

# The Cost of Delivering Vaccines Using Different Delivery Strategies in High Coverage Areas in Indonesia

Summary of methods and findings

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National Institute of  
Health Research and  
Development








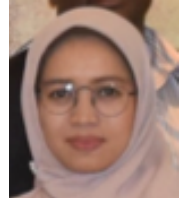

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This study was supported by the Bill & Melinda Gates Foundation

## STUDY TEAM

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## OUTLINE

- 1 Policy issue and research question
- 2 Methods
- 3 Results
- 4 Opportunities for using the evidence
- 5 Discussion and questions

## PROGRAMMATIC AND POLICY ISSUE

- In the decentralized health system, **immunization is partially funded and managed at district and city level.**
- Autonomous local governments are responsible for **ensuring sufficient budget for vaccine delivery/operational costs** (routine transportation costs, health promotion costs, community mobilization costs).
- In general, **fiscal capacity of districts and cities is low.** Budget execution and accountability is also challenged.
- **Accessible, evidence-based, and accurate information** on the cost of delivering vaccines is becoming more critical to **inform budgeting, planning, and policymaking** to ensure government at all levels has sufficient financial resources to deliver vaccines.
- **Cost evidence can support improved resource mobilization and more efficient delivery of immunization services.**

## STUDY OBJECTIVES

To provide costing evidence that:

- ① **Contributes to achievement of high coverage by providing evidence to support appropriate allocation of resources.**
- ② **Supports public health efforts in improving equity, efficiency, and effectiveness of local (district and city) financing for the immunization program.**

## RESEARCH QUESTION

Using a combination of different delivery strategies, what are the district/city-level costs incurred for immunization delivery that contribute to achievement of high coverage?

### Delivery Strategies

- Routine facility-based delivery at the *puskesmas* (health center): usually limited to one day per week to serve babies and children that visit the facility on that particular day
- Outreach activities at the *posyandu* (integrated health post): delivered once a month at agreed-upon spots (usually village office or house of a community member)
- School-based program: delivered twice a year at *elementary schools*

TYOLOGY	TARGET GROUP	ANTIGENS
Basic Immunization	Children aged <13 months	HepB 0, BCG, OPV4, DTP/HB/Hib3, Measles
Advanced Immunization	Children aged 13 months – 3 years	DTP/HB/Hib4, Measles
School-based Strategy	Children in 1 <sup>st</sup> – 3 <sup>rd</sup> Grade	Measles, DT, Td

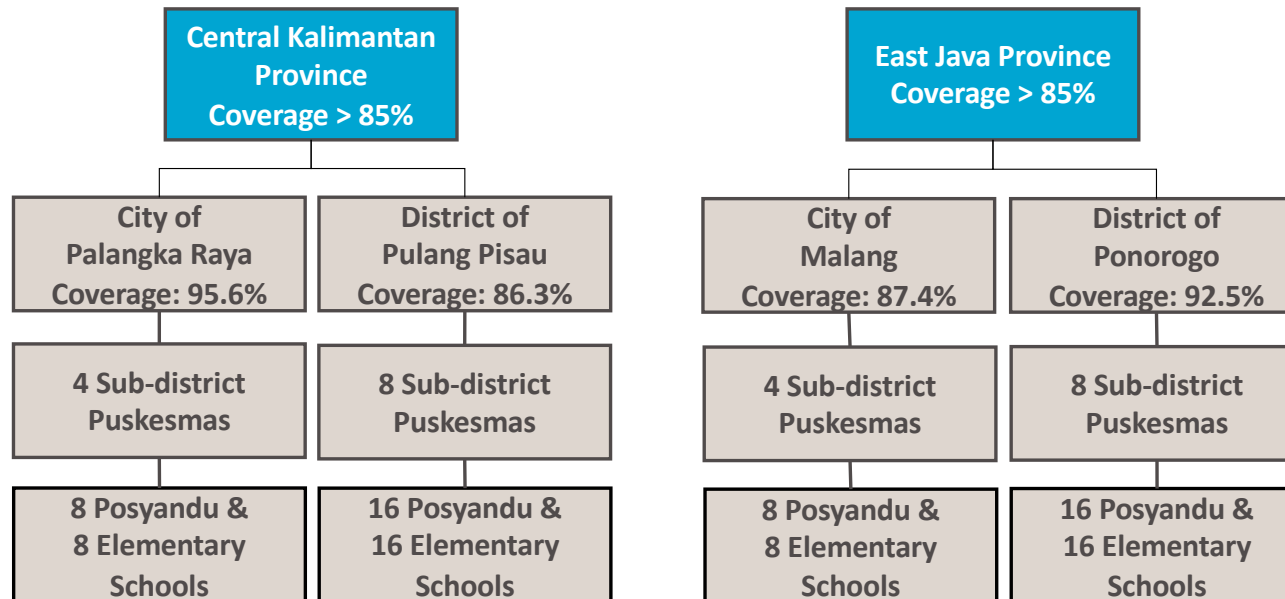
(Excluded vaccines: IPV, Rota, PCV, HPV)

## METHODOLOGY

- **Perspective:** Government or health service
- **Costing methodology:** Ingredients-based costing
- **Types of costs:** Full costing, not incremental costing. Financial costing, not economic costing (i.e., based on financial outlays incurred by government, and volunteer time is excluded)
- **Levels included:** District/city, sub-district, and village. National and provincial-level costs excluded
- **Study design:** Facility-based costing study with retrospective data collection
- **Time horizon for data collection:** January to December 2016

## SAMPLING STRATEGY (1/2)

- **Provinces and districts:** purposely selected by the research team based on high immunization coverage (i.e., >85%)
- **Puskesmas:** purposely selected by DHO based on high immunization coverage
- **Posyandu and schools:** purposely selected by Puskesmas based on high immunization coverage



## SAMPLING STRATEGY (2/2)

- Total sample: 2 provinces, 2 districts, 2 cities, 24 Puskesmas, 48 Posyandu, and 48 elementary schools.
- Although the sample is not large enough to be nationally representative:
  - The findings are the most up to date immunization delivery cost evidence available for Indonesia, providing a valuable opportunity to update existing cost norms for budgeting and benchmarking
  - The study provides valuable information about the cost of delivering vaccines in the four high coverage districts included
  - The unit and facility costs can be used to inform budgeting and planning in other districts/cities which have similar characteristics to the four selected; even if not identical, 'best fit' unit costs can be used and refined to reflect the district budget

## STAKEHOLDER CONSULTATIONS

- EPI Manager/Director of National Immunization Program and staff were involved from the preparation phase and in developing the research protocol. WHO and World Bank also provided inputs.
- Selection of study area and relevant EPI data was supported by SubDirectorate of Immunization, Center for Disease Control and Prevention, Indonesian Ministry of Health.
- Periodic discussions were conducted with EPI/Immunization Sub-Directorate of CDC during implementation. WHO, World Bank, UNICEF, Bappenas also consulted periodically.
- Input on potential policy and program use of results obtained from officials of EPI/Immunization Sub-Directorate of CDC.

