17th TechNet Conference

Panama City, Panama | October 16-19, 2023

Immunization Programmes That Leave No One Behind

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Keys to vaccine stock availability: new findings on vaccine waste and public finance

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Julia Guerette, Village Reach

Joanie Robertson, PATH

Moderated by **Mwenge Mwanamwenge,** Gavi

October 17, 2023`

Agenda

Introductions of speakers + session by **Mwenge Mwanamwenge**

Cross-country study on vaccine wastage in Ghana, Mozambique, and Pakistan by Mercy Mvundura

Linkages between public financial management and vaccine stock-outs by **Ulla Kou Griffiths**

Q&A – questions

Session Description: This session explores two immunization program aspects impacting vaccine availability. Evidence on vaccine wastage is presented, with recommendations on improvements to reduce wastage. The second presentation will present a framework and evidence on association between strengths of the public financial management system and vaccine stock-outs.

Cross-country study on vaccine wastage in Ghana, Mozambique, and Pakistan

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Study rationale and objectives

Rationale:

- **Lack of accurate data** on vaccine wastage is a **barrier** to correct **planning for vaccine procurement**.
- Lack of accurate data can **lead to over- or underestimation** of demand, resulting in:
  - ➢ Unnecessary vaccine procurement if wastage is overestimated.
  - ➢ Stockouts and service delivery interruptions if wastage is underestimated.

Study objectives:

To provide evidence on vaccine wastage in routine immunization programs by:

- ❖ Quantifying open- and closed-vial wastage rates for four focus vaccines in three countries.
- ❖ Understanding the context and causes of vaccine wastage.

Study research components

Objective: Estimate vaccine wastage rates

Method: Prospective tracking of stock data related to vaccine use and wastage for three months

Objective: Understand the context and causes of vaccine wastage

Method: Cross-sectional surveys and in-depth interviews with EPI staff at health facilities, vaccine stores, and warehouses

Objective: Provide recommendations to improve wastage monitoring and data use

Method: Synthesis of learnings from the study

Abbreviation: EPI, Expanded Programme on Immunization.

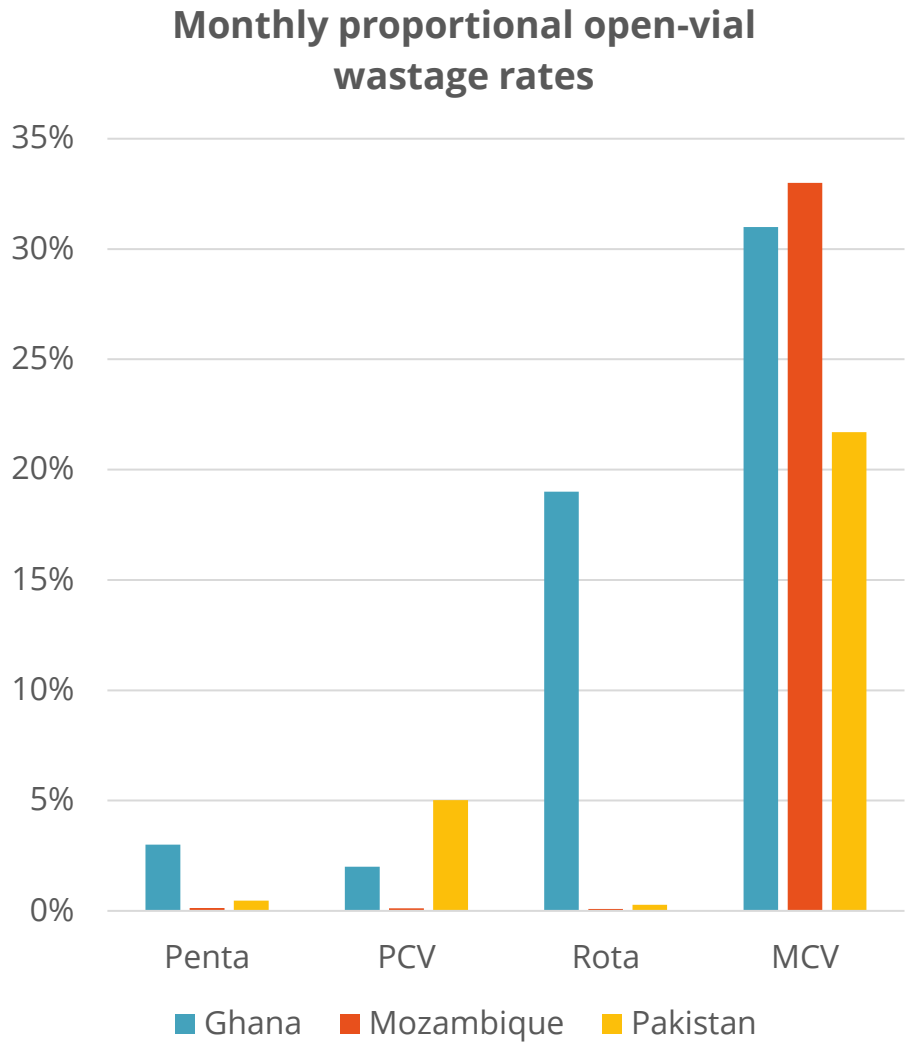
Countries included in the study, sample sizes, and vaccines evaluated

