

COVID-19 Lab Data Management in Limited Resource Setting

Utilizing PEPFAR Investment for Supporting COVID – 19 Pandemic

Support PHLIV for COVID-19 Pandemic



Current Landscape – COVID-19 Testing

From Laboratory Information System Perspective

TESTING SITES

Currently most of the COVID-19 Testing are performed in national laboratories located in capital or large cities.

TESTING POPULATION

Current testing population is high risk population and is mostly located at large cities. As disease is moving to community, target population will move to hard to reach areas.

DATA ANALYSIS

Data analysis is needed in real-time to identify hotspot and actions and heavily depends on lab TAT. Lab data is a great source for preliminary analysis.



TESTING METHOD

Most of the countries are currently using RT-PCR for COVID-19 testing.

LAB INFORMATION SYSTEM

LIS solution is important to assist and manage laboratory testing, supporting workflow, and return of test results in real time by reducing TAT.

Utilizing VLSM for COVID-19

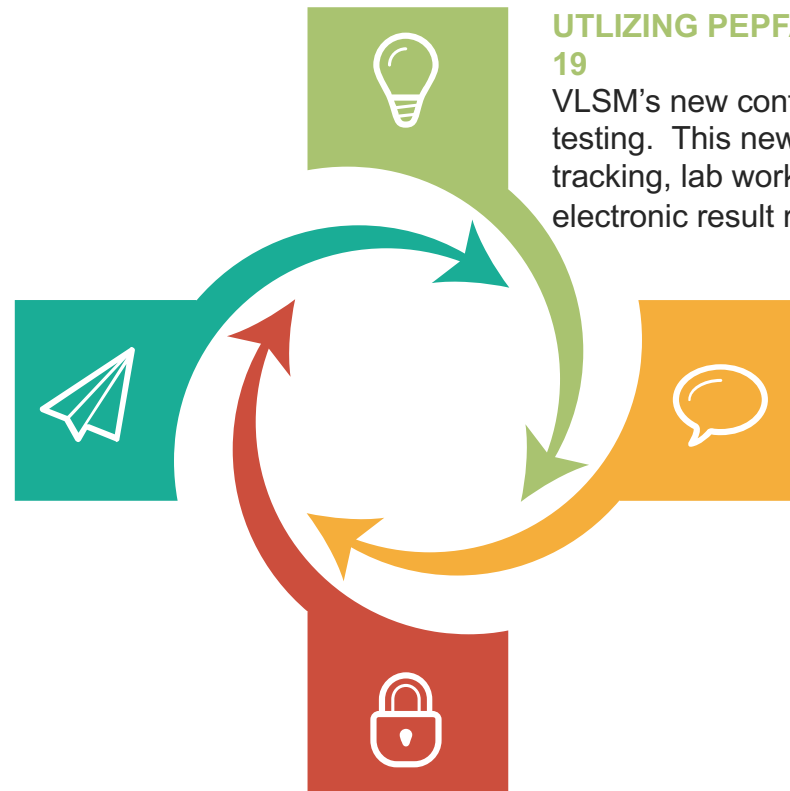
How PEPFAR tool can support COVID-19 Testing

PEPFAR INVESTMENT

PEPFAR has funded development and implementation of laboratory information system (Viral Load Sample Management system - VLSM) for VL and EID testing. VLSM is capable of managing laboratory workflow, tracking and reporting test results electronically, and reducing turnaround time. This tool is deployed in more than 25 laboratories in limited resource setting.

INTEROPERABILITY

This open source solution can be integrated with in-country data system such as DHIS2.



