monthly data were available, we used interrupted time series analysis; where one baseline and one endline measurement were available, we used difference-in-difference analysis to estimate the effect of the intervention. Time series analysis allowed us to compare how individual facilities performed in the intervention period relative to their own baseline performance, and revealed when PBI facilities experienced a change in level (a leap in performance at program outset) and/or a change in trend (gradual improvement over time) compared to control facilities. Difference-in-difference

THE SSDI-PBI INITIATIVE & IMPACT EVALUATION

The SSDI-PBI program aims to increase access, utilization, and quality of essential health services by linking rewards to service utilization and quality indicators across a range of conditions and services. Implemented by the Ministry of Health with funding from USAID and technical support from Jhpiego and Abt Associates, the program operates in 17 facilities across Chitipa, Nkhotakota, and Mangochi districts. SSDI-PBI entailed rewards paid to facilities and destined exclusively for facility improvements, and the procurement of goods and equipment via implementers rather than facilities directly.

This series of briefs is meant to serve as a resource for decision makers as they craft performance-based financing programs and policies in Malawi and similar settings. The briefs stem from a 1-year evaluation led by Heidelberg University in Germany and the College of Medicine in Malawi. While the design SSDI-PBI began in 2012 and will be implemented through September 2016, data for the evaluation represents the period up to and including December 2015.

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Doctor Ibe resuscitates a child who was not breathing after birth at Bwaila Maternity Unit in Lilongwe, Malawi. Photo credit: Paolo Patruno

analysis allowed us to compare what proportion of facilities were performing to a certain standard at baseline and post-intervention, and to compare whether changes in PBI and control facilities were measurably different. Ultimately, time series analysis was used to understand patterns related to service utilization (Tables 1 and 2) whereas difference-in-difference analysis was used to understand patterns across quality domains (Table 3). This was due to the type of data available for each type of indicator.

Given the heavy reliance on secondary data, the research team sought to draw from multiple sources of data in order to confirm or refute patterns across sources. This was possible, to a large extent, in relation to the service utilization data in the sense that Health Management Information Systems (HMIS) data could be crosschecked with data stemming from the Presidents Emergency Plan for AIDS Relief (PEPFAR) data. For the quality-related data, the research team intended to draw from three main sources: Service Provision Assessment (SPA) data collected in 2014, primary data that could complement questions within the SPA and Jhpiego's own Standards Based Management and Recognition (SBMR) data. Ultimately, due to data quality concerns, the SBMR data could not be used for analysis.

SUMMARY OF EFFECTS

In general, we observe more statistically significant improvements in health centers than hospitals when comparing SSDI-PBI facilities to controls. Furthermore, we see overall positive effects on MNH services, generally positive effect on HIV services, and neutral/no/negative effects on family planning and child immunization.

Table 1. Quantity Indicators Directly Incentivized by SSDI-PBI, results of a time-series analysis

INCENTIVIZED INDICATORS	TYPE OF EFFECT IN PBI HEALTH CENTERS	TYPE OF EFFECT IN PBI HOSPITALS
1. Number of pregnant women starting antenatal care during the 1st trimester	Trend increase	No effect detected
2. Number of women completing the 4 ANC visits	Level & trend increase	Level increase
3. Number of pregnant women receiving 2 IPT doses	Level & trend increase	Trend increase
4. Number of births attended by skilled birth attendants	Level & trend increase	No effect detected
5. Number of 1 year old children fully immunized	No effect detected	Level decrease
6. Number of HIV-positive pregnant women initiated on ART	Level increase	Trend decrease
7. Number of HIV/AIDS cases screened for TB	Data not available*	
8. Number of children receiving Vitamin A supplementation	Level increase	Trend increase
9. Number of clients counseled for FP	No effect detected	No effect detected
10. Number of couples tested for HIV during HTC services	Trend increase	Level & trend increase
11. Number of infants born by HIV positive mothers tested for HIV	Data not available*	
12. Number of women who receive PNC by skilled HCWs within 2 weeks	No effect detected	Trend increase
13. Number of pregnant women attending ANC receiving iron supplementation	Trend increase**	No effect detected

