



Review article

Sexually transmitted infections: progress and challenges since the 1994 International Conference on Population and Development (ICPD)^{☆,☆☆,★}

Nuriye Ortayli*, Karin Ringheim, Lynn Collins, Tim Sladden

330 East 38th Street, Apt 21B, New York, NY 10016, USA

Received 15 January 2014; revised 22 May 2014; accepted 10 June 2014

Abstract

Background: Despite being recognized as an important challenge at the 1994 International Conference on Population and Development (ICPD), sexually transmitted infections (STIs) other than HIV are one of the most neglected dimensions of sexual and reproductive health. STIs, often undiagnosed and untreated, have especially harmful consequences for women and their neonates.

Progress since ICPD: During the last two decades, substantial knowledge and experience have accumulated in behavior change programming during the global response to the HIV epidemic which can also be used for prevention of STIs. There has been progress in development and implementation of vaccines against certain STIs such as hepatitis B and the human papilloma virus. Development of a rapid, point-of-care test for syphilis has opened the door to control this infection.

Challenges: The estimated annual incidence of non-HIV STIs has increased by nearly 50% during the period 1995–2008. The growth in STIs has been aggravated by a combination of factors: lack of accurate, inexpensive diagnostic tests, particularly for chlamydia and gonorrhoea; lack of investment to strengthen health systems that can deliver services for diagnosis and management of STIs; absence of surveillance and reporting systems in the majority of countries; political, socioeconomic and cultural barriers that limit recognition of STIs as an important public health problem; and failure to implement policies that are known to work.

Recommendations: Governments, donors and the international community should give higher priority to preventing STIs and HIV; fully implementing behavior change interventions that are known to work; ensuring access of young people to information and services; investing in development of inexpensive technologies for STI diagnosis, treatment and vaccines; and strengthening STI surveillance, including of microbial resistance.

© 2014 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

Keywords: Policy; Women's health; Reproductive health; Health services

1. Background and scope of the challenge

The International Conference on Population and Development (ICPD) in 1994 recognized the “high and increasing” incidence of sexually transmitted infections (STIs) and, particularly, the greater vulnerability to STIs that women face, in part because such infections are often undetected until complications ensue. The ICPD Programme of Action (PoA) called for prevention and treatment of STIs to “become integral components of all reproductive and sexual health services” (Para 7.32). It further stipulated “that all ... family planning providers, should be given specialized training in the prevention and detection of ... sexually transmitted diseases” (PoA 7.31) and provide “accessible, complete and accurate information about various family

[☆] This paper is not under consideration at any other journal. It is a revised and shortened version of a background paper with the same title, presented at the “ICPD Beyond 2014 Expert Group Meeting on Women's Health: Rights, Empowerment and Social Determinants” organized by UNFPA-WHO in Mexico City during September 30–October 3, 2013.

^{☆☆} Authors have not received any financial compensation for writing this paper, except that three of them are UNFPA staff, and one had been a consultant for UNFPA in the team that wrote a report on ICPD progress. None of the authors have any conflict of interest.

[★] Authors would like to thank Ms. Adrienne Germaine and Dr. Rachel Snow for reviewing earlier versions of the background paper and providing valuable advice in strengthening it.

* Corresponding author at: 330 East 38th Street, Apt 21B, New York, NY 10016, USA. Tel.: +1 212 297 5001, +1 90 533 776 52 01.

E-mail addresses: ortayli@unfpa.org, nortayli@gmail.com (N. Ortayli).

planning methods, including ... their effectiveness in the prevention of the spread of HIV/AIDS and other sexually transmitted diseases.” (PoA 723 b). Recognizing that the risk of transmission is greater from men to women and that women are often powerless to protect themselves (PoA 7.28), the ICPD urged the development of “strategies to ensure that men share responsibility for sexual and reproductive health, including family planning, and for preventing and controlling STIs, HIV and AIDS.” (Para 8.27) [1]. However, the fight against STIs, other than HIV, has been one of the least visible areas of sexual and reproductive health (SRH), remaining underfunded despite its close links to the HIV epidemic. A chief factor contributing to this invisibility is a lack of national STI surveillance systems capable of identifying the considerable magnitude and scope of the problem, and monitoring progress or lack thereof. Currently, only a small minority of countries consistently collect STI surveillance data, and even these are subject to limitations in data quality and completeness [2]. Surveillance of antimicrobial resistance within newly emerging gonococcal strains is similarly lacking, with rates of multidrug-resistant gonorrhea increasing worldwide and contributing to increases in gonorrhea incidence. Enhanced surveillance is needed to track this problem [3–5]. Furthermore, STI diagnoses often go unreported due to weaknesses in health systems. The difficulty of collecting reliable data on STIs is compounded by shortages of trained human resources, inadequate laboratory facilities and other constraints, such as asymptomatic presentation, which together compromise accurate diagnosis. Owing to the sexual nature of transmission, STIs are also often stigmatized, and many individuals with symptoms do not seek testing or treatment, while others receive inaccurate diagnoses. In the absence of good surveillance data, there is a lack of public and political awareness of the magnitude of the problem. STI screening and treatment are not given priority within public health services, nor do STIs receive the political, socioeconomic and cultural attention they warrant.

In recent years, as new HIV infections were plateauing or declining in many regions, the World Health Organization (WHO) estimated that incidence of the four major curable bacterial/protozoan STIs (chlamydia, gonorrhea, syphilis and trichomonas) increased by nearly 50%. Using the limited available data [6], WHO estimated the total number of new

infections with these four agents to have risen worldwide from 333 million in 1995 [7] to 499 million in 2008 [2]. This 50% increase is only partially attributable to increased population. For example, chlamydia has risen by nearly a fifth, consistent with a 21% increase in global population over that period, while gonorrhea rose by 70%. New syphilis infections have slightly decreased, probably owing to existing, extensive antenatal testing [2]. Regional differences in STI incidence are widespread: e.g., Africa has the highest number of new syphilis infections, probably related to limited accessibility of care (Table 1 and Fig. 1). Higher levels of untreated STIs in sub-Saharan Africa are linked to higher HIV transmission rates and have been postulated to have contributed to the higher prevalence of HIV in that region [8]. While developing country data are scarce, evidence from the United States suggests that nearly half of STIs occur among young people 15 to 24 years of age [9] (Fig. 2).

Viral STIs are incurable, and they also affect large populations: an estimated 536 million people are living with herpes simplex virus (HSV) type 2, and approximately 291 million women at any given time have a human papilloma virus (HPV) infection [10]. Moreover, viral hepatitis, particularly hepatitis B (HBV), can be sexually transmitted and is a growing health concern, potentially leading to liver disease and cancer. About 240 million people live with chronic HBV infection.