UTILIZING PEPFAR RESOURCE FOR COVID-19

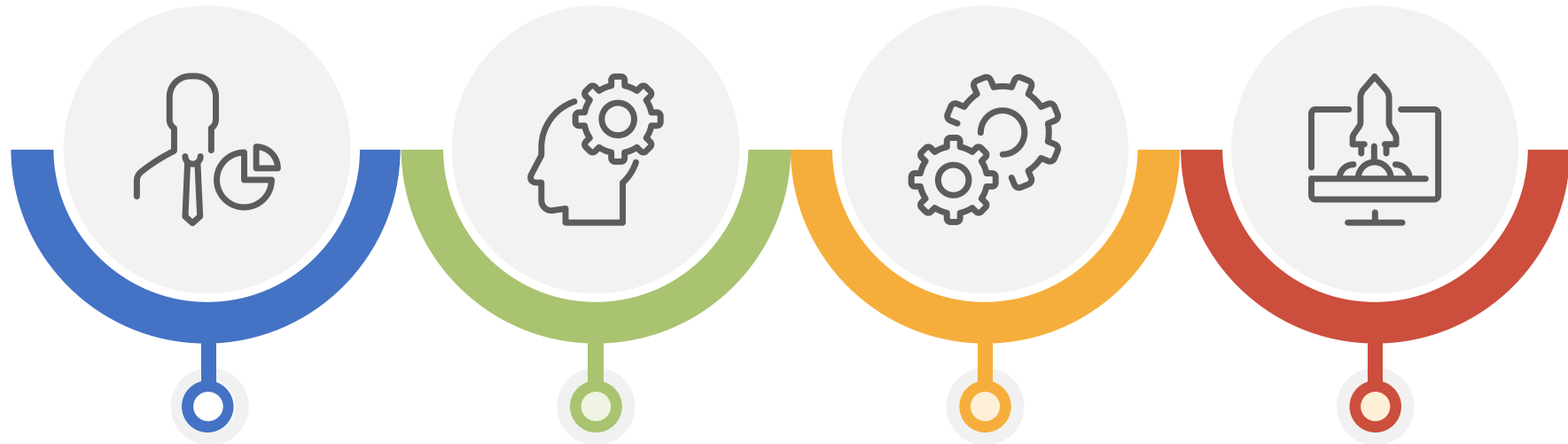
VLSM's new configuration supports COVID-19 testing. This new release support in sample tracking, lab workflow management, and electronic result reporting for COVID-19 tests.

NEXT STEP – DASHBOARD

Dashboard functionality is extended for COVID-19. Instrument interface with high through ROCHE & Abbott is supported.

COVID -19 Laboratory Essentials

From Laboratory Information System Perspective



SAMPLE TRACKING

Monitor status from sample collection to return of test result. This functionality provides caregivers the ability to track and monitor test results.

MANAGE WORK FLOW

Manage and prioritize test requests, workflow management, result verification for lab technicians. This functionality support smooth Lab operation.

RESULT REPORTING

Functionality to provide test report using e-mail and SMS to reduce turnaround time to caregiver and taskforce. An important tool to result reporting.

