Water and sanitation issues in relation to sexual and reproductive health across the female lifespan (WSSRH)

Background White Paper

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A painted mural on the urinal facility at Atono Primary instructs pupils about hand washing (photo by Imelda Akinyi); kindly provided by SWASH+ Assessing the Feasibility and Acceptability of Girls’ Urinals: Final Report
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1. Introduction

The British Council (BC) UK awarded Liverpool John Moores University with a Prime Minister’s Initiative (PMI) 2 ‘Connect’ 12 month grant to formalise and develop a strategic collaboration with a US University (University of Florida) and a country partner (Kenya), from April 2011 to March 2012. The US partner has a strong background in environmental health sciences. They have conducted leading national and international studies and developed a wealth of expertise on public health issues including water and sanitation. For example, SWASH+ [collaborative partners with Department of International Development (DFID), University Florida/Emory University, Kenya’s Ministry of Public Health and Sanitation (MOPHS), and the Great Lakes University of Kisumu] have conducted studies addressing water and sanitation needs in school, which can be accessed through the weblink below.¹ Their expertise has synergy with the research portfolio at the Centre for Public Health (CPH), Liverpool John Moores University, which is positioned within the public health field of population studies. The CPH specialises in work around sexual and reproductive health, HIV, teen pregnancy, wellbeing, alcohol, adolescent risk and violence, and houses the World Health Organization (WHO) Collaborating Centre for Violence Prevention. The third partner is the Kenya Medical Research Institute (KEMRI)/Centers for Disease and Prevention (CDC) Research and Public Health Collaboration which is a unique study site covering a population of ~240,000 people in rural western Kenya. It captures high quality routine health and demographic surveillance data, including that at household and at clinic level, with the opportunity to develop school-based surveillance. Collaboration with the KEMRI/CDC as well as colleagues at MOPHS will facilitate opportunities for local stakeholders (professional and lay) to define priority areas of research.

It is intended that this three way partnership will spearhead the development of joint grants for research projects in Kenya which seek to explore and understand the interface between water and sanitation on one hand and sexual and reproductive health on the other (WSSRH), across the female life course. The intention is to develop a strong collaborative programme of research activities within this neglected public health field and seek to identify evidence-based interventions that will reduce health and education inequalities, as outlined in the Millennium Development Goals. Where feasible, this opportunity will be utilised to further expand collaborative links with partners also involved with health and wellbeing needs of women. We believe this research focus, driven and delivered by international collaboration, will attract global research funding.

¹ www.swashplus.org/Pages/Kenya.aspx
2. Overview

UNICEF estimates that almost a quarter of Kenyans depend on water from unsafe sources.[1] In rural areas the figure is significantly higher, with 53% of the population collecting water from unsafe surface sources (lakes, rivers and ponds). Over one-third of the country spends 30 minutes or more to reach their water source (which often requires 2-3 trips to collect each day). In rural areas, where nearly 80% of Kenyans live, the burden is much greater. Forty per cent of rural households require 30 minutes or more per 20 litres collected. The disparity between sanitation access for urban Kenyans and rural Kenya is even greater. While 99% of the urban population have access to some form of toilet or pit latrine (34% improved and used by a single-household), 18% of rural Kenyans, (approximately five million people) have no facility at all and use the bush or field to relieve themselves.[2]

Women in Kenya, especially in rural areas, are mainly responsible for collecting drinking water.[2] In half (49%) of households it is adult women (over the age of 15) who are charged with water collection. In rural households, adult women are six times more likely than adult men to be the ones to fetch water (58% v 9%). In urban households, the ratio is 2:1 (22% v 10%). In 5% of all households children under the age 15 are expected to fetch drinking water for their household.

Water and sanitation have an impact on the sexual and reproductive health (WSSRH) of females across their lifespan. A draft diagram of the inter-relationships is presented in Annex 1. This document outlines some of the main sexual and reproductive health issues that are influenced or affected by poor or difficult access to clean water and improved sanitation. It highlights areas of pressing public health need that have been only partially addressed and champions the need to develop, test and evaluate innovative tools and interventions which may influence professional practice and organisation and delivery of care, leading to better public health outcomes. Ideas for research studies are presented in boxes at the end of each sub-section to inform discussion.

This document focuses largely on the Kenyan experience, although references from other countries are included, where relevant, to broaden the review. While the summaries do not include a specific section on the availability of clean water and access to sanitation, in primary through tertiary health care facilities, schools or workplaces, these are core themes which are implicit and underpin the document.
3. Subject-specific areas of particular concern to Public Health

**Pregnancy / Abortion / Birth / Postpartum**

There is strong international commitment to developing maternal health services and education, with deliveries required by law in many countries, now including Kenya, to be in a facility. However, in 2008/09 the Kenyan Demographic Health Survey (KDHS) found that 57% of women delivered at home and 28% had assistance from a Traditional Birth Attendant (TBA).[2] Traditional Birth Attendants have been somewhat discredited since maternal mortality rates have not fallen, despite Ministry of Health attempts to train and equip them. Traditional Birth Attendants may have no perception of, or opportunity to, adopt aseptic techniques and fail to wash hands or sterilize equipment leading to contamination during vaginal examination, or unclean objects used for cord-cutting. This can lead to post-partum urinary infection, tetanus or sepsis putting the mother at risk of maternal death. If authorities cut support and resources for TBAs but women elect to still use them then there is risk of further deterioration in the standard of home births. Therefore, there remains a need to explore current TBA practice and the support they receive to determine why some women prefer home births.