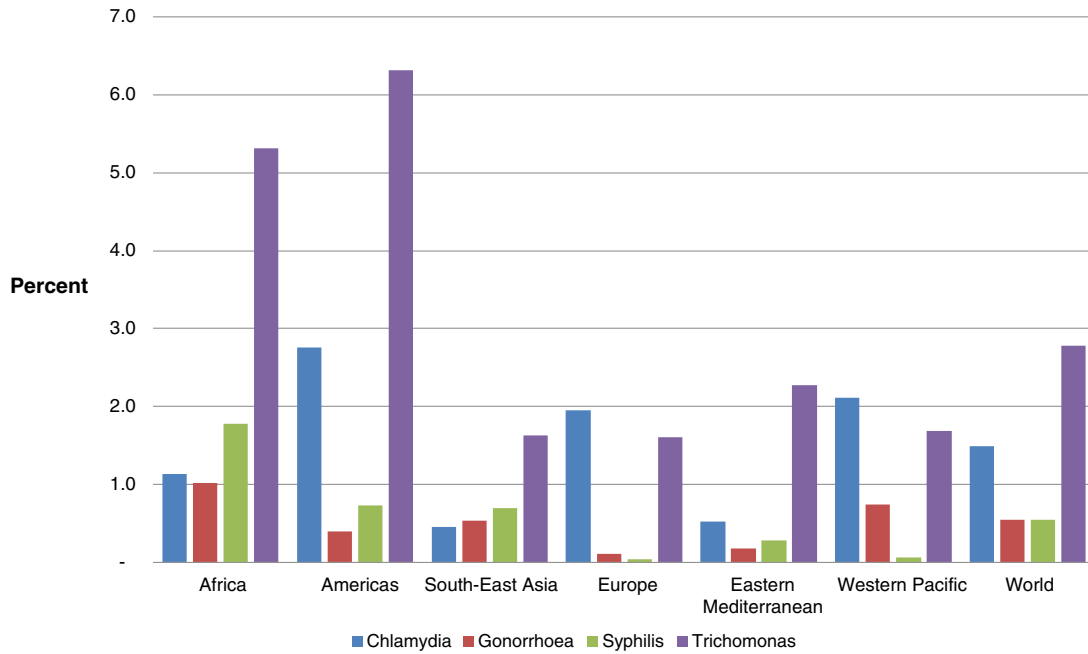
WHO identifies nine infections with a predominantly sexual mode of transmission in the *International Classification of Diseases* [11]. This paper focuses on the four common curable bacterial/protozoan STIs that contribute to most STI-related morbidity and mortality globally: chlamydia, gonorrhea, syphilis and trichomonas. While all STIs have specific diagnostic tests and treatment regimens, many preventative, management and surveillance aspects are applicable more broadly for all STIs.

It is beyond the scope of this paper to address the HIV epidemic in any significant depth, other than to highlight some of the connections between HIV and other STIs, particularly similar programming strategies. The response to the HIV epidemic has been unparalleled, marked by extraordinary activism, political commitment, resources and significant gains in health and rights. Achievements have been striking, particularly in the last decade, among them a promising trajectory of considerably fewer new HIV infections and AIDS-related deaths, and some notable but

Table 1
Estimated number of new cases of four bacterial STIs by WHO region (2008).¹
Numbers of new cases (millions).

Bacterial STI	Africa	Americas	Southeast Asia	Europe	Eastern Mediterranean	Western Pacific
<i>Chlamydia trachomatis</i>	8.3	26.4	7.2	20.6	3.2	40.0
<i>Neisseria gonorrhoeae</i>	21.1	11.0	25.4	3.4	3.1	42.0
<i>Treponema pallidum</i>	3.4	2.8	3.0	0.2	0.6	0.5
<i>Trichomonas vaginalis</i>	59.7	85.4	42.9	22.6	20.2	45.7
Total	92.6	125.7	78.5	46.8	26.4	128.2

¹ WHO. Global incidence and prevalence of selected curable sexually transmitted infections — 2008, 2012. Downloaded at <http://www.who.int/reproductivehealth/publications/rtis/stisestimates/en/index.html> on May 21, 2013.



STI data: http://apps.who.int/iris/bitstream/10665/75181/1/9789241503839_eng.pdf; Population Data: www.who.int/whosis/whostat/2010/en/

Fig. 1. Estimated total population prevalence (%) of bacterial STIs, WHO Health Regions, 2008.²

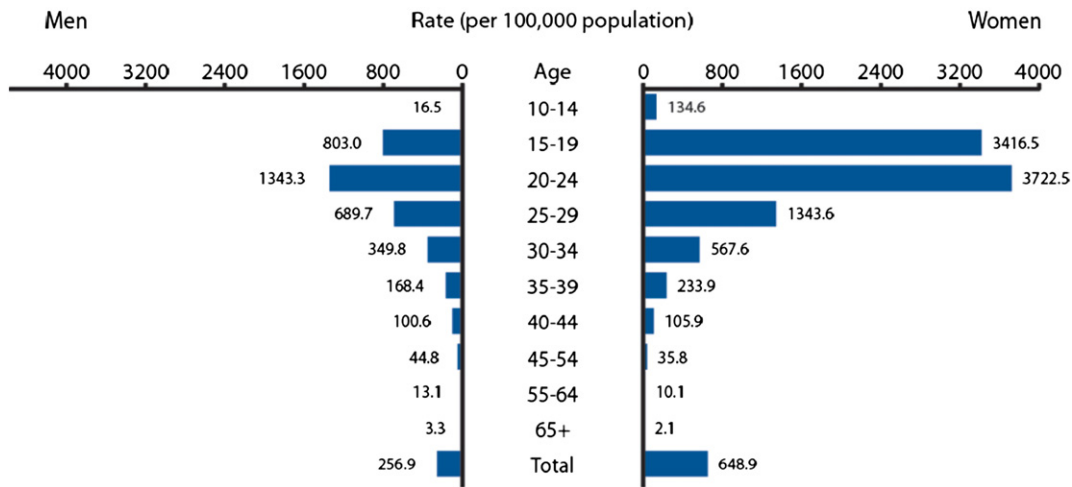


Fig. 2. Chlamydia—rates by age and sex, United States, 2011.³

precarious gains in human rights. While new HIV infections have steadily declined since the peak in 1997, the increased availability of life-extending antiretroviral treatment has led to an increase, to 34 million, in the number of people living with HIV globally [12]. HIV is the fifth most common cause of death for adults and a leading cause of death in women of reproductive age [13].

