URBAN MALARIA CONTROL SCHEME - INDIA

Dr. R. S. SHARMA
ranjandersharma@gmail.com
HOD, Centre for Medical Entomology & vector Management
National Centre for Disease Control
DELHI, INDIA
Malaria
An. culicifacies, An. fluviatilis, An. minimus
An. sundaicus, An. dirus, An. stephensi
Visceral leishmaniasis (Kala-azar)

P. argentipes

Dengue & Chikungunya
Ae. Aegypti, Ae. albopictus

Lymphatic Filariasis
Cx. quinquefasciatus, Ma. annulifera

Japanese Encephalitis
Cx. vishnui, Cx. tritaeniorhyncus

VECTOR BORNE DISEASES IN INDIA

URBAN MALARIA

1947
75 MILLION CASES AND 0.8 MILLION DEATHS

2013
0.44 M 519 DEATHS

1976
6.4 MILLION CASES

NMEP
0.1 MILLION CASES AND NO DEATH
• National Malaria Eradication Programme launched in 1958 included indoor residual spray for all roofed structures except those in urban areas.

• Anti larval measures recommended for towns and cities.

• Local bodies made responsible for implementation of anti larval measures in urban areas.

• Overall decline in incidence of malaria in rural areas from 1958, but maximum malaria burden in towns and cities, especially Chennai, Kolkatta, Vijayawada etc.

• By 1970s rural malaria incidence came down to 0.1 million cases but urban malaria showed rising trend to the extent of 9 to 10% of total cases.

• Historically, urban malaria was the problem in port cities.

• Later invasion of vector species *Anopheles stephensi* in towns along the rivers and excessive digging of wells introduced malaria in other towns (Delhi, Lucknow, Hyderabad etc.).

• Vector species and disease reported from other cities -
Urban Malaria Scheme (UMS) was sanctioned in 1971 after the recommendations of Madhok Committee in 1969.

Initially, 23 towns were selected for programme implementation.

Subsequently, the Scheme was extended to 131 towns in 19 states/Union Territories covering a population of 116 million.

**Objectives**

- To control malaria by reducing the vector population in the urban areas
- To Reduce morbidity and mortality

**Strategy**:

**ANTI-LARVAL MEASURES**

- Source reduction
- Biological control
- Chemical control
- Space Spray in & around malaria positive cases
- Legislative control
An. stephensi

Urban malaria Risk factors OHT
<table>
<thead>
<tr>
<th>State</th>
<th>No. of towns in UMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>8</td>
</tr>
<tr>
<td>Bihar</td>
<td>4</td>
</tr>
<tr>
<td>Gujarat</td>
<td>18</td>
</tr>
<tr>
<td>Haryana</td>
<td>17</td>
</tr>
<tr>
<td>Karnataka</td>
<td>8</td>
</tr>
<tr>
<td>MP</td>
<td>6</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>15</td>
</tr>
<tr>
<td>Manipur</td>
<td>1</td>
</tr>
<tr>
<td>Nagaland</td>
<td>1</td>
</tr>
<tr>
<td>Orissa</td>
<td>3</td>
</tr>
<tr>
<td>Punjab</td>
<td>13</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>6</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>12</td>
</tr>
<tr>
<td>UP</td>
<td>14</td>
</tr>
<tr>
<td>West Bengal</td>
<td>1</td>
</tr>
<tr>
<td>Tripura</td>
<td>1</td>
</tr>
<tr>
<td>Delhi</td>
<td>1</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>1</td>
</tr>
</tbody>
</table>
The staffing pattern approved on the basis of the areas of a town. The anti-larval staff provided on the basis of the Municipal area of each town to be covered.

