

Programme for Research & Capacity Building in Sexual & Reproductive Health & HIV in Developing Countries

Research Briefing

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A Summary of Programme Achievements

The **Programme for Research & Capacity Building in Sexual & Reproductive Health & HIV in Developing Countries** is a research programme consortium with core funding from the UK Department for International Development (DFID), and is now drawing to an end. Over its five-year lifetime, the Programme has worked to strengthen the evidence base regarding the impact and cost-effectiveness of interventions to improve sexual and reproductive health (SRH) and reduce HIV incidence in countries of Africa and Asia. Researchers have collaborated with local, national and international stakeholders, organisations and networks to ensure that the results of their high quality research are available to policy makers at national and international levels.

The Programme has focused on three thematic areas:

- 1) Development and evaluation of strategies to prevent risky sexual behaviour
- 2) Integration of sexual and reproductive health and HIV services
- 3) Evaluation of new biomedical tools for the control of HIV and other sexually transmitted infections.

Development and evaluation of strategies to prevent risky sexual behaviour

Effective behaviour change strategies are central to reversing the HIV epidemic and to reducing the transmission of other sexually transmitted infections (STIs).

Adolescent sexual & reproductive health

Nearly half of all new HIV infections are among young people aged 15-24, making them a priority target group for HIV prevention. Two large community randomised trials, involving Programme researchers, measured the effectiveness of schoolbased and peer-led adolescent SRH interventions in Tanzania (*Mema kwa Vijana* study) and Zimbabwe (*Regai Dzive Shiri* study). They showed that young people's knowledge of how to prevent HIV increased, and that these effects were sustained for at least 5 years. However, the interventions did not lead to a reduction in HIV, other STIs or unplanned

pregnancies. These two studies have been influential in shaping the WHO Adolescent and Child Health Department's strategies for curbing HIV incidence in young populations.

In follow-up research, the Mema kwa Vijana research team found that a major barrier to young people's behaviour change is the predominant norms and behaviours of adults in their community, including their own parents. A needs assessment found strong support amongst villagers and local NGOs for interventions to help parents protect their own children from sexual risks. Such interventions are also advocated in national government policy. More attention therefore needs to be paid to the development of parental programmes to improve parent-child relationships which may impact on children's sexual health. A communitybased parenting programme, Mema kwa Jamii, has been developed and is currently being piloted in four contrasting villages in Mwanza Region.

Further information

- "Broadening sexual health promotion for young people in sub-Saharan Africa", Programme Research Briefing no. 6, 2010. Online at: http://www.srhhiv.org/images/stories/briefings/srhhiv-rb6 asrh.pdf
- *Mema kwa Vijana* website: http://www.memakwavijana.org/

Sexual behaviour in general populations

In mature generalised HIV epidemics, such as those in East and Southern Africa, the majority of HIV infections occur within married or cohabiting couples because of premarital infection by one partner or sexual infidelity after marriage. Wider uptake of voluntary counselling and testing (VCT) is making more couples aware of their HIV status and the prevalence of HIV discordant couples is known to be high in many African countries. However, use of condoms in marriage remains much lower than in other relationships.

A study exploring trends in condom use for dual protection from HIV and unwanted pregnancy in Uganda and South Africa is under way. Results show that condom use among cohabiting or married couples has risen dramatically in the 10 years since previous surveys, but is still relatively rare. Analysis is ongoing to understand the attributes, communication strategies and negotiation tactics used by couples to achieve condom use.

The results are expected to encourage the promotion of condoms for the married population. Preliminary results for Uganda suggest the contraceptive motive for condom use is particularly important. Thus positioning condoms as a family planning method, rather than stressing their disease prevention role, may be the main policy message here.

Further information

• Cleland J. Use of the male condom within marriage. *IPPF Medical Bulletin* 2005; 39(3): 1-2.

Sexual behaviour in high-risk populations

A study commissioned by the National AIDS Control Programme (NACP) in Pakistan, funded by DFID Pakistan and conducted by researchers from the London School of Hygiene & Tropical Medicine (LSHTM) and collaborators from the NACP and

Sindh Institute of Urology and Transplantation in Pakistan, has shed much-needed light on the health and behaviour of populations often neglected or persecuted, in South Asia and elsewhere. The research showed that violence, abuse and discrimination are commonly experienced by sex workers and injecting drug users, and can increase the likelihood of HIV and STIs. A future HIV epidemic is likely to be concentrated in transgender sex workers, who have the highest levels of STIs and the highest levels of abuse.