## FINDINGS: NOTES

- All averages presented on the pages that follow are **volume-weighted averages**, not simple averages.
  - A weighted average takes total output into account. The sum of total costs is divided by total output (either doses or fully immunized children), as opposed to calculating simple averages.
- Costs presented are **immunization delivery costs** which exclude vaccine costs and consumables costs, which are covered in central budgets.
  - Cold chain-related costs are included as they are a normal part of immunization delivery costs; if these costs are paid by central level, the findings would need to be adjusted before they can be used for subnational budgeting and planning.
- All findings are presented in **2016 Indonesia Rupiah (IDR)**; U.S. dollar results can be found in the study report.

## DISTRICT/CITY CHARACTERISTICS AND ANNUAL IMMUNIZATION VOLUME

Volume/Output	DISTRICT		CITY	
	Ponorogo	Pulang Pisau	Malang	Palangka Raya
Size (km <sup>2</sup> )	1,372	8,997	110	2,400
Total population	868,814	125,484	856,410	267,757
Number of children under 1 year of age	11,766	2,327	12,714	5,593
Population density (persons/km <sup>2</sup> )	633	14	7,781	47
Total doses delivered	160,625	32,126	176,867	75,936
Total basic FIC*	10,339	2,009	12,038	5,348

\* A basic fully immunized child is a child who has completed the last dose of basic immunization (i.e. up to 13 months).

*There are differences in the total number of doses delivered and FICs achieved by district/city: the more population-dense areas of Malang and Ponorogo achieved the highest output.*

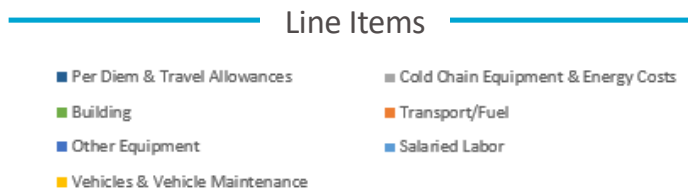
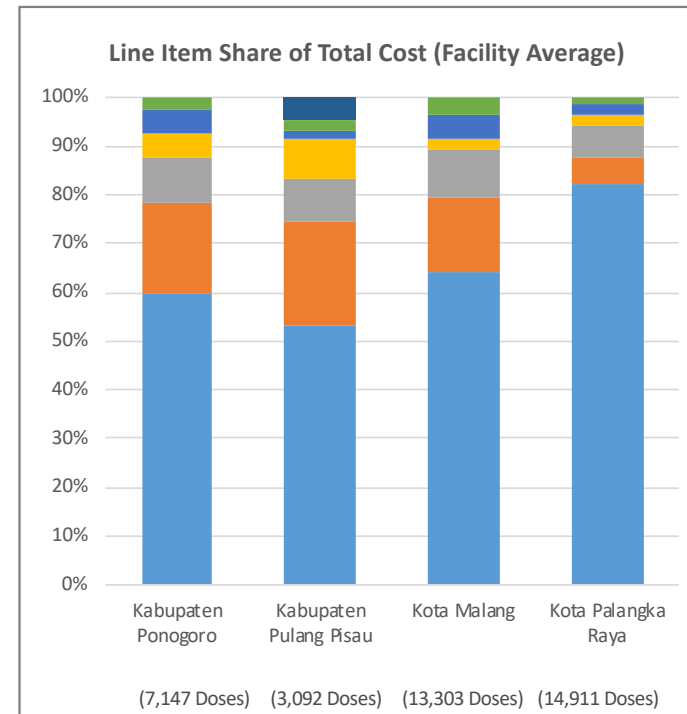
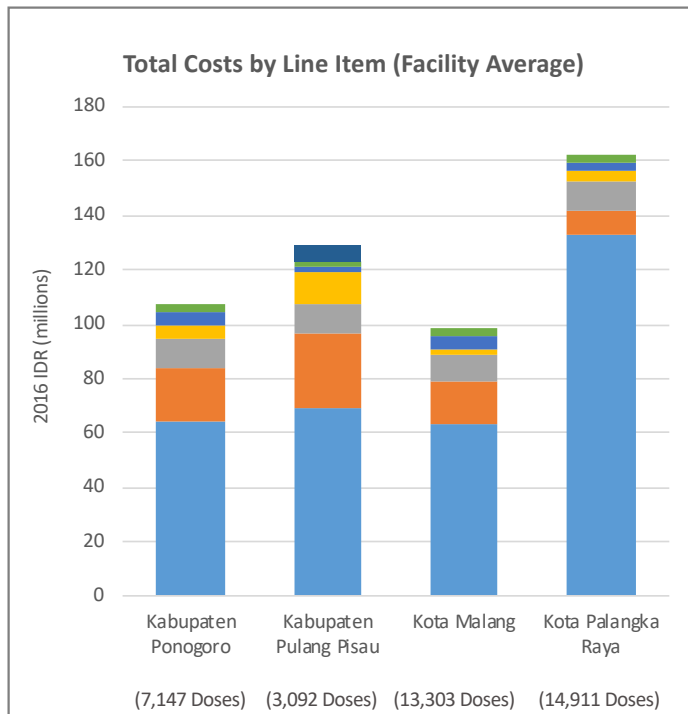
## NUMBER OF DOSES DELIVERED ANNUALLY PER DISTRICT/CITY (FACILITY AVERAGE)

Volume/Output	DISTRICT		CITY	
	Ponorogo	Pulang Pisau	Malang	Palangka Raya
Total Doses	7,147	3,092	13,303	14,911
Basic Immunization Doses	4,225	2,099	9,246	9,451
Advanced Immunization Doses	781	116	1,186	2,118
School Aged Strategy Doses	2,141	878	2,871	3,343
Total Basic Fully Immunized Children*	415	185	956	918

\* A basic fully immunized child is a child who has completed the last dose of basic immunization (i.e. up to 13 months).

