Vaccine Logistics Management Information System (vLMIS)

http://lmis.gov.pk

Networked Information Systems for Vaccine Logistics

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14 May 2015, Bangkok
Country Overview

Total population: ~196 million

Size: 796,095 sq km

Administrative structure:
- 04 provinces
- 143 districts
- 04 Federally administered regions
  (GB, AJ&K, FATA and ICT)
Challenges in EPI Supply Chain

- Fragmented EPI supply chain
  - No stock visibility in stores due to manual record keeping at all levels from federal to sub-district
  - No batch management based on FEFO and batch tracing and tracking
  - Limited cold chain assets data availability and cold chain capacity linkage with inventory and its working status
Challenges in EPI Supply Chain

- Lack of real time data visibility and data quality
  - Inaccurate immunization coverage data
  - Different vaccine wastage figures
  - Paper based system and HR capacity issues
  - Non dependable basis of forecasting and procurement of vaccine
Challenges in EPI Supply Chain

- No up-to-date cold chain inventory data
  - Fragmented antigen storage in the cold rooms
  - No real time storage capacity linkage with inventory
In a nutshell;

• No evidence based decision making

• Time lag in problem identification to correction of issue

• Lack of implementation of HR accountability at various levels of the EPI program
Inception of vLMIS

• Low measles vaccination coverage in Pakistan, leading to 25,859 cases and 570 deaths attributed to measles between January 2012 and mid-May 2013 *

* [http://reliefweb.int/disaster/ep-2012-000211-pak](http://reliefweb.int/disaster/ep-2012-000211-pak)

• Federal government requested USAID for the inclusion of vaccine products in LMIS ([www.lmis.gov.pk](http://www.lmis.gov.pk))

• vLMIS was conceived in June 2013 consultative meeting, where stakeholders from Federal EPI, Ministry, Regional/Provincial health departments, GAVI, DFID, BMGF, JICA, UNICEF and WHO gave inputs on the design
Pakistan Placed High Emphasis on Public Health Supply Chains Since 2009

LMIS
Pakistan Logistics Management Information System

After the Measles outbreak in 2012, the Government of Pakistan (GOP) formally requested USAID to support design, development, and deployment of vLMIS on the lines of cLMIS, as its 9th recommendation from the federal ombudsman report.

The LMIS is a Government of Pakistan's web-based health commodity information system catering the logistics management of health products for both population and health sectors.

VACCINES
http://v.lmis.gov.pk

The LMIS was launched by the Prime Minister of Pakistan in July 2011 as the first web-based LMIS under the ownership of the Government of Pakistan (GOP), and provides contraceptives logistics data for both health and population departments since January 2010.

CONTRACEPTIVES
http://c.lmis.gov.pk

More

TUBERCULOSIS
http://t.lmis.gov.pk

The Government of Pakistan (NTP/PTP/MNHSRC) with financing and technical assistance from the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM) and USAID | DELIVER PROJECT launched TB-DMIS in March 2013. TB_DMIS is being reported by ...

More
LMIS evolved organically through single codebase

- **Contraceptive Logistics Management Information System (LMIS)**
- **Contraceptive Warehouse Management System (cWMS)**
- **TUBERCULOSIS Drug Management Information System (DMIS)**
- **CONTRACEPTIVE LMIS & WMS (cLMIS)**
- **VACCINE Logistics Management Information System (vLMIS)**

**Journey towards Comprehensive MIS**
- cLMIS with service & demographic indicators
- vLMIS with demographic and service indicators

**Year Range**
- 2010
- 2011-12
- 2013-14
- 2015
vLMIS is a comprehensive information management system

http://v.lmis.gov.pk
Vaccines Logistics – Four Data Streams

Stocks

Inventory Management

Consumption Reporting

CCEM

Consumption Reporting

Cold Chain

Routine Immunization

SIAs
vLMIS is covering EPI functions throughout the supply chain.

**Federal EPI**
- **Store:**
  - Inventory management,
  - GS1 bar coding,
- **Procurement:**
  - Pipeline shipments
- **Other:**
  - Cold Chain Management
  - Campaigns Management

04 data entry points

**Provincial**
- **Store:**
  - Inventory management,
  - GS1 bar coding,
- **Other:**
  - Cold Chain Management
  - Campaigns Management

04 DE points at each provincial level (20 DE points)

**District EPI**
- **Store:**
  - Inventory management,
  - GS1 bar coding,
- **Other:**
  - Cold Chain Management
  - Campaigns Data Entry