Levels of the health system included and sample sizes:	**Ghana**	**Mozambique**	**Pakistan**
National vaccine warehouse	1	1	1
Regional vaccine warehouses	14	10	2
District vaccine stores	24	23	4
Service delivery points	48	46	46

Vaccines included:	Vaccine presentation	Has preservative	Route of admin.	Number of doses per vaccine vial		
				Ghana	**Mozambique**	**Pakistan**
Pentavalent	Liquid	Yes	Injection	10	10	1
Pneumococcal conjugate	Liquid	Yes	Injection	4	4	4
Rotavirus	Liquid	No	Oral	5	1	1
Measles-rubella	Dry	No	Injection	10	10	10

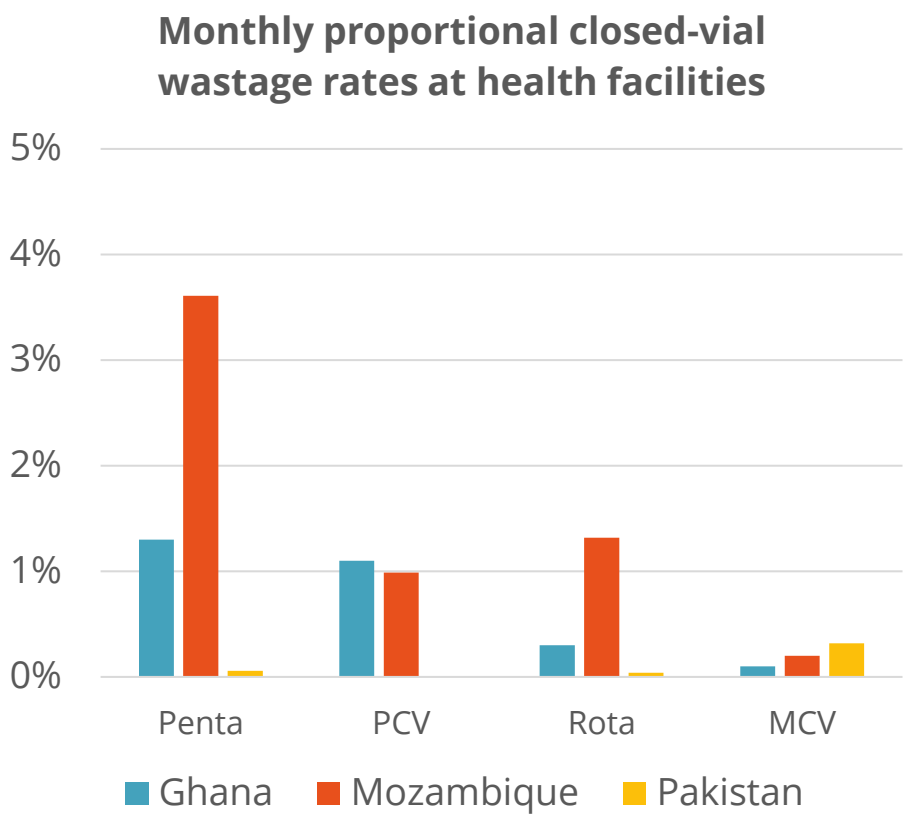
Results: Open-vial wastage at health facilities