Global HIV prevalence today, among adults 15 to 49 years old, is 0.8% and is below 1% in all regions, except sub-Saharan Africa, where prevalence is 4.7%. In this most severely affected region, 57% of 22 million persons living with HIV over age 15 are women [12]. As with other STIs, biological factors, gender-based violence, sexual coercion

and lack of access to information and services are among the key factors that promote increased vulnerability of women and girls to HIV [12]. HIV is the only STI for which functioning surveillance systems are generally in place. The relative success of HIV surveillance demonstrates that with political commitment, adequate resources and a rapid point-of-care test appropriate for low-resource

² WHO. Global incidence and prevalence of selected curable sexually transmitted infections — 2008, 2012. Downloaded at <http://www.who.int/reproductivehealth/publications/rtis/stisestimates/en/index.html> on May 21, 2013.

³ Downloaded from: <http://www.cdc.gov/std/stats11/figures/5.htm> on May 30, 2013.

settings, surveillance systems for other STIs are feasible for many low-income countries.

1.1. STIs can lead to serious health problems for women

STIs and complications resulting from them are among the top five reasons that adults seek health care [14]. Aside from HIV, other STIs may also pose serious reproductive health concerns for women and their infants. STIs, principally untreated chlamydia, are the major underlying cause of infertility among women. Up to 40% of women with untreated chlamydia or gonorrhea will develop pelvic inflammatory disease (PID), and one in four of these women will become infertile. Women with PID are also 6 to 10 times more likely to have an ectopic pregnancy, putting women's lives at risk and inevitably leading to fetal loss. Up to half of such ectopic pregnancies are the result of a previous PID. Women with untreated syphilis have a 25% probability of stillbirth and a 14% probability of neonatal death. It is estimated that, globally, up to 4000 newborn babies become blind every year because of eye infections attributable to untreated maternal gonococcal and chlamydial infections [15].

In 2008, an estimated 1.4 million pregnant women around the world were infected with syphilis, 80% of whom had attended antenatal care services. Syphilis infections among pregnant women caused approximately 520,000 harmful outcomes, including 215,000 stillbirths, 90,000 neonatal deaths, 65,000 preterm or low-birth-weight babies and 150,000 congenital infections. Two thirds of these adverse outcomes occurred among women who were neither tested nor treated for syphilis despite an antenatal care visit [16].

STIs also significantly increase the risk of both acquiring and transmitting HIV. Genital ulcers are estimated to cause a 50- to 300-fold increased risk of acquiring HIV per episode of unprotected sex [15]. Even nonulcerative STIs increase the likelihood of HIV transmission. Overall, improving the management of STIs is an important strategy in HIV prevention.

2. Interventions to control STIs/HIV

STIs, including HIV, are caused by microorganisms, and their acquisition is often closely linked to certain behaviors. “[Sexual] partnership and network formation, and the chance of acquiring and transmitting an infection sexually are not random; they are determined by individual factors, cultural values, geography, demography, economics, health service and political and legal structures.” [17]. STIs spread most easily when individuals, especially women, have little power to negotiate safer sex and have poor access to health services. Effective STI prevention and control require coordinated efforts to address those factors that facilitate transmission or that hamper access to prevention, detection, diagnosis and treatment. Such strategies include promoting and supporting community-led interventions, eliminating stigma and gender-based violence, providing clinical services that respect

confidentiality, and improving collection and use of reliable data to guide evidence-informed responses. The epidemiological approach suggests concentrating efforts on high-risk groups such as sex workers and their clients to more rapidly control the spread of STIs [18], whereas the ICPD PoA promotes a broader focus on ensuring universal access to STI services as part of comprehensive sexual and reproductive health care. Given the numerous factors that have an impact on transmission or control of STIs, programs should harmonize several interventions. All programs should have a strategy that would include the following [19];

1. Primary prevention which includes health promotion and education, school- and community-based programs, and male and female condom distribution
2. Diagnosis and management of infections, which will build on primary prevention and add diagnostic services, clinical services, and patient and partner management services. Each of these elements should be evidence based and adapted to the national/subnational context.
3. Opportunistic testing or screening for asymptomatic cases.

2.1. Primary prevention

2.1.1. Behavioral approaches

Several behaviors decrease the incidence of STIs and HIV including delaying sexual debut, using condoms and having fewer sexual partners [20]. Related behavior change interventions aim to change social norms and build the knowledge, motivation and especially skills to support safer sexual practices. Behavioral risk reduction programs use counseling, information and empowerment techniques to build motivation and capacity to practice safer sex and change social norms. They enhance decision-making ability for reducing risk of exposure and transmission within sexual relationships, including condom negotiation and use. Best described in the HIV literature, “combination prevention,” comprised of behavioral, biomedical and structural interventions, has had demonstrated results for HIV, which are also applicable for preventing STIs [20,21]. Key behavioral programs include testing and risk reduction counseling, behavior change communication, comprehensive sexuality education, media and interpersonal communication (including peer education), social marketing of male and female condoms, and incentives for avoiding risk.

Globally, since 2000, there has been a steady upturn in the practice of safer sex in most countries, which is having a favorable impact on the downward trend in new HIV infections [22]. A recent meta-analysis of 42 studies, covering 67 behavioral interventions, indicated an associated decrease in sexual risk-taking resulting in increased condom use, and fewer STIs, including HIV [23]. Many countries, including Kenya, Malawi, South Africa, Tanzania, Trinidad, Zambia and Zimbabwe, are reporting favorable results from behavioral interventions [24–27]. Comprehensive sexuality education is indispensable for behavior change and has been

demonstrated to increase knowledge and decrease risk-taking [28]. A review of 83 studies worldwide showed that two thirds of the sex and HIV education programs improved one or more sexual behaviors in young people [29]. Behavioral interventions can have an appreciable impact when combined with other approaches and implemented at scale [21]. It is, however, difficult to disentangle the relative impact and attribution of these factors, but together these combined approaches hold the key to effective HIV/STI prevention. These interventions need to be brought to scale and sustained to have impact within populations at risk [30]. Moreover, behavioral interventions should be coupled with structural approaches to eliminate gender-based violence, child marriage and other human rights violations, which contribute to risk of HIV and STI exposure and transmission.

2.1.2. *Biomedical approaches*

Improved use of condoms, together with risk reduction counseling, is a priority STI control intervention [31]. Male and female condoms not only are effective in protecting against transmission of HIV but also significantly reduce the risk of acquiring several other STIs such as gonorrhea, chlamydia, HSV-2 and syphilis. Condoms also reduce the risk of trichomoniasis [32] and may provide some protection from HPV transmission [33]. Generating greater demand for male and female condoms among specific clients at higher risk of STIs, including youth, has yielded positive results when policies and policy makers are consistently supportive, myths and misperceptions about condoms have been addressed, condom negotiation skills and correct use are widely taught, and adequate supplies of quality male and female condoms are distributed free or at an affordable price through multiple channels [34].

