Is there an effect of universal ART on sexual behaviours at population level in rural KwaZulu Natal, South Africa. ANRS 12249 Treatment-as-Prevention (TasP) trial

Matthieu Rolland[1,2], Nuala McGrath[3,4,5], Thierry Tiendrebeogo[1,2], Joseph Larmarange[3,6], Deenan Pillay[3,7], François Dabis[1,2], Joanna Orne-Gliemann[1,2], for the ANRS 12249 TasP study group

1. Univ. Bordeaux, Inserm, Bordeaux Population Health Research Center, UMR 1219, F-33000 Bordeaux, France. 2. Univ. Bordeaux, ISPED, Bordeaux Population Health Research Center, UMR 1219, F-33000 Bordeaux, France. 3. Africa Health Research Institute (previously Africa Centre for Population Health), KwaZulu-Natal, Somkhele, South Africa. 4. University College London, Research Department of Infection and Population Health London, United Kingdom. 5. University of Southampton, Faculty of Medicine and Faculty of Human, Social and Mathematical Sciences, Southampton, United Kingdom. 6. Ceped (UMR 196 Paris Descartes IRD), SageSud (ERL Inserm 1244), Institut de Recherche pour le Développement, Paris, France. 7. University College London, Division of Infection and Immunity, London, United Kingdom

Introduction

One of the concerns regarding the scale-up of universal ART is that promoting its preventive benefits could alter HIV risk perception and have a negative impact on sexual behaviours.
We investigated the role of universal ART on sexual behaviours at population level within a Treatment-as-Prevention (TasP) trial conducted in South Africa.

Objectives of the analysis

We analysed the impact of universal ART by comparing differences in sexual behaviour indicators between the two arms over time, differentiating the effect of trial rounds (number of survey rounds since the inclusion of each cluster in the trial) from calendar rounds (number of survey rounds implemented during the trial period).

Methods

ANRS 12249 Treatment-as-Prevention (TasP) trial overview

Registration: ClinicalTrials.gov: NCT01509508; South African National Clinical Trials Register: DOH-27-0512-3974 *(Iwuji et al, Trial 2013)*

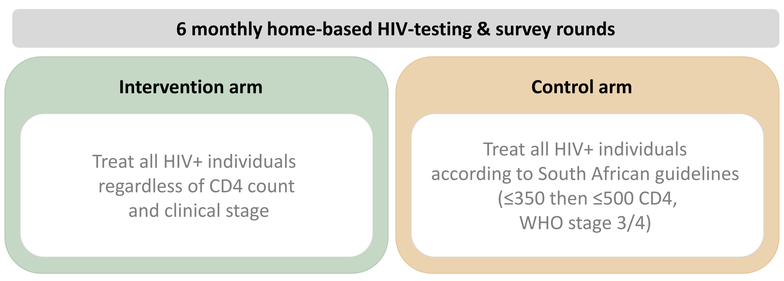
Design: two-arm cluster-randomized trial in 22 clusters

Phased implementation: 2x2 clusters opened in March 2013, an additional 2x3 in 2013 and additional 2x6 in 2014. All followed-up until June 2016

Trial objective: evaluate whether immediate ART offered to all HIV-positive individuals, identified through home-based HIV testing, reduces incidence in a rural and hyper-endemic region of South Africa:

Trial area: approximately 28,000 resident adults, 30% adult HIV prevalence

Eligibility: aged 16 years and older, resident in the community

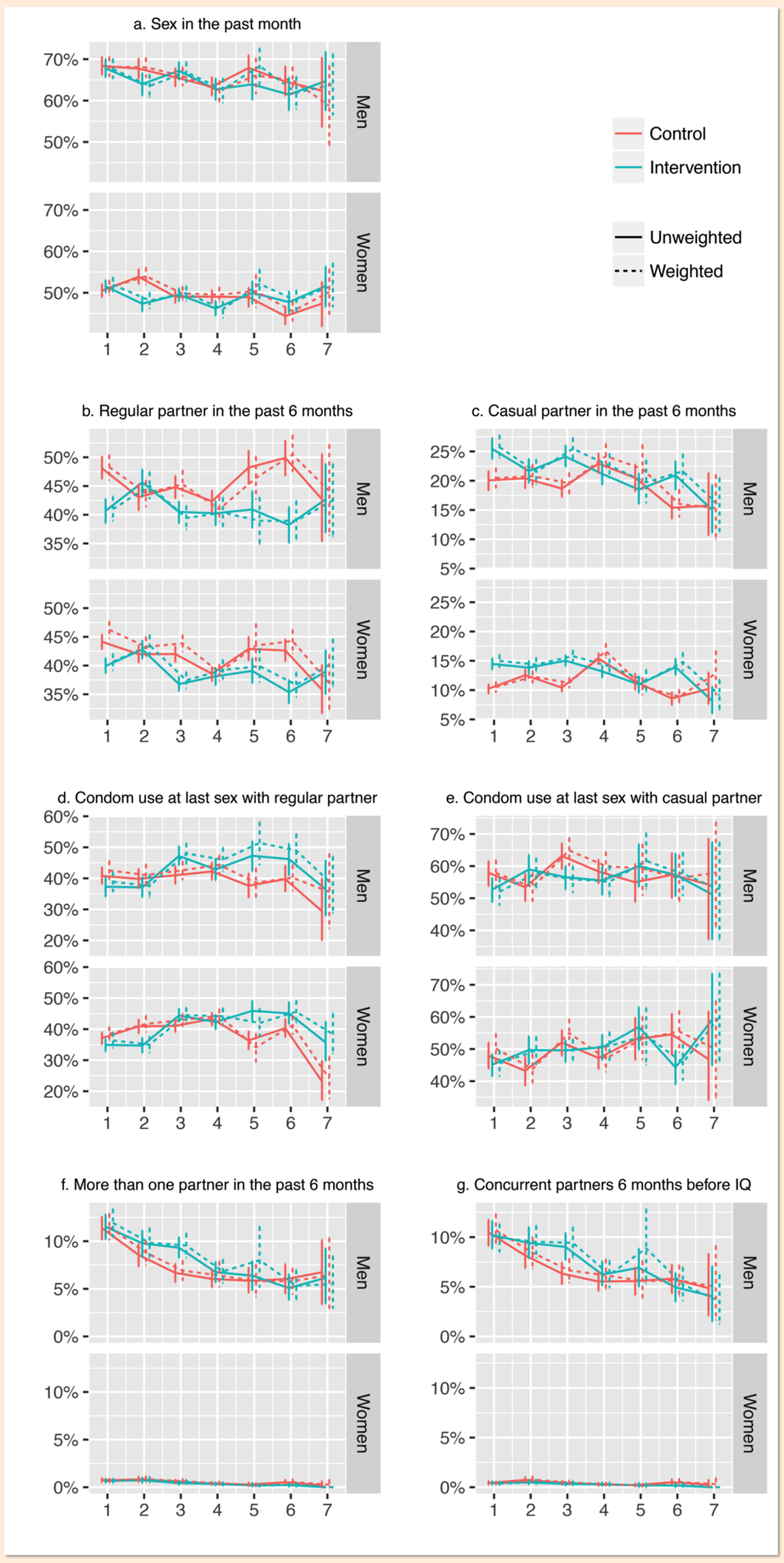


Sexual behaviours questionnaire

An individual questionnaire (IQ) was administered face-to-face at home by fieldworkers/HIV counsellors, at each home-based HIV testing & survey round. Sexual behaviour data was documented for the three most recent sexual partnerships of participants in the past 12 months.

Analysis

- Repeated cross-sectional analysis among participants who responded to ≥ 1 IQ
- Post-stratification weights based on sex, age group, education level, professional status and marital status were computed to adjust for non-response and match the eligible population
- Descriptive analysis: each indicator computed by trial round, sex and arm, with and without survey weights
- Multivariate models (using marginal Generalized Estimating Equations models (GEE) of logistic regression) for each indicator: 1) a full model was computed including study arm, trial round, calendar round and an interaction between arm and trial round; time was included as categorical to account for non-linear trends; 2) the most parsimonious model, with the lowest Quasi-Akaike Criterion (QIC) was kept.
- Software: R version 3.3.2 (include geepack and boot packages).



Results

The number of individuals eligible for a given calendar round varied between 1,145 and 7,339 among men and 1,963 and 13,889 among women (variations due to migration, deaths, individuals reaching the age of 16 and opening of clusters at different time-points). Participation rate at a given calendar round varied between 47% and 71% for men and between 71% and 83% for women.

The figure hereby presents the levels for men and women, and by trial arm, for 7 sexual behaviour indicators over trial rounds, descriptively, weighted and unweighted.