**Sepsis**

**Water and sanitation issues:** Surveys of postpartum women attending a child health clinic in Mombasa (up to 12 months) found 15% had access to piped water in their house, 80% had access to a public tap, and 5% used a well, borehole or surface water. Reproductive Tract Infections (RTIs) were common with 32% having Bacterial Vaginosis (BV), and 8% candida. Also present were high levels of fever, abdominal pain and abnormal vaginal discharge, making sepsis likely in a large proportion of these women.[3] Infection of the genital tract following delivery or abortion is an issue as the birth attendant may have dirty hands, or use unclean instruments. This can be fatal if no treatment is given.

**Risk Factors:** Home birth in unhygienic conditions, low socioeconomic status, poor nutrition, dirty sheets, anaemia, prolonged rupture of membranes, multiple vaginal examinations, caesarean section, retained products of conception and post-partum haemorrhage.[4]

**Prevalence:** A 2006 systematic review by WHO estimated that 9.7% (6.3%-12.6%) of maternal deaths in Africa were due to puerperal sepsis.[5] However, figures on sepsis are thought to be an underestimate due to lack of data on deaths outside hospital settings. Verbal autopsy was used to define cause of maternal deaths in an urban informal settlement in Nairobi; amongst these 10.3% were caused by postpartum sepsis.[6] Little is known about prevalence amongst mothers who recover.

**Possible studies:**
Prevalence of sepsis and survival; intervention studies; Vaginal lavage with chlorhexidine to prevent endometriosis in mothers during and shortly after delivery (recommended by PATH, personal communication. Dr Matt Steel). Water/hygiene package for home deliveries. Test post-partum pads.

**Obstetric Fistula**

**Water and sanitation issues:** Social stigma is high amongst women with fistula. In some communities, such as the Pokot, women cannot stay with others, or cook for the family when she has ‘the urine smell’. Where facilities for washing are not available, the woman remains in a constant odorous state. As a result, many isolate themselves, irrespective of the views of their family and social circle.
**Risk factors:** Obstetric fistula usually follows prolonged obstructed labour and poor obstetric care. Necrosis of the anterior and posterior vaginal wall, bladder, urethra and rectum occurs following compression between the foetal head and pubis. Fistula are more common in young girls whose pelvis is not fully developed, the malnourished, primigravidae, and those without access to skilled or emergency obstetric care.

**Prevalence:** The incidence and prevalence remains unknown in Kenya, although it is acknowledged as a big problem with South Nyanza one of the regions noted to have a high rate.[7] African Medical and Research Foundation (AMREF) estimate the incidence is 3,000 new cases every year, calculated from 1 – 2 cases per 1,000 deliveries with only 7.5% receiving treatment.² The Malawi Demographic Health Survey (DHS) estimated a fistula rate of 15.6 per 1000 live births.[8] Prevalence studies have not been conducted but case studies on surgical patients have investigated specific risk factors. This resulted in the Ministry of Health (MOH)/United Nations Population Fund (UNFPA) report acknowledging that this problem has not been given due attention.[7]

**Possible studies:**
Community studies on prevalence/incidence; needs assessment including WASH, stigma impact on quality of life, reproductive health.

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**Traumatic Fistula**

**Water and sanitation issues:** (see above – obstetric fistula)

**Risk factors:** Can be caused by trauma to the genital area through violence, or through cultural practices including Female Genital Mutilation (FGM) (see above).

**Prevalence:** To date, while there are emerging reports from medical personnel/aid relief workers, which indicate that it is a real problem, only anecdotal evidence or localised evidence exists.

**Possible studies:**
Community studies on prevalence / incidence; needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health.

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**Prolapse**

Pelvic organ, vaginal, genital, uro-genital and uterine prolapse have been widely researched in countries of Africa, particularly west (Nigeria, Ghana) and South Africa, with recent evaluations of surgical interventions on the pelvic floor, posterior intravaginal slingplasty, colposuspension, and hysterectomies. However, only one previous, non-current, study in Kenya was evident in the literature, which focused on risk factors associated with neonatal mortality.[9] Prolapse is not mentioned in the Kenyan Demographic and Health Survey,[2] however prevalence of chronic physical consequences, such as urinary and faecal incontinence are reported, as described below.

**Possible studies:**
Community studies on prevalence / incidence; needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health.

² [www.globalpressinstitute.org/print/327](http://www.globalpressinstitute.org/print/327)
Urinary Incontinence

Water and sanitation issues: Issues for incontinent women are very similar to those relating to menstruation. Women need access to cleansing materials, pads rather than unhygienic products such as rags or newspapers, and water for cleaning soiled clothing.

