Ministry of Health

Republic of Uganda

Laboratory Supervision Performance Assessment and Recognition Strategy (Lab SPARS)

Impact Assessment Report

November 2018

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ACRONYMS

AMC	Average Monthly Consumption
CPHL	Central Public Health Laboratories
DHO	District Health Officer
DLFP	District Laboratory Focal Person
EM SPARS	Essential Medicines SPARS
HC	Health Centre
HSD	Health Sub District
Lab SPARS	Laboratory Supervision Performance Assessment and Recognition Strategy
LSS	Laboratory SPARS Supervisor
MMS	Medicines Management Supervisor
PEPFAR	President's Emergency Plan for AIDS Relief
SLMTA	Strengthening Laboratory Management Toward Accreditation
SPARS	Supervision Performance Assessment and Recognition Strategy
WHO	World Health Organisation

EXECUTIVE SUMMARY

Efficient and reliable laboratory services are an essential and fundamental component of any strong and effective health system. Laboratory tests are essential to guide appropriate treatment and rational use of essential drugs, and for surveillance and control of diseases of public health concern (WHO, 2011).

Findings of the laboratory Logistics System Assessment of 2012 indicated inadequate storage, disorganised storage areas and limited access to reliable power as some of the major problems cited by health facilities (Pedun MO and Larsen CH, 2012). The report further showed that only 44% of the public health facilities were aware of the test menus relevant to their level of care.

Whereas the Ministry of Health adopted SLMTA as the overall program for laboratory quality systems improvement, gaps still do exist and as such the Lab SPARS pilot was conceived as a complementary intervention to ensure that these gaps are filled. Supervisors selected by the districts were trained in classroom, defensive motorcycle riding and practical field orientation. They were equipped with motorcycles, laptops, riding gear, modems, data collection tools, bags, rulers and pens to aid with their work. Support supervision visits were conducted on a bi-monthly basis and data submitted electronically.

Lab SPARS was implemented in 20 districts. To document the impact of this intervention, an assessment study was conducted over a period of six months. A total of 72 facilities were assessed at both baseline and end line (visit 3). Six districts were purposively selected from the 20 pilot districts and subsequently six health facilities randomly selected from each district to form the intervention group. The 36 intervention facilities were paired with 36 facilities from six selected control districts basing on a predetermined criteria.

Results of the study indicate a very significant impact of the lab SPARS pilot on laboratory commodity management at the health facilities in all the five domains that were assessed. There was a significant improvement of 80% (1.53, $p<0.001$), 66% (1.54,$p<0.001$) and 51%(1.06,$p<0.001$) in stock management, ordering receipt and recording and laboratory equipment respectively.

It is therefore recommended that Lab SPARS be rolled out to the rest of the districts in the country in order to improve laboratory commodities management at health facility level.

1.0: BACKGROUND

Efficient and reliable laboratory services are an essential and fundamental component of any strong and effective health system. Laboratory tests are essential to guide appropriate treatment and rational use of essential drugs, and for surveillance and control of diseases of public health concern (WHO, 2011).

In Uganda, Laboratory services are provided at Health Centre IIIs, Health Centre IVs, general hospitals, Regional Referral hospitals, National Referral Hospitals and the National Reference Laboratories. The Ministry of Health (MoH) has developed a strong policy foundation for improving laboratory services in the country requiring equitable access to services, functional equipment and adequate supplies, adequate number of skilled staff, laboratory information systems and monitoring laboratory performance (MoH, 2016).

1.1: Laboratory supply chain management

Findings of the laboratory Logistics System Assessment conducted in 2012 indicated inadequate storage, disorganised storage areas and limited access to reliable power as some of the major problems cited by health facilities (Pedun MO and Larsen CH, 2012). The report further showed that only 44% of the public health facilities were aware of the test menus relevant to their level of care. In addition, 7% of the facilities noted poor equipment maintenance as a concern with poor equipment functionality cited as having a major effect on alignment of test procedures as well as affecting overall laboratory logistics negatively.

A similar assessment conducted from 2010 to 2016 showed that documents and records was among the four worst performing components of the twelve Strengthening Laboratory Management Toward Accreditation (SLMTA) quality systems essentials (Yao et al, 2010). The average baseline score in 2010 for documentation and records was 33% whereas the mid-term results indicated an average score of 48% which falls short of the 50% mark (Yao et al, 2010).

1.2: Complementary supervision strategies for SLMTA

The SLMTA program was developed to promote immediate, measurable improvement in laboratories of developing countries (MoH, 2016). Like many other countries in the developing world, the Uganda National Health Laboratories (UNHLS) under Ministry of Health adopted SLMTA as the overall program for laboratory quality systems improvement. Approximately 100 laboratories (majorly from HC IV and above) out of over 2,400 laboratories in the country have been enrolled into SLMTA. SLMTA as a program, focuses on twelve laboratory based thematic areas, with a framework for implementation and has demonstrated improvements in the quality of laboratory services delivered, however, the design of the SLMTA package needs to be complemented with other national-specific strategies to achieve greater efficiency especially in laboratory supplies management.

1.3: Structure of Laboratory supervision

Laboratory services in Uganda are coordinated by the UNHLS a unit under the Department of National Disease Control (NDC) of the Ministry of Health. The structure of UNHLS consists of 3 levels; national, regional and district levels (National Health Laboratory Strategic Plan 2016-2021).

The districts in the country are grouped into health regions headed by a regional hospital. Each district is mandated to run their health services headed by a District Health Officer (DHO). To facilitate coordination of laboratory services, each district has designated a District laboratory Focal Person (DFLP) appointed by the DHO. To ease running of health services, each district is divided into health sub-district (HSD). Within the health sub-district, laboratory services exist at Health Centre IV (county level) and III (sub-county level). To facilitate coordination of laboratory services at the HSD level, the laboratory in-charge for the Health Centre IV serves as the HSD laboratory focal person.

1.4: Supervision Performance Assessment and Recognition Strategy (SPARS)

The SPARS strategy was made national in 2012; it's a multipronged approach that includes educational, managerial, regulatory and financial interventions combined with performance assessment. Results from the essential medicines SPARS showed overall SPARS scores improvement of 2.30 (22.3%) per visit from a mean baseline SPARS score of 10.31 (Trap et al 2017). It is against this background that the Lab SPARS strategy was developed.

2.0: Lab SPARS

Lab SPARS is a district driven intervention and as such taking care of the respective Health Sub Districts. The DHOs from each district appointed Lab SPARS supervisors who had a background in laboratory work and these were responsible for implementing Lab SPARS in both government and Private not for Profit health facilities.

Lab SPARS involved the examinable classroom, defensive motorbike, computer and practical field training. The classroom training spanned a period of two weeks and was conducted by trainers from CPHL who took the participants through general supervision, mentoring, problem solving, data management, logistics management and quality improvement principles. This was then followed by a practical field orientation which included a maximum of two days for each LSS and a one week motorbike riding lesson. Lastly, the LSS underwent computer training for a period of three days with focus on data entry and basic computer skills. A pre-requisite to practical training and supervision was passing the classroom training exam.

Figure 1: Lab SPARS supervisors undertake the defensive riding course at Garuga

On completion of the Lab SPARS training, all the LSS were given motorbikes, riding gear, laptops, laptop bags, calculator, pens, pencils, bags and data collection tools prior to implementation of lab SPARS. Using the indicator based assessment tool, the LSS conducted bi-monthly facility support supervision with coaching and mentoring of laboratory staff. After a facility had reached an overall Lab SPARS score of 21.6 (80% of the total score), it would be supervised less frequently.

For better impact, it was recommended that LSS focus their mentorships over five supervisions in specific domains. Recommended focus domains of lab SPARS from visit 1 to 3 are outlined below.

Table 1: Scheduling of Lab SPARS Supervision Visits for the Impact Assessment

Visit #	Timing	Activities to be conducted
Visit #1 =Baseline	This is the first visit to be conducted in the facility	· Collect data using the Lab SPARS routine tool. This serves as baseline for the Lab SPARS assessment for these facilities. · Focus mentoring and coaching on **two of the weakest domains**
Visit #2	2 months after visit 1	· Collect data and fill in the Lab SPARS tool · Assess performance of the 2 previously agreed upon domains for improvement based on agreed action points from the last visit. Address any gaps still present · Focus mentoring and coaching on **2 new domains with a sizeable[1] number of gaps**
Visit #3 =End line	2 months after Visit 2	· Collect data and fill in the Lab SPARS tool · Assess performance of the 2 previously agreed upon domain for improvement based on agreed action points from the last visit. Address any gaps still present · Focus mentoring and coaching on **last domain (not selected previously) and gaps still existent in the other four domains** performance components.