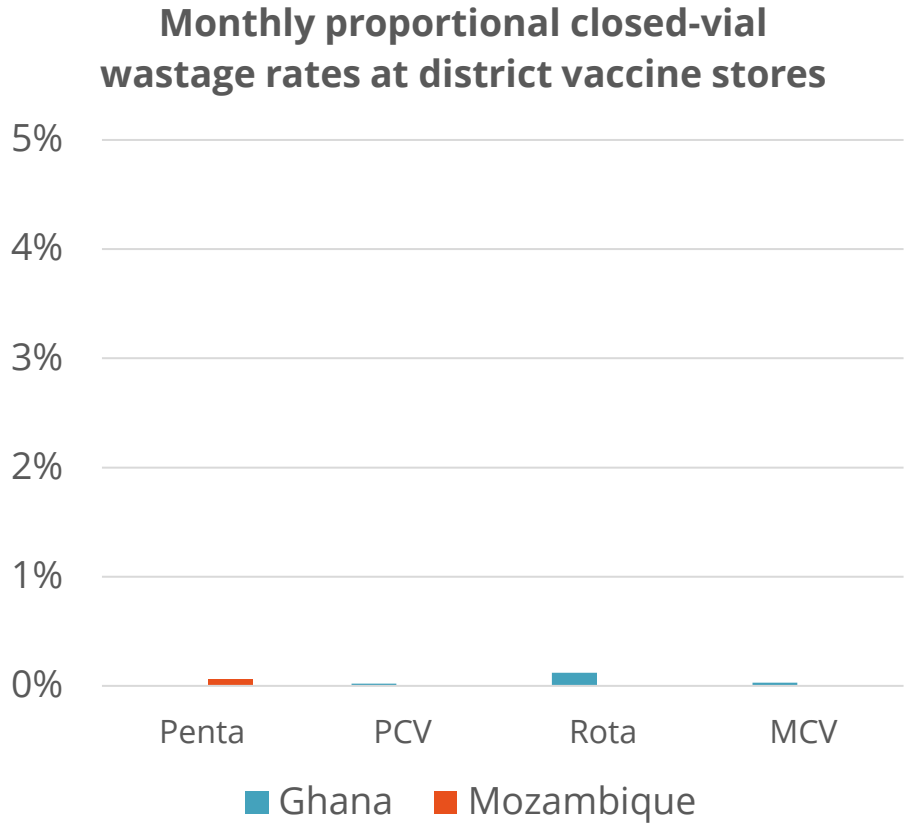
- Open-vial wastage rates for vaccines with preservatives were lower than for vaccines without preservatives.
- When vaccination sessions were conducted, vaccines without preservatives were generally not offered at every session.
- There was a difference between national guidance on when to open a vial and practice at health facilities.
- Supervision visits occurred to lower-level facilities, but wastage rates were not always discussed at these visits.
- Health workers reported insufficient knowledge on how to track and report vaccine wastage and desired more training on this topic.
- The wastage rate for rotavirus vaccine in Ghana was high at the time of the study, given that remaining doses in open vials were being discarded within six hours of opening.
- In Pakistan, wastage rate for PCV was relatively higher than in the other two countries as remaining doses in open vials were being discarded after outreach sessions.



Abbreviations: MCV, meningococcal vaccine; Penta, pentavalent vaccine; PCV, pneumococcal vaccine; Rota, rotavirus vaccine.

Results: Closed-vial vaccine wastage





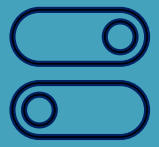
- Across all three countries, 17% to 50% of health facilities in the sample experienced at least one incident of closed-vial wastage during the prospective period, with wastage rates as high as 3.6%.
- However, at district vaccine storage facilities in Ghana and Mozambique, closed-vial wastage rates were generally low, well below 1%. Closed-vial wastage rates were not estimated for vaccine storage facilities in Pakistan.
- There was no reported closed-vial wastage at regional vaccine storage facilities in Ghana and Mozambique.