Risk factors: As with fistula, these include young girls whose pelvis is not fully developed, the malnourished, primigravidae, and those without access to skilled or emergency obstetric care. Additional risk factors include; multigravida (the Total Fertility Rate = 4.6 children, 2.9 for women in urban residence and 5.2 for those in rural areas), short birth interval (Median = 33 months, with 23% born less than 2 years following previous birth [DHS, 2008-9], and prolonged second stage of labour.[2]

Prevalence: Similar to obstetric fistula, the prevalence of incontinence is unknown. However in countries where obstetric fistula is high, it is likely that stress incontinence is also high, due to similarities in the cause i.e. damage to the pelvic fascia, nerves, ligaments and muscles during parturition. The MOH/UNFPA 2004 report (p20) stated that discussions with TBAs evidenced they had seen women who leaked urine with the occurrence rated as ‘1–2 for every 10 women who have delivered’. [7] Worldwide estimates suggest that 8.2% of women suffer from urinary incontinence.[10] Another recent study carried out in Sub-Saharan Africa found prevalence to be 17.7%, with stress incontinence the most common form. In 31% of cases this usually necessitated a change in underwear. A ‘psychosocial repercussion’ was found in 31% of cases. A convenience sample of Ghanaian women found 42% had a positive paper towel test. [11] Similarly, a study of pregnant women attending antenatal care in Nigeria showed a 21% prevalence rate.[12] Stress incontinence is associated with high rates amongst pregnant women, parous women, particularly in the months following delivery and following menopause.

Possible studies: Community studies on prevalence and risk factors; attitudes, impact on family, home, work life; needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health. Intervention trials (e.g. pelvic floor exercises).

Faecal Incontinence

Water and sanitation issues: Issues are similar to those for urinary incontinence but rather more pressing. There is a need for water for personal hygiene and cleaning of clothes, as well as pads.

Risk factors: As per urinary incontinence - spontaneous vaginal delivery, obstructed labour, prolonged second stage of labour, and multigravidae.

Prevalence: Usually lower than urinary incontinence rate; the prevalence of faecal incontinence is largely unknown in Kenya and in Sub Saharan Africa generally. A study in Nigeria found 2.7% of patients presenting to gynaecology clinic were incontinent for liquid stool and 2.2% were incontinent for solid stool.[13]

Possible studies: Community studies on prevalence and risk factors; attitudes, impact on family, home, work life; needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health. Intervention trials (e.g. pelvic floor exercises).
Menstrual management

A recent study of mean menarchial age among urban school girls in Kenya was 12.5 (+/-2.8) with 10% reaching menarche before aged 11 and 2% before 10 years. [14] A study of menopause in rural Kenya found it to be 48.3 years.[15] With evidence suggesting receding age at menarche and constant age at menopause, women in Kenya are likely to experience around 36 years of monthly periods, pregnancy and postpartum infecundity excepting.

Water and sanitation issues
Due to lack of provision of sanitary wear as well as prohibitive cost, the vast majority of Kenyan females resort to unhygienic practices such as using rags or paper, exposing themselves to infection risk each month in addition to lack of dignity and discomfort. Availability, cost, distribution, water and sanitation (home, school and workplace), and privacy space to change, all clearly influence use, hygiene and safety, and disposal of sanitary solutions. An absence of underwear has been reported by Non Governmental Organisations (NGOs) who give free pads to girls. While ‘comfort kits’ given to refugees include underwear to secure pads, wider distribution is unlikely.

Adolescent girls: Menarche, a sign of sexual maturity, can result in sexual coercion as girls are perceived as ready for sex. Stained clothing discloses their status, causes embarrassment and stigma, poor engagement, lost schooling and drop out.[16-18] Lost schooling among girls is a recognised inequity and reduces the likelihood of a nation reaching the Millennium Development Goals. Menstrual difficulties result in an average loss of 3-4 days schooling per girl each month,[17] while others drop out entirely.[16] The World Bank estimate if a girl misses 4 days of school every month due to her period, she will miss 10-20% of her school days.[19] As a consequence, schoolgirls in western Kenya identified menstrual management and pregnancy as top psychosocial stressors.[18] Worryingly girls may engage in sex to obtain sanitary items, further exacerbating risks; in western Kenya, studies report money from boyfriends paid for pads, implicates lack of menstrual strategies to sexual exposure, vulnerability to Sexually Transmitted Infections (STIs) and HIV, and pregnancy and abortion. Critical formative research from the US/Kenyan collaborative partners shows the lack of resources for girls’ menstruation in western Kenya, their disengagement in school, stigma, and connotations on their sexual maturity.[18]

To diminish these risks, interventions which manage schoolgirls menstruation are called for.[16, 18] Non Governmental Organisation projects distribute some sanitary pads in schools but pad provision is unsustainable, costly and environmentally unsound. A number of existing and new technologies offer this potential but have not been tested to establish acceptability, feasibility, cost-effectiveness, effectiveness in reducing sexual and reproductive harms, and impact on lost schooling. An NGO in coastal Kenya (Moving the Goalposts), linked with a Ugandan manufacturer to provide cheap papyrus pads, but final retail costs eventually equalled international products which are too expensive for girls. The African Medical and Research Foundation (APHRC) pilot of menstrual cups (Mcups) in Kenya (DFID-sponsored), found 86% of 35 women and 73% of 55 schoolgirls (15-17yrs) used the cup by month three with 94% and 96%, reporting intent to continue use.[20] Potential use of Mcups is hampered by water and sanitation concerns, inadequate data on acceptability, measurement of impact (school engagement etc). A pilot study involving LJMU, KEMRI/CDC, SWASH, APHRC, and other partners, is under development to evaluate and demonstrate factors which may impact on Mcup and sanitary towel use among schoolgirls, the role of water and sanitation on use, and measures of school attendance. Outcomes from such a pilot would inform future intended trial of sanitary solutions in schools.