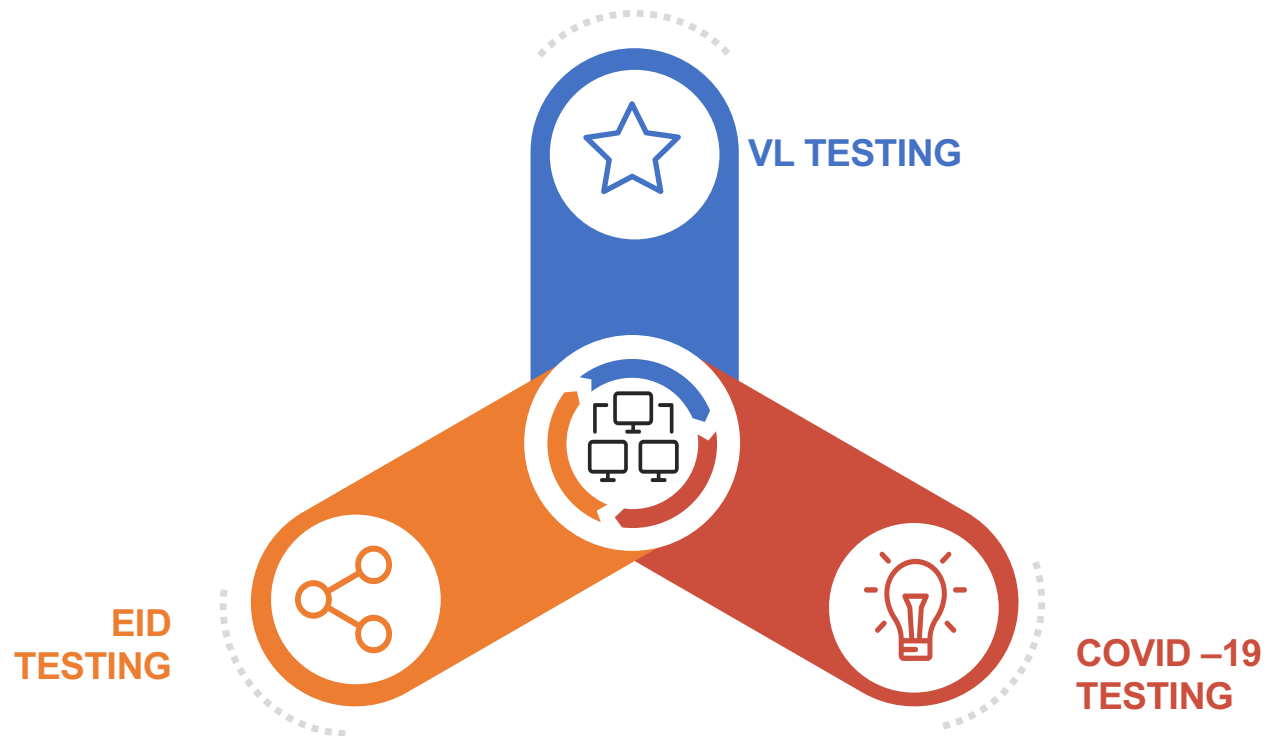
DATA INTEGRATION

Integration of all test data from different labs. An important functionality for data analysis and action plan creation.