Recommendations for local and global stakeholders

Enhance vaccine-related training, sensitization, and supportive supervision.

Update vaccine handling guidelines as soon as possible after a global policy change.

Continue efforts to optimize vaccine packaging and presentations and/or to reduce vial sizes.



When available, consider switching to smaller dose per vial presentations, especially for vaccines with preservatives.

Validate vaccine wastage estimation tools, such as the WHO wastage rates calculator using country-level data.

For more information, please refer to this publication

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Vaccine wastage in Ghana, Mozambique, and Pakistan: An assessment of wastage rates for four vaccines and the context, causes, drivers, and knowledge, attitudes and practices for vaccine wastage

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Available at:
https://www.sciencedirect.com/science/article/pii/S0264410X23005820?via%3Dihub

Thank You!

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Linkages between public financial management and vaccine stock-outs

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October 17, 2023

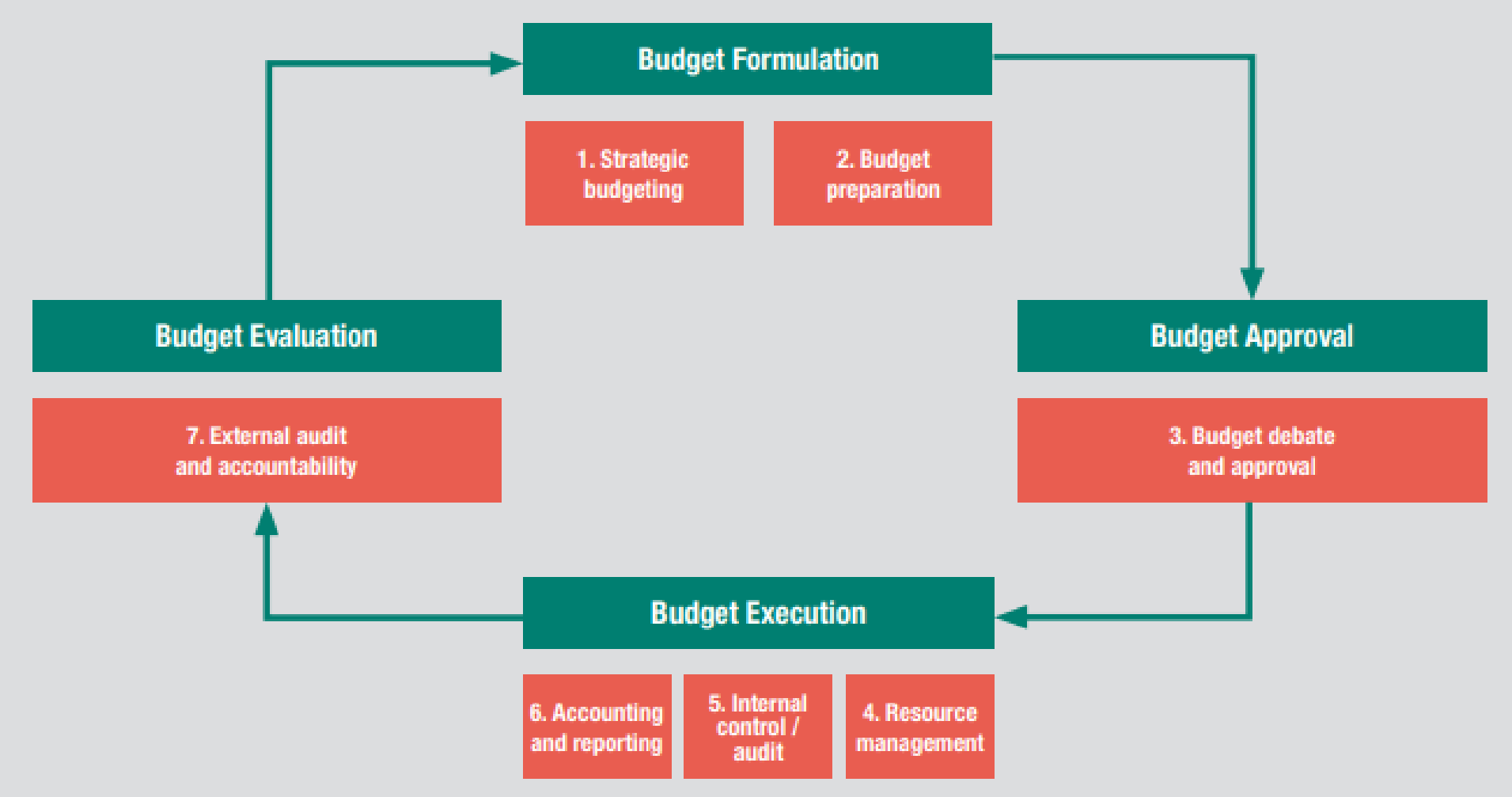
Presentation outline

Framework for analyzing links between public financial management (PFM) and vaccine stock-outs

Thrive360 PFM responses on causes of stock-outs

Regression analysis of PFM indicators against Thrive360 stock-out data

Defining Public Financial Management (PFM)



Source: Bryn Welham, Tom Hart, Shakira Mustapha and Sierd Hadley, Public financial management and health service delivery, ODI, 2017

PFM causing vaccine stock-outs at national level

Budget formulation	⟷	• Vaccine procurement cost estimates calculated too low • Vaccine procurement cost estimates not included in the budget when it is being formulated