On May 24 2011 the Prime Minister of Kenya directed the Ministry of Finance to factor in provision of sanitary towels in schools in the coming financial year. According to this directive, all
girls attending school countrywide should be provided with sanitary towels. Similar factors as above will impact on use, particularly the impact of water and sanitation on hygiene and safety.

Possible studies:
Evaluation of Mcup acceptability and use, cultural factors influencing use; factors influencing sanitary towel availability in schools; cost-effectiveness studies; impact of menstrual solutions on school attendance and engagement; school water and sanitation needs for supporting menstrual solutions; menstrual needs of older women; improving water and sanitation access in schools; other menstrual solutions, social enterprise schemes for self purchase.

**Menorrhagia**

**Water and sanitation issues:** Issues as identified above, but exacerbated need for sanitary provision and cleaning facilities.

**Risk factors:** Obesity, recent menarche, peri-menopause and Menorrhagia can provoke or exacerbate anaemia and if untreated may be life threatening in a small minority of cases.

**Prevalence:** A small study of 54 women admitted for hysterectomy at the Aga Khan Hospital 2000-2003 found that 26% of the operations were performed because of menorrhagia.[21] However prevalence in the general population is unknown in Kenya, although a study in Nigeria suggests that 12% of teenage girls had menorrhagia defined as blood loss of >80 ml per cycle. [22]

Possible studies:
Prevalence study; intervention trials (low cost treatments e.g. progestin – releasing Intrauterine Devices, Mirena Intrauterine System, Non-Steriodal Anti Inflammatory Drugs and transexamic acid), qualitative research to understand impact and needs.

**Female Genital Mutilation (FGM)**

**Water and sanitation issues:** Female Genital Mutilation poses considerable health risks in itself, however infections may spread after the use of contaminated instruments (e.g. use of same instruments in multiple genital mutilation operations), and during the healing period. Infection can lead to Urinary Tract Infections (UTIs), whilst the operation itself can lead to difficulties with menstruation and urination. Haemorrhage is also common. Longer term problems include obstruction of labour leading to incontinence and fistula.

**Prevalence:** Despite the passing of the ‘Children’s Bill’ outlawing the practice of FGM in Kenya in 2001 there is some evidence to suggest that the practice has become covert with resulting risk of greater prevalence of complications. Data collected during 2005 in Nakuru, Kenya where FGM was widely practiced showed that whilst there was a substantial shift in view towards this practice, one quarter of participants still had their child undergo FGM.[23] However, the 2008 Kenya Demographic Health Survey shows significant decline in the practice since 1998 with prevalence among women aged 15-49 falling from 38% to 27%.[2] For girls aged 15-19 years the corresponding figures were 26% reduced to 14.6%. The highest prevalence is amongst the Kisii and the Somali communities.

Possible studies:
Local knowledge and attitudes, migrant sub-study, studies in Kibera.

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3 http://ipsnews.net/news.asp?idnews=56612
Contraception care

Female condom

Water and sanitation issues: Two barrier methods of contraception are associated with hygiene issues and the need for uncontaminated washing water and clean hands for insertion. Some women have reported using the same female condom for multiple sex acts, behaviour said to be motivated by the high cost or limited availability of the device, as well as by its perceived strength. Such practices may expose women or their partners to pathogens during washing or subsequent re-use of the female condom, especially for populations living in areas of high STI/HIV prevalence. A recent WHO consultation looked at different aspects of a bleach disinfection step. A minimum bleach soak that adequately disinfected condoms demonstrated a safety margin with respect to the physical properties of the condoms, and there was no evidence of damage to the vagina or penis from any residues of bleach that might have remained on the condom after rinsing. However, the requirement to disinfect was perceived as a barrier to reuse in some circumstances while simply washing used condoms in soap and water could pose considerable safety risks when used in circumstances of high STI/HIV risk (such as western Kenya). Since one of the main reasons for using a female condom was to protect women and their partners from STI, disinfection of used condoms was therefore deemed necessary.⁴

Prevalence: Female condom use is limited in Kenya with just 0.6% women ever using a female condom. According to the 2008/2009 KDHS, the highest rate of condom use was among those aged 35-39 (2.7%).[2]

Possible studies:
Acceptability and safety trials on re-using durable female condom, use of soap and water cleaning.

Diaphragm

Water and sanitation issues: Like the female condom, the diaphragm requires insertion with clean hands to avoid introducing harmful bacteria into the vagina. On removing the diaphragm it requires washing with warm soapy water before storage or reinsertion.