Condom supplies in many high-burden countries are still inadequate: 2011 estimates for Sub-Saharan Africa indicate that only nine donor-provided condoms per year are available for each 15–49-year-old man and that only one female condom per year is available for every 10 women of the same age range. Numerous countries are now engaged in implementing comprehensive condom programming through a strategic 10-step approach that addresses coordination, supply, demand and support [35].

Male and female condoms can also be used for protection against unintended pregnancies, but male condoms have a contraceptive failure rate of 18% in the first year of typical use [36]. Therefore, “dual protection,” where condoms are used together with a modern contraceptive which is highly effective in preventing pregnancy, is an essential strategy for ensuring protection against both HIV/STIs and pregnancy. Though there has been an increase in dual-method use especially among at-risk populations, there is still much room for improvement [37–39].

Since ICPD, there have been efforts to develop multipurpose prevention technologies (MPTs) for SRH to simultaneously address diverse needs for combinations of STI, HIV and pregnancy prevention. Currently, the only

available MPT is the female or male condom. However, several other MPTs that could address two or more prevention needs at the same time are in the pipeline. Some of these include an intravaginal ring that continuously releases tenofovir and levonorgestrel from separate ring segments over a period of 90 days for contraception and HIV prevention; a gel combining MIV-150, zinc acetate and carrageenan, with combined activity against HIV and HSV; and a vaginal ring releasing dapivirine and a hormonal contraceptive over 60 days for contraception and HIV prevention. Reformulated tenofovir gel is also being studied in conjunction with the existing SILCS diaphragm as a combined barrier contraceptive, adding sperm-immobilizing agents and antiviral chemical protection against HIV and HSV [40].

As with the majority of infectious diseases, use of vaccines can be a turning point in controlling STIs. Currently, for two STIs, HBV and HPV, there are safe and effective vaccines. HBV vaccine is now adopted by more than 90% of countries and is part of childhood immunization programs [10].

The two types of HPV vaccines that are available now are both highly efficacious in preventing infection with virus types 16 and 18 that together are responsible for causing approximately 70% of cervical cancer cases globally. One vaccine is also highly efficacious in preventing anogenital warts, a common genital disease which is virtually always caused by infection with HPV types 6 and 11. Recently, use of the HPV vaccine by both girls and boys was approved in a number of industrialized countries,⁴ yet the primary target group continues to be young adolescent girls in the remaining countries as recommended by WHO [41].

The high cost discouraged many countries with a high burden of disease from introducing the vaccine at national scale, until recently. With a lower public sector price and the backing of the GAVI Alliance (formerly the Global Alliance for Vaccines and Immunization), the vaccines can become much more widely available [42]. WHO estimates that, with 70% vaccination coverage, current vaccines can prevent 4 million cervical cancer deaths over the next decade [10].

2.1.3. *Services for diagnosis and management*

Diagnosis and management of STIs present many challenges, depending on the characteristics of different agents. Diagnosis of gonorrhea and chlamydia is especially challenging for several reasons. Firstly, up to 70% of women, and a significant proportion of men, with either gonorrhea or chlamydia experience no symptoms until complications develop. Because women’s infections are more often undetected due to their asymptomatic nature and since women often have less access than men to STI testing and treatment, women have far greater STI-related morbidity than men [43].

⁴ Recently, CDC USA has recommended HPV vaccine also for adolescent boys. <http://www.cdc.gov/hpv/vaccine.html>.

Table 2
Sensitivity, specificity [43] and price⁵ of rapid chlamydia, gonorrhea, syphilis and trichomonas tests.

Organism	Test	Sensitivity	Specificity	Price
<i>Chlamydia</i>	ICT	33%–95%	>95%	High
	OIA			
<i>Chlamydia</i>	NAAT	97%–99%	99%–100%	High
<i>Gonorrhea</i>	ICT, OIA	54%–70%	90%–98%	High
<i>Gonorrhea</i>	NAAT	96%–100%	100%	High
<i>Syphilis</i>	ICT strip	86% (median)	99% (median)	Very low < \$1
<i>Trichomonas</i>	Wet mount	50%–54%	>95%	Very low
<i>Trichomonas</i>	OSOM® Rapid test	83%–90%	98%–100%	High

ICT, immunochromatographic; OIA, optical immunoassay; NAAT, nucleic acid amplification tests.

⁵ Price information is collected by UNFPA.

Secondly, tests for diagnosing chlamydia and gonorrhea infections not only are expensive but also require sophisticated laboratory facilities and highly trained staff, making it very difficult to offer these tests in low-resource settings. Among the four bacterial/protozoan STIs, currently, only syphilis has an inexpensive, rapid, point-of-care test that can be used in low-resource settings and can accurately determine the existence or absence of infection, meeting WHO's Affordable, Sensitive, Specific, User-friendly, Rapid and robust, Equipment-free and Deliverable to end users (ASSURED) criteria for low-resource settings [44]. *Trichomonas* protozoan infection can be detected by collecting a specimen during speculum examination and identifying it under a microscope, and there is hope for development of new tests meeting ASSURED criteria [45]. (Table 2).

Thirdly, although syndromic management is recommended by WHO for use in settings where etiologic diagnosis is not possible, it is neither very sensitive (accurate in confirming an STI) nor specific (correctly ruling out infection), especially for common syndromes like vaginal discharge among women. Syndromic management relies on simple flowcharts to help health care workers identify easily recognizable signs (syndromes) and provides an algorithm to guide treatment of the most probable cause(s). Treating the client at the first visit helps prevent complications and loss to follow-up and provides an opportunity for client education, counseling on safer sexual behavior, promotion or provision of condoms, partner notification, and HIV testing and counseling.

The syndromic approach, however, can overdiagnose STIs, exposing women to unnecessary treatment [46] and to possible risks, including relationship problems and even violence, if partners are given a false alert. It can also fail, as shown by several studies, to diagnose existing infections [47–49]. This is especially significant given the serious health consequences for women and infants caused by untreated chlamydia and gonorrhea. Efforts to increase the effectiveness of the syndromic approach by assessing the

risk of having an STI are limited by the unreliability of self-reporting, especially in low-prevalence settings [50].