04 DE points at each District /Agency level (204 DE points)

**UC**
- Consumption Reporting
- Stock Position
- Wastages calculation
- Cold Chain Status Reporting

01 DE points at each UC Cluster level (550+ DE points)
vLMIS Data Flow

**Users**
- Policy Makers
- Public Sector Health Managers
- Development Partners

**Inventory / Cold Chain**
- Federal EPI Store
- Provincial EPI Store
- District EPI Store
- Sub-District EPI Store

**Special Immunization Activities (Campaigns)**
- District Polio & Measles Control Rooms

**Monthly Vaccination Report**
- Vaccination - Out reach
- Vaccination - Fixed Site

**Web Data Entry**
- Analytical Report
Visualizing national picture at a glance
vLMIS is not just a software but a change agent to optimize governance and accountability

- vLMIS design, development, implementation and supportive supervision jointly

- More than 2,000 EPI staff were trained by project trained master trainers of the EPI
  - EPI store staff were trained on inventory management functions like stock receiving, storage, batch management (FEFO) and issuance
  - Vaccinators, computer operators and EPI Centers supervisors were trained as Cluster leads

- Computers, printers, UPS and internet dongles were provided in all EPI stores
Vaccine wastage trend at the Union Councils

![Graph showing vaccine wastage trend at the Union Councils for BCG-20 Doses in Faisalabad UCs (Apr 2015). The graph displays data with a view by filter for more than 50%.](image-url)
Reporting and non-reporting Union Councils

![Pie chart showing 42% reported and 58% non-reported Union Councils.]

<table>
<thead>
<tr>
<th>Reported Union Council List</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.No</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>9</td>
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<td>11</td>
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<td>15</td>
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<td>19</td>
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<td>21</td>
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<tr>
<td>23</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>27</td>
</tr>
</tbody>
</table>
### Strengthening Performance Accountability

#### Consumption Data Reporting Status (By UC) As on (April-2015)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahawalpur</td>
<td>108</td>
<td>108</td>
<td>100 %</td>
<td>107</td>
<td>99 %</td>
<td>103</td>
<td>95 %</td>
</tr>
<tr>
<td>Dera Ghazi Khan</td>
<td>59</td>
<td>59</td>
<td>100 %</td>
<td>59</td>
<td>100 %</td>
<td>59</td>
<td>100 %</td>
</tr>
<tr>
<td>Faisalabad</td>
<td>289</td>
<td>287</td>
<td>90 %</td>
<td>289</td>
<td>100 %</td>
<td>289</td>
<td>100 %</td>
</tr>
<tr>
<td>Gujranwala</td>
<td>195</td>
<td>194</td>
<td>99 %</td>
<td>194</td>
<td>99 %</td>
<td>194</td>
<td>99 %</td>
</tr>
</tbody>
</table>

#### UC Name | Health Facility | Operator | Address |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1/DNB</td>
<td>RHC Head Rajkan</td>
<td>Muhammad Boota</td>
<td>RHC Head Rajkan</td>
</tr>
<tr>
<td>106/DB</td>
<td>BHU 106/DB</td>
<td>Shafqat Ali</td>
<td>THQ Yazman</td>
</tr>
<tr>
<td>117/DB</td>
<td>BHU 113/DB</td>
<td>Shafqat Ali</td>
<td>THQ Yazman</td>
</tr>
<tr>
<td>12 B/C</td>
<td>BHU 29/MC</td>
<td>Syed Zakir Ali</td>
<td>RHC Dera Bakha</td>
</tr>
</tbody>
</table>

Phone: 0300-6835254
Stock level as per stock over/satisfactory/out status
Tehsil wise vaccine’s consumption in UCs
Stock position of district stores

<table>
<thead>
<tr>
<th>Vaccines</th>
<th>OB</th>
<th>Receive</th>
<th>Issue</th>
<th>CB</th>
</tr>
</thead>
<tbody>
<tr>
<td>bOPV</td>
<td>14,392,360</td>
<td>1,000,000</td>
<td>42,000</td>
<td>15,350,360</td>
</tr>
<tr>
<td>BCG-20</td>
<td>1,115,760</td>
<td>209,280</td>
<td>169,740</td>
<td>1,155,300</td>
</tr>
<tr>
<td>Pentavalent-1</td>
<td>2,330,967</td>
<td>0</td>
<td>163,473</td>
<td>2,167,494</td>
</tr>
<tr>
<td>Pneumococcal-2 (PCV10)</td>
<td>2,103,242</td>
<td>0</td>
<td>161,714</td>
<td>1,941,528</td>
</tr>
<tr>
<td>Measles-10</td>
<td>3,225,730</td>
<td>0</td>
<td>131,510</td>
<td>3,094,220</td>
</tr>
<tr>
<td>TT-10</td>
<td>621,030</td>
<td>0</td>
<td>0</td>
<td>621,030</td>
</tr>
</tbody>
</table>

