Report

Final Impact Assessment of the Results-Based Financing Programme for Northern Uganda

For the:
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ACRONYMS

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
ARI	Acute respiratory infection
CA	Catchment area
DHO	District health officer
DHT	District health team
DIP	Detailed implementation plan
DPT	Diphtheria, pertussis and tetanus
EPI	Extended programme of immunization
GoU	Government of Uganda
HC	Health centre
HF	Health facility
HFA	Health facility assessment
HH	Household
HMIS	Health Management Information System
IBF	Input-based financing
ITN	Insecticide Treated Net
IPT	Intermittent preventive treatment
LATH	Liverpool Associates in Tropical Health
LQAS	Lot Quality Assurance Sampling
LSTM	Liverpool School of Tropical Medicine
MOH	Ministry of Health
NGO	Non-government organisation
NUDC	Northern Uganda Data Centre
OOP	Out-of-pocket
PLHIV	People living with HIV
PMTCT	Prevention of mother to child transmission
PNFP	Private not for profit
RBF	Results-based financing
PNC	Postnatal care
PPS	Probability proportional to size
SA	Supervision area
SRS	Stratified random sample
TT	Tetanus Toxoid
UBOS	Uganda Bureau of Statistics
UCMB	Uganda Catholic Medical Bureau
USH	Uganda shillings
VCT	Voluntary counselling and testing

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A Score Card Comparing the RBF Supported Acholi Sub-Region and the IBF Supported Lango Sub-Region (2012-2015)

Indicators	Acholi RBF	Lango IBF	Comment
Score	9.49	3.81	This is the total of all points earned by the sub-region out of a total of 19 points.
Percentage of points available earned	50%	20%	Acholi scores 2.5 times more points.
Quality of Care in Private Not For Profit facilities (PNFP)			
Access Increased	0.5	0	Acholi unweighted score shows marked increase in access among small PNFPs.
Human Resources Improved	0.5	0	Acholi shows overall increase in staffing but a deficiency among small HCs.
Availability of National Guidelines	0.33	0.66	Lango displays greater improvement but Acholi also has statistical improvement.
Availability of Infrastructure and Supplies	0.33	0	Neither region shows significant improvement, but Acholi has a higher overall score.
Availability of Medicines	0.5	0	Acholi shows statistical improvement, but not a statistically significant Difference in Differences. §
Processes Improved	0	0.33	Neither region shows significant improvement of DiD, but Lango has a higher overall score.
Clinical Quality of Care Improved	0	0.66	Lango displays statistically significant improvement but not a significant DiD. Acholi shows no statistically significant improvement.
Caretaker Capacity to Manage Home Care	0	0.66	Acholi displays statistically significant diminished performance but not a significant DiD. Lango has slight improvement.
Sub-total Quality of Care	**2.16**	**2.31**	**8 points available (1 for each category)**
Use of Service			
Use of Service in PNFP HF: Child Health	1	0	Substantial increase in Acholi but not in Lango.
Use of Service in PNFP HFs: Maternal Health	0.33	0	Both sub-regions display a diminished average number of users across all maternal services, but a slight increase in the users of ANC services. However, Acholi displays 6 HC as providing service whereas previously they did not.
Increased Use of PNFP with Diminished Use of Public Sector	1	0	Acholi displayed this increase while Lango displayed diminished use of PNFP.
Use of Services in Catchment Area	0.5	0	Acholi displays statistically significant increase in use of PNFP services whilst Lango exhibits statistical reduction in PNFP use.
Coverage with Essential Health Services	**1**	**0**	In 5 of the 10 PNFPs' service indicators Acholi displays a significant DiD while Lango does not.
Sub-Total Use of Services	**3.83**	**0**	**5 possible points available**
Affordability of Health Services			
Reduced Number of PNFP Charge User Fees	0	0	Neither sub-region displayed decrease in number of PNFP charging user fees. Both sub-regions display net increase.

Patient Costs Decrease in PNFP Facilities	0.5	0.5	Patient costs on average decrease in both sub-regions but more so in Acholi, possibly due to HC-II charging less and Acholi having more HC-IIs.
Health Care Costs as a Percentage of Monthly Income	1	0	No significant change in Acholi, but significant increase in Lango with significant DiD.
Sold Household Assets	1	0	Statistically significant reduction in both sub-regions but significant DiD indicates the decrease in Acholi is greater.
Borrowed Money to Pay for Health Care	1	0	Statistically significant decrease in Acholi and a significant increase in Lango with a significant DiD.
Sub-total Affordability	3.5	0.5	5 possible points available
Disease Burden			
Decrease in Households with Sick Family Members	0	1	Although both sub-regions exhibit decreases in the proportion of households with health complaints, the decrease was significantly greater in Lango.
Sub-Total Burden of Disease	**0**	**1**	**1 point available**
Sustainability	**NA**	**NA**	**Too early to score**

§ A difference in differences (DiD) estimator is defined as the difference in average outcome in the RBF sub-region minus the difference in average outcome in the IBF sub-region after exposure to their respective financial mechanisms. It is intended to reduce the effects of selection bias detected in the baseline surveys.

Executive Summary

This document is the final report of the impact evaluation of a results based financing (RBF) programme funded by DFID, conducted by the Liverpool School of Tropical Medicine (LSTM) through LSTM Consulting acting as the independent evaluation agency. The purpose of this 3.5-year programme was to improve the health of very disadvantaged post-conflict communities in the Acholi sub-region of northern Uganda by implementing a novel RBF programme in support of the private-not-for-profit providers (PNFP) of services in the region. The DFID project, awarded to the consortium NU HEALTH, supported 21 PNFP health facilities in Acholi through a results-based financing (RBF) initiative where financing was based on achieving pre-agreed quantitative targets of service provision. To compare the effect of RBF to a more traditional financing mechanism, the project also supported 10 facilities receiving input-based financing (IBF), managed by PNFP providers in the nearby Lango sub-region.

The project goal was to improve the health of the very poor by improving their access to health care through implementing strategies designed to produce four main **outputs**:

1. Improved availability of essential medicines in PNFP health facilities
2. Reduced user fees at the point of delivery in PNFP providers;
3. Improved independent monitoring of PNFP by Government of Uganda (GoU) health districts, and analysis of the quality of PNFP service provision;
4. Improved effectiveness of ongoing GoU support for PNFP facilities.

The programme Theory of Change was based on three hypotheses:

Effectiveness

If financial subsidies are provided to PNFP facilities through a results-based financing approach, then **quality of care, use of services and affordability** of services will increase more than through a non-results-based intervention.

Impact

If the quality of care, use of services, and affordability of services are increased, then the disease burden among pregnant women and children under five who are users of that facility will decline.

Sustainability

If credible evidence of the impact of RBF subsidies on PNFP facilities can be generated, then government and development partners will provide more effective, sustained support to this sector.

LSTM Consulting designed a comprehensive evaluation that was feasible given the available budget. The evaluation assessed the three test hypotheses of the RBF programme and isolated as much as possible the effects of the two types of financing mechanisms by comparing selected indicators in the intervention RBF sub-region (Acholi) and in the intervention IBF sub-region (Lango).

LSTM measured the quality of care (QoC) by observing service provision using a rapid health facility assessment (R-HFA) tool to determine PNFP compliance with national protocols, by assessing use of services as recorded in the routine HMIS, and by measuring outcomes of health care provision and affordability using a community LQAS survey and the R-HFA. These tools were also used to monitor the effectiveness and impact of the project and to identify and explain factors most associated with change.

Data were collected at each of three time points using a non-equivalent control group design:

Evaluation Design					
Exposure Status: Region	**Project Year**				
	0	**Exposure = X**	**1.5**	**Exposure = X**	**3**
Intervention: Acholi	Ob	X	O1	X	O2
Control: Lango	Ob		O1		O2

A qualitative assessment carried out in 2014 provided additional background information on the reaction of health workers and their managers to RBF. It also gave insight about other donor funded projects implemented in the PNFP health facilities in both sub-regions.

Assessment of the Theory of Change

The Theory of Change proved to be partially correct for the programme goal and two of the hypotheses (effectiveness and impact). It did not hold for the sustainability hypothesis due to the lack of a strategy for institutionalizing the gains made by strengthening the health care system. We summarise our conclusions in the Score Card, which is a qualitative collation of our interpretation of the data. A summary of our main conclusions follows.

Effectiveness

Financial subsidies provided to the PNFP facilities through a results-based financing approach improved the **use of services and maintained the affordability** of services more than the non-results-based intervention.

Impact

The increased use of services, and maintaining the affordability of services improved access to health care for pregnant women and children under five whose use of services climbed substantially.

Sustainability

While we had evidence of the impact of RBF subsidies to increase access to PNFP facilities, we also found consistently poor quality clinical care and no evidence of a strategy to maintain the low cost for services when support from funders decreases. Further substantial action to sustain support to this sector is required.

With regards to the **outputs** of the project:

Outputs	Conclusion	Assessment Tools Used
Improved availability of essential medicines in designated health facilities (PNFP and GoU)	Largely achieved	R-HFA Qualitative study
Reduced user fees at the point of delivery in PNFP providers	Achieved User fees reduced in both areas but more so in Acholi. However, the overall cost of health care also increased.	R-HFA LQAS Qualitative study
Improved independent and GoU monitoring and analysis of the quality of PNFP service provision	Probably achieved as a result of LSTM involvement of the district staff to collect R-HFA, LQAS and qualitative data. No evidence of involvement of GoU in the RBF monitoring of payments. Although the District Health Team had the primary responsibility of providing guidance and oversight to the PNFPs in implementing RBF and troubleshooting, largely through feedback on HMIS reporting and planned supervisions.	Observation by LSTM experts Qualitative study
Improved effectiveness of ongoing GoU support for PNFP facilities	Not achieved Support not institutionalized	Observation by LSTM experts Qualitative study

In conclusion, the effectiveness and impact of the RBF approach in terms of increased use and access to services, and the maintaining of affordable user fees have improved service coverage particularly for pregnant women and children. It has also improved the infrastructure, supplies, and the availability of medicines. Also, the population's disease burden decreased although their demand for services remained unchanged. However, as the clinical QoC has not improved it is questionable whether the gains made in the RBF sub-region can be sustained without health system actions focused on improving the QoC.

The RBF intervention proved that short-term gains in access are possible when "perceived" QoC by users in terms of infrastructure, availability of medication, staff and affordable cost of health care are put in place. However the intervention needs to be supported by actions at the health care system level (processes) in terms of management and leadership, supply chain and HR if these gains are to be institutionalized and sustained.

The following sections summarize the results used to test the programme's three hypotheses.

CONCLUSIONS: ACCESS TO AND QUALITY OF SERVICES

The RBF financed sub-region displayed a marked increase in access to key maternal, newborn and child health interventions by the end of the project. This increase was due to increased access to these services in the smaller HC-IIs. However, the IBF finance sub-region already had access to these services and maintained this access during the programme period.

The availability of staff increased in both sub-regions when using the weighted results and decreased when using the unweighted results. The increase was more substantial in RBF sub-region. This pattern of results suggests that staffing improvements occurred in the larger facilities. Overall, the Acholi sub-region showed a higher increase than the Lango sub-region in both the weighted and unweighted results. Nevertheless, the pattern concerning improved staffing is worrisome given the increased access to services noted in this section. We question whether smaller HCs have the staff to meet the new demand and suspect the quality of care may deteriorate as a consequence. Our qualitative study documented a high staff turn-over in PNFPs: the majority of Acholi respondents had been in their post for less than two years and did not have knowledge of all changes taking place since the inception of the NU Health project. To institutionalise RBF, an induction process will need to be developed that informs new PNFP and district staff about RBF principles, incentives, and the M&E system.

Slight improvements were made to make national guidelines more available in both sub-regions. Lango PNFPs show a greater change and an overall higher score than Acholi PNFPs.

We note an overall greater improvement in the availability of infrastructure and supplies in Acholi from baseline to endline surveys. However, the Lango sub-region has higher baseline and endline scores. Lango reached universal coverage of infection control items, while Acholi only has 12 of 19 PNFPs with all items. Both sub-regions show improvements in supplies to take care of the sick child; however, neither has reached universal coverage. Availability of ANC supplies decreased in the Acholi sub-region. However, it is among the HC-IIs in Acholi where the availability of ANC supplies increased compared to other facility types. Lango show nearly universal coverage of ANC supplies in HC-IIs, HC-IVs, and the hospital, though HC-IIs show a decrease in HIV supplies.

The Acholi sub-region shows greater improvements and greater availability of medications when compared to that Lango sub-region. This result is likely due to the provision of the funded credit line for essential medicine and health supplies (EMHS) for all participating PNFP facilities through the Joint Medical Stores (JMS). Again, HC-IIs report greater improvements. These results again point to HC-IIs in the intervention group as exhibiting the largest benefits of RBF.

These results could have been a product of RBF as the payment formula made reference to access, human resources, infrastructure, supplies, and medical supply chain. However, the element not included in the RBF programme due to the *hands off* approach applied by NU Health, was the quality of clinical care. Our direct observation of clinical care in PNFP facilities documented that national protocols were not embraced for diagnosis of sick children and counselling of caretakers of children was poor. As a consequence caregivers left facilities without knowing how to administer the medication prescribed for their children. In this regard quality was poor. NU Health's own assessment of quality of care focused on the availability of medicines, other supplies, and equipment, and the provision of adequately skilled staffing. While they did assess the quality of clinical care using the information provided in medical records, they did not use direct observation of clinicians.

NU Health explained that the *hands off approach* meant that their role was to support the RBF process and support structure. This included strengthening the supply chain. However, their role did not include building capacity in the health facilities. The reason this activity was not included in their scope of work was that it confounded the incentives produced by RBF to improve the quality of care.

The qualitative study in Acholi (RBF) documented that health workers and managers working in PNFP facilities noticed an increase in the overall uptake of clients demanding services at PNFP facilities as a result of changes to the facilities. Respondents repeatedly cited: reduction in user fees, consistent availability of medications, availability of highly qualified staff and the increased staffing levels as the drivers of change behind the increased uptake of services. By-and-large, these internal changes were reportedly facilitated by the use of NU Health funding. Respondents working in Lango PNFP facilities also reported an overall increase in the uptake of services as a result of changes internal to health facilities. Changes such as improved staffing levels, consistent supply of medications, and increased services offered were credited with this increase. Unlike Acholi, respondents in Lango were less likely to report NU Health as the facilitator of these changes. Most of the time, respondents could not identify who facilitated the changes, and when they did identify a change agent, it was just as likely to be another stakeholder as it was to be NU Health.

Infrastructure improvements were important to both sub-regions. However, it was only in Acholi where the changes were primarily attributed to a donor and to RBF.

Conclusions: Use of Services

In the HFA data Acholi exhibited a substantially higher increase than Lango in the average number of sick children attending PNFP health services from the baseline to endline survey. The endline results show that on average 447 sick children were seen the month preceding the survey, which is a 90% increase from the baseline survey. This compares with only an 8% increase in the Lango sub-region over the same time span, with only an average of 175 sick children seen the month preceding the endline survey.

Although the number of ANC visits on average decreased in both sub-regions, the scatterplot of these visits indicates that 75% of Acholi PNFPs increased their ANC visits, which includes six facilities that had not previously supported ANC. Lango displayed small increases in 50% of their facilities, while the other 50% experienced no increase or a net decrease. While these results for ANC are not exceptional, they do suggest that Acholi is increasing access to services regardless of HC level or religious denomination.

These results suggest that RBF facilities tended to increase access to both sick children and pregnant women seeking ANC. However, it was particularly effective increasing the demand by caretakers to seek treatment for their sick child. This is a concrete result indicating a possible RBF impact. However, while this indicator signals an increased demand for services, it does not indicate necessarily that Acholi has an increasing number of sick children. That number could be the same while the demand for PNFP services increased. This increase also does not mean that the quality of care in PNFPs is improving. As we have seen the quality of clinical care has not improved and is of low quality.

From the LQAS community survey we observe 92.0% of households in Acholi with a health complaint in the three months preceding the survey having accessed care at a health facility. In Lango, the percentage was slightly less (90.4%). The most often used provider was the public sector, although this demand significantly decreased in both sub-regions, with the decrease being significantly larger in Lango. In Acholi, the demand for services increased among both PNFPs and the private sector. In Lango, increases occurred in the for-profit private sector only. PNFPs were the second most preferred provider; however, PNFP usage significantly increased in Acholi and significantly decreased in Lango. These changes created a statistically significant 7.8% differential. The for-profit private sector displayed the greatest increase in popularity across both sub-regions, which might be explained by the proximity of private health facilities, the availability of medication or the quality of care, which were the three main reasons households selected a particular facility.

Of the 25 service indicators measured in the LQAS community survey, 10 pertain to services provided at PNFPs. Five of them (50%) reveal statistically significant increased service use at a PNFP: TT vaccination, maternal and child post partum care, family planning and child immunisation. An additional indicator, treatment of malaria with ACT, displays a significant difference in differences result as well, although this result was not due to an increase in ACT treatments in Acholi. Rather, the effect is due to a diminished number of ACT treatments in Lango.

This complex set of variables suggested significantly increased demand for services among PNFPs in the RBF versus the IBF sub-region. While demand for the public sector also diminished in both sub-regions, in Lango the demand was not supplanted by PNFPs; rather, demand for PNFP services diminished in the IBF areas. **In this regard, the hypothesis that use of PNFP services would increase more in the RBF than IBF facilities was supported.** However, it is essential to take note that the demand for for-profit private providers increased in both sub-regions. With a poor quality of clinical care provided in PNFP facilities in both sub-regions it is possible that the current increased demand for PNFP services will wane in Acholi.

Our results from our 2014 qualitative study also support the finding that caretakers of children under five in the RBF region were choosing a health facility because of staff availability and quality of care. However, that study uses the perceptions of PNFP health workers and their managers. That study found that health facility staff respondents often reported improved staff-to-patient ratios and larger numbers of highly qualified staff within facilities largely attributed to the provisions of NU Health funds [1]. Likewise, the Rapid Health Facility Assessment Final Impact Evaluation conducted in 2015 also supports the increase in staffing, reporting a 6.3% increase from 2012 to 2015 in the percent of clinical staff working in the PNFPs on the day of the survey, a figure that only increased by 2.1% in Lango.

Conclusions: Affordability of Health Services

During the project period, Acholi (RBF) PNFPs continued to reduce user fees for the average patient/caregiver. They diversified their sources of funding by increasing the number of cost centres. In addition, user fees became nearly universal in the Acholi sub-region. Lango PNFPs also reduced user fees but never to the degree of Acholi PNFPs. During 2015 the average user fees in Lango were 2.2 times greater than the average Acholi user fees. Whilst the data do not clearly suggest that RBF led to these changes, Acholi PNFPs never increased their costs to the level of Lango.

Lango residents exhibited a greater financial burden compared to Acholi. The proportion of household heads that sold property to pay for health care services decreased significantly in both sub-regions. However, in Lango a larger portion of a resident's monthly income was used to pay for health care costs than was used by Acholi residents. Also, about one-quarter of residents in Acholi and one-third in Lango take loans to pay for health care, mostly those who come from the poorest households. Residents in both locations reported a similar repayment pattern. The decrease in sold property and the high level of payment out-of-pocket may signal that most people are able to cope with health care costs, with the exception of the very poor.

Overall, both sub-regions increased household income significantly. Whilst the relative increases did not differ, Acholi monthly incomes were higher. Health care costs increased in both locations but almost six times more so in Lango. It is interesting that while PNFP user fees decreased the overall costs increased. This is due to the latter estimate including use of all types of facilities in addition to PNFPs. The economies of health care in the two sub-regions differ especially for the costs of consultations (higher in Acholi), medications (higher in Lango) and transportation (higher in Lango). Transport costs in Acholi increased slightly. This effect is possibly due to the large proportion of HC-IIs supported by the project, which brought service closer to communities, and increased demand to visit them. The increased transport cost may also be due to the increased cost of petrol. During 2012 the costs that people paid for health care were initially higher in the RBF sub-region, but by 2014 the IBF exposed area exhibited an average cost of health care for the last three months about 1.8 times higher than Acholi. While the economic conditions may explain the continuing costs of health in Acholi and the increased costs in Lango, we should point out that Acholi fared much better in terms of affordability. Potentially the incentives associated with RBF may explain this result. In a time of worsening economic conditions the cost of health care did not increase.

CONCLUSIONS: RBF IMPACT ON HEALTH

The proportion of households with health complaints declined significantly in both sub-regions, but more so in Lango. Both sub-regions show lower disease burden during 2014 and 2015 as compared with the 2012 baseline. This is an important but complex finding. As we explain in the Methods Section of this report, these data were collected as part of the LQAS community survey. The households included in the sample were from the immediate catchment area of each PNFP facility. This result about disease burden cannot be attributed directly to a financial mechanism as household members report they visit a variety of service providers. However, we can say that in the area where households have the greatest access to PNFP the reported number of health complaints decreased.

Also, we see a seemingly contradictory result, as the proportion of households with a sick family member going to the health facility in the last three months remained without significant change in Acholi and increased in Lango. Interestingly the mean number of family visits to HFs in the last three months also remained unchanged in both sub-regions. Although we see a decreased number of health complaints, a family's number of visits does not reflect this decrease! A possible explanation is an increased demand for health services in both sub-regions. Although these sections produced an interesting set of results, we cannot attribute the effects in Acholi to RBF. Further investigation is warranted.

CONCLUSIONS: RBF SUSTAINABILITY

Sustainability is difficult to measure and requires creating an enabling environment for RBF to be maintained. In a three year project sustainability should not be expected. The hypothesis states that if RBF has an impact then the government and development partners will sustain support to it. In our proposal we said we would measure both programme effectiveness and impact, as these variables are directly linked to the hypothesis that government and donors would later invest in RBF.

While we do not award points to the scorecard at this early stage of the RBF activity, data do suggest that Acholi fared substantially better than did Lango. Districts health officers in the Acholi sub-region told LSTM researchers they promote future use of RBF in their sub-region. However, they gave no indication of financial commitment to sustain it. International donors such as the World Bank plan to support RBF in the Ugandan public sector through their Global Financing Facility. Their RBF model will not replicate the one used in this programme by NU Health. Rather, it will be a scaled down version. Therefore, whilst RBF may be sustained, the model will be different. Both sub-regions exhibited similar demand. They indicate desire to institutionalise the approach.

Nevertheless, there are numerous characteristics in Lango and Acholi that do not signal institutionalisation of RBF as yet. For example, there is no budget or RBF formula used for strategic planning in the sub-region, there are no specialised positions with trained personal in RBF management, and there is no training mechanism in place at the district or national level to train District Health Officers or other governors of the health system about RBF principles or practice. Whilst by these standards RBF has had some success, it is also clear that substantial institution building is still needed for RBF to be sustained in the sub-region.

Nevertheless, the districts eagerly participated in each round of the LQAS community surveys and the R-HFAs. All district appointed participants tended to collect the data in all three rounds. We found little attrition amongst the survey teams. The districts were highly committed to carrying out the RBF assessments and to learning the evaluation skills. We are therefore confident that local capacity for M&E was built.

Within the NU Health programme, the District Health Teams had the primary responsibility of providing guidance and oversight to the PNFPs in implementation of RBF and general troubleshooting. Their information sources were largely through HMIS reporting and planned supervisions. Initially NU Health supported all the participating DHTs in this role both financially and with the provision of secondees to support capacity, whilst gradually building their capacity to fulfil their supervision/verification role independently. This is another example of how routine monitoring was supported in the programme.

However, we need to reiterate that whilst some services improved, others did not. The qualitative study pointed out that multiple donors supported services in both sub-regions in addition to the RBF/IBF financing. Both regions exhibit substantial role ambiguity in the sense that PNFPs in both locations had difficulty keeping track of the specific donor goals. However, Acholi PNFPs did attribute the improvements in their facilities and performance to NU Health and therefore to RBF. Nevertheless, the facts are that several donors support health system improvements during the project period.

We also need to reiterate the very low quality of clinical care detected in both sub-regions. Families tended to select health facilities based on the proximity to their home, the quality of care and the availability of medicines. These findings augur ill for sustainability due to the very low quality of clinical care. Should treatment failures result, current increases in PNFP use in Acholi could abate or reverse.

Overall Conclusions

Whilst the access to health service increased in the RBF sub-region this effect was primarily seen in small health centres. The availability of staff also increased in that sub-region but unfortunately not in the small health centres. The quality of infrastructure, medical supplies, medicines, and management processes did improve substantially in the RBF-financed sub-region, but, the quality of clinical care was poor quality in both sub-regions, especially in Acholi. National protocols for diagnosis of the sick child were not used, caretakers were not counselled on how to administer the medicines prescribed for their child, and even fewer caretakers knew how to use the medication. All of these quality measures were elements in the NU Health RBF payment scheme with the exception of the quality of clinical care, despite this critical element being fundamental to the theory of change.

The use of child health services significantly increased in the RBF sub-region, while use did not increase in the IBF sub-region. The median for ANC usage increased in Acholi as well. The overall demand from PNFP users increased significantly in Acholi and decreased in Lango; in the latter sub-region only private sector demand increased. In 5 of the 10 PNFP service indicators measured in the population based LQAS survey, Acholi displayed a significantly greater increase in coverage while Lango did not.

With regard to the affordability of health services, patient costs on average decreased in both sub-regions but more so in Acholi possibly due to HC-IIs charging less and Acholi having more HC-IIs. We detected a statistically significant reduction in people selling household assets to pay for health care in both sub-regions, but a significantly greater reduction in Acholi. As regards taking loans to pay for health care, we found a statistically significant decrease in Acholi and a significant increase in Lango.

With respect to disease burden, both sub-regions exhibited decreases in the proportion of households with health complaints, but the decrease was significantly greater in Lango. These decreases were small (-2.7% in Acholi, 4.1% in Lango) with a differential of 1.4%. Nevertheless, the RBF sub-region did not display a reduced burden of disease that surpassed the IBF sub-region

There were several indications of increased demand for RBF by the World Bank and by district health officers. Capacity was built in Acholi to manage health facilities using the RBF payment scheme, and capacity was also built at the district level for using the M&E approaches applied in this evaluation. Further we experienced continuous demand for feedback on the results of this assessment on a PNFP-by-PNFP basis. However, institutions need to be established to enable RBF to become a component of the district governance system, but conditions do not yet exist to make this possible.

The Score Card, which is a qualitative collation of the results of this system, indicated that despite the RBF sub-region earning 50% of the available performance points, it scored 2.5 times more points than the IBF sub-region.

RECOMMENDATIONS

1. The very low quality of clinical care ought to be a priority for improvement in both sub-regions but especially in the RBF sub-region.

2. Clinical quality of care should become a component of the RBF payment formula and assessed with observational probability samples as used in this evaluation. The use of medical records for this purpose as used by NU Health was insufficient and not accurate.

3. RBF was particularly effective in small health facilities such as HC-II in improving access and infrastructure. These facilities could be a particular focus for future RBF activities and play a key role in any strategy for strengthening the health system. Improvements to HC-IIs increased access to services and were associated with increased demand for services.