Policy recommendations targeted at transgender sex workers will have little support among society, and will be difficult for the government and public sector to implement, but they could be implemented successfully by NGOs, with donor funding and support. For interventions to be successful and sustainable, the underlying vulnerabilities and environment faced by all of the groups most at risk must be addressed. Interventions must recognize, protect and promote the human rights of all individuals.

In Vietnam, improving condom use among female sex workers (FSWs) and their clients has been an important focus for many years. However, interventions have historically focused on the behaviours of FSWs alone. Population Services International (PSI) have therefore designed an intervention to target clients of sex workers. LSHTM and PSI researchers have carried out an innovative evaluation study of this intervention. It shows the importance of using interpersonal communication in convincing men to get tested for HIV, and of consistent condom use.

- "Confronting the HIV challenge in Pakistan: urgent need for health services in most-at-risk communities", Programme Policy Briefing no. 1, 2009. Online at: http://www.srh-hiv.org/images/stories/briefings/srhhiv-pb1 pakistanhealthservices.pdf
- "Confronting the HIV challenge in Pakistan: how human rights abuses are fuelling HIV risk", Programme Policy Briefing no. 2, 2009. Online at: http://www.srh-hiv.org/images/stories/briefings/ srhhiv-pb2 pakistanhumanrights.pdf
- "HIV in Pakistan: preventing a future epidemic in most-at-risk groups", Programme Research Briefing no. 1, 2009. Online at: http://www.srhhiv.org/images/stories/briefings/srhhiv-rb1_pakistan.pdf
- "STIs and HIV in Pakistan: from analysis to action". Sex Transm Infect 2009; 85(Suppl.2).

Stigma related to HIV treatment

The Kisesa/TAZAMA Cohort Study in Mwanza, Tanzania, involving researchers from the National Institute for Medical Research, Mwanza (NIMR) and LSHTM, has been examining community perceptions of antiretroviral therapy (ART) programmes and the barriers to initiating and sustaining treatment that individuals face. It has found two countervailing influences on HIV-related stigma. The clear health gains of those on therapy, which enable them to return to work and provide or care for their families, have led to a large reduction in feelings of shame for being a burden to family and society. However, new forms of stigma have emerged, with widespread fear that those who are infected can no longer be recognised and therefore are once again sexually attractive.

One of the most disturbing findings in relation to treatment access emerged as a by-product of the research done on integration of family planning advice with provider-initiated counselling and testing in antenatal clinics in Mwanza region. Of all the women who had learned in an antenatal clinic setting that they were HIV infected, only 35% received any form of drug therapy for prevention of mother-to-child transmission and only 24% received the full treatment regimen for themselves

and their newborn infants. Treatment access rates are lower in rural areas than in urban areas. Further research is needed to ascertain whether the main factor preventing women from accessing the treatment services at the time of delivery are transport related, or a result of a failure to disclose their need for treatment to their families.

This research has helped to clarify key areas that ART distribution programmes will need to address to ensure community acceptability, including family-level support. Prevailing stigma against people living with HIV at community and family level can discourage testing and treatment, even where health systems have made considerable efforts to facilitate access and health-seeking behaviour.

Further information

- Roura M, Urassa M, Busza J, Mbata D, Wringe A, Zaba B. Scaling up stigma? The effects of antiretroviral roll-out on stigma and HIV testing: early evidence from rural Tanzania. *Sex Transm Infect* 2009; 85(4):308-12.
- Roura M, Wringe A, Busza J, Nhandi B, Mbata, Zaba B, Urassa M. "Just like fever": a qualitative study on the impact of antiretroviral provision on the normalisation of HIV in rural Tanzania and its implications for prevention. *BMC Int Health & Human Rights* 2009; 9: 22.

Integration of sexual & reproductive health and HIV services

Integrated services for SRH and HIV can improve service accessibility, quality and efficiency, increasing client satisfaction and addressing unmet need. Our aim has been to explore optimal strategies for integrated services in different settings, including groups such as sex workers and men, and public, private and traditional sectors.

