

RESEARCH ARTICLE

# Heterosexual oral and anal sex in Kinshasa (D.R.Congo): Data from OKAPI prospective cohort

Silvia Carlos<sup>1,2,3\*</sup>, Cristina López-del Burgo<sup>1,2,3</sup>, Adolphe Ndarabu<sup>4</sup>, Alfonso Osorio<sup>2,3,5</sup>, Anaïs Rico-Campà<sup>1,2,6</sup>, Gabriel Reina<sup>2,7</sup>, Eduardo Burgueño<sup>4,8</sup>, Jokin de Irala<sup>1,2,3</sup>

**1** Preventive Medicine and Public Health Department, University of Navarra, Pamplona, Spain, **2** IdiSNA, Navarra Institute for Health Research, Pamplona, Spain, **3** Institute for Culture and Society (ICS), Education of Affectivity and Human Sexuality, University of Navarra, Pamplona, Spain, **4** Monkole Hospital, Kinshasa, Democratic Republic of Congo, **5** School of Education and Psychology, University of Navarra, Pamplona, Spain, **6** Biomedical Research Centre Network on Obesity and Nutrition (CIBERObn), Institute of Health Carlos III, Madrid, Spain, **7** Microbiology Service, Clínica Universidad de Navarra, Pamplona, Spain, **8** School of Medicine, University of Mwene-Ditu, Mwene-Ditu, Democratic Republic of the Congo

\* [scarlos@unav.es](mailto:scarlos@unav.es)



**OPEN ACCESS**

**Citation:** Carlos S, López-del Burgo C, Ndarabu A, Osorio A, Rico-Campà A, Reina G, et al. (2019) Heterosexual oral and anal sex in Kinshasa (D.R. Congo): Data from OKAPI prospective cohort. PLoS ONE 14(1): e0210398. <https://doi.org/10.1371/journal.pone.0210398>

**Editor:** Clement A. Adebamowo, Greenebaum Cancer Center, Institute of Human Virology, University of Maryland School of Medicine, UNITED STATES

**Received:** November 6, 2018

**Accepted:** December 21, 2018

**Published:** January 16, 2019

**Copyright:** © 2019 Carlos et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Data Availability Statement:** The minimal underlying data set necessary for replication of this study is available within Harvard Dataverse: <https://doi.org/10.7910/DVN/DKM2ZV>.

**Funding:** Funding was provided by the Government of Spain (Fondo de Investigación en Salud-FIS) (PI16/01908 to GR/SC), the Government of Navarra (045-2015 to SC), and the Institute for Culture and Society of the University of

## Abstract

### Background

Sexually transmitted infections can be spread through oral and anal heterosexual sex. There are few data on these practices in Sub-Saharan Africa. We analyzed the prevalence of heterosexual oral and anal sex among HIV Voluntary Counseling and Testing (VCT) attendees in Kinshasa and the associated sociodemographics, perceptions and behavioral factors.

### Methods

OKAPI (Observational Kinshasa AIDS Prevention Initiative) prospective cohort study. It evaluates the VCT impact on HIV-related knowledge and behaviors at 6 and 12-month follow-up. Since April 2016 until April 2018, 797 persons aged 15–59 years were HIV tested and replied to a baseline interview, including information about anal and oral sex. Descriptive, bi- and multivariate analyses were performed using baseline data.

### Results

Among 718 sexually active participants reporting heterosexual sex, 59% had had oral sex, 22% anal sex and 18% both practices. Among participants reporting “not” having had sex, 6% reported oral sex, 3% anal sex and 1% both. Oral sex was associated with a daily use of the Internet/mobile phone, perceiving low community HIV risk, reporting HIV-related behaviors (multiple partners, inconsistent condom use, anal, paid and forced sex) and having been pregnant. Being married-monogamous was inversely associated with oral sex. Anal sex was directly associated with having other risk sexual behaviors.

Navarra (EASH to JI). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

**Competing interests:** The authors have declared that no competing interests exist.

## Conclusions

Oral and anal sex were common among people reporting heterosexual sex in Kinshasa. Perceiving a low community HIV risk and having other sexual risk behaviors are associated with these practices, which are commonly not considered as risky despite their strong association with HIV/STIs. They need to be considered when designing preventive strategies in Kinshasa.

## Introduction

Although the incidence of HIV has declined in the last decade, in 2016 there were still 1.8 million people newly infected, and about 64% of new infections took place in Sub-Saharan Africa (SSA), where more than half of new infections are among women aged 15–24 years [1,2]. In this region, sexual transmission is the main infection route, mostly through heterosexual contact [3].

Most sexual prevention strategies are focused on biomedical approaches (such as condom or Pre-Exposure Prophylaxis use) and some behavioral ones (as the reduction in multiple sexual partnerships or the avoidance of early sex) [4–6]. However, official preventive recommendations focused on HIV and other Sexually Transmitted Infections (STIs) usually do not include messages about oral or anal sexual practices. Neither are there data on these specific behaviors for many SSA countries [7–21].

However, these extravaginal sexual practices carry a high risk, although people do not perceive it. Many different symptomatic and asymptomatic STIs can be spread through oral or anal sex, including HIV, Human Papillomavirus, Herpes Simplex Virus, Hepatitis B Virus, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Treponema pallidum* or *Trichomonas vaginalis* [22–29]. Other genital microorganisms have also been detected in the oral cavity, such as *Ureaplasma urealyticum*, *U. parvum*, *Mycoplasma hominis*, or *Mycoplasma genitalium* [30,31]. Furthermore, other agents transmitted through feces need to be considered, such as Hepatitis A Virus, *Shigella*, *Salmonella*, *Campylobacter* or *Entamoeba histolytica*, among others. It is now well known that, apart from the sexual and reproductive consequences of these infections [32], different types of cancers can also be developed (oropharyngeal, anal, cervical, vulvar, vaginal or penile cancers). In spite of all these risks, people (and mainly adolescents) have oral or anal sex believing they can avoid both pregnancy and STIs. They even consider that these practices are not “having sex” [33–37].

According to recent data, oral and anal sex are highly prevalent. In high-income countries, national surveys and different studies in the general population have shown a prevalence of people reporting heterosexual oral sex higher than 50% [38–41] and a prevalence around 30% of people reporting heterosexual anal sex [39,41]. Furthermore, there has been an increase in the prevalence of both oral and anal sex (particularly among 16- to 24-year-olds) [42]. In SSA, information on these practices is insufficient among the general population and regarding oral sex. The reported prevalence of oral sex comes mainly from young people and ranges from 8% to 52% [43–45], although some particular studies have shown even higher frequencies [46]. Regarding anal sex, figures range from 4% to 57% [8,16,17,43,44,47–50], with most of the information coming from South African studies.

In the Democratic Republic of Congo (DRC) there are no research data on oral and anal sexual practices, neither in the national Demographic and Health Survey [51]. Although the DRC is not among the SSA countries with the highest HIV prevalences or incidences and that

there has been a decline in the estimated people affected by HIV/AIDS, in 2017 390,000 people were estimated to be living with HIV. Among them 59% know their status and 93% of them were on antiretroviral treatment. Therefore, the country is far from reaching UNAIDS 90-90-90 goals for 2020 (90% of people living with HIV knowing their HIV status; 90% of them receiving antiretroviral therapy and 90% of people on treatment having viral suppression). At the same time, the DRC is among the countries with the highest prevalence of girls reporting sex before 15 years [52]. Therefore, great preventive efforts should be made to avoid new HIV infections and other STIs, especially among youth.

