Survey of
Well-being via
Instant and
Frequent Tracking

Frequent and timely monitoring of poverty, inequality, and poverty profiles using SWIFT during the COVID-19 Pandemic

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COVID-19 High Frequency Phone Surveys (HFPS)

- COVID-19 HFPS has been carried out by the World Bank in more than 50 countries to monitor the impact of the COVID-19 pandemic frequently and quickly

- Results are recently summarized in the globally harmonized database and its dashboard

- But the COVID-19 HFPS cannot monitor poverty directly because consumption or income data collection is too time-consuming and complex

    - SWIFT can be a solution

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What is SWIFT?

SWIFT: Rapid Poverty Assessment Tool

- A new household survey instrument engineered by machine learning technique and new ICT technology
- Estimate household expenditure and poverty data from only 10 to 15 questions
- Implemented or under preparation in 65 countries for 151 applications
- SWIFT with the COVID-19 HFPS is piloted in 20 countries

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How does SWIFT work?

Household Budget Survey

C

X

HFPS survey

Ĉ=F(X)

X’

Use *Machine Learning techniques* to find a **formula** that connect consumption with limited number of non-consumption variables

Identify only the most relevant variables X’

C=F(X’)

Collecting data X’ using smartphones/tablets = CAPI (Computer Assisted personal interview)

C: Log of Consumption
X: Variables collected by HBS
X’: Among X, variables correlates the most with consumption; variables collected by HFPS
Ĉ=F(X’): Predicted consumption

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A typical formula F(X)

Variables	2010 Rural model	
	Coefficient	Standard Error
Intercept	16.87	0.06
Household size	-0.22	0.02
Household size ^{2}	0.01	0.00
Dependency ratio	-0.77	0.16
Dependency ratio ^{2}	0.52	0.17
Head: Male	0.10	0.03
Head: Grades enrolled ^{2}	0.00	0.00
Cooking: coal/wood	0.21	0.03
Own: Car	0.32	0.09
Own: TV	0.10	0.03
Own: Vent	0.12	0.04
Me-Zochi dist.	0.15	0.04
Cantagalo dist.	0.21	0.07

In the case of Sao Tome Principe, we needed only 10 variables to get adj R2=40%

Challenges in using SWIFT with HFPS for poverty monitoring

1. **The samples of phone surveys are often not nationally representative**
    - Telephone ownerships are not uniform particularly in poorer countries, resulting in a severe rich bias
2. **A consumption model (F(X)) might not be correct due to the COVID-19 outbreak**
    - A large shock can change a consumption model (F(x)) - model instability over time

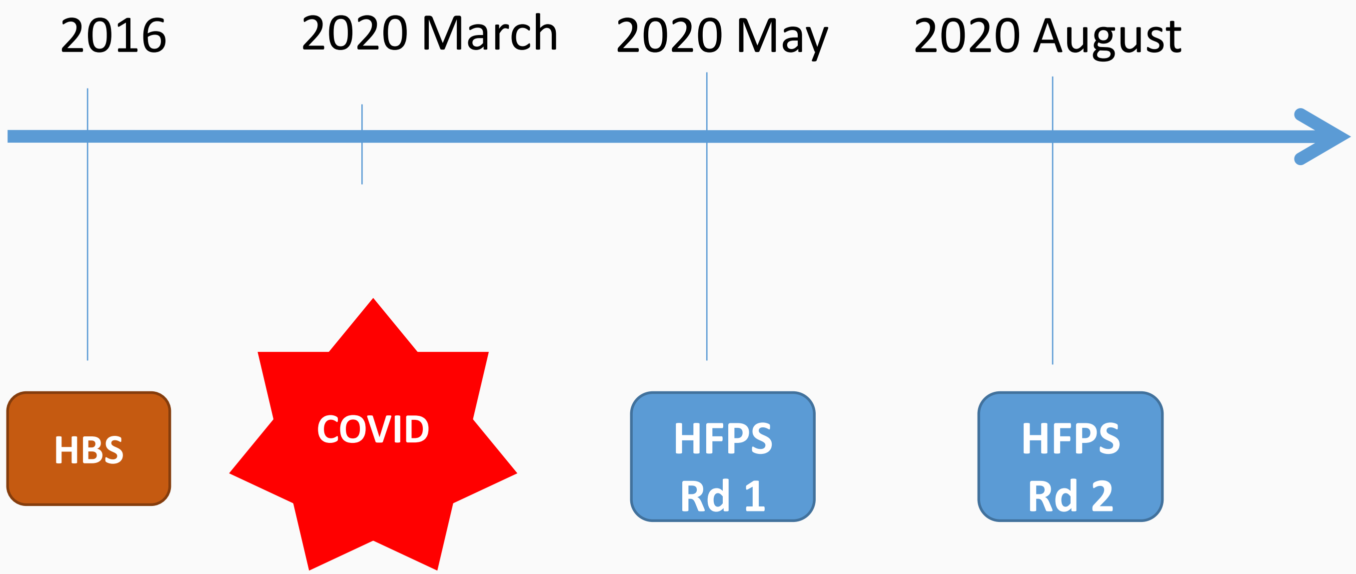
Solution for sampling bias correction - Reweighting

