The impact of local supply of popular contraceptives on women's unmet need for family planning: Findings from seven PMA countries

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Research Question

The availability of contraceptives is an important human right (Choi, Fabic, and Adutenji 2016; Hardee et al. 2014; WHO 2014) and is monitored under FP2020 (FP2020 2013, 2015). The goal of this research is to assess its impact on women's use of contraceptives. Specifically, we ask whether the greater availability of popular contraceptive methods across local service delivery providers (SDPs) is associated with less unmet need for contraceptives among nearby women.

Previous research findings are mixed. Some have found that greater contraceptive supply increases contraceptive use (Bongaarts 1978; Jain et al. 2012; Ojakaa 2008; Shelton et al. 1999). Others have found that more contraceptive options are beneficial in satisfying women's family-planning needs. In a recent study of rural married women in Ethiopia, Shiferaw et al. (2017) found that greater contraceptive choice at SDPs was associated with a greater likelihood of modern contraceptive use among nearby women.

But findings are not uniform. Other research discerns no significant relationship between contraceptive supply and demand for contraceptives (Casterline, Perez, and Biddlecom 1997; see also Pritchett 1994). As an example, a recent study of five countries in sub-Saharan Africa (Zimmerman et al. 2019) found that contraceptive stock-outs in nearby health facilities were generally not associated with women's likelihood of using contraception.

One explanation for the discrepancy in previous empirical research could be the

measurement of contraceptive supply. Studies can focus on the overall availability of contraceptives within an area, or on the number of facilities in that area experiencing stockouts. Measuring stockouts does not necessarily capture all shortages in family planning methods because some facilities never carry some methods. For example, drug stores are unlikely to ever stock intra-uterine devices (IUDs), so those SDPs will not report stock-outs of IUDs. However, a region with zero stockouts might still have a shortage or IUDs. We avoid this issue by focusing on the availability of contraceptives rather than shortages in them.

Previous studies have also tended to count stockouts in any contraceptive method, reasoning that a broad choice of options is most conducive to contraceptive use. While it is true that more contraceptive options are conducive to modern contraceptive use, this does not necessarily imply that all stockouts are equivalent. Measurements that make such a presumption may miss effects that occur when access to the most popular family planning methods is restricted. There may also be a threshold effect, that is, a basic level of contraceptive supply that must be exceeded before more choice begins to matter. To test this, in this analysis, we focus on the supply of the two most popular family planning methods within communities.

Data and Methods

Data

We use IPUMS Performance Monitoring for Action (IPUMS PMA; Boyle, Kristiansen & Sobek 2019) to study factors influencing women's unmet need for contraceptives. The PMA surveys use a multistage, clustered sampling design to draw nationally-representative samples. Enumeration areas (EAs) contain approximately 200 households each, and 33 to 44 households are randomly selected for a household roster interview. Women between the ages of 15 and 49

are then identified from the household roster survey and asked detailed questions about their family planning use and fertility, among other topics.

PMA constitute a unique data source, as measures are available for both individual women and Service Delivery Points (SDPs) near their households. SDPs are facilities that potentially provide family planning methods, such as hospitals, clinics, and pharmacies. SDPs are selected into the PMA sample if their catchment area includes a sampled enumeration area (EA). One respondent for each SDP is selected to answer a set of questions regarding facility characteristics.

Sample

For our analysis, we draw on nationally-representative samples of women of childbearing age from Burkina Faso, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, and Uganda in 2016 and 2017 (PMA Project, 2017). These countries were selected because they have among the highest fertility rates in Africa. We use IPUMS PMA (Boyle, Kristiansen & Sobek 2019) to create our pooled sample, which includes 61,358 women who are not currently pregnant, lactating, menopausal, or sterile, nor missing data for any explanatory variables.

The women in our sample are matched with aggregated SDP survey data based for their enumeration areas. The PMA team generally identified up to three public and three private SDPs in each EA, which in most cases was a full representation of the service provider context. Some EAs in our analysis had as many as nine SDPs, however. The minimum number of SDPs in an EA was one.

Measuring contraceptive supply

Due to a number of factors, such as familiarity and cultural acceptability, women may be more likely to use the same contraceptive method as their peers. For this reason, equating

stockouts of little-used contraceptives with popular methods is problematic. Instead, we take the novel approach of testing the effect of supplying the most commonly-used methods in each woman's EA.

