O12.4 IMPACT AND COST-EFFECTIVENESS OF HIV PREVENTION INTERVENTIONS AMONG TRANSGENDER WOMEN SEX-WORKERS IN LIMA, PERU USING MATHEMATICAL MODELLING INFORMED BY STAKEHOLDER ANALYSIS AND HEALTH SYSTEM CAPACITY EVALUATION

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Background HIV incidence remains high among transgender women (TW) in Lima, of whom the majority report sex-work. A stakeholder analysis and a health-system capacity assessment informed a mathematical modelling study to devise a tailored combination prevention programme. We modelled impact and cost-effectiveness of realistic combinations of interventions among TW sex-workers (TW-SW) in Lima.

Methods In an HIV policy dialogue, a stakeholder analysis provided data on acceptability, feasibility, appropriate coverage targets and scale-up times of both novel and (improved) existing interventions. The health system study assessed capacity, costs and needs. Using a published model we simulated HIV transmission among TW-SW, their clients and stable partners, with implementation of combinations of the following interventions: 15% and 10% relative increase in condom use with clients and stable partners respectively, 15% pre-exposure prophylaxis (PrEP) coverage, treatment following new WHO guidelines and "test and offer", both including testing promotion and leading to 65 and 75% coverage respectively. A social/structural component was part of all scenarios. The interventions' individual and combined impact and cost-effectiveness were assessed.

Results Combining increased condom use with clients and treatment under new WHO guidelines resulted in around 50% of new infections averted over 10 years; this was highly cost-effective ($90/DALY averted), under the World Bank threshold though feasibility of condom use increases remains problematic. Treatment in isolation was over the highly cost-effective threshold. A15% coverage of PrEP might be feasible and adds to impact, but is not cost-effective at $1440/year.

Conclusions Implementing WHO treatment guidelines, combined with increased condom use among TW-SW would be highly effective and cost-effective. Inclusion of PrEP adds to impact but requires drastic cost reductions to become cost-effective. Success of all interventions is contingent on effective adherence support. Involving stakeholders in the elaboration of mathematical modelling studies is feasible, and should result in more relevant cost-effectiveness analyses to support programmatic decision-making.

Declaration of conflicts of interest Dr. Guanira was the principal investigator for the Peruvian IPrEX sites. All authors declare having no conflicts of interest.

O12.5 BEHAVIOURAL INTERVENTIONS IMPROVE CONDOM USE AND HIV TESTING UPTAKE AMONG FEMALE SEX WORKERS IN CHINA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction Condom less commercial sex work is a common mode of HIV transmission in China. This study systematically reviews the impacts of behavioural interventions on condom use and HIV testing uptake among female sex workers (FSW) in China.

Methods Chinese and English language peer-reviewed articles published between January 2000 and December 2013 were searched in five electronic databases. Odds ratios (OR) were calculated by comparing the levels of improvements in condom use and HIV testing uptake by various intervention strategies. Study quality was assessed for included studies. This review followed the PRISMA guidelines and was registered in PROSPERO (CRD42014013466).

Results One hundred and twenty-eight studies met inclusion criteria. Meta-analyses indicated that FSW in the post-intervention period were 2.3–5.0 times more likely to use condoms with male clients in their last sexual act and 2.3–3.4 times more likely to consistently use condoms in the last month than in the pre-intervention period. In particular, multiple intervention sessions were more effective in improving condom use among FSW with male clients (OR = 5.6, [4.0–7.8]) than a single intervention session (OR = 3.3, [2.8–3.8]). Behavioural interventions also improved past-12-month HIV testing uptake 4.6 fold (95% CI, 2.9–7.4). Comprehensive intervention programs, which include health education plus additional sexual health care services, testing for HIV infection and counselling services, were more effective (OR = 8.1, [4.0–16.7]) in improving HIV testing uptake compared with health education only programs (OR = 2.7, [1.6–4.5]). Longer intervention duration (>12 months) did not increase effectiveness in improving condom use or HIV testing rate among Chinese FSWs.

Conclusion Behavioural interventions are effective in improving condom use and HIV testing uptake among Chinese FSW. This review highlights both the potentials and limitations of condom promotion interventions targeting female sex workers.

Disclosure of interest statement None.

O13 - Vaginal health and the microbiome

O13.1 THE BROAD DIVERSITY OF CULTIVABLE MICROBIOTA IN PREGNANT WOMEN AND THE DETECTION OF NOVEL ORGANISMS

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Background Our objective was to assess the full range of cultivable microflora from pregnant women and to identify the proportion which represents novel genera or species.