2.1: Performance assessment

The Lab SPARS supervisors (LSS) conducted record reviews and observation of staff practices to assess and evaluate performance based on 27 indicators of the Lab SPARS performance assessment tool. The LSS noted the results in a supervisory book and summarised performance scores on a spider graph. The 27 indicators were grouped into five Laboratory management domains: 1) Stock Management 2) Storage Management 3) Ordering, receipt and recording 4) laboratory Equipment and 5) Laboratory information systems. An illustration of a spider graph is shown in figure 2 below.

[1] Determined by Supervisor assessing the health facility and is context specific

Figure 2: A graphical presentation of the scores per domain

Each of the five domains had a maximum score of 5; therefore, the overall SPARS score had a maximum score of 25. However, the number of indicators per domain varied from three to nine, so the contribution of an individual indicator to a domain score of 5 varied; for example, if the domain had five indicators, each was worth one point; if the domain had seven indicators, each was worth 5/7th of a point. If an indicator is not assessed for a facility, that indicator score was not included in the domain score calculation (rather than be given a score of "0"). For example, if a facility did not have a score for one of the nine storage management indicators (marked "not applicable"), then each of the remaining indicators was worth 5/8th of a point instead of 5/9th of a point.

2.2: Data collection and reporting

The Lab SPARS performance tool was used for data collection and performance assessment. The LSS completed the paper-based form during supervision at the health facility. They then transferred what had been transcribed on the paper-based tool to the electronic database on a laptop and submitted it via the internet to the central Lab SPARS database hosted at CPHL. At this point, users were able to analyse this data and generate health facility, district and national reports. The reports generated were shared with the districts and key stakeholders.

2.3: Pilot districts

A total of 20 districts were purposively selected to ensure regional representation as follows;

- Northern region:Gulu.,Kitgum, Oyam, Dokolo, Apac, Arua and Nebbi
- Eastern region: Mbale, Kotido, Serere, Bugiri, and Kamuli
- Western region: Kyenjojo, Kyegegwa, Kiruhura, and Ibanda
- Central region: Masaka, Lwengo, Buikwe and Kayunga

Implementation of the lab SPARS strategy commenced and it is from this pilot that we sought to find out whether the intervention had had any effect hence the impact assessment.

3.0: OBJECTIVE

The aim of this study was to assess the impact of the Lab SPARS intervention on management of laboratory commodities at health facilities.

4.0: IMPACT ASSESSMENT

4.1: Design

The study was a pre-post with control design in which baseline measurements were obtained prior to the intervention and follow on measurements obtained after the intervention. In the intervention arm, Lab SPARS supervisors worked with the individual health facilities to properly manage laboratory commodities for a total of three supervisory visits. The control arm consisted of health facilities without the Lab SPARS intervention before, during and after the study period.

4.2: Sample size determination

To assess the difference in the mean Lab SPARS scores between the intervention and control facilities, a total of 72 facilities took part in the study with 36 health facilities in each group.

Based on SPARS data, we assume the following

There will be minimal change in the LAB SPARS for the control arm possibly a 2 point change in the overall total score

In the intervention after 5 visits, the scores will have increased by about 7 points (In SPARS at baseline facilities have a baseline score of 10.4 and at visit 5 the average score is 18.0).

The standard deviation was assumed to be the same in both the control and intervention arms after five visits and equal to the EM SPARS standard deviation of 3.2. For a power of 90% with a level of significance of 5%;

The sample size was;

$$n = \frac{2\sigma^2\left(Z_\beta + Z_{\alpha/2}\right)^2}{difference^2}$$

$$= \frac{2 * 3.2^2 * (1.28 + 1.96)^2}{6^2}$$

$$= \frac{2 * 3.2^2 * (3.24)^2}{6^2}$$

$$= \frac{214}{36}$$

$$= 6\ Facilities\ in\ each\ district$$

Because of the large difference between the intervention of and control and a small standard deviation, the sample size is equally small.

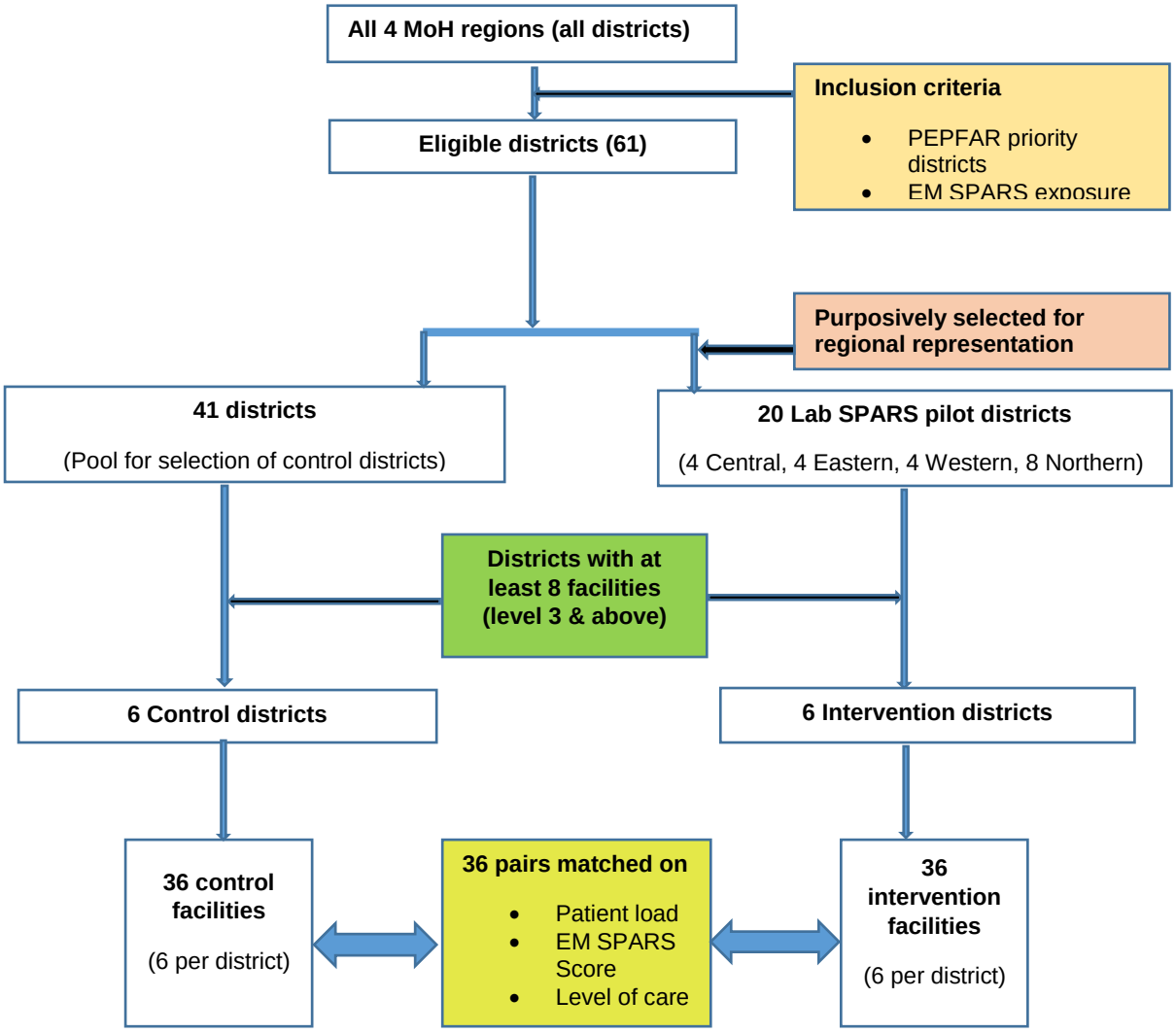
4.3: Sampling procedure

For the intervention arm, only pilot districts with at least 8 government health facilities from level 3 and above were included in the study. Of the districts that met the above criteria, 6 were randomly selected. From each of the 6 selected districts, 6 health facilities were randomly selected and paired with health facilities in the control arm amounting to a total of 72 health facilities.

