Baseline report on global sexually transmitted infection surveillance 2012

World Health Organization

Baseline report on global sexually transmitted infection surveillance 2012

World Health Organization

WHO Library Cataloguing-in-Publication Data :

Baseline report on global sexually transmitted infection surveillance 2012.

1.Sexually transmitted diseases – epidemiology. 2.Epidemiological monitoring.
3.Epidemiologic methods. I.World Health Organization.

ISBN 978 92 4 150589 5 (NLM classification: WC 140)

Printed in Switzerland

Acknowledgements

Lori Newman and Teodora Wi in the WHO Department of Reproductive Health and Research (WHO/RHR) coordinated development of this document. Nathalie Broutet and Igor Toskin contributed further input.

The World Health Organization would like to express gratitude to the Member States working to collect and share data on the STI burden in their countries. It is the work of dedicated individuals at the local and national levels that underlies all that is found in this report.

WHO/RHR would like to express thanks to the WHO regional staff members who support HIV and STI surveillance and programmes, including: Iyanthi Abeyewikreme, Monica Alonso, Emil Asamoa-Odei, Hamida Khattabi, Lali Khotenashvili, Ying-Ru Lo, Assimawe Pana, Razia Pendse, Gabriele Riedner, Suzanne Serruya, and Dongbao Yu. In addition, we would like to thank our colleagues in the Departments of HIV/AIDS and Reproductive Health and Research for their support in producing this baseline report and in the broader efforts to strengthen STI surveillance.

We also would like to express our gratitude to the WHO Gonococcal Antimicrobial Susceptibility Programme (GASP) collaborating centres and the technical leads in these centres, Monica Lahra, Magnus Unemo, Manju Bala, Jo Anne Dillon, Sarah Kidd, Tom Wong, Catherine Ison, David Lewis, Pilar Ramon Pardo, and Amina Hancali.

We thank consultants Richard Steen, whose work was instrumental in developing the road map and providing technical support to regions and countries; Virginia Loo, who drafted this report; and Francis Ndowa, who provided technical support and input for this work. We appreciate the fine work that WHO interns Floria Chi and Germaine Liu contributed to this report.

We also wish to thank, at the United States Centers for Disease Control and Prevention (CDC), Mark Stenger for support to the analysis of the European regional survey, Karen Hoover for support to STI surveillance in the Americas, Mary Kamb for review and input into STI surveillance strengthening, and Gail Bolan for ensuring that STI surveillance remains a priority. We are grateful also for financial support from the CDC and technical contributions by many other CDC staff members dedicated to strengthening STI surveillance at the country, regional, and global levels.

We thank Jura Editorial Services SARL for editing and design and Janet Petitpierre for cover design.

Contents

Abbreviations and acronyms

AFR	WHO African Region
AIDS	acquired immune deficiency syndrome
AMR	WHO Region of the Americas
ANC	antenatal care
CDC	Centers for Disease Control and Prevention
DSW	direct sex worker
EMR	WHO Eastern Mediterranean Region
EMTCT	elimination of mother-to-child transmission
EUR	WHO European Region
EURO	WHO Regional Office for Europe
FSW	female sex worker
FTA-ABS	fluorescent treponemal antibody – absorption (treponemal antibody tests)
GARPR	Global AIDS Response Progress Reporting
GASP	gonococcal antimicrobial surveillance programme
GISP	Gonococcal Isolate Surveillance Program
GUD	genital ulcer disease
HIV	human immunodeficiency virus
IgM	immunoglobulin M
KBR	Bei der Komplementbindungsreaktion (complement fixation test)
MIC	minimum inhibitory concentration
MOH	ministry of health
MSM	men who have sex with men
MTCT	mother-to-child transmission
PAHO	Pan American Health Organization
PPNG	penicillinase-producing *N. gonorrhoeae*
RHR	Department of Reproductive Health and Research (WHO)
RPR	rapid plasma reagin
SEAR	WHO South-East Asia Region
SSuN	STD Surveillance Network
STI	sexually transmitted infection
SW	sex worker
TPHA	treponema pallidum hemaglutination assay
TPPA	treponema pallidum particle agglutination assay
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
VDRL	Venereal Disease Research Laboratory
WHO	World Health Organization
WPR	WHO Western Pacific Region

Executive summary

Efforts to control sexually transmitted infections (STIs) require strong surveillance systems. Effective surveillance is crucial to monitoring epidemic trends, identifying severe or emerging epidemic outbreaks, strategically directing resources for prevention, treatment, and control efforts, and assessing the effectiveness of these efforts.

A baseline report

The World Health Organization (WHO) recently released updated guidance on methods for STI surveillance and developed a road map to improving STI surveillance at the country, regional, and global levels. This baseline report is intended to explore what data are currently available globally online for analysis, in order to inform renewed efforts to strengthen STI surveillance. The data presented in this report indicate that investments in STI surveillance are being made across the regions. A number of case studies, included here, illustrate how case report data have been used to guide revitalized primary prevention programmes and to demonstrate progress following improvements in STI services and primary prevention efforts. However, data are not routinely available online for the majority of countries. Efforts must be made at all levels to support improvements in STI surveillance. As a key first step, WHO is strengthening the global structure to routinely collect and disseminate data.

Although several countries have seen the burden of STI change over time, globally there is no suggestion from case report data that the overall burden of STIs changed between 2007 and 2010. This observation is roughly consistent with WHO estimates of the global burden of curable STIs (syphilis, gonorrhoea, chlamydia, and trichomoniasis) of 448 million in 2005 and 499 million in 2008. Clearly, efforts are needed not only to improve STI surveillance data, but also to ensure that these data are used to increase the effectiveness of STI prevention programmes.

Syphilis case reporting

Monitoring data on the rates and prevalence of syphilis are currently the most complete. A large number of countries generate syphilis case rates for men, women, and infants, as well as prevalence data from both general populations (i.e. ANC attendees) and key populations at higher risk (sex workers and men who have sex with men). Several factors contribute to the greater availability of data on syphilis than on other STIs. These include increased access to cheap and simple diagnostic tests and increased efforts at the national, regional, and global levels to eliminate mother-to-child transmission (MTCT) of syphilis.