In this study we aim to describe the prevalence of oral and anal sex among participants attending Voluntary Counseling and Testing (VCT) in Kinshasa reporting heterosexual sex. Also, we intend to analyze the sociodemographics, perceptions and behavioral factors associated with these practices.

## Methods

### Study design and participants

Since April 2016 until April 2018 all people aged 15–59 years attending HIV VCT at a reference hospital in Kinshasa were offered to participate in the OKAPI (Observational Kinshasa AIDS Prevention Initiative) prospective cohort study. All those accepting to participate were included in this cohort. It evaluates the impact of the HIV VCT on changes in HIV knowledge and sexual behaviors 6 and 12-months after VCT. People that had received a previous HIV positive test as well as pregnant women were excluded.

### Data collection

Face-to face interviews were carried out at baseline and at 6- and 12-month follow-up. Male and female interviewers were available. Through a pen and paper questionnaire they collected data about the participants' sociodemographics, HIV-related knowledge and beliefs, attitudes, behaviors and exposure to HIV-related information. Information about oral sex (fellatio and cunnilingus) and anal sex was collected for both male and female participants (insertive anal sex only among men). The possible answers were: 'never', 'rarely', 'often' and 'I don't want to answer'. Two new variables were created, 'having ever had oral sex' or 'having ever had anal sex'. In both cases we collapsed the categories 'rarely' and 'often' into the category 'yes' and 'never' and 'I don't want to answer' into 'no'.

### Laboratory analyses

A blood sample was collected from each participant. Consistent with the national protocol in Congo-Kinshasa for HIV diagnosis, rapid diagnostic tests were used: first, Determine HIV-1/2 test and if positive, DoubleCheckGold and Unigold rapid immunoassays.

### Statistical analyses

The main outcomes were having ever had oral sex or anal sex. Sociodemographic and behavioral independent variables were included in the analyses.

We first carried out a descriptive analysis to evaluate the baseline characteristics of study participants. Secondly, we carried out univariate logistic regressions to evaluate the characteristics of participants crudely associated with reporting and not reporting oral and anal sexual practices as well as age-adjusted models. Finally, to evaluate the association between participants' socio-demographics, knowledge/perceptions and behaviors and anal/oral sex, multivariate logistic regression models including all significant variables of the univariate regressions

were conducted. An additional multivariate analysis was carried out to study the association between anal/oral sex and an incident HIV positive test or an STI diagnosis.

All  $p$ -values  $< 0.05$  were considered statistically significant. Analyses were performed using STATA version 12.1 (StataCorp, College Station, TX, USA).

## Ethical issues

Ethical approval from the Research Ethics Committees of the two centers involved was obtained. A written informed consent was collected from each participant or from their parents/guardians in case they were minors.

## Results

### Participants' characteristics

During the study period, 797 participants (mean age: 30; SD: 9.4) were HIV tested and replied to the baseline interview.

At baseline, 58% of participants were women and 32% were aged 15–24 years, most of them women (77%). The majority of the participants reported a middle economic level (76%) and university studies (67%), with 10% of men and 16% of women being students at the time the study took place. Most participants were single (83% of men and 92% of women). Regarding their religion, 95% of participants reported a weekly or daily religious practice.

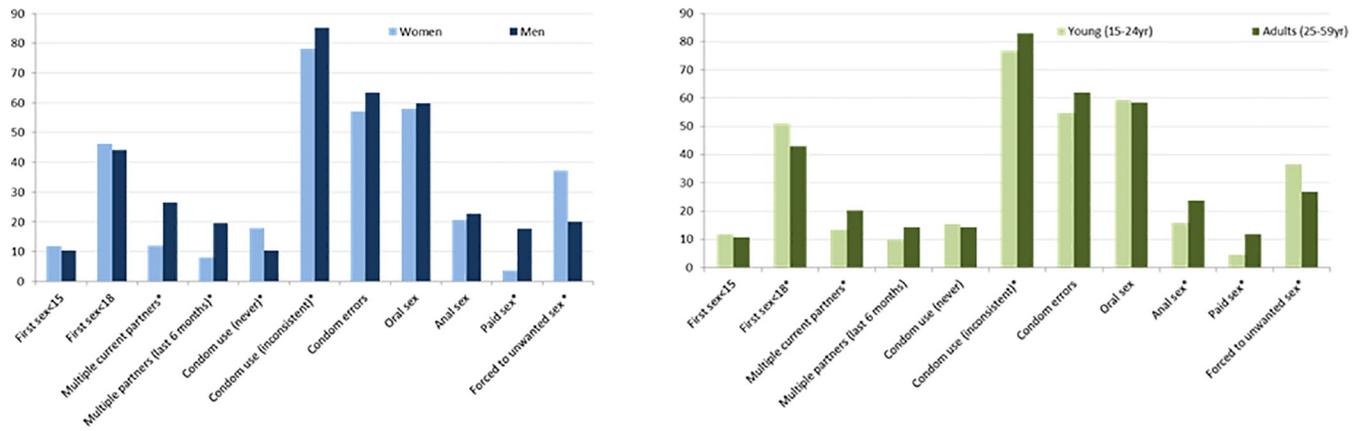
In general, participants requested VCT individually (84%) although some attended it with their partner (16%). Most people reported previous HIV screenings (64% at least one previous test and 20% two or more). However, only 3% of the participants perceived themselves as having a high HIV risk (1% of young aged 15–24 and 3% of adults) and 10% affirmed having ever had an STI diagnosis. When the HIV test was carried out, 3% of participants got a new HIV positive diagnosis at baseline.

Regarding HIV knowledge, although 75% reported talking about HIV/AIDS sometimes or often, misconceptions related to HIV transmission were highly prevalent, with 38% of participants thinking that HIV is transmitted through witchcraft or God's punishment, 24% through social kiss and 17% through mosquito bites.

### Sexual behaviors

With regards to sexual behaviors we found that most participants have had sexual relationships (80% of young and 97% of adults,  $p < 0.001$ ). Fig 1 shows the main HIV-related risk behaviors among sexually active participants reporting heterosexual sex: 11% had had sex before 15 years, 34% at 15–17 years and 45% before 18 years; multiple sexual partnerships were significantly more frequent among men than women, both concerning concurrent partners at study time (26% vs. 12%,  $p < 0.001$ ) and serial partners in the previous six months (20% vs. 8%,  $p < 0.001$ ). Regarding condom use, 93% had ever used condoms, but only 3% had used them consistently (no significant differences existed between women and men, but consistent use was significantly more frequent among young than adults). Among condom users, 60% reported at least one condom use error (late application, early removal, breakage, slippage or leakage), with no significant differences between age and age subgroups. The main reason for condom use was to reduce the probability of pregnancy (67%) and only 23% used them for HIV or STI prevention.

