Global Health
Supply Chain Summit

ABSTRACT # 85

Barbara Lamphere, JSI Research & Training Institute, Inc.   November 2019
Junardi Jufri, Johns Hopkins Center for Communication Programs

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Mitigating the Risk of FP Commodity Stock-outs
Empirical Evidence from Indonesia

Presenters:

Barbara Lamphere
JSI Research & Training Institute, Inc.

Junardi Jufri
Johns Hopkins Center for Communication Programs.

Co Authors:

Amir Karimi, Karthik Natarajan, and Kingshuk Sinha
Supply Chain and Operations Department, Carlson School of Management, University of Minnesota

Omar Balsara, Sarah Andersson, Barbara Lamphere, Bethany Saad
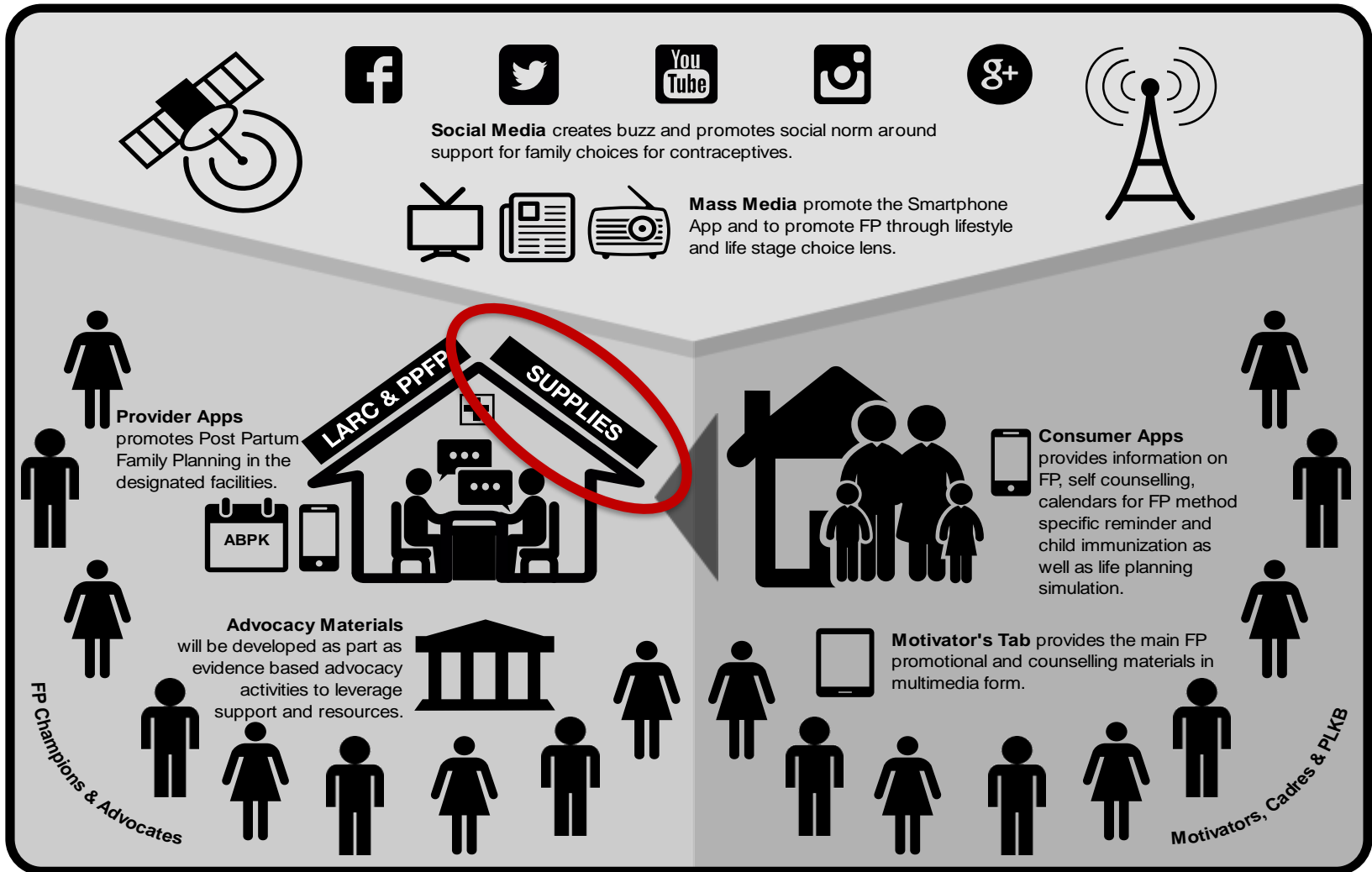*JSI Research and Training Institute, Inc.*

Global Health Supply Chain Summit
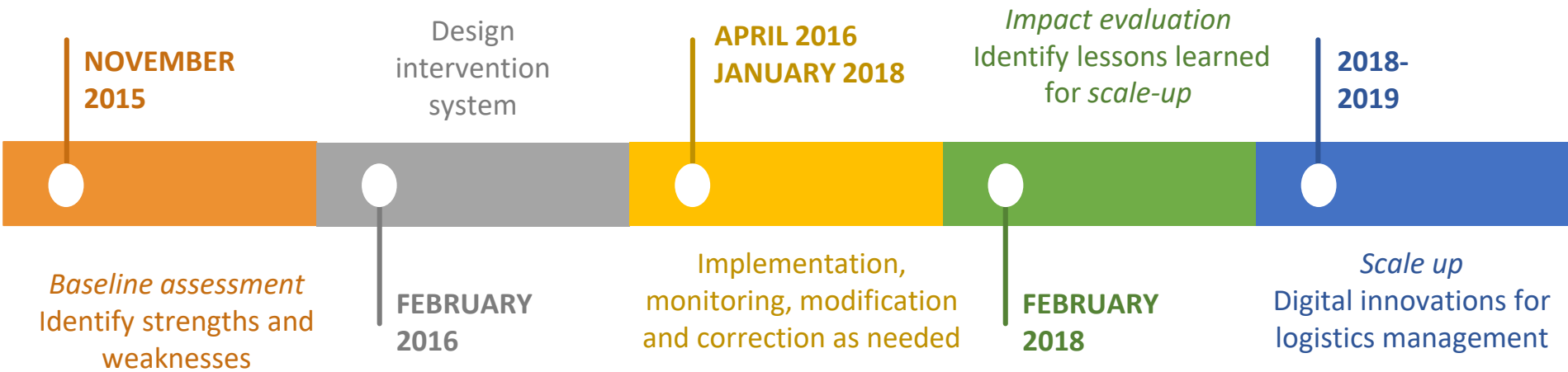
Social Media creates buzz and promotes social norm around support for family choices for contraceptives.