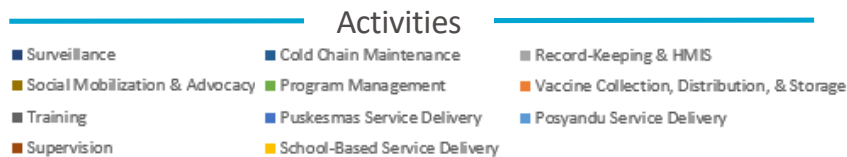
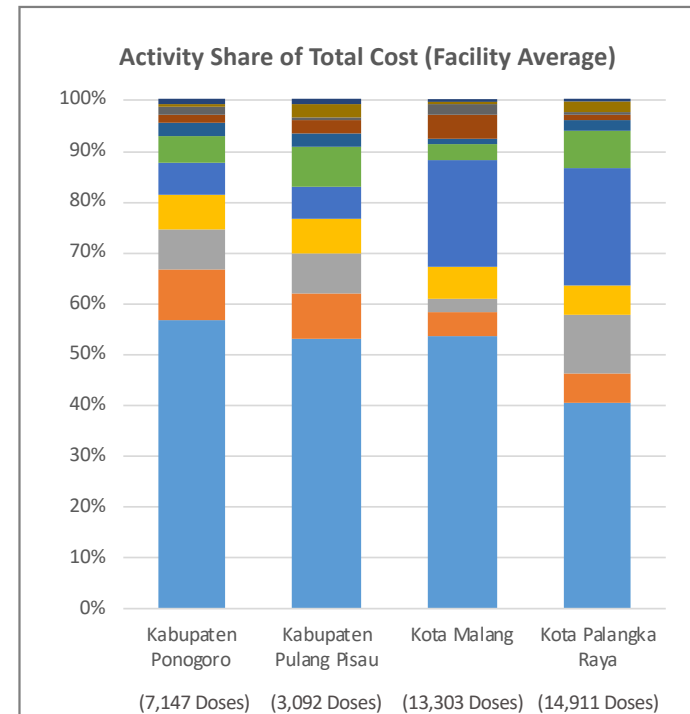
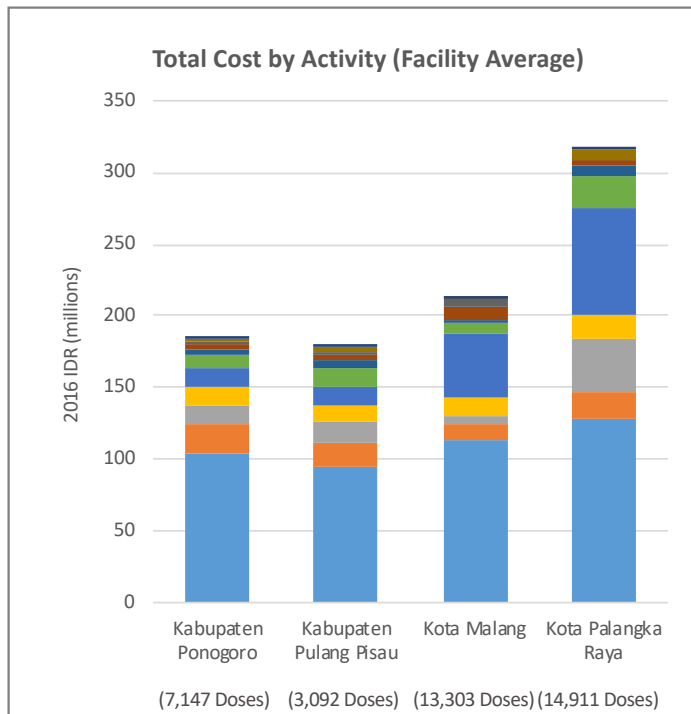
*As expected, facilities in cities delivered the highest number of doses on average. The average doses delivered per facility varied greatly in the other districts. Output/volume differences drive some of the cost differences, and are generally due to geography, population size and density.*

## IMMUNIZATION DELIVERY COSTS BY LINE ITEM (FACILITY AVERAGE)



*Salaried Labor, Transport/Fuel, and Cold Chain Equipment & Energy are the main cost drivers at facility level.*