Assuming needed medications are available, compliance with the treatment regimen is important to its success as well as to preventing the development of multidrug resistance. Breaking the chain of STI transmission requires preventing reinfection and onward transmission to other sexual partners. Providing earlier “treatment for prevention” has the potential to significantly lessen infectivity and decrease transmission to uninfected partner(s) [51]. Counseling on consistent condom use also aims to prevent transmission to partners or reinfection by partners. Partner notification is a key strategy to reach the presenting client's sexual partner(s), who may themselves be asymptomatic. If left untreated, partner(s) may suffer serious health consequences, may reinfect the treated partner and may transmit to other partners. Partners can be notified by the health provider or the client. One approach, sometimes referred to as expedited partner therapy, involves providing the client the requisite medication or prescription to deliver to their partner(s), with instructions for use [15]. This obviates the need for the partner(s) to come to the clinic and can increase the potential for partner treatment. Because partner notification can lead to intimate partner violence and other relationship problems, client safety must be carefully considered, especially when notification is based on potentially inaccurate syndromic diagnosis of infection among women [17].

2.1.4. Screening

Many people who acquire an STI do not have symptoms, or symptoms are mild and may disappear while the infection remains. Therefore, any efforts to determine the true extent of STIs within the population or to control STIs require the ability to diagnose asymptomatic infections as well as those that are symptomatic. Several tests with high sensitivity and specificity are available to diagnose certain specific STIs, both symptomatic and asymptomatic.

2.1.5. *Chlamydia and gonorrhea*

Screening to identify and treat chlamydia among asymptomatic women has been shown to reduce complications and transmission of the infection [52,53]. However, only a handful of countries either offer opportunistic testing of certain subsets of women, such as those seeking contraceptive or abortion services, or have programs which aim to screen all younger women (below the age of 25 or 29, age varying from country to country) [19,54–56]. Sweden's opportunistic chlamydia testing is an example which revealed success as well as new challenges. Opportunistic testing for chlamydia among young women in a variety of health care settings was introduced in some counties in Sweden in the early 1980s (Fig. 3). Since 1988, the law has made it compulsory across the country to provide free testing, treatment and contact tracing for any user of services with suspected chlamydia and to report diagnosed infections. Testing is targeted at sexually active women aged 15–29 years seeking contraception or abortion. Men are tested

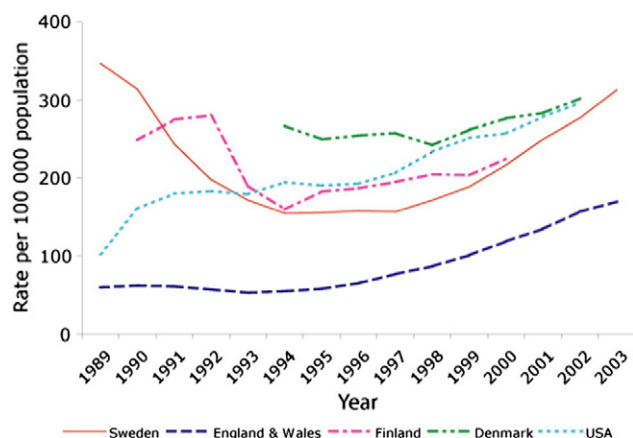


Fig. 3. Rates of reported genital chlamydia infection in selected countries, 1989–2003.⁶

when found through contact tracing or if symptomatic. Youth clinics have been established in many places to increase access to services for young people, including young men. As a result, the number of chlamydia infections decreased dramatically during the 1990s (Fig. 3). However, in 2007, a new chlamydia variant which could not be identified with the tests used at the time again caused an increase in infections [57]. This development of a new strain of chlamydia illustrates the importance of surveillance to track STI-causing organisms and their susceptibility to treatment. Sweden also participates in an ongoing multicountry European gonococcal antimicrobial susceptibility surveillance study, which has documented growing resistance to the primary drugs for treating gonorrhea, suggesting that gonorrhea may become untreatable using antimicrobial monotherapy [4].

2.1.6. An example of opportunistic testing: antenatal screening for syphilis

Syphilis, unlike many other STIs, has an inexpensive, rapid, point-of-care test, which can be used in low-resource settings, produces results within 20 min and confirms the presence of infection with high sensitivity and specificity (Table 2). Treatment of syphilis is also easy and inexpensive. A systematic review has found that opportunistic testing of all pregnant women who use antenatal care services for syphilis and their treatment could reduce the incidence of perinatal death and stillbirth attributable to syphilis by 50%, saving about 200,000 lives per year [58]. Most countries have policies for antenatal screening of STIs and HIV, but implementation is uneven. In some countries, for example, programs specifically designed to prevent new HIV infections in infants, including by preventing HIV infection in pregnant women and by screening and treating them for HIV [59], did not include similarly aggressive syphilis screening [60], despite it being part of the recommended global strategy [61]. This is a missed opportunity which is

currently being more vigorously addressed. Lack of universal access to antenatal care and attrition rates also limit the success of screening programs. The most recent data show that an estimated one in five pregnant women with syphilis did not receive antenatal care [16].

3. Policies

3.1. Integration of SRH services, including HIV and STIs

Integrating STIs/HIV with other SRH programs involves delivering a wide range of interventions to meet the comprehensive needs of clients such as offering rights-based family planning services to women living with HIV, delivering comprehensive sexuality education for young boys and girls, preventing child marriage, eliminating gender-based violence, managing sexually transmitted infections, ensuring access to female and male condoms for dual protection (against HIV/STIs and unintended pregnancy) and providing antiretroviral treatment as well as cervical cancer screening.

However, in responding to the AIDS crisis, key decisions made by global organizations and major donors led to the widespread development of stand-alone HIV services. STI programming was integrated neither into these HIV services nor into “its logical programmatic base[s] in sexual and reproductive health and rights.” [62]. Separate “vertical” health programs have resulted in lost opportunities for offering clients multiple services at a single visit. STI programs were not given high priority, and efforts to prevent HIV transmission were “largely managed through programs that [were] funded, implemented and evaluated independently of other STI control efforts.” [18].

Integrating STIs/HIV with other SRH programs, such as family planning and maternal health, can better meet the comprehensive needs of clients, ideally bringing all services together in one place and time. A global movement began in 2004 to link HIV and all SRH services, including STIs, at policy, systems and service delivery levels [63]. In 2009, the Commission on Population and Development urged governments to expand the capacity to deliver comprehensive HIV interventions in ways that strengthen national health and social systems by integrating them into primary health care, as well as by integrating SRH information and services, including for STIs, into HIV plans and strategies [64].