Linking SRH and HIV services

While most experts agree that linkages between SRH and HIV/AIDS services will improve public health outcomes, evidence is lacking regarding the impact and cost-effectiveness of these linkages, and which areas of programmatic integration will give the best outcomes. With funding from the Bill & Melinda Gates Foundation, Programme partners IPPF and LSHTM, in collaboration with the Population Council, are evaluating the operational characteristics and impact of linking SRH and HIV services in Kenya, Malawi and Swaziland. The

study primarily involves two 'integration' models: integration of HIV voluntary counselling and testing (VCT)/ART into family planning services, and integration of HIV VCT/ART into prenatal care services. This multi-disciplinary research programme, due to finish in 2012, is expected to be highly influential in terms of lessons learnt for policy makers and programme managers in both government and non-government sectors.

- Mitchell M, Mayhew SH, Haivas I. *Integration revisited*. Millennium Project Background Paper on Integration of Sexual and Reproductive Health Services. UNDP, Millennium Project, 2006. Online at: http://www.unmillenniumproject.org/documents/Mitchell_Mayhew_and_Haivasfinal.pdf
- IPPF. Sexual & reproductive health and HIV. Linkages: evidence review and recommendations. 2009. Online at: http://www.ippf.org/en/Resources/Reports-reviews/Linkages+Evidence+Review+and+Recommendations.htm

Programme researchers have also been involved in a study funded by the World Health Organization (WHO) on integrating family planning advice into HIV VCT in the context of prevention of mother-to-child transmission (PMTCT) antenatal clinics in Tanzania. This has shown that HIV-infected women have family planning patterns and past histories of family planning use that are different to those who are uninfected.

In a follow-up survey of women around 1 year postpartum who had undergone antenatal VCT, unmet need for contraception was significantly lower in HIV+ than in HIV- women, mainly because HIV+ women practised postpartum abstinence for longer. Respondents who had received a positive antenatal diagnosis had a smaller ideal family size and half the odds of wanting another child compared with HIV- respondents. HIV+ women overwhelmingly desired to stop childbearing, mainly due to worries about leaving their children orphaned. However, they also had to consider the heavy stigma of childlessness, which emerged as stronger than HIV-related stigma.

A further finding of relevance to integrating family planning counselling into antenatal services was that reproductive behaviour in the postpartum period was markedly different from at other times: women tended to underestimate their pregnancy risk postpartum, leading to low hormonal contraceptive use but higher condom use, and unplanned pregnancies. Major barriers to contraceptive use included not having resumed menses (even for women over a year postpartum), fear of contraceptive side-effects and partner's disapproval, which calls for improved antenatal and postnatal contraceptive counselling (preferably with partner involvement).

Counselling women on contraception at antenatal clinics in the context of post-test HIV counselling made them more likely to intend to use contraception in the future than the control group who received no extra family planning counselling, but not more likely to use it in the postpartum period, which could suggest persisting misconceptions about postpartum fertility. The findings point to numerous potential benefits of offering family planning counselling as part of antenatal services, particularly in clinics offering HIV VCT.

Male circumcision

Following the findings of 3 large community-based trials, adult male circumcision (AMC) is regarded as one of the prime HIV prevention strategies, in

particular for parts of sub-Saharan Africa where it is not practised and HIV incidence is high. The challenge is now to operationalise and scale up AMC services. Besides the continued work of Helen Weiss of LSHTM and colleagues at international level with WHO, UNAIDS and other coalitions, Programme partners are involved in work on the ground to promote and scale up AMC services.

In Tanzania, NIMR has been closely associated with the process of developing a national intervention programme and has been commissioned to undertake a national situational analysis of the existence and acceptability of AMC services using a WHO model. In South Africa, RHRU has been instrumental in providing the international scientific evidence to SANAC (the South African National AIDS Council) and in brokering discussions with various stakeholders, including traditional healers.

In Swaziland in 2009, the government passed a National Policy on Male Circumcision for HIV Prevention, and requested PSI to support the integration and scale up of the minimum package of AMC services into the public, private and NGO health sectors to reach 80% of the 150,000 males aged 13-29 years in the country. PSI and LSHTM researchers conducted research to assess the motivators and barriers regarding AMC services before embarking on a large-scale and costly programme. The research has shown that while there is real concern for risk compensation, double protection (getting circumcised and using condoms) seems an acceptable concept. The fear that testing is mandatory acts as a barrier, and from high testing rates (85%) and low HIV rates (3% among those circumcised) during the first 10 months of roll out, it seems that it is the more cautious men who are coming forward first.

In Ghana, WHO, KNUST and LSHTM held a meeting to discuss how Ghana, a traditionally circumcising country, has practiced circumcision over the past years with training for traditional circumcision providers in the field of infection prevention. This has provided guidance to WHO documents.