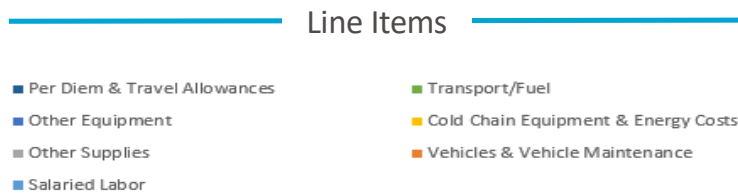
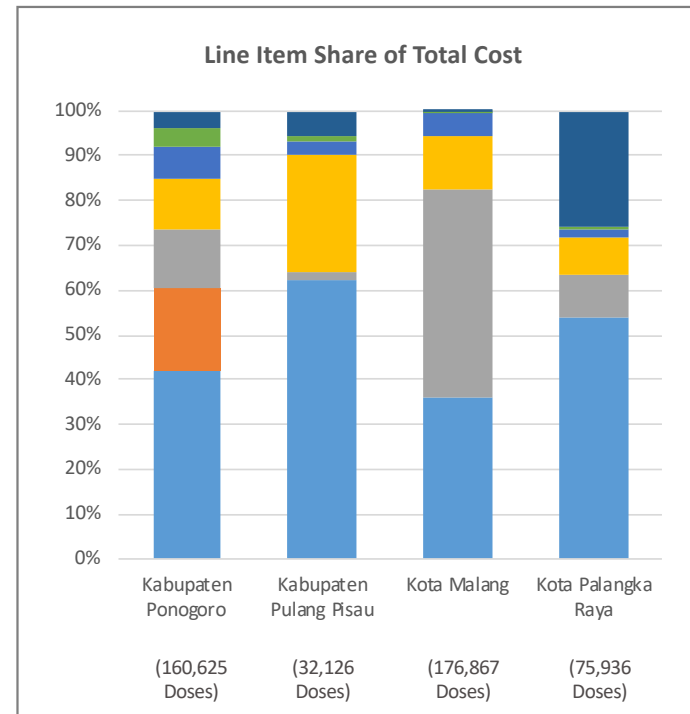
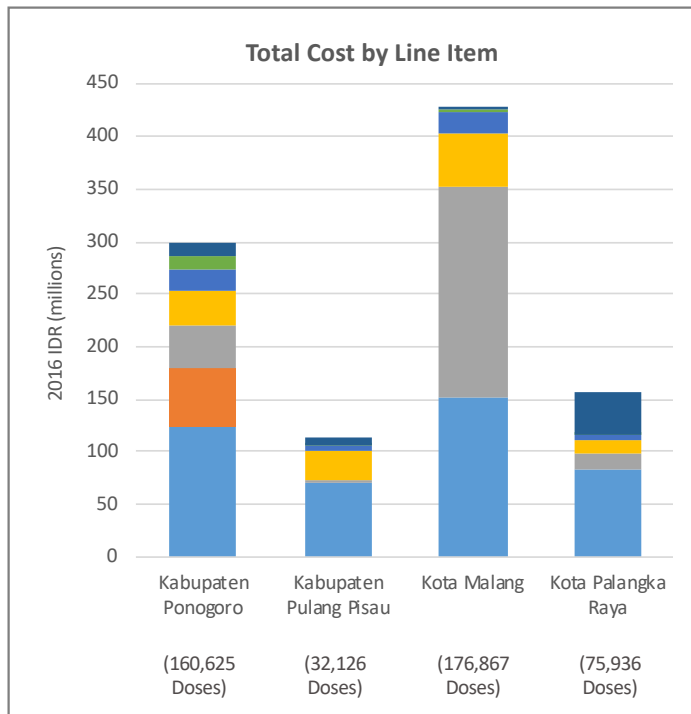
# IMMUNIZATION DELIVERY COSTS BY ACTIVITY (FACILITY AVERAGE)\*



*In all districts/cities, the service delivery activities (puskesmas, posyandu and school delivery) are the main cost drivers. Vaccine collection, distribution and storage, and record keeping are also important.*

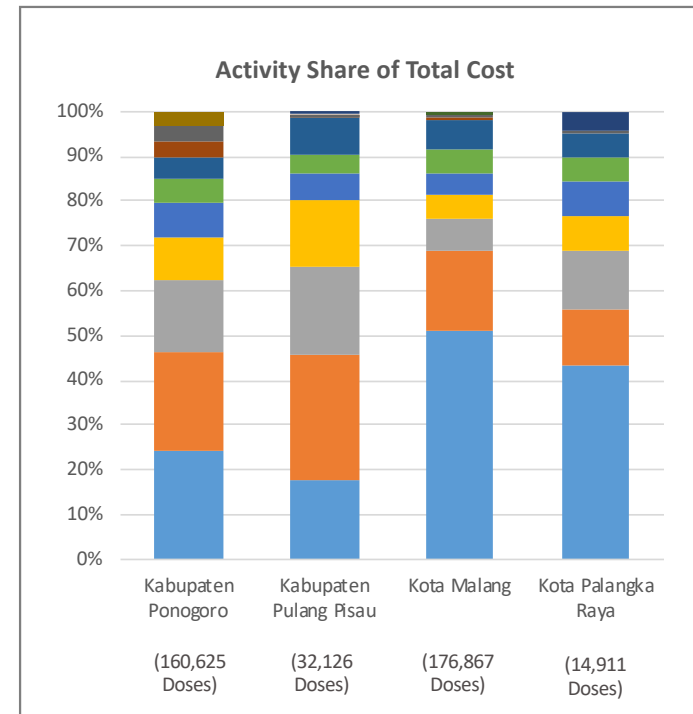
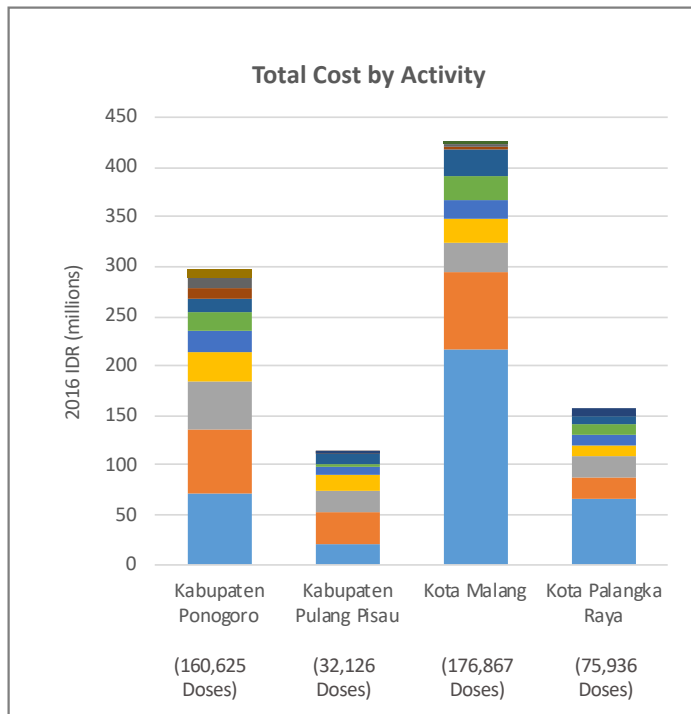
\* Vaccines and consumables costs are included in the three service delivery activities (routine facility-based, outreach and school delivery) even though they are paid at central level.

