Evaluating the Health Impact of Introducing Electronic Logistics Management Information System in Tanzania

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Tanzania’s public health supply chain delivers over 800 of products to over 6,000 health facilities.
**eLMIS**

An effective and sustainable electronic logistics management information system (eLMIS) should be user friendly and facilitate that adequate quality and quantities of health commodities* are always available at the point of service to meet patient demand. The eLMIS must provide integrated access to:

- Accurate, timely and routine consumption data
- Real-time logistics management capabilities covering point of origin to point of consumption
- Demand forecasting, capacity planning & modeling based on consumption

(* vaccines, medicines, medical & diagnostic supplies, etc.)
The LMU is a national entity within the Ministry of Health that identifies, prioritizes and coordinates supply chain interventions among various stakeholders partners.

- Logistics Data Management
- Monitoring & Evaluation
- Supply Chain Intervention Planning

- Quantification
- Coordination & Collaboration
- Supervision & Capacity Building
The eLMIS and LMU work synergistically to enhance the supply chain performance.
The eLMIS and LMU were designed and implemented to solve various supply chain challenges:

1. Improve quality of various upstream supply chain practices
2. Reduce the levels of expires and wastage
3. Enhance data visibility, analysis and use at all levels of the supply chain
4. Strengthen reporting rates, timeliness, data quality & ordering of commodities
5. Improve commodity availability and management at health facilities
A corresponding evaluation was conducted to examine impact of investment on performance and cost of the supply chain.

- What do the cost?
- Are they more effective?
- Are they more efficient?
- Are they saving money?
Methodology: A non-experimental pre and post design study with two of data collection was conducted

<table>
<thead>
<tr>
<th>Type of observation</th>
<th>Baseline</th>
<th>Upgrades begin</th>
<th>Round 1</th>
<th>Round 2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance data</td>
<td>$O_1$</td>
<td>X</td>
<td>$O_2$</td>
<td>$O_3$</td>
</tr>
<tr>
<td>Cost data</td>
<td>$O_4$</td>
<td>X</td>
<td>$O_5$</td>
<td>$O_6$</td>
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</table>

$O = $ Observation (data collection); $X = $ Intervention  
* Round 2 data collection depends on availability of funding under the GHSC project.
**Methodology:** Data was drawn from a nationally representative sample of facilities and districts including Medical Stores Dept.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Data Source</th>
<th>Program Focus</th>
<th>Measurement Focus</th>
<th>Data Collection Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUV Survey-Modified</td>
<td>~220 health facilities (hospitals, health centers and dispensaries)</td>
<td>ARV, ILS, OI, TB, EPI</td>
<td>Cost and performance at facility level</td>
<td>Aug 2013, April 2015</td>
</tr>
<tr>
<td>Upstream SC Survey</td>
<td>17 districts, 9 MSD zonal stores, 10 regional vaccine stores, MSD HQ</td>
<td>ARV, ILS, OI, TB, EPI</td>
<td>Cost and performance at higher tiers of the SC</td>
<td>Oct 2013, May 2015</td>
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Methodology: A comprehensive set of performance indicators were chosen to examine impact.

**Data use**
- Accessibility of data
- Visibility of data
- Timeliness of data
- Transparency of data

**Reporting**
- Frequency of reporting
- Timeliness of reporting
- Quality of reporting
- Reporting rates

**Supply chain outcomes**
- Product availability
- Inventory management
- Reduced expiries
- Forecast accuracy

**Management practices**
- Storage
- Inventory management
- Transport
- Logistics data management
- General management
- Quantification
- Control and monitor
- Design and plan
District Pharmacists reported reduced management complexities and high levels of satisfaction with the eLMIS