Among sexually active participants reporting heterosexual sex, 59% reported having ever had oral sex (55% fellatio and 55% cunnilingus among women, and 58% and 43% respectively, among men). Regarding anal sex, 19% of women reported receptive anal sex and 23% of men



\* Significant differences between males and females ( $p < 0.05$ ).

\* Significant differences between young and adults ( $p < 0.05$ ).

**Fig 1. Sexual behaviors among the sexually active OKAPI cohort participants (N = 718).**

<https://doi.org/10.1371/journal.pone.0210398.g001>

reported insertive anal practices. Nearly one out of five participants had ever practiced both oral and anal sex (18%). Among participants reporting heterosexual oral sex, only 2% were consistent condom users and 8% had never used condoms. For participants reporting anal sex, the percentages were 1% and 6%, respectively.

Among participants reporting “not” having had sex at baseline, we found that 6% had had oral sex, 3% anal sex and 1% both oral and anal sex.

### Factors associated with reporting heterosexual oral and anal sex

When factors associated with oral sex were analyzed (Table 1), we found that reporting oral sex was positively associated with having a daily use of the Internet and the mobile phone (OR = 1.6; 95% CI: 1.1–2.3 and OR = 3.9; 95% CI: 1.9–8.0, respectively), perceiving low HIV risk in the community (OR = 2.4; 95% CI: 1.5–3.9), having ever been pregnant (OR = 2.3; 95% CI: 1.4–3.8) and having HIV-related sexual risk behaviors, such as multiple sexual partners (OR = 2.3; 95% CI: 1.4–3.9), inconsistent condom use (OR = 2.8; 95% CI: 1.7–4.5), anal sex (OR = 3.6; 95% CI: 2.2–5.9), paid sex (OR = 2.1; 95% CI: 1.0–4.3) and forced sex (OR = 1.9; 95% CI: 1.3–2.9). On the contrary, an inverse association with oral sex was found for being in a monogamous marriage (OR = 0.5; 95% CI: 0.3–1.0).

Anal sex was directly associated with HIV-related sexual risk behaviors (Table 1): multiple sexual partners (OR = 1.6; 95% CI: 1.0–2.5), inconsistent condom use (OR = 2.1; 95% CI: 1.0–4.5), oral sex (OR = 3.2; 95% CI: 2.0–5.1), paid sex (OR = 2.5; 95% CI: 1.4–4.4) and forced sex (OR = 1.5; 95% CI: 1.0–2.2).

### Association between oral and anal sex and HIV and STI diagnosis

We found that 3% of our participants had a new HIV diagnosis and 10% reported having ever been diagnosed an STI but we did not find any significant association between reporting oral or anal sex and an HIV or STI diagnosis, after having adjusted for sex, age, having multiple sexual partners, condom use, forced sex and paid sex.

**Table 1. Factors associated with oral and anal sex among the sexually active OKAPI cohort participants (N = 718).**

	ORAL SEX					ANAL SEX				
	No	Yes	Crude OR	Age-adj OR	aOR*	No	Yes	Crude OR	Age-adj OR	aOR**
	(N = 296)	(N = 422)	(95%CI)	(95%CI)	(95%CI)	(N = 563)	(N = 155)	(95%CI)	(95%CI)	(95%CI)
	(%)	(%)				(%)	(%)			
Sex: women vs. men	57.8	55.9	0.9 (0.7–1.2)	0.8 (0.6–1.1)	0.8 (0.5–1.2)	57.4	54.2	0.9 (0.6–1.3)	1.0 (0.7–1.4)	1.0 (0.5–1.7)
Age (yrs.): 25–59 vs. 15–24	72.3	71.6	1.0 (0.7–1.3)	—	0.7 (0.5–1.1)	69.8	79.3	1.7 (1.1–2.5)	—	1.7 (1.0–2.7)
Married-monogamous: ‘Yes’ vs. other	13.8	6.2	0.4 (0.2–0.7)	0.5 (0.3–0.8)	0.5 (0.3–1.0)	9.1	10.3	1.2 (0.7–2.2)	1.1 (0.6–2.0)	—
Media use										
The internet (daily): ‘Yes’ vs. ‘no’	39.5	53.1	1.7 (1.3–2.3)	1.7 (1.2–2.3)	1.6 (1.1–2.3)	47.1	49.0	1.1 (0.8–1.5)	1.2 (0.8–1.7)	—
Mobile phone (daily): ‘Yes’ vs. ‘no’	87.8	96.2	3.5 (1.9–6.5)	3.4 (1.9–6.3)	3.9 (1.9–8.0)	92.9	92.3	0.9 (0.5–1.8)	0.9 (0.5–1.8)	—
Perceive low community HIV risk: ‘Yes’ vs. ‘no’	82.1	89.6	1.9 (1.2–2.9)	1.9 (1.2–2.9)	2.4 (1.5–3.9)	86.5	86.4	1.0 (0.6–1.7)	1.0 (0.6–1.7)	—
Alcohol consumption (daily): ‘Yes’ vs. ‘no’			2.7 (1.3–5.5)	2.8 (1.4–5.8)	1.9 (0.8–4.3)			2.5 (1.3–4.7)	2.4 (1.3–4.5)	1.6 (0.8–3.1)
Age at first sex (yrs). ‘Yes’ vs. ‘no’	42.6	47.2	0.9 (0.9–0.9)	0.9 (0.9–1.0)	0.9 (0.9–1.0)	41.6	58.7	0.9 (0.9–1.0)	0.9 (0.9–1.0)	0.9 (0.9–1.0)
Ever pregnant (women). ‘Yes’ vs. ‘no’	42.7	61.0	1.6 (1.1–2.2)	1.6 (1.1–2.2)	2.3 (1.4–3.8)	48.9	70.2	1.6 (1.1–2.3)	1.6 (1.1–2.3)	1.5 (0.9–2.7)
Multiple concurrent sexual partners. ‘Yes’ vs. ‘no’	9.8	24.2	2.9 (1.9–4.6)	3.0 (1.9–4.7)	2.3 (1.4–3.9)	14.9	30.3	2.5 (1.6–3.7)	2.4 (1.6–3.7)	1.6 (1.0–2.5)
Condom use: inconsistent vs. never	68.9	89.8	4.2 (2.7–6.5)	4.4 (2.9–6.9)	2.8 (1.7–4.5)	78.0	92.9	3.9 (1.9–7.8)	3.8 (1.9–7.7)	2.1 (1.0–4.5)
Type of sex										
Anal sex. ‘Yes’ vs. ‘no’	8.8	30.6	4.6 (2.9–7.2)	4.7 (3.0–7.5)	3.6 (2.2–5.9)	NA	NA	NA	NA	NA
Oral sex. ‘Yes’ vs. ‘no’	NA	NA	NA	NA	NA	52.0	83.2	4.6 (2.9–7.2)	4.8 (3.0–7.6)	3.2 (2.0–5.1)
Paid sex. ‘Yes’ vs. ‘no’	4.0	13.7	3.8 (2.0–7.2)	4.1 (2.1–7.8)	2.1 (1.0–4.3)	6.6	21.3	3.8 (2.3–6.4)	3.7 (2.2–6.2)	2.5 (1.4–4.4)
Ever partner-forced to unwanted sex. ‘Yes’ vs. ‘no’	21.3	35.5	2.0 (1.4–2.9)	2.0 (1.4–2.8)	1.9 (1.3–2.9)	26.8	40.0	1.8 (1.2–2.6)	1.9 (1.3–2.7)	1.5 (1.0–2.2)

\*Logistic regression model adjusted for sex, age and the significant variables in the crude model: married-monogamous, use of the Internet, mobile phone use, perception of community risk, alcohol consumption, age at first sex, pregnancy, multiple partners, condom use, anal sex, paid sex and forced sex.