VLSM for COVID-19 Support above Functionalities

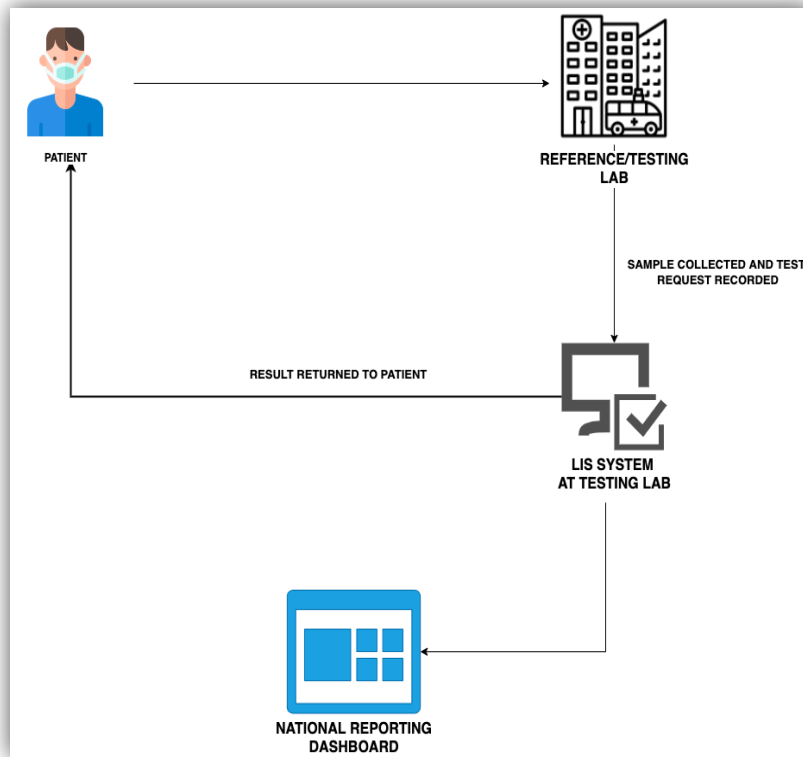
Supporting PLHIV for COVID-19

Linking patient data for VL, EID and COVID -19



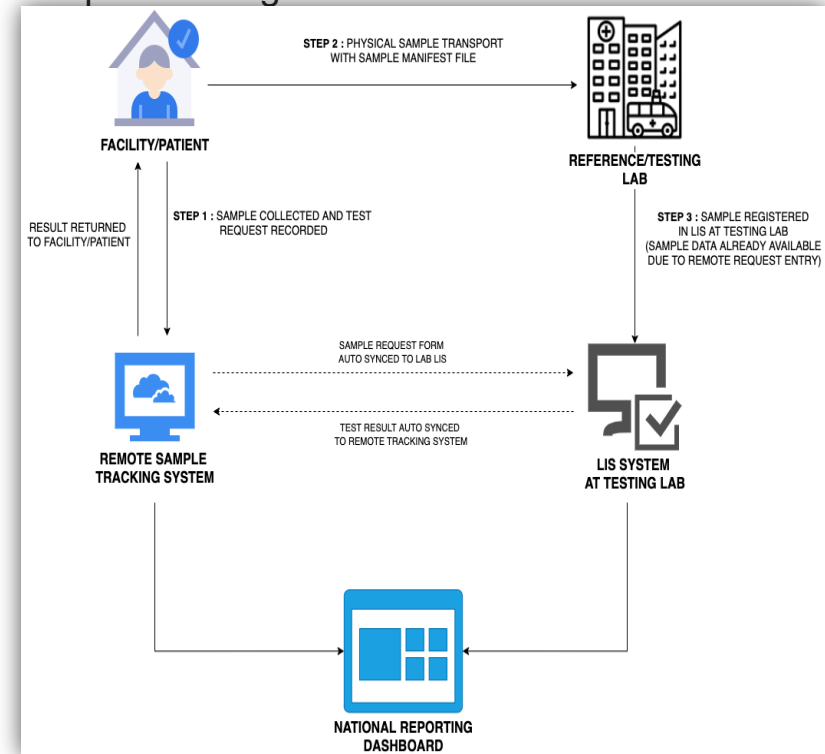
VLSM Configuration for COVID-19

VLSM has two components – Core LIS and Sample Tracking & Dashboard



LABORATORY MODULE

Deployment of Core LIS module



LABORATORY MODULE WITH SAMPLE TRACKING

Deployment Core LIS and Sample Tracking to support complete workflow.

VLSM Laboratory Module

VLSM Core

VLSM For COVID-19



Free and Open Source software, easy to train, deploy with changing requirements.



Streamline lab workflow, eliminate/reduce paperwork and improve lab efficiency.



Maintain and track historical patient data



Improve overall TAT. Return results by e-mail and paper format.

Support for instrument interface and interoperability.



VLSM Sample Tracking Module

Tracking and Reporting Samples

Provide real-time information on collected sample and test result.



Support dashboard for COVID-19 and other supported test.



Interoperate with other national system.



Provide reports/snapshot for all testing performed in country.



Further Reference

Finding Additional Information

ONLINE DEMO



AVAILABLE AT SLMTA WEB SITE

Additional Information and demo is available at: covid19.slmta.org

SOURCE CODE



AVAILABLE AT GITHUB

Download latest source code from :
<https://github.com/deforay/vlsm/releases>. Detailed instructions for setup can be found in README section at the bottom of the page.

VLSM – COVID-19

Screens and Functionalities



Walkthrough

Next few slides provide a quick overview of VLSM – COVID-19 Module

VLSM – COVID-19

Screens and Functionalities

Login

Lab Sample Management Module

User Name

Password

Login

v 3.20

Add Test Request

VLSM COVID-19 LIS

COVID-19 VIRUS LABORATORY TEST REQUEST

SITE INFORMATION

To be filled by requesting Clinician/Nurse

Sample ID* Case Definition* -- Select --

Province* -- Select -- District* -- Select -- Health Facility*

Implementing Partner -- Select -- Funding Partner -- Select --

PATIENT INFORMATION

First Name* Last Name

Patient ID* Date of Birth*

Manage Test Batches

Batch Number/Code : 20200427001 Result On : 17-Apr-2020 16:49:31

Covid-19 Test Worksheet Reviewed On :

| Pos. | Sample ID | BARCODE | Patient Code | Lot No. / Exp. Date | Test Result |
|------|-------------------------|---------|--------------|---------------------|-------------|
| 1. | Manufacturer Controls 1 | | | | |
| 2. | Manufacturer Controls 2 | | | | |
| 3. | Manufacturer Controls 3 | | | | |
| 4. | C190106001 | | 78452 | | |
| 5. | C190115001 | | 232323 | | |
| 6. | C190420002 | | 98798 | | |
| 7. | C190420003 | | 254789 | | |

