Divergent stated preferences for new antiretroviral-based HIV prevention products across adults, adolescents and female sex workers in South Africa

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International Health Economics Congress 2017

Sex, infection and choices: Stated preferences for preventing HIV and other sexually-transmitted infections in high- and low-income countries
Background and motivation

- South Africa has one of the largest and high profile generalised HIV epidemics in the world
  - Estimated 12% prevalence and increasing
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- Predominantly heterosexual epidemic – has some nuances:
  - Women 1.4x more like to be HIV positive than men
  - Adolescent girls 8x more likely to be HIV positive than boys of the same age
  - HIV prevalence for female sex workers (FSWs) in South Africa estimated at 70% (in Johannesburg)
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  - HIV prevalence for female sex workers (FSWs) in South Africa estimated at 70% (in Johannesburg)

- For years, condoms heavily relied on to prevent HIV transmission
  - Many reasons why they have not been effective at preventing a large epidemic
Background and motivation

• New antiretroviral (ARV)-based HIV prevention methods on the brink of roll-out.
  – >5 products in development – different ways of delivering ARV drugs
  – Potential to increase agency of vulnerable groups – no partner participation required
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• New antiretroviral (ARV)-based HIV prevention methods on the brink of roll-out.
  – >5 products in development – different ways of delivering ARV drugs
  – Potential to increase agency of vulnerable groups – no partner participation required
• But:
  – So far, only oral PrEP and intravaginal ring have been proven efficacious
  – Single purpose – only protect against HIV (for the moment)
  – Concerns of substitution from condom use
  – Efficacy ≠ effectiveness => adherence issues
Research Questions

1. What are the key drivers of demand for new HIV prevention products?
2. How much uptake can we expect?
3. How do preferences vary by population?
   a) Heterogeneity within and across groups
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3. How do preferences vary by population?
   a) Heterogeneity within and across groups

Sample size => n=800
Ekhuruleni Municipality

General population sample
Randomised household survey

- 200 adult males
  Sexually active
  Aged 18-45

- 200 adult females
  Sexually active
  Aged 18-45

- 200 adolescent girls
  Aged 16-17

Specific population sample
Respondent-driven survey

- 200 female sex workers
  Commercially active
  Aged 18-45

[Image]
Methods: Discrete Choice Experiment (DCE)

- DCE development:
  - Analysis of focus group data from previous research
  - Four focus group discussions among female sex workers
  - Economic and epidemiological literature review

- Piloting and testing
  - Developed presentation of attributes and levels
  - Lots (!) of revisions to the tools

- Efficient design from piloting priors (minimising D-error) – NGENE software
Methods: Discrete Choice Experiment (DCE)

Here are the products and this is what they do. Please select the product you would most prefer.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>Injection</td>
<td>Oral Prep</td>
<td>Diaphragm and Microbicide Gel</td>
<td>Condom</td>
</tr>
<tr>
<td>HIV Protection</td>
<td>95% risk reduction</td>
<td>75% risk reduction</td>
<td>95% risk reduction</td>
<td>95% risk reduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 of 20 people remain HIV negative</td>
<td>15 of 20 people remain HIV negative</td>
<td>19 of 20 people remain HIV negative</td>
<td></td>
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</tr>
<tr>
<td>Pregnancy Protection</td>
<td>Prevents pregnancy</td>
<td>Prevents pregnancy</td>
<td>Does not prevent pregnancy</td>
<td>Prevents pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>2 times per year</td>
<td>52 times per year (weekly)</td>
<td>Every sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STI Protection</td>
<td>STI Protection</td>
<td>Does not prevent STIs</td>
<td>STI Protection</td>
<td>STI Protection</td>
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<tr>
<td>Prevents STIs</td>
<td>Does not prevent STIs</td>
<td>Does not prevent STIs</td>
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<td></td>
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</tr>
<tr>
<td>Side Effects</td>
<td>Dizziness</td>
<td>No Side Effects</td>
<td>Nausea/feeling sick</td>
<td>No Side Effects</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Methods: Discrete Choice Experiment (DCE)

Here are the products and this is what they do. Please select the product you would most prefer.