- Correction of “rich bias” using some reweighting techniques with a nationally representative surveys or census (called “reference survey/census”)
  - **Propensity score matching** - matching household unit record between a phone survey and a reference survey/census
  - **Maxentropy & post stratification** – matching means of key variables between a phone survey and a reference survey/census
  - Details are available in Zhang and Yoshida (2022)

A sample case – before and after reweighting

Variable name	Reference survey	A phone survey	
		Original	Reweighted
Refrigerator	26.80%	44.40%	26.80%
Two-wheeler	49.40%	65.90%	49.40%
Washing machine	9.90%	13.10%	9.90%
TV	59.90%	91.60%	59.90%
casual	9.20%	10.50%	9.20%
salaried	4.70%	4.20%	4.70%
selfemployed	21.60%	17.40%	21.60%

Model stability



HBS	Training data
HFPS	HFPS round 1 and round 2

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SWIFT PLUS – Including fast-changing variables in models to limit the model instability

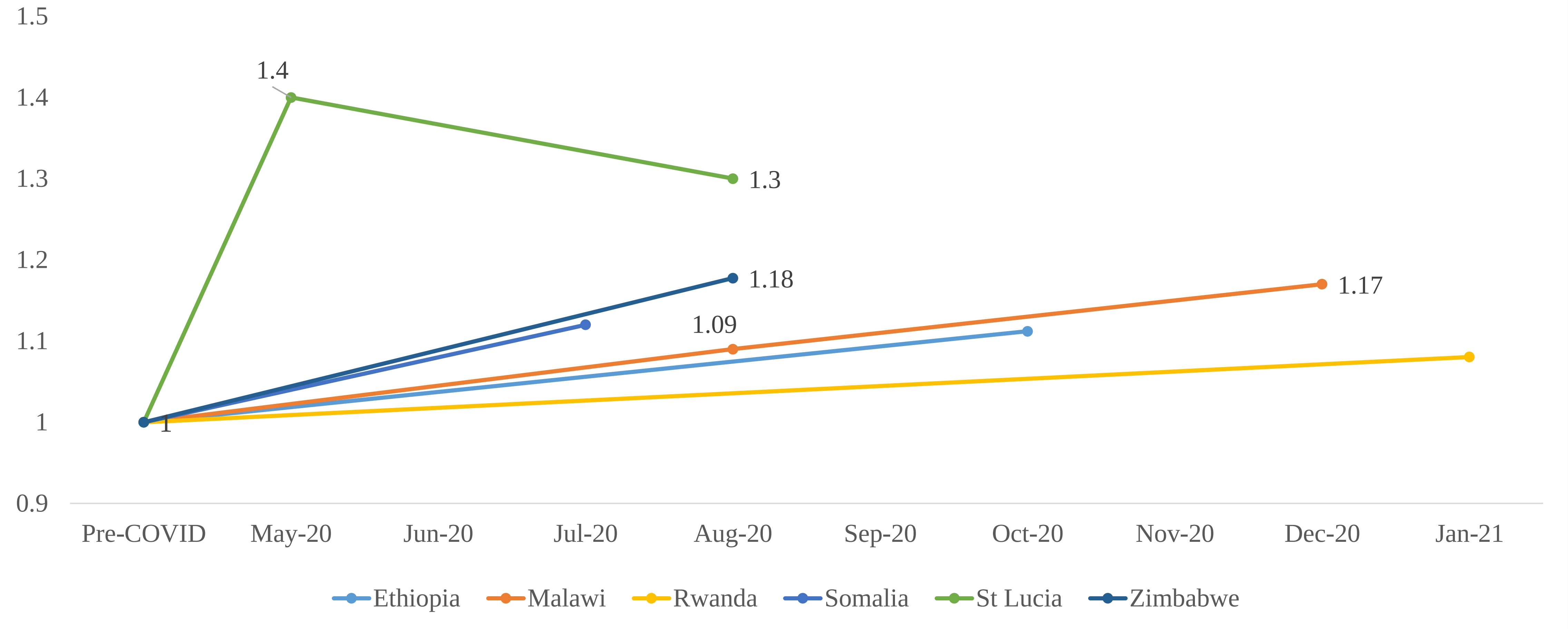
1. Household demographics and housing conditions
   - Usually very little changes over time
   - Good for estimating cross-sectional variations
   - Bad for estimating intertemporal variations
2. Asset Ownership
   - Relatively slow changes but respond well to the economic upturn in the medium term
   - Irreversibility – cannot be reduced easily
3. Fast changing variables: Consumption dummies, food insecurity
   - Quick to respond to both negative and positive changes
   - Good to predict poverty under economic downturns