\*\*Logistic regression model including the following variables: sex, age, alcohol consumption, early sex, pregnancy, multiple partners, condom use, oral sex, paid sex and forced sex.

NA: Not applicable.

<https://doi.org/10.1371/journal.pone.0210398.t001>

## Discussion

This is the first analytical study in the DRC showing the prevalence of oral and anal sex among people attending HIV Voluntary Counseling and Testing, and the associated demographic and behavioral factors. Among people attending VCT at a reference hospital in Kinshasa who were sexually active and had heterosexual relationships, 59% reported having ever engaged in oral sex, 22% in anal sex and 18% in both anal and oral sex. Even among participants reporting “not” having ever had sex 6%, 3% and 1% had had oral, anal sex and both practices, respectively. Oral sex was associated with a daily use of the Internet/mobile phone, perceiving low

community HIV risk, having ever been pregnant, and reporting HIV-related behaviors. Being married-monogamous was inversely associated with oral sex. Anal sex was directly associated with having other risk sexual behaviors.

Although there are not many studies on these sexual practices in SSA, the available information varies greatly among the different countries and study populations. Data on oral sex from the general heterosexual population is very scarce and mostly limited to young people, with a prevalence ranging from 8 to 52% [43,44]. Concerning data related to people attending VCT in a study carried out in South Africa among heterosexual partners, 78% had ever engaged in oral sex, with 45% having had multiple lifetime oral sex partners and 40% having practiced it before age 21 [53]. In another South African study among people aged 18 years and over visiting HIV VCT centers, 13% had had oral sex with the past three sexual partners [54]. Taking all these data into account we can state that the prevalence of lifetime oral sex in our study population was high, being a risk practice which is not present at all in preventive campaigns or strategies in Kinshasa and therefore should be taken into account.

With regards to anal sex, the highest prevalence in SSA among people not coming from high-risk groups was found in high-school students in Ethiopia among whom 57% reported anal practices [44], but other studies have found lower prevalences [8,10,16,17,43,47–49]. One out of five sexually active people attending VCT in Kinshasa reported anal intercourse. As it was already stated by Halperin in 1999 [55], it has been commonly believed that in SSA heterosexual anal sex practice is rare, but our data and previous evidence show that, although it is probably frequently underreported, the prevalence is remarkably high.

The reasons for practicing oral or anal sex in Africa are: avoidance of vaginal sex, menstruation, fulfillment of male pleasure, but also the prevention of unplanned pregnancy or the reduction of STIs [43,56,57]. However, regarding pregnancy we found that having ever been pregnant was independently associated with oral sex. Contraception has been one of the reasons described in the literature for practicing anal sex but there is no reason described for a higher prevalence of oral sex. A recent study carried out in South Africa among pregnant and postpartum women showed that during pregnancy 44% reported oral sex and 8% anal sex; and 49% and 11%, respectively at postpartum [9]. Teasdale et al. found in a study carried out with pregnant women from Zimbabwe and South Africa, that pregnancy decreased sexual activity and high-risk sex, including anal sex [49].

Regarding the perception that extrvaginal practices may reduce the risk of STIs, as we previously said, oral and anal sex are strongly associated with a high risk of different STIs [15,20,58]. Kalichman et al. stated that '*replacing all acts of anal intercourse with vaginal intercourse would reduce the mean risk of HIV acquisition by approximately 24%*' [15]. If we take into account that the prevalence of STIs is increasing in most countries (including the young group which are particularly susceptible) [7], we can realize that ignoring these practices could imply missing important opportunities for HIV and other STIs prevention [59]. Moreover, omitting messages about these practices could be even misinterpreted as if they were safe [56]. Oral and anal sex are rarely discussed in HIV prevention strategies and there is widespread lack of knowledge about their risks [20,60]. Therefore, there is an urgent need of informing the general population about the risks of oral and anal sexual practices [36]. As an example, the PREPARE (Promoting sexual and reproductive health among adolescents in southern and eastern Africa) intervention carried out in Tanzania did take into account the risks of anal sex and was effective in changing sexual risk behaviors [19,61]. One of the UNAIDS commitments to end AIDS by 2030 is to 'ensure by 2020 that 90% of young people have the skills, knowledge and capacity to protect themselves from HIV in order to reduce the number of new HIV infections' [62]. High-quality education is needed to achieve this goal [63].

With regards to age, we could assume that it would be associated with a higher probability of having had a sexual practice; however, as an effect of generational aspects, and looking at the actual tendencies, young people have today a higher probability of engaging in these extra-vaginal practices which frequency has increased in the last decades [40]. We did not find a significant association for oral sex but we did find an association between anal sex and an older age (25–59 years) compared to 15–24 years, as shown by other authors [64]. On the contrary, Kalichman et al. showed in 2011 that a younger age was associated with anal intercourse [15]. Oral sex is becoming popular among adolescents [65], therefore, there is clearly a need to inform young people on the risks associated with oral and anal sex. Over 60% of the population is under 20 years in the DRC [66] and information on some sexual practices are among Congolese young people's sexual concerns [67,68]. Far from this need, a 2010 WHO review of behavioral interventions in middle and lower-income countries for HIV positive prevention found that none of the interventions focused on young people [14].

We found that being in a monogamous marriage was inversely associated with oral sex. For anal sex we did not find a significant association. There is scarce published evidence on these associations. Kalichman et al. found that anal intercourse was associated with being unmarried [69]. On the contrary, a Nigerian study among 15–24 year olds showed that anal sex was most often reported in spousal relationships [10]. In any case, we have observed that it is not the civil status alone but the sexual risk behaviors and type of sexual partners which are associated with practicing oral and anal sex.

When information sources, knowledge and perceptions were evaluated, we found that oral sex was associated with a daily use of the Internet and mobile phone. This could be explained by the fact that daily users are more likely to visit pornographic sites, where these kind of sexual practices are common [12,70]. Based on the high use of the mobile phone in this population from Kinshasa (93%), these media are an opportunity to send preventive messages, including those concerning oral and anal sex.

The majority of the surveyed participants thought that the risk of HIV in their community was low and perceiving a low risk was strongly associated with practicing oral sex. Misconceptions regarding HIV risk, transmission and prevention are still common in RDC and may determine sexual risk behaviors [71]. Clear and correct information on the risks associated with each sexual behavior is needed.

