



Using Logistics Data to Estimate CPR for Short-Acting Family Planning Methods

Suzy Sacher

John Snow, Inc.

USAID | DELIVER PROJECT

5 OCTOBER 2015

Background

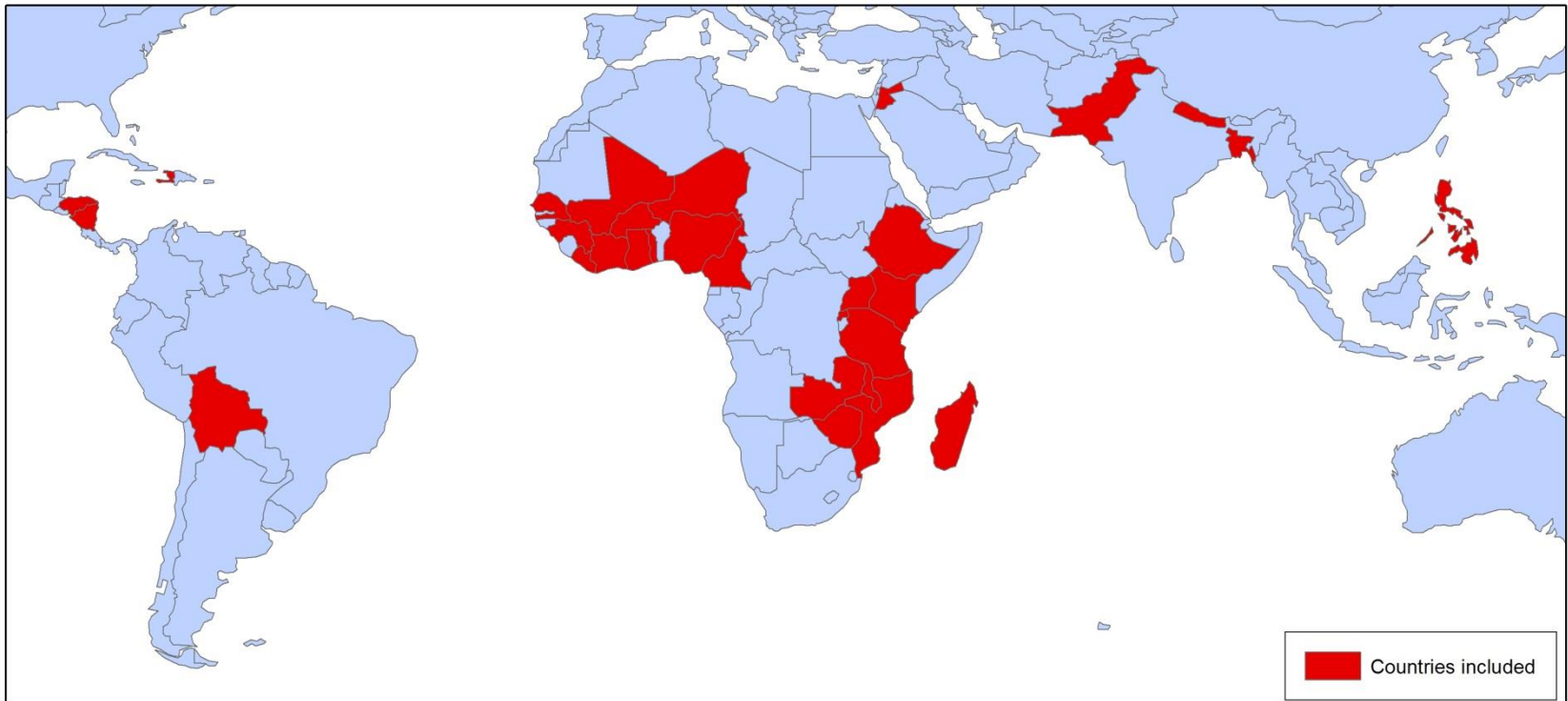
- Updates to CPR estimates often needed more frequently than population-based surveys can provide
- Alternative approaches for estimating CPRs are being explored
- Related work includes:
 - Linking logistics data, including at a subnational level in Rwanda
 - Showing the impact of stockouts in Malawi
 - Estimating additional CPR if no stockouts

Data Used

- Examined the relationship between public-sector:
 - logistics distribution data (PPMR, PipeLine)
 - CPRs (DHS)
- FP methods included:



Countries Included (30)



Models

- Tested **3 models** to generate country-level public sector CPR estimates:
 1. direct estimation through existing couple-years of protection (CYP) conversion factors
 2. bivariate linear regression
 3. multivariate linear regression
 - including historic data (previous DHS-based CPR)
- Used natural log transformations to meet the assumptions for linear regressions (due to a skewed dataset)

Association Findings

Strong, significant relationships between public-sector contraceptive logistics data and public-sector prevalence rates for short-acting methods.