First, we calculated the most popular methods. Women were asked whether they or their partners were doing something or using any method to delay or avoid pregnancy currently or within the past 12 months. If they responded affirmatively, they were asked the method used. The survey allowed for multiple methods to be reported; we use the most effective method used by each woman. The major contraceptives used by women in our sample overall were injectables, implants, the pill, and male condoms. We aggregated women's responses for each EA to calculate the top two family planning methods used there currently or within the past 12 months. On average, just under half of the women in each EA were using the same popular method (see Table 1). Generally, a large majority (average across EAs = 70.0%) were using one of the top two methods.

[Table 1 here]

We created a series of dummy variables indicating whether the most popular two methods of the EA were in stock at each SDP.[1] In the surveys of SDPs, interviewers asked which contraceptive methods the facility usually provides. For each method reported, the interviewer noted if the method was in stock at the time of the interview. We collapse the SDP data to produce a measure at the EA level of the number of facilities that have in stock at least one of the top two family planning methods. We attached this variable to the female records.

Measuring unmet need for contraceptives

[1] We considered assessing whether the top three methods were available. This would be problematic, however, because the third most popular method was often much less popular than the other two; sometimes there was no third choice of method at all.

In the PMA data, unmet need for contraceptives is a constructed variable. PMA defines unmet need using the woman's fertility preferences, current family planning use, and risk factors for pregnancy, and also consider whether the woman's current or most recent birth was unwanted, how long ago she was sexually active, and how long ago her last period was.

Our analysis uses a binary variable as our outcome of interest: whether a woman who wishes to delay or forego future pregnancy is using contraception. Women who have unmet need for contraception are at risk of pregnancy but are not using a family planning method. These women either have unmet need to space or to limit, depending on whether they wish to have another child, but at a later time (spacing), or they wish to not have any more children (limiting). Unmet need is coded 1; need satisfied is 0.

Control variables

To isolate the effect of contraceptive supply on unmet need, we control the number of SDPs in the EA, the woman's age, her age squared (to capture a potential curvilinear relationship), marital status, wealth quintile, urban/rural status, education level, and year.

Burkina Faso data indicate wealth of the household in wealth tertile, whereas all other country files express wealth in quintiles. We use the household level information and the continuous wealth score variable to produce quintiles for Burkina Faso. We replicated the calculation for other samples to ensure comparability.

Statistical approach

We chose a multilevel logistic regression analysis in which the dependent variable is the woman's unmet need status for family planning. The analysis uses clustered standard errors at the primary sampling unit (EA).

We constructed a denormalized weight by multiplying each observation's survey weight

by the ratio of the target population (the number of women aged 10 to 49) in each country for that year, divided by the sum of all individual weights from the sample.

Results

Table 2 shows the descriptive statistics for women and for SDPs. For the female respondents in our sample, the modal categories were rural residence (57.2%); completed primary education (34.2%), and married or partnered (63.6%). Households in the wealthiest quintile were somewhat overrepresented (24.7%). The average number of SDPs in each enumeration area was 2.53. Facilities tended to stock the most popular methods of contraceptives. On average, 2.10 facilities in each EA were providing at least one of the two most popular methods.

The preliminary results are provided in the Table 3 below. Model 1 shows the outcome of the logistic regression considering stock-ins. The critical finding is that each unit increase in the number of SDPs carrying at least one of the two most popular methods is associated with 9% lower odds of a woman in the same EA experiencing unmet need (OR = . 91; $p < .05$). The average number of facilities carrying a popular method within an EA is 2.10, so for many EAs, increasing supply by one facility can mean increasing supply by nearly 50%.

As a sensitivity analysis, we compare Model 1 with a model including stock outs (Model 2). The association of stockouts with unmet need appears to be negative in Model 2, although this association is not statistically significant at the .05 probability level. A comparison across Models 1 and 2 confirms our suspicion that studying stock-ins versus stockouts can lead to different conclusions regarding supply-side effects on unmet need.

As expected, given the definition of unmet need, married or cohabitating women are more than 4 times more likely than women who were never married to have unmet need (OR

= 4.62; $p < .001$). Women who are partnered are more likely to use contraceptives, but also have the greatest need for contraceptives, likely because they are currently negotiating issues of family size and child spacing.