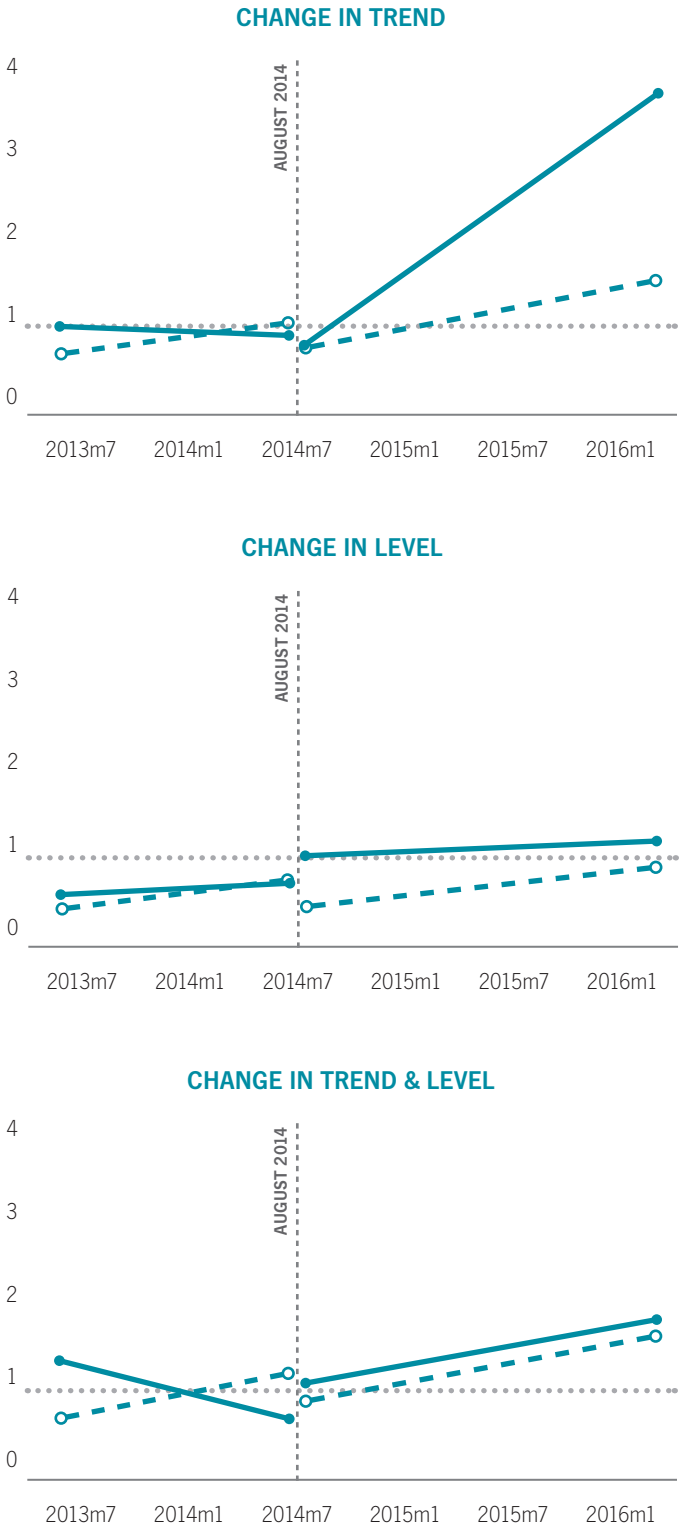
* For two indicators (#7 and #11) secondary data were not available either because data were not collected (#7) or had too many variables missing (#11).

