Increasing the take-up of long-acting reversible contraceptives among adolescents and young women in Cameroon

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“How is this still a thing?”

- **Startling fact #1:**
  - “Currently, almost half of the 6.7 million pregnancies in the United States each year are unintended.” (MDRC’s ICON project)

- **Even more startling fact #2:**
  - 48% of unintended pregnancies in the US occur in the same month when contraception is used (Finer and Henshaw 2006)
Why is this important?

- Maternal mortality ratio $\approx 600$ (per 100K live births)

- Lifetime risk of maternal death $\approx 1$ in 35

- Unintended pregnancies are a major factor in persistently high maternal mortality…
Why is this important?

- Loss of welfare for the mother
- Low age at first birth $\Rightarrow$ negative impacts on the spacing of births & timing of future pregnancies.
- Reduced accumulation of human capital for both the mother & the child.
It’s not like the technology does not exist...

- Long-acting reversible contraceptives (LARCs) are close to 100% effective in preventing unintended pregnancies.

- But, no one is using them *(at least until very recently)*
  - Especially in developing countries
  - Even more true for:
    - Adolescent females
    - Unmarried women, and
    - Nulliparous women
Interventions to maximize human capital accumulation among adolescent females

- Of the interventions, say, the World Bank supports (and others that you can think of), such as:
  - CCTs/UCTs,
  - Girls’ clubs,
  - Vocational training, etc.

- It’s quite possible that an effective intervention to increase the uptake of modern contraceptives would be the most cost-effective option…
  - But, what would such an intervention look like?
It’s a complicated problem...

- **Big picture**: There exists no contraceptive method that is highly effective, convenient to use, and has, on average, minimal side effects.
  - Worse, the side effects are highly idiosyncratic.
  - So are individual preferences…
  - A journey to find the right method for you (for a period of time)

- **Smaller picture**: Supply- and demand-side problems galore…
  - Lack of training and provider bias
  - Misinformation, fear, culture, religion
  - Cost
Redefining the “counseling approach”

- **Old/current paradigm for FP counseling:**
  - “An informed choice model in which individuals are given extensive information to make their own independent choices.”
  - “Tell the client about **ALL** the methods and let her make a decision.”

- **New paradigm/destination:**
  - Shared decision-making based on the client’s goals, needs, and preferences
  - Still patient-centered (respectful, empathetic, and confidential), while hopefully more efficient and realistic (Hoyt et al. 2017)
  - “Elicit client’s preferences, goals, needs, as well as her birth and medical history, and make a recommendation.”
FP3.0 - A Tablet-based Counseling “App”
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Consultation

What issues are you having with IUD?

- Inconvenient (forgot to take pill, facility far to refill)
- Side effects (headache, bleeding, acne, weight gain)
- Cost of method
- Other (not discrete, ineffective)

What are the side effects?

- Headaches (migraines)
- Bleeding
- Acne
- Weight gain
- Discomfort
- Others (not specified)

Consultation

Some women experience changes in their menstrual period after they start using a method of family planning. Other than rare occasions, these changes are normal, and are not a sign that the method is harmful to your health. Some women who use contraceptive implants and injectables stop having a menstrual period and this is not harmful either. None of the methods we will discuss affect your ability to conceive in the future: you can always stop using the method and try to get pregnant right away. Let’s talk about some of the more common things you may experience.

Some methods can cause increased menstrual bleeding and cramping, though this effect subsides for most women after the first three months. How important is it to you to minimize the chances of increased cramping or bleeding in the early stages of adopting a method?

INSTRUCTION
Please read out the answer choices to the patient

- NOT important
- Somewhat important
- Very important

Some methods cause decreased menstrual bleeding over time with some women eventually not having a period at all. As we mentioned before, absence of bleeding is definitely not harmful to your health. In fact, some women like you consider this to be convenient and it is an added health benefit. How important is it to you to maximize the likelihood of maintaining your period?
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Consultation

Are you taking any of the following drugs?

- Anti retroviral (ARV)
- TB drugs (such as rifampicin)
- Barbiturates (such as phenytoin)
- None

Do you experience unexplained vaginal bleeding?

- Yes
- No

Allow us to take your blood pressure

- Enter SYSTOLIC BP reading

Method choice

WARNING: the PILL - POP is contraindicated for this patient at this time
- Patient is taking TB drugs or barbiturates

WARNING: the PILL - COC is contraindicated for this patient at this time
- Patient has a history of hypertension OR systolic bp>=140 or diastolic bp >=90
- Patient is taking TB drugs or barbiturates

WARNING: the INJECTABLE is contraindicated for this patient at this time
- Patient has systolic bp=160 OR diastolic bp=100

Method: IMPLANT

Section not started

COMPLETE INTERVIEW
FP3.0 - A Tablet-based Counseling “App”
Advantages of FP3.0

- Makes the nurse’s job easier
- Empowers the client
- Produces rich data on client characteristics, preferences and outcomes
- And, allows for experimentation…
An adaptive experiment...

- Trying to increase the uptake of LARCs – particularly among adolescents and nulliparous/unmarried women – by:
  1. Randomly vary the **counseling approach** (mimicking the old and the new paradigms within the “app”)
  2. Offering random discounts to learn about the (cross-) **price elasticity** of demand and its heterogeneity by context
- Tailoring counseling to the client (**using contextual bandit algorithms**)
Randomized control trials

Fixed probability of assignment to each treatment*.

Roughly equal number of units assigned to each treatment.

Treatment value estimate

*Note: for illustration only. In our experiment there are 20 treatments.
Randomized control trials

Many individuals assigned to suboptimal treatments (regret).

Good treatments not necessarily estimated more accurately than bad ones.
Adaptive experiments
(multi-armed bandits)

Step 1: At the beginning of the experiment, assign treatments uniformly at random.
Adaptive experiments
(multi-armed bandits)

**Step 2:** Once some data has been collected, **increase** the probability of assignment to more promising arms.
Adaptive experiments
(multi-armed bandits)

Step k: Repeat this procedure in batches, increasing probabilities one assignment as we become more certain about which treatments are good.
Adaptive experiments

(multi-armed bandits)

As experiment progresses, suboptimal treatments are assigned less frequently…

…in the end, more observations assigned to optimal treatments (lower regret).

Tighter confidence intervals around optimal treatment value estimates (more power for hypotheses about better treatments).
Adaptive experiments (contextual bandits)

**Step 1:** Treatments assigned uniformly at random.

**Step 2:** Using contextual (personal) information, discover subgroups and update assignment probabilities for each group.

**Step k:** Retrain algorithm, discover more refined subgroups. Update probabilities to increase personalization.
Contextual bandits

- Tailoring the treatment to the individual client:
  - Random assignment probability not only depends on success (reward) in previous batches, but also on the individual characteristics (context) of the individual.
  - Best treatment in each subgroup can be estimated more accurately.
  - However, new statistical inference challenges due to adaptivity (e.g. Hadad et al, 2019; Deshpande et al, 2017)

- In our adaptive experiment, we are trying to minimize the probability of unintended pregnancies within 12 months for a given budget.
  - We are in the process of identifying a few contexts (adolescent/adult; married/unmarried; nulliparous/higher parity, etc.)
The pilot phase has begun ;-)