1. Staff for ward
   - 1.1 Inspector - 1
   - 1.2 Insect Collector - 1

2. Staff for one sector
   - 2.1 Superior Field Worker - 1
   - 2.2 Field Workers – 2
   - 2.3 Field Worker - 1

3. Driver
   - 3.1 One driver & One jeep for towns having upto 40 sectors
   - 3.2 Two drivers & two jeeps for towns having more than 40 sectors

4. Biologist
   - 4.1 One

5. Surveillance Staff
   - 5.1 One
Malaria, Pf cases & Deaths due to malaria in 19 States under LSM 2005–2013 upto September

**IMPACT - LSM**

EFFECTIVE IMPLEMENTATION OF LSM

<table>
<thead>
<tr>
<th>Year</th>
<th>Total cases</th>
<th>Pf</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>135249</td>
<td>14905</td>
<td>96</td>
</tr>
<tr>
<td>2006</td>
<td>129531</td>
<td>17278</td>
<td>145</td>
</tr>
<tr>
<td>2007</td>
<td>102829</td>
<td>18038</td>
<td>125</td>
</tr>
<tr>
<td>2008</td>
<td>115424</td>
<td>18971</td>
<td>102</td>
</tr>
<tr>
<td>2009</td>
<td>166075</td>
<td>31132</td>
<td>213</td>
</tr>
<tr>
<td>2010</td>
<td>220062</td>
<td>33174</td>
<td>149</td>
</tr>
<tr>
<td>2011</td>
<td>142502</td>
<td>13910</td>
<td>147</td>
</tr>
<tr>
<td>2012</td>
<td>82554</td>
<td>8236</td>
<td>61</td>
</tr>
<tr>
<td>2013</td>
<td>31446</td>
<td>1883</td>
<td>14</td>
</tr>
</tbody>
</table>
Impact – LSM MUMBAI

Outbreak of Malaria

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Cases</th>
<th>Pf Cases</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>17826</td>
<td>3262</td>
<td>109</td>
</tr>
<tr>
<td>2007</td>
<td>25403</td>
<td>5318</td>
<td>122</td>
</tr>
<tr>
<td>2008</td>
<td>26097</td>
<td>5130</td>
<td>98</td>
</tr>
<tr>
<td>2009</td>
<td>44035</td>
<td>9157</td>
<td>198</td>
</tr>
<tr>
<td>2010</td>
<td>76755</td>
<td>13363</td>
<td>145</td>
</tr>
<tr>
<td>2011</td>
<td>39822</td>
<td>3290</td>
<td>69</td>
</tr>
<tr>
<td>2012</td>
<td>5374</td>
<td>312</td>
<td>1</td>
</tr>
</tbody>
</table>

Construction activities
Vector density very high
Labour migration from endemic areas

Trend in 2009

Trend in 2010

Trend in 2011
RISK FACTORS FOR MALARIA OUTBREAK

Massive constructions

1926 - SEVERE OUTBREAK OF MALARIA I
1927 - Covell recommended species sanitation
1928 - Bombay act passed
  - Legislative measures for prevention of An. stephensi
Malaria Control Thru Vector Control MUMBAI

Elimination of Breeding sites

Engineering Methods
- Tanks
- Leakages
- Collection of Water

Punitive Action u.s.381 of MCGM Act if these measures are not undertaken

Malaria Control
Anti Larval Biological (Ponds)
Anti Adult
Chemical Fogging (Indoor)
IMPACT-LSM, Malaria in Delhi (1961 – 2011) 50 years

1996 Dengue Outbreak with 10,000 cases and more than 400 deaths
Development project without Health Impact Assessment (HIA): resulted in malaria outbreaks
ENVIRONMENTAL MODIFICATION and malaria control