Still, only about half of all countries reported on syphilis testing coverage in pregnancy, and this fraction did not increase markedly between 2008 and 2011. Greater surveillance efforts are needed not only to increase the number of countries reporting, but also to improve the quality of data, so that progress towards global targets for elimination of MTCT of syphilis can be monitored.

Eliminating MTCT of syphilis

In 2012 WHO and key partners came to consensus on global criteria and processes for validating the elimination of MTCT of syphilis and HIV (*1*). These criteria look beyond targets set for 2015. In 2011, 22 countries reported having tested at least 95% of pregnant women for syphilis, and 27 countries reported treating at least 95% of pregnant women who tested seropositive for syphilis. Fourteen countries reported data for all four global validation criteria that suggest that MTCT of syphilis may have been eliminated.

For countries to be validated as having eliminated MTCT of syphilis under the WHO criteria, they will have to develop routine reporting and periodically assess data quality. This effort provides some motivation to strengthen STI surveillance systems.

Antimicrobial resistance

Information generated through the WHO Gonococcal Antimicrobial Surveillance Programme (GASP) offers a clear example of data that highlight the need to improve STI programmes. Multiple countries have used the tracking of antimicrobial resistance of gonococcal isolates to adjust treatment guidelines to ensure effective treatment for *N. gonorrhoeae* infection. Decreased susceptibility of *N. gonorrhoeae* to cephalosporins, the last class of widely

effective antibiotics for the treatment of gonorrhea, has emerged in at least 36 countries, and treatment failures, in at least 10 countries. This situation must be monitored closely.

In summary, this baseline report demonstrates that, although STI surveillance is being conducted in many countries around the world, countries need to make a concerted effort to strengthen the quality of national data. At the regional and global levels, more robust structures are needed to support analysis and dissemination of these data. Accurate and timely routine data on trends in STI incidence and prevalence are important to ensuring that the world can respond appropriately and strategically to this common and devastating public health problem.

Introduction

Globally, new cases of curable sexually transmitted infections (i.e. syphilis, gonorrhoea, chlamydia, and trichomoniasis) numbered an estimated 499 million in 2008 (*2*). This figure is not much different from the estimated 448 million cases in 2005 (Table 1).

Table 1
Global STI incidence estimates for 2005 and 2008 (millions of cases)

Sexually transmitted infection	2005	2008	% change
Chlamydia trachomatis	101.5	105.7	4.1
Neisseria gonorrhoeae	87.7	106.1	21.0
Syphilis	10.6	10.6	0
Trichomonas vaginalis	248.5	276.4	11.2
Total	**448.3**	**498.9**	**11.3**

Source: WHO, 2012 (*2*)

When these infections go untreated, complications can include pelvic inflammatory disease, infertility, and congenital infections. Control of STIs is a critical component of global strategies to achieve the Millennium Development Goals in the areas of maternal and child health (MDGs 4 and 5) and combating HIV (MDG 6) (*3*). Improving access to STI services also is an important part of WHO's global strategy for universal access to reproductive health (*4*). Many countries have demonstrated that STI control programmes can dramatically reduce the prevalence of bacterial diseases such as gonorrhoea, syphilis, and chancroid. This reduction came about through a combination of increasing availability and access to testing and treatment as well as primary prevention efforts such as increased condom use.

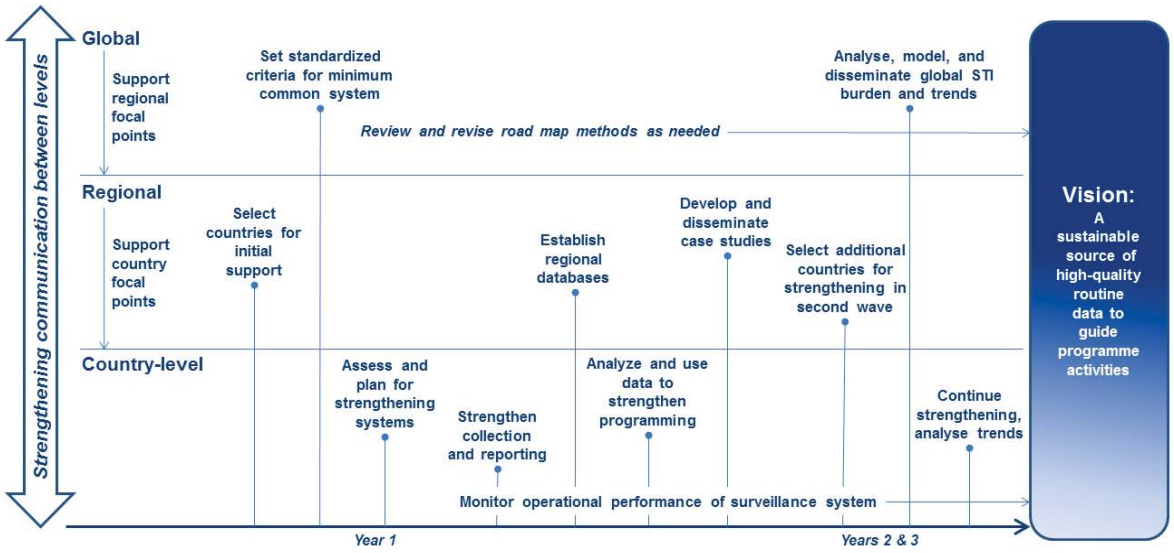
As outlined in the *Global strategy for the prevention and control of sexually transmitted infections, 2006–2015* (*5*), effective STI control relies on reliable, routine reporting from STI surveillance systems. Strong surveillance systems enable national health authorities, policy-makers, and STI programme managers to effectively monitor epidemic trends, to identify severe or emerging epidemic outbreaks, to strategically direct the investment of resources in prevention, treatment, care, and control efforts, and to assess the effectiveness of these efforts. For example, the global initiative to eliminate mother-to-child transmission of syphilis has set targets for 2015 of testing 90% of pregnant women and treating 90% of those who test seropositive for syphilis (*6*). Tracking progress toward such targets can tell decision-makers and programme managers where to focus effort and resources to ensure that these targets are achieved. Conversely, without quality STI surveillance data, it is easy for an epidemic to spread extensively before being recognized, making control more difficult and costly.

