Techno-Economic Assessment of Electronic Vaccine Intelligence Network (eVIN)
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Immunization Supply Chain

Universal Immunization Program of India, largest in the world, caters its beneficiaries through ~27,000 CCPs; with 95% CCPs situated below the district level (PHC, CHC, Urban Health Facility, Sub-centers)

An Effective Immunization Supply Chain Plays a Key Role in Improving the Immunization Coverage

eVIN has been designed to provide visibility of real time stock & temperature patterns, to calculate vaccine requirement, to tackle emergency situations of temperature breach, to provide information on consumption patterns and possibilities of stock reallocation

Rationale

• With the Gavi HSS1 support (2015-17), eVIN has been implemented in 12 out of 36 states and union territories. Gavi HSS2 support (2017-21) enabled the introduction of eVIN in the remaining 24 states and union territories. From the year 2018 onwards, state governments were expected to sustain its own implementation costs.

• Given the context, ‘Techno-economic assessment of eVIN’ was proposed to provide learnings for scale up of the programme in remaining states, and also pave a sustainable way forward for eventual transition of eVIN from UNDP/GAVI to GoI.

Source: VCCH 2016 Module
Study Objectives

01
To assess the programmatic usefulness of eVIN implementation, in areas of stock management and documentation, temperature monitoring and cold chain equipment

02
To document the program benefits and challenges of eVIN implementation, in contributing to system effectiveness and efficiencies

03
To evaluate the economic impact of eVIN implementation, including cost savings on vaccine and cold chain logistics management

04
To conduct an economic-feasibility assessment modelling the Return On Investment (ROI) of eVIN implementation
Study Design (Quasi Experimental Design)

Pre- and post- eVIN implementation assessment: To assess programmatic usefulness of eVIN

- A comparative analysis of key process indicators was done for all 12 eVIN states, based on a set of six-month data before eVIN implementation and another six-month data (Oct’17 to Mar’18) after eVIN implementation.

A comparative assessment in three eVIN and three Non-eVIN states:

- A comparative analysis of key performance indicators was done to assess enhanced outcomes in eVIN states as compared with non-eVIN states.

Economic assessment of eVIN implementation:

- Economic assessment was conducted in 7 states using a pre-post study design separately for one year before eVIN and one year from eVIN implementation.

Both quantitative and qualitative methods were applied for programmatic assessment, while economic assessment was purely quantitative.

Total 944 cold chain points were covered in programmatic assessment. Economic assessment collected data from 102 CCPs in 7 states.
Designation and Training Status of Cold Chain Handlers

10% of CCHs across 15 states belong to "others" category i.e. Class IV, Administrative, etc.

Majority of CCHs are ANM and Pharmacist
Savings in Vaccine Utilization by eVIN States (Source: Immunization Division, MoHFW)

- **Utilization of Doses (in lakh)**
  - Overall
  - Pre: 3053
  - Post: 2149

- **30% Saving in Vaccine Utilization**
  - ~900 lakh vaccine doses saved

- Uttar Pradesh and Bihar reported maximum saving of vaccine doses (~80%)

- **Vaccine Utilization** = Opening Dosage + Dosage Received – Closing Balance

- **Pre eVIN period**: 2015-16 for UP, MP and Raj as eVIN was implemented in early 2016-17; 2016-17 for remaining 9 states

- **Post eVIN period**: 2016-17 for UP, MP and Raj; 2017-18 for remaining 9 states

- *Vaccines Considered* - Hep-B, DPT, BCG, Pentavalent, TT - for 12 states

- Measles in 11 states except HP because of introduction of MR

- OPV in 9 states except Uttar Pradesh, Madhya Pradesh and Rajasthan because of t-opv to b-opv switch and mop-up rounds in 2016-17.
Facilities Reported Stock-out of any Antigen (%)

Facilities reported Stock-Out

- 30% reduction in facilities observed stock-out (statistically significant at 95% CI)
  - Pre: 37.8%
  - Post: 26.3%

Instances per Facility

- 40% reduction in instances of stock out
  - Pre: 1 instance
  - Post: 0.6 instance

Mean Duration of Stock-out Per Facility

- 37% reduction in mean duration of Stock-out
  - Pre: 13.1 Days
  - Post: 8.3 Days

There is no statistically significant difference in maximum and minimum stock of any antigen after introduction of eVIN.

*Reference period: Pre: 6 months prior to inception of eVIN, post: Oct’17 to Mar’18, Vaccines-Hep-B, DPT, BCG, Pentavalent, Measles, OPV & TT for 12 states except Measles not included for HP because of introduction of MR
Percent Reduction in Missed Opportunity

*Missed opportunity has been calculated by number of sessions missed, multiplied by number of children immunized/facility in the pre/post period from the HMIS data for the sampled districts. # Hep-B is in number of days of stock-out. To calculate missed opportunity, number of days of stock-out was multiplied with the number of children immunized with Hep-B in a facility in a day in the pre/post period from HMIS data for the sampled districts. $ includes children and women

<table>
<thead>
<tr>
<th>Antigen</th>
<th>Missed Opportunity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>6.4</td>
</tr>
<tr>
<td>HEP-B#</td>
<td>0.2</td>
</tr>
<tr>
<td>OPV</td>
<td>41.5</td>
</tr>
<tr>
<td>DPT</td>
<td>20</td>
</tr>
<tr>
<td>Penta</td>
<td>70.3</td>
</tr>
<tr>
<td>Measles</td>
<td>41.9</td>
</tr>
<tr>
<td>TT$</td>
<td>30.5</td>
</tr>
<tr>
<td>Total</td>
<td>38.1</td>
</tr>
</tbody>
</table>