Result PDF

MINISTRY OF HEALTH

COVID-19 TEST - PATIENT REPORT

| REQUESTING HEALTH CENTER NAME | HEALTH FACILITY CODE | Province/State | District/County |
|-------------------------------|----------------------|--------------------------|-----------------|
| Facility 17 | NMC | Eastern Equatorial State | Pageri |

| PATIENT NAME | PATIENT ID | AGE | GENDER |
|--------------|------------|-----|--------|
| Nirahan John | 254789 | 29 | Male |

| SAMPLE ID | SAMPLE COLLECTION DATE | SAMPLE RECEIPT DATE |
|------------|------------------------|----------------------|
| C190420003 | 02-Apr-2020 21:00:00 | 20-Apr-2020 06:00:00 |

| SAMPLE TEST DATE | RESULT RELEASE DATE | TEST PLATFORM |
|----------------------|----------------------|---------------|
| 23-Apr-2020 21:02:00 | 23-Apr-2020 18:41:11 | |

Result : Positive

VLSM – COVID-19

Screens and Functionalities

e-mail Result

The screenshot shows the 'E-mail Test Result' form in the VLSM system. The form includes fields for Subject (Covid-19 Test Results), Facility Name (To) (Select Facility), Message (Hi, PFA the Covid-19 Test results. Thanks), Sample Collection Date (Select Collection Date), Sample Type (-- Select --), Facility Name (Select Facilities), Gender (-- Select --), Province/State (-- Select --), District/County (-- Select --), Batch (Select Batches), Sample Status (-- Select --), and Mail Sent Status (Samples Not yet Mailed). A sidebar on the left shows navigation options: Request Management, Test Result Management, and Management.

Print Result

The screenshot shows the 'Print Covid-19 Results' form in the VLSM system. The form includes fields for Sample Collection Date (Select Collection Date), Batch Code (-- Select --), Sample Test Date (Select Sample Test Date), and Facility Name (Select Facilities). Below these fields are buttons for Search, Print, Result PDF, and Manage Columns. A table below the form displays a list of records with columns for Sample Code, Batch Code, Patient ID, Patient Name, Facility Name, Result, Last Modified On, Status, and Action. The table shows one record with Sample Code C190420002, Batch Code 20200427001, Patient ID 98798, Patient Name Jane Doe, Facility Name Mumuki PHCC, Result Positive, Last Modified On 27-Apr-2020 17:42:22, Status Accepted, and Action Print. A sidebar on the left shows navigation options: Dashboard, Admin, Request Management, Test Result Management, and Management.

| Sample Code | Batch Code | Patient ID | Patient Name | Facility Name | Result | Last Modified On | Status | Action |
|-------------|-------------|------------|--------------|---------------|----------|----------------------|----------|--------|
| C190420002 | 20200427001 | 98798 | Jane Doe | Mumuki PHCC | Positive | 27-Apr-2020 17:42:22 | Accepted | Print |

- ⊙ Results can be shared via email directly from laboratory to the Health Center
- ⊙ Results can be downloaded in PDF format and printed
- ⊙ SMS Functionality can be integrated, if needed.

VLSM – COVID-19

Screens and Functionalities Screens and Functionalities

e-mail Result

The screenshot shows the 'LSM Interfacing' window. At the top, it displays 'VL Machine Connected.' with a red 'Disconnect' button. Below this, a log shows a successful connection attempt. A 'Recent Results' section features a table with columns: Sample ID, Result, Unit, Tested By, Tested On, and LIMS Sync Status. The table is currently empty, with a note 'No data available in database' at the bottom. A 'Fetch Recent Orders' button is located to the right of the table.