Each of the 6 intervention districts selected were paired with a control district based on region in order to ensure regional representation. Health facilities were paired based on patient load in 2016 (per year out-patient visits plus in-patient admissions*3), MMS SPARS scores, and level of care. Private for profit (PFP) facilities were excluded from the study because they are not directly under the DHO's supervision.

The flow diagram below shows the approach to the selection of the districts and health facilities that participated in the study.

Figure 3: A schema of the sample selection process of the impact assessment facilities



From the flow chart, six randomly selected districts of Serere, Mbale, Buikwe, Lwengo, Kyenjojo and Gulu were eligible and formed the intervention arm. Six other districts comprising of Lira, Luweero, Mbarara, Mityana, Jinja and Soroti formed the control arm.

4.4: Data management and analysis

4.4.1: Data quality measures

Each Lab SPARS supervisor would cross-check the completed laboratory SPARS assessment tool for completeness, accuracy and consistency prior to entering the information into the e-tool. Logic checks were embedded into the e-tool to ensure that all data were complete before submission to the central database by the Lab SPARS supervisors.

In addition, periodic extraction of the data was done and data cleaning conducted by the central Lab SPARS coordination team.

4.4.2: Data analysis

Study outcomes on a continuous scale were tested for normality using Shapiro-Wilk test and upon which the **difference in difference** test was used to determine the significance of the differences between the intervention and control facilities at both time points. Bivariate analysis was done to identify factors that influenced the Lab SPARS score. Multivariate analysis was done using a logistic regression in which the outcome of interest was the total lab score at endline to determine the association between the statistically significant factors in the bivariate analysis and the outcome of the study. Facilities with a lab SPARS score above average were coded as 1 whereas those with a score that was less or equal to the average score were coded as 0. All analyses were done using Stata® version 13.0.

5.0 RESULTS

The main study findings are presented below to demonstrate the impact of the Lab SPARS pilot.

5.1: Characteristics of the health facilities assessed

Table 1: Distribution of Health Facilities by Ownership and Level of Care

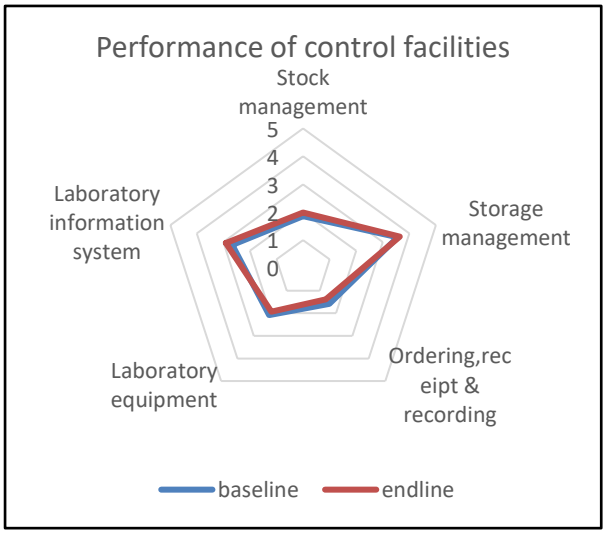
Level of care	Control group		Intervention group	
	Government N (%)	PNFP N (%)	Government N (%)	PNFP N (%)
HC3	23(70)	2(67)	23(70)	2(67)
HC4	8(24)	0(0)	8(24)	0(0)
Hospital	1(3)	1(33)	1(3)	1(33)
RRH	1(3)	0(0)	1(3)	0(0)
Total	**33(100)**	**3(100)**	**33(100)**	**3(100)**

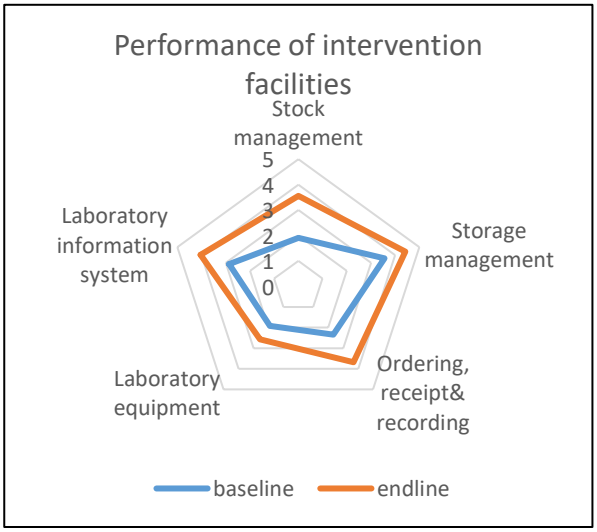
A total of 72 health facilities were assessed. Of these, 36 were intervention facilities and 36 were control facilities.The majority (66%) of the health facilities were government with those at level three accounting for 71%.

5.2: Overall performance

For each domain, scores for each indicator were aggregated and an average obtained. Facilities were assessed at baseline (first visit) and the end line score obtained at the third visit. A side by side graphical presentation of the average scores for either study group is shown in figure 3 below.

Figure 4: Average score per domain area for intervention and control facilities at baseline and end-line





The average baseline scores for stock management, storage management, laboratory equipment and laboratory information system were similar for both intervention and control groups. However, there is a noticeable difference in the average score for ordering, receipt and recording between the

intervention and control group with the intervention group reporting a higher figure (2.34) than the control group (1.59) as shown in table 3 below.

The intervention group had noticeably higher scores at end line in all the five domains than the control group with an overall average of 18.27 compared to 11.85 for the control group. This shows an improvement in performance of 45% at end line compared to the baseline.

A detailed description of the performance is shown in table 3 below.

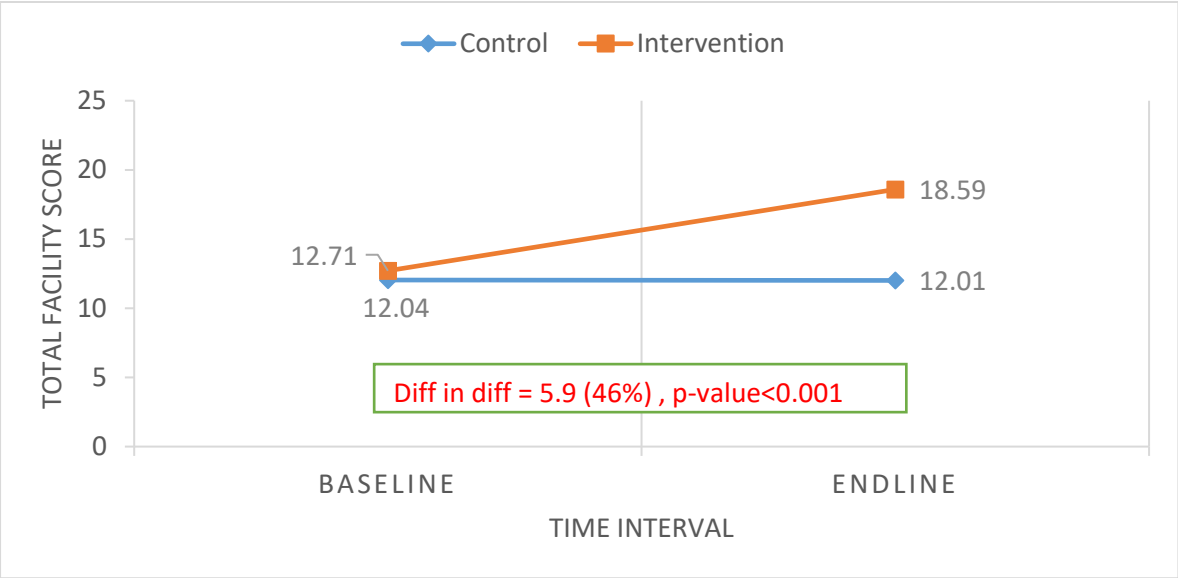
Table 2: Average Health Facility Score per Domain Area for Intervention and Control Health Facilities

Domain	Average score			
	Control group		Intervention group	
	baseline	end-line	baseline	end-line
Stock management	1.86	1.99	1.91	3.56
Storage management	3.56	3.64	3.56	4.42
Ordering, receipt & recording	1.59	1.38	2.34	3.68
Laboratory equipment	2.08	1.93	1.91	2.57
Laboratory information system	2.67	2.91	2.86	4.04
Total	11.76	11.85	12.58	18.27

A difference in difference model was used to assess the overall impact of the lab SPARS intervention on management of laboratory commodities. This model mimics random assignment with treatment and comparison groups. The treatment group in this case corresponds to the intervention group in which lab SPARS was implemented whereas the comparison group corresponds to the control group where lab SPARS was not implemented.