- Weiss H, Halperin D, Bailey R, Hayes R, Schmid G, Hankins C. Male circumcision for HIV prevention: from evidence to action? *AIDS* 2008; 22(5): 567-74.
- "Male circumcision and HIV", Programme Research Briefing no. 5, 2010. Online at: http:// www.srh-hiv.org/images/stories/briefings/ srhhiv_rb5_circumcision.pdf

Evaluation of new biomedical tools for the control of HIV and other sexually transmitted infections

New biomedical tools can improve the access of vulnerable groups, such as women, to SRH and HIV care and prevention. They can also provide new ways of reducing or preventing HIV/STI transmission, or prevent the development of other SRH complications.

Point-of-care diagnostic tests for syphilis

Globally, the annual number of foetal and perinatal deaths from maternal syphilis is greater than the number of deaths of children <15 years from HIV/AIDS. Many babies also suffer serious permanent defects due to congenital syphilis. Our research has shown that new user-friendly point-of-care (POC), rapid diagnostic tests for syphilis perform well in screening programmes for pregnant women, and these tests have been made available at discounted prices through the WHO bulk procurement programme.

In Tanzania, our results encouraged the government to agree to introduce one POC test as a demonstration project, which we will evaluate. The Brazilian government has also decided to use them for screening hard-to-access populations in the Amazonas Region, following several evaluations we conducted in the region. A study funded by the Bill & Melinda Gates Foundation is seeking to develop strategies for, and evaluate the impact of, scaling up the use of POC syphilis tests in various populations, including in Brazil, China, Haiti, Tanzania, Uganda and Zambia.

In 2009, the decision was made to use these tests for antenatal screening in Ghana and they will now be rolled out nationally to all antenatal clinics in the country. Programme partners LSHTM and KNUST are involved in the operational and economic evaluation of the programme.

Further information

- Mabey D, Peeling R, Ballard R et al. Prospective, multi-centre clinic-based evaluation of four rapid diagnostic tests for syphilis. *Sex Trans Infect* 2006; 82 (Suppl V): v13-16.
- "Screening for syphilis during pregnancy in Ghana", Programme Research Briefing no. 3, 2010. Online at: http://www.srh-hiv.org/images/stories/briefings/srhhiv-rb3-syphilisscreeningghana.pdf

Herpes simplex virus (HSV) treatment for HIV prevention

LSHTM scientists have previously demonstrated the important reciprocal synergistic relationships between Herpes simplex virus type-2 (HSV-2) and HIV. The logical next step was to conduct randomised trials to test the hypothesis that the HSV-2 cofactor effect on HIV could be influenced by HSVspecific control interventions. Whilst trials of herpes suppressive therapy conducted by Programme researchers in Tanzania, South Africa and Burkina Faso have shown that long-term herpes treatment has the potential to reduce HIV levels in genital secretions and blood by as much as 70%, this was shown not to be enough to reduce HIV transmission, nor to prevent HIV acquisition when provided to HIV-uninfected people. However, one large trial among sero-discordant couples did demonstrate that HSV treatment among HIV-infected individuals could decrease the rate of HIV disease progression by 17%, an outcome that had been predicted by modelling studies by Programme researchers.

In addition, trials of episodic therapy conducted in Ghana, Central African Republic, South Africa and Malawi have shown that short-term herpes treatment added to antibacterial syndromic treatment can improve ulcer healing and HIV genital shedding in men but not in women. These findings have led to the addition of HSV treatment in international (WHO) and national genital ulcer disease management guidelines.

- Watson-Jones D, Weiss HA, Rusizoka M et al. Effect of herpes simplex suppression on incidence of HIV among women in Tanzania. *N Engl J Med* 2008; 358(15): 1560-71.
- Delany S, Mlaba N, Clayton T et al. Impact of aciclovir on genital and plasma HIV-1 RNA in HIV-1 and HSV-2/ HIV-1 co-infected women: a randomized placebocontrolled trial in Johannesburg, South Africa. AIDS 2009; 23(4): 461-9.
- Mayaud P, LeGoff J, Weiss HA et al. Impact of acyclovir on genital and plasma HIV-1 RNA, genital herpes simplex virus type 2 DNA, and ulcer healing among HIV-1-infected African women with genital herpes ulcers: a randomized controlled trial. *J Infect Dis* 2009; 200(2): 216-26.
- "Getting research into policy at international level and in Ghana: the case of genital herpes treatment", Programme Research Briefing no. 4, 2010. Online at: http://www.srh-hiv.org/images/stories/briefings/srhhiv-rb4-grippghana.pdf

Introduction of human papillomavirus (HPV) vaccine and other technologies to control cervical cancer

Cervical cancer, caused by several oncogenic HPV genotypes, is the commonest cause of cancer-related death in women in developing countries. In most resource-constrained countries, screening programmes are very limited or absent. Further, it is known that HIV-related immunosuppression exacerbates the natural history of HPV infection, with faster progression to cervical cancer.