There is a socioeconomic gap in terms of demand and access. Each increase in wealth quintile results in a 13% decrease in the probability of unmet need (OR = 0.87; $p < .001$). Table 3, Model 1, also shows that women with higher levels of education are less likely to find themselves with an unsatisfied desire for contraceptives. Compared to women with no education, completing primary school decreases the odds of unmet need by 20% (OR = 0.80; $p < .001$); completing secondary school decreases the odds by 23% (OR = 0.77; $p < .001$); and completing education beyond secondary school decreases the odds by 46% (OR = 0.54; $p < .001$).

Limitations and Next Steps

The relationship between contraceptive supply and unmet need could be reciprocal. While the availability of more popular contraceptives appears to increase contraceptive uptake and lower unmet need, it is also likely that demand for popular products is influencing supply. To unpack the relationship between supply and demand more precisely, we plan to create lag variables of stock-ins in 2016 and 2017 and consider their relationship on women's unmet need in 2018.

Conclusion

Overall, our findings support the premise that greater contraceptive supply is influential in shaping women's family-planning behaviors. This preliminary work shows the promise of a more nuanced measure of contraceptive supply that considers both the popularity of methods within local communities and the availability of those methods in local service delivery providers. If these results continue to hold as we finalize our analysis, this provides an important

insight into ways of reaching the Family Planning 2020 goals.

Table 1. Women using one of the top three contraceptive methods

Number of methods	**Weighted percent of contraceptive users***
Most popular method	48.9%
Top two most popular methods	70.0%
Top three most popular methods	79.4%

Table 2. Descriptive Statistics

Female level				
Age (mean)	28.1			
Urban	42.8%			
Education				
Never	24.9			
Primary	34.2			
Secondary	30.6			
Tertiary	10.4			
Wealth				
Lowest quintile	21.2			
Lower quintile	18.9			
Middle quintile	17.4			
Higher quintile	17.7			
Highest quintile	24.7			
Marital status				
Never married	28.6			
Married or partnered	63.6			
Divorced/separated/widowed	7.8			
Service Delivery Providers in Enumeration Area				
	Mean	St. dev	Min	Max
Average number of facilities in stock of at least one of the top 3 methods	2.10	1.22	0	8
Average number of facilities in the EA	2.53	1.37	1	9

Table 3: Logistic regression: Log odds of unmet need by popular methods in stock, denormalized weight

	(1)		(2)	
	Odds ratio	Confidence Int.	Odds ratio	Confidence Int.
# facilities in stock of 1st or 2nd method	0.91*	(0.82 - 1.00)		
# facilities out of stock of 1st or 2nd method			0.94	(0.87 - 1.03)
# of facilities	1.02	(0.95 - 1.11)	0.97	(0.92 - 1.02)
Age	1.03	(1.00 - 1.06)	1.03	(1.00 - 1.06)
Age squared	1.00	(1.00 - 1.00)	1.00	(1.00 - 1.00)
Marital status (ref. Never married)				
Currently married/Cohabiting	4.62***	(4.00 - 5.35)	4.62***	(4.00 - 5.34)
Divorced/separated/widow	0.81	(0.65 - 1.01)	0.81	(0.65 - 1.01)
Wealth quintile	0.87***	(0.84 - 0.90)	0.87***	(0.84 - 0.90)
Urban	0.86*	(0.77 - 0.97)	0.85**	(0.76 - 0.96)
Education (ref. Never attended)				
primary/middle school	0.80***	(0.73 - 0.89)	0.80***	(0.73 - 0.89)
secondary/post-primary	0.77***	(0.69 - 0.87)	0.78***	(0.69 - 0.87)
tertiary/post-secondary	0.54***	(0.46 - 0.64)	0.54***	(0.46 - 0.64)
Survey Round (ref 2016)	0.92	(0.84 - 1.01)	0.91*	(0.83 - 1.00)
Constant	0.09***	(0.05 - 0.14)	0.09***	(0.05 - 0.14)
Observations	61,358		61,358	
Number of groups	1,458		1,458	

*** p<0.001, ** p<0.01, * p<0.05

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