WHO has recently released updated guidance on STI surveillance (*7*). This guidance emphasizes practical, routine approaches to conducting STI surveillance and making the best use of national STI screening protocols, laboratory capacity, and behavioural surveillance systems. In addition, WHO has developed a road map for strengthening STI surveillance, based on an informal assessment of online reported data and stakeholder interviews (Figure 1 and Annex 1). In this road map WHO proposes a set of key indicators to describe sexually transmitted epidemics and progress toward control of STIs. WHO has begun to implement this road map through a number of efforts:

- making STI data available online via the Global Health Observatory Repository and Theme pages (http://apps.who.int/gho/data and http://www.who.int/gho/en/);
- working with regions to develop tools for improving STI surveillance data;
- piloting new STI indicators in global reporting systems;
- working with pilot countries to improve STI surveillance; and
- developing guidance for validation of data related to elimination of mother-to-child transmission of syphilis.

This baseline report is intended to document what data are currently available at the global level for the proposed key indicators

Figure 1
Road map for strengthening STI surveillance



in the road map prior to implementation of activities now starting and those proposed in the road map. This report presents data on these key indicators both to describe the epidemiology of STIs and to document programmatic efforts to control STIs, including surveillance of gonococcal antimicrobial resistance. In addition, this report highlights the status of country surveillance systems for each of the key indicators. Based on their experience, countries that are collecting routine STI surveillance data can offer the world important lessons and approaches to addressing common barriers.

The data in this report come primarily from global reporting systems used to track the global response to AIDS and provide universal access to HIV services[1] (Global AIDS Response Progress Reporting (GARPR) (*8*)) and from online reports from government web sites that provide numbers of cases of some of the most prevalent curable STIs for 2007 through 2011 (Table 2). However, many countries with strong STI surveillance systems and good-quality data may not be included in this baseline report because online searching did not identify them.

A key aspect of interpreting STI data, including making comparisons between countries and generalizing across regions, is distinguishing lack of data from lack of an epidemic. A weak surveillance system may mask the presence of a serious epidemic, and stronger surveillance systems may show higher case rates than weaker ones. To help with appropriate interpretation and use of the information, this report presents epidemiologic and programmatic data with notations on sources as well as on data completeness and quality.

As surveillances systems are strengthened, future reports on global STIs will be able to provide more complete data on a set of key indicators, show trends over time, and allow comparison among regions and countries of epidemics and efforts to control transmission. At the same time, the availability of more data at the global level should indicate the increasing application of local data to improve STI control programmes around the world.

[1] These data also are publicly available through the WHO Global Health Observatory Data Repository (http://apps.who.int/gho/data/).

Table 2
Key STI indicators included in this report

Indicator	Primary source	Number of countries reporting
Sex-specific genital ulcer rate (cases per 100 000 adults)	Online reports	12
Urethral discharge rate (cases per 100 000 male adults)	Online reports	13
Gonorrhoea rate (cases per 100 000 male adults)	Online reports	46
Sex-specific syphilis rate (cases per 100 000 adults)	Online reports	51
Congenital syphilis rate (cases per 100 000 live births)	Online reports	72
Percentage of ANC attendees tested for syphilis at first ANC visit	GARPR	72
Percentage of ANC attendees tested who are positive for syphilis	GARPR	80
Percentage of ANC attendees positive for syphilis who are treated appropriately	GARPR	40
Prevalence of syphilis among female sex workers	GARPR	49
Prevalence of syphilis among men who have sex with men	GARPR	47

ANC = antenatal care, GARPR = Global AIDS Response Progress Reporting

Sources and method for developing this report

This first version of the global STI report includes STI surveillance data collected through the Global AIDS Response Progress Reporting (GARPR) system. Data on gonococcal antimicrobial susceptibility include data collected by regional reference laboratories participating in the WHO Gonococcal Antimicrobial Surveillance Programme (GASP) as well as published data from Europe, Asia and the Pacific, and the Americas. Data on other STI indicators came from a retrospective online review conducted as part of global efforts to strengthen STI surveillance. Detail on sources and methods appear in Annex 2.

Informed by the review of online data and interviews with key stakeholders, WHO proposed a set of key STI surveillance indicators as part of the road map for strengthening STI surveillance systems (Annex 1). Selection of the indicators considered feasibility of reporting, current availability of data, and relevance across a broad range of country contexts. Once key indicators were selected, relevant prevalence and case report data from 2007 through 2011 from GARPR and online searches were collated, and standardized rates were calculated.

Several caveats should be stated. It is possible that countries with excellent STI data may have been omitted from this report because the online search did not identify them Thus, an absence of data in this report for a given country should not be taken to mean that no surveillance data exist in that country. In addition, data quality is difficult to assess through a review such as this. Comparisons of case rates between countries should be made cautiously. Differences between countries may reflect differing patterns of health care seeking behaviour, screening practices, or access to health services rather than actual differences in incidence or prevalence among populations. Underreporting is universal, even in countries with relatively strong case reporting systems (*9*). Thus, STI case rates provide only an indication of the minimum level of STIs within a population.

STI incidence (case reports) and prevalence trends can be sensitive indicators of changing STI transmission and burden within countries and thus useful for monitoring the effectiveness of STI control efforts. However, other explanations should always be considered. For example, case reports may increase if new screening programmes are introduced (detecting more asymptomatic infections) or may fall if higher user fees result in fewer people seeking testing.