Budget approval	⟷	• Vaccine procurement budget requested by Ministry of Health not accepted by Ministry of Finance • Vaccine procurement budget not approved by Parliament
Budget execution	⟷	• Approved budget not being released in time when vaccine procurement is needed to avoid stock-outs

PFM and national level stock-outs

Vaccines cannot be procured until funds are released and transferred to UNICEF Supply Division

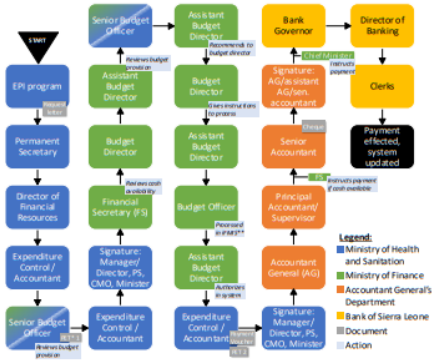
- Work undertaken by Noemi Schramm Ndao, UNICEF consultant
- Presented at International Health Economics Association conference in Cape Town in July 2023

The Government of Sierra Leone's **payments for vaccines can take up to 9 months** to be processed because they **have to pass 27 steps**

Describing the influence of Public Financial Management rules and procedures on vaccine financing of the Government of Sierra Leone

Background: The Government of Sierra Leone has defaulted on their co-financing obligations with Gavi in 2013, 2017 and 2018, and was granted a waiver in 2021. They have never paid for traditional vaccines (funded temporarily by UNICEF). This research wanted to understand how the public financial management processes influence the Government of Sierra Leone's capacity to pay vaccines.

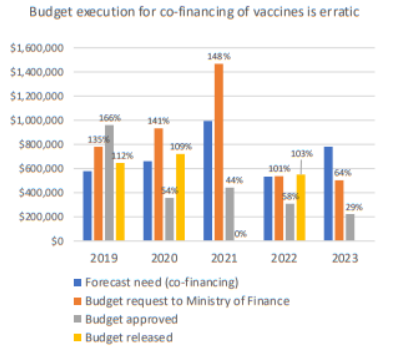
Result 1: The Government uses public financial management processes to ration cash, by increasing the number of steps a payment has to go through, and therefore slowing it down.



AG = Accountant General
CMO = Chief Medical Officer
IFMIS = Integrated Financial Management Information System
PET = Public Expenditure Tracking Form
PS = Permanent Secretary

Note: This has been developed based on consultations with Ministry of Health and Sanitation, Ministry of Finance and Accountant General's Department, but it is not a validated process and therefore subject to change. Last updated: 11th November 2022

Result 2: Budget request and allocation for vaccines are erratic, while actual expenditures follow (mostly) the need.