Power of SWIFT Plus

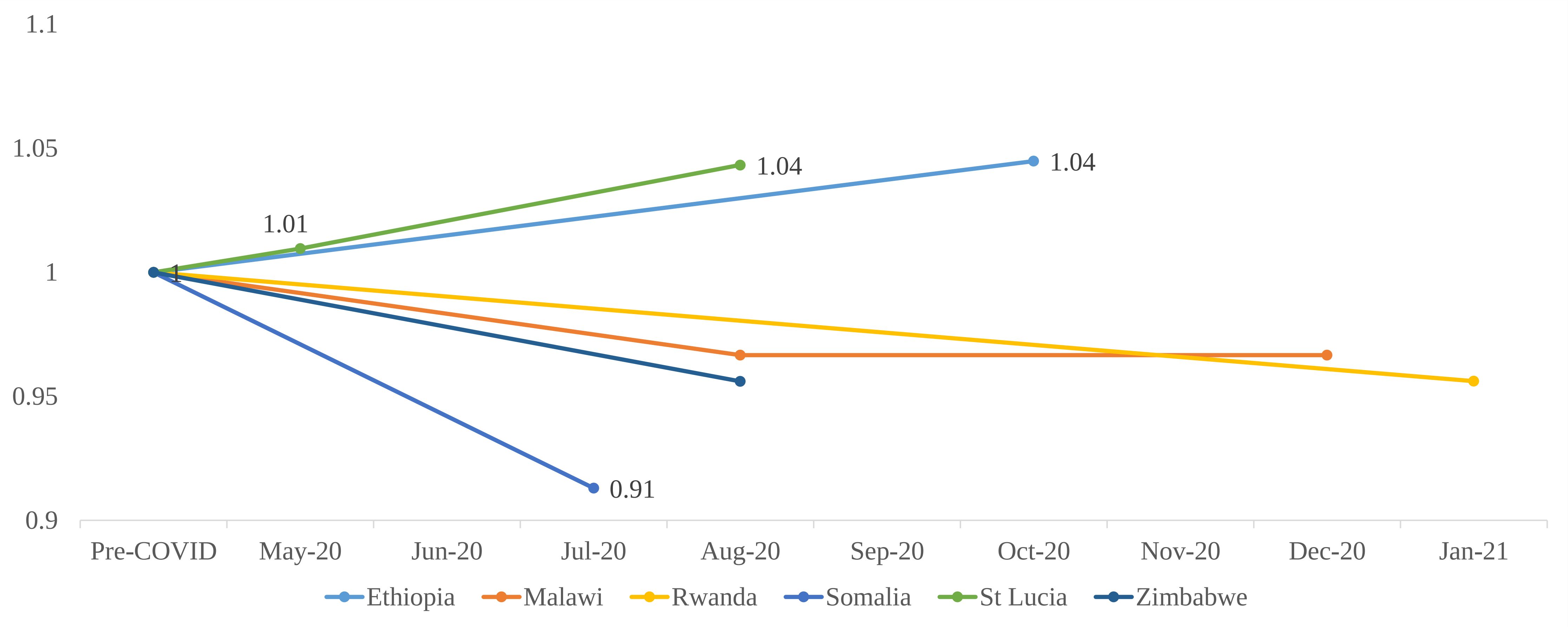
Comparing the performance of standard SWIFT and SWIFT PLUS using Afghanistan household survey 2011 and 2016