4. Human resource planning should coincide with improvements to HC-IIs. While considerable improvements in staffing took place in large facilities, the availability of staff at the lower level facilities diminished, a fact that may account for the low quality clinical care we detected. Although access and infrastructure improved, human resources deteriorated. While the RBF payment formula did contain a human resource element, deficiencies persisted at the lower level facilities. It is possible they remained undetected using the RBF payment formula.

5. In this study, the fact that 70% of the PNFP in Acholi were HC-IIs and only 20% were HC-IIs in Lango confounded RBF. Nevertheless, RBF was particularly effective in the smaller health centres. Future impact evaluations of RBF should take special care to ensure similar health system structures in both the RBF and the comparison areas.

6. The *hands-off approach* did serve its purpose, which was to assess RBF without other factors, such as observational studies, or capacity building strategies confounding the effect of RBF. However, it should be eliminated in future RBF projects. Had the evaluation data collected at time point two been made available to the district and PNFP managers, management decisions could potentially have been made to rectify the detected problems. High quality, evidence-based M&E systems together with RBF may produce an interaction effect leading to a more complete Theory of Change with a corresponding higher impact on quality, use, disease reduction and sustainability.

7. This evaluation data should be shared at the earliest possible time with the district management teams and the PNFP managers. While it was appropriate to not share these data during the trial, it is essential to do so now that it has concluded. This particular recommendation will contribute to two of the intended outputs of this project that have yet to be satisfactorily achieved:

    a. Improved independent and GoU monitoring and analysis of the quality of PNFP service provision;
    b. Improved effectiveness of ongoing GoU support for PNFP facilities.

8. Future applications of RBF ought to be undertaken as trials but with modifications learned from this study. The primary ones include:

    a. Having a neutral external agency assess clinical quality of care using observational techniques effectively used in the R-HFA. However, in this next application the hands-off approach should be replaced by including M&E feedback as a component of the RBF model. RBF without the M&E data very much restricts the steering and guiding mechanisms needed by district and PNFP management. Similarly, the LQAS data used in this same way permits the districts and PNFPs to assess the population based behaviours and to arrest pernicious trends that limit PNFP effectiveness.

b. Ideally the RBF and IBF mechanisms should be either randomly assigned or introduced in step-wedge designs in the same cultural settings so as to understand the effects of RBF versus other interactions effects that played an important role in this study. For example, the level of the HC does confound the effect of RBF in Acholi as 70% of PNFPs were HC-IIs. However, we do also see that HC-IIs benefited greatly from these DFID investments, which is value for money.

INTRODUCTION

The Department for International Development (DFID) funded a three-and-one-half year programme to support the strengthening of health systems in the Acholi sub-region of northern Uganda, an area that is still emerging from many years of conflict. The goal of the programme was to improve access to health care, particularly for the most vulnerable groups, through the implementation of a results-based financing (RBF) mechanism. Improving health care would also create economic, social and political opportunities that improve the lives of people affected by conflict. DFID's purpose was to increase access to effective health services for poor and vulnerable individuals of the Acholi sub-region in northern Uganda by implementing strategies to produce four outputs:

1. Improved availability of essential medicines in PNFP health facilities;
2. Reduced user fees at the point of delivery in PNFP providers;
3. Improved independent monitoring of PNFPs by Government of Uganda (GoU) health districts, and analysis of the quality of PNFP service provision;
4. Improved effectiveness of ongoing GoU support for PNFP facilities.

These outputs address DFID's Structural Reform Plan to pilot results-based financing contracts in its programmes. They are also intended to address current barriers to accessing health care, including user fees, which PNFPs are charging to due to declining resources coming from other sources.

Originally, the DFID formulated plan was to involve all 31 PNFP health facilities (HF) in six districts of the Acholi sub-region. However, following the inception period of the programme implementer, NU Health, it was decided that only 21 of the HFs were actually fit to implement RBF. Therefore, the overall design of the project was changed, with only 21 PNFP HFs in Acholi taking part through RBF, and another matched 10 PNFP HFs in 4 neighbouring districts of the Lango sub-region acting as the comparison group and receiving the same amount of funding, except through the more traditional input-based financing (IBF). The 21 HFs in the RBF-exposed sub-region and the 10 in the IBF-exposed sub-region constitute 100% of the HFs in the corresponding Acholi and Lango sub-regions.

This change in design affected the programme's Theory of Change (ToC) and the evaluation design, which we now describe. We provide this history so the reader can understand why this impact evaluation design deviates slightly from the original Terms of Reference.

THEORY OF CHANGE

The original programme hypotheses are presented below:

Effectiveness

- If financial subsidies are provided to PNFP facilities through a results-based financing approach, then **quality of care, use of services and affordability** of services will increase more than through a non-results based intervention. This is a supply-side intervention.

- If **financial support is provided for the cost of transport** to a health facility, and health services are available and affordable, then use of services will increase more than would have been the case in the absence of that intervention. This is a demand-side intervention. This theory was de-emphasized at DFID's suggestion following the implementing organisation's (NU Health) inception

report. Transport subsidies were therefore eliminated from the Theory of Change after the inception phase.

Impact

- **If quality of care, use of services, and affordability** of services are increased, then the disease burden among pregnant women and children under five who are users of that facility will decline.

Sustainability

- If credible evidence of the impact of RBF subsidies on PNFP facilities is generated, then government and development partners will provide more effective, sustained support to this sector.

While testing these hypotheses we are cognizant that this evaluation will assess the affordability and costs of care received at HFs, including the unit costs of targeted services and their use. At the household level we will measure the use of health services and out-of-pocket expenditures for health services.

IMPACT EVALUATION DESIGN AND CHANGES TO IT

Naturally, the change in the designation of health facilities to the RBF and IBF legs of the study, resulted in changes to the original ToC and a reduction in the budget for the impact evaluation (IE). Originally, the impact evaluation was to be based on a phased-in quasi-experimental design using non-equivalent control groups as a means to estimate both the demand and supply interventions. The evaluation was also carried out to ensure that evidence is used to promote lesson learning, accountability, and understanding the cost effectiveness of this strategy. The evaluation strategy used to test hypotheses is in line with the OECD-DAC evaluation criteria and with DFID's policy on evaluation.

The PNFP facilities were to be divided into three groups:

1. PNFP facilities receiving supply payments (fees subsidization and payment for results)
2. PNFP facilities or their communities receiving demand payments
3. PNFP facilities receiving both supply and demand payments

The data obtained through the selected design could then be used to model the phenomenon of change, as per the ToC set out in the project terms of reference. Three evaluation methods were identified to address the impact of the various components of the RBF programme and to isolate the effects of the interventions by measuring selected indicators to assess if the hypothesis on which the programme was based held true or not. The three survey methods were:

1. Rapid Health Facility Assessment
2. Community based Lot Quality Assurance Sampling (LQAS) survey
3. Compilation of relevant HF usage data via the HMIS in each HF.

The original design uses an “X” to refer to the exposure to an intervention, and “O” is an observation at one of six time points. The following figure shows the proposed roll out of the interventions.

Table 1: Original Evaluation Design for NU Health Proposed by LSTM

	Project Year									
Control GoU	**0**	**X**	**1.5**	**X**	**2.5**	**X**	**3.5**	**X**	**4.5**	**X**	**5.5**
Supply	Ob	X	O1	X	O2	X	O3	X	O4	X	O5
Supply	Ob		O1	X	O2	X	O3	X	O4	X	O5
Supply	Ob		O1		O2	X	O3	X	O4	X	O5
Demand	Ob	X	O1	X	O2	X	O3	X	O4	X	O5
Demand	Ob		O1	X	O2	X	O3	X	O4	X	O5
Demand	Ob		O1		O2	X	O3	X	O4	X	O5
Supply + Demand	Ob	X	O1	X	O2	X	O3	X	O4	X	O5
Supply + Demand	Ob		O1	X	O2	X	O3	X	O4	X	O5
Supply + Demand	Ob		O1		O2	X	O3	X	O4	X	O5

The resulting data set for the LQAS survey alone at each time point was to be:

GoU control: 10 HF x 4 Supervision Areas (SA) x 19 elements = 760 = n
Supply: 10 HF x 4 SA x 19 elements = 760 = n
Demand: 10 HF x 4 SA x 19 elements = 760 = n
S+D: 11 HF x 4 SA x 19 elements = 836 = n
TOTAL 3876 = n

After adapting to the logistical and financial constraints introduced after the inception phase, this design was modified to include three time points only:

Table 2: Revised Evaluation Design (2012)

Exposure Status: Region	Project Year				
	0	**Exposure = X**	**1.5**	**Exposure = X**	**3**
Intervention: Acholi	Ob	X	O1	X	O2
Control: Lango	Ob		O1		O2

The current LQAS dataset at each time point is:

Intervention: 20 HF x 4 SA x 24 elements = 1920 = n
Control: 10 HF x 4 SA x 24 elements = 960 = n
TOTAL 2880 = n

With this redesign we requested that the selection of health facility types in the intervention and comparison regions be similar and follow guidelines reported in Table 3. However, following an assessment of the PNFPs in the four selected comparison districts, the distribution of HFs was very different. While Acholi had 70% HC-IIs, Lango had 20% HC-IIs. This fact at the design stage indicated that comparing the two regions would offer challenges.

Table 3: Acholi & Lango PNFPs Selected as the Intervention Group Based on Their Capacity to Benefit from RBF, and the Expected and Observed Lango Distribution of PNFPs

TYPE	ACHOLI		Recommended Lango Distribution		Observed Lango Distribution	
Hospital	3	15%	1	10%	1	10%
HF-IV	0	0%	0	0%	1	10%
HF-III	3	15%	2	20%	6	60%
HF-II	14	70%	7	70%	2	20%
Total	20	100%	10	100%	10	100%

The history of the revision to the evaluation design is detailed in our 2011 report found in Appendix 6. It contains the agreed-upon indicators for this assessment as measured by the R-HFA and LQAS. These coincide with original indicators included in the original TOR but do diverge from them because of the revisions.

CURRENT THEORY OF CHANGE ASSESSED IN THIS EVALUATION

The hypotheses tested in this IE are very similar to the original but with slight modifications. We briefly state each one and how we interpreted them in the proposal and assess them. All interpretations and methods used for assessment were included in LSTM's original proposal:

Effectiveness

- If financial subsidies are provided to PNFP facilities through a results-based financing approach, then **quality of care, use of services and affordability** of services will increase more than through a non-results-based intervention. This information was obtained primarily through the HFA and the HMIS audit.
- If **financial support is provided for the cost of transport** to a health facility and health services are available and affordable, then the use of services will increase more than would have been the case in the absence of that intervention. Although this hypothesis was eliminated from DFID's ToC, we still collected information about caseload and also about caretakers' transport costs. This data collection was at no extra cost to the project.

Impact

- **If quality of care, use of services, and affordability** of services are increased, then the disease burden among pregnant women and children under five who are users of that facility will decline. This information is assessed through the LQAS community survey.

Sustainability

- If credible evidence of the impact of RBF subsidies on PNFP facilities is generated, then government and development partners will provide more effective, sustained support to this sector. The LQAS and HFA evaluations in addition to the HMIS audit will provide this information, as it will monitor

the effectiveness and impact of the project. It will also provide a model for explaining factors most associated with change.

THE RBF SCHEME USED BY NU HEALTH

The implementing organisation, NU Health, used the following formula to process the Results Based Financing.

$P = [S (x + y z) n]$ where:

P = Payment; S = Standard Subsidy for each care service; x = Base Incentive by facility type; y = Quality Incentive by facility type; z = Multiplier determined by the quality score; and n = number of patients.

We highlight that the payment is weighted by the HF type, meaning that 70% of the HFs in Acholi would receive funding on the lowest tier. The quality scores were derived from several sources: first, a monthly check of the claimed performance of in service provision (Data Quality Assessment or DQA) was undertaken by the programme in collaboration with the District Health Team1; second, to complement the DQA, a Quarterly Quality Assessment (QQA) was conducted at each health facility and a quality score given, which then acted as an additional factor in calculating the level of funding attained by the facility; thirdly, Direct Client Verification (DCV) of a sample of clients from each health facility was undertaken by mobile phone.

The DQA and QQA rely on medical records, and whilst this is consistent with other RBF assessments, it does rely on a convenience sample. The underlying assumption is that what is recorded in the existing record is an accurate reflection of reality. A competing assumption of this convenience sample is that high quality service providers could produce high quality records. However, low quality providers might not provide any records at all. Hence, one could surmise that the convenience sample may result in an over estimate of quality.

NU Health was commissioned to take a hands-off approach in this RBF so the effects of the financial incentive could be assessed without the interaction of technical assistance and capacity building by the implementing organisation. The District Health Team had the primary responsibility of providing guidance and oversight to the PNFPs in implementing RBF and troubleshooting, largely through feedback on HMIS reporting and planned supervisions.

THE IMPACT EVALUATION METHODOLOGY

This assessment uses Lot Quality Assurance Sampling (LQAS) and a health facility census to obtain the data to appraise this application of RBF. The LQAS method is used in two ways: (1) in the LQAS community survey to appraise the knowledge, attitudes and behaviours of the client population within the catchments areas of each PNFP, and (2) in the R-HFA to sample sick children to assess the quality of clinical care they receive in each facility. Although LQAS has been used frequently for these purposes and the methods are well documented [2-6], we explain our approach in more detail below.

Overview of LQAS

Lot Quality Assurance Sampling (LQAS) is a statistical testing and analysis technique that was first developed in the 1920s for industrial quality control [7]. Interest in applying LQAS to health assessments has been growing steadily since the mid-1980s as it can be used quickly and relatively inexpensively to judge performance in a defined geographical area [6]. In 1991, a World Health Organization consultation on epidemiological and statistical methods for rapid health assessments concluded that LQAS was one of the more practical methods available for health surveys and encouraged its further development to monitor health programmes [8].

Two major characteristics that have made LQAS attractive as a tool for evaluating public health services:

- Firstly, only a small sample (or "lot") is needed to judge whether a supervision area has reached the average coverage or predetermined target. For the northern Uganda survey, each HF catchment area was divided into four supervision areas (SA);
- Secondly, the LQAS sampling procedures and analyses are relatively simple and local managers and health workers, who need data for action down to very low levels such as sub-counties and even parishes, can use the findings immediately.

Briefly, when using LQAS, a coverage target is identified below which represents an unacceptable level of coverage. In the case of this survey the LQAS classifications are made using the Lango sub-region control average as the coverage benchmark against which all PNFP supervision areas (SA) are compared for each indicator.

Therefore, assuming a sample size of 19 respondents per SA, the coverage benchmark of 50% would be reached if a minimum of seven correct responses were achieved. Nineteen is usually the sample size used for each supervision area since that is the number determined to be the minimum sample size where the *alpha* or *beta* errors are less or equal to 10% (see Appendix 5: LQAS Decision Rules for an example of Sample Sizes and Coverage Targets). However, for this impact assessment and in order to increase the amount of data that could later be used for modelling, the sample size per SA was increased from n=19 to n=24. The sample size was also increased so as to produce an aggregate prevalence measure for any indicator that had a 95% confidence interval that did not exceed $\pm$10%.

In accordance with standard LQAS methodology, 30 PNFP HF catchment areas were divided into SAs and sampled and surveyed. In the project area each PNFP has four SAs. Data were subsequently cleaned, analysed, and interpreted, permitting SAs to be classified into two groups; i.e. 'high' and 'low' performance. Those achieving the average coverage of the Lango control group, on a given health indicator, are classified as HIGH performance, and those falling below this target are classified as LOW performance. The LQAS survey classifies each SA for all key indicators into 'high' and 'low', facilitating the identification of successful PNFP facilities, while promising interventions and strategies for PNFP facilities in need of further assistance. There are only two situations in which a classification is not possible: (1) the SA sample size is too small, or (2) the prevalence measure for an indicator is so low that no meaningful classification is possible.

Once the LQAS classifications have been made, the data are treated as a stratified random sample. These data provide robust data sets for difference testing with narrow 95% confidence intervals and which do not exceed $\pm$2.2% for Acholi and $\pm$3.2% for Lango.

THE RAPID HEALTH FACILITY ASSESSMENT (R-HFA)

We carried out a 100% sample of all PNFP health facilities in both the intervention sub-region for RBF (Acholi) and the comparison sub-region (Lango). The R-HFA tool used for the Northern Uganda RBF Impact Assessment was adapted from the R-HFA originally developed in 2006 through a collaboration of MEASURE Evaluation, The World Bank, and a panel of experts from US PVOs, USAID, and other cooperating agencies. The original tool and further information are available at http://www.mchipngo.net/controllers/link.cfc?method=tools_rhfa.

The tool has four modules:

- An Observation Checklist of Clinical Care for Six Randomly Selected Sick Children
- An Exit Interview with the Six Caretakers of the Same Six Randomly Selected Sick Children
- A Health Facility Checklist
- A Health Worker Interview (the health worker was the most experienced person providing the targeted services).

The first two modules (Observation Checklist of Clinical Care and Exit Interview with Caretakers) apply LQAS principles to classify HFs by their quality of clinical care. LQAS is discussed in a later section. The second two modules represent measures taken in 100% of the HFs.

LSTM together with the key district stakeholders refined the list of essential medicines for childcare and maternal and neonatal care, and the list of essential equipment and infrastructure consistent with the norms and protocols of the Ugandan Ministry of Health. The instrument was field-tested in three facilities in Gulu before the HFA baseline survey in July 2012 and subsequently modified based on that experience. To ensure that results could be compared, no changes other than minor corrections were made to the tool for the mid-term and end-point surveys. This same approach was used for the baseline (July 2012), mid-term (February 2014), and the endline (June 2012) assessments.

LQAS in the R-HFA

To assess a clinician's performance in the PNFP HFs, we used the binomial model with p_U=95% and p_L=50% [6]. The 95% standard assumes that clinicians must perform their clinical work according to the national guidelines at least 95% of the time. The District Health Officers and PNFPs agreed to this standard. The reason a high standard is used for clinical care is that clinicians may be doing harm if they perform at a lower level of quality. We set p_L=50% as we presume that clinical care is bimodal; clinicians either know and use the guideline in their clinical care, or they are not knowledgeable and therefore do not use it. This LQAS R-HFA standard is used to assess both the observations of consultations and patient exit interviews. We used a sampling plan of n=6 sick children and d=5 (alpha=3% and beta=10.9%), meaning that a HW passed as acceptable for a procedure if s/he performed according to the national guideline in five out of six cases (one mistake allowed). This 6:5 design has been used previously [2, 5, 9, 10].

Information Collected

The R-HFA identifies key bottlenecks to quality service delivery. The core indicator categories measured are grouped into four composite categories and include:

- **Access**: Availability of basic maternal, newborn and child health services.
- **Inputs**: Availability of a minimum level of infrastructure, personnel, supplies, and medications for essential maternal, neonatal and child health care.
- **Processes**: Adherence to quality management practices for record keeping (information use), training and supervision.
- **Outputs**: Adherence to evidence-based protocols for assessment, treatment and counselling for sick children (i.e., those with diarrhoea, malaria, and/or breathing difficulty); client satisfaction.

The core indicators in the R-HFA were formulated based on a standardised list of indicators formulated by the International Technical Working Group (ITWG) on Health Facility Assessment hosted by WHO and including a broad cross section of technical agencies. The ITWG indicators were supplemented with indicators adapted from the Service Provision Assessment (SPA) tool of the DHS (available at the MEASURE/Evaluation web site: http://www.cpc.unc.edu/measure/publications/ html/ms-02-09-tool06.html), some of which come from the IMCI-based Health Facilities Survey (HFS) tool of the World Health Organization.

Indicators of access, inputs and processes were added in the areas of antenatal care and emergency obstetrical and neonatal care. As mentioned, the R-HFA comprises four modules: an observation checklist of treatment of the sick child, an exit interview of the caregiver for the child, an observation checklist of infrastructure and supplies, and a health worker interview. In total, the R-HFA measures 36 indicators, which were subsequently reduced to 11 composite indicators in 5 indicator categories:

- Access: 5 items
- Inputs
  - Human resources: 1 item
  - Guidelines: 8 items
  - Infrastructure and supplies: 29 items
  - Medicines: 28 items
- Processes: 4 items
- Utilization of Services
  - Number of sick children 0-59 months seen: 1 item
  - Number of ANC visits: 1 item
- Performance
  - Health worker (5:6 benchmark): 4 items
  - Health worker (1:6 benchmark): 4 items
  - Knowledge of the caregiver: 1 items

Additional socio-economic indicators were added to gather information about the cost of services and the transparency of these fees and revenues. These indicators were formulated in collaboration with an economist and the country team. A summary of the 36 indicators is found in Appendices 3 and 6 and the results are presented in Appendix 3.

R-HFA Training

The R-HFA training was conducted in Gulu by three LSTM trainers from June 3rd to June 5th 2015. Twenty-three participants (20 data collectors and 3 supervisors) were trained to implement the R-HFA. The participants were health workers (nurses, clinical officers, laboratory technicians and one doctor) selected by the district health officers of the respective districts. The training consisted of an introductory section that established the purpose and background for the study, a review of the modules of the R-HFA tool, role plays to use the tool, two field practices that took place in government health facilities and a planning session to sequence the facility visits and supervision.

R-HFA Data Collection

The data collection for the final assessment was carried out from June 8th to June 12th 2015. Data collectors worked in pairs and were supervised on a daily basis by three MOH senior supervisors and LSTM staff. Each team member specialized in collecting data from two of the four modules. Each team collected data from one facility per day. All completed questionnaires were carefully reviewed for errors and missing data.

R-HFA Data Entry and Data Analysis

Following data collection, data were entered into a database in Gulu by two data entry clerks using EpiData v 3.1. The data entry screens were developed by an LSTM statistician and checked by the lead trainers for correctness. Data were exported to Stata 11.0 and analysed by the LSTM master trainers and statisticians. The purpose of the analysis was to identify what progress had been made since the baseline and to determine differences in progress between the intervention and control groups. The premise of the project is that the RBF group would be incentivised to perform better than the IBF group.

THE LQAS COMMUNITY SURVEY

Each PNFP was divided into four spatial units and called supervision areas (SA). Together they form the PNFP catchment area (CA). All data in this assessment were randomly sampled data from either the SA or from the PNFP HF. As a result the data collected do not result in a design effect. Using this approach the maximum power is obtained from the data. Nested within this stratified random sample is an LQAS analysis of each and every HF catchment area to determine whether the interventions are being introduced.

Survey Preparations and Questionnaire Development

LQAS Community Survey Objectives

The LQAS Community Survey was conducted in order to establish a baseline for the RBF programme on key outcome indicators with the following objectives in mind:

- To estimate PNFP facility coverage for key outcome indicators
- To assess whether or not the RBF programme is producing the expected results in each PNFP facility and identify priority outcome indicators by SA
- To build technical capacity of the district health teams (DHTs) in the use of LQAS methodology.

Sensitisation Meetings

LSTM held sensitisation meetings with district leaders to discuss the LQAS survey objectives, timeline, criteria for selecting data collection teams, criteria for dividing the PNFP facility catchment areas into SAs, and the roles and responsibilities of DHT members taking part in the survey.

LQAS Indicators and Questionnaire Development

The LQAS indicators can be found in Appendices 4 and 6. The survey indicators and questionnaires were developed and pretested with the assistance of district stakeholders for the Gulu DHT. During the pretesting exercise, the team noted whether particular questions tended to be misunderstood or required a lot of explanation to the respondent before the desired meaning was put across. The interviewers had the opportunity to meet all four survey target groups and the pretesting exercise provided insight into the questions that needed clarity and revision. To ensure consistency of the language used, key terms in the English questionnaire were translated into Lwo, the dialect that is spoken by the Acholi and Lango people, so that all enumerators used the same terminology.

Target Population Groups

Since the RBF Programme focuses its attention on the continuum of care in maternal, newborn and child health, the LQAS Community Survey assessed the following four target population groups, whose knowledge, practices and access to health care were measured, as well as socioeconomic information on household members in relation to their health and use of health services.

1. Mothers of children 0-5 months
2. Mothers of children 12-23 months
3. Mothers of children 0-59 months with fever in the last two weeks
4. Household heads with at least one child 0-59 months living in the house

Sampling Frame

Supervision Areas

The LQAS methodology requires identifying geographical areas, which are programme management units called supervision areas (SA), where data can be collected, analysed and interpreted to form an opinion about programme performance on specific outcome indicators. In the original proposal, LSTM planned to divide each PNFP health facility catchment area into three or four 5km bands, with each band representing one SA. The SAs comprise villages that were 0-5km, 5.1-10km, 10.1-15km and over 15km from the PNFP facility. However, after assessing a number of the selected PNFP facility catchment areas in the region, it was concluded that it was not possible to use these criteria for defining SAs in all selected PNFP facilities. There is a wide variability of catchment areas in terms of the portion of territory that they cover, varying from 2 sq. km for an HC-II to more than 50 sq. km for a hospital. Also, in more urban settings like Gulu, Kitgum and Lira, many of the PNFP catchment areas all overlapped considerably. The relative lack of detailed and up-to-date village and population data available for the Acholi sub-region—due to the twenty-year insurgency that caused mass displacement of entire populations, as well as the abandonment of many villages—made it impossible to produce a sampling frame using demographic and mapping data. Finally, identifying the distances of so many villages in all

SAs from the health facility would have required much more time and a much larger budget than we had available for the surveys.

Therefore, the criteria to define SAs varied among and between the PNFP facilities. For some PNFPs an SA was represented by a group of villages or a single parish, a group of parishes, or by a sub-county. However, each PNFP did have four SAs each; this did not vary. Based on all this information, the LQAS community survey was conducted in a total of 120 SAs (80 in the RBF intervention area and 40 in the non-intervention areas). An overview of the individual number of supervision areas per target districts can be found in Appendix 2.

The selected hospitals taking part in the project proved to be a problem because they have very wide catchment areas. These were often one or more sub-counties (or even a whole district or more than one district) consisting of several parishes. However, in practice most of their business comes from the nearby surrounding parishes, so in order to be relatively conservative the hospital SAs were defined considering the parishes actually surrounding the hospital; if the whole sub-county or even district was used as the catchment area, the data collectors would be travelling considerable distances, with only a faint chance of interviewing someone who actually ever used the hospital. Thus all SA boundaries were within 20km of the hospital location.

A list of villages and their respective number of households for each target group was made available by UBOS to LSTM staff. In conjunction with PNFP facility staff, LATH-LSTM confirmed the name of villages within each PNFP facility catchment area and based the sampling frames for the SA on this information. We then selected 24 interview locations for each SA using probability proportional to size sampling (PPS). With PPS sampling, the probability of selecting any one village within a catchment area is proportional to the size of the village's population, thus yielding a random, representative sample for the area as a whole. Unlike other methodologies, PPS sampling assures that those in larger villages within the SA have the same probability of being sampled as those in smaller villages and vice versa. PPS methodology involves ordering and listing all of the villages within each SA together with each village's respective population total, and a running, cumulative population total. The total population in the SA was then divided by 24 to create a sampling interval. A random number within the sampling interval served as the starting point for selecting the first village. The first village selected is the one that has the cumulative population total closest to the random number. The second village selected is that which has a population total closest to that of the random starting number plus the sampling interval. The third village selected is that which has a population total closest to that of the random number plus two times the sampling interval, etc. This pattern was repeated until 24 villages or areas within an SA had been selected.

