# 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.[1,2]

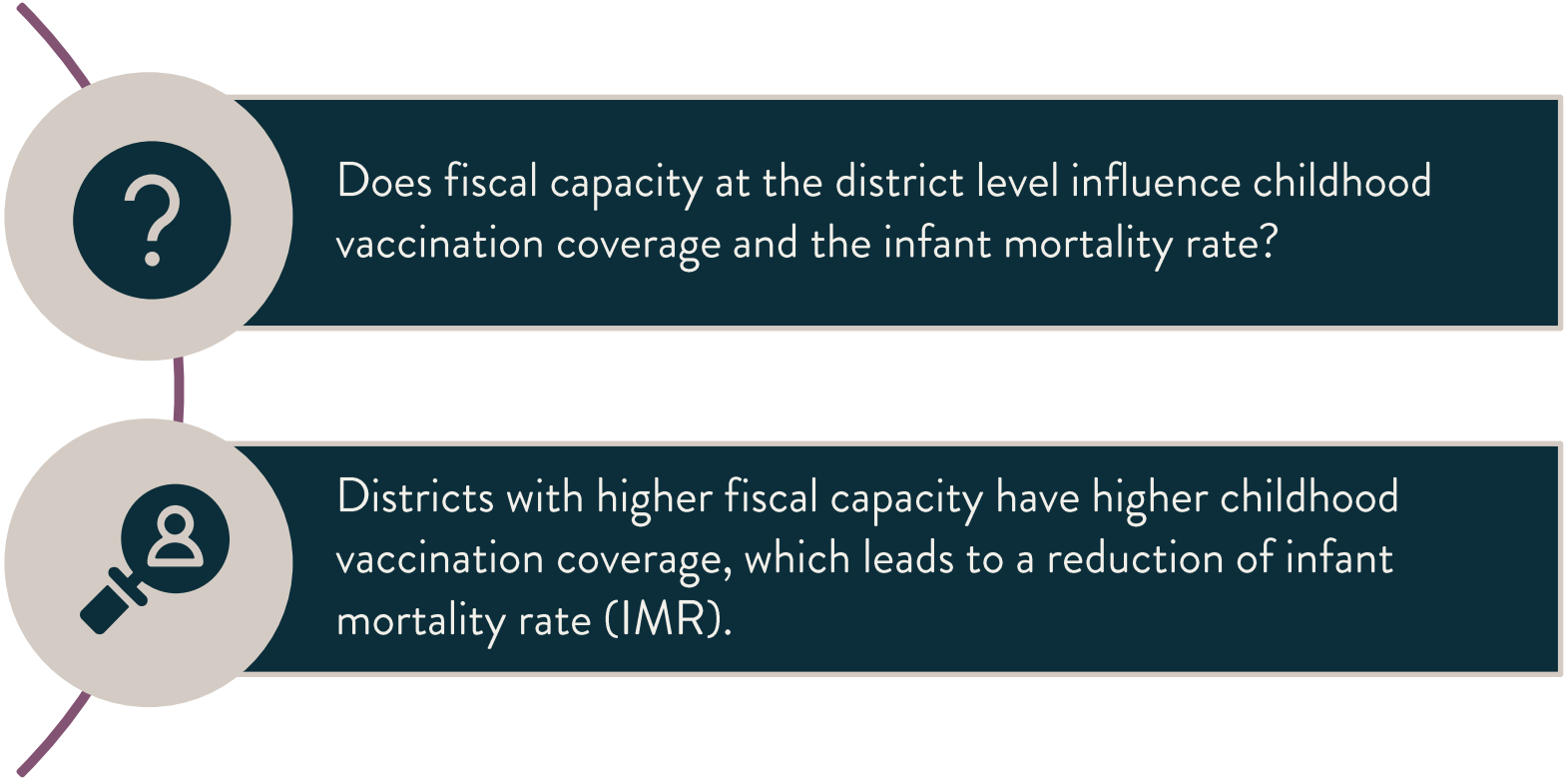
- Vaccine inequity, specifically the wealth gap, continues to be one of the main challenges in developing countries.
  - The poorest Indonesian children have the lowest vaccination coverage.[3,4]

- Most literature has focused on the association between household wealth and childhood vaccination coverage. [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:

Routine Data collected by Ministry of Finance (2019-2021)
District's Fiscal Capacity

Routine Data collected by Ministry of Health (2019-2021)
IMR at District-level


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)

$$\ln(IMR)_{it} = \beta_0 + \beta_1 * (District\ Fiscal\ Capacity)_{it} + \emptyset' Z_{it} + \sigma time_t + \varepsilon_{it} \quad (1)$$

$$\ln(Immunization\ Coverage)_{it} = \beta_0 + \beta_1 * (District\ Fiscal\ Capacity)_{it} + \emptyset' Z_{it} + \sigma time_t + \varepsilon_{it} \quad (2)$$

- 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)

| | Year | | |
|---|---|---|---|
| | 2019 | 2020 | 2021 |
| District-level | 45.6% (0% – 97.8%) | 47.4% (0% – 93.3%) | 52.5% (0% - 100%) |
| District by Fiscal Capacity | | | |
| Low | 41.0% (0% - 90.5%) | 45.7% (0% - 93.3%) | 49.1% (0% - 91.1%) |
| Medium | 40.2% (0% - 92.5%) | 41.5% (0% - 85.9%) | 48.9% (0% - 90.4%) |
| High | 48.9% (0% - 97.8%) | 49.0% (0% - 91.0%) | 53.8% (0% - 100%) |
| Very High | 50.6% (0.1% - 96.3%) | 51.5% (0% - 86.2%) | 56.7% (0% - 91.8%) |

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)

| | Year | | |
|---|---|---|---|
| | 2019 | 2020 | 2021 |
| District-level | 0.1 – 29.0 | 0.1 – 41.6 | 0.1 – 31.0 |
| District by Fiscal Capacity | | | |
| Low | 0.1 – 29.0 | 0.1 – 18.4 | 0.1 – 24.3 |
| Medium | 0.1 – 26.9 | 0.1 – 34.1 | 0.1 – 25.7 |
| High | 0.1 – 22.0 | 0.1 – 36.3 | 0.1 – 31.0 |
| Very High | 0.1 – 22.9 | 0.1 – 41.6 | 0.1 – 29.4 |

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[11]
- Limitation: Under-reporting of data

# Results (Association between Fiscal Capacity with Immunization Coverage & IMR)

| | Immunization Coverage<br>Adjusted Coefficient (95% Confidence Interval) | IMR<br>Adjusted Coefficient (95% Confidence Interval) |
|---|---|---|
| District's Fiscal Capacity (ref: Low) | | |
| Medium | 0.004 (-0.090 – 0.100) | 0.075 (-0.040 - 0.191) |
| High | 0.027 (-0.104 – 0.157) | 0.056 (-0.040 - 0.151) |
| Very high | 0.030 (-0.131 – 0.192) | -0.012 (-0.114 - 0.090) |

* $p < 0.1$, ** $p < 0.05$. 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)

| | Adjusted Coefficient (95% Confidence Interval) | | | |
|---|---|---|---|---|
| | Low Fiscal Capacity | Medium Fiscal Capacity | High Fiscal Capacity | Very High Fiscal Capacity |
| Immunization Coverage | -0.059 (-0.225 – 0.108) | 0.090 (-0.151 – 0.332) | 0.116 (0.038-0.193)** | -0.151 (-0.320 – 0.184)* |

* 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

# Conclusions

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

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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.

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# Thank you!

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