	Actual	Standard SWIFT	SWIFT PLUS
2011	38.3%		
2016	54.5%	39.4%	53.1%

Results of SWIFT: Frequent estimates of poverty



Results of SWIFT: Frequent estimates of inequality



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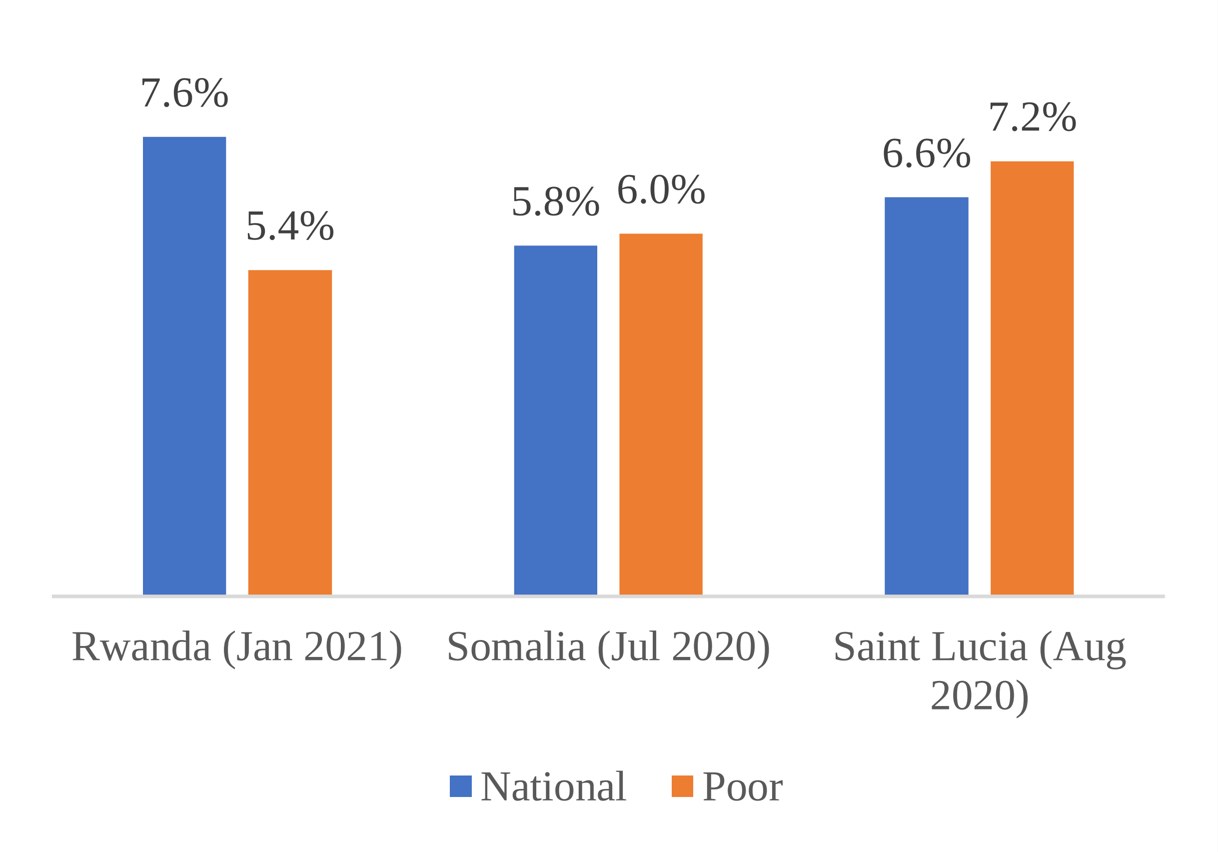
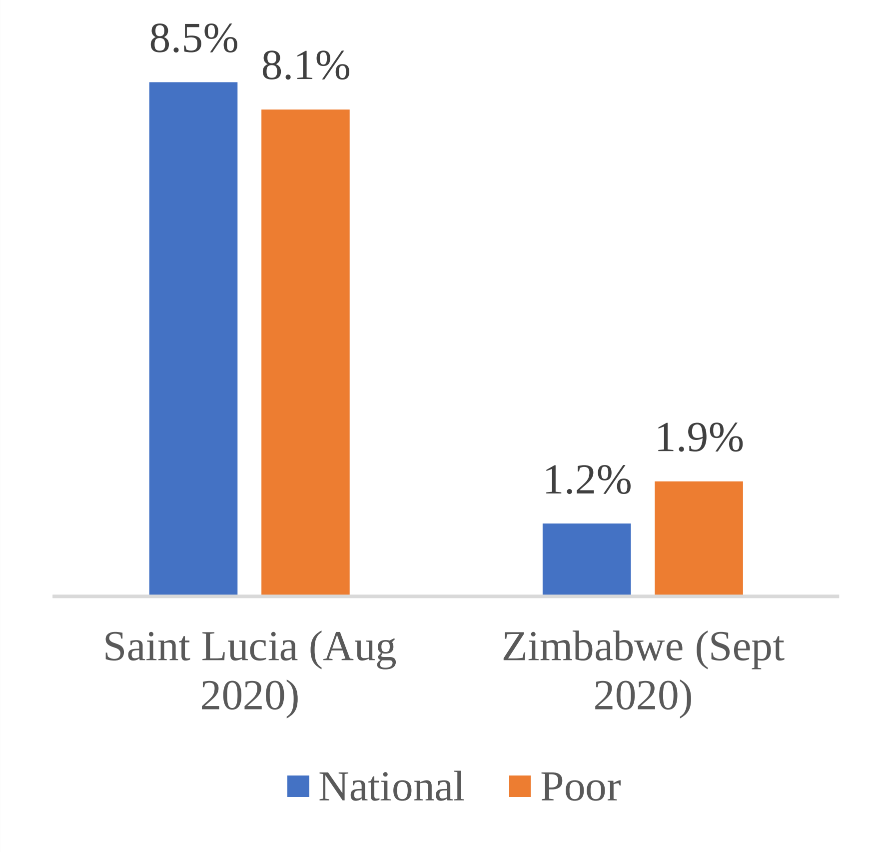
Results: Outreach of government assistance between the poor and national average

(a) Cash transfers



(b) Food



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Opportunities for the future

1. With SWIFT, we can address data deprivation

- At this point, the global poverty database of the World Bank shows poverty data are available every 7 years in low-income countries and fragile states
- But, with SWIFT, we can now produce poverty, inequality, and poverty profiling annually, quarterly or monthly in even these countries

2. With SWIFT, we can have frequent monitoring of poverty during crises

- SWIFT enabled us to monitor poverty during the COVID-19 pandemic
- SWIFT enabled us to monitor poverty immediately after a cyclone and surging inflation

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