Does fiscal capacity at the district level influence childhood vaccination coverage and the infant mortality rate?
Findings from Indonesian National Socio-Economic Survey 2019 – 2021

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Introduction

Childhood vaccination is one of the most cost-effective health interventions to reduce infants’ morbidity and mortality.\textsuperscript{1,2}

Vaccine inequity, specifically the wealth gap, continues to be one of the main challenges in developing countries.
- The poorest Indonesian children have the lowest vaccination coverage.\textsuperscript{3,4}

Most literature has focused on the association between household wealth and childhood vaccination coverage.\textsuperscript{5,6}
- Limited evidence on how the fiscal capacity of the district may also affect vaccination coverage.
Introduction (Indonesian Context)

- Lower-middle income country situated in Southeast Asia\(^7\)
  - 38 provinces: 514 districts

- Decentralization first occurred in 1999\(^8\)
  - By 2014, district government is stipulated to be responsible for provision of basic health services, including immunization for neonatal and children under five years old

- National complete basic immunization coverage have been stagnating in recent decade
  - 59.2% in 2013 to 58.2% in 2017\(^3,9\)
Research Question & Hypothesis

Does fiscal capacity at the district level influence childhood vaccination coverage and the infant mortality rate?

Districts with higher fiscal capacity have higher childhood vaccination coverage, which leads to a reduction of infant mortality rate (IMR).
**Methods (Data Source)**

Quantitatively assessed the association of district’s fiscal capacity to childhood vaccination coverage and infant mortality rate (IMR) in Indonesia using the following data:

1. Routine Data collected by Ministry of Finance (2019-2021)
   District’s Fiscal Capacity
2. Routine Data collected by Ministry of Health (2019-2021)
   IMR at District-level
3. Indonesia National Socio-Economic Survey (2019-2021)
   Vaccine coverage and other variables related to IMR, e.g. household wealth and maternal education
Methods (Statistical Analysis)

Unit of analysis: 509 districts
- 5 districts were dropped because these districts have 0 infant deaths in 2019-2021

This study only included children aged 12-23 months old\(^3,4,9\)
- Complete basic childhood immunization: Bacille Calmette-Guérin (BCG), diphtheria, tetanus, pertussis (DTP), polio, measles, and hepatitis B vaccines

In accordance with Indonesian Ministry of Finance, district’s fiscal capacity, which account for district’s income and expenditure, is categorized into 4 levels\(^{10}\)
- Low
- Medium
- High
- Very high
Methods (Statistical Analysis)

\[
\ln(IMR)_{it} = \beta_0 + \beta_1 \times (District\ Fiscal\ Capacity)_{it} + \varnothing' Z_{it} + \sigma t + \epsilon_{it} \quad (1)
\]

\[
\ln(Immunization\ Coverage)_{it} = \beta_0 + \beta_1 \times (District\ Fiscal\ Capacity)_{it} + \varnothing' Z_{it} + \sigma t + \epsilon_{it} \quad (2)
\]

Fixed-effect panel linear regressions with immunization coverage & IMR (outcome variables) and district’s fiscal capacity (predictor variable) while adjusting for other related variables, which are:

- **Socioeconomic backgrounds**: Household wealth, maternal education, maternal employment status
- **Service delivery**: Antenatal coverage, postnatal coverage, delivery at health facility
- **District’s characteristics**: District’s gross domestic products per capita, district’s health expenditure, government’s maternal neonatal health-focused districts
- **Others**: National health insurance coverage & exclusive breastfeeding coverage
# Results

**Complete Basic Childhood Immunization Coverage**

<table>
<thead>
<tr>
<th></th>
<th>District-level</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2019</td>
<td>2020</td>
</tr>
<tr>
<td>District-level</td>
<td>45.6% (0% – 97.8%)</td>
<td>47.4% (0% – 93.3%)</td>
</tr>
<tr>
<td>District by Fiscal Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>41.0% (0% - 90.5%)</td>
<td>45.7% (0% - 93.3%)</td>
</tr>
<tr>
<td>Medium</td>
<td>40.2% (0% - 92.5%)</td>
<td>41.5% (0% - 85.9%)</td>
</tr>
<tr>
<td>High</td>
<td>48.9% (0% - 97.8%)</td>
<td>49.0% (0% - 91.0%)</td>
</tr>
<tr>
<td>Very High</td>
<td>50.6% (0.1% - 96.3%)</td>
<td>51.5% (0% - 86.2%)</td>
</tr>
</tbody>
</table>

