Effects and cost-effectiveness of Measles vaccination campaigns

Evidence from Bandim Health Project

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Measles vaccination campaigns

Targets for measles elimination

Disease eradication - reaching all

→ Evaluation: Coverage
Measles vaccination campaigns

• Measles vaccination campaigns in LMIC (>1 billion doses of MV)

• Guinea-Bissau: measles campaigns every 3 years since 2006

• First studies of the effect of MV campaigns
  – 2006 campaign in rural Guinea-Bissau
  – 2012 campaign in Bissau city (urban) (Best data available)
Bandim Health Project
A platform for testing real-life effects of health interventions

Guinea-Bissau

Regular home visits

Rural Guinea-Bissau 2006

Urban Guinea-Bissau 2012
Measles vaccine (MV) campaign 2006 - Rural

- **Children (6-59 months):** 2004-Cohort, n=7999; 2005-Cohort, n=8108; 2006-Cohort, n=8158
- **Deaths:** 2004-Cohort, n=208; 2005-Cohort, n=207; 2006-Cohort, n=164

Timeline:
- **29-05-2004** to **15-05-2005**
- **29-05-2005** to **15-05-2006**
- **29-05-2006** to **15-05-2007**
Survival during follow-up

Lower mortality = 20% (4-34%)

Not explained by prevention of measles infection

Fisker, PIDJ, 2015
Mortality by routine measles vaccination status

Fisker, PIDJ, 2015
Measles vaccination campaign 2012 - Urban

- **Campaign**: Dec. 2012
- **End of follow-up**: Dec. 2013

**Participants**: information during campaign or after campaign

**Non-Participants**: information after campaign

No information
Mortality during follow-up

- Mortality 72% (23-90%) lower
- Mortality 85% (37-96%) lower
- Mortality 54% (-203-89%) lower

<table>
<thead>
<tr>
<th>Category</th>
<th>Campaign Vaccine</th>
<th>No Campaign Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>All children &lt;5 years</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Previous measles vaccine</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>No previous measles vaccine</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>
Boosting with measles vaccine

- Lower mortality after Measles vaccination campaigns
- Especially among previously vaccinated although one dose of measles vaccine is considered full protective against measles infection
- Preliminary analyses of data from 1996-2015 from Navrongo also indicate beneficial effects of measles vaccination campaigns – 26% (11-38%) lower mortality after four campaigns.
Cost-effectiveness (CE) of measles campaigns

All children 9-59 months of age in Guinea-Bissau in 2012 (n=247,786)

Societal perspective

2 scenarios:

Campaign
- Costs of campaign
- 30% reduction in hospital admissions*
- 72% lower mortality*
- (*Among the 85% covered)

No campaign
- No costs of campaign
- No reduction in hospital admissions
- Unchanged mortality
Results

- Total costs of 2012 campaign: **USD 272,441**

<table>
<thead>
<tr>
<th>Effect estimate</th>
<th>Deaths averted</th>
<th>Life Years gained</th>
<th>CE-ratio (Life years gained)</th>
<th>CE-ratio (deaths averted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>72% mortality reduction (2012 campaign)</td>
<td>7,279</td>
<td>192,141</td>
<td>USD 1.33/Life year gained</td>
<td>USD 35.2/Death averted</td>
</tr>
</tbody>
</table>

In comparison, introducing HPV costed USD 20-470/Life year saved in Kenya, Uganda, Mozambique and Tanzania (Campos et al, Int J Cancer, 2012)
Conclusions and recommendations

Conclusions:
• Beneficial to receive more than one dose of measles vaccine
• May have contributed importantly to lowering overall child mortality
• Campaigns are highly cost-effective

Recommendations:
• Continue campaigns
• Evaluate the overall effects of campaigns
• Take NSE into account when conducting cost-effectiveness analyses of vaccines
Costs

Health system related costs
• Operational costs (WHO)
• Measles vaccine, syringes and safety boxes (Measles&Rubella initiative)
• Health worker salary (micro-costing study)
• Hospital admissions averted

Household related costs
8 USD per hospital bed day averted
Hospital admissions

• Maternally reported hospital admission rates from the trimonthly HDSS visits (2011-2012)
• Median duration of admission
• USD 15 pr. hospital bed day (micro-costing study)
• Assumption: 30% lower hospital admission among participants (Martins, JID, 2014)