## IMMUNIZATION DELIVERY COSTS BY LINE ITEM (DHO-LEVEL)



*Salaried Labor is the main cost driver in Ponorogo, Pulang Pisau and Palangka Raya. In Malang, Other Supplies are more important.*

# IMMUNIZATION DELIVERY COSTS BY ACTIVITY (DHO-LEVEL)



- Activities**
- Training
  - Posyandu Service Delivery
  - Supervision
  - Other
  - Record-Keeping & HMIS
  - Program Management
  - School-Based Service Delivery
  - Cold Chain Maintenance
  - Vaccine Collection, Distribution, & Storage
  - Puskesmas Service Delivery
  - Surveillance
  - Social Mobilization & Advocacy

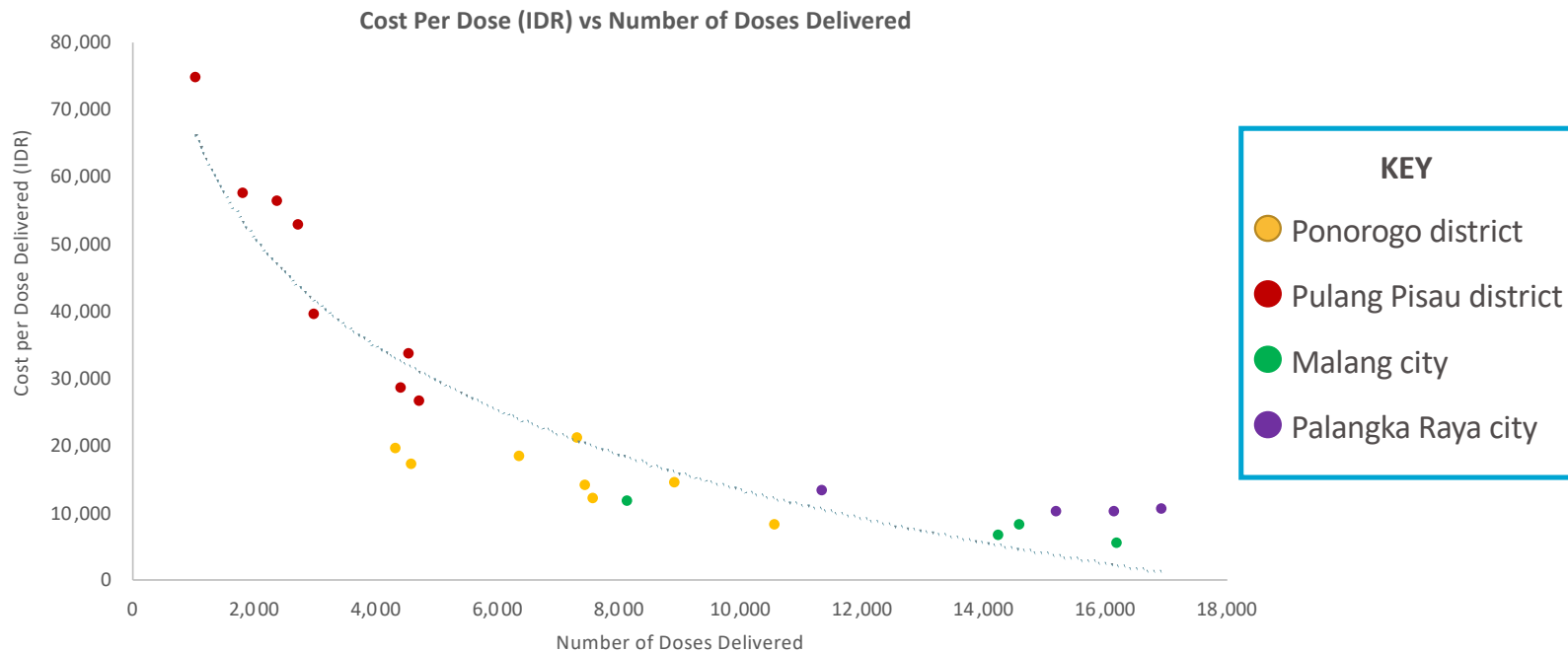
*The main cost driving activity in all districts/cities except Pulang Pisau is Social Mobilization & Advocacy. In Pulang Pisau, the DHO plays a large role in Vaccine Collection, Distribution & Storage. Program Management and Supervision are other important activities.*

## COST PER DOSE AND PER BASIC FIC (FACILITY AND DHO AVERAGE)

Unit Cost	2016 IDR			
	DISTRICT		CITY	
	Ponorogo	Pulang Pisau	Malang	Palangka Raya
Cost per dose (total)	16,653	43,421	9,824	12,849
Facility-level	14,799	39,893	7,415	10,790
DHO-level	1,854	3,528	2,409	2,058
Cost per basic FIC (total)	283,631	724,603	138,549	204,440
Facility-level	254,991	668,191	103,159	175,212
DHO-level	28,640	56,412	35,390	29,228