** A significant trend increase attributed to the intervention was detected in the first half of the implementation period, after which a significant trend decrease was observed in both RBF and control facilities, likely due to a nation-wide supply stock-out

We begin with a presentation of changes observed across the 13 indicators that were incentivized by the SSDI-PBI program (see Table 1). In our analysis, we took note of both changes in "level"

Figure 1. Interpreting time series analysis of changes in trend and level; a visual depiction

PBI (solid dots & line) vs non-PBI (hollow dots & dashed line) facilities



A mother carries her baby to Khuwi maternity clinic, Malawi.
Photo credit: Donna Murray

and "trend". A level increase refers to an indicator improving measurably around the time of program outset (September 2014). A trend increase refers to an indicator increasing in slope after program outset. In order to facilitate the reader's understanding of these concepts, following Table 1, we present three representative figures that depict a) a change in trend, b) a change in level, and c) a change in both trend and level. In these figures, the solid black lines represent increases among SSDI-PBI facilities over the performance in control facilities (dashed lines).

This analysis also included an assessment of service utilization for non-incentivized indicators comparing SSDI-PBI facilities to controls (see Table 2). Across the six indicators for which data were available, we observe mixed results. In some cases, such as BCG and polio vaccine coverage, there was no change in health centers but a decrease in hospitals (comparing SSDI-PBI facilities to controls). At other times, trends increased in hospitals but no change was observed in health centers (HIV testing among pregnant and non-pregnant females). In only one case, HIV testing among males, was a similar trend increase observed across both health centers and hospitals.

Finally we analyzed changes in indicators related to quality that were not directly incentivized by the SSDI-Program, but for which impartial secondary baseline data were available and could be complemented with endline primary data collection. In an overarching sense, we see that performance according to these measurements was typically high regardless of facility status (hospital versus health center, and intervention versus control) that there was minimal space to detect statistically significant differences.

In order to facilitate the reader's understanding of these concepts, following Table 3, we present three representative figures that depict instances when a) PBI facilities were protected from general declines, b) improvement in control facilities relative to PBI facilities were detected, and, c) when no statistically detectable difference was observed. The final category (category c) was the most common category in this analysis. In each representative figure, the solid black line represents performance across SSDI-PBI facilities while the dashed line represents performance in control facilities.

Table 2. Quantity Indicators Not Directly Incentivized by SSDI-PBI, results of a time series analysis

NON-INCENTIVIZED INDICATORS	TYPE OF EFFECT IN PBI HEALTH CENTERS	TYPE OF EFFECT IN PBI HOSPITALS
1. BCG vaccine coverage	No effect detected	Level decrease
2. Measles vaccine coverage	Most data missing	
3. Pentavalent III vaccine coverage	Level increase	Level decrease
4. Polio-III vaccine coverage	No effect detected	Level decrease
5. Number of HIV-tested pregnant females	No effect detected	Trend increase
6. Number of HIV-tested males	Trend increase	Trend increase
7. Number of HIV-tested non-pregnant females	No effect detected	Trend increase
8. Under-1 year old fully immunized children	Most data missing	
9. Over-1 year old fully immunized children	Most data missing	
10. Number of postnatal mothers supplemented	Most data missing	
11. Proportion of all deliveries that are facility-based	Most data missing	

Table 3. Quality Indicators Not Directly Incentivized SSDI-PBI*, results of a difference-in-difference analysis