→ validates quality & accuracy of logistics data

Association Between Referent Public-Sector Prevalence Rates and Average Monthly or Quarterly Logistics Distribution Data, by Contraceptive Type and Model Type					
Model and Contraceptive Type	N	β_0	β_1	β_2	R ² -adj
Bivariate Model					
Injectable contraceptives	30	- 4.11	0.72***	NA	.90
Oral contraceptives ^a	27	- 4.46	0.45***	NA	.48
Male condoms	28	- 6.49	0.44***	NA	.28
Multivariate Model					
Injectable contraceptives	28	- 4.21	0.62***	5.7	.91
Oral contraceptives ^a	25	- 4.97	0.23*	34.93***	.72
Male condoms	26	- 6.66	0.19	171.93***	.48

^a The analysis was restricted to countries with <20 average monthly distribution per 100 women of reproductive age.

* $P < .05$, ** $P < .01$, *** $P < .001$.

Model Accuracy Findings

Comparison of the model-generated CPRs with the DHS CPRs:

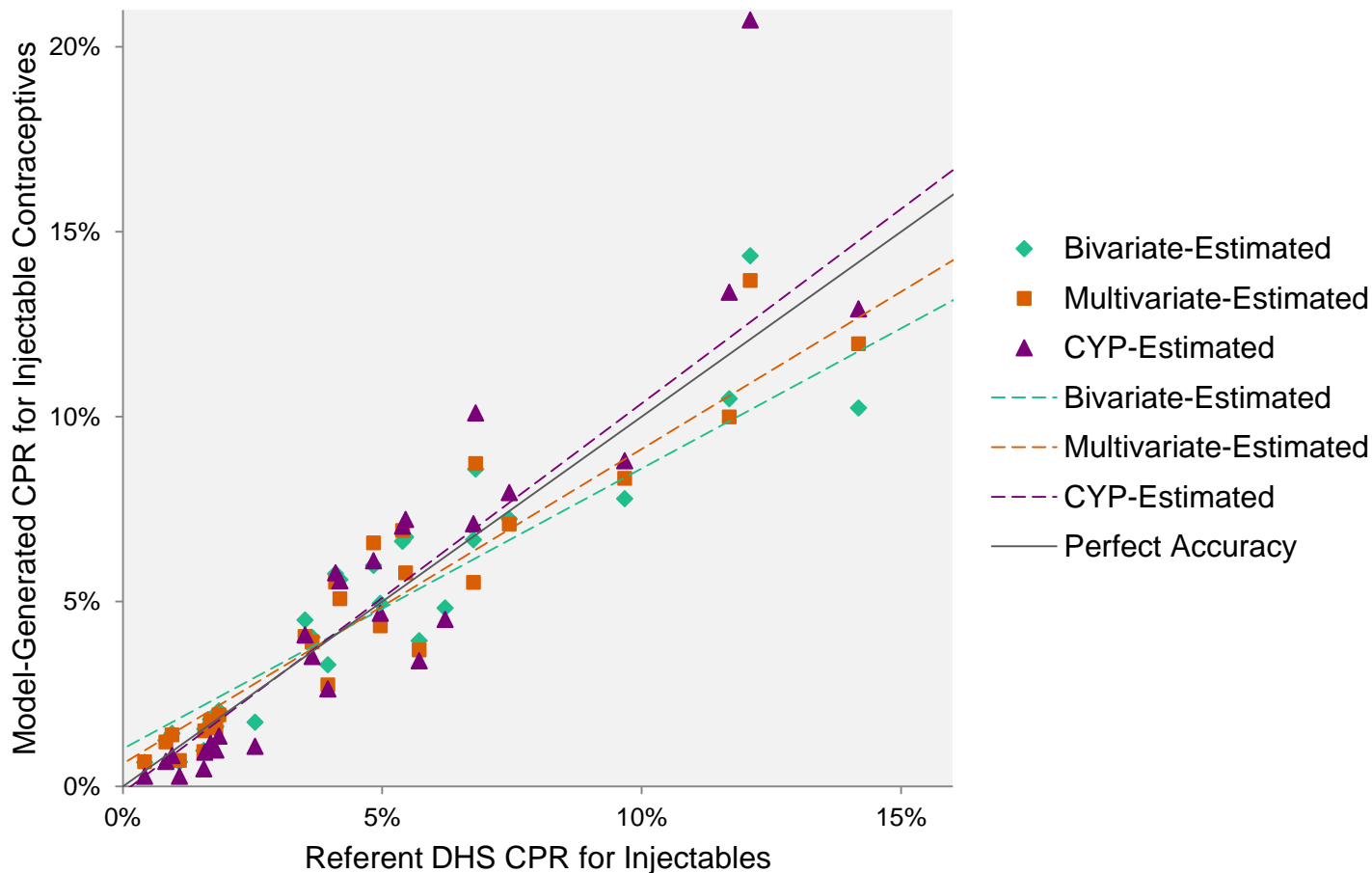
TABLE 4. Evaluation of Model Accuracy and Precision