<table>
<thead>
<tr>
<th>Product</th>
<th>HIV Protection</th>
<th>Pregnancy Protection</th>
<th>Frequency</th>
<th>STI Protection</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Oral PrEP</td>
<td>Prevents pregnancy</td>
<td>365 times per year (daily)</td>
<td>STI Protection</td>
<td>No Side Effects</td>
</tr>
<tr>
<td>B</td>
<td>Vaginal ring</td>
<td>Does not prevent pregnancy</td>
<td>4 times per year</td>
<td>Does not protect</td>
<td>Nausea/feeling sick</td>
</tr>
<tr>
<td>C</td>
<td>Microbicide Gel</td>
<td>Prevents pregnancy</td>
<td>365 times per year (daily)</td>
<td>STI Protection</td>
<td>No Side Effects</td>
</tr>
<tr>
<td><strong>Condom</strong></td>
<td><strong>Condom</strong></td>
<td>Prevents pregnancy</td>
<td><strong>Every sex</strong></td>
<td><strong>STI Protection</strong></td>
<td><strong>No Side Effects</strong></td>
</tr>
</tbody>
</table>
### Methods: Attributes and levels

<table>
<thead>
<tr>
<th>Product</th>
<th>Oral PrEP</th>
<th>Diaphragm and Microbicide Gel</th>
<th>Microbicide Gel</th>
<th>Vaginal ring</th>
<th>Injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV protection</td>
<td><img src="image" alt="95% risk reduction" /> 19 of 20 people remain HIV negative</td>
<td><img src="image" alt="75% risk reduction" /> 15 of 20 people remain HIV negative</td>
<td><img src="image" alt="55% risk reduction" /> 11 of 20 people remain HIV negative</td>
<td><img src="image" alt="0% risk reduction" /> 0 of 20 people remain HIV negative</td>
<td></td>
</tr>
<tr>
<td>Pregnancy prevention</td>
<td>Prevents pregnancy</td>
<td>Does not prevent pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of use</td>
<td>365 times per year (daily)</td>
<td>Every sex</td>
<td>52 times per year (weekly)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection against other infections</td>
<td><strong>STI Protection</strong> Prevents STIs</td>
<td><strong>STI Protection</strong> Does not prevent STIs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side effects</td>
<td><img src="image" alt="No Side Effects" /></td>
<td><img src="image" alt="Nausea/feeling sick" /></td>
<td><img src="image" alt="Stomach cramps/pain" /></td>
<td><img src="image" alt="Dizziness" /></td>
<td></td>
</tr>
</tbody>
</table>
### Methods: Data collection

<table>
<thead>
<tr>
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<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>name</td>
<td>label</td>
<td>hint</td>
<td>const</td>
<td>corr</td>
<td>required</td>
<td>appearance</td>
<td>relevant</td>
<td>read_only</td>
<td>calc_image</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>select_one decisions</td>
<td>decision_health</td>
<td>Who usually makes decisions about health care for you?</td>
<td>quick</td>
<td>selected(${dadston_health}, '8')</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>text</td>
<td>decision_health_other</td>
<td>Type who usually makes health care decisions</td>
<td>quick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>select_one decisions</td>
<td>decision_money</td>
<td>Who makes decisions about money you spend every day?</td>
<td>quick</td>
<td>selected(${decision_money}, '8')</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>text</td>
<td>decision_money_other</td>
<td>Type who usually makes everyday money decisions</td>
<td>quick</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Methods: Data collection

- Adult Females: 203 recruited, 158 completed DCE, 35 self-reported HIV positive (17%), 10 not sexually active
- Adult Males: 202 recruited, 182 completed DCE, 16 self-reported HIV positive (8%), 4 not sexually active
- Adolescent Females: 204 recruited, 199 completed DCE, 5 self-reported HIV positive (2%) 10 not sexually active
- Female sex workers: 203 recruited, 122 completed DCE, 81 self-reported HIV positive (40%), 0 not sexually active
- Total: 812 recruited, 661 completed DCE, 137 self-reported HIV positive (17%), 14 not sexually active
Methods: Analysis

- Nested logit (NL), mixed multinomial logit (MMNL) and latent class logit models (LC) used to analyse choice data
- Predicted probability analysis used to predict uptake from NL model
Results

- Different ways of presenting these results has been effective to different audiences
- 1) Product and attribute preferences
- 2) Uptake predictions
  - Heterogeneity in uptake among younger women
- 3) Latent class
Results: Product preferences (MMNL)
Results: Product preferences (MMNL)

- STI protection
- Pregnancy prevention
- HIV protection (75% efficacy)

Legend:
- Adult Males
- Adult Females
- Adolescent Females
- FSW
Results: Uptake predictions (NL)

Adolescent women

<table>
<thead>
<tr>
<th>Product</th>
<th>Just HIV protection</th>
<th>HIV and pregnancy protection</th>
<th>HIV, pregnancy and STI protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>PrEP</td>
<td>0%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Intravaginal ring</td>
<td>0%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Injectable ARV</td>
<td>0%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Microbicide gel</td>
<td>0%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>SILCS diaphragm</td>
<td>0%</td>
<td>5%</td>
<td>10%</td>
</tr>
</tbody>
</table>
Results: Uptake predictions (NL)