The evidence base has been growing on how integration strengthens health systems’ ability to offer clients comprehensive services and how such services can optimally be integrated. Systematic reviews of integrated service delivery have found a positive impact on client satisfaction, improved access to and uptake of services without a reduction in quality, favorable health and behavioral outcomes, reduced clinic-based STI/HIV-related stigma and cost-effectiveness [65,66]. Much more remains to be done to fully integrate STI services within broader SRH and HIV programs and to better deliver STI services within primary health care settings.

⁶ Low N. Current status of chlamydia screening in Europe. *Euro Surveill.* 2004;8(41):pii = 2566.

3.2. Reaching key populations

Sex workers, their clients and other partners, men who have sex with men and transgender people, and people who inject drugs have a higher likelihood of contracting an STI. However, due to marginalization, criminalization and cultural attitudes, the access to health service for these key populations is frequently lower than that for others. There is now good evidence for what works for specific key population groups [67–69]. Tailoring services for key populations, including reducing stigma and discrimination, is important to ensure uptake, and efforts are needed to try to ensure universal access for these higher-risk populations. Better linkage and integration of STI services within these focused programs, as well as within a broader range of SRH services for the whole community, are among the important factors to be considered in the future direction of STI prevention and control efforts.

4. Recommendations

4.1. Strengthening health systems

Integrating comprehensive SRH services, including for STIs, within primary health care is a core element. STI prevention and control require a strong health system which can deliver all aspects of STI management in a coordinated way (e.g., counseling, screening, diagnosis, treatment, follow-up and partner notification). All SRH services, including family planning, should take into account the risk for STIs and HIV when providing information, treatment and contraceptive choices. All clients should be instructed on the importance of consistent condom use for HIV and STI prevention and on how to negotiate their use. Female and male condoms should also be made widely available. Concerted efforts are needed to ensure that all pregnant women receive ANC early in pregnancy and that screening and treatment for syphilis are standard components of such care.

4.2. Behavior change interventions

All sexually active women and girls should have, at a minimum, access to information on the risks and symptoms of STIs, including an assessment of their own vulnerability, and how to reduce risk. Community-led interventions are needed to provide information on STIs, prevention education, unlimited access to male and female condoms, and referral for diagnosis and treatment, especially in low-resource areas lacking access to comprehensive primary health care. Community advocacy and education should engage men in protecting women and children from the health risks of STIs through promoting safer sex practices, access to treatment, preventing and addressing gender-based violence and assuring the safety of women in partner notification. The needs of specific key populations need to be addressed through current, identified best practice approaches.

4.2.1. A focus on young people to reduce vulnerability

Adolescents, especially girls, need universal access to SRH services, including HIV and STI screening, counseling and treatment or referral. These comprehensive services need to be respectful of their right to privacy, to confidentiality and to make their own decisions free from coercion. Comprehensive sexuality education including in schools can play a much greater role in educating youth about the health risks of asymptomatic and symptomatic infections for both adolescent boys and girls. Such programs should help girls develop the skills needed to combat the gender and social factors that render women and girls vulnerable to infection, support skills-building for negotiation and use of female and male condoms, and instill an understanding of the potential benefits of treatment for one's own health and as prevention of transmission.

4.3. Better diagnostics, vaccines and treatments

Inexpensive and accurate rapid point-of care diagnostic tests, especially for chlamydia and gonorrhea, are urgently needed in low-resource settings which lack laboratory facilities. Increased investment in research to develop rapid tests and address the high and growing rate of antimicrobial resistance is needed, as well as accelerated research on vaccines. A high priority should be placed on developing MPTs.

4.4. Increased STI surveillance

Global understanding of STIs and the disease burden they cause suffers from a lack of data. To better understand the epidemic and tailor programs effectively, greater investment is needed to improve STI surveillance and consistent reporting of known infections; follow up on partner notification; and collect and report data separately for men and women on the duration of infection, asymptomatic infections, antimicrobial resistance patterns, etc. Surveillance of STIs among women, especially of gonorrhea and chlamydia, should not be neglected because of the lack of rapid diagnostics. Existing diagnostics should be made available in all countries, at least for the purpose of surveillance.

This paper examines the current status of interventions and responses to the growing and neglected global epidemics of sexually transmitted infections other than HIV. While many challenges exist, there are also opportunities to better apply evidence-informed and human-rights-based approaches for control of STIs.

References

- [1] UNFPA. International Conference on Population and Development—ICPD — Programme of Action. Available from http://www.unfpa.org/webdav/site/global/shared/documents/publications/2004/icpd_eng.pdf [on May 21, 2003].
- [2] WHO. Global incidence and prevalence of selected curable sexually transmitted infections — 2008, 2012. Available from <http://www.who.int>.