Model	Difference Between Model Estimates and DHS Referent Values			Proportion of Model-Estimated Values Within 1, 2, and 5 Percentage Points of the DHS Value		
	Maximum Absolute Error (%)	Mean Absolute Error (MAE) (%)	Median Absolute Error (%)	1 Percentage Point (%)	2 Percentage Points (%)	5 Percentage Points (%)
Injectables						
Multivariate	3.8	1.0	0.6	57	<u>89</u>	100
Bivariate	7.0	1.1	0.7	57	<u>90</u>	97
CYP	8.6	1.4	0.8	54	<u>86</u>	93
Oral Contraceptives						
Multivariate	2.9	0.6	0.4	84	<u>92</u>	100
Bivariate	3.0	0.9	0.6	67	<u>89</u>	100
CYP	3.4	1.0	0.8	60	<u>92</u>	100
Condoms						
Multivariate	1.3	0.3	0.2	92	<u>100</u>	100
Bivariate	1.9	0.4	0.3	93	<u>100</u>	100
CYP	14.4	2.4	0.6	62	77	85

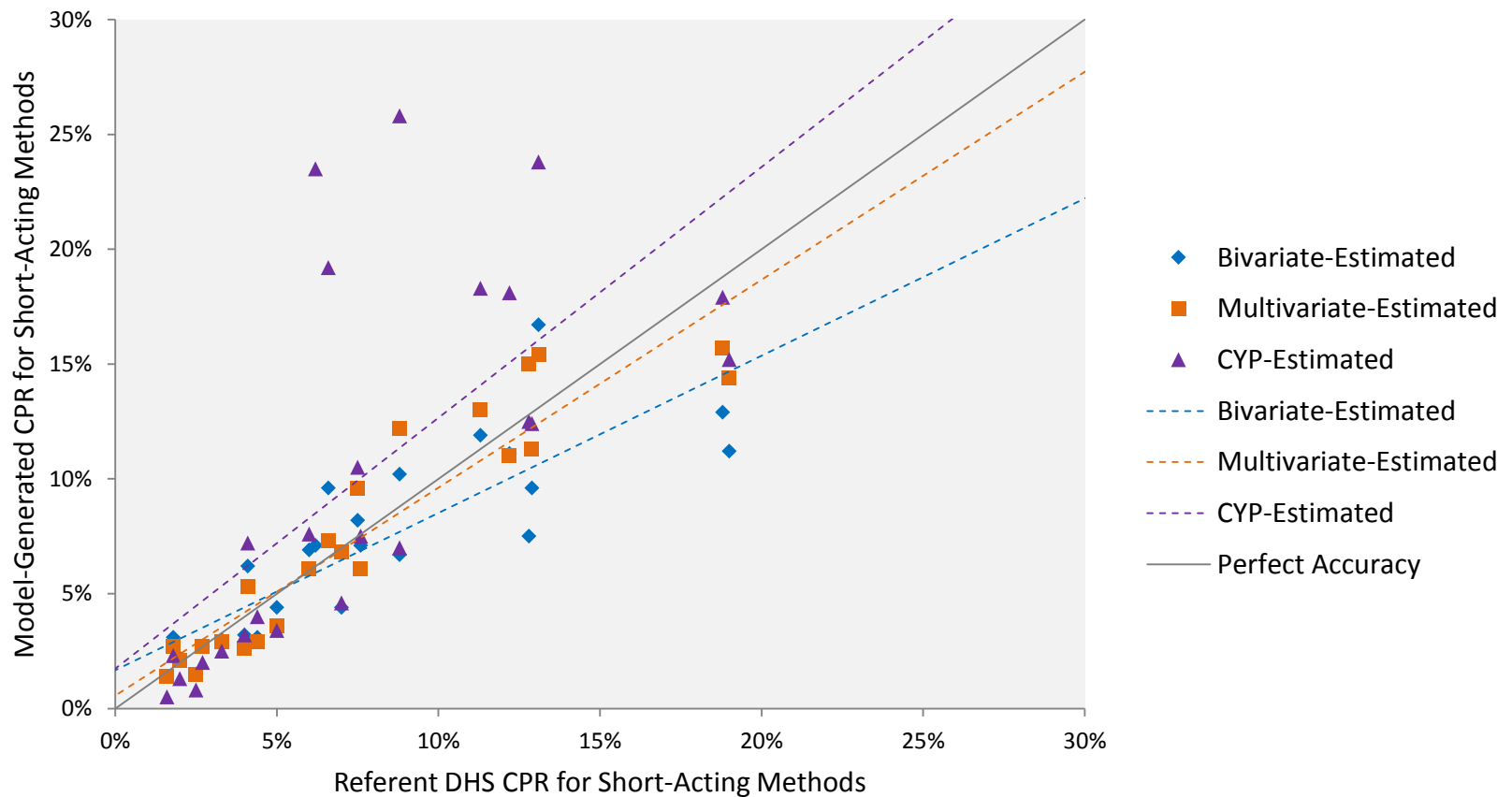
- All models except CYP-based condoms model estimated public-sector prevalence of short-acting methods to within 2 percentage points in at least 85 percent of countries
- Regression models = most accurate