After eVIN implementation, an additional 4,01,438 antigens were administered to the due beneficiaries

Significant reduction in instances of missed opportunities for most of the antigens
Facilities having Discard of any Vaccine

(Source: UNDP-India reported eVIN and VCCM records)

Difference in discard of any vaccine is statistically significant

25% reduction in facilities reporting wastage

Significance * p<0.05, ** p<0.01, *** p<0.001
Significance test of proportion (prtest)
UNDp data considered, includes wastage due to VVM, freezing, expiry and broken vials
## Doses Discarded: Projections

<table>
<thead>
<tr>
<th>Antigen</th>
<th>Pre-eVIN</th>
<th>Post-eVIN</th>
<th>% reduction in doses discarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>128,751</td>
<td>25,750</td>
<td>80.0</td>
</tr>
<tr>
<td>DPT</td>
<td>801,670</td>
<td>10,668</td>
<td>98.7</td>
</tr>
<tr>
<td>HEP-B</td>
<td>64,209</td>
<td>33,442</td>
<td>47.9</td>
</tr>
<tr>
<td>MEASLES</td>
<td>34,278</td>
<td>6,688</td>
<td>80.5</td>
</tr>
<tr>
<td>OPV</td>
<td>192,626</td>
<td>150,489</td>
<td>21.9</td>
</tr>
<tr>
<td>PENTA</td>
<td>29,094</td>
<td>16,387</td>
<td>43.7</td>
</tr>
<tr>
<td>TT</td>
<td>37,121</td>
<td>6,688</td>
<td>82.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12,87,749</strong></td>
<td><strong>2,50,112</strong></td>
<td><strong>80.6</strong></td>
</tr>
</tbody>
</table>
Vaccine Distribution Practices

- **Indent response Time**
  - **57% reduction**
  - In post eVIN mean response time was 3 days in comparison with 7 days in pre-eVIN

- **Order Fill Rate**
  - **2% marginal increase**
  - No significant change was observed. In post eVIN mean response time was 99% compared with 97% in pre-eVIN

- **Days left in expiry**
  - **10% reduction**
  - In post eVIN mean response time was 384 days in comparison with 428 days in pre-eVIN
Vaccine Documentation Practices

## Record Keeping Practices

Maintaining GOI register for record keeping has increased from 56.2% facilities in pre-eVIN to 97.4% facilities in the post-eVIN period.

## Vaccine Stock Updating Duration

The daily updating of vaccine stock register daily has improved from 38.6% facilities in pre-eVIN to 53.5% facilities in the post-eVIN period.
Documentation: More Than 90% Completeness

Indent register

- In pre-eVIN CCPs in comparison with in post-eVIN: 69% compared to 26%

Stock Register

- In pre-eVIN CCPs in comparison with in post-eVIN: 75% compared to 29%

Temperature Logbook

- In pre-eVIN CCPs in comparison with in post-eVIN: 70% compared to 29%

Above 90% completeness’ indicates less than or equal to 10 instances missed out of 6 critical indicators- batch no, expiry date, VVM status, opening balance, closing balance, open vials (at CCP).
Accuracy in Documentation (across eVIN states)

- 94% accuracy matched in stock registers and eVIN entries
- 92% accuracy matched in physical counting of doses and eVIN entries
Temperature Monitoring

CCH Recording on the Same Day

- eVIN: 97.2%
- Non eVIN: 81.8%

Observed Stem Thermometer Reading in the Recommended Temperature Range at the Time of Visit

- eVIN: 97.8%
- Non eVIN: 96.5%

Between 2 to 8 Degree
Accuracy of Temperature (%): eVIN Logger Matched with Stem Thermometer

88% accuracy

% Match

- 88.1
- 5.4
- 6.5

- Difference is less than ± 0.5 degree Celsius
- Difference between ± 0.5 to ± 1 degree Celsius
- Difference is more than ± 1 degree Celsius
Cold Chain Equipment: Sickness Rate

Sickness rate among eVIN states are less than 2%
Time Required to: Prepare Vaccine Indent, After Vaccine Receipt, and in Updating Vaccine Distribution

**Vaccine Indent**

- **Time taken to fill register**
- **Time taken to fill eVIN**

**After Vaccine Receipt**

**Updating of Vaccine Distribution**
Challenges Addressed or Not

Stock Management
- Addressed
  - Stock Out
  - Duration of Stock Out
  - Vaccine Indent
  - Response Time
  - FEFO
  - Lateral Sharing
  - Wastage
  - Stock Updation
- Not Addressed
  - Maximum Stock
  - Order Fill Rate
  - Lack of Indents
  - Minimum Stock

Temperature Management
- Addressed
  - Knowledge of Temperature Trends
  - Temperature Record Documentation
  - Documentation of Breach Events
- Not Addressed
  - Temperature of Cold Box
  - Placement of Sensor Position in Equipment

Cold Chain System Monitoring
- Addressed
  - Defined Key Areas of Monitoring
  - Deployment of Additional Resource (VCCM) for Monitoring
  - Involvement of State Officials in Monitoring
- Not Addressed
  - Strengthening of Monitoring at Regional, District and Sub District Level
  - Frequent Transfer/Change of Staff
Return on Investment (INR)

Current Saving
- Investment: 182.09 Crore
- Total Saving: 255.84 Crore
- Return On Investment: 1.41

Future Saving
- Investment: 87.81 Crore
- Total Saving: 255.84 Crore
- Return On Investment: 2.91
Thank You!