European region case study: Building a universal case reporting system for STIs

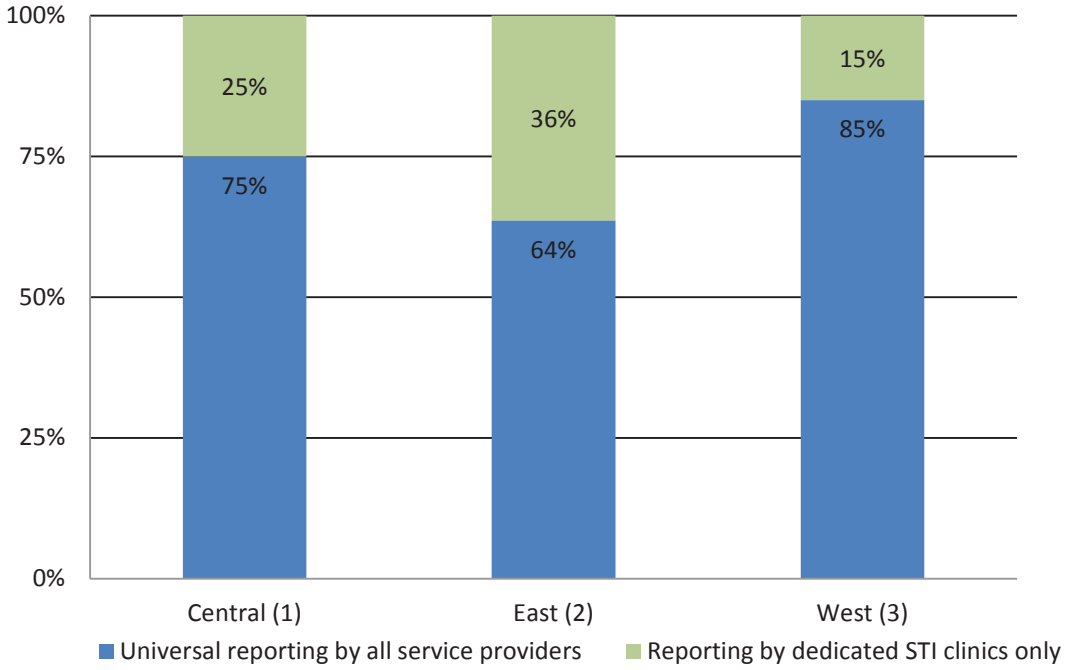
The WHO European Region provides some of the most comprehensive STI reporting of all WHO regions, facilitated in part by a regional online reporting tool. In addition, from June 2011 through July 2012, the WHO Regional Office for Europe (EURO), in collaboration with WHO headquarters and the United States Centers for Diseases Control and Prevention (CDC), conducted a survey of STI prevention and care programmes of all 53 Member States of the WHO European Region. The survey sought to obtain up-to-date information on the status of STI programmes across the WHO European Region and insights on progress made, remaining challenges, and possible ways to further strengthen STI prevention and treatment as well as care and support across the region.

Responses came from 52 Member States (98% of the members in the region). Member states reported on STI surveillance capacity and on national policies facilitating case reporting. These data provide a rich source for assessing country-specific STI surveillance infrastructure and are similar to a survey conducted in 1998–1999.

Preliminary findings from this most recent survey indicate that the majority of Member States in the region (47 of 52, or 90%) and in each of the three sub-regions maintain STI surveillance systems and have policies in place for case reporting (Figure 2). In all three sub-regions, the majority of Member States have policies that support universal reporting of STI cases by all service provider types. A minority of Member States, with the highest proportion in the eastern sub-region, reported that only dedicated STI clinics report cases. About one-third of states in the western sub-region also reported having an infrastructure for sentinel surveillance of STI prevalence in various settings to supplement universal case reporting (data not shown).

Figure 2

Proportion of Member States with STI surveillance systems, by reporting source and sub-region, WHO European Region, 2011–2012



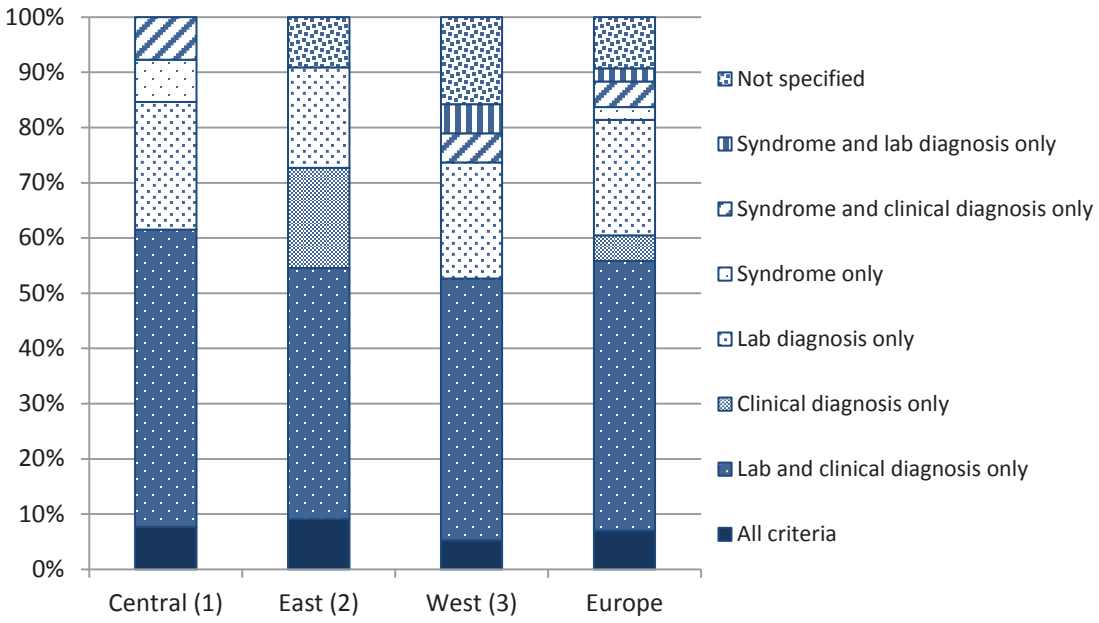
Source: EURO survey 2012
(1) Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia, Macedonia, Turkey
(2) Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
(3) Andorra, Austria, Belgium, Denmark, England, Finland, France, Germany, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland
Note: Excluding Kosovo, which reports reporting from all service providers.