Mass Media promote the Smartphone App and to promote FP through lifestyle and life stage choice lens.

LARC & PPFP

SUPPLIES

Provider Apps promotes Post Partum Family Planning in the designated facilities.

ABPK

Consumer Apps provides information on FP, self counselling, calendars for FP method specific reminder and child immunization as well as life planning simulation.

Advocacy Materials will be developed as part as evidence based advocacy activities to leverage support and resources.

Motivator's Tab provides the main FP promotional and counselling materials in multimedia form.

FP Champions & Advocates

Motivators, Cadres & PLKB

BASELINE ASSESSMENT – ASSESSING RISK FACTORS

Inventory Management

Use of service targets to make resupply decisions and an inadequate inventory control system resulting in stock imbalances.

Logistics Management Information Systems

BKKBN has a robust electronic LMIS, but poor records management at SDPs compromises quality and limits use of the data.

Communication and Collaboration

Supply chain functions cut across multiple divisions and levels with minimal communication and coordination resulting in inefficiencies within the supply chain.

Organizational Capacity

The FP program lacked standardized processes and a mechanism for routine monitoring and supervision of the supply chain. High staff turnover made capacity building challenging.

PROJECT INTERVENTIONS

Inventory Management

Solution: Design and implement a dynamic consumption-based inventory control system using fixed distribution schedules and standardized trigger points that facilitate emergency supplies or reallocations, making the system more adaptable to changes in demand.

Logistics Recording and Reporting

Solution: Build capacity of warehouse and SDP staff by equipping them with job aids and video tutorials that aim to improve accuracy of records and reports.

Quality Improvement Teams

Solution: Institute a Quality Improvement Team (QIT) model: a mechanism that fosters multi-division/level collaboration and inculcates a culture of data use for supply chain performance monitoring and improvement.

Mentorship and On-the-Job Training

Solution: Introduce a mentorship and on-the-job training program to build capacity of SDPs through coaching and feedback. Mentors also use a monitoring checklist that provides an additional dimension of data that can be used for decision making.

ARE WE MAKING AN IMPACT?

EVALUATION RESULTS

Baseline/Endline Quantitative Surveys

Data collection methods

- Interviews
- Physical count
- Review of records and reports
- Observations of storage conditions

Facility Type	Baseline	Endline
Primary Health Care (Puskesmas)	217	231
Private Facilities	91	84
Public/ Private Warehouses	33	43
District Warehouses	11	11
Provincial Warehouses	4	4
Total	**356**	**373**

Qualitative Group Discussions

Qualitative workshops with Province and District Stakeholders

- Data validation, identify strengths and challenges, sustainability
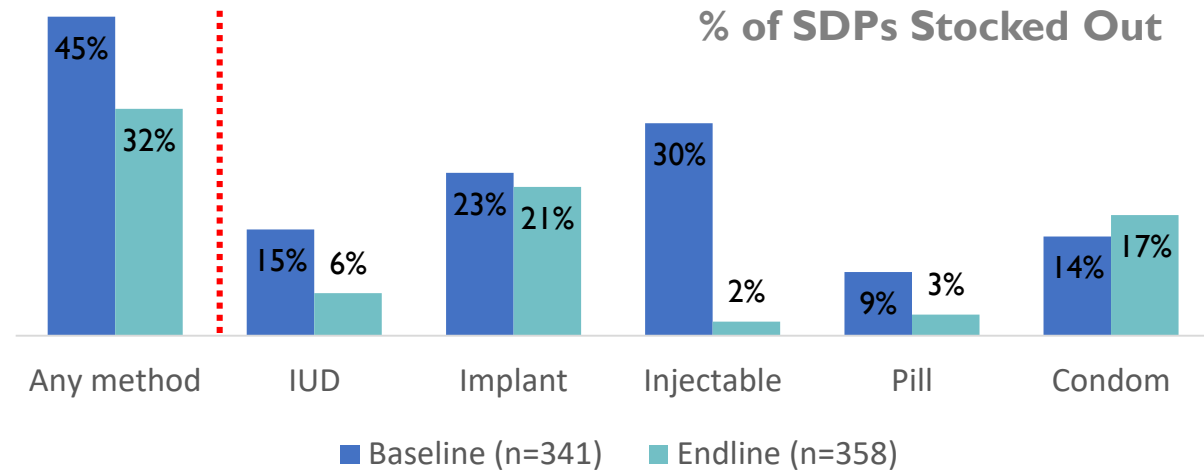
Routine Data Analysis