Data Collection

Staff Training

The LQAS training was carried out using training materials that had been field tested and previously used throughout the world [11]. Altogether, three LQAS trainings were carried out: two in Gulu, one for all data collectors in Gulu district and the second for data collectors in the remaining PNFP catchment areas in the Acholi region; and a third training in Lira for the four Lango districts. A total of 77 participants (50 in Gulu and 27 in Lira) attended, with the number of workshop participants in each venue being determined by the number of SAs in each district. The respective district health officer selected the interviewers and supervisors required for each SA, taking into account the selection criteria suggested by LSTM team.

Schedule of Data Collection

The team working in each SA consisted of two data collectors, with the time taken for data collection depending on the accessibility of the households within each village and among the villages in each SA. On average, five days were needed to complete data collection in each SA. During the survey, technical support was provided by district supervisors to ensure an adequate random selection of households and respondents and the correct administration of questionnaires in each village. In each SA, 24 respondents from each target group were randomly selected and interviewed. The local council chairpersons and Village Health Team (VHT) members helped guide the data collectors within the communities.

Supervision of data collection was structured in two layers with each district having a supervisor, supported by three regional supervisors (two in Acholi and one in the Lango sub-region). They ensured that all the necessary materials, transportation and logistical arrangements were made on time. They oversaw data collection, reviewed questionnaires for completeness during the course of the survey, observed interviews to ensure that the interviewer asked the questions in the right manner, and interpreted and recorded the answers correctly. In all, a total of 2880 sets of 4 different types of questionnaires were completed in the 10 selected districts in Acholi and Lango. A summary table of the sets of questionnaires completed in each district can be found in Appendix 2.

DATA ANALYSIS

LQAS Community Survey

Data entry for time points 1 and 2 was completed using double data entry by a team of ten data entry clerks over the course of three weeks, using EpiData 3.1 software. The final time point was collected using electronic data collection devices. The data were uploaded daily and screened for duplicate uploads and errors in field entries. Errors were corrected daily. Following cleaning of the data, analysis commenced using R version 2.15.1. The economic data were analysed using Stata 12.1.

At the baseline survey our analysis documented that the intervention and comparison sub-regions differed for most indicators (see [12, 13]). This result had far-reaching implications for the data analysis. A simple comparison of means and variance at multiple time points would be insufficient to show differences between the two sub-regions over time. Also, the mid-term analysis (18 months after the

baseline assessment) showed very little progress and no statistical difference from the baseline for most indicators [14, 15]. We concluded that the most cogent approaches for assessing difference are first to detect whether the change within each sub-region was significantly different from baseline to the end point and then whether these differences were different from each other. This latter decision indicates we measure differences in difference.

To simplify the analysis and because the mid-point data showed little progress, we compare the baseline with the final evaluation time point only. Little value is gained by including the mid-point data, which served its purpose in demonstrating a slow trajectory at 18 months. We use two approaches for assessing differences. Within each sub-region we calculate the difference between the two extreme time points (2015-2012), and then we use these differences to calculate the between-sub-region difference in differences (DiD). The LQAS community survey data is a random sample of the population in the catchment area of each PNFP. For these data we use difference tests to compare the Acholi and Lango sub-regions.

More details about the functions we use are given in the three links below:

https://stat.ethz.ch/R-manual/R-devel/library/stats/html/prop.test.html

https://stat.ethz.ch/R-manual/R-devel/library/stats/html/chisq.test.html

https://stat.ethz.ch/R-manual/R-devel/library/stats/html/t.test.html

For Step 2, we construct a difference in differences (DiD) as follows:

DiD = (Difference between 2012 and 2015 in Acholi) - (Difference between 2012 and 2015 in Lango) = D_A- D_L

The standard error (SE) of the DiD is based on the sum of the variances of each component, since they are independent, and defined as:

$$SE(DiD) = \sqrt{(\text{VAR(DiD)})} = \sqrt{(\text{VAR(D\_A)} + \text{VAR(D\_L)})}$$

where the variance for regions A and L are:

VAR(D_A) = SE_A_2012 * SE_A_2012 + SE_A_2015 * SE_A_2015

VAR(D_L) = SE_L_2012 * SE_L_2012 + SE_L_2015 * SE_L_2015

For binary indicators, the variance calculations for regions A and L are based on the coverage (and sample sizes):

$$\text{VAR(D\_A)} = \text{p\_A\_2012} * \frac{(1-\text{p\_A\_2012})}{1920} + \text{p\_A\_2015} * \frac{(1-\text{p\_A\_2015})}{1920}$$

$$\text{VAR(D\_L)} = \text{p\_L\_2012} * \frac{(1-\text{p\_L\_2012})}{960} + \text{p\_L\_2015} * \frac{(1-\text{p\_L\_2015})}{960}$$

We then test whether the standardized $SDiD = \frac{DiD}{\text{SE(DiD)}}$ is from a mean zero population (Null hypothesis) or not (Alternative hypothesis). Under the null hypothesis, the standardised DiD

approximately follows a standard normal distribution N(0,1). The p-value is calculated as the sum of two probabilities, N(0,1) >= SDiD and N(0,1) <= -SDiD. These tests were performed with the statistical software R, version 3.1.0, using the command t.test.

R-HFA Survey

The R-HFA results are 100% samples of PNFPs in each sub-region. Being a census we have exact measures of prevalence of each indicator.

USING A SCORE CARD

These studies have produced a wealth of data concerning multiple dimensions of the Theory of Change. To keep track of these diverse results we have developed a **Score Card.** Admittedly it is subjective but we show the rationale for the points we award to Acholi and Lango. We try to award one point for each assessment component, which we explain in the following sub-sections. Although we try to treat the scoring as a zero sum game, there are occasions in which we split points across the two sub-regions or award partial points.

RESULTS AND FINDINGS

The results are presented as they correspond to each of the three hypotheses. At the end of each section we present the Score Card as a means to collate the results. We aggregate this information at the end of the results section.

HYPOTHESIS 1: EFFECTIVENESS

If financial subsidies are provided to PNFP facilities through a results-based aid approach, then:

- **quality of care,**
- **use of services,** and
- **affordability of services** will increase more than through a non-results-based intervention.

We assess **quality of care** using the R-HFA, and we assess quality of coverage using the community LQAS survey. **Use of services** we measure using (a) recurrent information in the health facilities collected as part of the R-HFA, and (b) report information from the community LQAS survey. A**ffordability** we assess using the R-HFA and community LQAS survey.

Quality of Care

The implementing organisation, NU Health, considered quality of care (QoC) to include improvements to infrastructure, medical supply chain, and human resources. They assessed clinical quality of care by examining medical records to determine whether the medications used in treatment matched the clinical diagnosis. NU Health judged the quality of clinical care to be high. However, we note that recurrent information is a convenience sample that often suffer from biased reporting; high quality health workers report good quality data whilst poor quality providers may not provide any data at all.

This IE assesses *quality of care* using an observational approach. We begin this section by presenting two composite indicators in order to demonstrate our approach. We then move to a more aggregate approach, as the results may be clearer and more easily understood.

Access

The Acholi sub-region made progress since the baseline study by providing more access to child health services, antenatal care, and deliveries. This composite indicator provides an example of how the composite indicators were calculated. For access we measure the availability of three child health services + two maternal health services for a total of five services. Acholi PNFPs increased access by 0.27 points for an average of 4.91 services. Lango had 4.92 points on average but decreased by 0.03 points. Acholi PNFPs achieved universal provision of ANC services. By the endline survey, 73.7% of facilities in Acholi were offering deliveries (Table 4).

This first indicator demonstrates an interesting finding as well as the complexity of this analysis. All of the composite indicators we weighted by the number children attending the clinic in the previous month. The analyses use this weight as it is of public health interest. Larger facilities have greater exposure to client populations. Nevertheless, this program starts off with Acholi and Lango having many differences including that Acholi has 70% HC-IIs whilst Lango has 20% HC-IIs.

This difference is evident in the unweighted measures at 2012 for Acholi. Whilst the weighted results show that 93% of the points were earned at baseline, the unweighted results indicate that only 75% were attained. The unweighted results show 20% fewer point obtained at the baseline. The discrepancy disappears in 2015.

Table 4: Comparative Assessment of Composite Indicator 1 (Access to Health Services) in the Acholi and Lango Sub-regions 2012-2015

No	Indicator	Acholi				Lango				DiD
		2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
C1	ACCESS (N=5)	4.64	4.86	4.91	0.27	4.95	5	4.92	-0.03	0.3
	(Weighted)	93%	97%	98%	5%	99%	100%	98%	-1%	6%
	(Unweighted)	75%	91%	93%	18%	98%	100%	96%	-2%	20%
1	% PNFPs that offer 3 basic child health services (growth monitoring, immunization, sick child care)	68%	89%	89.5%	21.5%	100%	100%	80%	-20%	41.5%
2	% PNFPs offering ANC	68%	100%	100%	32%	100%	100%	100%	0%	32%

3	% PNFPs delivering babies	47%	63%	73.7%	26.7%	90%	100%	100%	10%	16.7%

These results indicate that in Acholi the smaller health facilities (HC-II) are responsible for a large proportion of the improvements taking place with respect to access to services. In this regard, large gains were made for child, ANC and delivery services. Lango already had very high access but demonstrate a decline in both the weighted and unweighted results. The similarities of the weighted and unweighted results in Lango reflect the smaller number of HC-IIs in the sub-region and the more uniform access that already exists. Nevertheless, the large Difference in Differences (DiD) Scores underscore the progress made by Acholi.

Inputs

Despite the increase in access to services, we do not detect a corresponding increase in human resources in all levels of services. Table 5 shows a 6.3 percentage point increase in human resources for Acholi PNFP HFs with the weighted measure but a -21.1 percentage point decline for the unweighted measures. This result suggests that whilst HC-IIs are delivering more services, their staff numbers are actually decreasing. However, staff are increasing their numbers in the larger Acholi HFs. We find the same pattern in Lango. This result augurs ill, as it is unlikely that services will continue even at their current level of quality with a diminishing work force, especially in the smaller facilities.

Table 5: Comparative assessment of Composite Indicator 2 (Human Resources) to Health Services in the Acholi and Lango Sub-regions 2012-2015

No.	Indicators	Acholi				Lango				DiD
		2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
C2	Input I: Human Resources (N=1) (weighted)	65.7%	35.5%	72%	6.3%	45.1%	76.6%	47.2%	2.1%	4.2%
4	% staff who provide clinical services working in PNFPs on the day of the survey (unweighted)	63.2%	57.9%	42.1%	-21.1%	70%	70%	30%	-40%	19%

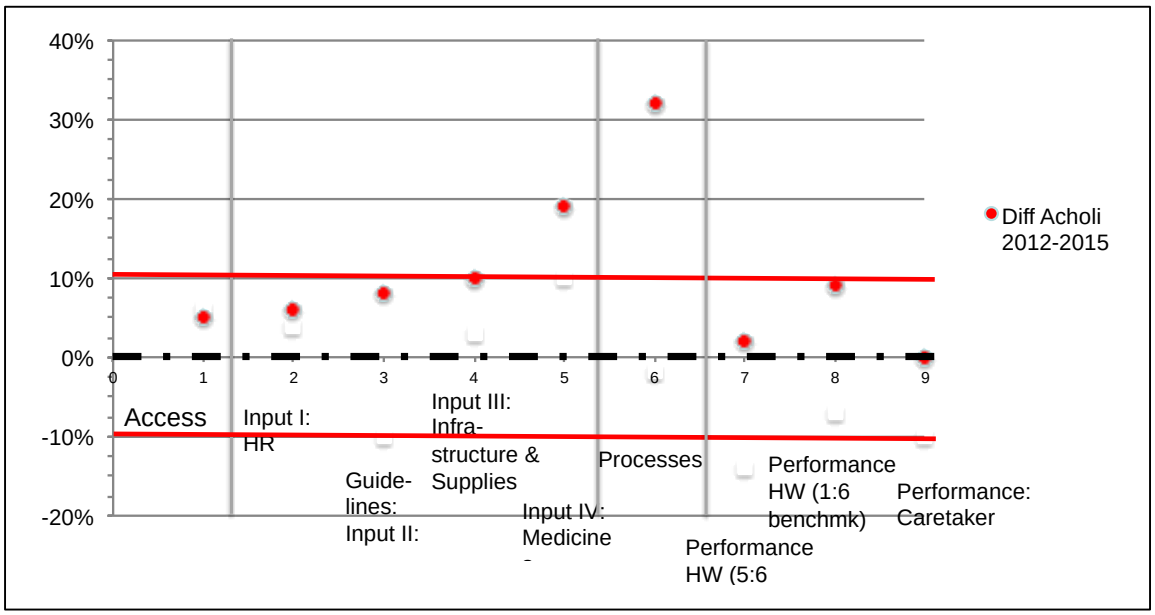
This report may help us understand the data in Table 5. The RBF sub-region was understaffed although service provision was increasing (as will be reported in the following sections). The IBF sub-region also experienced an increased caseload with minimal increase in staff – especially in the small facilities.

An Overview of Differences in 9 Composite Inputs, Processes, and Clinical Performance Indicators in Acholi (2012-2015)

Thus far we have reported on Composite Indicators 1 and 2. This section reports on Composite Indicators 3 through 9 (Figure 1). Composite Indicators 3 to 5 concern additional input indicators: availability of eight different sets of guidelines (N=8), infrastructure (including supplies) (N=29), and medicines (N=28). Composite Indicator 6 (N=4) comprises the process indicators that monitor continuing medical education, updating and use of information from clinical records, and regular supervision of staff. Composite Indicator 7 (N=4) assesses clinical performance using the R-HFA LQAS decision rule, for which five of six children are attended using the national clinical guidelines; Composite Indicator 8 (N=4) uses a very relaxed performance standard for which at least one of six sick child was attended according to the national clinical guidelines. Composite indicator 9 (N=1) assesses the child's caretaker and his/her knowledge about how to correctly administer the antibiotic, antimalarial, or ORS and zinc prescribed to treat the child's illness.

Figure 1 tracks the 2012-2015 difference in performance for each composite indicator in the Acholi sub-region. We have placed two red lines to identify changes of at least 10%. C1 through C3, while showing substantial increases in this period, do not reach 10%. C4 though C6 show substantial increases during the same period. We highlight these six indicators as they are the same areas reinforced by the RBF payment function use by NU Health. However, C7 through C9, the clinical performance indicators, were not included in the NU Health RBF payment formula. C7 and C9 are particularly important in this regard. Clinical performance of health workers and the caretaker's knowledge of how to administer the medication for their sick child show virtually no improvement. Neither of these critical measures of quality of quality was included in the cost function. Please note that NU Health's hands off instruction prevented them from overtly tracking clinical care as we did in this evaluation.

Figure 1: Summary of Weighted Difference Score for 9 Composite Indicators for the Acholi Sub-region (2012-2015)



The reason we track clinical performance is that it is critical to the Theory of Change which posits that RBF will have an impact on health outcomes or the health status of the population. In order for clinical

care to have such a beneficial outcome it must be performed to a high standard. Poor clinical care and ineffective counselling of caretakers does harm and mitigates the beneficial impacts that could result from improved access, inputs and processes.

C8, which is the very relaxed standard of at least one in six children receiving care consistent with the national guidelines, does show an increase. However, in comparison to the correct standard of care (C7) it is insufficient progress. It may indicate that given more time and focus (or inclusion in the RBF payment function) it could improve.

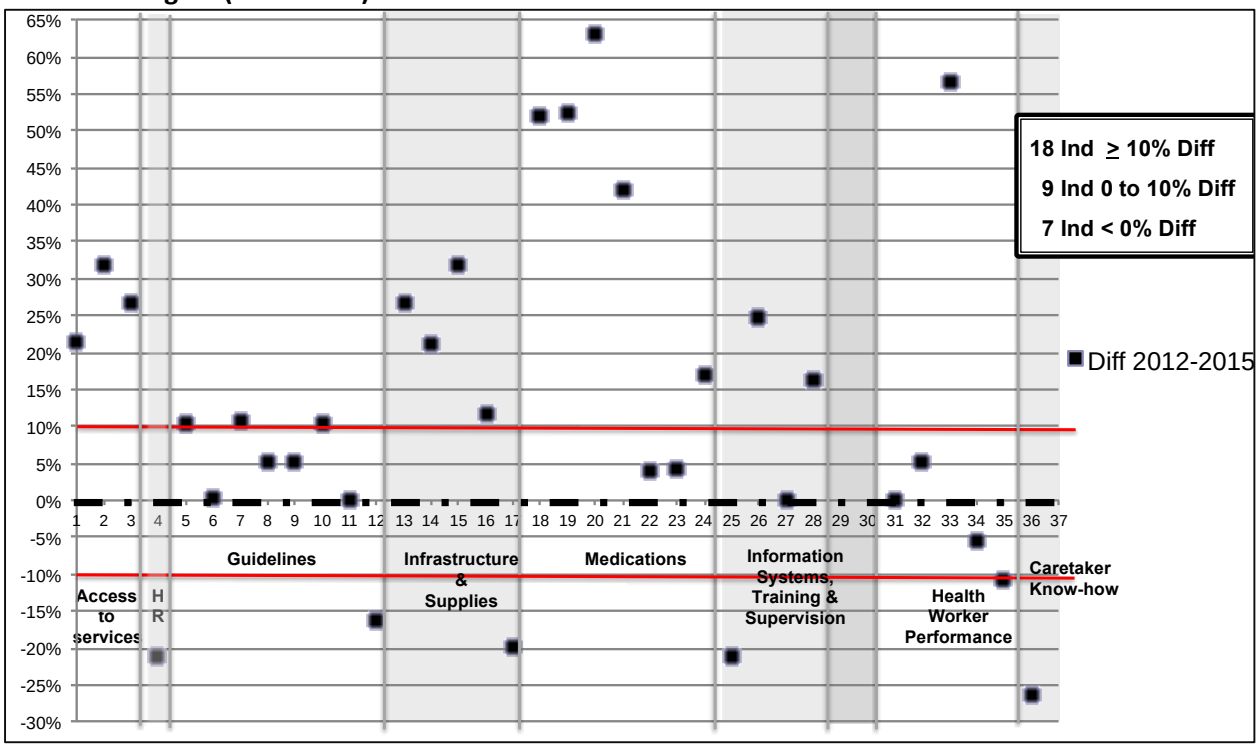
Overview of Differences for 37 Unweighted Inputs, Processes, and Clinical Performance Indicators in Acholi (2012-2015)

We can gain further insight into the nine composite indicators by unpacking them to look at the individual indicators of which they are comprised. We have already discussed the Composite Indicators 1 and 2 for *Access* and *Human Resources*. For Composite Indicator 3, of the eight required sets of guidelines, five were more available by 2015, but three important sets were not (Figure 2): delivery care, immunisations and prevention of mother-to-child transmission of HIV. PMCT guidelines became less available, perhaps because several HC-IIs that had not carried out deliveries in 2012 were now doing so, but they did not yet have the proper guidelines. The 11 indicators (#13 through #24) (Figure 2) concerning infrastructure, supplies and medications universally improved in all the HCs in the Acholi sub-region, with one exception. Infrastructure and medications were central to the NU Health RBF payment formula. The one exception was the availability of seven essential supplies to support antenatal care on the day of the survey (indicator 17)[1]. This indicator may have deteriorated because some HC-IIs started providing maternal health care services even though they still were not fully equipped for this service.

Composite Indicator 6, *Processes*, includes maintaining and using information systems, training (continuing medical education) and supervision (#25 through #28); these were also components of the RBF formula. Interestingly, two of the four indicators improved substantially, namely, maintaining up-to-date records for antenatal care and carrying out regular supervision. However, maintaining up-to-date records for treatment of children under five years of age deteriorated, and appropriate pre-service or in-service continued medical education did not change. This latter deficiency is particularly problematic as it is directly related to clinical performance.

[1] Refrigerator for TT, blood pressure machine, haemoglobin reagents, syphilis testing kit, RDT or microscopy for malaria and albustix for protein, HIV testing for PMTCT); only PNFPs admitting to providing ANC services were included in this estimate.

Figure 2: Differences for 37 Unweighted Access, Input, Process and Performance Indicators in the Acholi Sub-region (2012-2015) *



** Columns 29 & 30 are not shown in Figure 2 as they are the average number of children and ANC patients seen in the last month.*

Indicators #31 through #36 concern clinical performance of child health services. We measured these indicators by observing the most experienced health worker in the PNFP providing treatment to six randomly selected children in the waiting room who fit the inclusion criteria: they presented with diarrhoea, respiratory complaint or fever. The data collector used an observation checklist to assess each action of the selected health worker. To satisfy the criteria for Composite Indicators 7 and 8, the clinician had to provide clinical care conforming to the national guidelines for children they treated according to Indicators 31-32. The remaining indicators are also listed below (#33 - #36).

- Indicator 31 (5 key tasks): checking the presence of general danger signs, namely, the child's ability to feed or breastfeed, whether the child vomits persistently, and presence of convulsions; assessing nutritional status, and checking the vaccination status. To satisfy the criteria for indicator 31, five of the six sick children needed to have all of the five key tasks completed.
- Indicator 32 (5 key tasks): the same as Indicator 31 with the exception that at least one child has to be treated in a manner consistent with the national guidelines.
- Indicator 33: RDT or another test is used to diagnose malaria in 100% of children with fever.
- Indicator 34: the treatment is appropriate for the diagnosis of a child with malaria, pneumonia, or diarrhoea.
- Indicator 35: the health worker who prescribed an antibiotic, antimalarial, or ORS and zinc correctly describes to the caretaker how to administer all drugs prescribed.
- Indicator 36: the caregiver for the sick child who received an antibiotic, antimalarial, or ORS and zinc can correctly describe how to administer all drugs prescribed.

Figure 2 and Table 7 indicate that Acholi PNFPs had no change in clinical performance during the project period. 0% of facilities continued to treat sick children using the appropriate clinical guidelines (#31). When the standards were relaxed so that at least one child received appropriate care, Acholi achieved a 5.3% improvement vis a vis 2012 (#32). However, only 15.8% of the PNFP HFs achieved even this low standard of care. The largest increase in quality (56.5%) is observed for the use of an RDT or another approved test for the diagnosis of malaria in febrile children; by 2015 89.5% of HFs achieved this standard of care.

However, the next two indicators reveal serious failures in the health system. Only 5.3% of clinicians correctly explained to their patients how to use the prescribed medication, and only 5.3% of caregivers leave the HF knowing how to correctly administer the medication in the prescriptions they have been given. Both of these proportions represent a deterioration in the quality of care (-5.4% and -10.7%, respectively). These two indicators are particularly problematic because they demonstrate the enormity of the missed opportunity for providing adequate health care in the Acholi sub-region. Even if all other measures of quality had been very high, if the patient is counselled insufficiently to use the therapy given to them by the clinician and if they leave the HF without knowing how to use it, the likelihood of treatment failure could be very high.

Composite Indicators 7 – 9 were not included in the NU Health RBF policy due to the hands-off policy mandated to the implementing organisation. However, they are critical to the Theory of Change as already explained.

Table 6: Composite and Individual Process Indicators

No.	Indicator	Acholi				Lango				DID
		2012	2014	2015	Difference 2012-2015	2012	2014	2015	Difference 2012-2015	
C6	Processes N=4 (weighted)	2.18	3.01	3.44	1.26*	2.4	3.53	3.73	1.33***	-0.08
		55%	75%	86%	31%	60%	88%	93%	33%	-2%
	(unweighted)	41%	82%	72%	32%	58%	88%	90%	33%	82%
25	% PNFPs that maintain up-to-date records of sick U5 children (age, diagnosis, treatment) and have report in last 3 months and evidence of data use	100%	94.7%	79%	-21.1%	50%	100%	100%	50%	-71.1%
26	% PNFPs that maintain up-to-date records of antenatal care (TT, iron/folate, expected date of delivery)	38.5%	68.4%	63.2%	24.7%	40%	70%	90%	50%	-25.3%
27	% PNFPs in which interviewed HWs reported receiving in-service or pre-service training in maternal, child or neonatal health in last 12 months	63.2%	78.9%	63.2%	0.0%	40%	80%	80%	40%	-40%
28	% PNFPs that received external supervision at least once in the last 3 months (supervision included one or more of the following: checked records or reports, observed work, provided feedback, gave praise, provided updates, discussed problems, or checked drug supply)	68.0%	84.2%	84.2%	16.2%	100%	100%	90%	-10%	26.2%

*** $p < 0.001$

Table 7: Composite and Individual Performance Indicators: Healthcare Worker

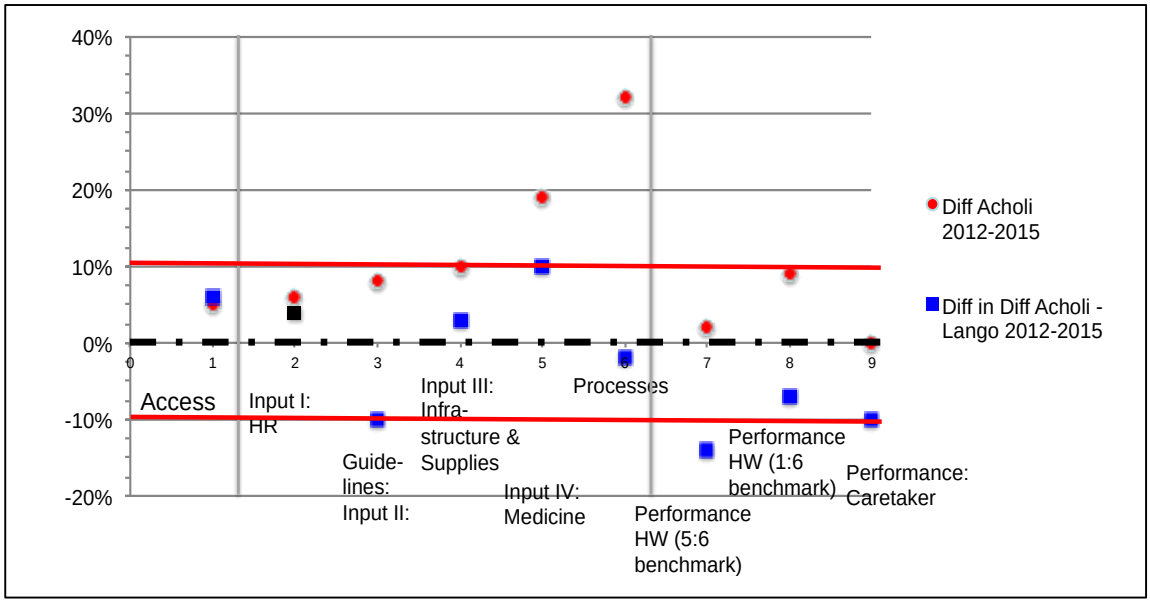
No.	Indicator	Acholi				Lango				
		2012	2014	2015	Difference 2012-2015	2012	2014	2015	Difference 2012-2015	DiD
C7	Performance: Health worker (5:6 benchmark) (N=4) (weighted)	1.34	1.95	1.43	0.09	1.18	1.83	1.82	0.64**	-0.55**
		34%	49%	36%	2%	30%	46%	46%	16%	-14%
	(unweighted)	26%	41%	37%	11%	33%	48%	50%	18%	-11%
C8	Performance: Health worker (1:6 benchmark) (N=4) (weighted)	1.37	2.3	1.72	0.35	1.18	1.83	1.82	0.64**	-0.29
		34%	58%	43%	9%	30%	46%	46%	16%	-7%
	(unweighted)	29%	46%	41%	12%	33%	48%	50%	18%	-12%
31	% PNFPs in which all key assessment tasks are made by HWs (check presence of general danger signs, assess feeding practices, assess nutritional status, check vaccination status) (benchmark 5 of 6 clinical observations)	0.0%	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	% PNFPs in which all key assessment tasks are made by HWs (check presence of general danger signs, assess feeding practices, assess nutritional status, check vaccination status) (benchmark 1 of 6 clinical observations)	10.5%	26.3%	15.8%	5.3%	0.0%	0.0%	0.0%	0.0%	5.3%
33	% PNFPs that used an RDT or another test to diagnose malaria in 100% of children presenting with fever	33.0%	84.2%	89.5%	56.5%	40.0%	90.0%	100.0%	60.0%	-3.5%
34	% PNFPs in which treatment is appropriate to diagnosis for child with malaria, pneumonia, or diarrhoea	58.0%	63.2%	52.6%	-5.4%	70.0%	80.0%	80.0%	10.0%	-15.4%
35	% PNFPs in which the health worker who prescribed an antibiotic, antimalarial, or ORS and zinc can correctly describe to the caretaker how to administer all drugs	16.0%	10.5%	5.3%	-10.7%	20.0%	20.0%	20.0%	0.0%	-10.7%

** p <0.01

An Overview of Differences in Nine Composite Inputs, Processes, and Clinical Performance Indicators in the Acholi and Lango Sub-regions (2012-2015)

Figure 3 depicts the differences in differences (DiD) in performance for the RBF and IBF sub-regions during 2012-2015. A positive score indicates that that the increases in RBF sub-region outstripped those in the IBF sub-region. A negative score indicates the opposite effect. For the six Composite Indicators (C1 through C6) included in the RBF payment formula, the RBF sub-region displayed higher value differences in performance than the IBF sub-region for four indicators: *access, human resources, infrastructure/supplies, and medical supplies.* For each indicator the unweighted differences were higher values than the weighted values indicating that the smaller HCs displayed higher values that than the larger ones (Table 8). This is an interesting result as it may suggest that the greatest benefits of RBF are seen in the smaller HCs. The difference between the two sub-regions was negligible for C9 *processes* but for the C3 *guidelines* Lango displayed higher values.