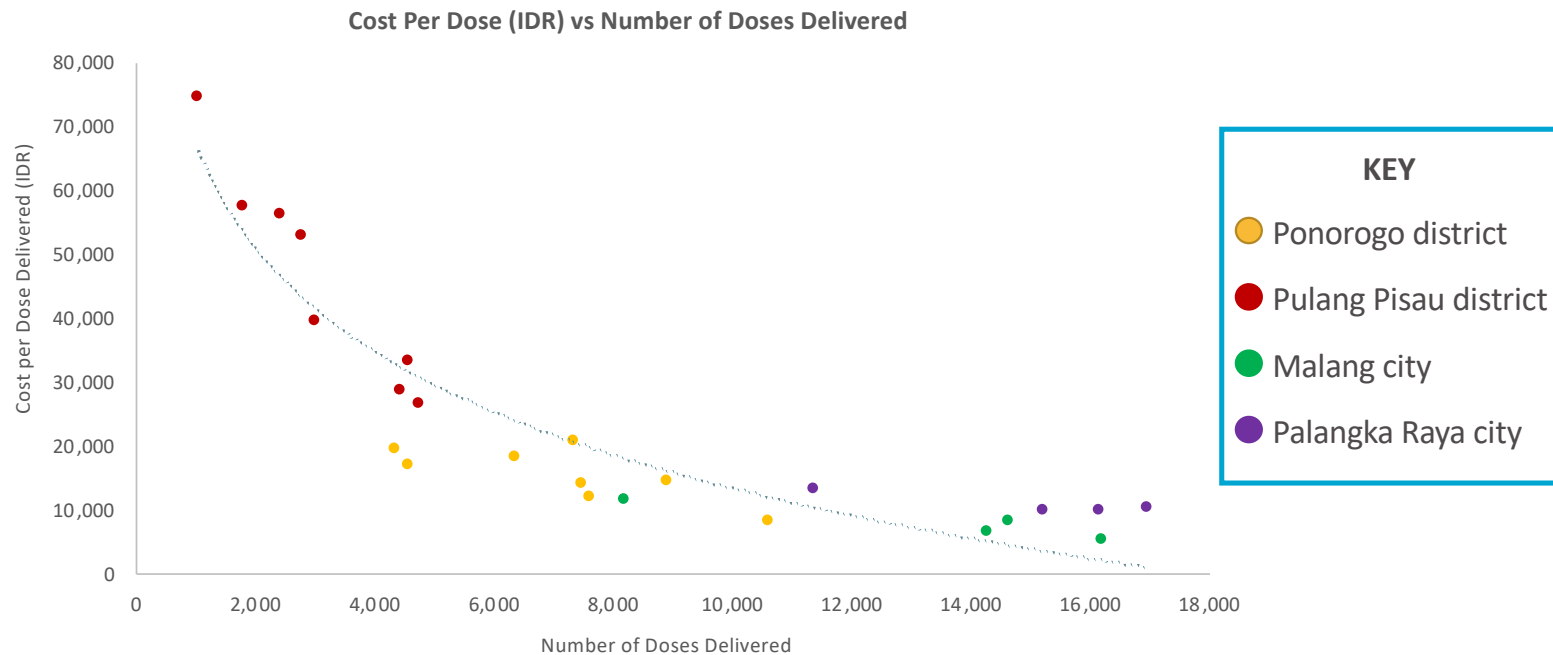
*The average cost per dose delivered and per basic FIC in Pulang Pisau was much higher than other districts/cities, likely due to lower volume, extra per diems for staff for posyandu, and greater facility distance. The cost per basic FIC measure gets at efficiency. As the delivery of the schedule is more complete, the cost per basic FIC decreases as costs are spread over more children.*

## COST PER DOSE VS AVERAGE NUMBER OF DOSES DELIVERED (FACILITY AVERAGE, EXCLUDES DHO COSTS)



*As the number of doses delivered increases, the cost per dose decreases. At lower volumes, the cost per dose is higher. This is expected because at higher volumes, fixed costs are spread over more doses, so the cost per dose decreases.*

## COST PER BASIC FIC VS AVERAGE NUMBER OF BASIC FICS (FACILITY AVERAGE, EXCLUDES DHO COSTS)



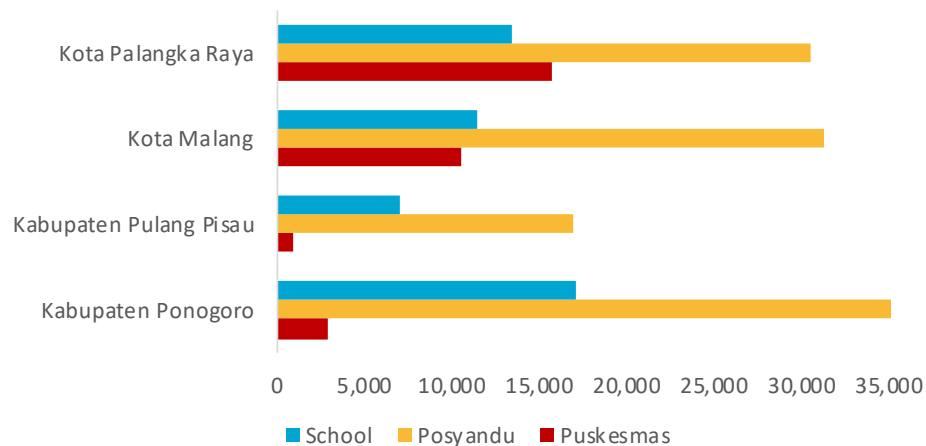
*As you achieve more basic FICs, the cost per basic FIC decreases. When you have fewer basic FICs, the cost per basic FIC is higher. The reasoning is the same as for cost per dose: at higher volumes, fixed costs are spread over more doses, so the cost per basic FIC decreases.*

## COST PER DOSE DELIVERED BY DELIVERY STRATEGY (FACILITY AND DHO AVERAGE\*)

Delivery Strategy	2016 IDR			
	DISTRICT		CITY	
	Ponorogo	Pulang Pisau	Malang	Palangka Raya
Puskesmas	41,581	83,237	15,295	19,351
Posyandu	17,648	48,705	9,806	12,085
School	7,732	25,758	4,904	6,940

\* The DHO amount is IDR 1,854 to IDR 3,528 per dose, depending on the district/city.

Number of Doses Delivered by District/City



*School delivery is least costly, primarily due to high volumes reached during the two annual immunization sessions. Posyandu delivery also benefits from high volumes, bringing down the cost. However, costs may be underestimated as this study did not include volunteer labor. Puskesmas delivery is most costly due to low volumes.*