Review monthly reports

- Warehouse and health facility monthly eLMIS reports
- Mentorship visit reports
- Comparison of eLMIS data from project districts with non-intervention districts
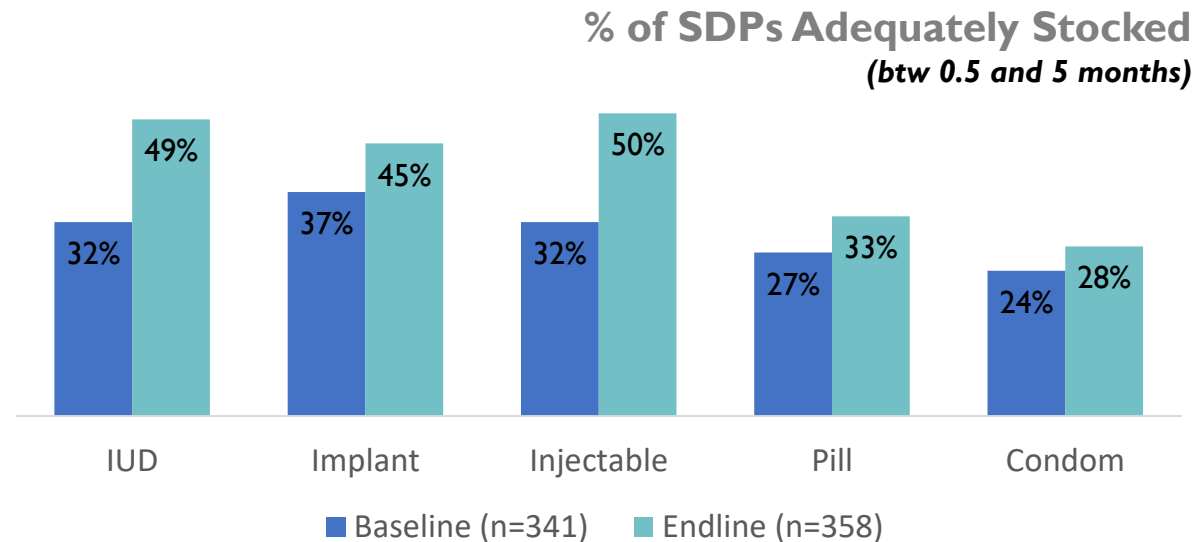
IMPROVED PRODUCT AVAILABILITY AT SDPs
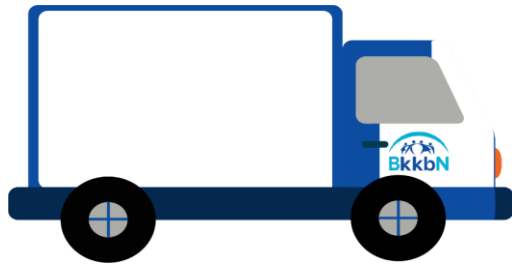

47%
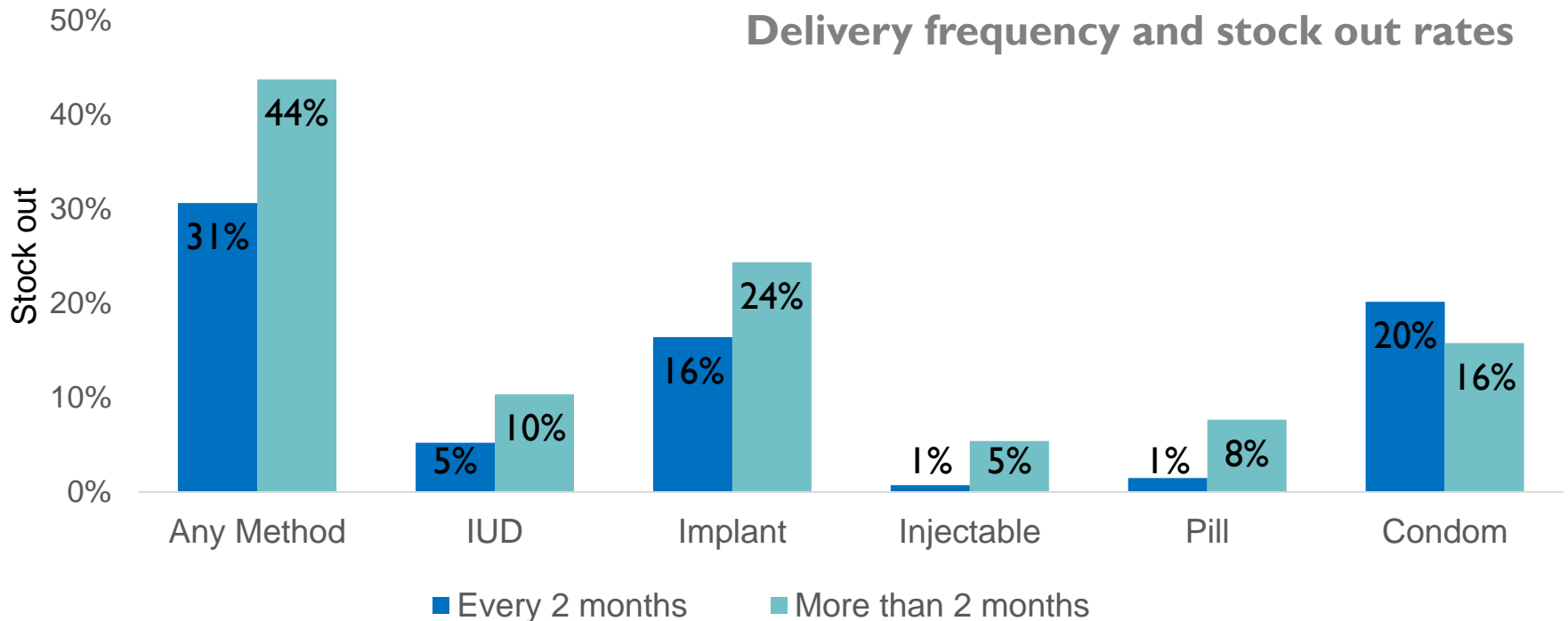
DECREASE in number of SDPs STOCKED OUT*

% of SDPs Stocked Out

	Any method	IUD	Implant	Injectable	Pill	Condom
Baseline (n=341)	45%	15%	23%	30%	9%	14%
Endline (n=358)	32%	6%	21%	2%	3%	17%

