Application of GIS to Strengthen Immunization in Nepal

Mahesh Pathak
Society for Conservation GIS-SCGIS Nepal
healthgisnp@gmail.com

Pradeep Adhikari
CROE Polio Program
Outline

• Introduction
• Routine Immunization
• GIS Application scenarios
• Demonstration
Nepal: Location and physiography

- Area: 147181 (Sq.KM)
Demography

- **Total Population:** 
  - 26.5 Million
- **Total HH:** 
  - 542,3297
- **Growth Rate:** 
  - 1.35%
- **Urban population:** 
  - 17.1%
- **Rural population:** 
  - 82.9
- **Life Expectancy:** 
  - 64.1
- **Mountain Population:** 
  - 6.7%
- **Hill Population:** 
  - 43.0%
- **Terai:** 
  - 50.3%
Basic Health Statistics

• Public hospitals: 102
• Primary Health Care Center (PHCCs): 208
• Health Posts (HPs): 1559
• Sub Health Posts (SHPs): 2247
• Primary Health Care/Outreach Clinic (PHC/ORC): 12618
• Expanded Program of Immunization (EPI): 16840
• Female Community Health Volunteers (FCHVs): 50024
Immunization Status

• National Immunization Program- 1st Priority Program
• Recognized as a well functioning immunization system
• Accessibility of immunization has reached to the 97% of population
• Polio free status: 27th March 2014
# Immunization Coverage

<table>
<thead>
<tr>
<th>IMMUNIZATION</th>
<th>2011/212</th>
<th>2012/13</th>
<th>2013/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of children under one year immunized with BCG</td>
<td>96</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>% of children under one year immunized with DPT-HepB-Hib3</td>
<td>90</td>
<td>93</td>
<td>92</td>
</tr>
<tr>
<td>% of children under one year immunized with OPV 3</td>
<td>90</td>
<td>93</td>
<td>92</td>
</tr>
<tr>
<td>% of one-year-old children immunized against Measles/Rubella (90)*</td>
<td>86</td>
<td>88</td>
<td>88</td>
</tr>
</tbody>
</table>
Immunization services

• Immunization Program
  • Routine Immunization
  • National Immunization Day (NID)
  • Supplementary Immunization Day (SNID)

• Service delivery
  • Static immunization sessions (clinic)
  • Outreach sessions (established at different locations in VDC/Municipalities)
  • Mobile clinics
  • Immunization session: 3-5 in a VDC, more in municipalities.
  • Almost 16,000 immunization sessions held each month
  • 1, 92,000 sessions per annum nationwide
# National Immunization Schedules

<table>
<thead>
<tr>
<th>Type of Vaccine</th>
<th>Number of Doses</th>
<th>Recommended Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>1</td>
<td>At birth or on first contact with health institution</td>
</tr>
<tr>
<td>OPV</td>
<td>3</td>
<td>6, 10, and 14 weeks of age</td>
</tr>
<tr>
<td>DPT-Hep B-Hib</td>
<td>3</td>
<td>6, 10, and 14 weeks of age</td>
</tr>
<tr>
<td>Measles-Rubella</td>
<td>1</td>
<td>9 months of age</td>
</tr>
<tr>
<td>TD</td>
<td>2</td>
<td>Pregnant women (2 doses of Td)</td>
</tr>
<tr>
<td>JE</td>
<td>2</td>
<td>12-23 months of age</td>
</tr>
</tbody>
</table>
GIS Application: Strengthen immunization Program

• Phase I: Introducing GIS in Public Health
  • Immunization coverage mapping

• Phase II: Looking toward granular details
  • Urban Health facility mapping
Phase I: Introducing Technology

• GIS Capacity building
  • GIS Training
  • Health GIS database

• Strengthen National Immunization Program
  • Immunization access and utilization
  • Immunization Session Plan
Immunization access and utilization

What proportion of children have access to immunization services?
- High coverage with DTP1 (>80%)
- Low coverage with DTP1 (<80%)

What proportion of children COMPLETE the immunization schedule?
- Drop out rate <10%
- Drop out rate >10%

Category 1: Poor Utilization Poor Access
Category 2: Good Access Good Utilization
Category 3: Good Access Poor Utilization
Category 4: Good Utilization Poor Access
Immunization access and utilization
Phase II: Toward granular details

Census Block (Ward unit) VS Tole/Settlement
Urban Health Facility Mapping: Kathmandu Metropolitan City

- Strengthen Immunization program in urban areas
- Urban area health facility/immunization clinic mapping
- Estimation of Tole/Settlement level population/Target population
- Identify hard to reach areas
- Dissemination and deliver mapping product to support Google Earth and Web map
Kathmandu Metropolitan City

• Total Population (2001): 975007
• Wards/Census unit: 35
• Immunization Clinic: 461
• Target population (<1 Year): 25350
Estimation of Tole/Settlement population

- GPS Survey of Health Facility/Immunization Clinic
- Collect Place name/landmarks
- Delineate Tole/Settlement boundary
- Estimate Tole/settlement population