## COST PER DOSE BY AGE GROUP (FACILITY AVERAGE, EXCLUDES DHO COSTS\*)

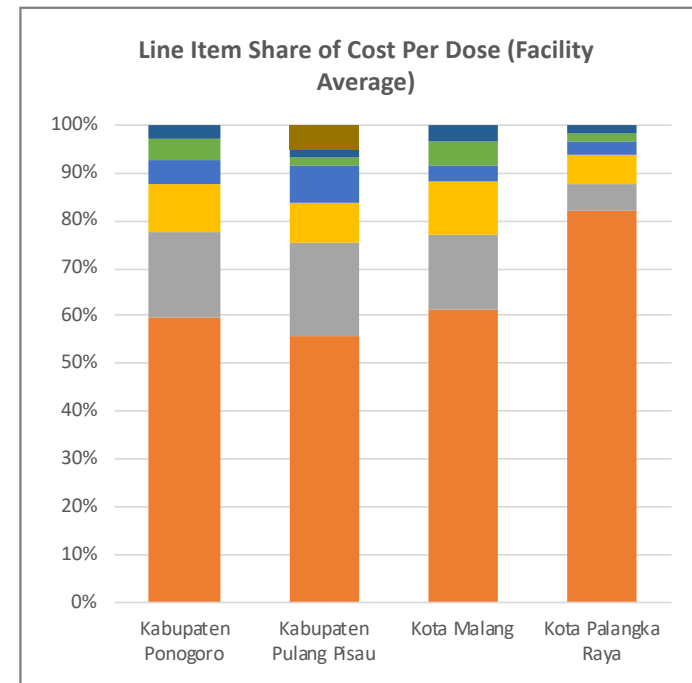
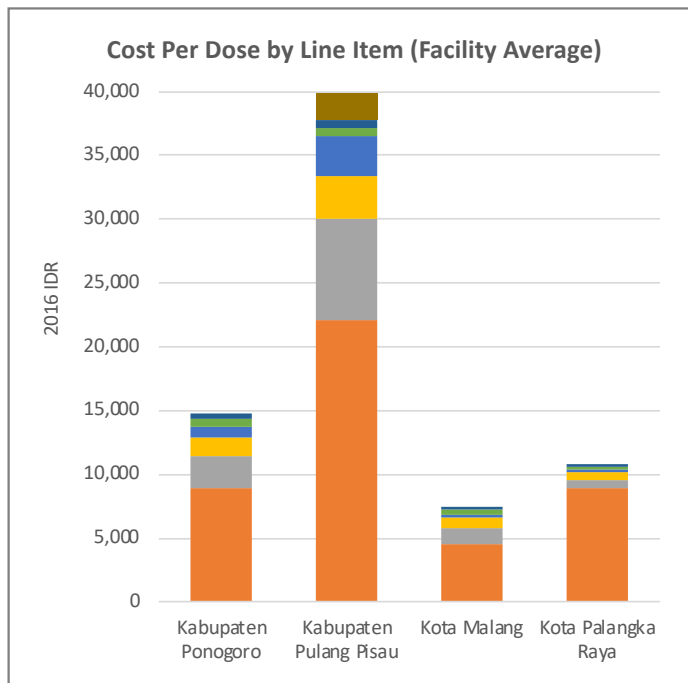
Target Age Group	2016 IDR			
	DISTRICT		CITY	
	Ponorogo	Pulang Pisau	Malang	Palangka Raya
Basic immunization (children <13 months)	18,369	46,712	8,775	12,554
Advanced immunization (children 13-36 months)	33,971	454,949	82,325	95,787
School-aged children	6,313	22,230	2,496	4,882

\* The DHO amount is IDR 1,854 to IDR 3,528 per dose, depending on the district/city.

*On average, facility-level cost per dose varies significantly by age group:*

- *Cost per dose is lowest when delivered to school-aged children, likely due to high volumes reached during the two annual sessions.*
- *Cost per dose for basic immunization is considerably lower than advanced immunization, again likely driven by volume.*

## COST PER DOSE BY LINE ITEM (FACILITY AVERAGE, EXCLUDES DHO COSTS\*)



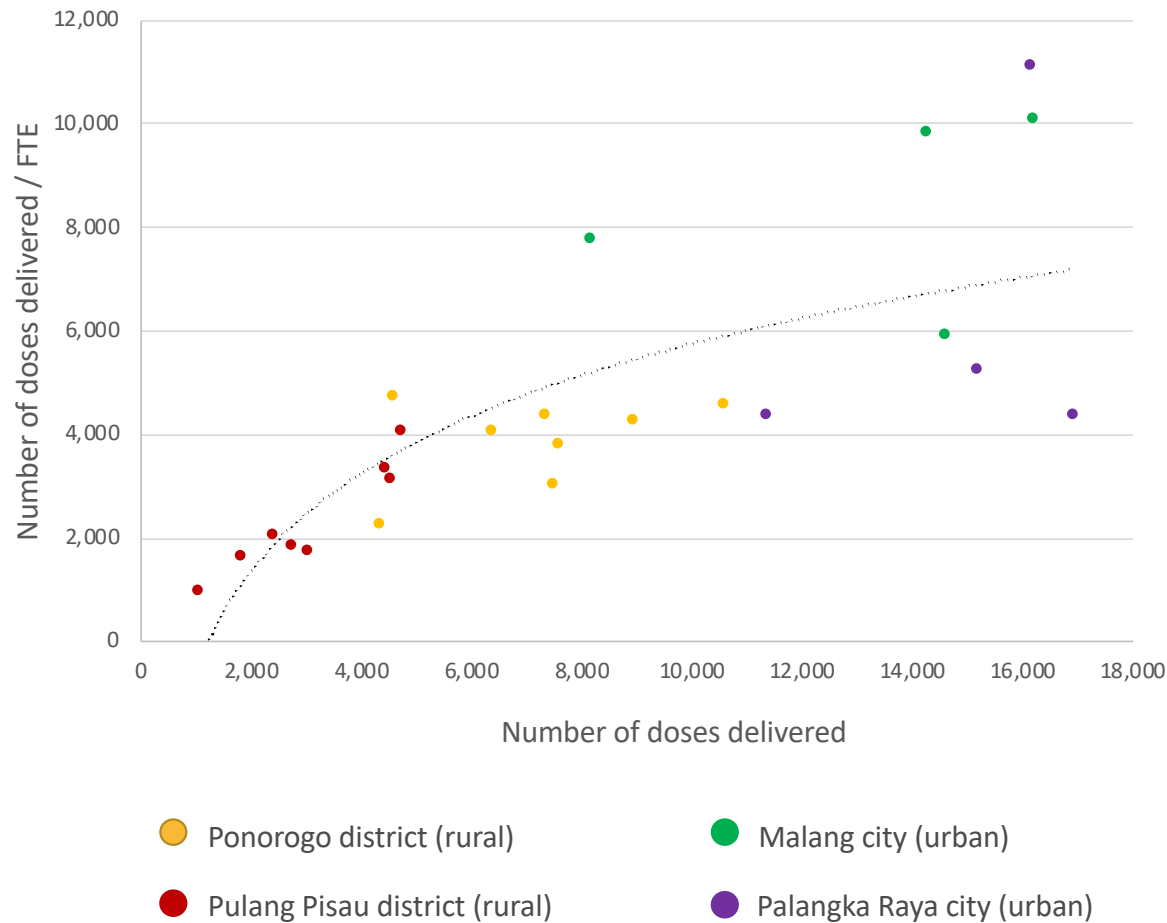
### Line Items

- Per Diem & Travel Allowances
- Cold Chain Equipment
- Cold Chain Energy Costs
- Building
- Other Equipment
- Vehicles & Vehicle Maintenance
- Cold Chain Equipment & Energy Costs
- Transport/ Fuel
- Salaried Labor

*Salaried Labor accounts for over 50% of the cost per dose in all districts/cities. Transport/fuel is also an important unit cost driver, given the large reliance on non-facility-based delivery strategies.*

\* The DHO amount is IDR 1,854 to IDR 3,528 per dose, depending on the district/city.