The **difference in difference** estimator is defined as the difference in average outcome in the treatment group (intervention) before and after treatment minus the difference in average outcome in the control group before and after treatment.

Figure 5: Overall impact of the Lab SPARS intervention on laboratory commodity management (Control vs Intervention performance)



The difference in difference estimator (5.9, p<0.001) shows a significant (46%) increase in the facility score in the intervention group where Lab SPARS was implemented. It should be noted that prior to the intervention, the scores for both groups were noticeably similar. The sizeable increase in facility scores therefore lends credence to the hypothesis that the facility score actually increased by the third visit in the intervention group.

5.3: Performance per indicator

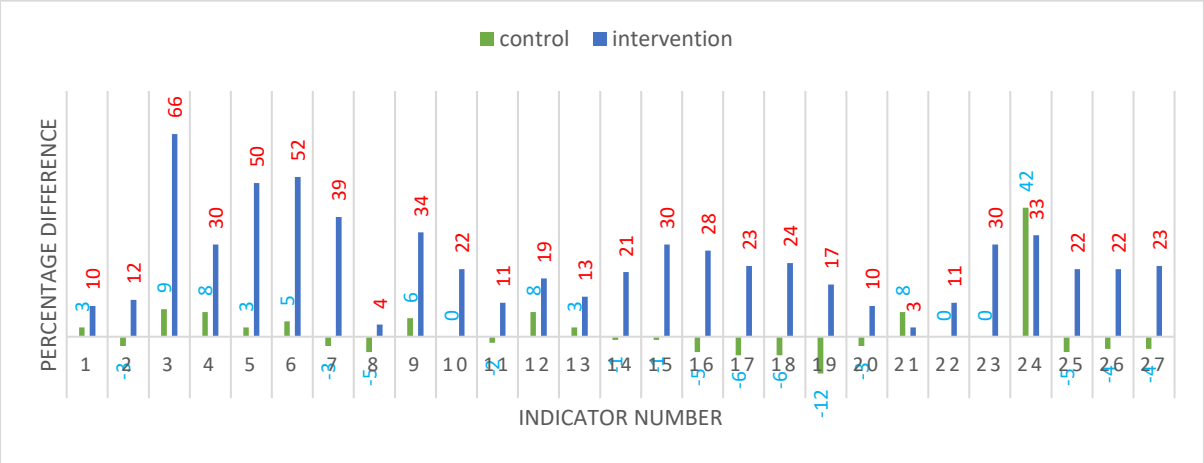
A total of 27 indicators were assessed at both baseline and endline. A detailed description of each of the indicators is shown in table 4 below.

Table 3: List of the 27 Lab SPARS Performance Indicators

Indicator #	Description	Indicator #	Description
1	Availability of item	15	Reorder level calculation
2	Availability of stock card	16	Adherence to ordering & delivery procedures
3	Correct filling of stock card	17	Availability of laboratory product catalogue
4	Physical count & stock card agree	18	equipment inventory maintenance
5	Correct AMC on stock card	19	Availability of equipment management plan
6	Correct filling of stock book	20	Equipment functionality
7	Correct AMC in stock book	21	Equipment utilisation
8	Is item overstocked	22	Availability of data collection tools
9	Order refill rate	23	Availability of HMIS105 reports
10	Cleanliness of lab & main store	24	Timeliness of HMIS105 reports
11	Hygiene of the laboratory	25	Completeness & accuracy of HMIS105
12	Storage system	26	Availability of displayed information
13	Storage conditions	27	Filing of reports
14	Storage practices		

In order to obtain the percentage difference, the performance of each indicator out of 100 was calculated at baseline and endline for both intervention and control groups. By subtracting the percentage score at baseline from the percentage score at endline for each indicator in each study group, the percentage difference was obtained as shown in figure 12 below.

Figure 6: Percentage improvement per indicator by study group



Overall, the intervention group performed better than the control group for all the indicators except indicator 24 (timeliness of HMIS105 reports). The control group registered a decline in over half (52%) of the indicators at endline compared to baseline with the worst decline (12%) noted for indicator 19 (availability of equipment management plan).

The best performing indicators for the intervention group were; correct filling of stock card (66%), correct filling of stock book (52%), correct AMC on stock card (50%), correct AMC in stock book (39%), order refill rate (34%), and timeliness of HMIS105 reports (33%).

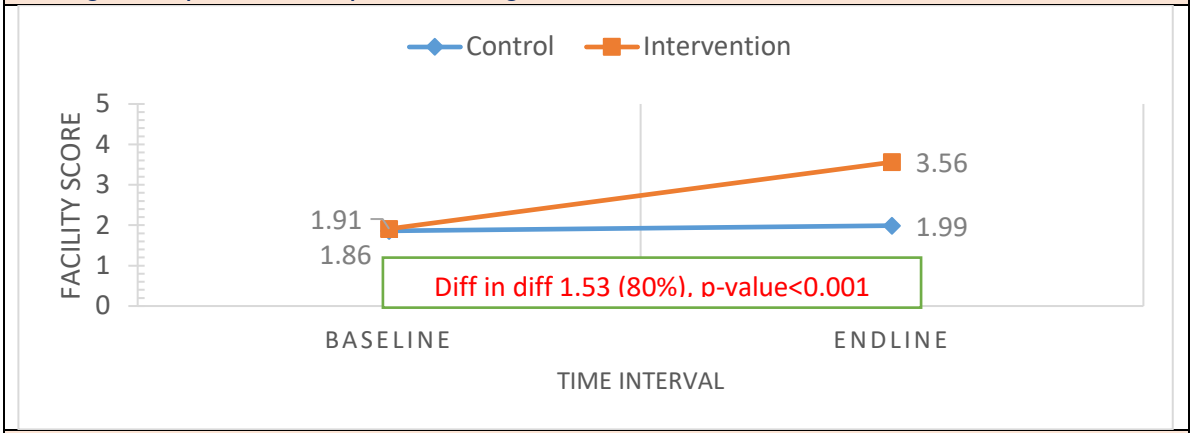
Whereas the worst performing indicators for the intervention group were; equipment utilization (3%) and is item overstocked (4%).

5.4 Performance of Lab SPARS per domain

Performance of the Lab SPARS pilot per domain

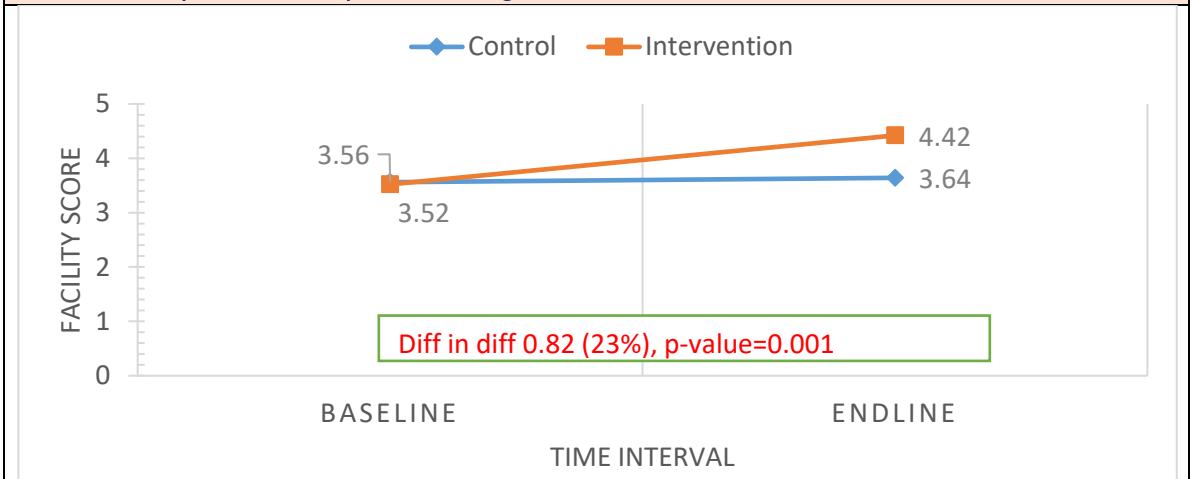
1: Stock management

There was a significant (80%) increase in the domain score in the intervention group. This was the highest improvement reported among all the five domains.