The criteria for reporting STIs varied somewhat across sub-regions. A majority of all Member States with universal reporting (N = 34) based at least some of their STI case reporting on laboratory diagnosis (Figure 3). Only one Member State reported relying solely on syndromic reporting as the basis for universal case reporting.

This assessment of surveillance systems in Europe suggests that, although basic policies are in place, further strengthening of STI surveillance is needed, especially in light of increasing sexual transmission of HIV infection (*10*). Along with case reporting, emphasis should be given to monitoring trends in STI prevalence, especially in key populations at higher risk. The WHO Regional Office for Europe is currently analysing survey data to inform efforts to help Member States strengthen STI prevention, treatment, and control.

Figure 3

Basis of universal case reporting by sub-region, WHO European Region, 2011–2012



Source: EURO survey 2012

(1) Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Hungary, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia, Macedonia, Turkey

(2) Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

(3) Andorra, Austria, Belgium, Denmark, England, Finland, France, Germany, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland

Note: Excludes Kosovo, which reports universal case reporting based on all criteria

Case reporting systems – general population epidemiology

Case reporting forms the backbone of most communicable disease surveillance systems, including STI surveillance. For countries without strong laboratory capacity, genital ulcers in both males and females and urethral discharge in males are considered key surveillance indicators. These syndromes are generally highly specific to sexually transmitted infections, are based on case definitions that require no laboratory capacity, and can be identified in any clinical setting.

Indicator 1: Sex-specific genital ulcer rate (cases per 100 000 adults)

In STI surveillance genital ulcer cases serves as a proxy for important curable bacterial STIs, such as syphilis and chancroid, as well as for incurable viral STIs such as herpes simplex virus. Where most genital ulcer cases are due to curable bacterial STI, strengthening management of STIs should lead to a decline in rates of genital ulcer cases. WHO's guidance on global STI surveillance recommends periodic assessment of the etiology of STI syndromes. Countries can better interpret trends in urethral discharge case rates by conducting periodic validation studies of the etiology of urethral discharge, as recommended in the WHO global STI surveillance guidance (*7*).

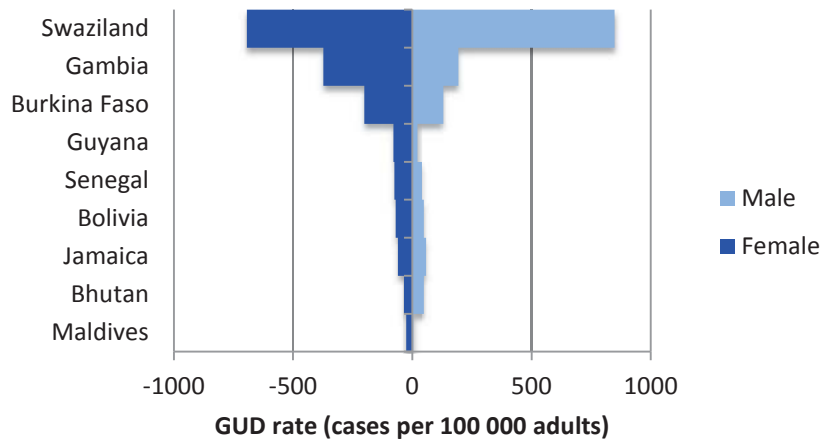
Female case rates per 100 000 population ranged from 2 to 694; male case rates per 100 000 ranged from 3 to 849 (Figure 4 and Annex 3).

Across the five countries with trend data, no consistent pattern emerges (Annex 3). In Burkina Faso and Guyana, genital ulcer case rates increased among both men and women. In Bolivia genital ulcer case rates declined steadily among women but were relatively stable among men. Among both men and women in Cambodia and the Maldives, case rates for genital ulcers did not show distinct changes.

Status of the data: Genital ulcer disease rates

As of 2012, prior to establishment of a global STI reporting system for genital ulcer disease, 12 countries had sex-disaggregated surveillance data on genital ulcer cases available online for the period 2007–2011. Of these, five countries, Bolivia, Burkina Faso, Cambodia, Guyana, and the Maldives, have reported sex-disaggregated genital ulcer disease data consistently, i.e. for at least three of those five years. Only two countries, Djibouti and Senegal, provided age-disaggregated case reports, using the age categories of 15–24 and 25+.

Figure 4
Sex-specific genital ulcer rates: Reported cases per 100 000 adults, most recent data, 2007–2011



Source: Annex 3
Note: Rates for Cambodia, Djibouti, and Guatemala omitted as too small to show.

Indicator 2: Urethral discharge rate (cases per 100 000 male adults)

Urethral discharge among males is another key indicator in countries without strong STI laboratory capacity. Urethral discharge among males is commonly due to gonorrhoea, chlamydia, or trichomoniasis infection.[1] Countries can better interpret trends in urethral discharge case rates by conducting periodic validation studies of the etiology of urethral discharge, as recommended in the WHO global STI surveillance guidance (*7*).