- who.int/reproductivehealth/publications/rtis/stisestimates/en/index.html [on May 21, 2013].
- [3] Ohnishi M, Golparian D, Shimuta K, et al. Is *Neisseria gonorrhoeae* initiating a future era of untreatable gonorrhea? Detailed characterization of the first strain with high-level resistance to ceftriaxone. *Antimicrob Agents Chemother* 2011;55(7):3538–45, <http://dx.doi.org/10.1128/AAC.00325-11> [PMid:21576437 PMCid:3122416].
 - [4] European Centre for Disease Control. Gonococcal antimicrobial susceptibility surveillance in Europe, 2011/978-92-9193-450-8; 2013 [Stockholm].
 - [5] U.S. Department of Health and Human Services. CDC sexually transmitted disease surveillance 2012: Gonococcal Isolate Surveillance Project (GISP) supplement and profiles; 2014 [Atlanta. Available from <http://www.cdc.gov/std/gisp> (accessed 14 March 2014)].
 - [6] WHO estimates for chlamydia, gonorrhea, and syphilis in North America and for syphilis in WHO Euro are based on surveillance data. For other regions and infections prevalence, estimates were generated from prevalence data.
 - [7] WHO. Global prevalence and incidence of selected curable sexually transmitted infections. available from http://www.who.int/hiv/pub/sti/who_hiv_aids_2001.02.pdf [on May 21, 2013].
 - [8] Johnson LF, Dorrington RE, Bradshaw D, Coetzee DJ. The role of sexually transmitted infections in the evolution of a South African HIV epidemic. *Trop Med Int Health* 2012;17(2):161–8, <http://dx.doi.org/10.1111/j.1365-3156.2011.02906.x> [Epub 2011 Oct 31. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22035250>].
 - [9] Weinstock H, Berman S, Cates W. Sexually transmitted diseases among American youth, incidence and prevalence estimates, 2000. *Perspect Sex Reprod Health* 2004;36:6–0.
 - [10] World Health Organization. Sexually transmitted infections. Available from http://apps.who.int/iris/bitstream/10665/82207/1/WHO_RHR_13.02_eng.pdf 2013.
 - [11] World Health Organization. International statistical classification of diseases and related health problems 10th revision (ICD-10) version for 2010. Available from <http://apps.who.int/classifications/icd10/browse/2010/en#/A50-A64> [on March 25, 2014].
 - [12] UNAIDS. Global report UNAIDS report on the global AIDS epidemic. Geneva: UNAIDS; 2012. [Available from http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/2012_FS_regional_ssa_en.pdf June 6, 2013].
 - [13] Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012;380(9859):2095–128.
 - [14] WHO. Sexually transmitted infections. Fact sheet no. 110. Updated on May 2013, available from <http://www.who.int/mediacentre/factsheets/fs110/en/index.html> 2013.
 - [15] WHO. Global strategy for the prevention and control of sexually transmitted infections, breaking the chain of transmission. Geneva: WHO; 2006–2015. 2007.
 - [16] Newman L, Kamb M, Hawkes S, Gomez G, Say L, Seuc A, et al. Global estimates of syphilis in pregnancy and associated adverse outcomes: analysis of multinational antenatal surveillance data. *PLoS Med* 2013 [Available from <http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001396> on May 21, 2013].
 - [17] Low N, Broutet N, Adu-Sarkodie Y, Barton P, Hossain M, Hawkes S. Global control of sexually transmitted infections. *Lancet* 2006;368(9551):2001–16.
 - [18] Steen R, Wi TE, Kamali A, Ndowa F. Control of sexually transmitted infections and prevention of HIV transmission: mending a fractured paradigm. *Bull World Health Organ* 2009;87:858–65.
 - [19] European Centre for Disease Control. Chlamydia control in Europe, 2009. Available from http://www.ecdc.europa.eu/en/publications/publications/0906_gui_chlamydia_control_in_europe.pdf 2014.
 - [20] UNAIDS. UNAIDS thematic segment background paper. Combination prevention: addressing the urgent need to reinvigorate HIV prevention responses globally by scaling up and achieving synergies to halt and begin to reverse the spread of the AIDS epidemic; 2012. [Geneva, Switzerland. 5–7 June 2012 Available from http://www.unaids.org/en/media/unaids/contentassets/documents/pcb/2012/20120516_ThematicSegment_background_paper_en.pdf].
 - [21] UNAIDS. Combination HIV prevention: tailoring and coordinating biomedical, behavioral and structural strategies to reduce new HIV infections. A UNAIDS discussion paper. UNAIDS; 2010. [JC2007].
 - [22] UNAIDS. Global report UNAIDS report on the global AIDS epidemic 2013. Geneva: UNAIDS; 2013. [http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2013/gr2013/UNAIDS_Global_Report_2013_en.pdf].
 - [23] Scott-Sheldon LAJ, Huedo-Medina TB, Warren MR, Johnson BT, Carey MP. Efficacy of behavioral interventions to increase condom use and reduce sexually transmitted infections: a meta-analysis, 1991 to 2010. *J Acquir Immune Defic Syndr* 2011;58:489–98.
 - [24] Bello G, Simwaka B, Ndhlovu T, Salaniponi F, Hallett TB. Evidence for changes in behavior leading to reductions in HIV prevalence in urban Malawi. *Sex Transm Infect* 2011;87(4):296–300.
 - [25] Gregson S, Gonese E, Hallett TB, Tarubekera N, Hargrove JW, Lopman B, et al. HIV decline in Zimbabwe due to reductions in risky sex? Evidence from a comprehensive epidemiological review. *Int J Epidemiol* 2010;39(5):1311–23.
 - [26] Johnson LF, Hallett TB, Dorrington RE. The effect of changes in condom usage and antiretroviral treatment coverage on human immunodeficiency virus incidence in South Africa: a model-based analysis. *J R Soc Interface* 2012;9(72):1544–54.
 - [27] Burton J, Darbes LA, Operario D. Couples-focused behavioral interventions for prevention of HIV: systematic review of the state of evidence. *AIDS Behav* 2010;14:1–0.
 - [28] UNESCO. International technical guidance on sexuality education. Geneva: UNESCO; 2009.
 - [29] Kirby DB, Laris BA, Rolleri LA. Sex and HIV education programs: their impact on sexual behaviors of young people throughout the world review article. *J Adolesc Health* 2007;2007(40):206–17.
 - [30] Gurman T, Rubin S, Roess A. Effectiveness of mHealth behavior change communication interventions in developing countries: a systematic review of the literature. *J Health Commun* 2012;17(Suppl 1):82–04, <http://dx.doi.org/10.1080/10810730.2011.649160>.
 - [31] Manhart LE, Holmes KK. Randomized controlled trials of individual-level, population-level, and multilevel interventions for preventing sexually transmitted infections: what has worked? *J Infect Dis* 2005;191(Suppl 1):S7–24.
 - [32] Gallo MF, Steiner JF, Warner L, et al. Self-reported condom use is associated with reduced risk of chlamydia, gonorrhea and trichomoniasis. *Sex Transm Dis* 2007;6(34):829–33 [Center for Disease Control, Condoms and STDs: fact sheet for public health personnel. Available from www.cdc.gov/condomeffectiveness/latex.htm].
 - [33] Holmes KK, Levine R, Weaver M. Effectiveness of condoms in preventing sexually transmitted infections. *Bull WHO* 2004;82:454–61.
 - [34] Haddock S, Hardee K, Gay J, et al. Comprehensive HIV prevention: condoms and contraceptives count. Washington DC: Population Action International; 2008.
 - [35] UNFPA, UNFPA. Comprehensive condom programming. Available from <http://www.unfpa.org/webdav/site/global/shared/documents/publications/2011/CCP.pdf> [on July 21, 2013].
 - [36] Trussell J. Contraceptive failure in the United States. *Contraception* 2011;83(5):397–404.
 - [37] Yam EA, Mnisi Z, Mabuza X, Kennedy C, Kerrigan D, Tsui A, et al. Use of dual protection among female sex workers in Swaziland. *Int Perspect Sex Reprod Health* 2013 Jun;39(2):69–78, <http://dx.doi.org/10.1363/3906913>.
 - [38] Seutlwadi L, Peltzer K. The use of dual or two methods for pregnancy and HIV prevention amongst 18–24-year-olds in a cross-sectional study conducted in South Africa. *Contraception* 2013;87(6):782–9, <http://dx.doi.org/10.1016/j.contraception.2012.09.026> [Epub 2012 Oct 31].