Adult women

- PrEP
- Intravaginal ring
- Injectable ARV
- Microbicide gel
- SILCS diaphragm

% Predicted uptake

- Just HIV protection
- HIV and pregnancy protection
- HIV, pregnancy and STI protection

USAID
Pepfar
Results: Uptake predictions (NL)

Female sex workers

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<td></td>
<td></td>
</tr>
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<td></td>
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<td>SILCS diaphragm</td>
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Results: Determinants of uptake among under-25s

• Uptake of ring/oral PrEP higher among women who are:
  • Older
  • Currently using contraception
  • Have high HIV knowledge
  • Making no decisions about their lives (bargaining power)
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• Uptake of ring/oral PrEP lower among women who are:
  • Experiencing intimate partner violence
  • In low income households
  • Cohabiting with a sexual partner
  • Engaging in anal sex
## Results: Latent class model (females only)

<table>
<thead>
<tr>
<th>Class</th>
<th>34% of sample</th>
<th>Class 2</th>
<th>19% of sample</th>
<th>Class 3</th>
<th>48% of sample</th>
</tr>
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<tbody>
<tr>
<td><strong>Coeff. (SE)</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>HIV protection (100%)</td>
<td>0.53 (1.79)</td>
<td>7.59 (1.05)**</td>
<td>3.28 (0.64)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy prevention</td>
<td>1.33 (0.19)***</td>
<td>0.27 (0.12)***</td>
<td>0.26 (0.06)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STI protection</td>
<td>1.34 (0.21)***</td>
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</table>

### Class membership probabilities

<table>
<thead>
<tr>
<th>Variable</th>
<th>Class 1 Coeff. (SE)</th>
<th>Class 2 Coeff. (SE)</th>
<th>Class 3 Coeff. (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.23 (0.93)</td>
<td>-1.09 (1.17)</td>
<td></td>
</tr>
<tr>
<td>Female sex worker</td>
<td>1.98 (0.77)**</td>
<td>1.83 (0.96)*</td>
<td></td>
</tr>
<tr>
<td>Adolescent</td>
<td>0.99 (0.46)**</td>
<td>1.42 (0.65)**</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.06 (0.03)**</td>
<td>-0.02 (0.04)</td>
<td></td>
</tr>
<tr>
<td>Experience of IPV in last 12 months</td>
<td>-0.14 (0.17)</td>
<td>-0.19 (0.23)</td>
<td></td>
</tr>
<tr>
<td>Unhappy if self/partner became pregnant</td>
<td>0.03 (0.14)</td>
<td>0.16 (0.19)</td>
<td></td>
</tr>
<tr>
<td>High HIV knowledge</td>
<td>-0.47 (0.15)**</td>
<td>-0.56 (0.21)**</td>
<td></td>
</tr>
<tr>
<td>Alcohol use at last sex</td>
<td>0.34 (0.34)</td>
<td>1.01 (0.33)**</td>
<td></td>
</tr>
<tr>
<td>Report external partners in last 3 months</td>
<td>0.03 (0.36)</td>
<td>-0.12 (0.44)</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.10 (0.18)</td>
<td>0.03 (0.24)</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

• Injectable PrEP favoured by all groups

• Effective products popular, but HIV prevention not the only important driver of demand

• Multipurpose protection from HIV, other STIs, and pregnancy was strongly valued by adolescent girls, less so by older women

• Age, HIV knowledge, and structural risks associated with preference heterogeneity
  – Associated with increased and decreased uptake estimates
Discussion points

• Design issues
  – Complexity of tasks: 3 unlabelled alternatives Vs. 5 labelled products (+ opt-out)
  – Choice and refinement of attributes
    o Heterogeneity of data from piloting and qualitative work
  – Use of pictures
    o Need further work to understand interpretation of risk words and array images

• Sampling
  – Reaching those at risk
    o 204 adolescents!
Discussion points (2)

- Latent class useful for describing heterogeneity
  - Variation by HIV knowledge interesting, but can we target programmes by it?
  - Should we only include class membership/interaction characteristics that services can be targeted with?
- Picking what is relevant for different audiences
Discussion points (2)

• Latent class useful for describing heterogeneity
  – Variation by HIV knowledge interesting, but can we target programmes by it?
  – Should we only include class membership/interaction characteristics that services can be targeted with?

• Picking what is relevant for different audiences

• How can we present results usefully?
  – Choice modellers love tables of numbers, LL, AIC, BIC
  – We have found predicted uptake to be a better characterisation of preferences (and variation)
    o With caveats of hypothetical bias

• Are people interested?
  – Yes
  – But serious doubts that data can be reliably used for planning/policy
Acknowledgements

• All study participants
• Interviewers and staff of Progressus Research and Development
• Bill and Melinda Gates Foundation
• PATH
• UK Economic and Social Research Council

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Thank you

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OPTIONS Consortium Partners