Data are shown in mean (range)

- In 2019 – 2021, overall immunization coverage ranged from 45.6% to 52.5%
- Wide heterogeneity at subnational level for immunization coverage\(^6\)
## Results (IMR)

<table>
<thead>
<tr>
<th>District by Fiscal Capacity</th>
<th>Year</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>District-level</td>
<td></td>
<td>0.1 – 29.0</td>
<td>0.1 – 41.6</td>
<td>0.1 – 31.0</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>0.1 – 29.0</td>
<td>0.1 – 18.4</td>
<td>0.1 – 24.3</td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td>0.1 – 26.9</td>
<td>0.1 – 34.1</td>
<td>0.1 – 25.7</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>0.1 – 22.0</td>
<td>0.1 – 36.3</td>
<td>0.1 – 31.0</td>
</tr>
<tr>
<td>Very High</td>
<td></td>
<td>0.1 – 22.9</td>
<td>0.1 – 41.6</td>
<td>0.1 – 29.4</td>
</tr>
</tbody>
</table>

Data shown are in range

- In 2019 – 2021, district-level IMR ranged from 0.1 to 41.6 per 1,000 live births
  - Indonesian Ministry of Health set the IMR target at 16 per 1,000 live births by 2024
- Limitation: Under-reporting of data
**Results** (Association between Fiscal Capacity with Immunization Coverage & IMR)

### Immunization Coverage

<table>
<thead>
<tr>
<th>District’s Fiscal Capacity (ref: Low)</th>
<th>Adjusted Coefficient (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>0.004 (-0.090 – 0.100)</td>
</tr>
<tr>
<td>High</td>
<td>0.027 (-0.104 – 0.157)</td>
</tr>
<tr>
<td>Very high</td>
<td>0.030 (-0.131 – 0.192)</td>
</tr>
</tbody>
</table>

### IMR

<table>
<thead>
<tr>
<th>Adjusted Coefficient (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.075 (-0.040 - 0.191)</td>
</tr>
<tr>
<td>0.056 (-0.040 - 0.151)</td>
</tr>
<tr>
<td>-0.012 (-0.114 - 0.090)</td>
</tr>
</tbody>
</table>

* p < 0.1, ** p < 0.05. The model adjusted for socioeconomic backgrounds, service delivery, district’s characteristics, and other variables.

- District’s fiscal capacity did not influence immunization coverage nor IMR
- Possible explanations for this null findings:
  - Other potential variables in the causal pathway (e.g. quality of care, sociocultural acceptance)
  - Did not account for district’s commitment and capability (i.e. planning, budgeting, and utilizing their budget successfully)
Results
(Subgroup Analyses - Association between IMR and Immunization Coverage by Fiscal Capacity)

<table>
<thead>
<tr>
<th>Fiscal Capacity</th>
<th>Immunization Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>-0.059 (-0.225 – 0.108)</td>
</tr>
<tr>
<td>Medium</td>
<td>0.090 (-0.151 – 0.332)</td>
</tr>
<tr>
<td>High</td>
<td>0.116 (0.038-0.193)**</td>
</tr>
<tr>
<td>Very High</td>
<td>-0.151 (-0.320 – 0.184)*</td>
</tr>
</tbody>
</table>

Adjusted Coefficient (95% Confidence Interval)

* p < 0.1, ** p < 0.05. The model adjusted for socioeconomic backgrounds, service delivery, district’s characteristics, and other variables.

- Higher immunization coverage significantly reduced IMR in district with very high fiscal capacity, yet it increased IMR in district with high fiscal capacity.
  - Mixed findings indicates a complex interplay between these 3 variables
- Future qualitative study: Describe barrier & driving factors for utilization of district’s fiscal capacity to improve immunization coverage and reduce IMR
District government’s fiscal capacity does not seem to influence childhood immunization coverage nor IMR

Childhood vaccination coverage is context-specific: significant association between coverage and IMR in districts with variable fiscal capacities
Acknowledgement

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For more information, please visit our website at https://thinkwell.global/projects/sp4phc/. For questions, please write to us at sp4phc@thinkwell.global.
References

Thank you!

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