- [39] Higgins JA, Cooper AD. Dual use of condoms and contraceptives in the USA. *Sex Health* 2012;9(1):73–80, <http://dx.doi.org/10.1071/SH11004>.
- [40] Harrison PF, Hemmerling A, Romano J, Whaley KJ, Young Holt B. Developing multipurpose reproductive health technologies: an integrated strategy. *AIDS Res Treat* 2013;15, <http://dx.doi.org/10.1155/2013/790154> [Article ID 790154].
- [41] WHO. Immunization, vaccines and biomedical: human papilloma virus. Available from, <http://www.who.int/immunization/topics/hpv/en/> [on March 12, 2014].
- [42] GAVI. GAVI welcomes lower prices for life-saving vaccines. Geneva: Press Release; 2011 [Available from, <http://www.gavi.org/library/news/press-releases/2011/gavi-welcomes-lower-prices-for-life-saving-vaccines> on August 20, 2013].
- [43] Abouzahr C. Trends and projections in mortality and morbidity. Paper prepared for UNFPA–WHO meeting “ICPD Beyond 2014 Expert Group Meeting on Women’s Health: Rights, Empowerment and Social Determinants”. September 30–October 3, 2013, Mexico City; 2013.
- [44] Peeling RW, Holmes KK, Mabey D, Ronald A. Rapid tests for sexually transmitted infections (STIs): the way forward. *Sex Transm Infect* 2006;82(Suppl V):v1–6, <http://dx.doi.org/10.1136/sti.2006.024265>.
- [45] Gaydos C, Hardick J. Point of care diagnostics for sexually transmitted infections: perspectives and advances. *Expert Rev Anti Infect Ther* 2014;1–6 [Early, online].
- [46] Mayaud P, Hawkes S, Mabey D. Advances in control of sexually transmitted diseases in developing countries. *Lancet* 1998;351(Suppl III):29–32.
- [47] Hawkes S, Morison L, Foster S, Gausia K, Chakraborty J, Weeling R, et al. Reproductive-tract infections in women in low-income, low-prevalence situations: assessment of syndromic management in Matlab, Bangladesh. *Lancet* 1999;354:1776–81.
- [48] Younis N, Khattab H, Zurayk H, et al. A community study of gynecological and related morbidities in rural Egypt. *Stud Fam Plann* 1993;24(3):175–86.
- [49] García PJ, Carcamo CP, Garnett GP, Campos PE, Holmes KK. Improved STD syndrome management by a network of clinicians and pharmacy workers in Peru: the PREVEN Network. *PLoS One* 2012;7(10):e47750, <http://dx.doi.org/10.1371/journal.pone.0047750>. Epub 2012 Oct 17.
- [50] Bulut A, Yolsal N, Filippi V, Graham W. In search of truth: comparing alternative sources of information on reproductive tract infection. *Reprod Health Matters* 1995;3(6):31–9.
- [51] Cohen M, McCauley M, et al. Prevention of HIV-1 infection with early anti-retroviral therapy. *N Engl J Med* 2011;365:493–505.
- [52] Low N, Bender N, Nartey L, Shang A, Stephenson JM. Effectiveness of chlamydia screening: systematic review. *Int J Epidemiol* 2008;1–4.
- [53] Giertz G, Kallings I, Nordenvall M, Fuchs T. A prospective study of *Chlamydia trachomatis* infection following legal abortion. *Acta Obstet Gynecol Scand* 1987;66:107–9.
- [54] US Preventive Services Task Force. Recommendations for gonorrhea screening. Accessed at <http://www.uspreventiveservicestaskforce.org/uspstf05/gonorrhea/gonrs.htm> [on May 21, 2013].
- [55] US Preventive Services Task Force. Screening for chlamydial infection. Downloaded t <http://www.uspreventiveservicestaskforce.org/uspstf/uspshlm.htm> [on March 12, 2014].
- [56] Low N, Cassell JA, Spencer B, et al. Chlamydia control activities in Europe: cross-sectional survey. *Eur J Pub Health* 2011.
- [57] Hansdotter F, Blaxhult A. “Chlamydia Monday” in Sweden. *Euro Surveill* 2008;13(38).
- [58] Hawkes S, Matin N, Broutet N, Low N. Effectiveness of interventions to improve screening for syphilis in pregnancy: a systematic review and meta-analysis. *Lancet Infect Dis* 2011;11:684–91.
- [59] UNAIDS. Global plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: UNAIDS; 2011.
- [60] Potter D, Goldenberg RL, Chao A, et al. Do targeted HIV programs improve overall care for pregnant women? Antenatal syphilis management in Zambia before and after implementation of prevention of mother-to-child HIV transmission programs. *J Acquir Immune Defic Syndr* 2008;47:79–85.
- [61] Interagency Task Team on the Prevention of HIV in Pregnant Women, Mothers, and their Children. Preventing HIV and unintended pregnancies: strategic framework; 2012 [London].
- [62] Germain A, Dixon-Mueller R, Sen G. Back to basics: HIV/AIDS belongs with sexual and reproductive health. *Bull World Health Organ* 2009;87(11):840–5.
- [63] 26th Meeting of the UNAIDS Programme Coordinating Board, Geneva, Switzerland, 22–24 June 2010 Thematic segment: sexual and reproductive health (SRH) services with HIV interventions in practice; 2013. [Available from, http://www.srhivlinkages.org/content/uploads/docs/articles/26thpcbthematicbackground_2010_en.pdf on July 2013].
- [64] Commission on Population. The contribution of the Programme of Action of the International Conference on Population and Development to the internationally agreed development goals, including the Millennium Development Goals. New York: United Nations; 2009. [paragraphs 20].
- [65] Church K, Mayhew SH. Integration of STI and HIV prevention, care, and treatment into family planning services: a review of the literature. *Stud Fam Plann* 2009;40(3):171–86.
- [66] Kennedy CE, Spaulding AB, Brickley DB, Almers L, Mirjahangir J, Packer L, et al. Linking sexual and reproductive health and HIV interventions: a systematic review. *J Int AIDS Soc* 2010;13:26.
- [67] WHO. Prevention and treatment of HIV and other sexually transmitted infections for sex workers in low- and middle income countries: recommendations for a public health approach. Available from http://www.who.int/hiv/pub/guidelines/sex_worker/en 2012 [on July 21, 2013].
- [68] WHO. Prevention and treatment of HIV and other sexually transmitted infections for men who have sex with men and transgender people: recommendations for a public health approach. Available from, http://www.who.int/hiv/pub/guidelines/msm_guidelines2011/en 2011 [on July 21, 2013].
- [69] WHO, UNODC, UNAIDS. Technical guide for countries to set targets for universal access to HIV prevention, treatment and care for injecting drug users: 2012 revision. Available from, http://www.who.int/hiv/pub/idu/targets_universal_access/en/index.html [on July 21, 2013].