OPV campaigns – their role in reaching MDG4: Bandim and Navrongo

Paul Welaga, Navrongo
Peter Aaby, Bandim
Single-disease-eradication campaigns

Smallpox eradicated 1977
Smallpox vaccination stopped 1980

Eradication planned within the next 10-20 years for Polio and Measles

Oral polio vaccine (OPV) to be stopped in 2020

The effect of these campaigns have not been evaluated

From smallpox eradication campaigns in West Africa in the 1960s
Trial of BCG+OPV at birth vs BCG-only for infant mortality
(N=7000; No polio in Bissau)

<table>
<thead>
<tr>
<th>Group</th>
<th>Mortality reduction for OPV0+BCG vs BCG-alone</th>
</tr>
</thead>
<tbody>
<tr>
<td>All children</td>
<td>32% (0-57%)</td>
</tr>
<tr>
<td>Enrolled day 0-2</td>
<td>42% (10-62%)</td>
</tr>
</tbody>
</table>

Lund et al CID 2015
Campaigns not evaluated
17 years of campaigns in Guinea-Bissau

Polio and measles are not major killer diseases now so no effect on child survival expected.
Polio campaigns during the last 15-20 years: No study

First OPV campaign in Bissau 1998 - Mortality March-Dec 1998

<table>
<thead>
<tr>
<th>OPV campaign in 1998 – age groups</th>
<th>Mortality for 1-2 doses of OPV</th>
<th>Mortality for No OPV</th>
<th>Reduction in mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>3.7%</td>
<td>5.8%</td>
<td>33% (10-50%)</td>
</tr>
</tbody>
</table>
2002 to 2014 Bandim has conducted 7 randomised trials with mortality as main outcome testing different schedules for vaccines and vitamin A supplementation.
We assessed the effect of campaigns within these 7 randomised trials:
  – blue time before campaign; green time after campaigns
2002-2014: Bandim has conducted 7 randomised trials

Results: OPV-campaigns reduced mortality by 19\% (5-30\%) – Each additional dose reduced mortality by 13\% (4-21\%)

Simulation studies with random selection of dates of campaigns: Unlikely to be chance, season or time trend which explains effect
Under-3-mortality in Guinea-Bissau in 2002–2014

The beneficial non-specific effects of numerous OPV campaigns?

OPV-campaigns: 25% (15-33%) reduction in mortality. No effect of Vitamin A
Approaching polio eradication => The world is switching from OPV to Inactivated polio vaccine (IPV)

IPV vaccinations and survival have not been examined IPV used as comparator vaccine to children aged 4-6 months in randomised studies in Bissau in the 1980-90s

<table>
<thead>
<tr>
<th>Mortality before receiving measles vaccine</th>
<th>Mortality rate for girls</th>
<th>Mortality rate for boys</th>
<th>Increase in female-male mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomised to IPV</td>
<td>8.3%</td>
<td>5.4%</td>
<td>52% (2-128%)</td>
</tr>
</tbody>
</table>
OPV and Measles Campaigns in Navrongo, Ghana

Map of The Kassena-Nankana Districts showing the DSS zones, some health facilities and the major Settlements.
Campaigns in Navrongo: 1996-2012
Mortality day 1 to 3-years in Navrongo 1996-2015

Deaths per 1000 live births

Birth year


203 38
The effect of campaigns: OPV and Vitamin A

In Bandim and Navrongo

<table>
<thead>
<tr>
<th>Studies</th>
<th>Period Age of children</th>
<th>OPV: reduction in mortality</th>
<th>Vitamin A: increase in mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandim</td>
<td>2002-2014 0-3 years</td>
<td>25% (15-33%)</td>
<td>42% (24-63%)</td>
</tr>
<tr>
<td>Navrongo</td>
<td>1996-2015 0-3 years</td>
<td>12% (4-19%)</td>
<td>1 campaign: no effect</td>
</tr>
<tr>
<td>Combined Bandim and Navrongo</td>
<td>18% (4-30%) reduction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions
OPV has side effects in rare cases but OPV has also much larger beneficial effect on mortality than previously assumed:
- OPV at birth
- OPV Campaigns

Removing OPV:
- No campaigns to reduce mortality
- Replacing OPV with IPV could have negative effect

We need to monitor the withdrawal of OPV