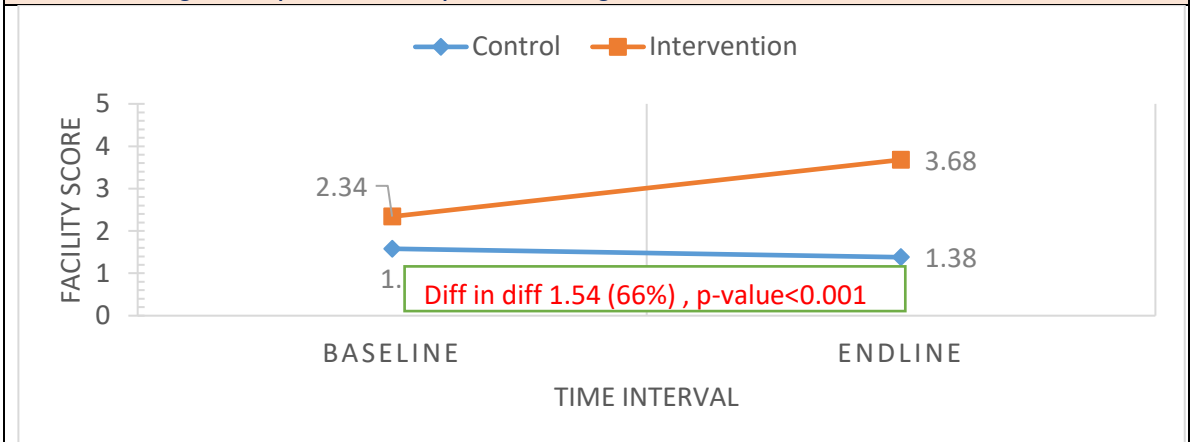
2: Storage management

There was a significant (23%) increase in the domain score in the intervention group. This was the lowest improvement reported among all the five domains



3: Ordering, receipt and recording

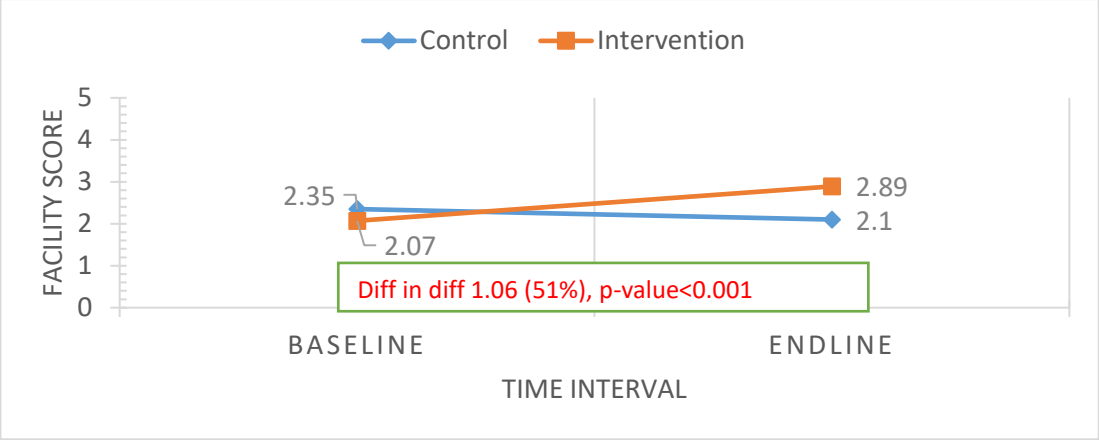
There was a significant (66%) increase in the domain score in the intervention group. This was the second highest improvement reported among all the five domains



4: Laboratory equipment

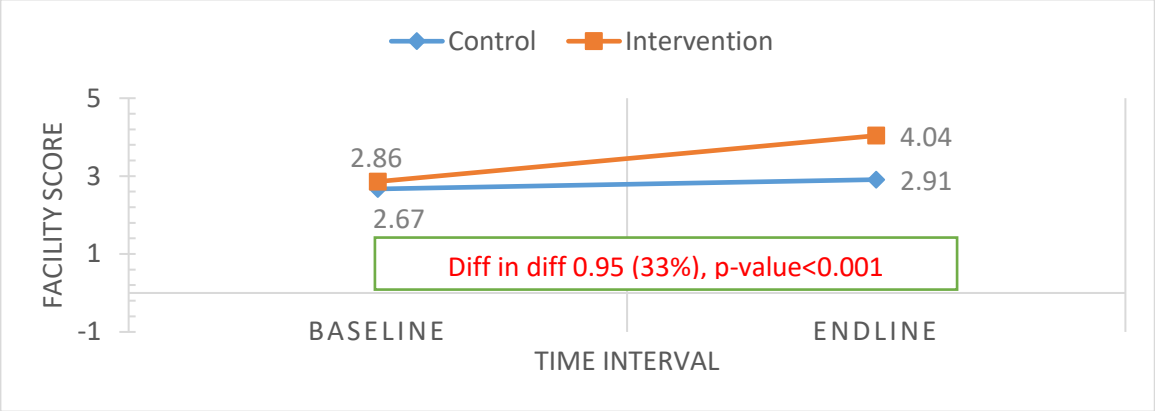
Performance of the Lab SPARS pilot per domain

There was a significant (51%) increase in the domain score in the intervention group.



5: Laboratory information system

There was a significant (33%) increase in the domain score in the intervention group.



5.4: Factors that influenced performance

5.4.1: Behavioral indicators

The best performing indicators which also accounted for over 70% of the total number of indicators were behavioral indicators some of which include; correct filing of stock card, correct filling of stock book, timeliness of HMIS 105 reports, reorder level calculation, physical count and stock card balance agree, adherence to ordering and delivery procedures, filing of reports, cleanliness of laboratory and main store, availability of displayed information and completeness and accuracy of HMIS 105.

This is because what needs to be done is quite obvious and as such through the continuous coaching and mentorship of health facility staff by our trained LSS particularly in good practices such as opening and updating of stock cards and stock books, calculation of AMC, placement of correct orders, accurate completion of HMIS105 reports and hygiene and cleanliness of the laboratory, and storage area. Identification of existing gaps at each subsequent visit and establishment of improvement projects further contributed to this great performance.

> *"Change is not made without inconvenience, even from worse to better."*
> Richard Hooker, 1554-1600

It should also be noted that change of behavior requires minimal or no financial resources and is highly dependent on the health worker attitude. The LSS ensured that during the supervision visits, emphasis was laid on the fact that a change in the poor stock management practices would benefit the staff tremendously by reducing on the amount of time it takes to perform certain activities such as report compilation, placement of accurate orders and stock status assessment. This led to better acceptance of the intervention thereby contributing to better outcomes.

5.4.2: Resource indicators

The least improved indicators such as equipment utilization, item availability and equipment functionality were mainly resource indicators. In order for a health facility to register marked progress, there is need for increase in availability of reagents required to run laboratory tests which requires a great deal of financial resources. In addition, equipment functionality is highly dependent on adherence to equipment service schedules by the respective IPs who are tasked with the facilitation of service engineers which has cost implications as well.

5.4.3: Policy Issues

Changes in policy affected the performance of indicator number 21 (equipment utilization). The role of CD4 cell count in the management of people living with HIV is once again changing, most notably with a shift away from using CD4 assays to decide when to start antiretroviral therapy (ART) with campaigns such as test and treat. In addition, for patients stable on ART, CD4 cell counts are no longer needed to monitor the response to treatment where HIV viral load testing is available (Ford et al, 2017). There has been a substantial decline in the number of CD4 tests conducted at health facilities across the entire country yet equipment such as Pima machines are available.