We have reported on the high prevalence of both HPV and HIV and the interplay between these viruses in Tanzania and Burkina Faso, putting millions of women at high risk of cervical cancer. The development of highly efficacious vaccines to prevent HPV infection, and of POC tests to detect oncogenic HPV types, represent two major opportunities to tackle a neglected SRH problem affecting millions of women worldwide.

With local funding from the RAITH Foundation in South Africa, RHRU are studying the feasibility and acceptability of various modes of introduction of the HPV vaccine in the country. In Ghana, KNUST and NHRC, together with health economists at LSHTM, have undertaken an economic evaluation

of cervical cancer control strategies including HPV vaccination.

Mwanza, Tanzania, was chosen as one of two African sites for the evaluation of the safety and immunogenicity of the GSK vaccine (Cervarix®) in young, HIV-uninfected African girls and women, the results of which are due in 2010. Furthermore, we have obtained funding from the Wellcome Trust and a Merck donation of Gardasil® vaccines to study ways of introducing HPV vaccination in schools of the Mwanza region.

Finally, with support from the European Union FP7 Programme, we will study the role and impact of HPV POC tests in the screening and management of HIV-infected women in South Africa and Burkina Faso.

Further information

- Louie KS, de Sanjose S, Mayaud P. Epidemiology and prevention of human papillomavirus (HPV) and cervical cancer in sub-Saharan Africa: a comprehensive review. *Trop Med Int Health* 2009; 14(10): 1287-302.
- "Preventing cervical cancer in sub-Saharan Africa", Programme Factsheet, 2009. Online at: http://www.srh-hiv.org/images/stories/factsheets/srhhiv-rr_hpvfactsheet.pdf
- "Costs of cervical cancer screening in Ghana", Programme Research Briefing no. 2, 2010. Online at: http://www.srh-hiv.org/images/stories/ briefings/srhhiv-rb2-cervicalcancerscreening.pdf

Capacity building

Research capacity building and strengthening is seen as a key strategy to achieve health equity. Capacity to conduct high quality and relevant research has been strengthened across all Programme members through various short courses and fellowships.

In the past, capacity strengthening has been largely at the individual level, yet it is widely acknowledged that long-term support of institutions is essential to strengthen intellectual output and enhance the research environment. Following research showing the dearth of high calibre social scientists involved in research in East Africa, NIMR and MRC SPSHU, with support from Programme funds, conducted a needs assessment for strengthening social science research capacity at NIMR. Funding was then secured from the MRC for a three-year post-doctoral fellowship to be allocated to an East African scholar with 25% of the fellow's time being devoted to strengthening institutional research capacity at NIMR.

Institutional capacity building in SRH research has been the focus of four large grants obtained from the EDCTP by NIMR and RHRU with partners in the UK, France, Belgium and The Netherlands in Europe and Burkina Faso, Mozambique and Uganda in Africa. The recent award of two grants from the Wellcome Trust's African Institutions Initiative will result in large and long-term investments aimed at developing institutional capacity to support and conduct health-related research for our Tanzanian and South African partners.

Further information

"Strengthening social science research capacity". SRH & HIV Bulletin no. 3, July 2008. Online at: http://www.srh-hiv.org/images/stories/bulletin/srhhivbulletin3.pdf

Microbicides

The persistently high rates of HIV infection, particularly among women in sub-Saharan Africa, highlight the need for new and additional female-controlled methods of prevention, such as vaginal microbicides. Programme researchers from RHRU, NIMR and LSHTM have been involved in the Microbicides Development Programme's recent trials of PRO 2000, and researchers from KNUST/Ghana were involved in evaluating another second generation vaginal microbicide (Savvy®).

While the Savvy® trial was discontinued for futility, and the PRO 2000 trial did not show an effect against HIV infection, both of these trials provided an opportunity to deliver HIV prevention education to thousands of women at risk of HIV. The women participating in the trials (and sometimes their male sexual partners) benefited from discovering their HIV status, receiving counselling and referral, and receiving treatment for STIs. The partnerships and trust that developed between researchers, participants and communities have taught us important lessons that we will carry into future HIV prevention studies.