37%

INCREASE in number of SDPs ADEQUATELY STOCKED*

% of SDPs Adequately Stocked
(btw 0.5 and 5 months)

	IUD	Implant	Injectable	Pill	Condom
Baseline (n=341)	32%	37%	32%	27%	24%
Endline (n=358)	49%	45%	50%	33%	28%

Source: My Choice Baseline and Endline Surveys

DISTRIBUTION SCHEDULE REDUCED STOCK OUTS

Bi-monthly Distribution

Delivery frequency and stock out rates

Stock out

	Any Method	IUD	Implant	Injectable	Pill	Condom
Every 2 months	31%	5%	16%	1%	1%	20%
More than 2 months	44%	10%	24%	5%	8%	16%
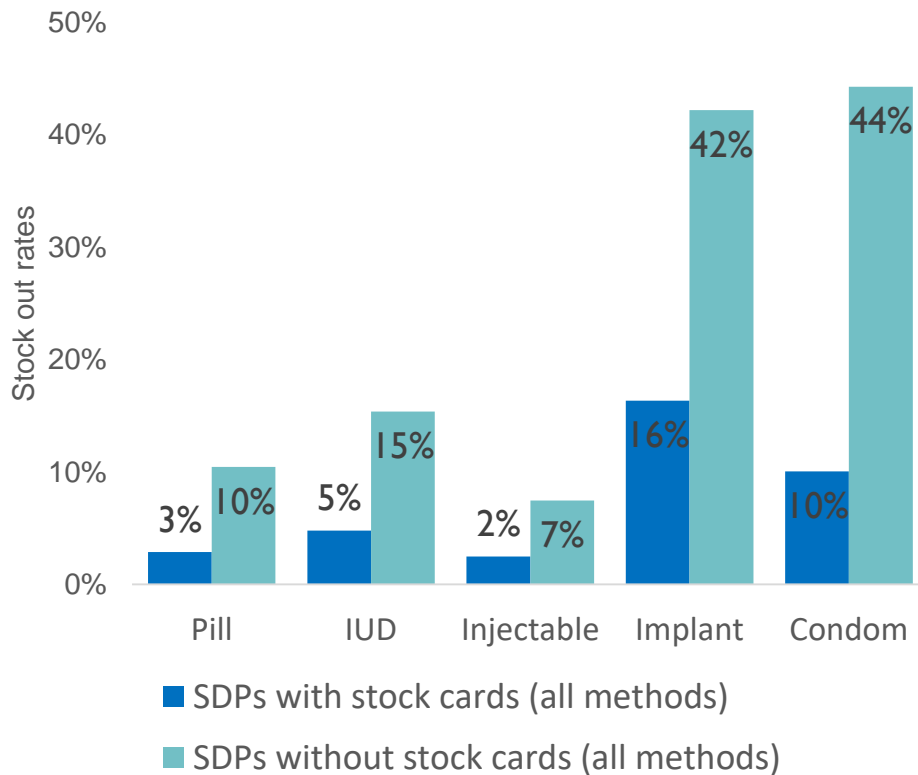
■ Every 2 months ■ More than 2 months
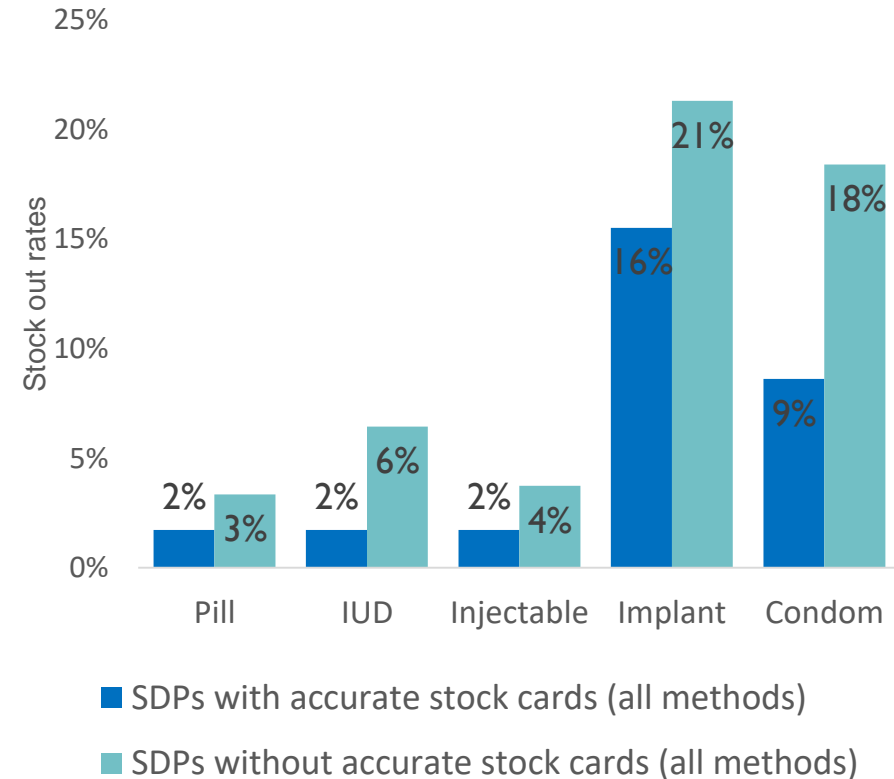
ROUTINE MENTORSHIP IMPROVED DATA QUALITY