5.4.4: Other factors

Health facilities that had an LSS as a laboratory as a member of staff were 25 times (see table 5) more likely to perform above average at endline than those that did not. This highlights the importance of having at least one member of staff at each facility undergoing the classroom training in laboratory logistics in order to have constant sharing of knowledge with other staff members and lead implementation of required standards in between the scheduled supervisory visits.

Table 4: Factors Associated with Lab SPARS Performance

Variables	Total score above average		Un Adj. OR (95% CI)	P-value
	Yes (N, %)	No (N, %)		
Level of care				
HC3	13 (52)	12 (48)	1	
HC4 & above	5 (45)	6 (55)	0.77	0.717
District				
Arua	1 (17)	5 (83)	1	
Buikwe	2 (33)	4 (67)	2.5 (0.16,38.59)	0.512
Kyenjojo	6 (100)	0 (0)	1	
Lwengo	3 (50)	3 (50)	5 (0.34,72.8)	0.239
Mbale	1 (17)	5 (83)	1 (0.05,20.82)	1.000
Serere	5 (83)	1 (17)	25 (1.20,520.73)	0.038*
Presence of SLMTA				
No	15 (47)	17 (53)	1	
Yes	3 (75)	1 (25)	3.4 (0.32,36.27)	0.279
LSS as staff at facility				
No	11 (39)	17 (61)	1	
Yes	7 (87)	1 (13)	10.8 (0.04,1.17)	0.012*

Table 5: Multivariate Analysis of Factors Associated with Lab SPARS Performance

Variable	Un Adj. OR (95% CI)	Adj OR (95% CI)	P value
LSS as staff at facility			
No	1	1	
Yes	10.8 (0.04,1.17)	25.8 (1.51, 440.18)	0.025*
District			
Arua	1	1	
Buikwe	2.5 (0.16,38.59)	0.65 (0.02,19.01)	0.802
Kyenjojo	1		
Lwengo	5 (0.34,72.8)	2.1 (0.11,39.63)	0.629
Mbale	1 (0.05,20.82)	0.37 (0.01,13.64)	0.589
Serere	25 (1.20,520.73)	0.2(0.23,1.71)	0.084

Only two factors that had a p value of less than 0.05 were included in the multi variate model. However, only the presence of a LSS as a member of staff at a health facility was statistically significant at multi-variate level. Facilities that had a LSS as a member of staff were 25 times more likely to have a score above average than those without a LSS as staff when adjusted for district.

6.0: CONCLUSION

The lab SPARS intervention provided an opportunity for training of laboratory personnel as supervisors in management of laboratory commodities who in turn mentored and coached health facility staff. In facilities with resident Supervisors, the Supervisors were regular points of reference and lead implementation of set standards. Taken together, Lab SPARS led to significant gains in stock management practices, storage management practices, ordering receipt and recording practices, laboratory equipment management and laboratory information systems at the health facility.

The Lab SPARS intervention therefore, had a very significant impact on the management of laboratory commodities at health facilities.

7.0: RECOMMENDATIONS AND LESSONS LEARNED

- Lab SPARS should be rolled out to the rest of the districts in the country in order to replicate the success of the pilot in other health facilities that did not participate in the initial phase.
- It is very important to maintain a good relationship with District Health Teams headed by the District Health Officers as their leadership and support is critical for the LSS to successfully carry out project activities at the respective health facilities.
- It is necessary to modify the training design in line with the findings by widening the target audience for the classroom training to include at least one member of staff from each health facility. This training could be district based to reduce on costs.
- Facilities have had difficulties in ensuring that their equipment are serviced and repaired on time by the respective IPs. This more often than not leads to equipment breakdown.
- The supervision visits should be scheduled in such a way that poorly performing areas such as laboratory equipment management are addressed during the first visit and the best performing area which in this case was storage management is handled last in order to register more gains.
- DHTs should liaise with the respective IPs in their districts to ensure adherence to equipment service schedules to avoid breakdown of laboratory equipment which often times leads to interruption of services at the health facilities.
- There is need for improvement of communication and coordination within and across levels in the laboratory supply chain by forming teams with a common vision of improving product availability at health facilities.

References

1. Atieno, R. (2010). Practical Pharmacy For Developing Countries. *Practical Pharmacy*.
2. Ford et al, N. (2017). The evolving role of CD4 cell counts in HIV care. *Current Opinion in HIV and AIDS*, Volume 12.
3. Ministry of Health, Uganda. (2012). *Essential Medicines and Health Supplies List Uganda.* Kampala, Uganda: Ministry of Health, Uganda.
4. Ministry of Health, Uganda. (2015). *Pharmaceutical Sector Conference Achievements and Opportunities 2009-2019.* Kampala: Ministry of Health, Uganda.
5. MoH. (2016). *Uganda National Health Laboratory Services Policy.* Kampala: Ministry of Health-Uganda.
6. MSH. (2016). *Longitudinal SPARS study.* Kampala: MSH.
7. Pedun MO and Larsen CH. (2012). *Uganda Laboratory Logistics System Assessment(Uganda).* Kampala: SURE-USAID.
8. Trap et al, B. (2016). Supervision, Performance Assessment, and Recognition Strategy(SPARS)-a multipronged intervention strategy for strengthening medcines management in Uganda: method presentation and facility performance at baseline. *Journal of Pharmaceutical Policy and Practice*, Vol 9: Issue 21.
9. URC. (2013). *Strengthening Uganda Systems for Treating AIDS Nationally(SUSTAIN): Improving the quality of laboratory services at Uganda public care health facilities .*
10. White, H., & S. Sabarwal. (2014). *Quasi-experimental Design and Methods, Methodological Briefs: Impact Evaluation 8.* Florence: UNICEF Office of Research.
11. WHO. (2011). *Development of national health laboratory policy and plan.* New Delhi: World Health Organisation, South East Asia region.
12. Yao et al, k. (2010). Imrpoving Quality Management Systems of Laboratories in Developing Countries: An innovative Training Approach to Accelerate Laboratory Accreditation. *American Journal of Clinical Pathology*, Vol 134(3): 401 -409.

Annex 1: List of districts for the Lab SPARS pilot

Region	District
Central	Buikwe
Central	Kayunga
Central	Lwengo
Central	Masaka
Eastern	Bugiri
Eastern	Kamuli
Eastern	Mbale
Eastern	Serere
Northern	Apac
Northern	Arua
Northern	Dokolo
Northern	Gulu
Northern	Kitgum
Northern	Kotido
Northern	Nebbi
Northern	Oyam
Western	Ibanda
Western	Kiruhura
Western	Kyegegwa
Western	Kyenjojo

Annex 2: List of intervention facilities per district

Region	District	Health Facility Name
Northern	Arua	Arua RRH Ombidriondrea HC3 Pawor HC3 Siripi HC3 Vurra HC3 Yinga HC3
Central	Buikwe	Buikwe HC3 Kawolo Hospital Njeru HC3 St. Charles Lwanga Hospital St. Francis HC3 Wakisi HC3
Western	Kyenjojo	Butiiti HC3 Butunduzi HC3 Kigaraale HC3 Kyarusozi HC4 Mwenge Clinic HC3 Nyamabuga HC3
Central	Lwengo	Kinoni HC3 Kiwangala HC4 Kyazanga HC4 Lwengo HC4 Nanywa HC3 Nkoni HC3
Eastern	Mbale	Buwangwa HC3 Busamaga HC3 Busiu HC4 Lwangoli HC3 Nakaloke HC3 Namawanga HC3
Eastern	Serere	Apapai HC4 Bugondo HC3 Kateta HC3 Kyere HC3 Pingire HC3 Serere HC4