As other studies have shown [13,38,40,44,53,59,72], we found that practicing oral or anal sex were associated with other sexual risk behaviors, such as a sexual debut before age 18, having multiple partners, inconsistent condom use or paid sex. Among our young study participants 41% reported having had first sex before 18 years and 10% before 15 (lower rates than shown for Kinshasa in the national health survey and in another recent Congolese study [51,73]). This makes it easier to engage in a greater variety of sexual practices. In fact, a study carried out in Tanzania showed that school students having practiced oral sex and anal sex were more likely to report ever having intercourse [74]. Literature shows that the 'normal' sequence of the sexual experience is to begin with oral sex, continue with vaginal sex and then anal sex, with this last practice being associated with having multiple sexual partners [65,75]. People are more conscious that multiple partnership is a risk behavior for HIV but think that oral sex is, on the contrary, a lower risk practice for HIV transmission than vaginal intercourse and thus, they engage in multiple partnerships not thinking in many other STIs. Also, participants reporting oral or anal sex were more likely to report an inconsistent condom use, as it has been described in other studies [10,76].

Finally, oral and anal sex were associated with reporting having ever been forced to have unwanted sex or unwanted practices, as shown by other authors [50,76,77]. In fact, forced sex

itself can include these sexual practices [78,79]. It is important to highlight that HIV/STI transmission risk is even higher in forced sexual practices due to the trauma they can cause [80].

The present study has some limitations. First, we have evaluated sexual behaviors that are perceived as socially unacceptable [20,47,81] and misclassification bias cannot completely be ruled out. However, professional interviewers, individual rooms and anonymity were present to reduce this bias. In any case, this possible misclassification (non-differential) would have biased results towards the null and we still found significant associations. Secondly, we limited questions regarding oral and anal sex to their lifetime prevalence and we did not ask about specific behaviors within each practice, such as the use of condom in oral/anal sex, whether they had these sexual practices with multiple partners or the type of partners involved. Finally, we carried out a cross-sectional analysis of the cohort baseline data and therefore we cannot be sure of the real sequence of the associations found.

Despite these limitations, our study has several strengths. First, this is the first study evaluating the prevalence of oral and anal sex in a Congolese heterosexual population, which contributes to a better knowledge of the HIV epidemic in the country, but also to a better design of the HIV and STI control strategies in SSA. Second, having a high number of participants allowed us to evaluate adjusted associations between many different sociodemographic, knowledge and behavioral factors and extravaginal sexual practices.

## Conclusions

Oral and anal sex are common sexual practices among heterosexual HIV Voluntary Counseling and Testing (VCT) attendees in Kinshasa. They perceive a low HIV risk in the community and have other sexual risk behaviors associated with these extravaginal practices. These practices were commonly not considered as risky despite their strong association with HIV and other STIs. These findings highlight the need of considering oral and anal sex when designing new preventive strategies for heterosexual people in Kinshasa. Information on the risks of these sexual practices needs to be included in preventive campaigns for both men and women, young and adults.

## Acknowledgments

The authors want to thank Monkole Hospital, the interviewers for their essential work and especially the generous participants who make this research possible.

## Author Contributions

**Conceptualization:** Silvia Carlos, Adolphe Ndarabu, Gabriel Reina, Eduardo Burgueño, Jokin de Irala.

**Data curation:** Silvia Carlos, Anaïs Rico-Campà.

**Formal analysis:** Silvia Carlos, Anaïs Rico-Campà.

**Funding acquisition:** Silvia Carlos, Gabriel Reina.

**Investigation:** Silvia Carlos, Adolphe Ndarabu, Alfonso Osorio, Anaïs Rico-Campà, Gabriel Reina, Eduardo Burgueño, Jokin de Irala.

**Methodology:** Silvia Carlos, Cristina López-del Burgo, Adolphe Ndarabu, Jokin de Irala.

**Project administration:** Silvia Carlos, Gabriel Reina.

**Supervision:** Silvia Carlos, Adolphe Ndarabu, Gabriel Reina, Jokin de Irala.

**Writing – original draft:** Silvia Carlos, Cristina López-del Burgo, Adolphe Ndarabu, Alfonso Osorio, Anaïs Rico-Campà, Gabriel Reina, Eduardo Burgueño, Jokin de Irala.

**Writing – review & editing:** Silvia Carlos, Cristina López-del Burgo, Adolphe Ndarabu, Alfonso Osorio, Anaïs Rico-Campà, Gabriel Reina, Eduardo Burgueño, Jokin de Irala.

## References

1. UNAIDS. UNAIDS data 2017. JC2910E. Geneva, 2017.
2. Odimegwu C, Somefun OD, Chisumpa VH. Regional differences in positive sexual behavior among youth in Sub-Saharan Africa. *J Biosoc Sci.* 2018; 10:1–19. [Epub ahead of print].
3. Morris BJ, Wamai RG, Henebeng EB, Tobian AR, Klausner JD, Banerjee J, et al. Estimation of country-specific and global prevalence of male circumcision. *Popul Health Metr.* 2016; 14: 4. <https://doi.org/10.1186/s12963-016-0073-5> PMID: 26933388
4. UNAIDS. Invest in HIV Prevention. Geneva, 2015.
5. UNAIDS. Global AIDS Monitoring 2019. Indicators for monitoring the 2016 Political Declaration on Ending AIDS. Geneva, 2018.
6. UNAIDS. Miles to go. The response to HIV in Western and Central Africa. 2018
7. Torrone EA, Morrison CS, Chen PL, Kwok C, Francis SC, Hayes RJ, et al. Prevalence of sexually transmitted infections and bacterial vaginosis among women in sub-Saharan Africa: An individual participant data meta-analysis of 18 HIV prevention studies. *PLoS Med.* 2018; 15(2):e1002511. <https://doi.org/10.1371/journal.pmed.1002511> PMID: 29485986
8. Shayo EH, Kalinga AA, Senkoro KP, Msovela J, Mgina EJ, Shija AE, et al. Prevalence and risk factors associated with female anal sex in the context of HIV/AIDS in the selected districts of Tanzania. *BMC Res Notes.* 2017; 10(1):140. <https://doi.org/10.1186/s13104-017-2452-9> PMID: 28347357
9. Joseph Davey D, Farley E, Gomba Y, Coates T, Myer L. Sexual risk during pregnancy and postpartum periods among HIV-infected and -uninfected South African women: Implications for primary and secondary HIV prevention interventions. *PLoS One.* 2018; 13(3):e0192982. <https://doi.org/10.1371/journal.pone.0192982> PMID: 29509759
10. Folayan MO, Adebajo S, Adeyemi A, Ogungbemi KM. Differences in Sexual Practices, Sexual Behavior and HIV Risk Profile between Adolescents and Young Persons in Rural and Urban Nigeria. *PLoS One.* 2015; 10(7):e0129106. <https://doi.org/10.1371/journal.pone.0129106> PMID: 26171859
11. Abdool Karim SS, Abdool Karim Q. HIV/AIDS in South Africa. 2nd ed. Cambridge University Press, 2010.
12. Arulogun OS, Ogbu IA, Dipeolu IO. Influence of internet exposure on sexual behaviour of young persons in an urban district of Southwest Nigeria. *Pan Afr Med J.* 2016; 25:261. <https://doi.org/10.11604/pamj.2016.25.261.2630> PMID: 28293377
13. Davidson CL, Richter KL, Van der Linde M, Coetsee J, Boy SC. Prevalence of oral and oropharyngeal human papillomavirus in a sample of South African men: a pilot study. *S Afr Med J.* 2014; 104(5):358–61. <https://doi.org/10.7196/samj.7542> PMID: 25212204
14. Toska E, Pantelic M, Meinck F, Keck K, Haghighat R, Cluver L. Sex in the shadow of HIV: A systematic review of prevalence, risk factors, and interventions to reduce sexual risk-taking among HIV-positive adolescents and youth in sub-Saharan Africa. *PLoS One.* 2017; 12(6):e0178106. <https://doi.org/10.1371/journal.pone.0178106> PMID: 28582428
15. Kalichman SC, Pinkerton SD, Carey MP, Cain D, Mehlomakulu V, Carey KB, et al. Heterosexual anal intercourse and HIV infection risks in the context of alcohol serving venues, Cape Town, South Africa. *BMC Public Health.* 2011; 11:807. <https://doi.org/10.1186/1471-2458-11-807> PMID: 21999574
16. Hoffman S, Levasseur M, Mantell JE, Beksinska M, Mabude Z, Ngoloyi C, et al. Sexual and reproductive health risk behaviours among South African university students: results from a representative campus-wide survey. *Afr J AIDS Res.* 2017; 16(1):1–10. <https://doi.org/10.2989/16085906.2016.1259171> PMID: 28367750
17. Owen BN, Elmes J, Silhol R, Dang Q, McGowan I, Shacklett B, et al. How common and frequent is heterosexual anal intercourse among South Africans? A systematic review and meta-analysis. *J Int AIDS Soc.* 2017; 19(1):21162. <https://doi.org/10.7448/IAS.20.1.21162> PMID: 28364565
18. Abdul R, Gerritsen AAM, Mwangome M, Geubbels E. Prevalence of self-reported symptoms of sexually transmitted infections, knowledge and sexual behaviour among youth in semi-rural Tanzania in the period of adolescent friendly health services strategy implementation. *BMC Infect Dis.* 2018; 18(1):229. <https://doi.org/10.1186/s12879-018-3138-1> PMID: 29778101