- **OB**: Opening Balance at the start of month (September, 2014)
- **CB**: Closing Balance at the end of month (September, 2014)
- **Receive**: Receive Balance during the month (September, 2014)
- **Issue**: Issue Balance during the month (September, 2014)
Cold Chain Capacity

Dashboard dashboard & statistics

Capacity by: Utilization  
Capacity by: Vaccine  
Status by: VVM

+2-8C Cold Rooms (in Litres)

Net Usable | Being Used

[Bar chart showing litres of cold rooms]
Antigen wise distribution

+2-8C Cold Rooms Capacity (In Litres)
Cold chain capacity in liters in different districts
Vaccine storage capacity w.r.t facility types

- Basic Health Unit
- Civil Hospital CH
- DHQ hospital
- Dispensary
- District/Agency vaccine store
- Hospital - Private
- MCH Center
- Others
- Rural health centre
- Teaching hospital
- Tehsil/Taluka HQ Hospital
- Tehsil/Town vaccine store

Legend:
- Surplus > 30%
- Surplus 10-30%
- Match +/- 30%
- Shortage 10-30%
- Shortage > 30%
GS1 Bar coding

• Directorate Central Warehouse, Karachi is using pre-printed non-GS1 Bar codes for tracking contraceptive commodities since Aug 2012
• Logistics management information system (LMIS) is being used as a central database to store and share barcode information (batch number) for any particular product
• Vaccine and Contraceptive LMIS Release 2 was mandated with bar code tracking of commodities
• GS1 barcode Pilot is planned from Dec14 to May15
Pilot Products

Vaccine (Measles & Tetanus Toxoid)
Vaccines Bar coding Process Diagram

**Federal EPI Store**
- Receive
- Scanning and unpacking tertiary packaging
- Store secondary packages in Cold Room
- Scanning secondary packages
- Issuance

**Provincial EPI Store**
- Issuance
- Scanning secondary packages
- Store Secondary Packages in Provincial Cold Room
- Scanning secondary packages at Provincial Store
- Receive
- Ship to Provincial EPI Store

**District Store**
- Receive
- Scanning secondary packages at District Store
- Store Vials in Ice Line Refrigerator
- Issue Primary packs to Vaccinator
- Ship to District Store
Scanning Device & Concept

Scan & update local App

Upload in vLMIS
What have we learned WITH GS1 Bar Coding

- Bar code suitable for National & Provincial but not district level due to unavailability of barcode on **sub-secondary** package

<table>
<thead>
<tr>
<th>Healthcare Product</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary packaging</td>
<td>No Bar code</td>
</tr>
<tr>
<td>(one vial)</td>
<td></td>
</tr>
<tr>
<td>Sub-Secondary packaging</td>
<td>No Bar code</td>
</tr>
<tr>
<td>(multipack - 1 box of 50 vials each)</td>
<td>50 Vials</td>
</tr>
<tr>
<td>Secondary packaging</td>
<td>GS1-DataMatrix</td>
</tr>
<tr>
<td>(6 multipacks of 50 vials each)</td>
<td>300 Vials</td>
</tr>
<tr>
<td>Tertiary packaging – (4 multipacks of secondary packaging)</td>
<td>GS1-128</td>
</tr>
</tbody>
</table>
Serialization and Delimiter Character

• For complete tracking of products, serialization is key to accuracy as it avoids double scanning and tracing of batches through out the supply chain

• GS1- DataMatrix from SII has no delimiter character while parsing scanned string to separate variable length serial number and the batch
Quality of bar code

• Bar codes need to be printed on paper sticker instead of rough box surface.
• Suppliers may consider quality of bar codes issue like no, skewed and deformed bar codes
Mix batches and lose products

• Mix batch in a secondary box requires multiple bar codes or needs to be avoided

• Sub-national consignments must be packed/distributed as per the quantity of secondary package and must not contain any lose products
Simplification of vLMIS Scanner App

- Simplification and enhancement of bar code scanner application
Helpdesk Support Mechanism

• Support email i.e. support@lmis.gov.pk
• Mantis open source application to log support tickets
• HR deputed to receive support calls
• Strong liaison with provincial program teams
Pakistan vLMIS is multi dimensional, multi level EPI need based IS with GS1 bar coding & GIS capability

- Walk, talk and shoulder with the Government and partners for the highest ownership
- We do not need to re-invent as it is an open source, countries may adapt in their local context
- Multi-donor efforts should exploit the experiences of vLMIS for strengthening routine immunization efforts
- Multi level data review, OTJ training and field monitoring and supportive supervision are must
- Industry should respond to bar coding requirement of all antigen for accountable country level supply chain
- Right technology at the right time and the right place
Before Reforms in Federal EPI Store
After Reforms in Federal EPI Store
Thanks

For more information

www.deliver.jsi.com
www.lmis.gov.pk