Figure 3: Differences in Nine Composite Indicators in Acholi and Lango (2012-2015)



For clinical performance Composite Indicators 7 and 8, the RBF sub-region displayed lower values for their differences than did the IBF sub-region. It is interesting that the unweighted differences were higher than the weighted values, especially for the Acholi sub-region. C9 assesses the caregiver's knowledge about how to use the medication prescribed for the sick child. These DiD were not only lower in the RBF sub-region than in the IBF region, they demonstrate a precipitous decline in the unweighted measures. This indicates that the smaller HCs decreased their values more so than the large ones. However, we know from the qualitative survey that there was unhappiness amongst the staff. This may have been due to the increased caseloads they experienced and the diminishing human resources that were most evident in the small HCs in Acholi. This could have resulted in having less experienced staff being hired into positions in Acholi and being less able to adequately counsel caregivers about how to administer medications.

Nevertheless, despite the lower performance of Acholi for C7 through C9, these are indicators that were not included in the RBF payment formula, and hence, they were not tied to the incentive structure. We find this a key problem with the Theory of Change that posited a health benefit will result from RBF but did not provide the incentives for these clinical performance Indicators to affect PNFP management.

Table 8: Summary Table of HFA Composite Indicators Displaying Average Points Earned by PNFPs and the Proportion of Points Earned at Three Time Points with In-Region Differences and Difference in Differences Tests

No.	Indicator	Total Possible Points	Acholi			Lango			Diff Acholi 2012-2015	Diff Lango 2012-2015	DiD
			2012	2014	2015	2012	2014	2015			
C1	Access (weighted)	5	4.64	4.86	4.91	4.95	5	4.92	0.27	-0.03	0.3
	(unweighted)		93%	97%	98%	99%	100%	98%	5.00%	-1.00%	6%
			75%	91%	93%	98%	100%	96%	18.00%	-2.00%	20.00%
C2	Input I: Human Resources (weighted)	1	65.70%	35.50%	72%	45.10%	76.60%	47.20%	6.00%	2.00%	4%
	(unweighted)		63.20%	57.90%	42.10%	70.00%	70.00%	30.00%	-21.10%	-40.00%	18.90%
C3	Input II: Guidelines (weighted)	8	2.3	3.17	2.91	2.54	2.95	3.91	0.61*	1.37*	-0.76
	(unweighted)		29%	40%	36%	32%	37%	49%	8%	17%	-10%
			30%	30%	33%	30%	35%	40%	3.00%	10.00%	-7.00%
C4	Input III: Infrastructure and Supplies (weighted)	29	21.8	24.8	24.56	23.78	24.07	25.67	2.76	1.89	0.86
	(unweighted)		75%	86%	85%	82%	83%	89%	10%	7%	3%
			59%	77%	74%	75%	80%	89%	15.00%	14.00%	1.00%
C5	Input IV: Medicines (weighted)	28	20.51	25.29	25.72	22.78	24.9	25.29	5.21*	2.51	2.7
	(unweighted)		73%	90%	92%	81%	89%	90%	19%	9%	10%
			58%	85%	83%	75%	85%	90%	25.00%	15.00%	10.00%
C6	Processes (weighted)	4	2.18	3.01	3.44	2.4	3.53	3.73	1.26***	1.33***	-0.08
	(unweighted)		55%	75%	86%	58%	88%	90%	31.00%	32.00%	-1.00%
			41%	82%	72%	32%	58%	88%	31%	56%	-25%
C7	Performance: Health worker (5:6 benchmark) (weighted)	4	1.34	1.95	1.43	1.18	1.83	1.82	0.09	0.64**	-0.55*
	(unweighted)		34%	49%	36%	30%	46%	46%	2%	16%	-14%
			26%	41%	37%	33%	48%	50%	11.00%	17.00%	-6.00%

C8	Performance Health worker (1:6 benchmark) (weighted) (unweighted)	4	1.37	2.3	1.72	1.18	1.83	1.82	0.35	0.64**	-0.29
			34%	58%	43%	30%	46%	46%	9%	16%	-7%
			29%	46%	41%	33%	48%	50%	12.00%	17.00%	-5.0%
C9	Performance: Caretaker (weighted) (unweighted)	1	7.60%	78.70%	1.50%	32.30%	72.70%	36.10%	-6%***	4%	-10%
			31.60%	63.20%	5.30%	40%	80.0%	40%	-26.30%	0.00%	-26.3%

* p <0.05, ** p <0.01, *** p < 0.001

† Figure excludes an outlier of over 6000, which we assume is a recording error.

Conclusions: Quality of Care

The RBF financed sub-region displayed a marked increase in access in the key maternal, newborn and child health interventions targeted by the project. However, the IBF finance sub-region already had access to these services and maintained this access during the programme period.

The availability of staff increased in both sub-regions when using the weighted results and decreased when using the unweighted results. The increase was more substantial in the RBF sub-region. This pattern of results suggests that staffing improvements occurred in the larger facility types. Overall, the Acholi sub-region showed a higher increase than the Lango sub-region in both the weighted and unweighted results. The pattern concerning improved staffing is worrisome given the increases noted in the section about access to services. We question whether smaller HCs have the staff to meet the new demand and whether the quality of care may deteriorate as a consequence. These two elements of the RBF payment scheme appear out of sync. Service use is increasing, but the staff are not in place to accommodate the increased number of cases in HC-IIs in particular. Awards may accrue for the increased service use, but at what cost in terms of quality if the staff are not in place to address the needs?

Slight improvements were made to make national guidelines more available in both sub-regions. Lango PNFPs show a greater change and an overall higher score than Acholi PNFPs.

We note an overall greater improvement in the availability of infrastructure and supplies in Acholi from baseline to endline surveys. However, the Lango sub-region has a higher baseline and endline score. Lango reached universal coverage of infection control items, while Acholi only has 12 of 19 PNFPs with all items. Both sub-regions show improvements in supplies to take care of the sick child; however, neither has reached universal coverage. The availability of ANC supplies decreased in the Acholi sub-region. However, it is among the HC-IIs in Acholi where the availability of ANC supplies increased compared to other facility types. Lango shows nearly universal coverage of ANC supplies in HC-IIs, HC-IVs, and the hospital, though HC-IIs show a decrease in HIV supplies.

The Acholi sub-region shows greater improvements and greater availability of medications when compared to the Lango sub-region. This result is likely due to the provision of the funded credit line for essential medicine and health supplies (EMHS) for all participating PNFP facilities through the Joint Medical Stores (JMS). Again, HC-IIs report greater improvements. These results again point to HC-IIs in the intervention group as exhibiting the largest benefits from RBF.

These results could have been a product of RBF as the payment formula made reference to access, human resources, infrastructure, supplies, and medical supply chain. However, the element not included in the RBF programme due to the *hands off* approach applied by NU Health, was the low quality of clinical care. Our direct observation of clinical care in PNFP facilities documented that national protocols were not embraced for diagnosis of sick children and counselling of caretakers of children was poor. As a consequence caregivers left facilities without knowing how to administer the medication prescribed for their children. In this regard quality was poor. NU Health's own assessment of quality of care focused on the availability of medicines, other supplies, and equipment, and the provision of adequately skilled staffing. While they did assess the quality of clinical care using the information provided in medical records, they did not use direct observation of clinicians.

NU Health explained that the *hands off approach* meant that their role was to support the RBF process and support structure. This included strengthening the supply chain. However, their role did not include building capacity in the health facilities. The reason this activity was not included in their scope of work was that it confounded the incentives produced by RBF to improve the quality of care. As already reported, the District Health Team was responsible for guidance of PNFPs using routine supervision and HMIS information.

The qualitative study in Acholi (RBF) documented that health workers and managers working in PNFP facilities usually reported an increase in the overall uptake of services at PNFP facilities as a result of changes to the facilities. Respondents repeatedly cited: reduction in user fees, consistent availability of medications, availability of highly qualified staff and the increased staffing levels as the drivers of change behind the increased uptake of services. By-and-large, these internal changes were reportedly facilitated by the use of NU Health funding. Respondents in Lango PNFP facilities also reported an overall increase in the uptake of services as a result of changes internal to health facilities. Changes such as improved staffing levels, consistent supply of medications, and increased services offered were credited with this increase. Unlike Acholi, respondents in Lango were less likely to report NU Health as the facilitator of these changes. Most of the time, respondents could not identify who facilitated the changes, and when they did identify a change agent, it was just as likely to be another stakeholder as it was to be NU Health.

Infrastructure improvements were important to both sub-regions. However, it was only in Acholi where the changes were primarily attributed to a donor and to RBF.

The Score Card using the quality of care data is as follows:

Score Card for Quality of Care			
Quality of Care	**Acholi**	**Lango**	**Comment**
Access Increased	0.5	0	Acholi's unweighted score shows marked increase in access among small PNFPs.
Human Resources Improved	0.5	0	Acholi shows overall increase in staffing but a deficiency among small HCs.
Availability of National Guidelines	0.33	0.66	Lango displays greater improvement but Acholi also has statistical improvement.
Availability of Infrastructure and Supplies	0.33	0	Neither region shows significant improvement of DiD. But Acholi has a higher overall score.
Availability of Medicines	0.5	0	Acholi shows statistical improvement but not a statistically significant DiD.
Processes Improved	0	0.33	Neither region shows significant improvement of DiD, but Lango has a higher overall score.
Clinical Quality of Care Improved	0	0.66	Lango displays statistically significant improvement but not a significant DiD. Acholi shows no statistically significant improvement.
Caretaker Capacity to Manage Home Care	0	0.66	Acholi displays statistically significant diminished performance but not a significant DiD. Lango has slight improvement.
Sub-total Quality of Care	**2.16**	**2.31**	8 points available (1 for each category)

Use of Health Services

This section assesses use of health services in Acholi and Lango PNFP facilities using both the R-HFA and LQAS data.

Use of Health Services in the R-HFA

This section has two indicators derived from the R-HFA measuring service utilisation:

- Average number of sick children seen at a health facility
- Average number of ANC visits in a health facility.

Overall, the average number of sick children seen in each facility during the month preceding the survey in the Acholi sub-region increased substantially compared to the Lango sub-region. By the endline survey, Acholi PNFPs were seeing on average 212 more children than at the baseline survey. Lango PNFPs report only seeing an average of 13 more children over the same period (Table 9).

Table 9: Utilization Indicators for the Acholi and Lango Sub-regions

Indicator	Acholi				Lango				DiD
	2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
Average number of sick children seen at the health facility in previous month	235	353	447	212	162*	201	175	13	199
Average number of ANC visits in previous month	170	160	119	-51	207	255	203	-4	-47

*This figure excludes and outlier of over 6000, which we inspected and code as a recording error.

Table 10 stratifies the caseload in the 19 Acholi and 10 Lango facilities at 100 patient increments for each time point. It also shows the median number of children treated (which is less influenced by outliers and skewed data sets, as is the mean). The data show that whereas at the baseline the majority of clinics in both Acholi and Lango were seeing less than 100 children per month, by the endline survey the majority of clinics in Acholi were seeing over 300 patients while most all clinics in Lango were seeing between 100-300 patients. Acholi clearly increased access to patients as contrasted with Lango. This is an important improvement given that it has a larger proportion of HC-IIs versus HC-IIIs compared to Lango, which typically see fewer patients.

In 2012 the median caseload was 84 in Acholi and 93 in Lango. By the endline the median had increased 4.3-fold in Acholi, but had increased by 73.1% in Lango. Acholi outperformed Lango in the increased use of child health services—a striking and positive result for the RBF intervention group. These data indicate that access increased, which is a result supporting the first hypothesis derived from the Theory of Change for this project.

Table 10: Health Facilities Categorised by Number of Sick Children Seen in the Preceding Month

Patients	Acholi*			Lango*		
	2012	2014	2015	2012	2014	2015
≤ 100	11	0	0	5	2	1
101-200	3	6	5	0	3	5
201-300	0	6	3	3	3	4
>300	5	7	11	2	2	0
Mean	235	353	447	162	201	175
Median	84	266	447	93	205	161

*All Acholi figures are out of 19 PNFPs; all Lango figures are out of 10 PNFPs.

ANC visits show a different pattern than the consultations for children under five years (Table 11). The results show an increased median ANC caseload of 39.8% in Acholi and a 8.8% increase in Lango. Although the mean has reduced in both sub-regions it is interesting that the median indicates that a larger proportion of health facilities in both areas are seeing more ANC clients. Overall, the median increase in Acholi is 4.5 times greater than in Lango. This result is consistent with the hypothesis that greater service use results in the RBF facilities vis a vis the IBF facilities.

Viewing these two sets of results the question arises whether the PNFPs prioritized child health. Although ANC visits did increase it was to a lesser degree than for child health. This result is credible

since some HC-IIs had not previously carried out ANC, whilst all of them had previously treated sick children.

Table 11: Health Facilities Categorised by Number of ANC Visits in the Preceding Month

Patients	Acholi*			Lango*		
	2012	2014	2015	2012	2014	2015
≤ 100	9	12	11	3	3	3
101-200	0	2	5	3	2	3
201-300	1	1	1	2	3	3
>300	4	4	2	2	2	1
Mean	170	160	119	207	255	203
Median	41.5	77	58	182	220.5	198

Figure 1 contains a scatterplot of the PNFPs by the difference in sick child caseload from 2012 to 2015. The results are revealing. All HC-IIs in Acholi increased access to sick children irrespective of their denomination, some of them by more than 200 patients per month. The three Catholic PNFPs display the largest improvements. Only one facility, Ambrosoli Hospital, registered a notable decrease in sick children seen. Therefore, Acholi displays a uniform increase in sick children access irrespective of size and religious denomination. Only one PNFP did not have an increase.

Lango displays a very different pattern: half of the PNFPs increased access while half recorded a decrease. However, none of those with decreasing access were HC-IIs; rather they were HC-IIIs and higher. Religious denomination does not appear to be a factor associated with this pattern. No facility in Lango approached the level of improvement found in Acholi. At least 11 Acholi PNFPs increased access more than the best performing Lango PNFP.

However, ANC visits show a very different pattern than the sick children consultations. Figure 2 provides more information. In Acholi, five of the 19 facilities experienced a substantial decrease in ANC visits. All of these facilities were Catholic HC-IIIs or hospitals. This is interesting given that four of the five had registered a large increase in child consultations. Six other facilities (a combination of HC-IIs and HC-IIIs) which did not have ANC previously are now attending women in ANC clinics, albeit the attendance is less than 100 women. Only two PNFPs had increases larger than 100 women. This may explain why the Acholi PNFPs have a low mean value. There are off-setting patterns of care. However, most Acholi facilities (73.7%) did increase the attendance of their ANC clinics. This result contrasts with Lango where 50% of PNFPs had either no increase or a decrease.

Figure 4: Difference in the Average Number of Sick Children Seen during the Month Preceding the Survey in the Acholi and Lango Sub-regions: 2012-2015

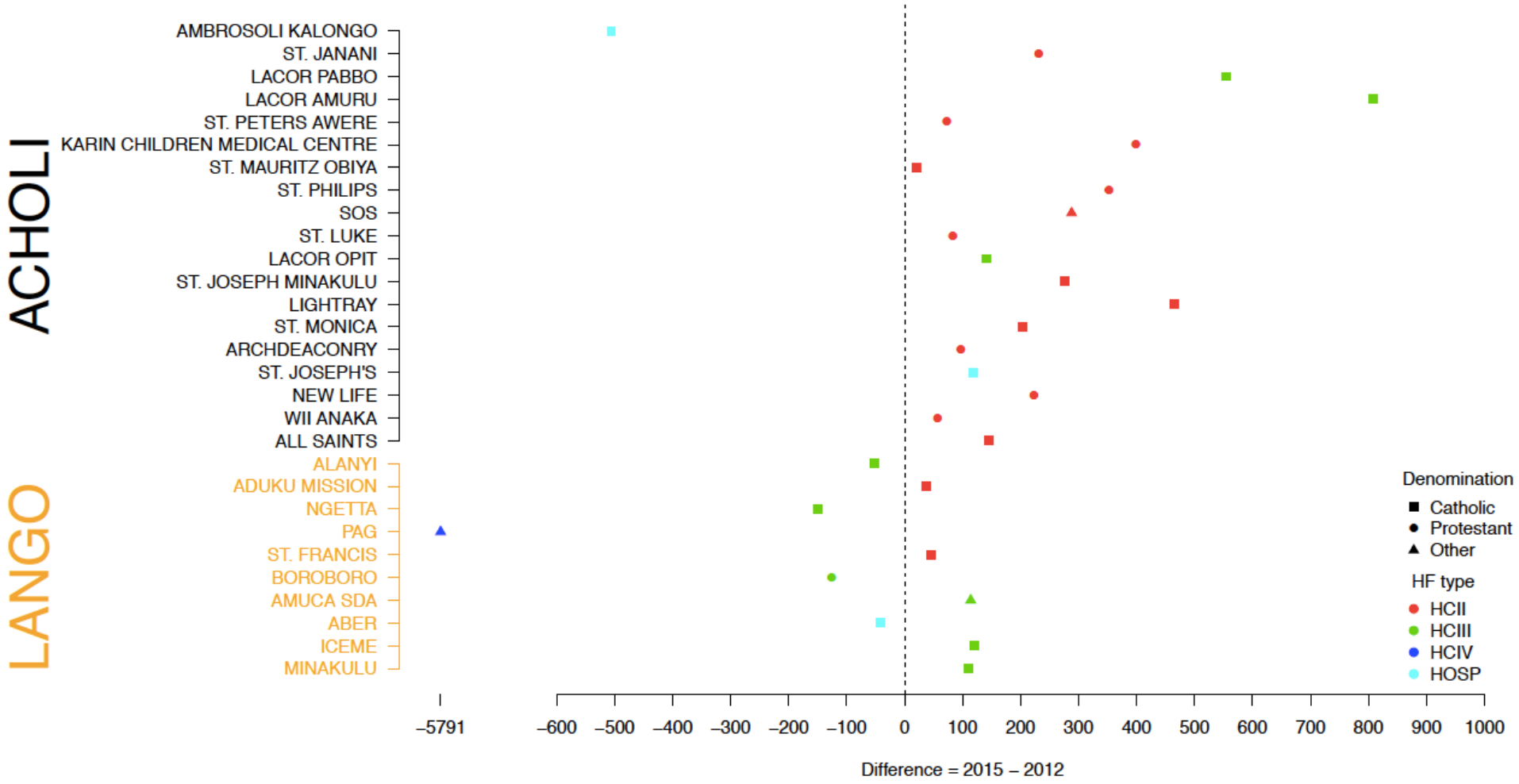
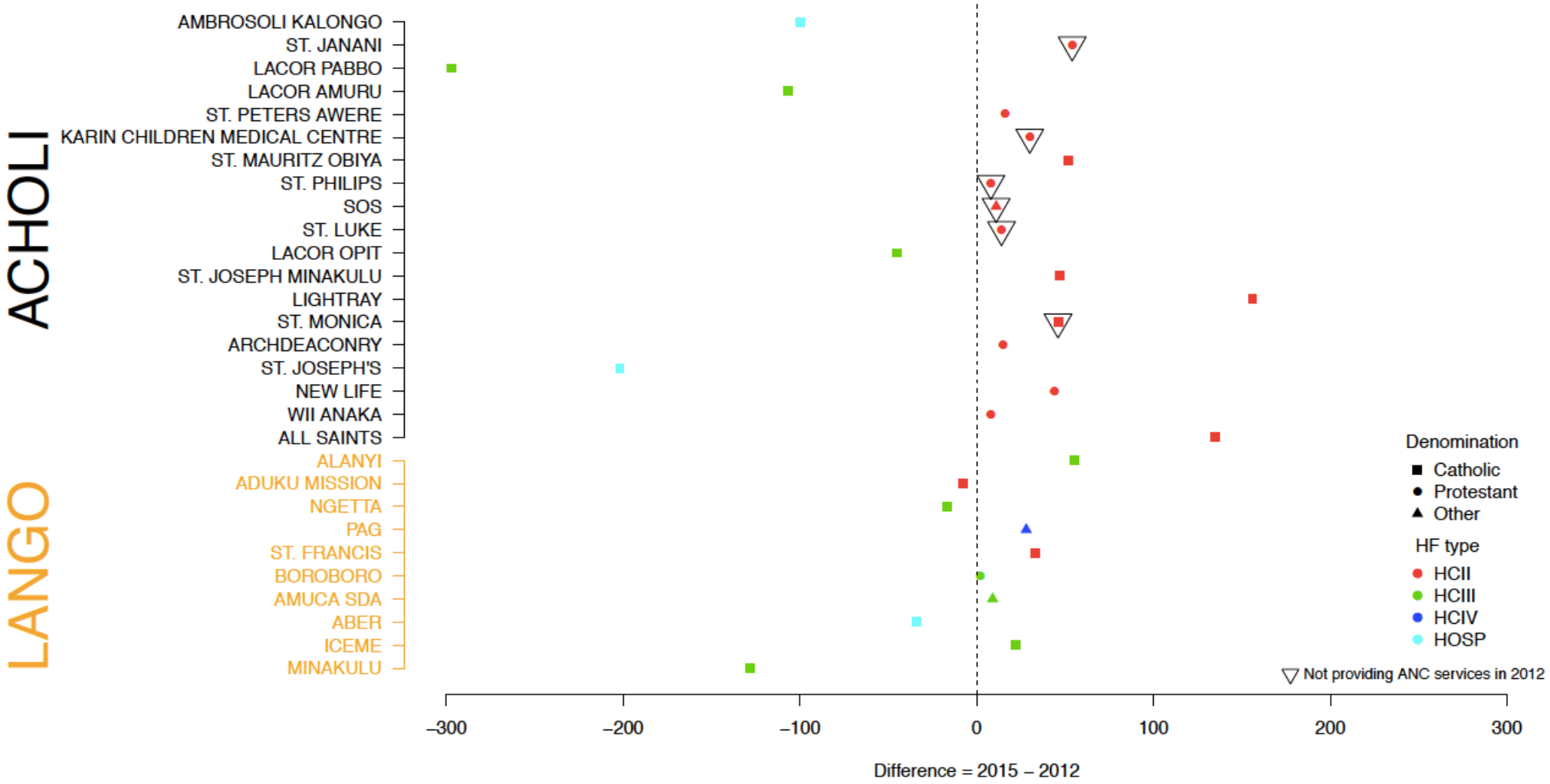


Figure 5: Difference in the Average Number of Children Seen for ANC Visits during the Month Preceding the Survey in the Acholi and Lango Sub-regions: 2012 to 2015



Demand for Health Services and Provider Choice

This section reports on the sources of health care in the PNFP catchment areas (CA) in the Acholi and Lango sub-regions (Table 12). We examine patients' demand for health services and their choice of health facility. We found a small but statistically significant decrease (Acholi 69.1% reduced to 66.4%; Lango 74% reduced to 69.9%) in the number households reporting having a health complaint in the last three months, with the great majority of them (92.0% and 90.4%) still seeking care at a health facility. The DiD in Lango was statistically greater indicating greater decline in health complaints. Treatment seeking patterns were very similar from 2012 to 2015; we note a small but significant increase in Lango families with sick family members using health facilities. No change occurred in either sub-region for the number of family visits to the HFs in the previous three months, with both reporting approximately 2.21 to 2.46 visits.

The choice of health facility by a family with a sick family member produced more informative results. Here we see an interesting effect with 35.6% of households in Acholi and 26.8% of households in Lango selecting PNFP facilities. This represents a slight but significant increase in Acholi and a significant decrease in Lango (2.1% and -5.7%, respectively, $p<0.001$). The resulting DiD is also significant ($p<0.001$). Demand for PNFP services is increasing in Acholi and decreasing in Lango.

While public sector health facilities remain the preferred health care provider, significant decreases in their use did occur in both sub-regions (-8.2% and -12.2%, respectively for Acholi and Lango, $p<0.001$). Additionally, we see a significant increase in private sector usage (7.5% and 17.9%, respectively, $p<0.001$). Overall, the burden of health care to the public sector has decreased significantly in both sub-regions, with more families in Acholi demanding more care from PNFPs and private providers. However, in Lango we see decreased demand for both public facilities and for PNFP.