19. Mmbaga EJ, Kajula L, Aarø LE, Kilonzo M, Wubs AG, Eggers SM, et al. Effect of the PREPARE intervention on sexual initiation and condom use among adolescents aged 12–14: a cluster randomised controlled trial in Dar es Salaam, Tanzania. *BMC Public Health*. 2017; 17(1):322. <https://doi.org/10.1186/s12889-017-4245-4> PMID: 28415973
20. Githuka G, Hladik W, Mwalili S, Cherutich P, Muthui M, Gitonga J, et al. Populations at increased risk for HIV infection in Kenya: results from a national population-based household survey, 2012. *J Acquir Immune Defic Syndr*. 2014; 66 Suppl 1:S46–56.
21. Green EC, Ruark AH. *AIDS, Behavior, and Culture: Understanding Evidence-based Prevention*. Left Coast Press, 2011.
22. CDC. Sexually Transmitted Diseases. Fact sheets. 2017. [https://www.cdc.gov/std/healthcomm/fact\\_sheets.htm](https://www.cdc.gov/std/healthcomm/fact_sheets.htm)
23. Shigeishi H, Sugiyama M. Risk Factors for Oral Human Papillomavirus Infection in Healthy Individuals: A Systematic Review and Meta-Analysis. *J Clin Med Res*. 2016; 8(10):721–9. <https://doi.org/10.14740/jocmr2545w> PMID: 27635177
24. Chancellor JA, Ioannides SJ, Elwood JM. Oral and oropharyngeal cancer and the role of sexual behaviour: a systematic review. *Community Dent Oral Epidemiol*. 2017; 45(1):20–34. <https://doi.org/10.1111/cdoe.12255> PMID: 27642003
25. Taberna M, Inglehart RC, Pickard RK, Fakhry C, Agrawal A, Katz ML, et al. Significant changes in sexual behavior after a diagnosis of human papillomavirus-positive and human papillomavirus-negative oral cancer. *Cancer*. 2017; 123(7):1156–1165. <https://doi.org/10.1002/cncr.30564> PMID: 28195638
26. Barnabas SL, Dabee S, Passmore JS, Jaspan HB, Lewis DA, Jaumdally SZ, et al. Converging epidemics of sexually transmitted infections and bacterial vaginosis in southern African female adolescents at risk of HIV. *Int J STD AIDS*. 2018; 29(6):531–539. <https://doi.org/10.1177/0956462417740487> PMID: 29198180
27. Meque I, Dubé K, Feldblum PJ, Clements AC, Zango A, Cumbe F, et al. Prevalence, incidence and determinants of herpes simplex virus type 2 infection among HIV-seronegative women at high-risk of HIV infection: a prospective study in Beira, Mozambique. *PLoS One*. 2014; 9(2):e89705. <https://doi.org/10.1371/journal.pone.0089705> PMID: 24586973
28. Moscicki AB, Ma Y, Farhat S, Jay J, Hanson E, Benningfield S, et al. Natural history of anal human papillomavirus infection in heterosexual women and risks associated with persistence. *Clin Infect Dis*. 2014; 58(6):804–11. <https://doi.org/10.1093/cid/cit947> PMID: 24368624
29. Kapiga S, Kelly C, Weiss S, Daley T, Peterson L, Leburg C, et al. Risk factors for incidence of sexually transmitted infections among women in South Africa, Tanzania, and Zambia: results from HPTN 055 study. *Sex Transm Dis*. 2009; 36(4):199–206. <https://doi.org/10.1097/OLQ.0b013e318191ba01> PMID: 19265734
30. Le PT, Hamasuna R, Matsumoto M, Furubayashi K, Hatanaka M, Kawai S, et al. The detection of microorganisms related to urethritis from the oral cavity of male patients with urethritis. *J Infect Chemother*. 2017; 23(10):668–673. <https://doi.org/10.1016/j.jiac.2017.06.011> PMID: 28803864
31. Carter-Wicker K, Utuama O, Omole F. Can trichomoniasis cause pharyngitis? A case report. *SAGE Open Med Case Rep*. 2016; 4:2050313X16682132.
32. Iacobucci G. Syphilis and gonorrhoea cases rose by a fifth in England last year. *BMJ*. 2018; 361:k2502. <https://doi.org/10.1136/bmj.k2502> PMID: 29871938
33. Goldstein R, Halpern-Felsher B. Adolescent Oral Sex and Condom Use: How Much Should We Worry and What Can We Do? *J Adolesc Health*. 2018; 62(4):363–364. <https://doi.org/10.1016/j.jadohealth.2018.01.002> PMID: 29571434
34. Bavoil PM, Marques PX, Brotman R, Ravel J. Does Active Oral Sex Contribute to Female Infertility? *J Infect Dis*. 2017; 216(8):932–935. <https://doi.org/10.1093/infdis/jix419> PMID: 29029270
35. Holway GV, Tillman KH. Timing of Sexual Initiation and Relationship Satisfaction in Young Adult Marital and Cohabiting Unions. *J Fam Issues*. 2017; 38(12):1675–1700. <https://doi.org/10.1177/0192513X15613826> PMID: 29056806
36. Ndongmo TN, Ndongmo CB, Michelo C. Sexual and reproductive health knowledge and behavior among adolescents living with HIV in Zambia: a case study. *Pan Afr Med J*. 2017; 26:71. <https://doi.org/10.11604/pamj.2017.26.71.11312> PMID: 28451048
37. Goldberg SK, Halpern CT. Sexual Initiation Patterns of U.S. Sexual Minority Youth: A Latent Class Analysis. *Perspect Sex Reprod Health*. 2017; 49(1):55–67. <https://doi.org/10.1363/psrh.12020> PMID: 28253427
38. Rohde RL, Adjei Boakye E, Christopher KM, Geneus CJ, Walker RJ, Varvares MA, et al. Assessing university students' sexual risk behaviors as predictors of human papillomavirus (HPV) vaccine uptake