<table>
<thead>
<tr>
<th>Tole/Settlement Name</th>
<th>Buildings</th>
<th>Total Population</th>
<th>Target Population (&lt;1 Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahiti Pokhari</td>
<td>643</td>
<td>5356</td>
<td>139</td>
</tr>
<tr>
<td>Balaju</td>
<td>1076</td>
<td>8964</td>
<td>233</td>
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<tr>
<td>Balaju Baisdhara</td>
<td>125</td>
<td>1042</td>
<td>27</td>
</tr>
<tr>
<td>Balaju Bypass</td>
<td>1827</td>
<td>15221</td>
<td>396</td>
</tr>
<tr>
<td>Balaju Industrial Area</td>
<td>94</td>
<td>782</td>
<td>20</td>
</tr>
<tr>
<td>Balaju Slum Area</td>
<td>178</td>
<td>1484</td>
<td>39</td>
</tr>
<tr>
<td>Balaju Tar</td>
<td>474</td>
<td>3949</td>
<td>103</td>
</tr>
<tr>
<td>Balganga Ghat</td>
<td>86</td>
<td>717</td>
<td>19</td>
</tr>
<tr>
<td>Banasthali</td>
<td>581</td>
<td>4841</td>
<td>126</td>
</tr>
<tr>
<td>Bandevi</td>
<td>212</td>
<td>1766</td>
<td>46</td>
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<tr>
<td>Basanta Nagar</td>
<td>1104</td>
<td>9197</td>
<td>239</td>
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<tr>
<td>Bhimmukteshwor</td>
<td>153</td>
<td>1275</td>
<td>33</td>
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<tr>
<td>Bohora Tar</td>
<td>623</td>
<td>5190</td>
<td>135</td>
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<tr>
<td>Gunstar Phant</td>
<td>269</td>
<td>2241</td>
<td>58</td>
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<tr>
<td>Gurudwara nanak</td>
<td>7</td>
<td>58</td>
<td>2</td>
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<tr>
<td>Jagriti Tole</td>
<td>282</td>
<td>2349</td>
<td>61</td>
</tr>
<tr>
<td>Kalikasthan</td>
<td>401</td>
<td>3341</td>
<td>87</td>
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<tr>
<td>Khadga Gaun</td>
<td>324</td>
<td>2698</td>
<td>70</td>
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<tr>
<td>Machha Pokhari</td>
<td>372</td>
<td>3099</td>
<td>81</td>
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<tr>
<td>Nagarjun forest</td>
<td>22</td>
<td>184</td>
<td>5</td>
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<tr>
<td>Nayabazar</td>
<td>757</td>
<td>6306</td>
<td>164</td>
</tr>
<tr>
<td>Painko Tole</td>
<td>448</td>
<td>3731</td>
<td>97</td>
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<tr>
<td>Paknalol</td>
<td>528</td>
<td>4399</td>
<td>114</td>
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<tr>
<td>Pipalboat</td>
<td>130</td>
<td>1082</td>
<td>28</td>
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<tr>
<td>Siddhi Ganesh</td>
<td>106</td>
<td>883</td>
<td>23</td>
</tr>
<tr>
<td>Soharakhutte</td>
<td>383</td>
<td>3191</td>
<td>83</td>
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<tr>
<td>Taudel</td>
<td>228</td>
<td>1900</td>
<td>49</td>
</tr>
<tr>
<td>Thapa Gaun</td>
<td>282</td>
<td>2349</td>
<td>61</td>
</tr>
<tr>
<td>Vinayak Basti</td>
<td>230</td>
<td>1916</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>11945</td>
<td>99511</td>
<td>2588</td>
</tr>
</tbody>
</table>
Estimation of Tole/Settlement population...
Estimation of Tole/Settlement population...

<table>
<thead>
<tr>
<th>Before</th>
<th></th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total geographic unit</td>
<td>35</td>
<td>Total geographic unit</td>
</tr>
<tr>
<td>Largest target population</td>
<td>2995</td>
<td>Largest target population</td>
</tr>
<tr>
<td>Lowest target population</td>
<td>91</td>
<td>Lowest target population</td>
</tr>
</tbody>
</table>
Estimation of Tole/Settlement population...

Before

After
Demonstration

• Immunization Atlas
• Immunization Clinic
  • Google Earth Layers
  • Web map application
  • Web map
Acknowledgment

• Child Health Division- Department of Health Services
• WHO IPD- Nepal
• CARE Nepal
• Society for Conservation GIS (SCGIS)/ESRI Conservation Program
Reference/Data sources

- Field survey
- Topographic map, Survey departments
- Google Earth Imagery
- Central Bureau of Statistic (CBS), Government of Nepal
- HMIS, Department of Health Services
- Department of Health Services, Government of Nepal
- Annual Report-Department of Health Services, Government of Nepal
- RED Strategy
Thank You!!!
Questions??

Mahesh Pathak
Email:
healthgisnp@gmail.com