Methods Vaginal swab samples from 451 pregnant women (median gestational age 25 weeks, range 9–39) were transported in an anaerobic transport device. Vaginal fluid was eluted from the swabs, serially diluted and inoculated onto 27 different pieces of culture media. Colonies were subcultured to purity and DNA was extracted. A combination of biochemical tests, 16S rDNA gene sequencing, and restriction fragment length polymorphism (RFLP) were used for identification. A vaginal smear was assessed according to the Nugent criteria.

Results A total of 5688 isolates were recovered, with a mean of 12.6 isolates per sample. Women having a Nugent score of 0–3 had a lower number of cultivable species per sample (2408/255 = 9.4) compared to women having Nugent scores of 4–6 (1168/76 = 15.4) or 7–10 (2112/120 = 17.6). A total of 305 unique bacterial species were recovered, with 62 (20%) representing novel organisms which may have previously been considered uncultivable, including *Megasphaera* phylotypes 1–3, novel *Prevotella* species, and new genera of anaerobic gram negative and positive rods.

Discussion Culture methods detect a greater diversity of microorganisms than has been previously recognised. Multiple novel bacteria will require further characterisation.

Disclosure of interest statement There are no conflicts of interest to disclose. This study was funded by the US National Institutes of Health.

O13.2 HORMONAL CONTRACEPTION IS ASSOCIATED WITH STABILITY AND *LACTOBACILLUS*-DOMINANCE OF THE VAGINAL MICROBIOTA IN A TWO-YEAR OBSERVATIONAL STUDY

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Introduction Hormonal contraception (HC) has been associated with a reduced risk of bacterial vaginosis (BV). We conducted a prospective study to evaluate the relationship between vaginal microbiota and several HC methods.

Methods During 2-years of follow-up, 108 women provided 2,662 mid-vaginal samples. Participants reported three HC methods [oral contraceptive pill (OCP), vaginal ring, implanon]. Controls not taking HC were also followed. Visits were scheduled at baseline, 2 weeks, 4 weeks, 3 months, 6 months, 12 months, 18 months, and 24 months. Additionally, participants self-collected mid-vaginal swabs twice-weekly in the two weeks before each visit. Vaginal microbiota composition was characterised on all samples by 16S rRNA gene analysis of the V3-V4 hypervariable regions. We identified four community state types (CSTs) which were dominated by *Lactobacillus* species. CST-IV-B was characterised by a low relative abundance of *Lactobacillus* spp. and higher proportions of BV-associated bacteria (Gardnerella and Atopobium). A multinomial model for dependence of proportions was used to evaluate the association between CST and HC. Jensen-Shannon distances between all pairs of samples were analysed to assess stability of the microbiota longitudinally.

Results Women on OCPs had more stable bacterial communities than controls during the 2-year follow-up ($p = 0.04$). HC (overall) also tended toward greater stability ($p = 0.10$). The low-*Lactobacillus* CST-IV-B had an 83% lower probability among OCP users and a 55% lower probability among implanon users. CST-II (L. gasseri-dominated) was significantly higher in all HC types compared to controls. Additionally, OCP users were more likely to be CST-III-A (*L. iners*-dominated) and CST-V (L. jensenni-dominated), while CST-III-A was also high among ring users. CST-I (L. crispatus-dominated) was associated with implanon. All reported findings were statistically significant ($p < 0.03$).

Conclusion Women on HC experienced greater stability of the vaginal microbiota over time compared to controls. OCPs and the vaginal ring were protective against transition to a *Lactobacillus*-depleted state.

Disclosure of interest statement The study was funded by the US National Institute of Allergy and Infectious Diseases (NIAID) R01-AI089878. No pharmaceutical grants were received in the development of this study.

O13.3 THE IMPACT OF VAGINAL BACTERIAL BIOFILM ON INTRAVAGINAL RINGS

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Introduction Intravaginal rings are used worldwide, mostly for contraception, and are now being investigated for pre-exposure prophylaxis for HIV and multipurpose technologies that combine antiviral products with contraception. Despite its ubiquitous use, little research has been done to study the effect of the vaginal microbiome on these rings.

Methods The amount of bacterial biofilm was assessed using crystal violet staining (CV) on 403 contraceptive intravaginal rings (CVR) worn for 21 days by 120 women participating in a CVR clinical trial in Rwanda. A subset of 22 CVRs was evaluated by confocal microscopy after Fluorescence *In Situ* Hybridization (FISH) with species-specific probes for *A. vaginae* (Av), *G. vaginalis* (Gv) and for the *Lactobacillus* genus (Lsp). At each CVR-removal visit, vaginal slides were made for Nugent scoring to diagnose bacterial vaginosis (BV) and FISH to assess the presence of Av and Gv biofilm.