## EFFICIENCY ANALYSIS: DOSES DELIVERED PER FULL TIME EQUIVALENT (FTE) (FACILITY AVERAGE)

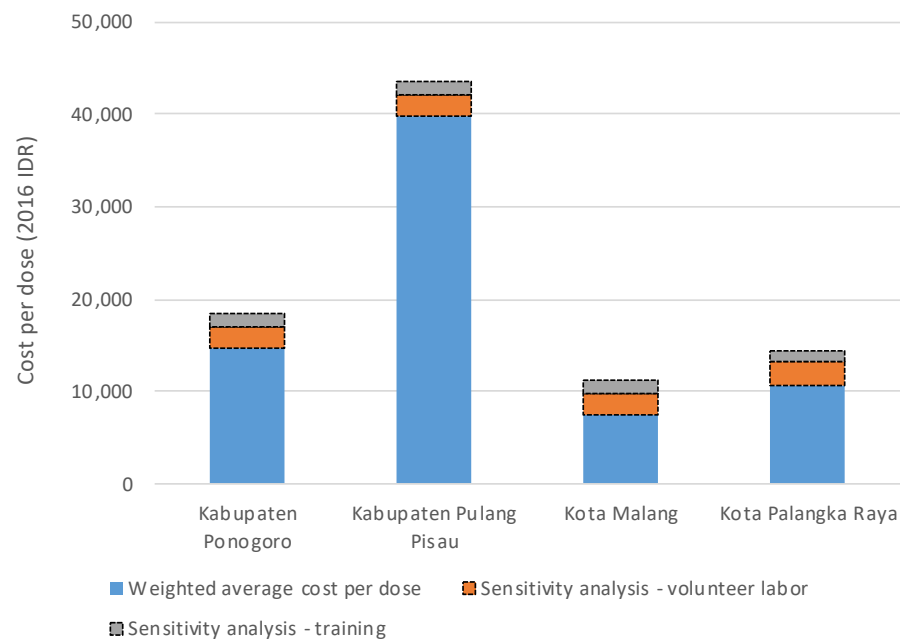


*Improving the allocation and/or efficiency of human resources could be a key cost-savings measure. As the number of doses delivered increases (horizontal axis), the staff time spent on immunization (FTE) also increases, though only marginally. Especially as volume increases, we see differences in the number of doses delivered per FTE at similar delivery volumes. This suggests there may be opportunity for higher delivery volumes or reduced staff time for immunization at facilities located below the trend line.*

## SENSITIVITY ANALYSIS RESULTS

A sensitivity analysis explored:

1. the change in cost per dose of remunerating volunteer labor at the market rate
2. the inclusion of staff training costs



*Volunteer labor and staff training were excluded from the main analysis because volunteers are not currently remunerated and no training occurred during the study year. However, this may change in the future, so these costs should be known and taken into account.*

*Remunerating volunteer labor increases the cost per dose by IDR 2,354 (a 5-24% increase, depending on the district/city). Training costs increase the cost per dose by IDR 1,361 (3-15%). Together, these two items would increase the cost per dose by 9-49%.*

## SUMMARY OF FINDINGS (1/3)

- There is **large variation in total and unit costs** between districts/cities, facilities, vaccine delivery strategies and target age groups.
- The **total delivery cost** ranged from approximately IDR 100 million to IDR 160 million (facility average); at DHO-level, total costs ranged from 113 million to 426 million.
- **Cost per dose** ranged from IDR 9,824 in Malang to IDR 43,421 in Pulang Pisau (facility and DHO-level average).
- **Cost per basic fully immunized child (FIC)** ranged from IDR 138,549 to IDR 724,603 (facility and DHO-level average).

## SUMMARY OF FINDINGS (2/3)

- By **delivery strategy**, average cost per dose to deliver a vaccine is lowest at schools (ranging from IDR 4,904 to IDR 25,758), followed by posyandu (IDR 9,806 to IDR 48,705) and then puskesmas (IDR 15,295 to IDR 83,237) (facility and DHO-level average).
- By **age group**, advanced immunization doses (for children aged 13-36 months) are the most expensive to deliver, followed by basic immunization and school-aged doses (facility average).

## SUMMARY OF FINDINGS (3/3)

- **Differences in volume are largely related to geography, population and population density:** the more population-dense areas of Malang and Ponorogo delivered the most doses and achieved the highest number of FICs.
- **Increased volume per facility or per delivery strategy is associated with increased efficiency.** At higher volumes, fixed costs are spread over more doses and the cost per dose decreases.
- **Salaried Labor is the main cost driver** at both facility and DHO levels. **At facility level, Transport/Fuel and Cold Chain Equipment & Energy are also important.**

## OPPORTUNITIES FOR USE OF RESULTS

- The findings are the most up to date immunization delivery cost evidence available for Indonesia, though not nationally representative.
- Short-term opportunities for use of results (late 2019) include:
  - Inputs into National Mid-term Development Plan 2020-2024
  - Inputs into OneHealth costing for National Health Plan
- Annual budgeting and planning process for 2021 (national and subnational):
  - Updating cost norms and guidance for budgeting and benchmarking
  - District/city budgeting and benchmarking in the sampled districts/cities
  - District/city budgeting and planning for those locations with similar characteristics as the four selected for our sample
- Budget estimates for new vaccine introduction delivery costs

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Thank You!