Further information

• Watts C, Foss A, Kumaranayake L, Cox A, Terris-Prestholt F, Vickerman P. Identifying optimal strategies for microbicide distribution in India and South Africa: modelling and cost-effectiveness analyses. International Partnership for Microbicides, 2008. Online at: http://www.ipmglobal.org/pdfs/english/ipm_publications/2008/IPM PolicyReport(English).pdf

Modelling the impact of HIV treatment on HIV transmission

The role of highly active antiretroviral therapy (HAART) in preventing HIV transmission ('Treatment as Prevention' or TASP) has been hotly debated. Modelling studies suggest that high detection rates and treatment of all HIV-infected patients, regardless of levels of immunosuppression, would have the potential to greatly reduce transmission.

Our research in Burkina Faso has shown, however, that even when well suppressed, women taking antiretrovirals still have the potential to transmit HIV through genital shedding. We are studying the factors influencing this compartmentalised HIV genital replication in the Burkina Faso female sex workers cohort over a period of 6 years. We will use this data and other epidemiological data to model the effect of antiretrovirals and other cofactors on HIV transmission from this core group to the general population. There are also plans to conduct with other investigators large randomised trials of HIV TASP campaigns measuring the impact on HIV transmission at population level.

Aiming to influence policy and practice nationally and internationally

Our primary aim in research has been to provide robust evidence to stakeholders at national, regional or international levels. Our research is rigorous, locally relevant and locally owned, combining social sciences, clinical epidemiology, health economics and mathematical modelling in a truly multi-disciplinary approach. We have set up or taken part in multi-centric trials and comparative studies which reflect the diversity of epidemiological and socio-cultural and economic settings in Africa. This means that research results are more likely to be generalisable to a multitude of environments, whilst remaining context specific.

How our work has influenced policy makers

Programme researchers have created multiple opportunities to influence policies at national and international levels, through their participation in various Commissions, Expert Panels or by providing evidence in multiple formats and communication channels. Examples abound in STI management, SRH and HIV integration, male circumcision, microbicides, HSV-2 treatment, HPV vaccination.

Programme contributions to WHO documents in 2005-2010 include:

- Sexually transmitted and other reproductive tract infections: a guide to essential practice. Geneva: World Health Organization, 2005.
- Sexual and reproductive health and HIV/AIDS: a framework for priority linkages. Geneva: World Health Organization, 2005.
- Eliminating congenital syphilis: a global health priority. Geneva: World Health Organization, 2005.
- Global strategy for the prevention and control of sexually transmitted infections: 2006–2015: Key messages. Geneva: World Health Organization, 2006.
- Global strategy for the prevention and control of sexually transmitted infections: 2006–2015. Breaking the chain of transmission. Geneva: World Health Organization, 2007.
- The global elimination of congenital syphilis: rationale and strategy for action. Geneva: World Health Organization, 2007.
- Essential prevention and care interventions for adults and adolescents living with HIV in resource-limited settings. Geneva: World Health Organization, 2008.
- Sexual & reproductive health and HIV linkages: evidence review and recommendations (WHO, IPPF, UNAIDS, UNFPA, UCSF). Geneva: World Health Organization, 2009.
- A strategic approach to strengthening control of reproductive tract and sexually transmitted infections: use of the programme guidance tool. Geneva: World Health Organization, 2009.

Programme Partners

National Institute for Medical Research (NIMR), Mwanza, Tanzania http://www.nimr.or.tz/

Navrongo Health Research Centre (NHRC), Navrongo, Ghana http://www.navrongo.org/

School of Medical Sciences of Kwame Nkrumah University of Science and Technology (KNUST-SMS), Kumasi, Ghana

http://www.knust.edu.gh/pages/index.php?siteid=sms

Reproductive Health and HIV Research Unit (RHRU), University of the Witwatersrand, Johannesburg, South Africa

http://www.rhru.co.za/

London School of Hygiene and Tropical Medicine (LSHTM), London, UK http://www.lshtm.ac.uk/

Social and Public Health Sciences Unit of the Medical Research Council (MRC SPHSU), Glasgow, UK

http://www.sphsu.mrc.ac.uk/

International Planned Parenthood Federation (IPPF)

http://www.ippf.org/

Population Services International (PSI)

http://www.psi.org/

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