Methods

- Mixed methods research: key informant interviews and analysis of budgets, expenditure reports and public financial management laws
- Research was conducted in 2021 and updated in 2022

Discussion

- Public Financial Management practices ***de facto*** **keep evolving** and the process mapping is a snapshot at a certain time
- The government introduced **new gatekeeping processes in 2022 to ration cash**, which **increased the transaction costs** for the EPI team and duration of paying vaccines
- The payment process is **largely completed manually**, increasing **opportunities for rent-seeking or human error**
- The government **did not have a budget line for traditional vaccines until 2022**, a first step towards funding them
- Budget credibility for vaccines is low, **vaccine budgets are not protected despite** its compulsory manner, increasing the amount of escalation and advocacy necessary to successfully pay vaccines

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PFM causing vaccine stock-outs at lower levels health facility levels

Low budget execution

- Lack of vehicles to transport vaccines
- Lack of fuel for vehicles to transport vaccines
- Lack of salary payment to health workers who use their own transport to collect vaccines

Thrive360 PFM responses

Reasons for stock-outs reported in Thrive360-August 2023 report

	Number of countries	Percent
In-country issues	10	42%
Delayed Govt. funding	8	33%
Delayed order	3	13%
Under-allocation by GAVI	2	8%
Supply constraints	1	4%
Total	**24**	**100%**

Perhaps PFM

PFM

Regression analysis

Study objectives

To assess the relationship between vaccine stock-outs and strength of the PFM system

To investigate whether the relationship differs between traditional vaccines and Gavi funded vaccines

Multiple regression model

$$\mathcal{Y}_{i,t} = \beta_0 PFM_{i,t} + \beta_1 Z_{i,t} + Y_0 + \epsilon_{i,t}$$

$\mathcal{Y}_{i,t}$	=	Frequency of stock-outs at national level
PFM	=	Public financial management quality measure
$Z_{i,t}$	=	Vector of control variables
Y_0	=	Intercept along Y-axis
ϵ	=	Error term

Data sources

Dependent variable:
Thrive 360 stock-out data

- 52 countries
- February 2020 – June 2023
- Stock-out data of BCG, HepB and Td as traditional vaccines
- Stock-out data of Gavi-supported vaccines
- Observation months for each country between 12 (Kosovo) and 38 (Niger)
- Total of 14,935 observations
    - 4,375 for traditional vaccines

Independent variables:
World Bank Public Expenditure and Financial Accountability (PEFA) scores

- PEFA scores:
    - Budget reliability
    - Transparency of public finances
    - Management of assets and liabilities
    - Policy-based fiscal strategy and budgeting
    - Predictability and control in budget execution
    - Accountingand Reporting
- Most recent PEFA year between 2008 (Yemen) and 2021 (Kyrgyzstan and Mozambique)

Control variables:

- GDP per capita
- Percentage of healthcare expenditure as a percentage of GDP
- World Bank Country Policy and Institute Assessment (CPIA) surveys

Results: Traditional vaccines

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Log^2 GDP	0.10%	0.66%	0.1523	0.8796
CPIA Quality of Governance	2.16%	1.35%	1.5978	0.1168
PEFA Summary (Most Recent)	-7.25%	1.65%	-4.3845	0.0001
Healthcare Expenditure as % of GDP	0.14%	0.27%	0.5233	0.6033

Frequency of stock-outs of traditional vaccines is correlated with low PFM quality score

Results: Gavi supported vaccines

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Log^2 GDP	-0.34%	1.43%	-0.2352	0.8150
CPIA Quality of Governance	4.46%	2.94%	1.5162	0.1362
PEFA Summary (Most Recent)	-4.27%	3.60%	-1.1849	0.2420
Healthcare Expenditure as % of GDP	-0.17%	0.59%	-0.2923	0.7714

No significant correlation between stock-outs of Gavi supported vaccines and PFM quality scores

Conclusion

Our PFM hypothesis was confirmed with the regression analysis

This is just the beginning of this work!

- Develop a greater understanding of how varying components of the budget cycle affect stock-outs
- Utilize framework to understand the risk of increased stock-out when Gavi financing is reduced
- Understand the link between PFM and stock-outs at health facility levels
- Actions to do in terms of improving PFM systems!

Limitations

- PEFA data and vaccine stock-out data not from the same years
- Most Thrive360 data from COVID-19 pandemic period

Thank You!

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