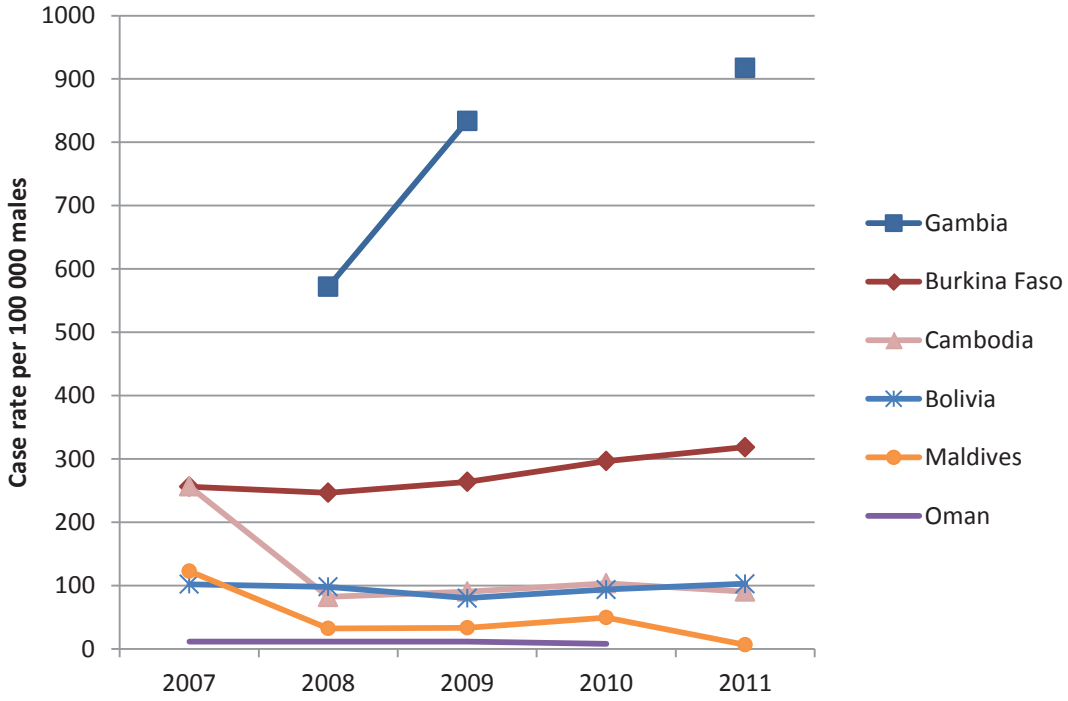
Over the 2007–2011 period, rates ranged from 5 to 5140 cases per 100 000 males (Annex 3). Zimbabwe consistently reported the highest rates. Following a decrease in recent years, the rate in Zimbabwe in 2011 stood at 3896 cases per 100 000 males (see Zimbabwe case study). Swaziland also reported a very high rate of urethral discharge cases in 2010. Both the Gambia and Jamaica reported moderately high case rates in recent years.

Status of the data: Urethral discharge rates

As of 2012, prior to establishment of a global STI reporting system for urethral discharge, 13 countries had online routine surveillance data on urethral discharge among males for the period 2007–2011 (Annex 3). Seven of these countries had data for at least three of the five years. Djbouti, Oman, and Senegal presented their case reports disaggregated by age, using the 15–24 and 25+ categories.

Among the seven countries with multiple years of data, no common trend emerges (Figures 5 and 6). Burkina Faso and the Gambia appear to have had increasing rates. Maldives and Zimbabwe appear to have had a decreasing rate.

Figure 5
Trends in reported rates of male urethral discharge, 2007–2011



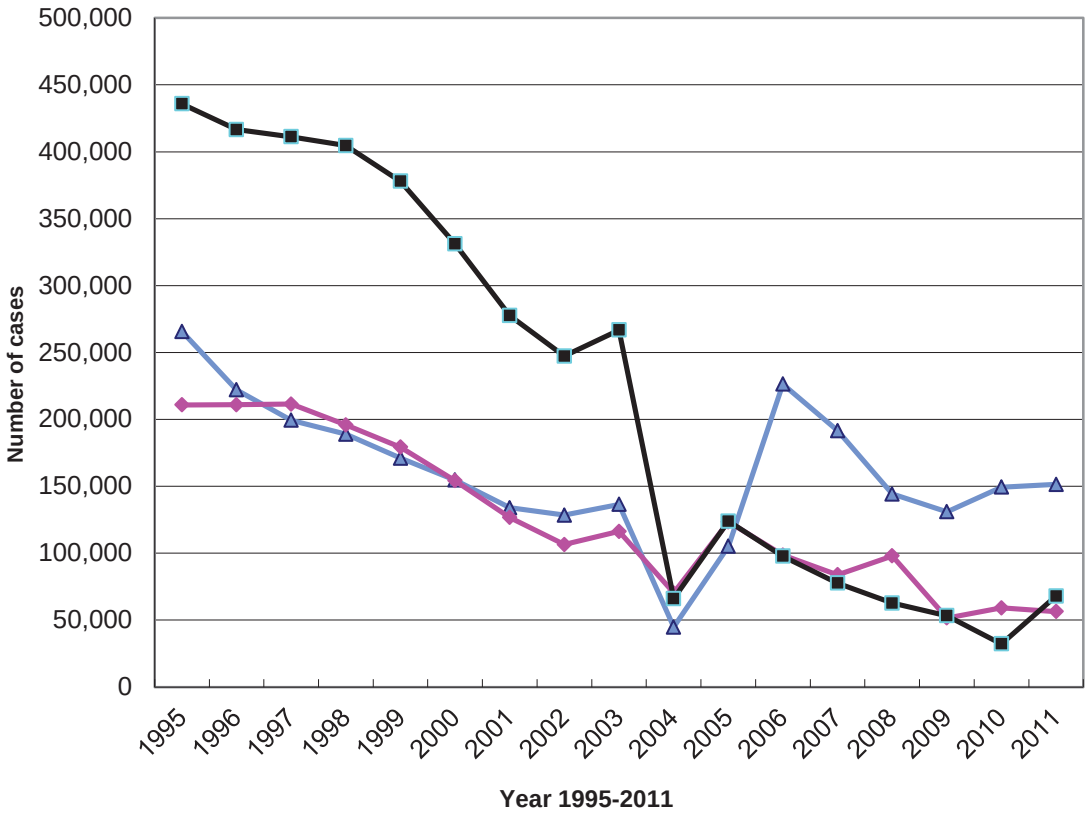
Source: Annex 3

[1] In contrast, monitoring of vaginal discharge is not a priority indicator for STI surveillance since it is difficult to distinguish between discharge due to STIs and discharge due to common conditions that are not sexually transmitted, such as bacterial vaginosis and candidiasis.