- behavior. *Vaccine*. 2018; 36(25):3629–3634. <https://doi.org/10.1016/j.vaccine.2018.05.022> PMID: 29753605
39. Habel MA, Leichter JS, Dittus PJ, Spicknall IH, Aral SO. Heterosexual Anal and Oral Sex in Adolescents and Adults in the United States, 2011–2015. *Sex Transm Dis*. 2018; 45(12):775–782. <https://doi.org/10.1097/OLQ.0000000000000889> PMID: 29965947
  40. Holway GV, Hernandez SM. Oral Sex and Condom Use in a U.S. National Sample of Adolescents and Young Adults. *J Adolesc Health*. 2018; 62(4):402–410. <https://doi.org/10.1016/j.jadohealth.2017.08.022> PMID: 29174873
  41. Herbenick D, Bowling J, Fu TJ, Dodge B, Guerra-Reyes L, Sanders S. Sexual diversity in the United States: Results from a nationally representative probability sample of adult women and men. *PLoS One*. 2017; 12(7):e0181198. <https://doi.org/10.1371/journal.pone.0181198> PMID: 28727762
  42. Lewis R, Tanton C, Mercer CH, Mitchell KR, Palmer M, Macdowall W, et al. Heterosexual Practices Among Young People in Britain: Evidence From Three National Surveys of Sexual Attitudes and Lifestyles. *J Adolesc Health*. 2017; 61(6):694–702. <https://doi.org/10.1016/j.jadohealth.2017.07.004> PMID: 29169520
  43. Dietrich JJ, Lazarus E, Andrasik M, Hornschuh S, Otwombe K, Morgan C, et al. Mobile Phone Questionnaires for Sexual Risk Data Collection Among Young Women in Soweto, South Africa. *AIDS Behav*. 2018; 22(7):2312–2321. <https://doi.org/10.1007/s10461-018-2080-y> PMID: 29594618
  44. Cherie A, Berhane Y. Oral and anal sex practices among high school youth in Addis Ababa, Ethiopia. *BMC Public Health*. 2012; 12:5. <https://doi.org/10.1186/1471-2458-12-5> PMID: 22216887
  45. Chege W, Pals SL, McLellan-Lemal E, Shinde S, Nyambura M, Otieno FO, et al. Baseline findings of an HIV incidence cohort study to prepare for future HIV prevention clinical trials in Kisumu, Kenya. *J Infect Dev Ctries*. 2012; 6(12):870–80. <https://doi.org/10.3855/jidc.2636> PMID: 23276741
  46. Maswanya ES, Moji K, Yamamoto T, Aoyagi K, Yahata Y, Takemoto T. Sexual behavior and condom use among male students in Dar-Es-Salaam, Tanzania with emphasis on contact with barmaids. *East Afr J Public Health*. 2012; 9(1):39–43. PMID: 23120948
  47. Harling G, Gumede D, Mutevedzi T, McGrath N, Seeley J, Pillay D, et al. The impact of self-interviews on response patterns for sensitive topics: a randomized trial of electronic delivery methods for a sexual behaviour questionnaire in rural South Africa. *BMC Med Res Methodol*. 2017; 17(1):125. <https://doi.org/10.1186/s12874-017-0403-8> PMID: 28818053
  48. Ybarra M, Price-Feeney M, Mwaba K. Prevalence and correlates of anal sex among secondary school students in Cape Town, South Africa. *AIDS Care*. 2018; 30(7):821–829. <https://doi.org/10.1080/09540121.2018.1426824> PMID: 29388443
  49. Teasdale CA, Abrams EJ, Chiasson MA, Justman J, Blanchard K, Jones HE. Sexual Risk and Intra-vaginal Practice Behavior Changes During Pregnancy. *Arch Sex Behav*. 2017; 46(2):539–548. <https://doi.org/10.1007/s10508-016-0818-z> PMID: 27600836
  50. Folayan MO, Harrison A, Brown B, Odetoyinbo M, Stockman JK, Ajuwon AJ, et al. Associations between Forced Sexual Initiation, HIV Status, Sexual Risk Behavior, Life Stressors, and Coping Strategies among Adolescents in Nigeria. *PLoS One*. 2016; 11(5):e0155210. <https://doi.org/10.1371/journal.pone.0155210> PMID: 27163436
  51. Ministère du Plan et Suivi de la Mise en oeuvre de la Révolution de la Modernité (MPSMRM), Ministère de la Santé Publique (MSP) et ICF International, 2014. Enquête Démographique et de Santé en République Démocratique du Congo 2013–2014. Rockville, Maryland, USA: MPSMRM, MSP et ICF International.
  52. Bruni L, Barrionuevo-Rosas L, Albero G, Serrano B, Mena M, Gómez D, et al. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in the World. Summary Report 27 July 2017. [accessed May 18th, 2018].
  53. Vogt SL, Gravitt PE, Martinson NA, Hoffmann J, D'Souza G. Concordant Oral-Genital HPV Infection in South Africa Couples: Evidence for Transmission. *Front Oncol*. 2013; 3:303. <https://doi.org/10.3389/fonc.2013.00303> PMID: 24377087
  54. Peltzer K. Correlates of HIV infection among people visiting public HIV counseling and testing clinics in Mpumalanga, South Africa. *Afr Health Sci*. 2012; 12(1):8–16. PMID: 23066414
  55. Halperin DT. Heterosexual anal intercourse: prevalence, cultural factors, and HIV infection and other health risks, Part I. *AIDS Patient Care STDS*. 1999; 13(12):717–30. <https://doi.org/10.1089/apc.1999.13.717> PMID: 10743535
  56. Duby Z, Colvin C. Conceptualizations of heterosexual anal sex and HIV risk in five East African communities. *J Sex Res*. 2014; 51(8):863–73. <https://doi.org/10.1080/00224499.2013.871624> PMID: 24611445