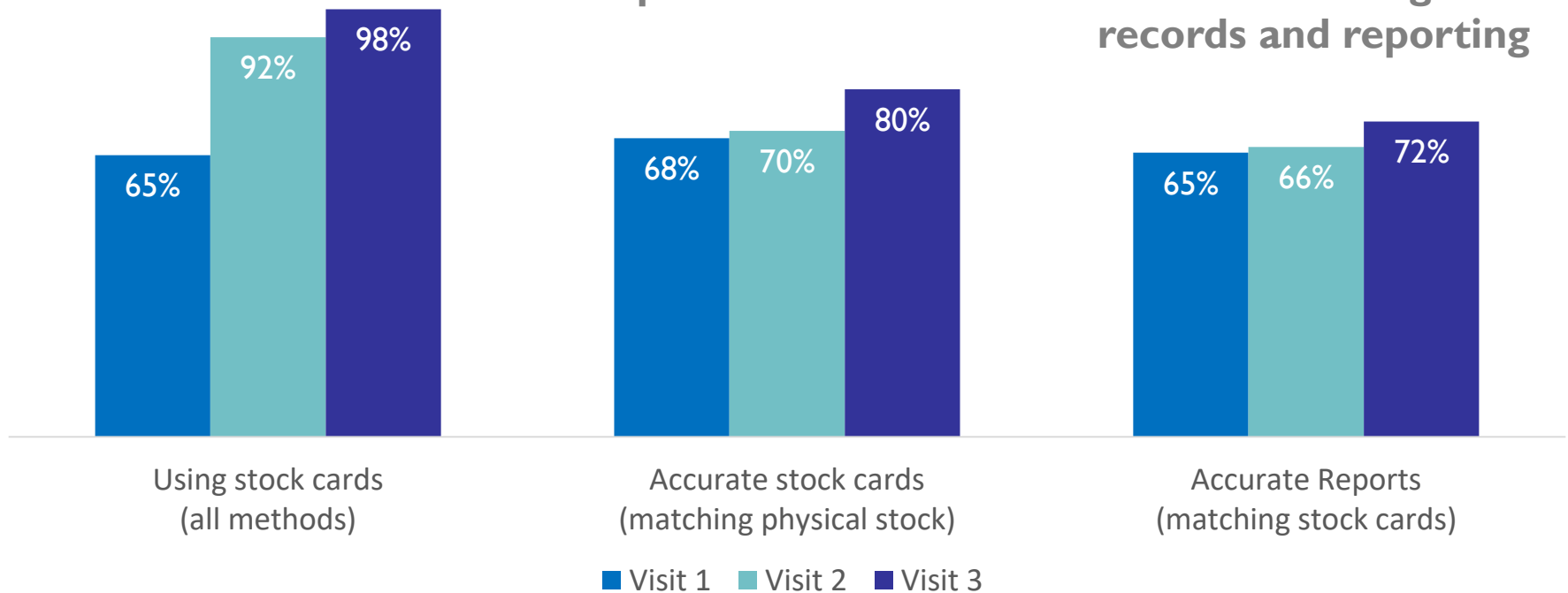*"The mentorship and on-the-job training program...inform facilities about the importance of maintaining accurate records. Now health facilities are consistently conducting physical stock counts at the end of each month."*

—HEAD OF FP PROGRAM & FINANCE DIVISION, BREBES DISTRICT, CENTRAL JAVA

Impact of routine mentor visits on SDP logistics records and reporting

	Using stock cards (all methods)	Accurate stock cards (matching physical stock)	Accurate Reports (matching stock cards)
Visit 1	65%	68%	65%
Visit 2	92%	70%	66%
Visit 3	98%	80%	72%

■ Visit 1 ■ Visit 2 ■ Visit 3

Source: Mentorship Program Data

We examined the effects of key program interventions on "stock card usage", "stock card accuracy", "stock-outs" (defined as stock-out today and stock-out in the last 3 months), and "adequately stocked" using logistic regression models.

All models were run in Stata 15, using pre- and post- intervention survey data and/or routine supportive supervision data collected by the program via Magpi, a mobile data platform.

Independent Variable 1

Independent Variable 2

Independent Variable n

Dependent Variable (outcome)

Control Variable 1

Control Variable 2

Control Variable n
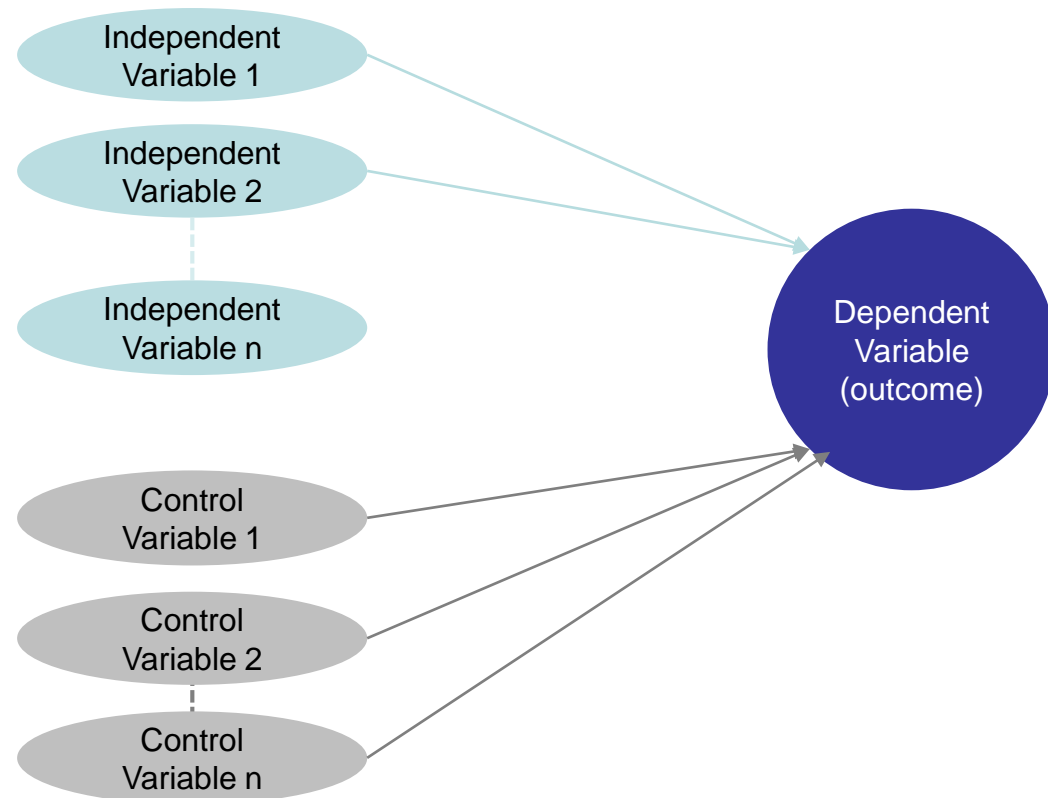
Logistic Regression Model 1: Drivers of **Stock Card Usage**