The screenshot shows the 'System Settings' window. It contains several input fields for configuration: Lab Code/ID (1000), Lab Name (TEST), Machine Name (Cobas6000), Host/IP Address/Serial Device (127.0.0.1), Port no. (3120), Connection Protocol (ASTM), Connection Type (TCP/IP Client), MySQL Host (localhost), MySQL Port (3306), MySQL DB Name (interfacing), MySQL DB User (root), and MySQL DB Password (mysql). A 'Check MySQL Connection' button is located at the bottom right.

Instrument Interface

Automatically pull results from testing machines once the test is performed

- ⦿ VLSM supports Roche Cobas and Abbott high throughput molecular machine.
- ⦿ Removes the manual steps of copying and importing file generated from testing machine

VLSM – COVID-19

Screens and Functionalities



SAMPLE TRACKING & DASHBOARD

Provide understanding of Lab activities.

VLSM – COVID-19

Remote Test Ordering and Sample Tracking



REMOTE TEST ORDER

Web based application used by collection sites to record test requests.



MOVING REQUEST TO LAB

Test request are automatically synced to the VLSM installed in labs. This reduces manual entry and reduce workload and transcription error.



GETTING RESULT BACK

Collect status of test and results from lab and available at online portal for download and track.



LINKING DATA TOGETHER

Integrate all test requests and test results, this make easier to view and analyze all data and assist in making plan.



INTEROPERABILITY

Lab DataMart provide an easy platform to integrate with national system and support interoperability.

VLSM – COVID-19

Screens and Functionalities

Online Request

COVID-19 LABORATORY TEST REQUEST

Sample ID:

Case Definition:

Province: District: Health Facility:

Implementing Partner: Funding Partner: Lab Name:

PATIENT INFORMATION

First Name: Last Name:

Patient ID: Date of Birth:

Online Result

Covid-19 Sample Referral Manifest

Facility 1

C19200427NRMP4M

| SN | SAMPLE ID | Health facility, District | Patient Name | Patient ID | Date of Birth | Patient Gender | Sample Collection Date | Sample Barcode |
|----|------------|---------------------------|--------------|------------|---------------|----------------|------------------------|----------------|
| 1. | RC19111111 | Facility 1, Juba | DAx | 232323 | 01-Oct-1998 | Female | 15-Apr-2020 00:00:00 | |

Generated By: Amit Dugar Verified By: Received By: (at Referral lab/NRL)

Tracking Sample

Covid-19 Requests

| Sample Code | Remote Sample Code | Sample Collection Date | Batch Code | Facility Name | Patient ID | Patient Name | Province/State | District/County | Result | Last Modified On | Action |
|-------------|--------------------|------------------------|-------------|---------------|------------|--------------|--------------------------|-----------------|--------|------------------|--------|
| C190115001 | | 15-Apr-2020 | 20200418001 | Mumuki PHCC | 232323 | D Ax | Central Equatorial State | Juba | | 17/19 | |

Showing 1 to 1 of 1 entries

Print Result

Print Covid-19 Results

Results not yet Printed Results already Printed

Sample Collection Date: Batch Code: Sample Test Date:

Facility Name:

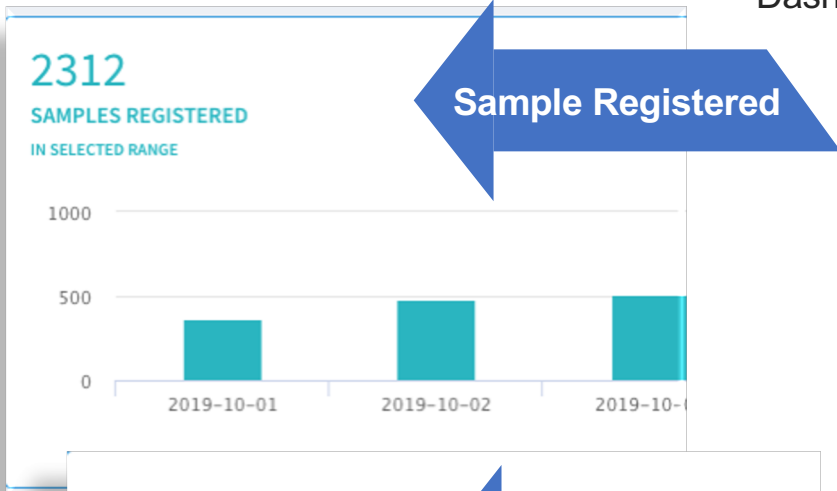
Search Reset Result PDF Manage Columns

| Sample Code | Remote Sample Code | Batch Code | Patient ID | Patient Name | Facility Name | Result | Last Modified On | Status | Action |
|----------------------------|--------------------|------------|------------|--------------|---------------|--------|------------------|--------|--------|
| No data available in table | | | | | | | | | |