Table 12: Respondents Choice of Source of Health Care in the Acholi and Lango Sub-regions

Indicator	Acholi				Lango				DiD
	2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
Households with children <5yrs with family member health complaint in last 3 mos.	69.1%	61.1%	66.4%	-2.7% ***	74.0%	71.1%	69.9%	-4.1% ***	1.4% ***
Family member was sick in the last 3 mos. and went to a health facility	90.4%	93.2%	92.0%	1.6%	86.7%	88.3%	90.4%	3.8% *	-2.2%
Mean number of family visits	2.46	2.46	2.34	-0.12	2.37	2.44	2.21	-0.16	0.04

to HF in last 3 mos.										
Choice of health facility by households with children <5yrs with a sick family member in the last 3 mos.	PNFP	33.5%	29.4%	34.1%	0.6% ***	32.4%	25.9%	26.8%	-5.7% ***	6.3% ***
	Private	3.0%	8.7%	10.5%	7.5% ***	8.0%	20.7%	25.9%	17.9% ***	-10.4% ***
	Public	63.5%	61.9%	55.4%	-8.2% ***	59.6%	53.4%	47.3%	-12.2% ***	4.1% ***

Table 13 suggests that the proximity of the facility is the most important criterion for selecting a facility in both sub-regions, although the proportion of respondents giving this response diminished in Acholi and increased in Lango. In Acholi, the second most important factor is the quality of care, followed by the availability of medication. In Lango, the availability of medication and the quality of care are of similar importance. This result is particularly important given the finding reported in the previous section. This assessment has detected a low quality of clinical performance in both the Acholi and Lango sub-regions. Should this low quality result in treatment failure and families conclude that quality of care is low in PNFPs, then we would fully expect diminished demand for PNFP services.

Table 13: Reason for Selecting a Health Facility in the Acholi and Lango Sub-regions

Reason for Selecting a Health Facility	Acholi Number of respondents (%)						Lango Number of respondents (%)					
	2012		2014		2015		2012		2014		2015	
Near Home	423	50.7%	282	42.8%	335	45.8%	153	35.0%	162	44.5%	137	39.4%
Staff Available	29	3.5%	14	2.1%	35	4.7%	24	5.5%	6	1.6%	11	3.2%
Meds Available	176	21.1%	132	20.0%	105	14.3%	83	19.0%	51	14.0%	61	17.5%
Low Price	29	3.5%	51	7.7%	38	5.2%	24	5.5%	23	6.3%	25	7.2%
Better Care	89	10.7%	122	18.5%	143	19.5%	107	24.5%	70	19.2%	58	16.7%
Preferred	60	7.2%	25	3.8%	25	3.4%	42	9.6%	33	9.1%	42	12.1%
Other	29	3.5%	33	5.0%	51	7.0%	4	0.9%	19	5.2%	14	4.0%
Total responses	**835**		**659**		**732**		**437**		**364**		**348**	

Coverage with Health Services

This section presents findings for key indicators of the LQAS household survey. Table 14 below summarises the population coverage for 37 key services in the RBF area (20 PNFPs in the Acholi sub-region) and IBF comparison area (10 PNFPs in the Lango sub-region) at the baseline, midpoint and endline surveys. It also includes analyses of these results for statistically significant changes over time within each sub-region. Finally, it presents difference in differences (DiD) analysis to assess the relative change between Acholi and Lango. Note that these results represent sub-regional averages for all 20 PNFP catchment areas in Acholi and 10 PNFP catchment areas for Lango. Disaggregated results by PNFP CA are given in Appendix 4.

Figure 6 displays the difference scores for Acholi from 2012-2015, showing 19 significant results among the 38 indicators (28i, 28ii counted as two indicators); 12 measure increases in patients paying user fees and are not considered in this section: indicators –6, 7, 13, 14, 17, 22, 23, 27, 30, 31, 34, and 37). Four of them (indicators: 6, 17, 34, 37) show an increase in the number of people paying user fees for services. The remaining indicators show increases in three antenatal care, two tetanus toxoid, one IPT, two institutional delivery, four post partum care, two family planning, and one child immunisation service. Of the 25 service indicators measured 15 (60%) exhibit statistically significant increases relative to 2012.

Of the 25 service indicators, 10 pertain to services provided at PNFP. Four of them (40%) reveal statistically significant increased services use at a PNFP: indicators – 10 (TT vaccination), 19 and 21 (post partum care), and 29 (child immunisation). The DiD for each of these indicators is also significant. One additional indicator also (36: treatment of malaria with ACT) displayed a significant DiD although there was no increase in Acholi; the effect is due to diminished use in Lango. Nevertheless, in 5 of the 10 PNFP service indicators Acholi displays a significant DiD while Lango does not.

Figure 7 displays the DiD of the Acholi vis a vis Lango sub-region for the 37 indicators. Twelve are payment indicators and not considered for the moment. Of the 25 remaining service provision indicators, 14 display a positive effect in which the DiD value is significantly greater in the RBF sub-region (52%): one ANC, two TT vaccination, one IPT, four post partum care, one family planning, three child immunisation, two malaria case management. This is quite a diverse series of effects and displays information consistent with the hypothesis that regarding use of services the RBF area will display greater increases.

However, we must note the caveat that several of these positive differences result from declines in the IBF sub-region and cannot be attributed solely to increases in Acholi. This point, however, should be understood in context: if the IBF side did diminish but the RBF did not do so to the same degree, then this is an appropriate beneficial effect of RBF. In short, losses were not incurred.

Of the 14 positive service provision effects 6 were significant DiD effects for service provision in PNFPs, which represents 60% of the PNFP service provision indicators. These results indicate that the changes in indicator values in the RBF area exceeded those in the IBF area.

Table 14: Summary Table for All Indicators for the Acholi and Lango Sub-regions

No	Indicator	Acholi				Lango				DiD
		2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
1	Percentage of mothers with children 0-5 months who attended ANC from any facility during last pregnancy	98.2%	99.3%	98.8%	0.6%	99.5%	98.3%	99.0%	-0.5%	1.1%
2	Percentage of mothers with children 0-5 months who attended at least four ANC visits during last pregnancy	41.1%	50.1%	55.9%	14.8% ***	45.9%	52.2%	62.3%	16.4% ***	-1.5%
3	Percentage of mothers with children 0-5 months who attended first ANC visit before 4 months pregnancy	52.7%	57.2%	62.0%	9.2% ***	46.4%	48.5%	56.3%	9.9% ***	-0.7%
4	Percentage of mothers with children 0-5 months who had at least one ANC visit at a PNFP facility during last pregnancy	36.6%	33.7%	37.4%	0.7%	36.3%	38.4%	38.9%	2.7%	-1.9%
5	Percentage of mothers with children 0-5 months who paid for any ANC visit during last pregnancy	15.3%	24.8%	25.6%	10.2% ***	24.6%	31.1%	33.8%	9.2% ***	1.1%
6	Percentage of mothers with children 0-5 months who paid for ANC received at a PNFP facility during last pregnancy	32.7%	61.1%	52.6%	19.9% ***	56.5%	74.0%	76.5%	20.0% ***	-0.1%
7	Percentage of mothers with children 0-5 months who know at least two danger signs of pregnancy	79.4%	85.2%	68.5%	-10.9% ***	72.3%	82.9%	47%	-25.2% ***	14.3 % ***
8	Percentage of mothers with children 0-5 months who had a birth plan	77.3%	77.5%	75.7%	-1.7%	64.6%	74.1%	63.8%	-0.8%	-0.8%
9	Percentage of mothers with children 0-5 months who received two or more TT vaccinations during last pregnancy	12.9%	26.2%	20.9%	8.0% ***	19.0%	15.0%	11.5%	-7.6% ***	15.5 % ***
10	Percentage of mothers with children 0-5 months who during their last pregnancy received at least a single TT vaccination at a PNFP facility	19.2%	37.0%	46.6%	27.4% ***	25.8%	21.4%	46.7%	20.9% ***	6.5% *
11	Percentage of mothers with children 0-5 months who received at least two doses of IPT during last pregnancy	36.9%	47.9%	43.5%	6.6% ***	50.9%	48.3%	39.2%	-11.8% ***	18.4 % ***

12	Percentage of mothers with children 0-5 months who received any single dose of IPT at a PNFP facility during last pregnancy	32.1%	29.8%	33.1%	1.0%	32.9%	32.5%	33.5%	0.6%	0.4%
13	Percentage of mothers with children 0-5 months who paid for any IPT received	1.9%	2.2%	2.0%	0.1%	13.9%	7.5%	2.6%	-11.3% ***	11.3 % ***
14	Percentage of mothers with children 0-5 months who paid for IPT received at a PNFP facility during last pregnancy	2.1%	3.4%	3.3%	1.2%	29.0%	20.5%	6.6%	-22.4% ***	23.6 % ***
15	Percentage of mothers with children 0-5 months who gave birth at a health facility during last pregnancy	73.8%	81.3%	85.2%	11.4% ***	61.5%	74.7%	74.9%	13.4% ***	-2.1%
16	Percentage of mothers with children 0-5 months who gave birth at a PNFP facility during last pregnancy	28.3%	27.7%	32.2%	3.9%*	21.0%	27.7%	26.4%	5.3%**	-1.4%
17	Percentage of mothers with children 0-5 months who gave birth at a PNFP facility and paid for delivery during last pregnancy	43.1%	62.1%	58.3%	15.1% ***	92.1%	85.3%	89.7%	-2.4%	17.5 % ***
18	Percentage of mothers with children 0-5 months who had at least one postpartum check-up at health facility during the first 6 weeks after delivery	19.9%	28.9%	40.4%	20.5% ***	13.7%	15.5%	16.6%	2.9%	17.6 % ***
19	Percentage of children 0-5 months who had at least one postpartum check-up from a health facility during the first 6 weeks after delivery	30.7%	28.9%	35.3%	4.6%**	18.2%	18.5%	16.1%	-2.1%	6.7% **
20	Percentage of mothers with children 0-5 months who had at least one postpartum check-up at a PNFP facility during the first 6 weeks after delivery	7.3%	11.7%	18.0%	10.7% ***	5.3%	6.7%	7.3%	2.0%	8.7% ***
21	Percentage of children 0-5 months who had at least one postpartum check-up at a PNFP facility during the first 6 weeks after delivery	10.4%	11.5%	14.5%	4.2% ***	7.3%	7.6%	7.4%	0.1%	4.1% *
22	Percentage of mothers with children 0-5 months who paid for any postnatal care received	3.8%	6.4%	5.9%	2.1%	7.7%	8.4%	10.8%	3.1%	-1.0%
23	Percentage of mothers with children 0-5 months who paid for postnatal care at a PNFP facility	4.9%	11.0%	9.4%	4.5%	10.2%	11.3%	9.7%	-0.4%	4.9% **
24	Percentage of mothers with children 0-5 months who are using any family planning method	12.6%	10.5%	15.3%	2.7%*	7.9%	9.4%	12.6%	4.7% ***	-2.0%

25	Percentage of mothers with children 0-5 months who are using any modern family planning method	11.6%	10.4%	14.5%	2.9%**	7.8%	9.2%	12.1%	4.3% **	-1.4%
26	Percentage of mothers with children 0-5 months who received a modern family planning method from a PNFP facility	0.6%	1.3%	2.8%	2.2%***	0.8%	0.8%	1.6%	0.7%	1.5% *
27	Percentage of mothers with children 0-5 months who paid for receiving a family planning method at a PNFP facility during last pregnancy	25.0%	32.0%	22.8%	-2.2%	75.0%	37.5%	46.7%	-28.3%	26.1 % ***
28i	Percentage of children 12-23 months who were fully immunised before their first birthday (card + questionnaire data, 3 polio)	64.6%	69.9%	64.6%	0.0%	68.2%	56.5%	55.8%	-12.3% ***	12.3 % ***
28ii	Percentage of children 12-23 months who had a measles vaccination before their first birthday (card + questionnaire data)	82.5%	84.1%	84.8%	2.3%	82.4%	74.4%	75.6%	-6.7% ***	9.0% ***
29	Percentage of children 12-23 months who have ever received any single vaccination at a PNFP facility	32.5%	36.7%	40.4%	7.9% ***	48.7%	47.5%	45.6%	-3.2%	11.1 % ***
30	Percentage of mothers with children 12-23 months who paid for any single vaccination received by her child at a PNFP facility	2.6%	0.9%	1.5%	-1.1%	1.1%	5.3%	2.9%	1.8%	-2.9% ***
31	Percentage of mothers with children 12-23 months who paid for any single vaccination received by her child	1.4%	1.0%	1.1%	-0.4%	0.6%	2.9%	2.1%	1.5%*	-1.9% **
32	Percentage of mothers with children 0-5 months who attended ANC from a health facility and who received counselling and testing for HIV and received their test result during last pregnancy	88.6%	88.3%	89.3%	0.6%	81.4%	74.5%	78.9%	-2.5%	3.1
33	Percentage of mothers with children 0-5 months who attended ANC at a PNFP facility and who received counselling and testing for HIV and received their test result during last pregnancy	33.3%	30.3%	34.1%	0.8%	28.6%	26.8%	30.3%	1.7%	-0.9%
34	Percentage of mothers with children 0-5 months who paid for an HIV test at a PNFP facility during last pregnancy	2.4%	6.4%	7.0%	4.6% ***	8.5%	18.8%	15.0%	6.4%*	-1.9%
35	Percentage of children under 5 years with fever in the last two weeks who were treated with ACT from any facility	39.2%	43.2%	35.3%	-3.9%*	32.6%	31.6%	21.1%	-11.5% ***	7.6% **
36	Percentage of children under 5 years with fever in the last two weeks who were treated with ACT from a PNFP	9.8%	10.6%	10.3%	0.4%	6.8%	7.8%	3.8%	-3.0%**	3.4% *

37	Percentage of mothers with children under 5 years who paid for malaria treatment received by her child at a PNFP facility	48.6%	77.8%	81.4%	32.8% ***	95.2%	89.2%	87.3%	-7.9%	40.7 % ***

- p <0.05, ** p <0.01, *** p < 0.001

Figure 6 Acholi LQAS Results Showing Difference for 38 Indicators (2012-2015)

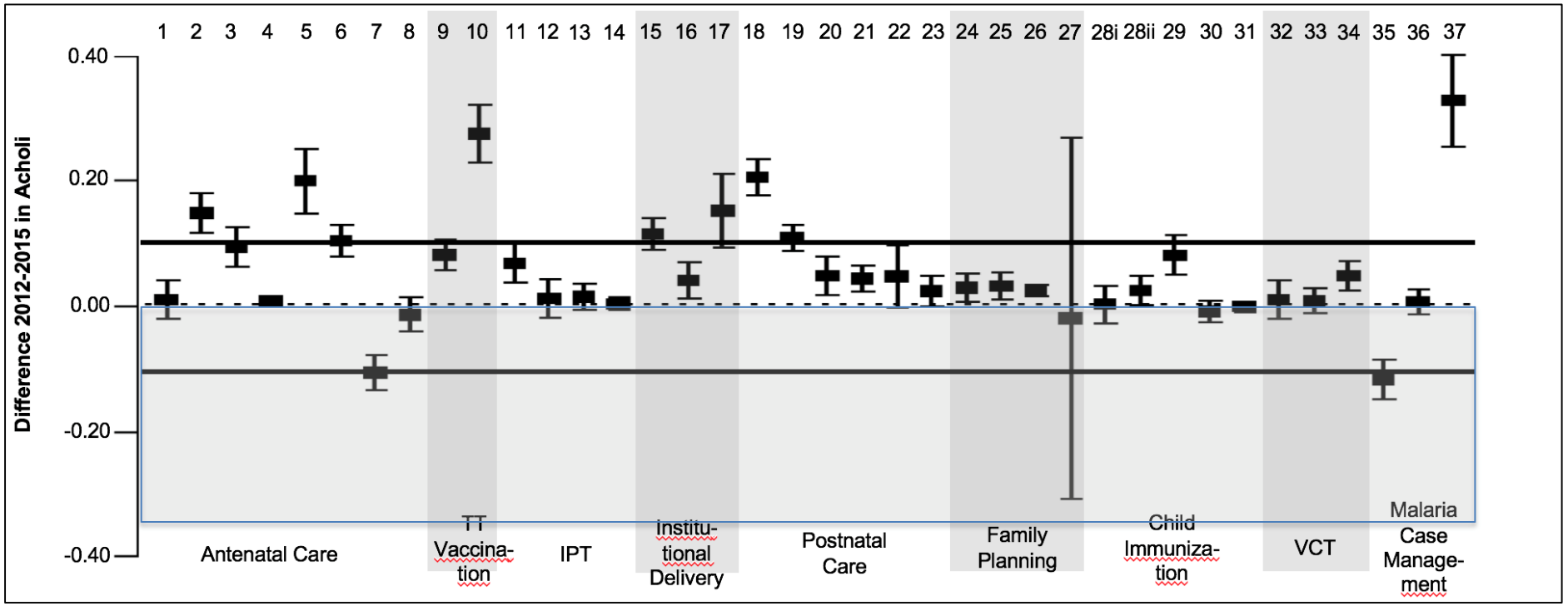
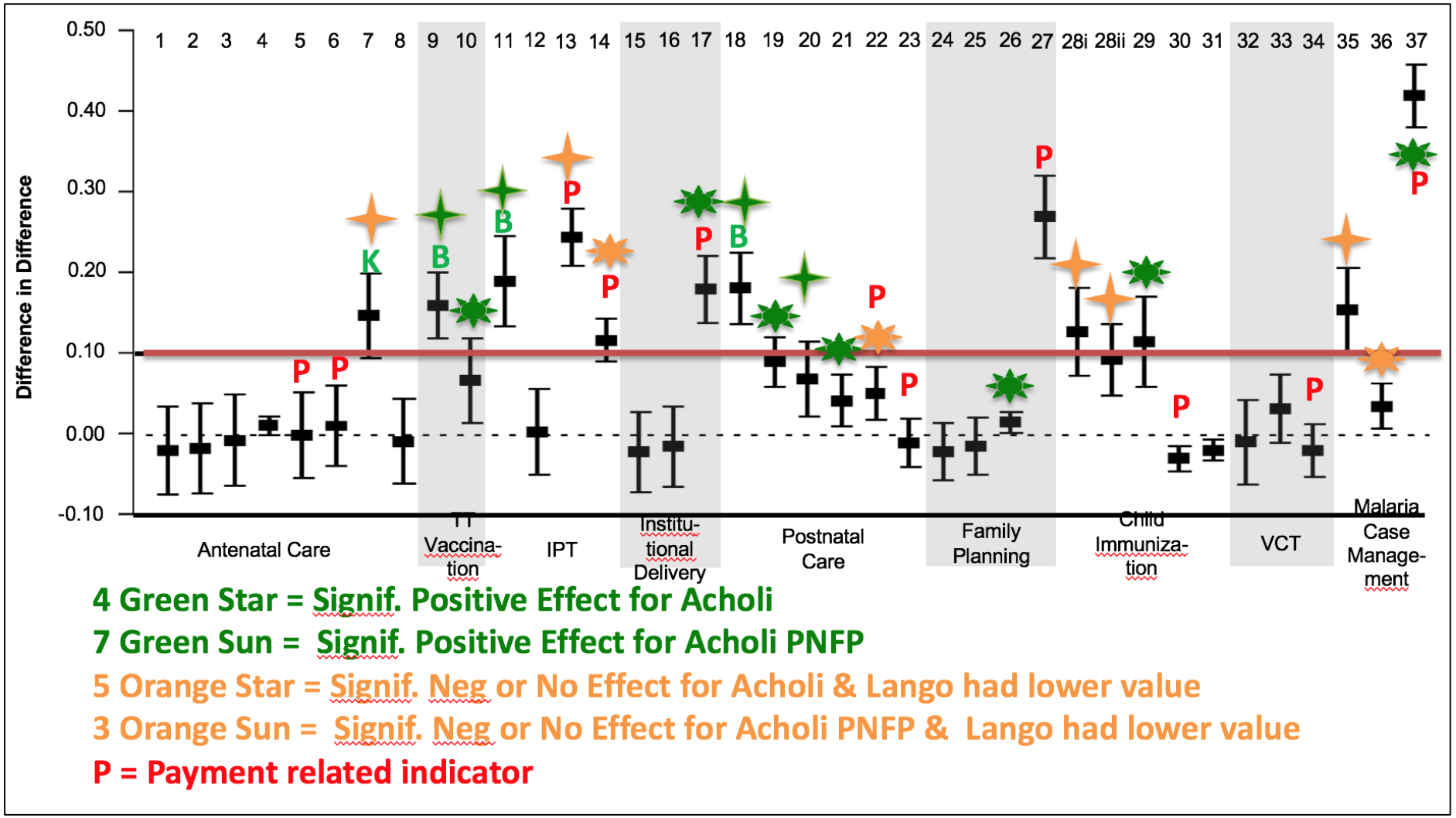


Figure 7 Difference In Differences Results of Acholi to Lango for 38 Service Provision Indicators (2012-2015)



Conclusion: Use of Services

In the HFA data Acholi exhibited a substantially higher increase than Lango in the average number of sick children attending PNFP health services from the baseline to endline survey. The 2015 results show that on average 447 sick children were seen the month preceding the survey, which is a 90% increase in Acholi from the baseline survey. This compares with only an 8% increase in the Lango sub-region over the same period, with only an average of 175 sick children seen the month preceding the endline survey.

Although the number of ANC visits on average decreased in both sub-regions, the scatterplot of these visits indicates that 75% of Acholi PNFP increased their ANC visits, which includes six facilities that had not previously supported ANC. Lango displayed small increases in 50% of their facilities, while the other 50% experienced no increase or a net decrease. While these results for ANC are not exceptional, they do suggest that Acholi is increasing access to services regardless of the level or denomination.

These results suggest that RBF facilities tended to increase access to both sick children and pregnant women seeking ANC. However, it was particularly effective increasing the demand by caretakers to seek treatment for their sick child. This is a concrete result indicating a possible RBF impact. However, while this indicator signals an increased demand for services, it does not indicate necessarily that Acholi has an increasing number of sick children. It signals an increased demand for services. It does not indicate necessarily that Acholi has an increasing number of sick children. That number could be the same while the demand for PNFP services increases. This increase also does not mean that the quality of care in PNFPs is improving. As we have seen the quality of clinical care has not improved and is of low quality.

From the LQAS community survey we observe 92.0% of households in Acholi with a health complaint in the three months preceding the survey having accessed care at a health facility. In Lango, the percentage was slightly less (90.4%). The most often used provider was the public sector, although this demand significantly decreased in both sub-regions, with the decrease being significantly larger in Lango. In Acholi, the demand for services increased among both PNFPs and the private sector. In Lango, increases occurred in the for-profit private sector only. PNFPs were the second most preferred provider; however, PNFP usage significantly increased in Acholi and significantly decreased in Lango. These changes created a statistically significant 7.8% differential. The for-profit private sector displayed the greatest increase in popularity across both sub-regions, which might be explained by the proximity of private health facilities, the availability of medication or the quality of care, which were the three main reasons households selected a particular facility.

Of the 25 service indicators measured in the LQAS community survey, 10 pertain to services provided at PNFPs. Five of them (50%) reveal statistically significant increased service use at a PNFP: TT vaccination, maternal and child post partum care, family planning and child immunisation. An additional indicator, treatment of malaria with ACT, displays a significant difference in differences result as well, although this result was not due to an increase in ACT treatments in Acholi. Rather, the effect is due to a diminished number of ACT treatments in Lango.

This complex set of variables suggested significantly increased demand for services among PNFPs in the RBF versus the IBF sub-region. While demand for the public sector also diminished in both sub-regions, in Lango the demand was not supplanted by PNFPs; rather, demand for PNFP services diminished in the IBF areas. **In this regard, the hypothesis that use of PNFP services would increase more in the RBF than**

IBF facilities was supported. However, it is essential to take note that the demand for for-profit private providers increased in both sub-regions. With a poor quality of clinical care provided in PNFP facilities in both sub-regions it is possible that the current increased demand for PNFP services will wane in Acholi.

Our results from our 2014 qualitative study also support the finding that caretakers of children under five in the RBF region were choosing a health facility because of staff availability and quality of care. However, the qualitative study uses the perceptions of PNFP health workers and managers, rather than clients. That study found that health facility staff respondents often reported improved staff-to-patient ratios and larger numbers of highly qualified staff within facilities largely attributed to the provisions of NU Health funds [1]. Likewise, the Rapid Health Facility Assessment Final Impact Evaluation conducted in 2015 also supports the increase in staffing, reporting a 6.3% increase from 2012 to 2015 in the percent of clinical staff working in the PNFPs on the day of the survey, a figure that only increased by 2.1% in Lango.

The Score Card for this section on service use is:

Score Card for Service Use			
Use of Service	**Acholi**	**Lango**	**Comments**
Use of Service in PNFP HFs: Child Health	1	0	Substantial increase in Acholi but not in Lango.
Use of Service in PNFP HFs: Maternal Health	0.33	0	Both sub-regions display a diminished mean number of users but a slight increase in the median for users of ANC services. However, Acholi displays 6 HCs as providing service whereas previously they did not.
Increased us of PNFPs with diminished use of public sector facilities	1	0	Acholi displayed this increase while Lango displayed diminished use of PNFPs.
Use of Services in Catchment Area	0.5	0	Acholi displays statistically significant increase in use of PNFP services whilst Lango exhibits statistical reduction in PNFP HF use.
Coverage with Essential Health Services	**1**	**0**	In 5 of the 10 PNFP service indicators Acholi displays a significant DiD while Lango does not.
Sub-total Use of Services	**3.83**	**0**	5 Possible points available

Affordability of Health Services

The final component of hypothesis 1 posits that with RBF, health services become more affordable. We assess this supposition in three ways: user fees charged by health facilities, patient costs for health service, and the financial burden of health services in the PNFP catchment areas. The third approach examines the methods families pay for health care.

User Fees

Tables 15 and 16 show, respectively, the percentage of PNFP facilities charging for services according to patient reports and the PNFPs' stipulated charges. In only one facility in Acholi did patients report they did not have to pay for services. This information indicates a larger proportion of facilities are charging

fees in 2015 as compared with the baseline and midterm assessments. At those earlier points in time three facilities did not charge user fees, whilst now there is only one. In Lango, patients report paying for services in all ten PNFP facilities. This is the same condition as in each previous year. Therefore, during the life of this project more facilities in the intervention group charge user fees.

Acholi PNFP facilities report a decrease in charging for treatments and no charges for laboratory tests, while the facilities increased charges for other services (i.e., consultations, ANC visits, deliveries). Overall, 25% of PNFPs increased explicit charging for the six cost centres we assessed. Post-partum care remains the sole cost centre in Acholi PNFPs not having an explicit cost. Lango displays a different pattern of increase where 30% more PNFPs report users fees for cost centres. According to the facilities half of them charge for consultations and one facility charged for postnatal care.

While the patterns charging user fees differ in the two sub-regions, the trend is similar. Lango PNFPs more frequently charge user fees, although both regions are increasing the proportion of PNFPs that do so. Patients report nearly universal user fees, and PNFPs report they are more explicit in charging for services and materials than they were during 2012. Whilst the control PNFPs display a 5% greater increase than the intervention PNFPs, the fact remains that both groups of PNFPs report substantial increases.

Table 15: Facilities Charging for Services Reported by Patients

Percentage of PNFPs charging for services as reported by patients	Acholi			Lango		
	2012	2014	2015	2012	2014	2015
Paid a fee	84%	84%	95%	100%	100%	100%

Table 16: Facilities Charging for Services According to the Facilities' Reports (by Service)

Percentage of PNFPs charging for services according to facilities	Acholi				Lango				DiD
	2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
Consultations	50%	74%	68%	18%	60%	50%	50%	-10%	28%
Treatment	78%	47%	63%	-15%	50%	100%	90%	40%	-55%
Lab tests	63%	53%	63%	0%	100%	90%	90%	-10%	10%
ANC	27%	42%	42%	15%	90%	100%	100%	10%	5%
Deliveries	50%	26%	57%	7%	90%	100%	100%	10%	-3%
Postnatal care	0%	0%	0%	0%	20%	10%	10%	-10%	10%
Totals				25%				30%	-5%

Despite these increased user fees in Acholi there is still a continuing practice of lump-sum payments being made by patients. Only one facility in Acholi did not have any patients reporting they paid a lump sum for their services. Thus, there are still substantial costs paid by patients (which are not itemized).