$$Pr\big(Stock\ Card\ Usage_{ij} = 1 \mid X\big) \tag{1}$$
$$= \beta_0 + \beta_{Control}\, X_{Control} + \beta_1 Logistics\ Reporting\ \&\ Recording\ (LRR)_j$$
$$+ \beta_2 Mentorship\ \&\ Job\ Training\ (MOT)_j + \varepsilon_{ij}$$

Logistic Regression Model 2: Drivers of **Stock Card Accuracy**

$$Pr\big(Stock\ Card\ Accuracy_{ij} = 1 \mid X\big) \tag{2}$$
$$= \beta_0 + \beta_{Control}\, X_{Control} + \beta_1 Logistics\ Reporting\ \&\ Recording\ (LRR)_j$$
$$+ \beta_2 Mentorship\ \&\ Job\ Training\ (MOT)_j + \varepsilon_{ij}$$

Logistic Regression Model 3: Drivers of **Stock-out Today**

$$Pr\big(Stock-out\ Today_{ij} = 1\,\big|\,X\big)$$
$$= \beta_0 + \beta_{Control}\,X_{Control} + \beta_1 Inventory\ Management\ (IM)_j$$
$$+ \beta_2 Stock\ Card\ Usage_{ij} + \varepsilon_{ij}$$
(3a)

$$Pr\big(Stock-out\ Today_{ij} = 1\,\big|\,X\big)$$
$$= \beta_0 + \beta_{Control}\,X_{Control} + \beta_3 Stock\ Card\ Accuracy_{ij} + \varepsilon_{ij}$$
(3b)

Logistic Regression Model 4: Drivers of **Stock-out Last 3 Months**

$$Pr\big(Stock-out\ Last\ 3\ Months_{ij} = 1\,\big|\,X\big)$$
$$= \beta_0 + \beta_{Control}\,X_{Control} + \beta_1 Inventory\ Management\ (IM)_j$$
$$+ \beta_2 Stock\ Card\ Usage_{ij} + \varepsilon_{ij}$$
(4a)

$$Pr\big(Stock-out\ Last\ 3\ Months_{ij} = 1\,\big|\,X\big)$$
$$= \beta_0 + \beta_{Control}\,X_{Control} + \beta_3 Stock\ Card\ Accuracy_{ij} + \varepsilon_{ij}$$
(4b)

Logistic Regression Model 5: Drivers of **Adequately Stocked**

$$Pr\big(Adequately\ Stocked_{ij} = 1 \mid X\big) \hspace{3cm} (5a)$$
$$= \beta_0 + \beta_{Control}\ X_{Control} + \beta_1 Inventory\ Management\ (IM)_j$$
$$+ \beta_2 Stock\ Card\ Usage_{ij} + \varepsilon_{ij}$$

$$Pr\big(Adequately\ Stocked_{ij} = 1 \mid X\big) \hspace{3cm} (5b)$$
$$= \beta_0 + \beta_{Control}\ X_{Control} + \beta_3 Stock\ Card\ Accuracy_{ij} + \varepsilon_{ij}$$

- Unit of Analysis across all models: <u>facility-method</u>, i.e., a contraceptive commodity offered at a facility

- Standard errors clustered at the facility-level to account for potential correlation of observations within facilities

Control Variables:

- Primary facility: takes value of 1 when facilities are either 'Pukesmas' or 'Private Clinic', and 0 otherwise

- Protective measures: measured on a scale of 0-7

- Contraceptive Method Fixed Effects

- District Type Fixed Effects

- Year/Month Fixed Effects: corresponding to when the survey was conducted

LRR and MOT have a positive effect on facility level stock card usage. When LRR and/or MOT are conducted, stock card usage increases. Similarly, **MOT has a positive effect on stock card accuracy**; when MOT is conducted accuracy improves.

DV: Stock Card Usage	Model 1
Logistics Reporting & Recording (LRR)	1.02*** (0.34)
Mentorship & Job Training (MOT)	0.74*** (0.18)
Control Variables	Yes
Pseudo R Squared	0.41
Observations	3,269

DV: Stock Card Accuracy	Model 2
Logistics Reporting & Recording (LRR)	-0.04 (0.18)
Mentorship & Job Training (MOT)	0.21** (0.09)
Control Variables	Yes
Pseudo R Squared	0.09
Observations	1,993

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note. Robust standard errors clustered at the facility level in parentheses.

Negative association between stock-out rates and stock card usage and stock card accuracy, meaning **stock-out rates decrease as usage and/or accuracy increase**.

Inventory management, specifically distribution schedule, had no significant effect on stock-out rates in this model.

DV: Stock-out Today	Model 3	
	(a) All	(b) Stock Card Users Only
Inventory Management	0.06	
	(0.16)	
Stock Card Usage	-0.41**	
	(0.21)	
Stock Card Accuracy		-0.32***
		(0.02)
Control Variables	Yes	Yes
Pseudo R Squared	0.16	0.33
Observations	3,214	1,828

*** p<0.01, ** p<0.05, * p<0.1

Note. Robust standard errors clustered at the facility level in parentheses.

Negative association between stock-outs in the last three months and stock card accuracy, meaning the **stock out rates over the last three months were reduced** when stock card accuracy increased.

While the presence of stock card usage and inventory management reduced stock-outs, these results were not statistically significant.