57. Mtenga S, Shamba D, Wamoyi J, Kakoko D, Haafkens J, Mongi A, et al. How long-distance truck drivers and villagers in rural southeastern Tanzania think about heterosexual anal sex: a qualitative study. *Sex Transm Infect.* 2015; 91(8):576–80. <https://doi.org/10.1136/sextrans-2015-052055> PMID: 26113730
58. O'Leary A, DiNenno E, Honeycutt A, Allaire B, Neuwahl S, Hicks K, et al. Contribution of Anal Sex to HIV Prevalence Among Heterosexuals: A Modeling Analysis. *AIDS Behav.* 2017; 21(10):2895–2903. <https://doi.org/10.1007/s10461-016-1635-z> PMID: 28058564
59. Longo JD, Simaleko MM, Diemer HS, Grésengué G, Brücker G, Belec L. Risk factors for HIV infection among female sex workers in Bangui, Central African Republic. *PLoS One.* 2017; 12(11):e0187654. <https://doi.org/10.1371/journal.pone.0187654> PMID: 29108022
60. Clutterbuck DJ, Flowers P, Barber T, Wilson H, Nelson M, Hedge B, et al. UK national guideline on safer sex advice. *Int J STD AIDS.* 2012; 23(6):381–8. <https://doi.org/10.1258/ijsa.2012.200312> PMID: 22807529
61. Aarø LE, Mathews C, Kaaya S, Katahoire AR, Onya H, Abraham C, et al. Promoting sexual and reproductive health among adolescents in southern and eastern Africa (PREPARE): project design and conceptual framework. *BMC Public Health.* 2014; 14:54. <https://doi.org/10.1186/1471-2458-14-54> PMID: 24438582
62. UNAIDS. Fast-track commitments to end AIDS by 2030. Geneva, 2018.
63. Grabowski MK, Serwadda DM, Gray RH, Nakigozi G, Kigozi G, Kagaayi J, et al. HIV Prevention Efforts and Incidence of HIV in Uganda. *N Engl J Med.* 2017; 377(22):2154–2166. <https://doi.org/10.1056/NEJMoa1702150> PMID: 29171817
64. Wiebe ER. Who uses anal sex for birth control? *Int J Gynaecol Obstet.* 2012; 117(2):185–6. <https://doi.org/10.1016/j.ijgo.2011.12.018> PMID: 22374107
65. Nguyen NP, Nguyen LM, Thomas S, Hong-Ly B, Chi A, Vos P, et al. Oral sex and oropharyngeal cancer: The role of the primary care physicians. *Medicine (Baltimore).* 2016; 95(28):e4228.
66. Parker L, Maman S, Pettifor A, Chalachala JL, Edmonds A, Golin CE, et al. Adaptation of a U.S. evidence-based Positive Prevention intervention for youth living with HIV/AIDS in Kinshasa, Democratic Republic of the Congo. *Eval Program Plann.* 2013; 36(1):124–35. <https://doi.org/10.1016/j.evalprogplan.2012.09.002> PMID: 23063699
67. Nsakala GV, Coppieters Y, Kayembe PK. An innovative approach to using both cellphones and the radio to identify young people's sexual concerns in Kinshasa, Democratic Republic of Congo. *Arch Public Health.* 2014; 72(1):21. <https://doi.org/10.1186/2049-3258-72-21> PMID: 25089197
68. Mbadu Muanda F, Gahungu NP, Wood F, Bertrand JT. Attitudes toward sexual and reproductive health among adolescents and young people in urban and rural DR Congo. *Reprod Health.* 2018; 15(1):74. <https://doi.org/10.1186/s12978-018-0517-4> PMID: 29728101
69. Kalichman SC, Simbayi LC, Cain D, Jooste S. Heterosexual anal intercourse among community and clinical settings in Cape Town, South Africa. *Sex Transm Infect.* 2009; 85(6):411–5. <https://doi.org/10.1136/sti.2008.035287> PMID: 19429569
70. Rice E, Craddock J, Hemler M, Rusow J, Plant A, Montoya J, et al. Associations Between Sexting Behaviors and Sexual Behaviors Among Mobile Phone-Owning Teens in Los Angeles. *Child Dev.* 2018; 89(1):110–117. <https://doi.org/10.1111/cdev.12837> PMID: 28556896
71. Carlos S, Martínez-González MÁ, Burgueño E, López-Del Burgo C, Ruíz-Canela M, Ndarabu A, et al. Misconceptions about HIV infection in Kinshasa (Democratic Republic of Congo): a case-control study on knowledge, attitudes and practices. *Sex Transm Infect.* 2015; 91(5):334–7. <https://doi.org/10.1136/sextrans-2014-051734> PMID: 25416838
72. Mazeingia YT, Olijira L, Dessie Y. Anal sexual experience and HIV risk awareness among female sex workers in Dire Dawa, eastern Ethiopia. *Glob Health Res Policy.* 2017; 2:27. <https://doi.org/10.1186/s41256-017-0047-6> PMID: 29202095
73. Hurley EA, Brahmabhatt H, Kayembe PK, Busangu MF, Mabilia MU, Kerrigan D. The Role of Alcohol Expectancies in Sexual Risk Behaviors Among Adolescents and Young Adults in the Democratic Republic of the Congo. *J Adolesc Health.* 2017; 60(1):79–86. <https://doi.org/10.1016/j.jadohealth.2016.08.023> PMID: 28341016
74. Kakoko DC. Reported heterosexual intercourse and related behaviours among primary school pupils in Kinondoni district, Dar es Salaam, Tanzania. *Cult Health Sex.* 2013; 15(2):235–45. <https://doi.org/10.1080/13691058.2012.738829> PMID: 23140465
75. Chow EPF, Wigan R, McNulty A, Bell C, Johnson M, Marshall L, et al. Early sexual experiences of teenage heterosexual males in Australia: a cross-sectional survey. *BMJ Open.* 2017; 7(10):e016779. <https://doi.org/10.1136/bmjopen-2017-016779> PMID: 29038178
76. Maheu-Giroux M, Baral S, Vesga JF, Diouf D, Diabaté S, Alary M, et al. Anal Intercourse Among Female Sex Workers in Côte d'Ivoire: Prevalence, Determinants, and Model-Based Estimates of the

- Population-Level Impact on HIV Transmission. *Am J Epidemiol*. 2018; 187(2):287–297. <https://doi.org/10.1093/aje/kwx244> PMID: 28633387
77. Gaffoor Z, Wand H, Daniels B, Ramjee G. High risk sexual behaviors are associated with sexual violence among a cohort of women in Durban, South Africa. *BMC Res Notes*. 2013; 6:532. <https://doi.org/10.1186/1756-0500-6-532> PMID: 24330846
  78. Watt MH, Sikkema KJ, Abler L, Velloza J, Eaton LA, Kalichman SC, et al. Experiences of forced sex among female patrons of alcohol-serving venues in a South African township. *J Interpers Violence*. 2015; 30(9):1533–52. <https://doi.org/10.1177/0886260514540807> PMID: 24981006
  79. De Vries H, Eggers SM, Jinabhai C, Meyer-Weitz A, Sathiparsad R, Taylor M. Adolescents' beliefs about forced sex in KwaZulu-Natal, South Africa. *Arch Sex Behav*. 2014; 43(6):1087–95. <https://doi.org/10.1007/s10508-014-0280-8> PMID: 24729133
  80. Baggaley RF, Dimitrov D, Owen BN, Pickles M, Butler AR, Masse B, Boily MC. Heterosexual anal intercourse: a neglected risk factor for HIV? *Am J Reprod Immunol*. 2013; 69 Suppl 1:95–105.
  81. Woto-Gaye G, M'Farrej MK, Doh K, Thiam I, Touré S, Diop R, et al. [Human papilloma viruses: other risk factor of head and neck carcinoma]. *Bull Soc Pathol Exot*. 2016; 109(3):160–4. <https://doi.org/10.1007/s13149-016-0500-7> PMID: 27325173