Patient Costs

Table 17 below shows the average amount paid by the six caretakers of patients interviewed at each facility at each time point. We categorised the average amount paid at the facility in four groupings: no fee, 1 to 2500 Ugandan Shillings (UGX), 2501-5000 UGX, and 5001-8000 UGX.

Table 17: Average Amount Paid by the Six Interviewed Patients at Each Health Facility in Acholi and Lango

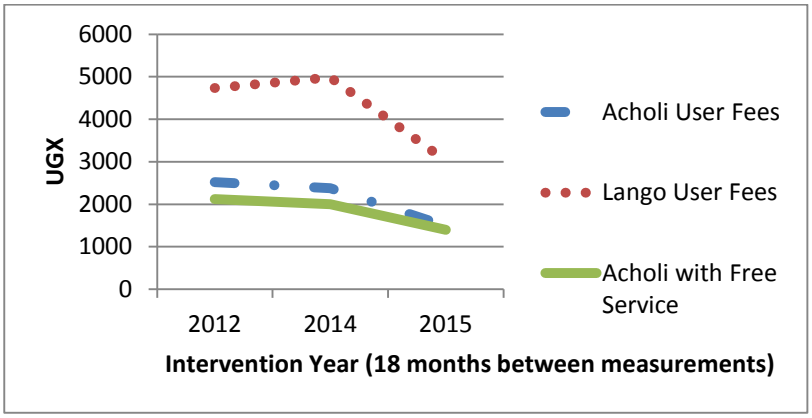
Average patient cost paid in a health facility	Number of HFs in Acholi**			Number of HFs in Lango***		
	2012	2014	2015	2012	2014	2015
No Fee	3	3	1	0	0	0
1-2500 UGX*	11	11	10	0	1	1
2501-5000 UGX	4	4	6	7	5	4
5001-8000 UGX	1	1	2	3	4	5
Mean cost excluding PNFPs providing free services	2404	2299	1488	4522	4755	3023
Mean cost adjusted for inflation paid by patients interviewed	2519†	2378††	1488	4739†	4983††	3023
Mean cost including PNFPs providing free services	2122†	2003††	1399	4739†	4983††	3023

*UGX = Ugandan Shillings, **n = 114 patients, ***n = 60 patients
† Inflation rate August 2012-May 2015 = 4.8%, †† Inflation rate March 2014-May 2015 = 3.45%[2]

Table 17 includes data for patients/caregivers who paid a fee for services and those who received free services. Only PNFPs in the Acholi sub-region provided free services (2012: 3 facilities, 2014: 3 facilities, 2015: 1 facility). It does not take into account patients who were given free medicine on an ad hoc basis. Using these inclusion criteria Table 17 identifies an important difference in health system costs in the two sub-regions. Both the RBF- and IBF-financed PNFPs display a progressively diminishing cost for services during 2012-2015. Both regions decreased costs by more than 30% (Figure 8). During this period, Acholi PNFPs consistently charged between 47% and 53% lower user fees than Lango PNFPs. However, even in 2015 Lango's charges exceed those of Acholi in 2012. This result is made clearer in the following line chart that indicates a strong decrease in user fees in the second half of the project in both sub-regions.

[2] Source material for inflation rates: http://www.indexmundi.com/facts/indicators/FP.CPI.TOTL.ZG/compare?country=ug

Figure 8: Average User Fees in the Control and Intervention Group



Financial Burden of Health Care

Family Income and Expenditure on Health

Table 18 below displays the monthly income in the Acholi and Lango sub-regions, and health care expenditures.

Table 18: Summary of Economic Indicators in the Acholi and Lango Sub-regions

Indicator	Acholi				Lango				DiD
	2012	2014	2015	Diff 2015-2012	2012	2014	2015	Diff 2015-2012	
Monthly income in the intervention and control areas	81,019	77,450	95,499	14,480 ***	69,270	77,629	79,366	10,096 **	4,383
Expenditure on Health Care									
Total expenses for seeking health care in the past 3 months†	11,084	12,389	14,835	3,751*	6,001	23,198	24,869	18,868 ***	-15,117 ***
Health expenditure as a percentage of monthly income†	7.8%	8.5%	10.0%	2.2%	4.8%	19.0%	19.0%	14.2% ***	-12.0% ***
Percentage of total health expenses attributable to consultations†	8.00%	9.30%	13.60%	5.60% ***	5.00%	3.00%	2.20%	-2.80%	8.4% ***
Percentage of total health expenses attributable to medications†	18.70%	18.03%	20.90%	2.20%	21.39%	33.93%	39.20%	17.81%	-15.61%
Percentage of total health expenses attributable to traditional medicine†	0.60%	0.73%	0.50%	-0.10%	0.00%	0.51%	0.90%	0.90%	-1.00%
Percentage of total health expenses	22.66%	20.77%	25.00%	2.34%	7.67%	12.70%	14.80%	7.13% ***	-4.79

attributable to transport†									
Percent of patients paying lump sum invoices†	50.0%	51.18%	40.0%	-10.0% ***	65.63%	49.94%	42.8%	-22.83% ***	12.83% **

* p <0.05, ** p <0.01, *** p < 0.001

† excludes outliers of 11.42 million UGX in Acholi and 237 million UGX in Lango 2015;

Inflation rate adjustment August 2012-May 2015 = 4.8%, Inflation rate adjustment March 2014-May 2015 = 3.45%

In Acholi, household heads reported an 18% increase in monthly income (+14,480 UGX, p<0.001). When we adjust for the inflation rate[3] the average monthly income increase reduces to 10,591 UGX. In Lango, the average family income increased by 15% increase (+10,096 UGX, p<0.01). However, with an adjustment for inflation the increased average monthly income is 6,771 UGX. The DiD shows no difference between the two sub-regions for an increase of monthly income.

Health care expenditures in Acholi increased significantly from 11,084 (adjusted: 11,616 UGX) to 14,835 UGX (p<0.05). Likewise, the proportion of monthly income spent on health also increased from 7.8% to 10.0%. However, the increase is not statistically significant. Lango shows a greater increase in health expenditure from 6,001 (adjusted: 6,289 UGX) to 24,869 UGX. The 18,868 UGX increase is statistically significant (p<0.001) as is the DiD between the two regions which indicates a much larger increase in the financial burden of health care in the Lango sub-region. Similarly, the percentage of monthly income spent on health in the Lango sub-region increased significantly from 4.8% to 19% (p<0.001) from 2012 to 2015. The DiD test shows a greater increase in the Lango sub-region than in Acholi.

These results suggest that the overall financial burden of health care is substantially higher in the IBF sub-region and that the financial burden for health care increased there in three years. In the RBF-financed sub-region health expenditure increase relative to income there was unchanged. This result is consistent with the hypothesized effect.

Specific Health Care Costs

An analysis of reported household health expenses in the community survey in the PNFP catchment areas shows that the proportion of household health expenses spent on consultations increased significantly by 5.6% (p<0.001) in Acholi and decreased by 2.8% (N.S) in Lango. The DiD test shows a significant difference between the two sub-regions. The proportion of expenditure allocated to medication in Acholi also increased by 2.2%, but the increase is much higher in Lango (17.81%, p<0.001). By 2015, 20.9% of the health costs in Acholi and 39.2% in Lango were spent on medication. The DiD test shows a significant difference (p<0.01) with Lango having the greater increase. Expenditure on traditional medicine has shown very little change in either sub-region and remains very low. Expenditure on transport as a proportion of all costs increased in Acholi by 2.34% (N.S) and increased significantly in Lango by 7.13% (p<0.001). The DiD test was not significant. This significant change in Lango may have contributed to the decreased usage of PNFP. Another explanation is that HC-IIs in Acholi now were perceived by families as being closer to their homes, having medications and having higher quality care

[3] Inflation rate August 2012-May 2015 = 4.8%, Inflation rate March 2014-May 2015 = 3.45%

than in 2012. Hence, they are now using them more frequently with the result of a decreased cost of transport.

The last indicator in Table 18 concerns lump-sum payments made to health facilities. These are payments that do not provide a detailed breakdown of specific costs. Lump-sum payments mask the underlying reasons for the expenditure. Lump-sum payments have decreased significantly in both sub-regions (Acholi by 10.0%, p<0.001; Lango by 22.83%, p<0.001), but to a greater degree in Lango (12.83%, p<0.01). Less than half of the respondents across both sub-regions report paying lump sums at the end line survey and both sub-regions are equivalent at about 40% of all costs.

Source of Financing to Pay for Health Care

The sources of financing to pay for health care PNFP CAs in the Acholi and Lango sub-regions are reported in Table 19 in three categories:

- Selling assets to pay for health care
- Taking loans to pay for health care
- Out-of-pocket health expenditure

Table 19: Sources of Expenditure for Health Care in the Acholi and Lango Sub-regions

Indicator	Acholi				Lango				DiD
	2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
Sold property to pay for health care services	52.9%	53.9%	44.1%	-8.8% ***	57.8%	62.5%	53.5%	-4.3% ***	-4.4 ***
Needed to borrow money for payment of monthly health expenses	28.1%	20.3%	23.5%	-4.6% ***	32.0%	26.0%	33.1%	1.1% ***	-5.8% ***
Size of loans and loans as a percentage of monthly income‡	80.0%	99.0%	85.0%	5.0%	102.0%	105.0%	103.0%	1.0%	4.0%
Percentage of households paying out of pocket for health expenses	78.8%	92.9%	92.7%	13.9% ***	98.1%	96.1%	95.6%	-2.5% ***	-16.3% ***

* p <0.05, ** p <0.01, *** p < 0.001

‡ excludes outliers of 1.1 million, 1.2 million and 5 million in Acholi 2015; outliers of 2 million and 4 million in Lango 2014; outliers of 1.5 million and 2.5 million in Lango 2015

The proportion of household heads that sold assets to pay for health care significantly declined in both sub-regions (p<0.001). At the endline, 44.1% of Acholi respondents and 53.5% of Lango respondents claim to have sold property to pay for health care services, which marks a significant reduction of 8.8% in Acholi and 4.3% in Lango. Although the statistically significant DiD reveals a greater reduction in Acholi, a substantial proportion of people still sell assets to pay for health care in both sub-regions (Acholi: 44.1%; Lango: 53.5%). This aspect of the financial burden of health services has declined significantly in the RBF sub-region, which is an effect consistent with the test hypothesis that the

financial burden of health care will reduce more in the RBF rather than the IBF areas. Nevertheless, selling household assets still affects a large proportion of families in both regions.

Acholi experienced a small, albeit significant decrease while Lango had a small but significant increase in the proportion of respondents taking a loan ($p<0.001$ in both locations). Both proportions remain high (23.5% and 33.1%, respectively) (Table 19). Overall, a greater proportion of household heads took loans in Lango than in Acholi -– about 10 percentage points more (DiD $p< 0.001$). Table 20 gives further information about the size of the loans, particularly as a percentage of monthly income.[4]

Table 20: Loans Taken Out for Health Care in the Acholi and Lango Sub-regions

	Acholi			Lango		
Loans:	**2012**	**2014**	**2015**	**2012**	**2014**	**2015**
Average size of loan	31,358	36,425	34,985*	35,403	36,423*	42,786*
Adjusted size of loan §	32,863	35,210	34,985*	37,102	35,208*	42,786*
Loan as a percentage of monthly income	80%	99%	85%*	102%	105%*	103%*
Loan repayment period:						
Less than one month	19%	10%	14%	31%	0%	15%
One to two months	32%	53%	34%	31%	46%	32%
Two to three months	19%	20%	13%	13%	25%	14%
Three to four months	19%	9%	12%	13%	22%	9%
More than four months	10%	7%	26%	13%	7%	30%
Source of loans:						
Family or friends	88%	80%	83%	86%	80%	82%
Private bank	6%	2%	1%	3%	2%	0%
Cooperative	3%	5%	5%	3%	5%	4%
Microfinance	3%	4%	5%	4%	4%	6%
Other	0%	10%	6%	4%	10%	8%

*Loan figures calculated minus the largest outliers.
§ Inflation rate adjustment August 2012-May 2015 = 4.8%, Inflation rate adjustment March 2014-May 2015 = 3.45%

The results show a 6.5% increase in the average loan size (adjusted for inflation) in Acholi and a 15% increase in Lango, with the 2015 average loan size in Lango being approximately 7801 UGX larger than in Acholi. The loans taken in Acholi are 85% of the average monthly income while in Lango the loans taken are 103% of the average monthly income. Please note that for this calculation we used as a denominator the monthly incomes of household heads that took loans rather than the average income in each sub-region. Had we used the sub-region average then the results would have been strikingly different, with loans representing a smaller portion of monthly income. However, by calculating loans as a proportion of income for those who borrow, it becomes apparent that it is the poorest of the poor who take loans, which is why loans represent such a high proportion of their monthly income. The majority of loans are taken from family or friends with slightly less than half of this debt cleared within two months; people in both sub-regions repay loans at similar rates. 26% of households who borrowed in Acholi and 30% in Lango were still paying off loans more than four months later.

[4] In 2014 in Lango there were outlier loans of 4 million and 2 million; in 2015 there were outliers of 1.1 million, 1.2 million and 5 million in Acholi, and outliers of 1.5 million and 2.5 million in Lango.

Table 21 shows the percentage of payments made out-of-pocket by household heads. Out-of-pocket expenditure significantly increased in Acholi from 78.8% to 92.7% ($p<0.001$) and decreased from 98.1% to 95.6% ($p<0.001$) in Lango. While the DiD test indicates a greater decrease in Lango, the overall health expenses paid out of pocket are still higher in Lango. Both percentages are greater than 90%. This result may suggest that residents in the sub-regions are increasingly able to pay for health care from their regular income.

The increase costs in Acholi can possibly be attributed to the decrease in the proportion of households exempt from costs from 2012 to 2015. The decrease of households paying out-of-pocket in Lango may be due to the slight increase of households with insurance and an increase of households exempt from costs. However, as already reported, by 2015 more than 90% of households in both regions were paying for health services using out-of-pocket cash. This is a financial burden which has not been abated by RBF.

Table 21: Source of Capital for Health Services in the Acholi and Lango Sub-regions

Source of Capital for Services	Frequency	Percent	Frequency	Percent	Frequency	Percent
	2012		2014		2015	
Acholi						
Cash (out of pocket)	503	78.8%	601	92.9%	682	92.7%
In kind	11	1.7%	10	1.6%	13	1.8%
Insurance (all costs)	3	0.5%	4	0.6%	1	0.1%
Exempt from costs	71	11.1%	24	3.7%	7	1.0%
Other	50	7.8%	8	1.2%	32	4.4%
Total	**638**	**100%**	**647**	**100%**	**736**	**100%**
Lango						
Cash (out of pocket)	302	98.1%	373	96.1%	410	95.6%
In kind	3	0.97%	7	1.8%	1	0.2%
Insurance (all costs)	2	0.65%	1	0.3%	3	0.7%
Exempt from costs	0	0	4	1.0%	2	0.5%
Other	1	0.32%	3	0.8%	12	2.8%
Total	**308**	**100%**	**388**	**100%**	**429**	**100%**

Conclusion: Affordability of Health Services

During the project period, Acholi (RBF) PNFPs continued to reduce user fees for the average patient/caregiver. They diversified their sources of funding by increasing the number of cost centres. In addition, user fees became nearly universal in the Acholi sub-region. Lango PNFPs also reduced user fees but never to the degree of the Acholi PNFPs. During 2013 the average user fees in Lango were 2.2 times greater than the average Acholi user fees. Lango already had universal user fees, but also continued to increase the number of cost centres. Whilst the data do not clearly suggest that RBF led to these changes, Acholi PNFPs never increased their costs to the level of Lango.

Lango residents displayed a greater financial burden compared to Acholi. The proportion of household heads that sold property to pay for health care services decreased significantly in both sub-regions, with Lango residents paying a larger percentage of monthly income than Acholi residents. About one-quarter of residents in Acholi and one-third in Lango take loans to pay for health care, with those taking loans more likely to be amongst the poorest residents. Residents in both locations reported a similar repayment pattern. The decrease in sold property and the high level of payment out-of-pocket may signal that most people are able to cope with health care costs, with the exception of the very poor.

Overall, both sub-regions increased household income significantly. Whilst the relative increases did not differ, Acholi monthly incomes were higher. Health care costs increased in both locations but almost six times more so in Lango. It is interesting that while PNFP user fees decreased the overall costs increased. This is due to the latter estimate including use of all types of facilities in addition to PNFPs. The economies of health care in the two sub-regions differ especially for the costs of consultations (higher in Acholi), medications (higher in Lango) and transport (higher in Lango). Transport costs in Acholi increased slightly. This effect is possibly due to the large proportion of HC-IIs supported by the project, which brought service closer to communities, and increased demand to visit them. The increased transport cost may also be due to the increased cost of petrol. During 2012 the costs that people paid for health care were initially higher in the RBF sub-region, but by 2014 the IBF exposed area exhibited an average cost of health care for the last three months about 1.8 times higher than Acholi. While the economic conditions may explain the continuing costs of health in Acholi and the increased costs in Lango, we should point out that Acholi fared much better in terms of affordability. Potentially the incentives associated with RBF may explain this result. In a time of worsening economic conditions the cost of health care did not increase.

The Score Card for Health Affordability is as follows:

Score Card for Affordability of Health Services			
Indicators	**Acholi**	**Lango**	**Comment**
Reduced Number of PNFPs Charging User Fees	0	0	Neither sub-region displayed a decrease in the number of PNFPs charging user fees. Both sub-regions display a net increase.
Patient Costs Decrease in PNFP Facilities	0.5	0.5	Patient costs on average decrease in both sub-regions but more so in Acholi possibly due to HC-IIs charging less and Acholi having more HC-IIs.
Health Care Costs as Percent of Monthly Income	1	0	No significant change in Acholi, but a significant increase in Lango with significant DiD.
Sold Household Assets	1	0	Statistically significant reduction in both sub-regions but significant DiD indicates the decrease in Acholi is greater.
Borrowed Money to Pay for Health Care	1	0	Statistically significant decrease in Acholi and a significant increase in Lango with a significant DiD.
Sub-total Affordability	3.5	0.5	5 points available

HYPOTHESIS 2: IMPACT

The second hypothesis posits that if the quality of care, use of services, and affordability of services increased, then the disease burden among pregnant women and children under five who are users of PNFP facilities with RBF will decline. This assessment was not able to carry out a disease-specific population based survey due to the cost constraints. We also could not use the R-HFA for this purpose since demand should also increase with RBF. In that case, increased demand confounds an assessment of disease burden if we use the recurrent information system of the health facilities. However, we can assess this hypothesis using the community LQAS survey.

Table 22 exhibits reported burden of disease information from the community LQAS survey of households with children under five years of age. The proportion of households with health complaints declined significantly in both sub-regions, but more so in Lango. Both sub-regions show lower disease burden during 2014 and 2015 as compared with the 2012 baseline. This is an important but complex finding. As we explain in the Methods Section of this report, these data were collected as part of the LQAS community survey. The households included in the sample were from the immediate catchment area of each PNFP facility. This result about disease burden cannot be attributed directly to a financial mechanism as household members report they visit a variety of service providers. However, we can say that in the area where households have the greatest access to PNFP the reported number of health complaints decreased.

Also, we see a seemingly contradictory result, as the proportion of households with a sick family member going to the health facility in the last three months remained without significant change in Acholi and increased in Lango. Interestingly the mean number of family visits to HFs in the last three months also remained unchanged in both sub-regions. Although we see a decreased number of health complaints, a family's number of visits does not reflect this decrease! A possible explanation is an increased demand for health services in both sub-regions due to the improved infrastructure and medical supply change, and affordability of services. Although these sections produced an interesting set of results, we cannot attribute the effects in Acholi to RBF. Further investigation is warranted.

Table 22: Burden of Disease and Use of Health Facilities

Indicator	Acholi				Lango				DiD
	2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
% HHs with family member with health complaint last 3 months	69.1%	61.1%	66.4%	-2.7% ***	74.0%	71.1%	69.9%	-4.1% ***	1.4% ***
% HHs with family member in last 3 months who went to health facility	90.4%	93.2%	92.0%	1.6%	86.7%	88.3%	90.4%	3.8% *	-2.2%
Mean number of family visits to HFs in last 3 months	2.46	2.46	2.34	-0.12	2.37	2.44	2.21	-0.16	0.04

The Score Card for this hypothesis contains one indicator:

Score Card for Disease Burden			
Disease Burden	**Acholi**	**Lango**	**Comment**
Decrease in households with Sick Family members	0	1	Although both sub-regions exhibit decreases in the proportion of households with health complaints, the decrease was significantly greater in Lango.
Sub-total Burden of Disease	0	1	1 point available

HYPOTHESIS 3: SUSTAINABILITY

The third and final hypothesis concerns sustainability – concept that is difficult to measure. To sustain RBF requires creating an enabling environment for it to be maintained. In a three year project sustainability should not be expected. The hypothesis states that if RBF has an impact then the government and development partners will sustain support to it. In our proposal we said we would measure both programme effectiveness and impact, as these variables are directly linked to the hypothesis that government and donors would later invest in RBF.

While we do not award points to the scorecard at this early stage of the RBF activity, data do suggest that Acholi fared substantially better than did Lango. Districts health officers in the Acholi sub-region told LSTM researchers they promote future use of RBF in their sub-region. However, there gave no indication of financial commitment to sustain it. International donors such as the World Bank plan to support RBF in the Ugandan public sector through their Global Financing Facility. Their RBF model will not replicate the one used in this programme by NU Health. Rather, it will be a scaled down version. Therefore, whilst RBF may be sustained, the model will be different. Both sub-regions exhibited similar demand. They indicate desire to institutionalise the approach.

Nevertheless, there are numerous characteristics in Lango and Acholi that do not signal institutionalisation of RBF as yet. For example, there is no budget or RBF formula used for strategic planning in the sub-region, there are no specialised positions with trained personal in RBF management, and there is no training mechanism in place at the district or national level to train District Health Officers or other governors of the health system about RBF principles or practice. Whilst by these standards RBF has had some success, it is also clear that substantial institution building is still needed for RBF to be sustained in the sub-region.

Nevertheless, the districts eagerly participated in each round of the LQAS community surveys and the R-HFAs. All district appointed participants tended to collect the data in all three rounds. We found little attrition amongst the survey teams. The districts were highly committed to carrying out the RBF assessments and to learning the evaluation skills. We are therefore confident that local capacity for M&E was built.

Within the NU Health programme, the District Health Teams had the primary responsibility of providing guidance and oversight to the PNFPs in implementation of RBF and general troubleshooting. Their information sources were largely through HMIS reporting and planned supervisions. Initially NU Health supported all the participating DHTs in this role both financially and with the provision of secondees to

support capacity, whilst gradually building their capacity to fulfil their supervision/verification role independently. This is another example of how routine monitoring was supported in the programme.

However, we need to reiterate that whilst some services improved, others did not. The qualitative study pointed out that multiple donors supported services in both sub-regions in addition to the RBF/IBF financing. Both regions exhibit substantial role ambiguity in the sense that PNFPs in both locations had difficulty keeping track of the specific donor goals. However, Acholi PNFPs did attribute the improvements in their facilities and performance to NU Health and therefore to RBF. Nevertheless, the facts are that several donors support health system improvements during the project period.

We also need to reiterate the very low quality of clinical care detected in both sub-regions. Families tended to select health facilities based on the proximity to their home, the quality of care and the availability of medicines. These findings augur ill for sustainability due to the very low quality of clinical care. Should treatment failures result, current increases in PNFP use in Acholi could abate or reverse.

Table 23: A Score Card Comparing the RBF-Supported Acholi Sub-region and the IBF-Supported Lango Sub-region (2012-2015)

Indicators	Acholi	Lango	Comment
Score	9.49	3.81	This is the total of all points earned by the sub-region out of a total of 19 points.
Percentage of points available earned	50%	20%	Acholi scores 2.5 times more points.
Quality of Care in Private Not For Profit facilities (PNFP)			
Access Increased	0.5	0	Acholi unweighted score shows marked increase in access among small PNFPs.
Human Resources Improved	0.5	0	Acholi shows overall increase in staffing but a deficiency among small HCs.
Availability of National Guidelines	0.33	0.66	Lango displays greater improvement but Acholi also has statistical improvement.
Availability of Infrastructure and Supplies	0.33	0	Neither region shows significant improvement, but Acholi has a higher overall score.
Availability of Medicines	0.5	0	Acholi shows statistical improvement, but not a statistically significant Difference in Differences.§
Processes Improved	0	0.33	Neither region shows significant improvement of DiD, but Lango has a higher overall score.
Clinical Quality of Care Improved	0	0.66	Lango displays statistically significant improvement but not a significant DiD. Acholi shows no statistically significant improvement.
Caretaker Capacity to Manage Home Care	0	0.66	Acholi displays statistically significant diminished performance but not a significant DiD. Lango has slight improvement.
Sub-total Quality of Care	**2.16**	**2.31**	**8 points available (1 for each category)**
Use of Service			
Use of Service in PNFP HF: Child Health	1	0	Substantial increase in Acholi but not in Lango.

Use of Service in PNFP HFs: Maternal Health	0.33	0	Both sub-regions display a diminished average number of users across all maternal services, but a slight increase in the users of ANC services. However, Acholi displays 6 HC as providing service whereas previously they did not.
Increased Use of PNFP with Diminished Use of Public Sector	1	0	Acholi displayed this increase while Lango displayed diminished use of PNFP.
Use of Services in Catchment Area	0.5	0	Acholi displays statistically significant increase in use of PNFP services whilst Lango exhibits statistical reduction in PNFP use.
Coverage with Essential Health Services	**1**	**0**	In 5 of the 10 PNFPs' service indicators Acholi displays a significant DiD while Lango does not.
Sub-Total Use of Services	**3.83**	**0**	**5 possible points available**
Affordability of Health Services			
Reduced Number of PNFP Charge User Fees	0	0	Neither sub-region displayed decrease in number of PNFP charging user fees. Both sub-regions display net increase.
Patient Costs Decrease in PNFP Facilities	0.5	0.5	Patient costs on average decrease in both sub-regions but more so in Acholi, possibly due to HC-II charging less and Acholi having more HC-IIs.
Health Care Costs as a Percentage of Monthly Income	1	0	No significant change in Acholi, but significant increase in Lango with significant DiD.
Sold Household Assets	1	0	Statistically significant reduction in both sub-regions but significant DiD indicates the decrease in Acholi is greater.
Borrowed Money to Pay for Health Care	1	0	Statistically significant decrease in Acholi and a significant increase in Lango with a significant DiD.
Sub-total Affordability	3.5	0.5	5 possible points available
Disease Burden			
Decrease in Households with Sick Family Members	0	1	Although both sub-regions exhibit decreases in the proportion of households with health complaints, the decrease was significantly greater in Lango.
Sub-Total Burden of Disease	**0**	**1**	**1 point available**
Sustainability	**NA**	**NA**	**Too early to score**

§ A difference in differences (DiD) estimator is defined as the difference in average outcome in the RBF sub-region minus the difference in average outcome in the IBF sub-region after exposure to their respective financial mechanisms. It is intended to reduce the effects of selection bias detected in the baseline surveys.