Zimbabwe case study: Long-term investment in syndromic STI case reporting systems

Case report data for STI syndromes have been available in Zimbabwe for more than 15 years. Although urethral discharge rates in the country are some of the highest found in our online search, these rates have declined substantially since the mid-1990s (Figure 6). These trends are also seen for genital ulcer disease and other STIs. They reflect measures taken by the Ministry of Health and Child Welfare to control STIs and prevent HIV. These measures include primary prevention efforts such as heavy condom promotion and distribution as well as increasing the availability of public-sector STI services and testing for gonococcal antimicrobial resistance to ensure that treatment of gonorrhoea remains effective. The Zimbabwe data on urethral discharge cases show a transient decrease followed by a marked increase between 2004 and 2006, perhaps related to a severe national economic crisis and associated disruptions in reporting systems and service delivery and perhaps exacerbated by changes in sexual practices.

Figure 6
Case reports of urethral discharge, genital ulcers, and other STIs, Zimbabwe, 1995–2011



Source: Zimbabwe MOH

Indicator 3: Gonorrhoea rate (cases per 100 000 male adults)

Laboratory-confirmed diagnosis of gonorrhoea through Gram stain is one of the more feasible etiologic diagnoses of STIs for use in low resource settings. Countries with greater resources may use culture or nucleic acid amplification tests, which are more sensitive and specific, to confirm the etiology as *Neisseria gonorrhoeae*.

As for other types of case reporting, unless a screening programme is in place, identification of gonorrhoea cases requires patients to recognize symptoms and to seek testing. Even though countries may include gonorrhoea testing as part of their national STI management protocols and guidelines, resources for laboratory testing may not be available in all settings. If a large proportion of infected persons seek services from the informal sector or from primary health facilities where laboratory diagnosis is not performed, the numbers of cases reported may be artificially low.

This indicator as presented here is limited to males due to the high proportion of infections in women that are asymptomatic and the lower sensitivity of Gram stain of cervical samples than of male urethral samples. For both these reasons, a much lower proportion of gonorrhoea cases is likely to be identified among women than among men.

Between 2007 and 2011 the median case rate among the 29 high-income countries with available data ranged from 8.4 to 12.5 cases per 100 000 males, while the median case rate among the 9 lower or middle income countries with available data ranged from 5.0 to 5.8 cases per 100 000 males[1] (Annex 4). Differences in case rates between high-income countries and middle and lower income countries may reflect differences in how STI diagnostics are used as well as the quality of surveillance systems, rather than true differences in disease burden.

Where trends are available, there are no dramatic changes in reported gonorrhoea rates over the 5-year period. Although slight increases were reported in the Netherlands and Norway, case rates were relatively low in these countries compared with other high-income countries. Rates decreased in several countries, including the Czech Republic, Estonia, Latvia, Moldova, Romania, and the Republic of Korea.

Status of the data: Laboratory-confirmed gonorrhoea rates

Almost all countries in the European region report laboratory-confirmed gonorrhoea rates through the regional online reporting system. As of 2012, prior to establishment of a global STI reporting system for gonorrhoea, outside of Europe only 15 countries have online routine surveillance data on gonorrhoea case reports among males for the 2007–2011 period. Only three countries, Canada, Kyrgyzstan, and the United States of America, have online data disaggregated by age, using the 15–24 and 25+ categories.

[1] Income categorization is based on classifications used by the World Bank (*36*).

Case study of the United States: Case reporting as a central pillar of a comprehensive gonorrhoea surveillance system

In the United States the national gonorrhoea case rate is derived from gonorrhoea case reports from state and local health departments. Case detection and reporting is certainly incomplete; it is estimated that less than half of all gonococcal infections in the United States are reported to state and/or local health departments, mostly because they were not detected. Still, it is possible to follow overall trends in the gonorrhoea case rate because the case definition and reporting policies of states and local areas have remained relatively stable over time. At the same time, however, it is important to look at data from a variety of different sources, as trends in the gonorrhoea case rate are likely affected by changes in screening practices and test technology, especially as laboratories expand their use of more sensitive tests (e.g. nucleic acid amplification tests).

Differences in testing or reporting practices in different groups may complicate comparisons of gonorrhoea case rates between demographic groups. Also, because of the large number of cases reported, behavioural data, such as the sex of a sex partner, and clinical data, such as treatment and antimicrobial susceptibility, are not routinely collected for most reported cases. For these reasons, it is valuable to have additional sources of gonorrhoea surveillance data that can aid the interpretation of case report data.

In the United States data from projects that monitor gonorrhoea prevalence and gonorrhoea test positivity in certain settings supplement the general gonorrhoea case report data. For example, the Centers for Disease Control and Prevention (CDC) receives gonorrhoea prevalence data for men and women entering the National Job Training Program (an educational programme for socioeconomically disadvantaged youth ages 16–24 years) and for men and women entering corrections facilities. Because all these individuals are tested for gonorrhoea, differences in prevalence based on sex, age, or race/ethnic group cannot be attributed to differences in screening practices. While not necessarily generalizable to the entire population, data from these projects likely provide more reliable estimates of differences between demographic groups than case report data and may be more indicative of overall trends.

Data from the STD Surveillance Network (SSuN) also supplement the gonorrhoea case report data. SSuN is a network of STI clinics and local health departments that conduct enhanced STI surveillance among patients seen at participating clinics and in a random sample of all gonorrhoea cases reported in SSuN jurisdictions. SSuN provides data on behavioural and clinical case characteristics (e.g. sex of sex partner, symptoms, test used, treatment given) that are not collected through routine gonorrhoea case reporting. SSuN clinics also provide data on gonorrhoea test positivity. These data are critical for targeting gonorrhoea control efforts.

Finally, the United States Gonococcal Isolate Surveillance Program (GISP) is a sentinel surveillance system that monitors antimicrobial susceptibility in *Neisseria gonorrhoeae* isolates collected from symptomatic men at selected STI clinics throughout the country. Like SSuN, GISP collects data on case characteristics (such as sex of sex partner) that are not collected through routine gonorrhoea case reporting. In addition to providing essential data on trends in gonococcal antimicrobial susceptibility, GISP data contribute to the understanding of gonorrhoea epidemiology among men in the United States.