Risk Factors: The diaphragm may be associated with increased risk of UTI as well as toxic shock syndrome.[24] There was no increase in BV or UTIs in a 6 month prospective study among female sex workers (FSW) and other women attending sexual and reproductive health (SRH) services in Mombasa.[25] Additional studies suggest that it may help to protect from pelvic inflammatory disease,[26] and human papillomavirus,[27] although this may be due to the spermicide used with it. KHDS 2008/09 does not report on diaphragm use.[2] However a qualitative study amongst both FSW and attenders at SRH clinic found that women who worked struggled with hygiene issues if the needed to remove it during work time as they cannot remove and wash it.[28] An acceptability study in Mombasa found women liked using it and 96% (of 130) reported willingness to continue using.[25]

Prevalence of use: Current use data are scarce; a recent KHDS survey did not report diaphragm use.

Possible studies:
Prevalence of use, how they are kept hygienic, safety issues.

**Sexually Transmitted Infections (STIs)**

**HIV**

**Water and sanitation issues:** Diarrhoea is one of the main causes of morbidity and mortality for persons living with HIV. Access to clean water and sanitation is vital to reduce risk of infections. Studies have shown chlorination of water at point of use significantly reduces diarrhoea rates among persons living with HIV.[29] Immuno-compromised adults are also more likely to contract cryptosporidium infections; drug treatment of such infection is difficult, placing the burden of care on prevention of infection, through filtration and clean storage of drinking water.[30] Diarrhoea can also be a side effect of antibiotics and anti-HIV drugs, particularly protease inhibitors and abacavir. While side effects may resolve they may also be permanent.  

**Prevalence:** Prevalence according to 2008/09 KDHS is 8.0% in women aged 15-49.[2] This varies from 10.4% in urban areas to 7.2% in rural areas. Prevalence is high in Nyanza Province with a reported 16%. Those with low CD4 count are particularly at risk.

Possible studies:
Current issues relating to water and sanitation in face of antiretrovirals availability, longevity of those living with HIV. See below, risk associated with fishermen.

**Candidiasis**

**Water and sanitation issues:** Symptoms include inflammation, itching, soreness and odorous discharge. Lack of hygiene can play a big part in transmission - sharing bathrooms or toilets (in poor hygiene condition) with someone who is already infected and sharing underwear.  

**Risk factors:** Diabetes  

**Prevalence:** A cross sectional study of 621 women with vaginal discharge attending clinic in Nairobi found 50% prevalence rate.[31]

Possible studies:  
Prevalence, risk factors, at risk population, needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health.

**Gonorrhea**

**Water and sanitation issues:** Although some females can be asymptomatic, symptoms include itching and burning of the vagina usually with a thick yellow/green discharge, the need to urinate frequently and bleeding between menstrual periods.  

**Risk factors:** Associated with increased risk of HIV. Studies among fishermen along Lake Victoria indicate high rates of Gonorrhoea. Anecdotally, sex for fish has been identified as one way women are able to supplement their families’ food, with alcohol use exacerbating risk among fishermen and women requiring fish.[32] Male circumcision in the area has been shown not to reduce the risk of such STIs.[33]  

**Prevalence:** The prevalence in women of reproductive age in Kisumu is reported to be 0.9%.[34] The highest rate was found in those aged 15-19 years (1.4%) whilst no cases were reported in women aged 40-49.
Possible studies:
Prevalence, risk factors, at risk population, link with transactional sex and alcohol between fishermen and clients; needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health.

Chlamydia

**Water and sanitation issues:** Whilst many females are asymptomatic for Chlamydia trachomatis, symptoms include milky coloured discharge which may have unpleasant odour. Spotting between periods may also occur.

**Risk factors:** As above, studies among fishermen along Lake Victoria indicate high rates of Chlamydia. Anecdotally, sex for fish has been identified as one way women are able to supplement their families’ food, with alcohol use exacerbating risk among fishermen and women requiring fish.[32] Male circumcision in the area has been shown not to reduce the risk of such STIs.[33]

**Prevalence:** Seven per cent of women with vaginal discharge attending a STI clinic in Nairobi were diagnosed with Chlamydia.[35] However, a community study in Kisumu found overall rate of 4.5%, though infection was predominantly in the younger age groups i.e. 4.7% in those aged 20-29 and 9.2% in females aged 15-19.[34]

Possible studies:
Prevalence, risk factors, at risk population, link with transactional sex and alcohol between fishermen and clients; needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health.