CONCLUSIONS

Each of the preceding sections above ends with a set of conclusions summarizing results. We have collated them in the Executive Summary and will not repeat them here. We have also presented the conclusions for each element in the Theory of Change in the Score Card (Table 23). In summary, the Theory of Change proved to be partially correct for the programme goal and two of the hypotheses (effectiveness and impact). It did not hold for the sustainability hypothesis due to the lack of a strategy for institutionalizing the gains made by strengthening the health care system.

The following sections present our overall conclusions, recommendations and lessons learned. It also presents limitations of this study.

Overall Conclusions

Whilst the quality of access to health service increased in the RBF sub-region, this effect was primarily seen in small health centres. The availability of staff also increased in that sub-region but unfortunately not in the small health centres. The quality of infrastructure, medical supplies, medicines, and management processes did improve substantially in the RBF-financed sub-region. However, the quality of clinical care was poor in both sub-regions –especially in Acholi. National protocols for diagnosis of the sick child were not used, caretakers were not counselled about how to administer the medicines prescribed for their child, and even fewer caretakers knew how to use the medication. All of these quality measures were elements in the NU Health RBF payment scheme with the exception of the quality of clinical care, despite this critical element being fundamental to the theory of change. The one exception was the increased use of RDTs for the diagnosis of malaria.

Use of child health services significantly increased in the RBF sub-region, while they did not increase in the IBF sub-region. The median for ANC usage increased in Acholi as well. The overall demand for PNFP users increased significantly in Acholi and decreased in Lango. In the latter sub-region only the private sector exhibited increased demand. In 5 of the 10 PNFP service indicators measured in the population based LQAS survey, Acholi displayed a significantly greater increase in coverage while Lango did not.

With regard to the affordability of health services, patient costs on average decreased in both sub-regions but more so in Acholi, possibly due to HC-IIs charging less and Acholi having more HC-IIs. We detected a statistically significant reduction in people selling household assets to pay for health care in both sub-regions, with a significantly greater reduction in Acholi. As regards taking loans to pay for health care, we found a statistically significant decrease in Acholi and a significant increase in Lango.

With respect to disease burden, both sub-regions exhibited decreases in the proportion of households with health complaints, but the decrease was significantly greater in Lango. These decreases were small (-2.7% in Acholi, 4.1% in Lango) with a differential of 1.4%. Nevertheless, the RBF sub-region did not display a reduced burden of disease that surpassed the IBF sub-region

There were several indications of increased demand for RBF by World Bank and district health officers. Also, capacity was building Acholi in managing health facilities using the RBF payment scheme. Capacity was also built at the district level for using the M&E approaches applied in this evaluation. Further we experienced continuous demand for feedback on the results of this assessment on a PNFP-by-PNFP basis. However, institutions need to be established to enable RBF to become a component of the district governance system. Those conditions do not exist as yet.

In summary, the Theory of Change proved to be partially correct for the programme goal and two of the hypotheses (effectiveness and impact). It did not hold for the sustainability hypothesis due to the lack of a strategy for institutionalizing the gains made by strengthening the health care system. We summarise our conclusions in the Score Card, which is a qualitative collation of our interpretation of the data. A summary of our main conclusions follows.

The Score Card, which is a qualitative collation of the results of this system, indicated that despite the RBF sub-region earning 50% of the available performance points, it scored 2.5 times more points than the IBF sub-region.

Recommendations and Lessons Learned

1. The very low quality of clinical care ought to be a priority for improvement in both sub-regions but especially in the RBF sub-region.

2. Clinical quality of care should become a component of the RBF payment formula and assessed with observational probability samples as used in this evaluation. The use of medical records for this purpose as used by NU Health was insufficient and not accurate.

3. RBF was particularly effective in small health facilities such as HC-II in improving access and infrastructure. These facilities could be a particular focus for future RBF activities and play a key role in any strategy for strengthening the health system. Improvements to HC-IIs increased access to services and were associated with increased demand for services.

4. Human resource planning should coincide with improvements to HC-IIs. While considerable improvements in staffing took place in large facilities, the availability of staff at the lower level facilities diminished, a fact that may account for the low quality clinical care we detected. Although access and infrastructure improved, human resources deteriorated. While the RBF payment formula did contain a human resource element, deficiencies persisted at the lower level facilities. It is possible they remained undetected using the RBF payment formula.

5. In this study, the fact that 70% of the PNFP in Acholi were HC-IIs and only 20% were HC-IIs in Lango confounded RBF. Nevertheless, RBF was particularly effective in the smaller health centres. Future impact evaluations of RBF should take special care to ensure similar health system structures in both the RBF and the comparison areas.

6. The *hands-off approach* did serve its purpose which was to assess RBF without other factors, such as observational studies, or capacity building strategies confounding the effect of RBF. However, it should be eliminated in future RBF projects. Had the evaluation data collected at time point two been made available to the district and PNFP managers, management decisions could potentially have been made to rectify the detected problems. High quality, evidence-based M&E systems together with RBF may produce an interaction effect leading to a more complete Theory of Change with a corresponding higher impact on quality, use, disease reduction and sustainability.

7. This evaluation data should be shared at the earliest possible time with the district management teams and the PNFP managers. While it was appropriate to not share these data during the trial, it is essential to do so now that it has concluded. This particular recommendation will contribute to two of the intended outputs of this project that have yet to be satisfactorily achieved:

    a. Improved independent and GoU monitoring and analysis of the quality of PNFP service provision;
    b. Improved effectiveness of ongoing GoU support for PNFP facilities.

8. Future applications of RBF ought to be undertaken as trials but with modifications learned from this study. The primary ones include:

a. Having a neutral external agency assess clinical quality of care using observational techniques effectively used in the R-HFA. However, in this next application the hands-off approach should be replaced by including M&E feedback as a component of the RBF model. RBF without the M&E data very much restricts the steering and guiding mechanisms needed by district and PNFP management. Similarly, the LQAS data used in this same way permits the districts and PNFPs to assess the population based behaviours and to arrest pernicious trends that limit PNFP effectiveness.

b. Ideally the RBF and IBF mechanisms should be either randomly assigned or introduced in step-wedge designs in the same cultural settings so as to understand the effects of RBF versus other interactions effects that played an important role in this study. For example, the level of the HC does confound the effect of RBF in Acholi as 70% of PNFPs were HC-IIs. However, we do also see that HC-IIs benefited greatly from these DFID investments, which is value for money.

LIMITATIONS OF THE STUDY

The major limitation of this evaluation is the initial starting differences of the RBF-exposed PNFPs in Acholi and the IBF comparison group. This limitation affected our methodology restricting us from using between group difference tests. The lack of random assignment of the RBF and IBF financial mechanisms is also a limitation as several differences would have had to exist in the two groups other than the financial mechanism. Due to these and other initial differences in the two sub-regions we are unable to establish causality of the RBF exposure.

LSTM's evaluation team was financed to carry out data collection and analysis during three months, at each of the three time points. This intensely concentrated period of work prevented the team from gleaning additional information that could have provided insights into the financial mechanisms under study. Also, the inability of the DFID to fund qualitative assessments at each time point was another limitation. Whilst we were able to carry out a small qualitative study during the summer 2014, these data were out of sequence with the other time points and had limited application in the final assessment.

The statistical lack of difference between the 2012 baseline and the 2014 midline data is another limitation, although not one we could control. This effect suggested that the effects of RBF are not immediate and, in the case of Acholi, needed time to take root. The original evaluation design LSTM recommended was for five time points. Although more expensive, it may have provided more definitive data than the three-time-point study we carried out.

The R-HFA tool observed clinicians performing services. Certainly we concede that observing creates a Hawthorne Effect as the clinicians may perform differently than they normally would by knowing they are a part of an assessment. Nevertheless, the Hawthorne Effect normally promotes better performance rather than hindering it [16]. In this regard, our data probably exhibit the best case scenario for quality of clinical performance.

As mentioned in the methods sections, the statistical modelling we carried out provided no more insight that those provided in the results already presented. Further analytic work on the existing database and by adding additional information or correlates to the models could produce a more ample Theory of Change.

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APPENDICES

Appendix 1: PNFP selected for the impact evaluation

Appendix 2: Number of Supervision Areas and Sets of Questionnaires Completed in Each District

Appendix 3: Summary of unweighted R-HFA results

Appendix 4: Catchment LQAS Area level results for the Acholi and Lango sub-regions

Appendix 5: LQAS Decision Rules Table

Appendix 6: Revision of the Impact Evaluation Design

Appendix 7: R-HFA tool and LQAS Questionnaires

APPENDIX 1. PNFPS SELECTED FOR THE IMPACT EVALUATION

Selected PNFP Facilities (Acholi sub-region)

District	Name of PNFP	ID Code	Type	Total HFs
Agago	Ambrosoli Kalongo	01	Hospital	2
	St. Janino	02	HC-II	
Amuru	Lacor Pabo	03	HC-III	2
	Lacor Amuru	04	HC-III	
Gulu	Lacor Hospital	05	Hospital	12
	St. Peters	06	HC-II	
	Karin Children Medical Centre	07	HC-II	
	St. Mauritz Obiya	08	HC-II	
	St. Philips	09	HC-II	
	SOS	10	HC-II	
	St. Luke	11	HC-II	
	Lacor Opit	12	HC-III	
	St. Joseph Minakulu	13	HC-II	
	Lightray	14	HC-II	
	St. Monica	15	HC-II	
Kitgum	Kitgum Archdeaconry	16	HC-II	3
	St Joseph's Hospital	17	Hospital	
	New Life	18	HC-III	
Nwoya	Wi Anaka	19	HC-II	1
Pader	All Saints	20	HC-II	1
Total				**20**

Selected PNFP Facilities (Acholi sub-region)

District	Name of PNFP	ID Code	Type	Total HFs
Alebtong	Alanyi	21	HC-III	1
Apac	Aduku Mission	22	HC-II	1
Lira	Ngetta	23	HC-III	5
	PAG	24	HC-IV	
	St. Francis Akia	25	HC-II	
	Boroboro	26	HC-III	
	Amuca SDA	27	HC-III	
Oyam	Aber	28	Hospital	3
	Iceme	29	HC-III	
	Minakulu	30	HC-III	
Total				**10**

APPENDIX 2: NUMBER OF SUPERVISION AREAS AND SETS OF LQAS QUESTIONNAIRES COMPLETED IN EACH DISTRICT

District	Number of SAs	Sets of Questionnaires Completed	Individual Questionnaires Completed
Intervention Area – Acholi			
Gulu	44	1056	4224
Pader	4	96	384
Kitgum	12	288	1152
Agago	8	192	768
Amuru	8	192	768
Nwoya	4	96	384
Control Area – Lango			
Alebtong	4	96	384
Apac	4	96	384
Lira	20	480	1920
Oyam	12	288	1152
Total	**120**	**2880**	**11520**

APPENDIX 3: SUMMARY OF UNWEIGHTED R-HFA INDICATOR RESULTS

Indicator domain	No.	Indicator	Acholi				Lango				Diff in Diff 2012-2015
			2012	2014	2015	Diff 2012-2015	2012	2014	2015	Diff 2012-2015	
Availability Child Services	**1**	% PNFPs that offer three basic child health services (growth monitoring, immunization, sick child care)	68.0%	89.0%	89.5%	21.5%	100.0%	100.0%	80.0%	-20.0%	41.5%
Availability ANC Services	**2**	% PNFPs that offer ANC	68.0%	100.0%	100.0%	32.0%	100.0%	100.0%	100.0%	0.0%	32.0%
Availability Maternity Services	**3**	% PNFPs that conduct deliveries	47.0%	63.0%	73.7%	26.7%	90.0%	100.0%	100.0%	10.0%	16.7%
Availability Staffing	**4**	% staff who provide clinical services working in PNFPs on the day of the survey	63.2%	57.9%	42.1%	-21.1%	70.0%	70.0%	30.0%	-40.0%	19.0%
Availability of Guidelines	**5**	% PNFPs with nationally mandated guidelines for care of children available and accessible on day of survey	58.0%	79.0%	68.4%	10.4%	60.0%	80.0%	90.0%	30.0%	-19.6%
	6	% PNFPs with nationally mandated guidelines for delivery care available and accessible on day of survey	5.0%	28.6%	5.3%	0.3%	0.0%	0.0%	20.0%	20.0%	-19.7%
	7	% PNFPs with nationally mandated guidelines for newborn care available and accessible on day of survey	5.0%	14.3%	15.8%	10.8%	20.0%	20.0%	30.0%	10.0%	0.8%

	8	% PNFPs with nationally mandated guidelines for postnatal care available and accessible on day of survey	0.0%	21.3%	5.3%	5.3%	10.0%	0.0%	20.0%	10.0%	-4.7%
	9	% PNFPs with nationally mandated guidelines for antenatal care available and accessible on day of survey	21.0%	36.8%	26.3%	5.3%	40.0%	40.0%	30.0%	-10.0%	15.3%
	10	% PNFPs with nationally mandated guidelines for disposal of invalid medications available and accessible on day of survey	0.0%	5.6%	10.5%	10.5%	10.0%	0.0%	0.0%	-10.0%	20.5%
	11	% PNFPs with nationally mandated guidelines for immunizations available/accessible on day of survey	21.0%	42.1%	21.1%	0.1%	0.0%	40.0%	20.0%	20.0%	-20.0%
	12	% PNFPs with nationally mandated guidelines for PMTCT available and accessible on day of survey	53.0%	47.4%	36.8%	-16.2%	40.0%	40.0%	40.0%	0.0%	-16.2%
Availability of Infrastructure	**13**	% of PNFPs with 7 essential pieces of infrastructure available on day of the survey (power, improved water source, functional latrine for clients, communication equipment, emergency transport, overnight beds, setting allowing auditory and visual privacy)	5.0%	5.3%	31.6%	26.6%	0.0%	30.0%	30.0%	30.0%	-3.4%
	14	% PNFPs with all infection control supplies and equipment on day of survey	42.1%	79.0%	632.0%	21.1%	80.0%	50.0%	100.0%	20.0%	1.1%

Availability of Supplies for Treating the Sick Child	**15**	% of PNFPs with 5 essential supplies to support child health on day of the survey (accessible and working scale for child, accessible and working scale for infant, timing device for diagnosis of pneumonia, spoon/cup/jug to administer ORS, jar for oral rehydration)	5.0%	31.6%	36.8%	31.8%	20.0%	30.0%	30.0%	10.0%	21.8%
	16	% of PNFPs with 3 essential supplies to support newborn health on day of the survey (resuscitation device, weighing scale, antibiotics to prevent eye infection). Only PNFPs admitting to providing delivery services were included in this estimate.	67.0%	72.7%	78.6%	11.6%	78.0%	67.0%	90.0%	12.0%	-0.4%
Availability of ANC Supplies	**17**	% of PNFPs with 7 essential supplies to support antenatal care on day of the survey (refrigerator for TT, blood pressure machine, haemoglobin reagents, syphilis testing kit, RDT or microscopy for malaria and albustix for protein, HIV testing for PMTCT). Only PNFPs admitting to providing ANC services were included in this estimate.	46.0%	36.8%	26.3%	-19.7%	40.0%	22.2%	60.0%	20.0%	-39.7%
Availability of Medications	**18**	% of PNFPs with 5 first-line medications for child health in on day of the survey (ORS, zinc, first-line oral antibiotic for pneumonia and for dysentery (cotrimoxazole in both cases), first-line anti-malarial, vitamin A)	32.0%	84.2%	84.2%	52.2%	50.0%	80.0%	100.0%	50.0%	2.2%

	19	% PNFPs with acceptable child drugs (at least ORS + zinc, cotrimoxazole or amoxicillin for pneumonia, Coartem or Artesunate + Amodiaquine for malaria, Cotrimoxazole OR Nalidixic Acid or Ciprofloxacin for Dysentery)	37.0%	84.2%	89.5%	52.5%	50.0%	80.0%	100.0%	50.0%	2.5%
	20	% of PNFPs with no stock-out of essential child drugs in the last 3 months	16.0%	84.2%	79.0%	63.0%	40.0%	80.0%	100.0%	60.0%	3.0%
	21	% PNFPs with the first-line medication for newborn sepsis on day of the survey	58.0%	89.5%	100.0%	42.0%	90.0%	90.0%	100.0%	10.0%	32.0%
	22	% of 3 essential ANC medications in surveyed PNFPs on day of survey (iron, folic acid, antimalarial for IPT) and TT	54.0%	94.7%	57.9%	3.9%	60.0%	70.0%	70.0%	10.0%	-6.1%
	23	% of PNFPs with no stock-out of ANC drugs in the last 3 months	38.0%	89.5%	42.1%	4.1%	50.0%	70.0%	70.0%	20.0%	-15.9%
	24	% of PNFPs with at least 5 essential emergency drugs for the labour room	33.0%	16.7%	50.0%	17.0%	33.0%	55.6%	50.0%	17.0%	0.0%
Information Systems	**25**	% PNFPs that maintain up-to-date records of sick U5 children (age, diagnosis, treatment) and have report in last 3 months and evidence of data use	100.0%	94.7%	79.0%	-21.1%	50.0%	100.0%	100.0%	50.0%	-71.1%
	26	% PNFPs that maintain up-to-date records of antenatal care (TT, iron/folate, expected date of delivery)	38.5%	68.4%	63.2%	24.7%	40.0%	70.0%	90.0%	50.0%	-25.3%
	27	% PNFPs in which interviewed HWs reported receiving in-service or pre-service training in maternal, child or neonatal health in last 12 months	63.2%	78.9%	63.2%	0.0%	40.0%	80.0%	80.0%	40.0%	-40.0%

Supervision	**28**	% PNFPs that received external supervision at least once in the last 3 months (supervision included one or more of the following: checked records or reports, observed work, provided feedback, gave praise, provided updates, discussed problems, or checked drug supply)	68.0%	84.2%	84.2%	16.2%	100.0%	100.0%	90.0%	-10.0%	26.2%
Utilization of Services	**29**	Average number of sick children seen in previous month	235	353	447	212.0	162	201	175	13	**199**
	30	Number of ANC visits in previous month	170	160	119	-51.0	207	255	203	-4	**-47**
Health Worker Performance	**31**	% PNFPs in which all key assessment tasks are made by HWs (check presence of general danger signs, assess feeding practices, assess nutritional status, check vaccination status) (benchmark 5 of 6 clinical observations)	0.0%	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	32	% PNFPs in which all key assessment tasks are made by HWs (check presence of general danger signs, assess feeding practices, assess nutritional status, check vaccination status) (benchmark 1 of 6 clinical observations)	10.5%	26.3%	15.8%	5.3%	0.0%	0.0%	0.0%	0.0%	5.3%
	33	% of fever cases in which an RDT or another test was used to diagnose malaria	33.0%	84.2%	89.5%	56.5%	40.0%	90.0%	100.0%	60.0%	-3.5%
	34	% PNFPs in which treatment is appropriate to diagnosis for child with malaria, pneumonia, or diarrhoea (benchmark: 5 of the 6 clinical observations)	58.0%	63.2%	52.6%	-5.4%	70.0%	80.0%	80.0%	10.0%	-15.4%

	35	% PNFPs in which the health worker who prescribed an antibiotic, antimalarial, or ORS and zinc can correctly describe to the caretaker how to administer all drugs (benchmark: 5 of the 6 caretakers interviewed)	16.0%	10.5%	5.3%	-10.7%	20.0%	20.0%	20.0%	0.0%	-10.7%
Caretaker Performance	**36**	% PNFPs in which the caretaker whose child was prescribed an antibiotic, antimalarial, or ORS and zinc can correctly describe how to administer all drugs (benchmark: 5 of the 6 caretakers interviewed)	31.6%	63.2%	5.3%	-26.3%	40.0%	80.0%	40.0%	0.0%	-26%

APPENDIX 4: LQAS CATCHMENT AREA LEVEL RESULTS FOR THE ACHOLI AND LANGO SUB-REGIONS

CA level results for each of 34 indicators for the Acholi sub-region

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of mothers with children 0-5 months who attended ANC from any facility during last pregnancy	2012	98%	99%	98%	98%	97%	97%	100%	98%	100%	100%	100%	96%	97%	96%	98%	100%	99%	100%	100%	95%
	2014	100%	100%	99%	100%	100%	96%	100%	96%	99%	100%	100%	100%	100%	100%	99%	100%	100%	99%	99%	100%
	2015	99%	100%	98%	99%	98%	99%	100%	99%	98%	99%	100%	99%	100%	100%	97%	99%	100%	100%	100%	93%
% of mothers with children 0-5 months who attended at least four ANC visits during last pregnancy	2012	46%	41%	57%	45%	27%	48%	28%	66%	34%	43%	35%	39%	43%	25%	50%	33%	46%	32%	36%	47%
	2014	56%	38%	45%	45%	49%	50%	43%	67%	59%	47%	50%	68%	33%	35%	38%	68%	59%	54%	40%	60%
	2015	66%	60%	41%	60%	54%	56%	49%	60%	48%	43%	56%	59%	61%	52%	58%	61%	66%	61%	47%	58%
% of mothers with children 0-5 months who attended first ANC visit before 4 months pregnancy	2012	12%	56%	62%	62%	58%	53%	52%	52%	70%	71%	61%	60%	69%	43%	70%	30%	33%	28%	48%	68%
	2014	28%	51%	54%	70%	74%	53%	51%	65%	77%	48%	62%	79%	61%	51%	64%	47%	54%	39%	53%	61%
	2015	38%	51%	66%	72%	61%	56%	74%	54%	73%	57%	63%	73%	82%	54%	64%	62%	53%	63%	57%	67%

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of mothers with children 0-5 months who had at least one ANC visit at PNFP facility during last pregnancy	2012	66%	10%	89%	62%	5%	43%	83%	48%	22%	14%	24%	18%	45%	0%	38%	49%	27%	28%	44%	11%
	2014	63%	6%	68%	40%	6%	43%	72%	61%	21%	29%	34%	19%	35%	1%	29%	42%	33%	32%	28%	14%
	2015	53%	22%	68%	46%	18%	46%	78%	52%	26%	28%	27%	18%	27%	15%	46%	52%	24%	39%	29%	35%
% of mothers with children 0-5 months who paid for any ANC visit during last pregnancy	2012	74%	3%	1%	0%	8%	4%	31%	41%	4%	22%	14%	13%	27%	0%	28%	0%	2%	1%	21%	12%
	2014	70%	2%	55%	40%	4%	38%	44%	43%	14%	34%	36%	20%	27%	3%	32%	4%	2%	4%	20%	5%
	2015	40%	14%	56%	44%	4%	44%	32%	49%	23%	22%	27%	16%	27%	17%	57%	5%	0%	4%	25%	3%
% of mothers with children 0-5 months who paid for ANC received at PNFP facility during last pregnancy	2012	94%	11%	1%	0%	60%	8%	36%	76%	10%	85%	39%	63%	59%	NA	64%	0%	4%	0%	31%	22%
	2014	86%	33%	78%	97%	17%	79%	55%	71%	55%	89%	85%	83%	56%	0%	68%	3%	6%	10%	62%	15%
	2015	64%	38%	80%	91%	6%	86%	39%	78%	58%	22%	73%	65%	58%	79%	84%	4%	0%	3%	71%	3%
% of mothers with children 0-5 months who know at least two danger signs of pregnancy	2012	80%	68%	82%	99%	84%	55%	95%	58%	97%	76%	99%	75%	86%	88%	78%	75%	72%	63%	84%	74%
	2014	95%	99%	70%	86%	98%	72%	57%	84%	96%	92%	77%	85%	77%	92%	99%	90%	85%	90%	84%	76%
	2015	79%	76%	54%	61%	79%	71%	58%	44%	67%	61%	73%	49%	80%	74%	74%	82%	80%	79%	59%	68%

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of mothers with children 0-5 months who had a birth plan	2012	21%	65%	85%	89%	75%	88%	79%	97%	91%	83%	98%	71%	77%	52%	84%	75%	76%	72%	83%	83%
	2014	76%	76%	61%	88%	73%	75%	82%	72%	64%	77%	79%	85%	88%	61%	66%	100%	94%	74%	81%	80%
	2015	69%	64%	77%	93%	61%	86%	83%	92%	48%	69%	59%	69%	68%	78%	63%	76%	93%	91%	92%	84%
% of mothers with children 0-5 months who received two or more TT vaccinations during last pregnancy	2012	2%	3%	0%	2%	4%	13%	4%	17%	18%	5%	2%	16%	16%	16%	15%	31%	24%	22%	18%	31%
	2014	31%	11%	48%	28%	22%	28%	37%	43%	9%	14%	27%	13%	16%	39%	11%	18%	35%	42%	24%	29%
	2015	18%	33%	36%	20%	19%	25%	31%	41%	17%	21%	17%	18%	13%	8%	11%	21%	27%	15%	11%	17%
% of mothers with children 0-5 months who during their last pregnancy received at least a single TT vaccination at a PNFP facility	2012	27%	6%	30%	31%	0%	9%	36%	30%	12%	20%	12%	12%	18%	0%	21%	50%	24%	32%	32%	4%
	2014	74%	9%	55%	54%	10%	48%	48%	53%	36%	36%	57%	16%	31%	0%	34%	34%	31%	29%	34%	17%
	2015	58%	29%	86%	60%	25%	62%	83%	59%	24%	25%	32%	22%	25%	5%	52%	51%	27%	59%	80%	22%
% of mothers with children 0-5 months who received at least two doses of IPT during last pregnancy	2012	42%	16%	23%	33%	33%	23%	47%	33%	19%	42%	45%	58%	26%	35%	58%	46%	46%	48%	33%	32%
	2014	46%	74%	51%	47%	35%	14%	38%	46%	46%	46%	36%	66%	53%	54%	59%	66%	61%	50%	41%	29%
	2015	53%	45%	53%	64%	45%	22%	46%	32%	41%	44%	47%	31%	56%	46%	45%	51%	51%	30%	27%	43%