Annex 3: List of non-intervention facilities per district

Region	District	Health Facility Name
Eastern	Jinja	Kakira HC 3 Kakaire HC3 Police Barracks HC3 Mpumudde HC4 Walukuba HC4 Busede HC3
Northern	Lira	Lira Prisons HC3 Barr HC3 Amach HC4 Ogur HC4 Bar Pwo HC3 Boroboro HC3
Central	Luwero	Katikamu HC3 Luwero HC4 Bbowa HC3 Wabusana HC3 Zirobwe HC3 Bamunanika HC3
Western	Mbarara	Kinoni HC4 Ruharo Mission Hospital Rubindi HC3 Mbarara RRH Kagongi HC3 Bukiiro HC3
Central	Mityana	Malangala HC3 Mityana Hospital St Francis HC3 Ssekanyonyi HC4 Maanyi HC3 Kabule HC3
Eastern	Soroti	Diana HC4 Eastern Division HC3 Tubur HC3 Kichinjaji Northern Division HC3 Kamuda HC3 Dakabela HC3

Annex 4: Overall performance of the 292 Lab SPARS facilities

Figure 6: Average performance per domain at visit 1, 3 & 5

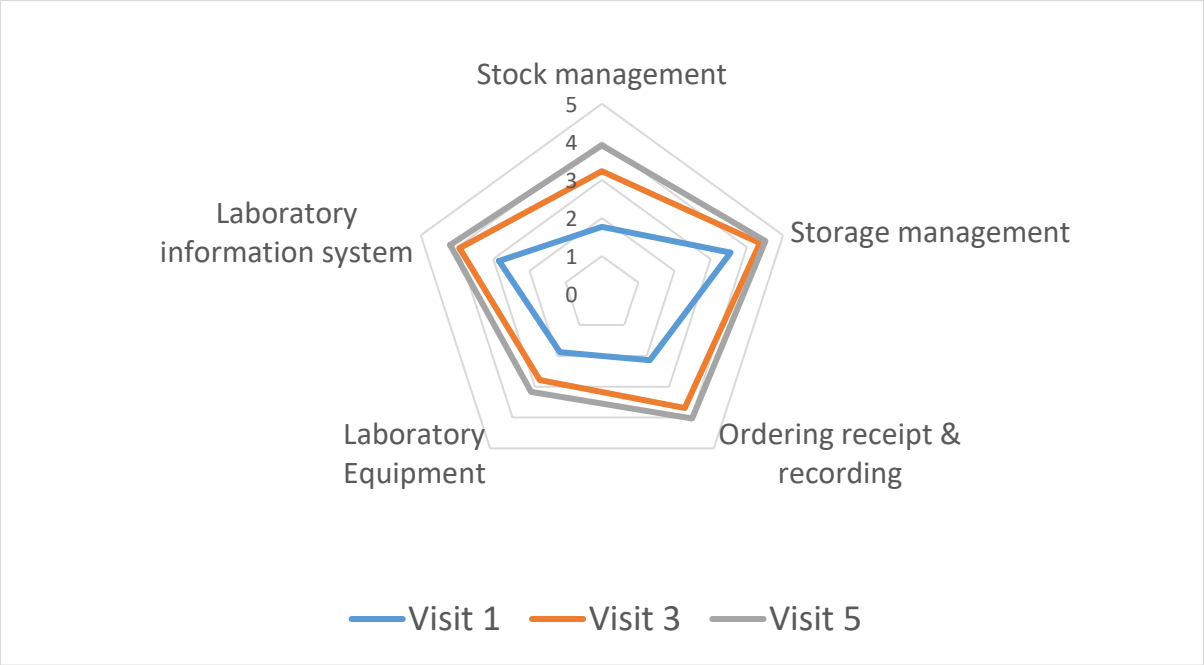
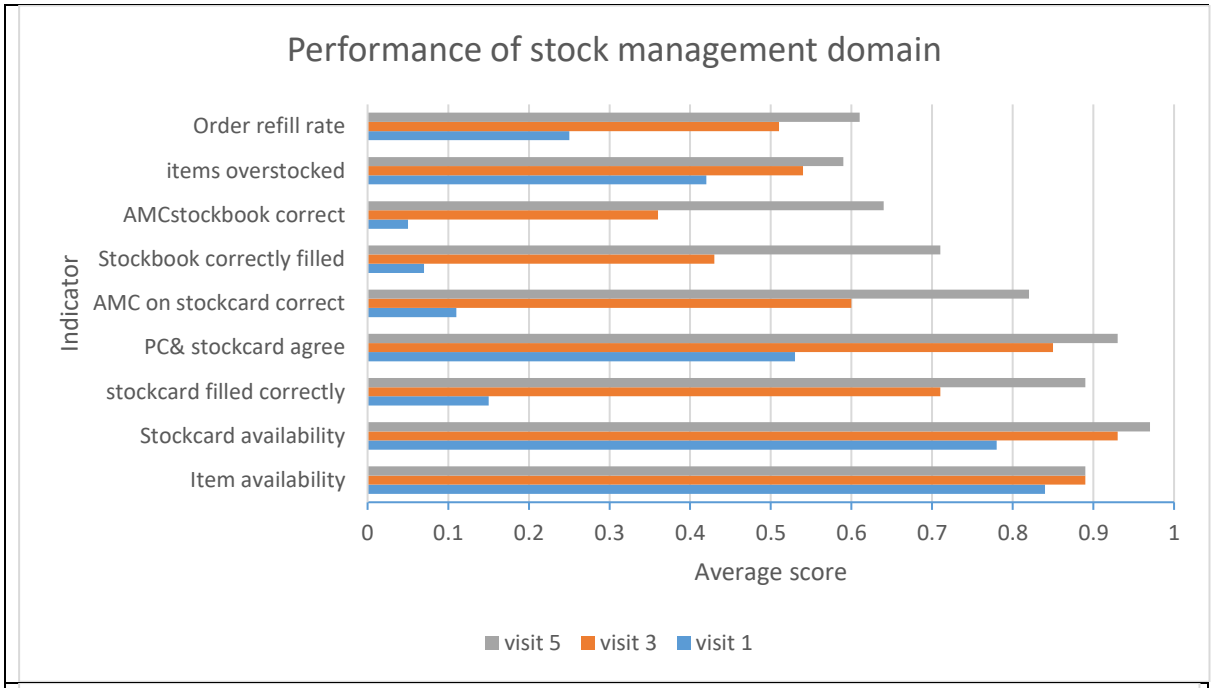
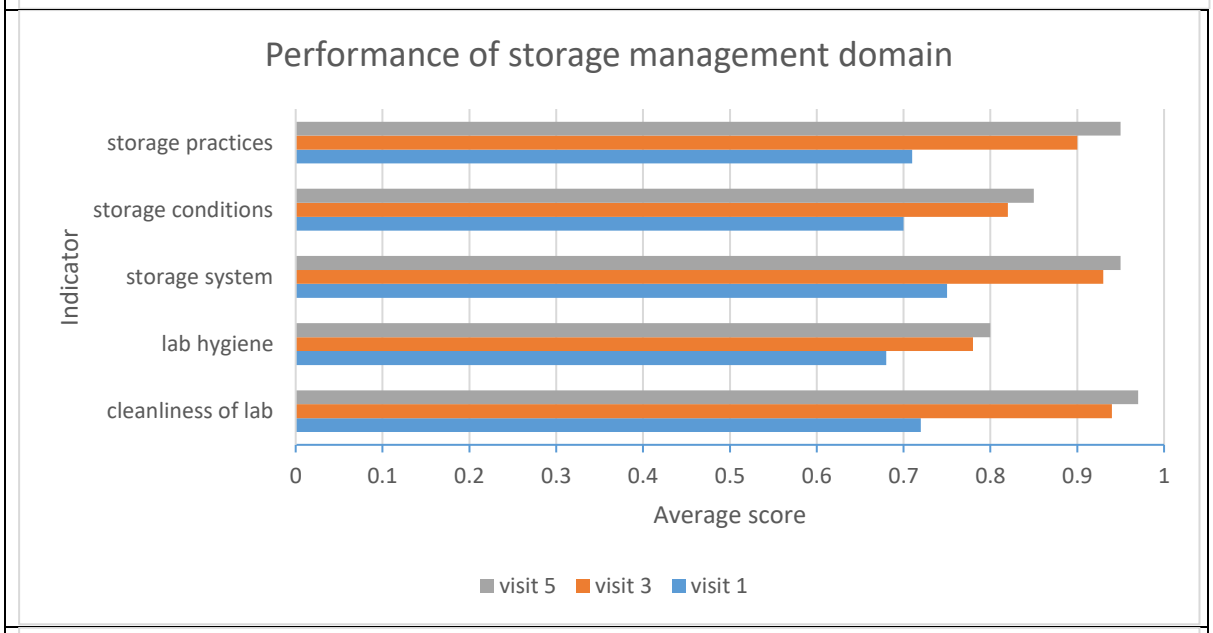