Genital ulcers

**Water and sanitation issues:** These can be caused by STIs and also by fistula, allergic reactions, Behcets disease (chronic condition resulting from disturbances in the body's immune system), chancroid, fungal skin infections and yeast infections amongst others. It is likely that these infections are exacerbated by poor genital hygiene whilst simple measures such as washing with clean water and soap can be effective in limiting the disease.[36]

**Risk factors:** Genital Ulcer Disease is identified as a risk factor for HIV because they provide a direct portal of entry for HIV through mucosal disruption.[37]

**Prevalence:** Largely unknown although acknowledged as common in sub-Saharan Africa (SSA) generally; most studies are conducted in STI clinics. The incidence of genital ulcers is reported to be decreasing in Nairobi, with 1,237 females with GUD presenting to five health centres in 1993 reduced to just 765 in 1997.[38] Kenya has not been mentioned as a country with high prevalence, although GUD is linked with HIV (suggesting an absence of studies rather than low prevalence).[37]

Possible studies:
Prevalence, risk factors, at risk population, needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health.
Reproductive Tract Infections (RTIs)

Bacterial vaginosis (BV)

Water and sanitation issues: May be asymptomatic, but symptoms are vaginal discharge and unpleasant odour. Women with BV are at increased risk for the acquisition of some STIs (e.g. HIV, N. gonorrhoeae, C. trachomatis, and HSV-2), complications after gynaecological surgery, complications of pregnancy and adverse pregnancy outcomes (premature rupture of membranes, preterm labour, preterm birth, intra-amniotic infection, and postpartum endometritis). The change in vaginal flora is usually due to increased proportions of anaerobes that are naturally occurring rectal bacteria. These reduce the natural bacteria (e.g. lactobacillus species) that produce microbicidal hydrogen peroxide. Hygiene, including clean underwear and the ability to wash and wipe could be causally implicated.

Risk factors: HIV acquisition, STIs, associated with lack of hygiene, multiple or new sexual partners, intrauterine devices for contraception, recent antibiotic use, vaginal douching, and cigarette smoking. Vaginal cleansing by sex workers and STD and HIV risk has been well studied, however, the role of sexual activity in the development of the condition is not fully understood, and bacterial vaginosis can still develop in women who have not had sexual intercourse.

Prevalence: PATH estimates that BV affects nearly half of African women and after treatment a large proportion have the BV clinical syndrome within six months. Studies in Kenya are limited. The KDHS 2008/09 study[2] reported 4.0% of women recorded a bad smelling/abnormal genital discharge in the past 12 months. The highest was in women of 30-39 years (4.6%; higher in divorced/ separated/widowed women – 6.1%), women in Nyanza Province (4.8%), and in those with no education (7.3%). In Mombasa, BV was present in 32% of postpartum women.[3] Sex workers without access to vaginal washing had increased risk of BV.[39]

Possible studies:
Douching and BV relationship with other infections very well studied, water and sanitation issues such as underwear and self-cleaning.

Trichomoniasis

Water and sanitation issues: May be asymptomatic but symptoms characterised by diffuse, malodorous, yellow-green vaginal discharge with vulvar irritation. Persons affected need access to clean water for washing.

Risk factors: New or multiple partners, STIs. Vaginal trichomoniasis has been associated with adverse pregnancy outcomes, particularly premature rupture of membranes, preterm delivery, and low birth weight. Trichomoniasis has been associated with a 1.5 fold increased risk of HIV-1 after adjustment for potential confounding factors.[40] A similar relationship between HIV infected women and trichomoniasis was reported in a Kisumu study.[41]

Prevalence: There is a high re-infection rate. A study of women workers in six rural sites in Kenya found a prevalence of 10.4%.[42] 8% in postpartum women in Mombasa,[3] and 34% of female attenders at an STI clinic in Nairobi, who had vaginal discharge were diagnosed with Trichomoniasis. A community study in Kisumu reported a prevalence of 29.3% with a higher prevalence in younger ages (33.7%, 15-19 years; 32.8%, 20-29 years; 22.9%, 30-39 years and 24.6%, 40-49 years).[41]

Possible studies:
Prevalence, risk factors, at risk population, needs assessment including WASH, stigma impact on quality of life, sexual and reproductive health.
**Genital schistosomiasis**

**Water and sanitation issues:** Female genital schistosomiasis is regarded as a neglected cause of reproductive and other ill-health. [43, 44] It is second to malaria in terms of public health need. It is a water-borne parasitic disease with exposure through swimming and bathing in infected waters. There is an extensive literature which demonstrates that water management programmes including irrigation systems and large scale dams have actually contributed to the increase in schistosomiasis.[45]

**Risk factors:** While schistosome infections are not immediately life threatening, they contribute to a wide range of chronic co-morbidities that include anaemia, growth stunting, cognitive impairment, and malnutrition.[44] The impact on health may be particularly detrimental during adolescence and may persist and lead to irreversible outcomes if infections are not treated expediently. Documented sequelae relating to female genital schistosomiasis (FGS) include: ectopic pregnancy, infertility, abortion, and cervical lesions and symptoms which mimic cervical cancer and STIs [43]. In addition to the impact FGS has on reproductive health, it increases the risk of acquiring HIV and HPV. [43, 46] Thus, treatment or prevention of schistosomiasis in adolescents has benefits not only in terms of reducing the pathology directly caused by the infection but would also diminish known related sequelae. The drug of choice for treating the infection is praziquantel but there is a call to explore other compounds before drug resistance develops. The success of pharmacological control programmes is multi-factorial. The programmes are costly and so there is a drive to make efficiencies and improve clinical outcomes by treating co-infections simultaneously.[47] Moreover, a Zambian study illustrates that iron supplementation concurrent with treatment for schistosomiasis may prevent or reduce likelihood of reinfection.[48]

**Prevalence:** Schistosomiasis is a parasitic infection which peaks in both prevalence and intensity of infection during early adolescence. Across Africa, it is estimated that 200 million are infected and 80% of those live in sub-Saharan Africa. The annual mortality rate is around 280,000 and 150,000 respectively.[47] Around 50.8 million young people under the age of 20 are infected in West Africa with either S. mansoni, or S. haematobium or both. Prevalence varies geographically and is estimated to be 17.6% in The Gambia and 51.6% in Sierra Leone.[49]

**Possible studies:**
Improved methods for diagnosing and monitoring the health impact of schistosome infections; prevention and early treatment studies in schools.