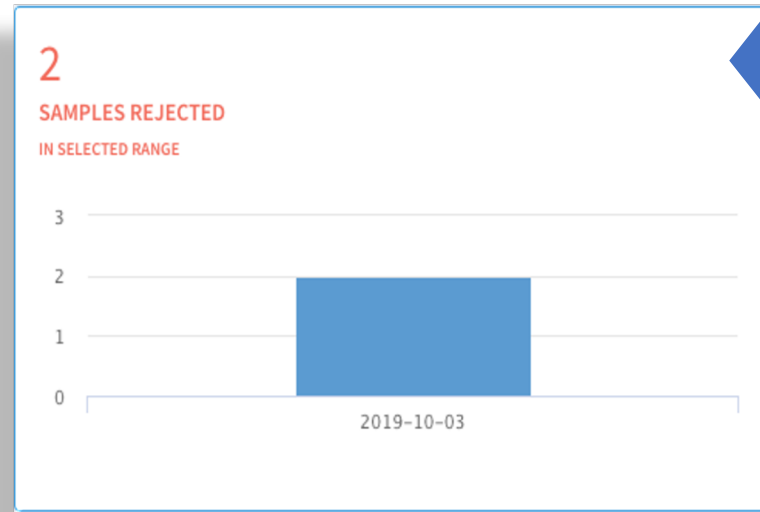
Showing 0 to 0 of 0 entries

VLSM – COVID-19

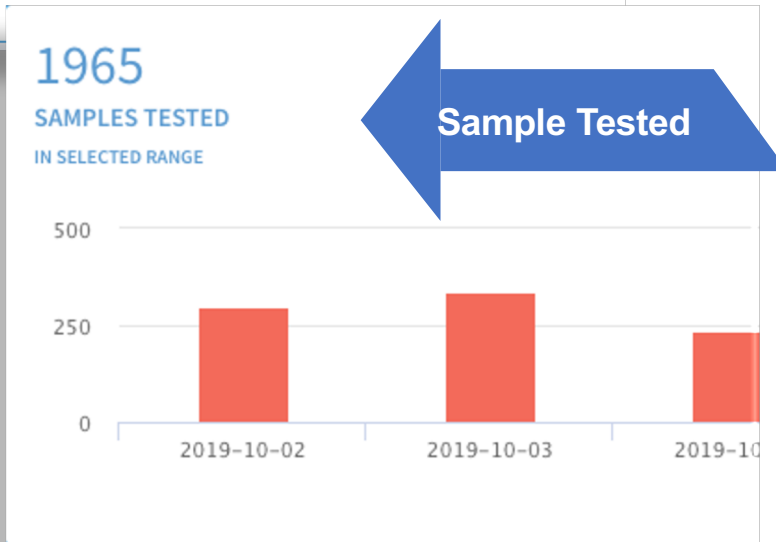
Dashboard – Testing Overview



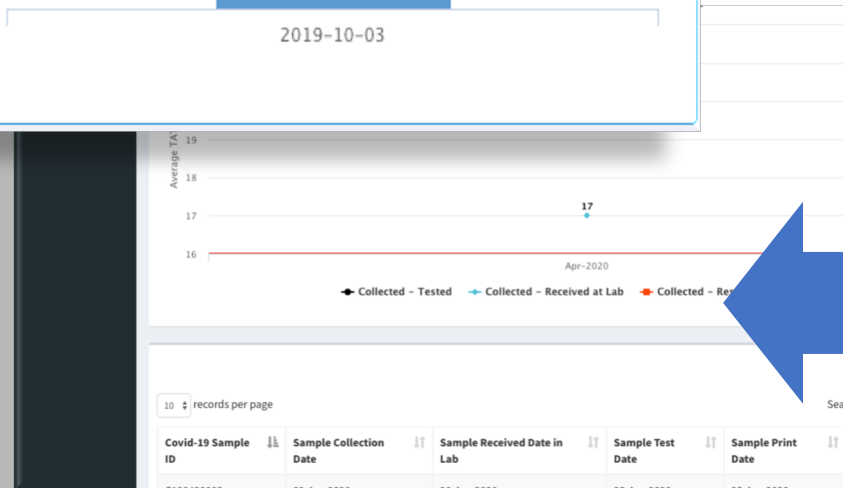
← **Sample Registered**



← **Sample Rejected**



← **Sample Tested**



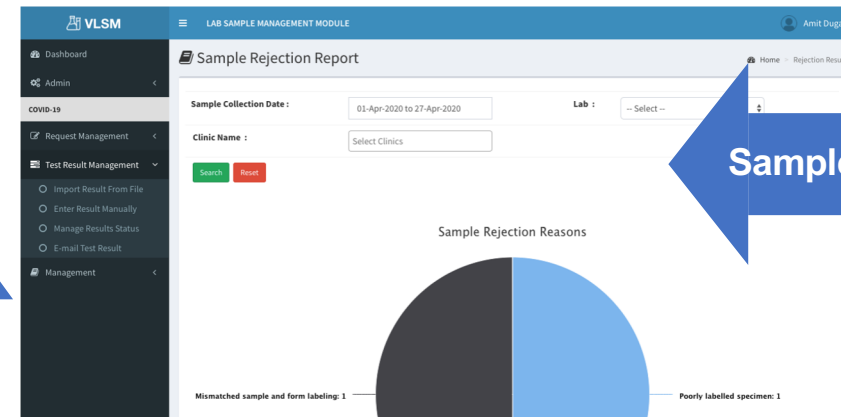
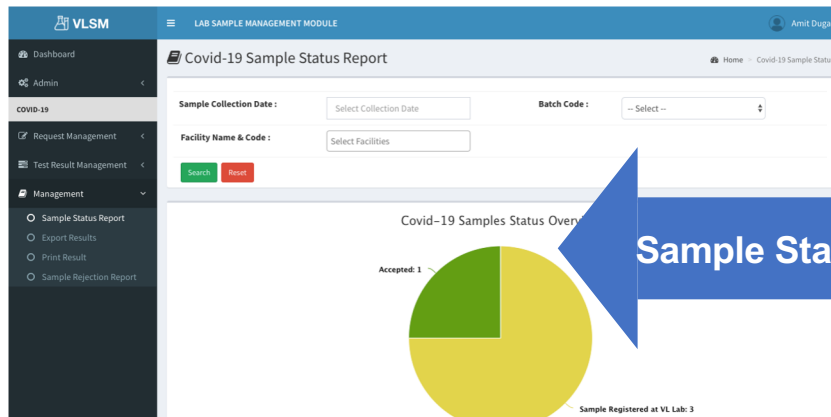
← **Lab TAT**

10 records per page

| Covid-19 Sample ID | Sample Collection Date | Sample Received Date in Lab | Sample Test Date | Sample Print Date |
|--------------------|------------------------|-----------------------------|------------------|-------------------|
| 6100420003 | 03-Apr-2020 | 20-Apr-2020 | 23-Apr-2020 | 23-Apr-2020 |

VLSM – COVID-19

Dashboard – Testing Overview



Further Reference

Finding Additional Information

ONLINE DEMO



AVAILABLE AT SLMTA WEB SITE

Additional Information and demo is available at: covid19.slmta.org

SOURCE CODE



AVAILABLE AT GITHUB

Download latest source code from :
<https://github.com/deforay/vlsm/releases>. Detailed instructions for setup can be found in README section at the bottom of the page.