Sexual intercourse in the past 6 months *(Fig a)*
- Men: **no difference between arms**; significantly lower odds of sex in the past 6 months in later trials rounds (4,6, 7) compared to trial round 1; no change over calendar time
- Women: significant interaction between arm/trial round but **no overall pattern across trial rounds or difference between arms**; no change over calendar time

Regular partner in the past 6 months *(Fig b)*
- Men: in the intervention arm, significantly lower odds of reporting a regular partner in the past 6 months compared to the control arm, but this difference was already present at trial round 1, so **no intervention effect**; no difference between trial rounds; calendar rounds 2-3 with higher odds, and calendar rounds 4-5 with lower odds than calendar round 7
- Women: significant interaction between arm/trial round but no overall pattern across trial rounds, **no difference between arms**; calendar rounds 1-3 with significantly higher odds than later.

Casual partner in the past 6 months *(Fig c)*
- Men and women: significant interaction between arm/trial round: participants in the intervention arm had significantly higher odds of reporting a casual partner at trial round 1 i.e. at beginning of the trial due to chance, than those in the control arm; **no overall pattern across trial rounds or difference between arms**
- Men: no change over calendar time
- Women: calendar rounds 1-3 with higher odds than later

Multipartnership and point prevalence estimate of concurrent partnerships *(Fig f & g)*
- Men: in the **intervention arm, significantly higher odds of reporting multiple partnerships and concurrent partnerships than in the control arm**; no statistically significant interaction between arm/trial round (likely insufficient power); odds in each arm decrease in trial rounds 2-5 (compared to trial round 1) with less decrease in the intervention arm; odds increase in trial rounds 6-7 (compared to trial round 1) in the control arm, with less change in the intervention arm; **statistically significant decline in the odds of multiple partnerships and concurrency among men over calendar time** (no modelling for women)

Condom use at last sex with a regular partner *(Fig d)*
- Men: significant interaction between arm/trial round: **in the intervention arm, lower odds in trial round 1 and higher odds in later rounds of condom use at last sex compared to the control arm**; no change over calendar time
- Women: significant interaction between arm/trial round: **in the intervention arm, increased odds by trial round 3, staying similar through trial round 6**; in the control arm higher odds in trial round 2-4 and lower odds in round 7 compared to trial round 1; odds lower in calendar rounds 1, 3 and 5 compared to calendar round 7

Condom use at last sex with a casual partner *(Fig e)*
- Men: **no difference between arms, trials rounds or calendar time**
- Women: **higher odds of condom use a last sex with a casual partner in later trial rounds compared to trial round 1**; changes with calendar round but no linear pattern

Discussion

There were no significant sustained differences in sexual behaviour between arms during the study. In particular sexual disinhibition was not observed for any of the 7 indicators in the universal ART arm. Weighting did not substantially change estimates. We observed a decline in the odds of multiple partnerships and concurrency among men over calendar time.
Continued monitoring of population-level sexual behaviour indicators, in particular multiple partnerships, is needed as the UTT strategy is rolled out.

ANRS 12249 Study Group (by alphabetical order):
Kathy Baisley, Eric Balestre, Till Bärnighausen, Brigitte Bazin, Sylvie Boyer, Alexandra Calmy, Vincent Calvez, Marie-Laure Chaix, François Dabis (co-PI), Anne Derache, Hassimiou Diallo, Hermann Donfouet, Rosemary Dray-Spira, Jaco Dreyer, Kamal El Farouki, Ken Freedberg, Andréa Gosset, Kobus Herbst, John Imrie, Maxime Inghels, Collins Iwuji (Coordinator South), Sophie Karcher, Joseph Larmarange, France Lert, Richard Lessells, Thembisa Makowa, Anne-Geneviève Marcelin, Laura March, Kevi Naidu, Colin Newell, Marie-Louise Newell (co-PI), Nuala McGrath, Nonhlanhla Okesola, Tulio de Oliveira, Joanna Orne-Gliemann (Coordinator North), Delphine Perriat, Deenan Pillay (co-PI), Mélanie Plazy, Mélanie Prague, Camélia Protopescu, Claire Rekacewicz, Tamsen Rochat, Bruno Spire, Frank Tanser, Rodolphe Thiébaut, Thierry Tiendrebeogo, Johannes Viljoen, Thembelile Zuma.