DV: Stock-out Last 3 Months	Model 4	
	(a) All	(b) Stock Card Users Only
Inventory Management	-0.13	
	(0.13)	
Stock Card Usage	-0.26	
	(0.18)	
Stock Card Accuracy		-0.29***
		(0.02)
Control Variables	Yes	Yes
Pseudo R Squared	0.18	0.29
Observations	3,254	1,828

*** p<0.01, ** p<0.05, * p<0.1

Note. Robust standard errors clustered at the facility level in parentheses.

Positive association between "adequately stocked" and inventory management and stock card accuracy.

As facilities receive contraceptives on a bi-monthly basis, the likelihood of commodities being adequately stocked increases.

As stock card accuracy increases, the likelihood of commodities being adequately stocked increases.

	Model 5	
DV: Adequately Stocked	(a) All	(b) Stock Card Users Only
Inventory Management	0.24** (0.12)	
Stock Card Usage	0.11 (0.13)	
Stock Card Accuracy		0.13*** (0.02)
Control Variables	Yes	Yes
Pseudo R Squared	0.05	0.07
Observations	3,279	1,997

*** p<0.01, ** p<0.05, * p<0.1

Note. Robust standard errors clustered at the facility level in parentheses.

MITIGATION FACTORS FOR STOCK OUTS

Risk factor	Mitigation	Impact
Stock-out (today)	Stock card usage (via exposure to LRR and MOT)	An increase in stock card usage leads to a **34% decrease** in the odds of stock-outs across all methods
	Stock card accuracy (via exposure to LRR and MOT)	A one-percent increase in stock card accuracy leads to a **27% decrease** in the odds of a stock out across all methods
Stock-out (last 3 months)	Stock card accuracy (via exposure to LRR and MOT	A one-percent increase in stock card accuracy leads to a **25% decrease** in the odds of a stock-out across all methods

MITIGATION FACTORS FOR ADEQUATE STOCK

Risk factor	Mitigation	Impact
Adequate Stock (today) (Between 0.5 and 5 months of stock)	Inventory Management (timely bi-monthly distribution)	SDPs that received commodities timely on a bi-monthly basis were 27% more likely to have commodities adequately stocked.
	Stock card accuracy (via exposure to LRR and MOT)	A one-percent increase in stock card accuracy leads to a **14% increase** in the odds that commodities are adequately stocked.

MITIGATION FACTORS FOR STOCK OUTS

Risk factor	Mitigation	Impact
Stock card usage	Exposure to comprehensive logistics recording and reporting practices, material and exercises	A **177% increase** in the odds of stock card usage
	Exposure to on-the-job mentorship and training program	A **110% increase** in the odds of stock card usage
Stock card accuracy	Exposure to on-the-job mentorship and training program	An **increase** of **23%** in the odds of stock card accuracy

ARE WE MAKING AN IMPACT?