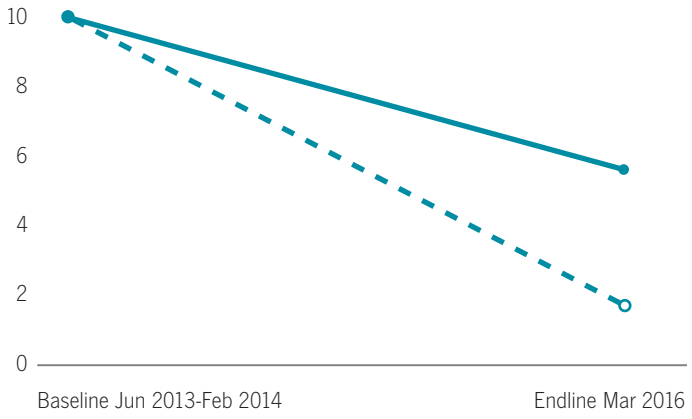
INDICATOR	INDICATOR PERFORMANCE PBI VS. CONTROL FACILITIES
15. Proportion of facilities that reported receiving external supervision within past 6 months	No effect detected
16. Proportion of facilities that reported having management meetings at least every 6 months	No effect detected
17. Proportion of facilities with client feedback system in place	No effect detected
18. Proportion of facilities with SP available at facility	No effect detected
19. Proportion of facilities with iron supplements available at ANC service site	PBI facilities protected from general declines
20. Proportion of facilities with injectable FP methods available	Control facilities improved
21. Proportion of facilities with oxytocin available in maternity unit	No effect detected
22. Proportion of facilities with delivery packs available at maternity unit	No effect detected
23. Proportion of facilities with partograph forms available at maternity unit	No effect detected
24. Proportion of facilities with rapid HIV tests available	No effect detected

* These indicators were chosen from among available data collected as part of Malawi's Service Provision Assessment (SPA). While not directly incentivized by SSDI-PBI, these indicators may be linked, or may constitute subcomponents of, more pointed indicators that were incentivized by SSDI-PBI or by an umbrella program that was ongoing in most facilities called "Performance Quality Improvement" (PQI).

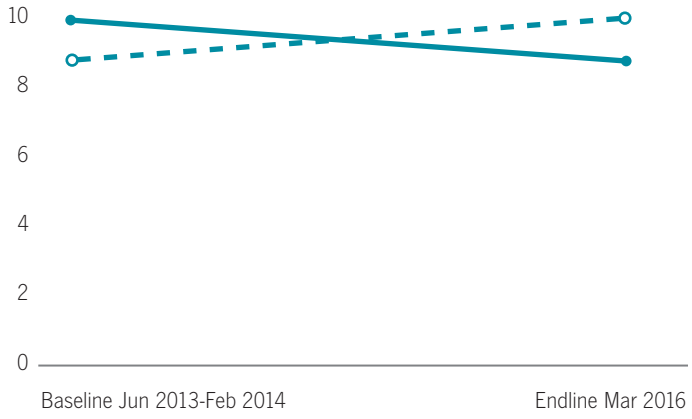
Figure 2. Interpreting difference-in-difference analysis of quality indicator performance; a visual depiction

PBI (solid dots & line) vs non-PBI (hollow dots & dashed line) facilities

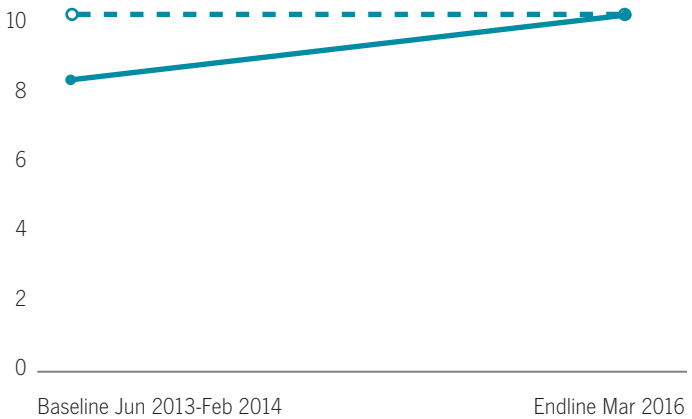
A. PBI FACILITIES PROTECTED FROM GENERAL DECLINES



B. IMPROVEMENT IN CONTROLS RELATIVE TO PBI FACILITIES



C. NO STATISTICALLY DETECTABLE DIFFERENCE



SERVICE PROVISION

Antenatal Care (ANC) Services

In respect to ANC service performance, PBI incentivized facilities to improve both service outputs and clinical content. In terms of ANC service outputs, the following performance indicators were used: a) the number of pregnant women starting ANC during their first trimester of pregnancy (Indicator 1 in Table 1), and b) the number of women completing at least 4 ANC visits during their pregnancy (Indicator 2 in Table 1). In terms of ANC service quality the following performance indicators were used: a) the number of pregnant women attending ANC services receiving at least 2 doses of IPT during the course of their pregnancy (Indicator 3 in Table 1), b) the number of pregnant women attending ANC services receiving iron supplementation (Indicator 13 in Table 1), c) proportion of facilities with Sulfadoxine-Pyrimethamine (SP) available at the facility (Indicator 18 in Table 3), and d) proportion of facilities with iron supplements available at ANC service site (Indicator 19 in Table 3).