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**Urinary Tract Infections**

**Cystitis**

**Water and sanitation issues:** Can result from poor hygiene as well as sex. Bacteria from faecal matter at the rectum can be easily transferred to the urethra. Stress, bad diet, dehydration, oral contraceptives and antibiotics can also trigger it. A study in Egypt found incidence higher in those with unsatisfactory personal hygiene and those using underwear clothes, other than cotton garments.[50] Bacterial not interstitial cystitis is exacerbated by lack of fluid to flush bacteria out of the system, illustrating the need for sufferers of UTI to drink copious amounts of clean water.

**Risk factors:** If pregnant, can lead to poor outcome – higher probability of premature delivery and low birth weight.[50] The risk for UTIs, both symptomatic and asymptomatic, is highest in women after menopause. This is primarily due to oestrogen loss, which thins the walls of the urinary tract.
and reduces its ability to resist bacteria. Oestrogen loss can also reduce certain immune factors in the vagina that help block *E. coli* from adhering to vaginal cells.

**Prevalence:** A large study of inpatient and outpatient urinary samples in Nigeria found prevalence to be 14.6% in females—nosocomial UTIs was significantly higher than community acquired type.[51] A retrospective study of case notes from all pregnancies and deliveries at Kikuyu hospital, Kenya found that UTI was the commonest maternal illness in pregnancy – 14.5%.[52]

Possible studies:
Ascending recurrent UTI due in part to poor hygiene may be linked to intra-amniotic infection (IAI), which is associated with stillbirth and approximately 40-50% of early (first 7 days) postnatal sepsis among neonates as they are exposed during the delivery process.

### Vaginal Cleansing / Douching

**Water and sanitation issues:** Studies suggest that vaginal cleansing is common amongst sex workers, however, practices employed for personal hygiene, perceived disease prevention, and client pleasure include the use of potentially harmful substances such as cloth and soapy water. In addition, the water itself may be contaminated. Cleansing with cloths or soapy water, or application of herbs or rocks, result in chemical and physical abrasions, or change the vaginal pH encouraging the growth of other organisms.[53]

**Risk factors:** Vaginal cleansing has been linked in prospective studies to changes in vaginal flora, bacterial vaginosis, pelvic inflammatory disease and sexually transmitted infections (STI), including HIV.[39] Douching in general and douching with soap and water were significantly associated with bacterial vaginosis in female sex workers (FSW) in Nairobi (p = 0.05 and p = 0.04 respectively).[54] However, the evidence is inconsistent.[55, 56] However, while a systematic review of studies found it a plausible pathway there was no conclusive evidence for an association between intravaginal cleaning practices with vaginal infections and increased susceptibility to HIV infection.[53]

**Prevalence:** Prevalence of cleansing is high in sex workers. Among FSW in Kibera, 99% reported cleansing in the two weeks prior to survey for hygiene or to remove evidence of last intercourse.[57]

Possible studies:
Studies on prevalence in the general public (outside high risk groups) are scarce.

### Water Collection / Latrine Use

#### Sexual risks and violence

**Water and sanitation issues:** Predominantly the role of females to collect water, often involves travel. For households located 30 minutes or more from their water source, (40% in rural areas) women or children may be required to collect water for over two hours to collect sufficient water for a family of four.[2, 58] Violence is often inherent in the process of water collection.[1] In order to fulfill all daily chores, many women leave home before dawn and travel in the dark to get to the water point early. Travelling alone leaves women vulnerable to sexual assault. The infirm, disabled, blind and elderly are often forced to trade sex for men to deliver it for them if they cannot pay for...
the service. Girls report anecdotally that they fear going out at night to use a latrine or change menstrual items, for fear of violence/rape.

**Prevalence:** Statistics are sparse, and although there is a great deal of anecdotal information regarding women’s safety in water collection and night latrine use,[59] published scientific evidence is lacking on the extent of the problem.

**Possible studies:**
Studies on prevalence of violence and rape at the time of water collection, or when trying to use communal latrines, or payment to access latrines, or receive clean water.

**Physical risks**
Carrying heavy water containers such as jerry cans or pots is damaging in the long term for women, but for girls there are even greater implications due to their physical immaturity. Weight of water containers can cause damage to the head, neck, and spine, and in serious cases cause deformity of the spine that will lead to difficulties in pregnancy and childbirth in adulthood. Pregnant women face risk of miscarriage through carrying heavy loads.