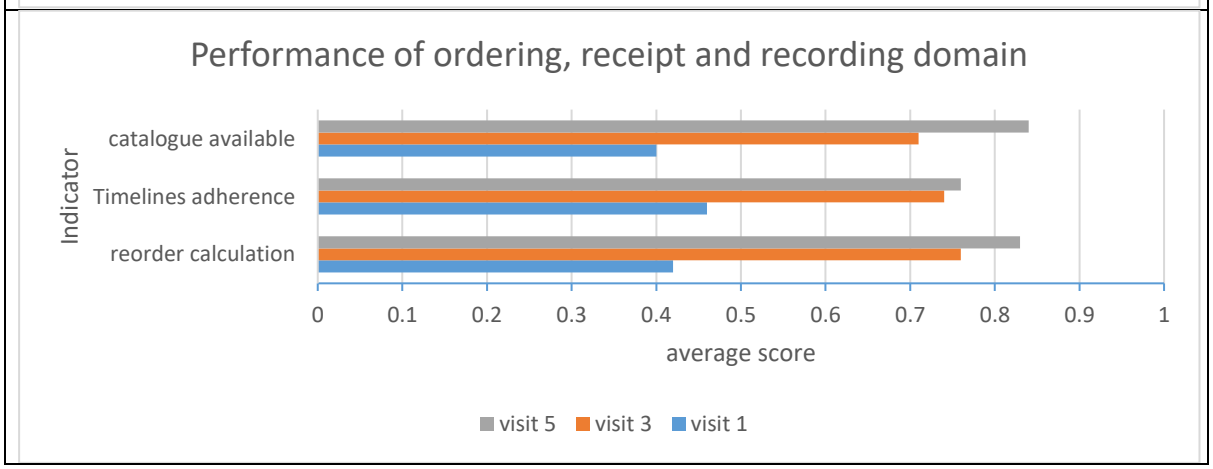
Table 6: Average scores at visit 1, 3 & 5

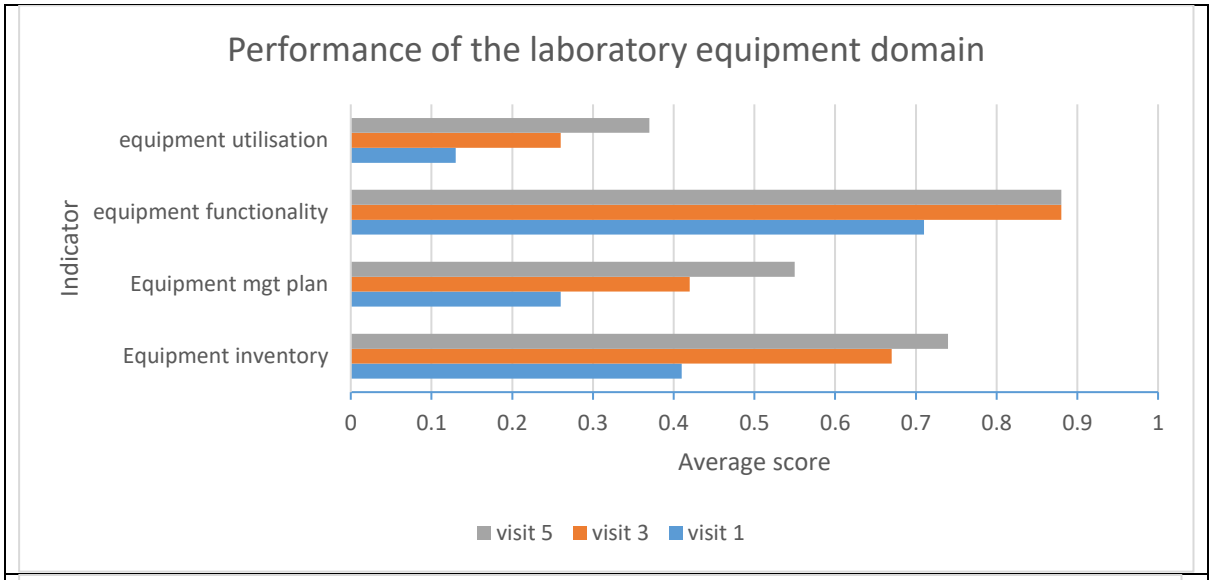
Domain	Visit number		
	Visit 1	Visit 3	Visit 5
Stock management	1.77	3.23	3.91
Storage management	3.55	4.36	4.51
Ordering receipt & recording	2.14	3.69	4.03
Laboratory Equipment	1.88	2.78	3.17
Laboratory information system	2.84	3.93	4.19
Total	**12.18**	**17.99**	**19.81**

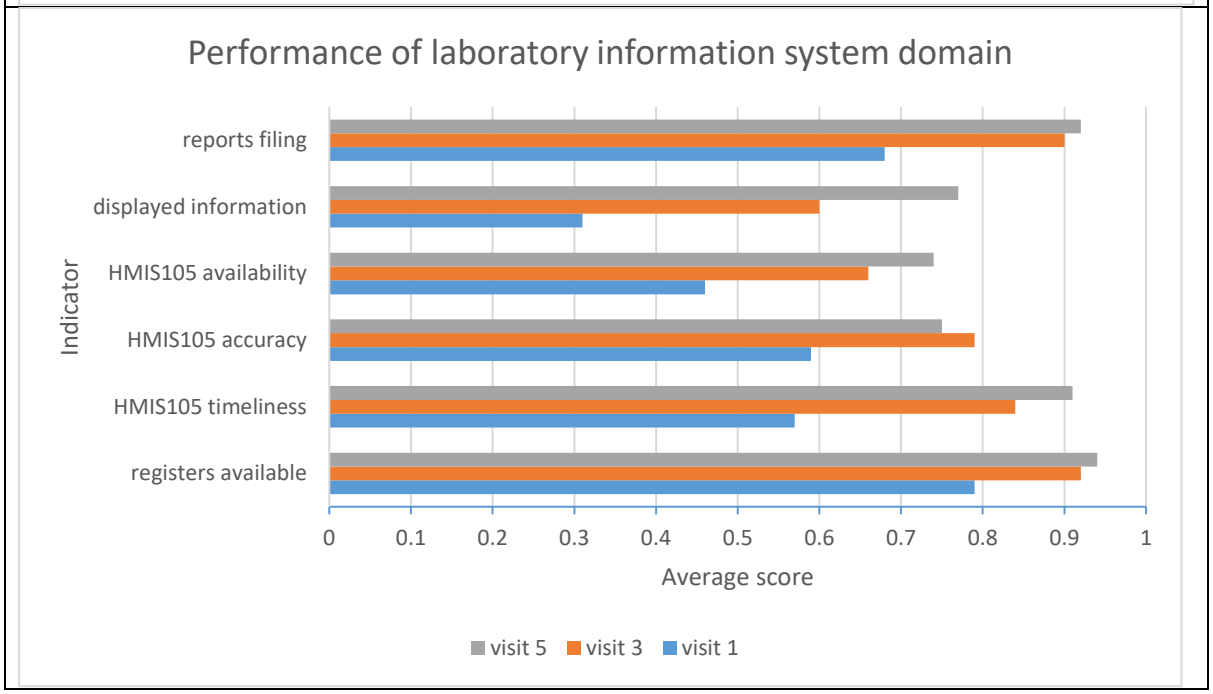
Annex 5: Overall of performance 292 facilities performance by domain








Performance of the laboratory equipment domain
equipment utilisation
equipment functionality
Equipment mgt plan
Equipment inventory
Indicator
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Average score
visit 5
visit 3
visit 1


Performance of laboratory information system domain
reports filing
displayed information
HMIS105 availability
HMIS105 accuracy
HMIS105 timeliness
registers available
Indicator
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Average score
visit 5
visit 3
visit 1