For health centers, we found significant positive effects of PBI on both the number of first trimester ANC visits and the number of total ANC visits during a pregnancy. For hospitals, significant effects were only observed for the number of total ANC visits during a pregnancy. While PBI had an initial positive effect on the number of women who received iron supplementation during their ANC visits across health centers, this effect became significantly negative at later time points due to a national iron/folate (FeFo) tablet shortage; Indicator 19 in Table 3 indicates that PBI facilities were significantly better protected from the effects of the shortage than control facilities. However, there was no significant PBI effect observed across hospitals for a number of pregnant women receiving iron supplementation. For both health centers and hospitals PBI had significant positive effects on the number of women who received at least two doses of IPT during pregnancy. For both PBI and control facilities, SP was available at all facilities at both baseline and endline surveys.

Labor and Delivery Services

In respect to labor and delivery service performance, PBI incentivized facilities only in terms of labor and delivery service quality by improving the number of births attended by a SBA (Indicator 4 in Table 1). We additionally evaluated a) proportion of facilities with oxytocin available in maternity unit (Indicator 21 in Table 3), b) proportion of facilities with delivery packs available at maternity unit (Indicator 22 in Table 3), and c) proportion of facilities with partograph forms available at a maternity unit (Indicator 23 in Table 3).

A health worker prepares an IV bag in the pediatrics ward of a large referral hospital in Lilongwe, Malawi. Photo credit: Fletcher Gong'a

There was no statistically significant effect of PBI on the number of delivery cases attended by SBAs at health centers. At hospitals, we found a significant negative effect of PBI on this indicator. There was no significant difference in proportion of facilities with oxytocin, delivery packs, or partograph forms available in the maternity unit.

Child Health Services

In respect to child health service performance, PBI incentivized child health service outputs only, using the following performance indicators: a) the number of one-year old children fully immunized (Indicator 5 in Table 1), and b) the number of under-five-year-old children having received vitamin A supplementation (Indicator 8 in Table 1).

While there was no significant effect on the number of one-year old children fully immunized at health centers, we found significant negative effects of PBI on the performance of hospitals in respect to this indicator. We observed significant positive effects of PBI on the number of under-five-year-old children having received vitamin A supplementation at both health centers and hospitals.

Prevention of Mother-to-Child-Transmission of HIV (PMTCT) Services

In respect to service performance of prevention of mother-to-child-transmission of HIV (PMTCT), PBI incentivized facilities only in terms of PMTCT service outputs by improving a) the number of HIV-positive pregnant women initiated on anti-retroviral therapy (ART) (Indicator 6 in Table 1) and b) the number of infants born to HIV positive mothers tested for HIV (Indicator 11 in Table 1).

We observed a significant positive effect on ART coverage of pregnant HIV positive mothers across health centers, but a significant negative effect across hospitals during the late intervention period. We were unable to assess PBI's effect on HIV testing of infants born to HIV positive mothers due to low quality of available data on this indicator (many missing values in the database).

HIV Services

In respect to HIV service performance, the PBI incentivized facilities on improving HIV service outputs by improving a) the number of couples tested for HIV during testing and counseling sessions (HTC) (Indicator 10 in Table 1) and b) the number of HIV/AIDS cases screened for tuberculosis (TB) (Indicator 7 in Table 1). We additionally analyzed the number of HIV-tested pregnant females, males, and non-pregnant females, (non-incentivized indicators 5, 6, and 7 in Table 2, respectively) and the proportion of facilities with rapid HIV tests available (Indicator 24 in Table 3).