4. **Next Steps**

This White Paper will be used as a basis for discussions at a British Council supported WSSRH workshop, to be held at the KEMRI/CDC Research and Public Health Collaboration Offices at Kisian, Kisumu, western Kenya, on 28th June 2011. Key discussion points regarding research and policy needs will feed into the development of research grant proposals. Discussions will also inform a second back-to-back broader workshop of collaborative partners concerned with the unmet needs of Adolescents and Young People, to be held at the same venue on 30th June-1st July 2011. The White Paper will be used as the base for a WSSRH review paper for publication. Outcomes from the British Council supported WSSRH Workshop, and the broader based collaborative partners Adolescent and Young Persons Platform Workshop will be presented separately.
Glossary

AMREF: African Medical and Research Foundation
APHRC: African Population and Health Research Center (Nairobi, Kenya)
BV: Bacterial Vaginitis
CDC: Centers for Disease Control and Prevention (Atlanta, USA)
CPH: Centre for Public Health (Liverpool, UK)
DFID: Department for International Development (UK)
FSW: Female Sex Workers
FGM: Female Genital Mutilation
FGS: Female Genital Schistosomiasis
GUD: Genital Ulcer Disease
HDSS: Health and Demographic Surveillance Site
HIV: Human Immunodeficiency Virus
HSV-2: Herpes Simplex Virus 2
KEMRI: Kenyan Medical Research Institute
KDHS: Kenyan Demographic Health Survey
LJMU: Liverpool John Moores University
LSHTM: London School of Hygiene and Tropical Medicine
MOPHS: Ministry of Public Health and Sanitation
PATH: Program for Appropriate Technology in Health
SDH: Siaya District Hospital
SRH: Sexual and Reproductive Health
SSA: Sub-Saharan Africa
STI: Sexually Transmitted Infections
SWASH+: Sustaining and Scaling School Water, Sanitation and Hygiene Plus Community Impact
TBA: Traditional Birth Attendant
UTI: Urinary Tract Infections
WASH: Water, Sanitation and Hygiene
WSSRH: Water and Sanitation, and Sexual and Reproductive Health
## Annex 1 - Diagram of Interrelationship Across the Female Life-Course (for Workshop Discussion)

<table>
<thead>
<tr>
<th>Birth</th>
<th>Infant</th>
<th>Child</th>
<th>Puberty-Adolescent</th>
<th>Women of Reproductive Age</th>
<th>Menopausal</th>
<th>Older Women</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water and Sanitation</strong></td>
<td><strong>Delivery, post-partum:</strong></td>
<td><strong>Neonatal Care</strong></td>
<td><strong>Cleaning, soiling bed, clothes</strong></td>
<td><strong>Genital Mutilation</strong></td>
<td><strong>Menstrual Manage</strong></td>
<td><strong>Incontinence</strong></td>
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<td>Cleansing/ sterile water, cloth, rags</td>
<td>Sterile water, cloth, rags</td>
<td>Cleansing/ soiling water</td>
<td>Sterile or infection</td>
<td>Cleansing/ sterile water, cloth, rags</td>
<td>Cleansing/ sterile water, cloth, rags</td>
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<td>Drinking water</td>
<td>Soiling baby</td>
<td>Breathing</td>
<td>Menstrual manage</td>
<td>Clothing</td>
<td>Clothing</td>
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<tr>
<td>Stillbirths</td>
<td>Breastfeeding</td>
<td>Water for bottlefeed (HIV)</td>
<td>HIV related</td>
<td>Menstrual manage</td>
<td>Sterile or infection</td>
<td>Sterile or infection</td>
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<td>Sterile environment</td>
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<td>Cleaning</td>
<td>Clothing</td>
<td>Cleaning</td>
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<tr>
<td><strong>Sexual/Reproductive Health</strong></td>
<td><strong>Delivery; post-partum:</strong></td>
<td><strong>Collecting water</strong></td>
<td><strong>Menstrual manage</strong></td>
<td><strong>Douching</strong></td>
<td><strong>Water Collect Risk</strong></td>
<td><strong>Sexual Abuse/Rape</strong></td>
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<td>Cleansing/ sterile water, cloth, rags</td>
<td>Schooling- miss education</td>
<td>Cleansing (also at night)</td>
<td>Vaginitis/STI</td>
<td>Sexual abuse/rape</td>
<td>Other outcomes ie repro-tract fistula</td>
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<tr>
<td>Miscarriage</td>
<td>Breastfeeding</td>
<td>Sex and Relationships Education (SRE)</td>
<td>leads to sexual harm</td>
<td>HIV</td>
<td>Other outcomes ie repro-tract fistula</td>
<td>HIV, STI</td>
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<td>Stillbirths</td>
<td>Water for bottlefeed (HIV)</td>
<td>Sexual abuse/rape</td>
<td><strong>Collecting water</strong></td>
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<td><strong>Other outcomes ie repro-tract fistula</strong></td>
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<td>Sterile environment</td>
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<td>teen preg</td>
<td><strong>Sexing- miss education</strong></td>
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<td>Other outcomes ie repro-tract fistula</td>
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<td>Sexual harm, STI and HIV</td>
<td>Pregnancy</td>
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<td><strong>HIV</strong></td>
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<td><strong>HIV, STI</strong></td>
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References


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