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of mothers with children 0-5 months who received any single dose of IPT at PNFP facility during last pregnancy	2012	62%	7%	79%	49%	4%	33%	69%	44%	20%	14%	23%	18%	35%	0%	32%	49%	26%	24%	39%	9%
	2014	55%	5%	47%	39%	5%	37%	68%	56%	19%	19%	30%	17%	33%	1%	29%	41%	31%	28%	25%	11%
	2015	45%	22%	65%	45%	15%	34%	74%	39%	24%	24%	23%	14%	26%	13%	43%	46%	24%	32%	25%	28%
% of mothers with children 0-5 months who paid for any IPT received	2012	0%	2%	0%	1%	1%	1%	1%	7%	3%	3%	1%	3%	2%	3%	5%	0%	1%	2%	0%	0%
	2014	0%	0%	1%	1%	1%	2%	4%	2%	5%	1%	3%	0%	3%	0%	8%	1%	1%	6%	1%	2%
	2015	1%	8%	0%	3%	0%	0%	0%	5%	2%	1%	1%	0%	8%	0%	3%	1%	0%	1%	4%	0%
% of mothers with children 0-5 months who paid for IPT received at PNFP facility during last pregnancy	2012	0%	0%	0%	0%	25%	7%	0%	12%	6%	8%	0%	0%	4%	NA	7%	0%	0%	0%	0%	0%
	2014	0%	0%	2%	0%	0%	7%	5%	3%	13%	6%	7%	0%	4%	0%	4%	3%	4%	5%	0%	11%
	2015	2%	25%	0%	8%	0%	0%	0%	4%	5%	0%	5%	0%	9%	0%	3%	0%	0%	4%	13%	0%
% of mothers with children 0-5 months who gave birth at a health facility during last pregnancy	2012	64%	83%	63%	45%	58%	65%	85%	68%	88%	69%	81%	85%	88%	73%	81%	97%	91%	80%	66%	47%
	2014	83%	96%	65%	58%	69%	74%	89%	81%	100%	77%	88%	96%	95%	71%	85%	98%	92%	90%	64%	56%
	2015	89%	97%	66%	63%	83%	76%	97%	81%	95%	79%	86%	97%	97%	86%	90%	97%	94%	90%	70%	73%
% of mothers with children 0-5 months who gave birth at PNFP facility during last pregnancy	2012	46%	17%	59%	29%	3%	27%	77%	30%	23%	8%	24%	9%	35%	0%	32%	51%	32%	30%	24%	8%
	2014	55%	11%	55%	22%	1%	39%	69%	46%	21%	15%	24%	8%	32%	2%	27%	41%	26%	26%	20%	14%
	2015	61%	23%	47%	39%	6%	39%	80%	45%	28%	18%	24%	21%	18%	8%	36%	53%	22%	25%	17%	34%

% of mothers with children 0-5 months who gave birth at PNFP facility and paid for delivery during last pregnancy	2012	95%	94%	2%	0%	0%	4%	3%	97%	10%	50%	9%	33%	15%	NA	26%	98%	90%	93%	52%	88%
	2014	98%	91%	25%	29%	100%	51%	52%	93%	50%	71%	91%	88%	74%	100%	31%	82%	88%	20%	58%	23%
	2015	98%	95%	9%	16%	50%	62%	52%	93%	37%	41%	61%	60%	71%	75%	66%	65%	86%	58%	94%	3%
% of mothers with children 0-5 months who had at least one postpartum check-up at health facility during the first 6 weeks after delivery	2012	17%	9%	15%	13%	7%	11%	5%	8%	8%	9%	20%	19%	15%	56%	24%	45%	46%	49%	10%	12%
	2014	41%	5%	40%	19%	20%	30%	52%	13%	27%	25%	25%	33%	21%	36%	35%	50%	41%	45%	11%	9%
	2015	42%	23%	41%	43%	33%	35%	55%	24%	39%	53%	22%	31%	50%	46%	39%	64%	46%	44%	50%	29%
% of children 0-5 months who had at least one postpartum check-up from a health facility during the first 6 weeks after delivery	2012	14%	11%	27%	42%	5%	13%	7%	11%	34%	14%	48%	71%	15%	56%	15%	57%	58%	53%	49%	16%
	2014	40%	2%	35%	15%	18%	31%	47%	14%	22%	22%	27%	30%	20%	31%	29%	54%	42%	43%	28%	29%
	2015	41%	26%	29%	26%	36%	38%	44%	15%	17%	55%	16%	42%	49%	45%	33%	54%	47%	41%	39%	16%
% of mothers with children 0-5 months who had at least one postpartum check-up at PNFP facility during the first 6 weeks after delivery	2012	17%	3%	14%	6%	0%	6%	5%	6%	2%	2%	6%	4%	3%	0%	14%	21%	14%	18%	3%	2%
	2014	34%	2%	27%	6%	1%	15%	44%	8%	11%	5%	9%	5%	14%	0%	11%	17%	8%	10%	4%	1%
	2015	33%	7%	30%	26%	6%	10%	51%	14%	13%	20%	10%	15%	14%	3%	20%	36%	17%	16%	14%	6%
% of children 0-5 months who had at least one postpartum check-up at PNFP facility during the first 6 weeks after delivery	2012	14%	3%	22%	17%	0%	6%	6%	6%	8%	4%	14%	13%	5%	0%	7%	25%	17%	20%	18%	3%
	2014	33%	0%	22%	7%	2%	18%	40%	8%	5%	3%	10%	6%	11%	1%	9%	22%	9%	13%	6%	2%
	2015	31%	6%	22%	16%	6%	17%	36%	10%	3%	20%	6%	14%	13%	2%	14%	30%	14%	17%	11%	3%

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of mothers with children 0-5 months who paid for any postnatal care received	2012	0%	6%	0%	0%	0%	7%	6%	33%	0%	6%	4%	13%	0%	2%	18%	0%	0%	0%	0%	4%
	2014	0%	14%	5%	5%	0%	10%	11%	21%	18%	3%	7%	5%	9%	0%	5%	3%	7%	0%	22%	16%
	2015	5%	8%	7%	2%	3%	6%	11%	4%	5%	6%	0%	15%	13%	8%	11%	3%	0%	0%	6%	3%
% of mothers with children 0-5 months who paid for postnatal care at PNFP facility	2012	0%	0%	0%	0%	NA	17%	17%	0%	0%	0%	13%	17%	0%	NA	31%	0%	0%	0%	0%	0%
	2014	0%	50%	7%	14%	0%	14%	10%	22%	36%	13%	22%	20%	15%	NA	8%	5%	10%	0%	25%	50%
	2015	6%	14%	3%	4%	17%	0%	12%	8%	17%	16%	0%	29%	21%	33%	16%	6%	0%	0%	15%	0%
% of children 12-23 months who were fully immunised before their first birthday (card + questionnaire data, 3 polio)	2012	67%	51%	69%	50%	73%	60%	40%	59%	64%	75%	69%	72%	67%	64%	74%	75%	67%	75%	57%	65%
	2014	65%	64%	89%	66%	71%	46%	76%	74%	76%	59%	65%	84%	81%	65%	79%	75%	72%	66%	59%	69%
	2015	58%	69%	80%	64%	63%	64%	67%	61%	43%	68%	73%	71%	67%	64%	56%	58%	83%	40%	66%	79%
% of children 12-23 months who had a measles vaccination before their first birthday (card + questionnaire data)	2012	74%	70%	85%	74%	86%	82%	81%	89%	85%	83%	86%	91%	94%	77%	83%	85%	78%	85%	81%	79%
	2014	76%	84%	90%	83%	83%	72%	93%	91%	91%	77%	79%	89%	86%	84%	91%	92%	85%	82%	77%	77%
	2015	76%	81%	84%	82%	89%	85%	85%	82%	88%	85%	90%	86%	82%	79%	80%	93%	92%	81%	80%	94%

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of children 12-23 months who have ever received any single vaccination at PNFP facility	2012	31%	5%	89%	65%	6%	53%	90%	68%	21%	5%	18%	12%	33%	2%	21%	45%	23%	28%	34%	3%
	2014	52%	3%	78%	37%	30%	45%	85%	67%	13%	28%	29%	35%	28%	3%	26%	50%	37%	43%	43%	3%
	2015	41%	20%	71%	50%	48%	51%	81%	70%	16%	53%	31%	37%	33%	3%	41%	54%	28%	29%	34%	18%
% of mothers with children 12-23 months who paid for any single vaccination received by her child	2012	2%	0%	1%	0%	0%	0%	0%	14%	0%	2%	0%	0%	0%	3%	2%	0%	0%	1%	2%	2%
	2014	3%	6%	0%	1%	0%	1%	0%	2%	1%	0%	0%	1%	0%	0%	3%	0%	1%	0%	0%	0%
	2015	1%	0%	0%	0%	3%	0%	0%	1%	1%	0%	2%	0%	0%	3%	4%	1%	1%	0%	5%	0%
% of mothers with children 12-23 months who paid for any single vaccination received by her child at PNFP facility	2012	3%	0%	1%	0%	0%	0%	0%	19%	0%	0%	0%	0%	0%	50%	5%	0%	0%	0%	3%	0%
	2014	2%	0%	0%	0%	0%	2%	0%	2%	8%	0%	0%	3%	0%	0%	5%	0%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	7%	0%	0%	0%	7%	0%	3%	0%	0%	50%	6%	0%	0%	0%	10%	0%
% of mothers with children 0-5 months who attended ANC from a health facility and who received counselling and testing for HIV and received their test result during last pregnancy	2012	96%	89%	88%	94%	79%	79%	98%	84%	94%	88%	91%	84%	90%	77%	90%	98%	96%	96%	81%	83%
	2014	85%	91%	84%	94%	86%	75%	89%	89%	86%	81%	88%	92%	99%	82%	88%	98%	97%	91%	83%	90%
	2015	95%	97%	88%	94%	79%	83%	91%	77%	84%	82%	92%	92%	97%	91%	85%	94%	98%	91%	90%	88%

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of mothers with children 0-5 months who attended ANC at PNFP facility and who received counselling and testing for HIV and received their test result during last pregnancy	2012	65%	7%	80%	59%	4%	33%	82%	40%	22%	11%	23%	17%	41%	0%	36%	49%	27%	27%	38%	5%
	2014	57%	6%	60%	39%	4%	34%	64%	52%	19%	23%	31%	19%	35%	1%	25%	42%	32%	28%	22%	13%
	2015	52%	22%	60%	46%	14%	36%	74%	39%	23%	25%	26%	18%	26%	14%	40%	49%	24%	38%	26%	32%
% of mothers with children 0-5 months who paid for HIV test at PNFP facility during last pregnancy	2012	0%	0%	2%	3%	20%	0%	0%	10%	0%	0%	0%	0%	0%	NA	9%	0%	4%	4%	5%	0%
	2014	0%	0%	5%	0%	0%	10%	14%	17%	5%	22%	6%	0%	0%	100%	4%	0%	0%	0%	4%	25%
	2015	6%	10%	6%	14%	6%	2%	3%	17%	9%	7%	12%	0%	0%	21%	12%	0%	0%	0%	21%	3%
% of children under 5 years with fever in the last two weeks who were treated with ACT from any facility within 24 hours of the onset of symptoms and took the full dose for the required period	2012	44%	58%	21%	40%	29%	21%	53%	25%	53%	48%	28%	38%	37%	50%	50%	31%	42%	38%	48%	32%
	2014	52%	55%	42%	39%	32%	37%	32%	26%	28%	41%	31%	41%	43%	58%	46%	63%	44%	39%	53%	64%
	2015	43%	31%	56%	33%	38%	24%	26%	39%	19%	28%	30%	30%	48%	44%	28%	44%	44%	24%	40%	39%

Indicator	Year	Ambrossoli Kalongo Hospital	St. Janani Health Center II	Lacor Amuru HC III	Lacor Pabbo Health Center III	Karim Children Medical Center HC II	Lacor Opit HC III	Lightray HC III	San Joseph Minakulu HC II	SOS Health Center II	St. Luke HC II	St. Mary Lacor Hospital	ST. Mauritz Obija HC II	St. Monica HC II	St. Peters HC II	St. Philips HC II	Archdeaconery HC II	New Life HC II	ST. Joseph Hospital	Wi Anaka HC II	All Saints HC II
% of children under 5 years with fever in the last two weeks who were treated with ACT from a PNFP facility within 24 hours of the onset of symptoms and took the full dose for the required period	2012	11%	1%	7%	19%	3%	11%	46%	11%	13%	2%	2%	3%	16%	5%	20%	8%	4%	2%	10%	1%
	2014	21%	0%	22%	16%	5%	10%	17%	8%	4%	7%	6%	16%	10%	5%	17%	17%	8%	8%	9%	3%
	2015	14%	10%	20%	7%	8%	8%	18%	16%	3%	14%	13%	6%	16%	4%	11%	9%	8%	1%	16%	3%
% of mothers with children under 5 years who paid for malaria treatment received by her child at PNFP facility	2012	100%	100%	11%	0%	33%	11%	17%	81%	28%	100%	33%	80%	62%	100%	90%	87%	100%	100%	80%	100%
	2014	100%	NA	55%	77%	56%	94%	67%	95%	90%	100%	100%	81%	89%	100%	47%	52%	77%	92%	90%	0%
	2015	90%	100%	63%	72%	80%	82%	83%	95%	75%	65%	74%	100%	75%	100%	76%	83%	100%	100%	100%	0%

CA level data for each of 34 indicators for the Lango sub-region

Indicator	Year	Alanyi HC	Aduku Mission HC	Amuca SDA HC	Boroboro HC	Ngetta HC	PAG HC	St. Francis Akia HC	Iceme HC	Minakulu HC	Pope John's Hospital
% of mothers with children 0-5 months who attended ANC from any facility during last pregnancy	2012	100%	100%	100%	100%	99%	100%	99%	99%	99%	99%
	2014	99%	100%	100%	99%	94%	94%	98%	100%	100%	100%
	2015	98%	97%	100%	100%	99%	98%	100%	99%	99%	100%
% of mothers with children 0-5 months who attended at least four ANC visits during last pregnancy	2012	43%	36%	66%	53%	42%	58%	51%	46%	37%	28%
	2014	59%	59%	62%	59%	46%	47%	47%	52%	48%	42%
	2015	61%	65%	61%	58%	54%	77%	68%	67%	62%	51%
% of mothers with children 0-5 months who attended first ANC visit before 4 months pregnancy	2012	49%	37%	55%	43%	45%	59%	46%	41%	40%	49%
	2014	42%	50%	48%	52%	53%	56%	48%	43%	48%	45%
	2015	59%	52%	63%	57%	48%	62%	56%	55%	55%	57%
% of mothers with children 0-5 months who had at least one ANC visit at PNFP facility during last pregnancy	2012	66%	4%	22%	45%	39%	26%	19%	30%	71%	41%
	2014	75%	4%	20%	32%	37%	23%	24%	34%	77%	58%
	2015	65%	3%	34%	31%	43%	21%	32%	40%	76%	43%
% of mothers with children 0-5 months who paid for any ANC visit during last pregnancy	2012	65%	2%	22%	45%	40%	29%	13%	8%	21%	1%
	2014	72%	5%	22%	28%	32%	22%	16%	18%	65%	31%
	2015	63%	5%	34%	35%	45%	22%	11%	27%	65%	28%
% of mothers with children 0-5 months who paid for ANC received at PNFP facility during last pregnancy	2012	94%	50%	90%	91%	65%	84%	44%	21%	25%	0%
	2014	94%	100%	100%	72%	76%	76%	52%	52%	82%	48%
	2015	93%	100%	94%	93%	88%	70%	19%	63%	82%	61%
% of mothers with children 0-5 months who know at least two danger signs of pregnancy	2012	65%	77%	78%	82%	56%	85%	100%	60%	75%	44%
	2014	91%	84%	85%	91%	84%	90%	60%	91%	82%	71%
	2015	51%	25%	35%	51%	57%	63%	44%	53%	39%	53%
% of mothers with children 0-5 months who had a birth plan	2012	12%	66%	91%	88%	96%	65%	74%	51%	53%	48%
	2014	49%	81%	72%	73%	73%	81%	79%	89%	68%	78%
	2015	57%	71%	52%	65%	46%	81%	72%	66%	54%	74%
% of mothers with children 0-5 months who received two or more TT vaccinations during last pregnancy	2012	6%	36%	3%	26%	29%	17%	19%	8%	15%	32%
	2014	5%	14%	27%	38%	16%	14%	11%	6%	19%	1%
	2015	16%	9%	16%	18%	5%	2%	9%	14%	21%	5%

Indicator	Year	Alanyi HC	Aduku Mission HC	Amuca SDA HC	Boroboro HC	Ngetta HC	PAG HC	St. Francis Akia HC	Iceme HC	Minakulu HC	Pope John's Hospital
% of mothers with children 0-5 months who during their last pregnancy received at least a single TT vaccination at a PNFP facility	2012	65%	0%	18%	37%	34%	6%	14%	13%	32%	34%
	2014	100%	3%	25%	22%	16%	11%	13%	36%	78%	8%
	2015	95%	0%	46%	24%	36%	17%	57%	76%	70%	18%
% of mothers with children 0-5 months who received at least two doses of IPT during last pregnancy	2012	69%	23%	34%	69%	35%	58%	59%	49%	61%	51%
	2014	40%	54%	46%	66%	38%	57%	50%	52%	51%	30%
	2015	24%	27%	59%	64%	38%	58%	35%	21%	40%	26%
% of mothers with children 0-5 months who received any single dose of IPT at PNFP facility during last pregnancy	2012	57%	3%	18%	45%	32%	25%	18%	28%	66%	38%
	2014	54%	4%	18%	30%	29%	19%	22%	29%	68%	52%
	2015	49%	1%	31%	31%	37%	19%	29%	34%	64%	39%
% of mothers with children 0-5 months who paid for any IPT received	2012	6%	2%	1%	16%	16%	18%	7%	1%	60%	5%
	2014	7%	0%	0%	13%	1%	6%	20%	1%	24%	1%
	2015	0%	0%	1%	5%	1%	5%	8%	0%	4%	0%
% of mothers with children 0-5 months who paid for IPT received at PNFP facility during last pregnancy	2012	8%	50%	7%	28%	34%	13%	25%	0%	77%	3%
	2014	11%	0%	0%	33%	0%	13%	78%	0%	42%	3%
	2015	0%	NA	4%	12%	0%	8%	29%	0%	8%	0%
% of mothers with children 0-5 months who gave birth at a health facility during last pregnancy	2012	49%	59%	73%	78%	53%	88%	46%	74%	48%	47%
	2014	49%	72%	79%	89%	66%	97%	72%	75%	80%	68%
	2015	51%	77%	80%	81%	76%	95%	70%	77%	68%	74%
% of mothers with children 0-5 months who gave birth at PNFP facility during last pregnancy	2012	29%	7%	24%	33%	21%	15%	2%	22%	35%	22%
	2014	39%	4%	22%	43%	17%	18%	24%	20%	61%	29%
	2015	28%	1%	24%	36%	25%	22%	20%	27%	53%	27%
% of mothers with children 0-5 months who gave birth at PNFP facility and paid for delivery during last pregnancy	2012	96%	71%	87%	94%	100%	86%	100%	100%	91%	86%
	2014	86%	100%	95%	85%	75%	100%	61%	84%	88%	86%
	2015	81%	100%	100%	89%	92%	67%	89%	92%	96%	92%

Indicator	Year	Alanyi HC	Aduku Mission HC	Amuca SDA HC	Boroboro HC	Ngetta HC	PAG HC	St. Francis Akia HC	Iceme HC	Minakulu HC	Pope John's Hospital
% of mothers with children 0-5 months who had at least one postpartum check-up at health facility during the first 6 weeks after delivery	2012	4%	6%	24%	9%	60%	14%	6%	1%	6%	5%
	2014	11%	5%	18%	13%	7%	38%	13%	13%	29%	9%
	2015	19%	15%	19%	16%	8%	40%	14%	7%	20%	9%
% of children 0-5 months who had at least one postpartum check-up from a health facility during the first 6 weeks after delivery	2012	4%	14%	38%	15%	66%	12%	9%	6%	9%	9%
	2014	14%	5%	25%	24%	5%	41%	17%	21%	25%	8%
	2015	11%	15%	20%	15%	5%	39%	16%	3%	28%	10%
% of mothers with children 0-5 months who had at least one postpartum check-up at PNFP facility during the first 6 weeks after delivery	2012	3%	0%	7%	5%	24%	4%	2%	0%	4%	3%
	2014	7%	1%	6%	8%	0%	8%	4%	5%	22%	4%
	2015	14%	0%	7%	5%	1%	11%	5%	4%	19%	6%
% of children 0-5 months who had at least one postpartum check-up at PNFP facility during the first 6 weeks after delivery	2012	3%	0%	15%	10%	27%	3%	2%	1%	7%	4%
	2014	9%	1%	9%	15%	1%	7%	4%	6%	20%	3%
	2015	7%	0%	8%	5%	1%	10%	10%	1%	24%	6%
% of mothers with children 0-5 months who paid for any postnatal care received	2012	25%	0%	4%	20%	5%	33%	0%	0%	0%	0%
	2014	7%	13%	11%	0%	9%	5%	0%	0%	15%	25%
	2015	40%	10%	4%	0%	9%	2%	13%	17%	3%	21%
% of mothers with children 0-5 months who paid for postnatal care at PNFP facility	2012	33%	NA	0%	33%	0%	75%	0%	NA	0%	0%
	2014	0%	0%	33%	0%	NA	11%	0%	0%	19%	25%
	2015	23%	NA	0%	0%	0%	0%	20%	25%	0%	33%
% of children 12-23 months who were fully immunised before their first birthday (card + questionnaire data, 3 polio)	2012	61%	64%	90%	82%	73%	68%	75%	61%	59%	48%
	2014	44%	66%	69%	68%	53%	68%	66%	48%	41%	44%
	2015	47%	74%	63%	64%	57%	57%	63%	36%	43%	55%
% of children 12-23 months who had a measles vaccination before their first birthday (card + questionnaire data)	2012	64%	83%	98%	82%	86%	86%	76%	84%	82%	81%
	2014	66%	83%	89%	83%	76%	80%	84%	61%	68%	53%
	2015	68%	85%	92%	90%	77%	81%	80%	63%	54%	67%
% of children 12-23 months	2012	74%	22%	53%	49%	64%	42%	50%	34%	75%	25%

who have ever received any single vaccination at PNFP facility	2014	69%	14%	50%	58%	55%	42%	48%	31%	65%	39%
	2015	56%	18%	55%	48%	54%	43%	72%	26%	61%	24%
% of mothers with children 12-23 months who paid for any single vaccination received by her child	2012	1%	0%	0%	0%	3%	1%	0%	0%	0%	1%
	2014	8%	0%	0%	0%	1%	0%	0%	1%	16%	0%
	2015	5%	0%	0%	0%	2%	1%	0%	4%	9%	1%
% of mothers with children 12-23 months who paid for any single vaccination received by her child at PNFP facility	2012	1%	0%	0%	0%	5%	3%	0%	0%	0%	0%
	2014	12%	0%	0%	0%	2%	0%	0%	4%	20%	0%
	2015	9%	0%	0%	0%	2%	0%	0%	5%	11%	0%
% of mothers with children 0-5 months who attended ANC from a health facility and who received counselling and testing for HIV and received their test result during last pregnancy	2012	80%	64%	89%	97%	93%	89%	98%	67%	67%	72%
	2014	72%	69%	84%	89%	68%	82%	90%	77%	53%	61%
	2015	75%	59%	81%	95%	84%	94%	79%	71%	71%	79%

Indicator	Year	Alanyi HC	Aduku Mission HC	Amuca SDA HC	Boroboro HC	Ngetta HC	PAG HC	St. Francis Akia HC	Iceme HC	Minakulu HC	Pope John's Hospital
% of mothers with children 0-5 months who attended ANC at PNFP facility and who received counselling and testing for HIV and received their test result during last pregnancy	2012	47%	1%	19%	44%	34%	20%	19%	20%	47%	36%
	2014	50%	4%	15%	26%	21%	20%	21%	30%	38%	44%
	2015	48%	0%	21%	30%	38%	20%	21%	31%	54%	41%
% of mothers with children 0-5 months who paid for HIV test at PNFP facility during last pregnancy	2012	13%	0%	5%	5%	3%	30%	39%	4%	0%	3%
	2014	10%	100%	53%	27%	9%	5%	60%	3%	14%	20%
	2015	8%	67%	10%	24%	0%	10%	48%	5%	7%	32%
% of children under 5 years with fever in the last two weeks who were treated with ACT from any facility within 24 hours of the onset of symptoms and took the full dose for the required period	2012	29%	15%	28%	41%	31%	35%	41%	60%	14%	32%
	2014	29%	26%	47%	39%	41%	35%	35%	22%	19%	23%
	2015	28%	18%	29%	31%	28%	23%	14%	13%	9%	19%
% of children under 5 years with fever in the last two weeks who were treated with ACT from a PNFP facility within 24 hours of the onset of symptoms and took the full dose for the required period	2012	7%	0%	1%	7%	13%	7%	10%	16%	2%	4%
	2014	13%	0%	6%	7%	14%	7%	16%	4%	6%	5%
	2015	5%	1%	7%	2%	5%	3%	6%	1%	2%	4%
% of mothers with children under 5 years who paid for malaria treatment received by her child at PNFP facility	2012	100%	NA	100%	100%	100%	73%	95%	95%	75%	100%
	2014	100%	NA	71%	89%	89%	80%	95%	80%	89%	88%
	2015	100%	100%	57%	50%	100%	100%	70%	100%	100%	100%

APPENDIX 5: LQAS DECISION RULES TABLE

LQAS Table: Decision Rules for Sample Sizes of 12-30 and Coverage Benchmarks or Average Coverage of 10% to 95%																		
	Coverage Benchmarks or Average Coverage																	
Sample Sizes	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
12	N/A	N/A	1	1	2	2	3	4	5	5	6	7	7	8	8	9	10	11
13	N/A	N/A	1	1	2	3	3	4	5	6	6	7	8	8	9	10	11	11
14	N/A	N/A	1	1	2	3	4	4	5	6	7	8	8	9	10	11	11	12
15	N/A	N/A	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12	13
16	N/A	N/A	1	2	2	3	4	5	6	7	8	9	9	10	11	12	13	14
17	N/A	N/A	1	2	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18	N/A	N/A	1	2	2	3	5	6	7	8	9	10	11	11	12	13	14	16
19	N/A	N/A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20	N/A	N/A	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17
21	N/A	N/A	1	2	3	4	5	6	8	9	10	11	12	13	14	16	17	18
22	N/A	N/A	1	2	3	4	5	7	8	9	10	12	13	14	15	16	18	19
23	N/A	N/A	1	2	3	4	6	7	8	10	11	12	13	14	16	17	18	20
24	N/A	N/A	1	2	3	4	6	7	9	10	11	13	14	15	16	18	19	21
25	N/A	1	2	2	4	5	6	8	9	10	12	13	14	16	17	18	20	21
26	N/A	1	2	3	4	5	6	8	9	11	12	14	15	16	18	19	21	22
27	N/A	1	2	3	4	5	7	8	10	11	13	14	15	17	18	20	21	23
28	N/A	1	2	3	4	5	7	8	10	12	13	15	16	18	19	21	22	24
29	N/A	1	2	3	4	5	7	9	10	12	13	15	17	18	20	21	23	25
30	N/A	1	2	3	4	5	7	9	11	12	14	16	17	19	20	22	24	26

For all coverage benchmarks (except where noted) LQAS is at least 92% sensitive and specific

N/A = Not Applicable -- Indicates that LQAS should not be used since coverage is too low for LQAS to detect.

Alpha and Beta Errors are > 10%

Alpha and Beta Errors are > 15%

APPENDIX 6: REVISED IMPACT ASSESSMENT DESIGN FOR THE NORTHERN UGANDA HEALTH PROJECT

APPENDIX 7: HFA TOOL AND LQAS SETS OF QUESTIONNAIRES

The set of LQAS questionnaires was transferred to an electronic device for data collection. This is why branding does not appear on the coverage page as it does for the R-HFA tool.