We observed significant positive effects on the number of couples tested during HTC. We were unable to assess the PBI effect on TB screening of patients with HIV/AIDS due to an absence of data for this indicator in available databases. We also observed a significant trend increase in hospitals in the number of HIV-tested pregnant females, males, and non-pregnant females, and a significant trend increase in health centers in the number of HIV-tested males. While there was an increase in the proportion of PBI facilities with rapid HIV tests available, the effect was not statistically significant.

Family Planning Services

In respect to FP service performance, PBI incentivized facilities on improving FP service output related to the number of clients counseled for modern family planning methods (Indicator 9 in Table 1). We also assessed the proportion of facilities with injectable FP methods available (Indicator 20 in Table 3).

We observed mainly negative effects of PBI on the number of clients counseled across both facility types. Additionally, control facilities showed significant improvement over PBI facilities' decline in terms of proportion of facilities with injectable FP methods available.

Postnatal Care (PNC) Services

In respect to PNC service performance, PBI incentivized facilities on improving PNC service outputs by improving the number of women who receive PNC by skilled health care workers within two weeks of delivery (Indicator 12 in Table 1).

We observed a positive PBI effect across health centers and a negative effect across hospitals in the number of women receiving PNC by skilled providers.

Service Management and Quality Assurance

Although not specifically incentivized, we assessed a set of indicators related to aspects of service management and general quality assurance, including: a) the proportion of facilities that reported receiving external supervision within past 6 months (Indicator 15 in Table 3), b) the proportion of facilities that reported having management meetings at least every 6 months (Indicator 16 in Table 3), and c) the proportion of facilities with client feedback system in place (Indicator 17 in Table 3).

For both external supervision and client feedback we observed non-significant negative intervention effects. For periodic management meetings we did not observe any effects due to PBI.

LOOKING AHEAD

Effects by health facility type: Generally, service provision quality at health centers seemed to have improved more than at hospitals. This might indicate that the intervention design targeted service performance issues that were more pertinent to health centers. The PBI approach based on setting clear performance targets and the influx of additional financial income likely allowed health centers to better identify and prioritize those aspects of work performances and overall facility management that ensured higher service quality yields. It might therefore be useful to follow more differentiated understanding of service provision in respect to hospitals in order to align performance incentives and targets more closely to the realities and challenges encountered at different levels of healthcare provision.

Effects by health service type: We noted overall positive effects on services related to maternal and newborn health (ANC, skilled birth attendance, PMTCT, and to some degree PNC). The PBI also positively affected service quality related to HIV counseling and testing, however had no effect on counseling services related to family planning, and affected child immunization services even negatively. Although the underlying causes for these observed patterns could not be identified by our data, findings underscore the point that performance incentives might not always result in desired outcomes. Further understanding of how and why different health services respond differently to a PBI program might allow for some adjustments that ultimately improve quality more consistently across services and facility levels.

PBI as a vehicle for service reform: Depending on the design, PBI programs can restore or even reform certain functions essential to service organization, facility management, and quality assurance by aligning individuals' sense of responsiveness or accountability with general service efficiency. As PBI effects on these service elements are difficult to measure, especially using routine data, we nevertheless identified indicators on service and system organization (i.e. external supervision, facility management meetings, patient feedback procedures) as best possible proxies. Deeper understanding of the extent to which the current SSDI PBI design contributes to an overall system-reform process within and beyond the enrolled facilities might provide useful information for future program expansion or scale-up.

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TRACTION PROJECT OVERVIEW

The Translating Research Into Action (TRAction) Project, funded by the U.S. Agency for International Development, focuses on implementation and delivery science—which seeks to develop, test, and compare approaches to more effectively deliver health interventions, increase utilization, achieve coverage, and scale-up evidence-based interventions. TRAction supports implementation research to provide critically-needed evidence to program implementers and policy-makers addressing maternal and child health issues.

For more information on the TRAction Project:
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