<table>
<thead>
<tr>
<th>TASKS</th>
<th>INDICATOR</th>
<th>Number of district pharmacists:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor and follow up on reporting rates and timeliness</td>
<td>eLMIS has helped eLMIS has made task easier Level of satisfaction with task</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Analyze commodity availability across the district</td>
<td>eLMIS has helped eLMIS has made task easier Level of satisfaction with task</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Make redistribution decisions</td>
<td>eLMIS has helped eLMIS has made task easier Level of satisfaction with task</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Analyze budgets of facility orders</td>
<td>eLMIS has helped eLMIS has made task easier Level of satisfaction with task</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Internal performance reviews</td>
<td>eLMIS has helped eLMIS has made task easier Level of satisfaction with task</td>
<td>![Bar Chart]</td>
</tr>
<tr>
<td>Supervision of facilities</td>
<td>eLMIS has helped eLMIS has made task easier Level of satisfaction with task</td>
<td>![Bar Chart]</td>
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</table>
The same group reported that the LMU has helped make positive changes.
Anecdotal evidence points to generally positive changes

<table>
<thead>
<tr>
<th>Supply Chain Performance</th>
<th>Reduction in stock outs; fewer reports (&quot;complaints&quot;) of stock outs to MSD</th>
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<tr>
<td>Management Practice</td>
<td>Data facilitating redistribution within and among districts; MSD reports fewer “push” orders</td>
</tr>
<tr>
<td>Reporting</td>
<td>Frequent reports of better and more timely reporting and ordering; more accountability at lower levels</td>
</tr>
<tr>
<td>Data Use</td>
<td>Orders more likely to be based on consumption or issues; ability to validate order quantities and inventory levels; ability to inform program commodity decisions</td>
</tr>
<tr>
<td>Other Mgmt Practices</td>
<td>More follow up with facilities that don’t order; ability to prioritize supervision needs</td>
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</table>
Results: Stock out rates fell for all product groups

Average across commodities:

- **Baseline**: 32%
- **Round 1**: 23%

95% Confidence Interval
Results: Stock out durations also fell during the same period
Results: Expiry rates fell at SDPs, rose slightly for central and zonal.

Change in expiry rate, baseline versus round 1

SDPs: 0.1 – 0.4%

Central and zonal: 0.06%
The management upgrades were more costly, but also made the national supply chain more effective and more efficient.
Cost savings due to improved system efficiencies were realized in year 1 and are projected to grow over time.
Key Takeaway: Cost effectiveness of the supply chain as well as overall system performance all improved

- The upgrades had a positive impact on key supply outcomes especially stockout rates, stock out duration and expires. A corresponding time series analysis supports these findings.
- Key stakeholders including District Pharmacists, Central MoHSW staff were all very positive with these interventions while others demanded further improvement.
- The upgrades also appear to have generated significant savings to the government.
- The upgraded system costs more but also is more efficient.
The additional success factors of these management upgrades will help support their long term sustainability.

- Expansion of eLMIS support team
- Enhanced data visibility
- Increased data use & analytics
- Effective change management
- Performance
- Strengthened coordination amongst national stakeholders
- National ownership and buy-in
- Alignment
The eLMIS and LMU have been instrumental in making Tanzania’s supply chain more integrated.

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<th>Ad Hoc Phase</th>
<th>Organized Phase</th>
<th>Integrated Phase</th>
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<td>- No formal logistics roles and processes</td>
<td>- Standardized systems designed and implemented</td>
<td>- People, functions, levels and entities linked under an interconnected organization</td>
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<tr>
<td>- Fragmented efforts across actors, who have limited understanding of the supply chain</td>
<td>- Logistics roles and processes defined and followed</td>
<td>- Supply chain managers are empowered, using information to manage the system and align actors</td>
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<td>- Sufficient resources mobilized</td>
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</tbody>
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Moving from Ad Hoc to Organized:
- Conduct system assessment, using process mapping, network optimization and costing analysis
- Undertake system design for functions and products using segmentation analysis
- Roll out logistics system by conducting training on developed SOPs and supervision guidelines
- Conduct regular quantification of commodity needs

Moving from Organized to Integrated:
- Establish logistics management units and technical working groups
- Professionalize supply chain managers
- Optimize performance with analysis and tools
- Strengthen automated processes for data collection and sharing
- Develop performance management indicators and incentives