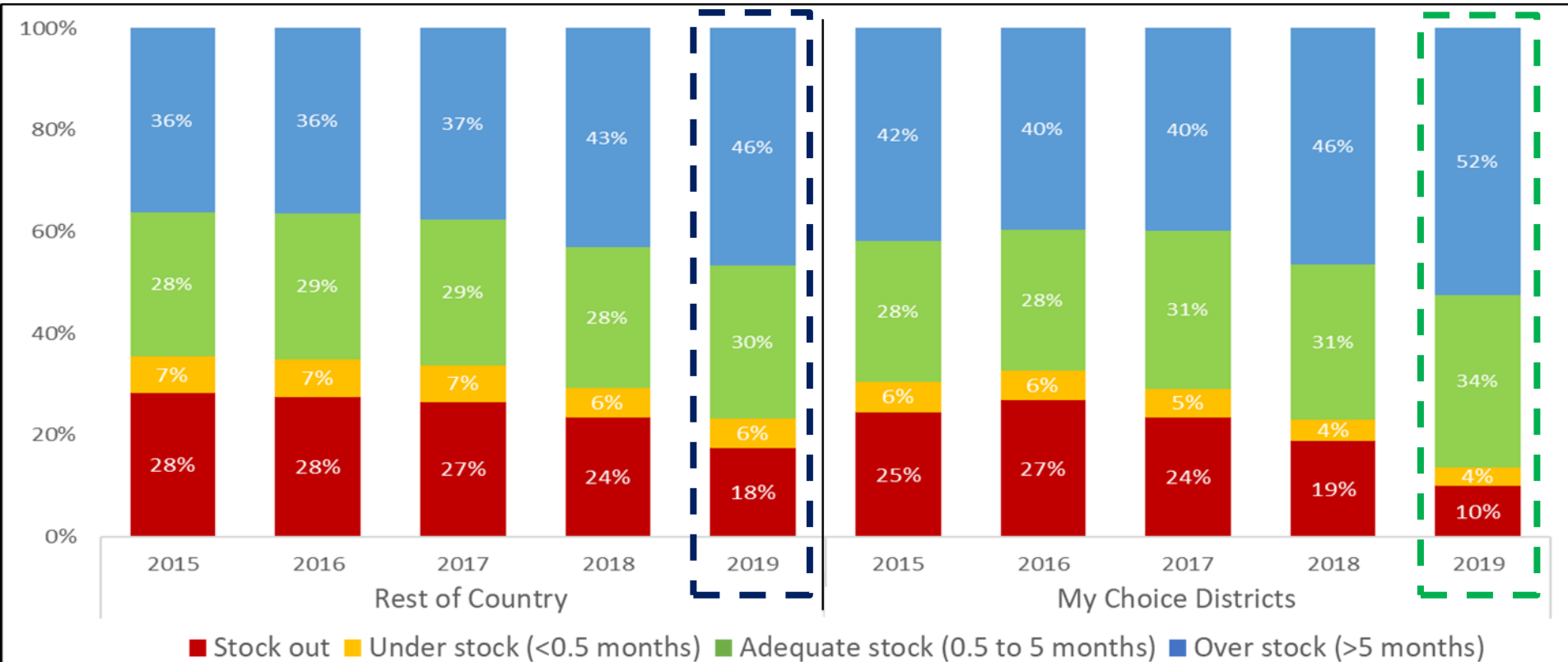INTERVENTION VS. NON-INTERVENTION

STOCK IMBALANCES DECREASED
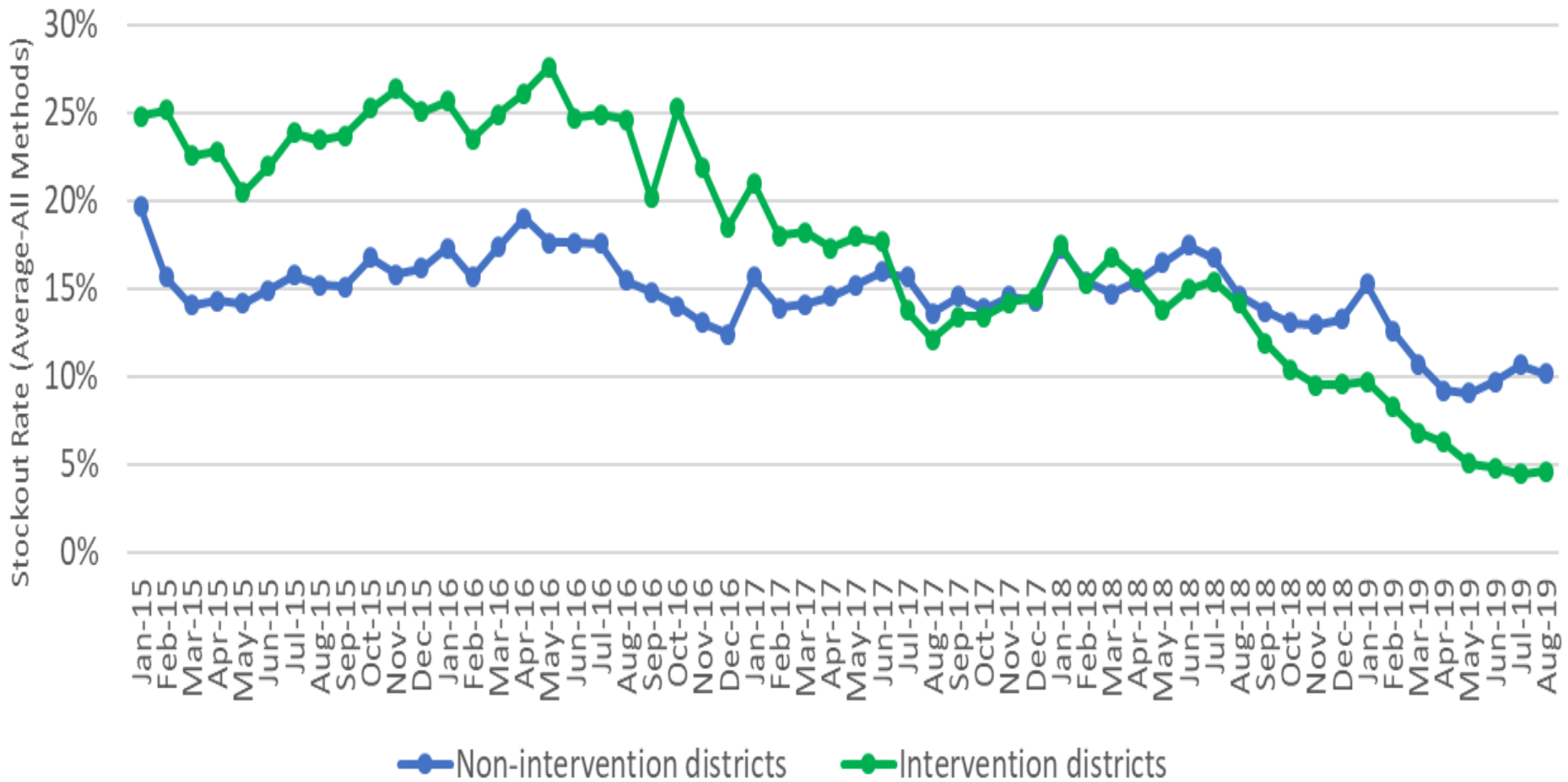
44%
fewer SDPs
stocked out

12%
more SDPs
with adequate stock

Average Stock Status at SDPs for all methods

Rest of Country

	2015	2016	2017	2018	2019
Over stock (>5 months)	36%	36%	37%	43%	46%
Adequate stock (0.5 to 5 months)	28%	29%	29%	28%	30%
Under stock (<0.5 months)	7%	7%	7%	6%	6%
Stock out	28%	28%	27%	24%	18%

My Choice Districts

	2015	2016	2017	2018	2019
Over stock (>5 months)	42%	40%	40%	46%	52%
Adequate stock (0.5 to 5 months)	28%	28%	31%	31%	34%
Under stock (<0.5 months)	6%	6%	5%	4%	4%
Stock out	25%	27%	24%	19%	10%

Legend: ■ Stock out ■ Under stock (<0.5 months) ■ Adequate stock (0.5 to 5 months) ■ Over stock (>5 months)

Source: BKKBN eLMIS data – average of Monthly Reports

REDUCED STOCK OUTS

% of SDPs Stocked out - **CENTRAL JAVA PROVINCE**

Supply Chain Policy Improvements: Improving guidelines and SOPs, building on the successes and lessons learned from the implementation in the pilot regions

Quantification: Strengthening methodologies and tools to improve forecast accuracy and supply planning

Training Design: Curriculum development and building capacity of trainers

Supply Chain Digitization: Digitizing distribution planning and warehouse management practices through development of mobile and web-based applications

Performance Monitoring: Development of a supply chain dashboard to improve logistics data visibility and use

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