CPR Estimates for Injectable Contraceptives

Model-generated prevalence estimates were generally more accurate for injectables than for other methods.



CPR Estimates for Short-Acting Methods (3 methods combined)



Limitations

- Product-specific issues (condoms)
 - May not be used immediately
 - Dual use
- Variations in logistics data available
 - Issues data
 - Forecast data
 - Dispensed-to-user data
- Small sample size

Conclusions

- Most models able to provide relatively accurate prevalence estimates
- Potential for using logistics data to provide low-cost interim CPR estimates for injectables and orals when timely survey data are unavailable
- CYP-based model is easiest to use and interpret
 - we recommend using it for estimating national prevalence rates for injectables and orals

Future Research Recommendations

- Develop similar models for:
 - long-acting methods
 - beyond the public sector
 - at the subnational level
- Refine models when more data (and more dispensed-to-user data) become available
- Consider reexamining CYP conversion factors for condoms, and/or incorporating dual use in CYP models

Thank You

Team:

Marc Cunningham

Ariella Bock

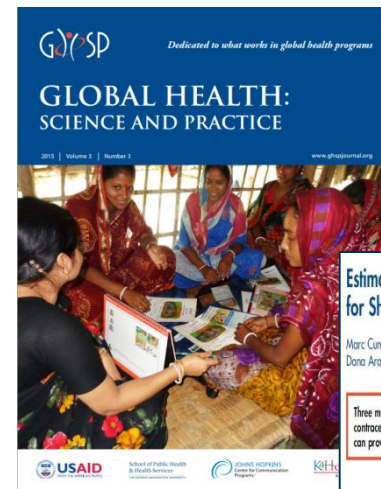
Niquelle Brown

Suzy Sacher, ssacher@jsi.com

Benjamin Hatch

Andrew Inglis

Dana Aronovich



Estimating Contraceptive Prevalence Using Logistics Data for Short-Acting Methods: Analysis Across 30 Countries

Marc Cunningham,^a Ariella Bock,^a Niquelle Brown,^b Suzy Sacher,^c Benjamin Hatch,^c Andrew Inglis,^a Dana Aronovich^d

Three models showed strong correlation between public-sector logistics data for injectables, oral contraceptives, and condoms and their prevalence rates, demonstrating that current logistics data can provide useful prevalence estimates when timely survey data are unavailable.

ABSTRACT

Background: Contraceptive prevalence rate (CPR) is a vital indicator used by country governments, international donors, and other stakeholders for measuring progress in family planning programs against country targets and global initiatives as well as for estimating health outcomes. Because of the need for more frequent CPR estimates than population-based surveys currently provide, alternative approaches for estimating CPRs are being explored, including using contraceptive logistics data.

Methods: Using data from the Demographic and Health Surveys (DHS) in 30 countries, population data from the United States Census Bureau International Database, and logistics data from the Procurement Planning and Monitoring Report (PPMR) and the Pipeline Monitoring and Procurement Planning System (Pipeline), we developed and evaluated 3 models to generate country-level, public-sector contraceptive prevalence estimates for injectable contraceptives, oral contraceptives, and male condoms. Models included: direct estimation through existing couple-years of protection (CYP) conversion factors, bivariate linear regression, and multivariate linear regression. Model evaluation consisted of comparing the referent DHS prevalence rates for each short-acting method with the model-generated prevalence rate using multiple metrics, including mean absolute error and proportion of countries where the modeled prevalence rate for each method was within 1, 2, or 5 percentage points of the DHS referent value.

Results: For the methods studied, family planning use estimates from public-sector logistics data were correlated with