SCENARIO

Sabarmati: erstwhile

Intervention: Channelization

Narmada Fed Sabarmati

Outbreak of Malaria in Ahmedabad city
## LSM IMPCT, NAVI MUMBAI

<table>
<thead>
<tr>
<th>Year</th>
<th>PV</th>
<th>PF</th>
<th>MIX</th>
<th>TOTAL</th>
<th>PF%</th>
<th>SPR</th>
<th>API</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>114605</td>
<td>5060</td>
<td>3869</td>
<td>9024</td>
<td>42.8%</td>
<td>7.87</td>
<td>18</td>
</tr>
<tr>
<td>1998</td>
<td>144195</td>
<td>4383</td>
<td>2157</td>
<td>6593</td>
<td>32.7%</td>
<td>4.57</td>
<td>11.59</td>
</tr>
<tr>
<td>1999</td>
<td>118895</td>
<td>2576</td>
<td>1078</td>
<td>3694</td>
<td>29%</td>
<td>3.11</td>
<td>5.95</td>
</tr>
<tr>
<td>2000</td>
<td>110566</td>
<td>1760</td>
<td>1033</td>
<td>2823</td>
<td>36.5%</td>
<td>2.55</td>
<td>4.00</td>
</tr>
<tr>
<td>2001</td>
<td>111392</td>
<td>1824</td>
<td>907</td>
<td>2779</td>
<td>34%</td>
<td>2.49</td>
<td>3.85</td>
</tr>
<tr>
<td>2002</td>
<td>120455</td>
<td>1524</td>
<td>525</td>
<td>2080</td>
<td>25.24%</td>
<td>1.72</td>
<td>2.6</td>
</tr>
<tr>
<td>2003</td>
<td>127156</td>
<td>1497</td>
<td>349</td>
<td>1878</td>
<td>20%</td>
<td>1.47</td>
<td>2.27</td>
</tr>
<tr>
<td>2004</td>
<td>123838</td>
<td>1406</td>
<td>299</td>
<td>1725</td>
<td>18.49%</td>
<td>1.39</td>
<td>1.95</td>
</tr>
</tbody>
</table>

**Know Malaria to No Malaria**
Model civic bye-laws and building bye-laws for prevention and control of vector breeding

**Model Civic Bye-laws:** Promulgation and implementation with provision to prevent /eliminate mosquito breeding like Municipal Corporation of Greater Mumbai, NCT Delhi, Chandigarh, Bhopal, Agartala, Navi Mumbai Municipal Corporation, Thane and Goa.

**Building Bye-laws:** Provision to prevent mosquitogenic conditions on the exterior of the buildings and clauses in the contract to keep curing tanks free of mosquito breeding during construction phase and dismantling of the same before issuance of occupancy certificate.
Malaria Bye-laws:

- To reduce future potential breeding places.

- Inspect the site for any potential breeding places at the construction.

- “No Objection Certificate” is issued from Health Department of NMMC for Occupancy.
Gaps and Challenges in the existing Urban Malaria PROGRAMME

1. Urbanization and Population Growth: The increasing population growth unable to match with the civic facilities leading to increased malaria vector breeding including invasion by *Aedes aegypti* the vector of dengue fever, Dengue Hemorrhagic Fever (DHF) & Chikungunya and JE.

2. Spatial Spread: Inclusion of other vector species: Due to population pressure all towns & mega cities are expanding and new settlements in peri-urban areas have come up. These peri-urban situations have low infrastructure which lead to inclusion of *An. culicifacies* (*malaria vector in rural areas*) alongwith the vector of urban malaria *An. stephensi*.

3. Vertical spread: Mega towns are now expanding vertically creating new avenues of breeding. For example, fire fighting exigencies require building of two storage tanks one at the ground and other at the top with high breeding potential of *A. stephensi*. 
4. **Drinking water supply**: Intermittent water supply developed storage practices in artificial containers which generated breeding sites for vector mosquitoes.

5. **Development project without Health Impact Assessment (HIA)**: resulted in malaria outbreaks in Mangalore City.

6. **Inadequate health infrastructure**: Lack of man-power.

7. **Immigration**: particularly population from disease endemic areas to urban cities/towns. Kolkata, Mumbai and Ahmedabad.

8. **Poor disease surveillance**: activities in urban areas of Delhi.
The fever'd hands, and note down all I see, That some dim distant light may haply break. The painful faces ask, can we not cure? We answer, No, not yet; we seek the laws.

Sir Ronald Ross