Sources:
Centers for Disease Control and Prevention. *Gonorrhoea fact sheet*. http://www.cdc.gov/std/gonorrhea/STDFact-gonorrhea.htm
Centers for Disease Control and Prevention. *National notifiable disease surveillance system fact sheet*. http://www.cdc.gov/osels/phsipo/docs/pdf/factsheets/DNDHI_NNDSS_12_232372_L_remediated_10_26_2012.pdf
Centers for Disease Control and Prevention. *Sexually transmitted disease surveillance 2011*. http://www.cdc.gov/std/stats11/Surv2011.pdf

Indicator 4: Sex-specific syphilis rate (cases per 100 000 adults)

Laboratory-confirmed diagnosis of syphilis is one of the more common etiologic diagnoses of STIs in low resource settings, due to widely available and simple serologic tests. Different countries apply different algorithms for syphilis testing. Algorithms also may vary depending on whether the testing is done in the context of clinical care of symptomatic patients, screening, or sentinel surveillance. For example, some countries rely exclusively on non-treponemal tests, which, if positive, suggest active syphilis but are not highly specific for *Treponema pallidum* and so read positive due to other conditions, such as those causing inflammation. Other countries have moved to the use of rapid treponemal tests to increase testing coverage in care settings without laboratories. However, treponemal tests cannot distinguish among infections that are active, latent, or were treated in the past. Still other countries use treponemal and non-treponemal tests together to confirm active syphilis infection. Given the differences in sensitivity and specificity of different tests and testing algorithms, reported positivity rates should be interpreted cautiously, particularly because the testing algorithm is rarely reported.

Distinguishing symptomatic cases (i.e. primary and secondary infections) from other syphilis cases (i.e. latent infections or infections of unknown duration) can help to minimize the impact of changes in screening practices. Most countries do not disaggregate their case reporting by presence of symptoms or stage of disease, however.

Female syphilis rates range from 0.1 to 70.7 cases per 100 000 females. Male syphilis rates range from 0.3 to 94.4 cases per 100 000 males. In a majority of countries (41 of 51), male case rates are higher than female case rates. Exceptions include Austria, Burkina Faso, El Salvador, Jamaica, Oman, Paraguay, Qatar, and Senegal (Annex 5).

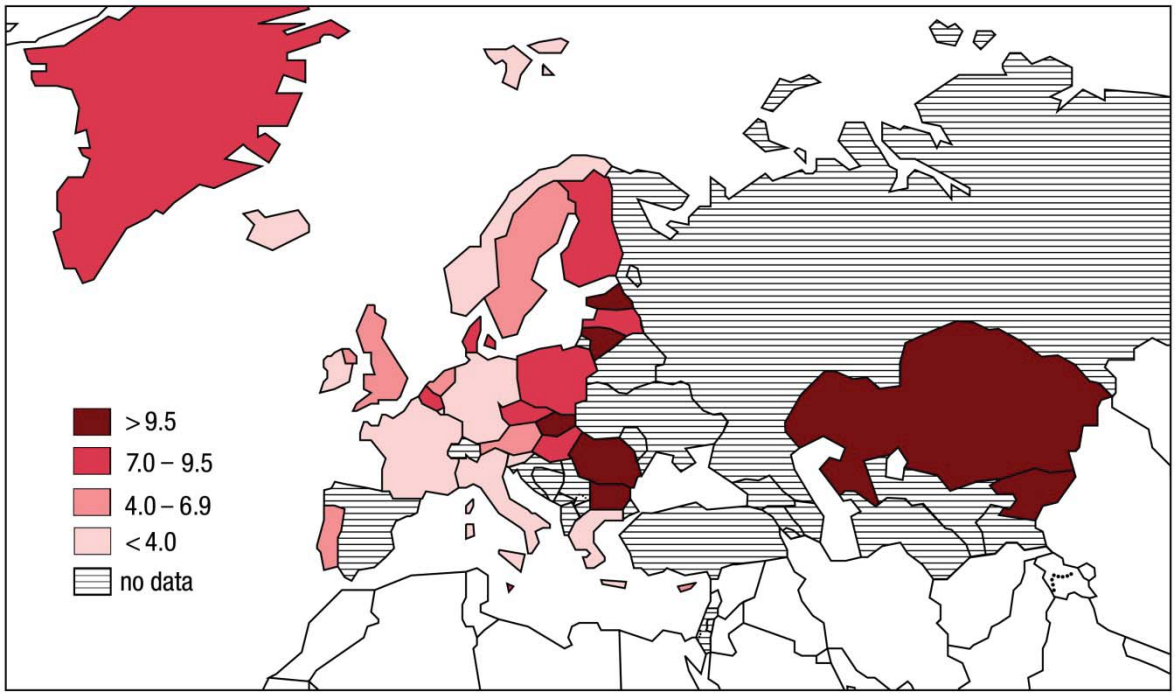
In contrast to rates for gonorrhoea, median syphilis case rates among low and middle income countries are considerably higher than for high-income countries for both males and females. This may reflect the wider availability, affordability, and feasibility of syphilis tests than of gonorrhoea tests in low and middle income countries. No consistent trends in median syphilis rates from 2007 to 2011 emerge for either males or females in high or low income countries. Paraguay shows declines in female case rates from 2007 to 2009. Steady declines also were observed in female case rates in Estonia, Latvia, Kyrgyzstan, and Romania. From 2007 to 2011, among countries reporting for at least three years, male syphilis case rates increased in Bulgaria, Canada, Denmark, Estonia, Malta, Slovakia, and the United States but declined in Italy, Latvia, Moldova, Oman, Romania, and the United Kingdom. In low and middle income countries as a group, both male and female median syphilis case rates appear to have declined between 2007 and 2010.

Status of the data: Laboratory-confirmed syphilis in the general population

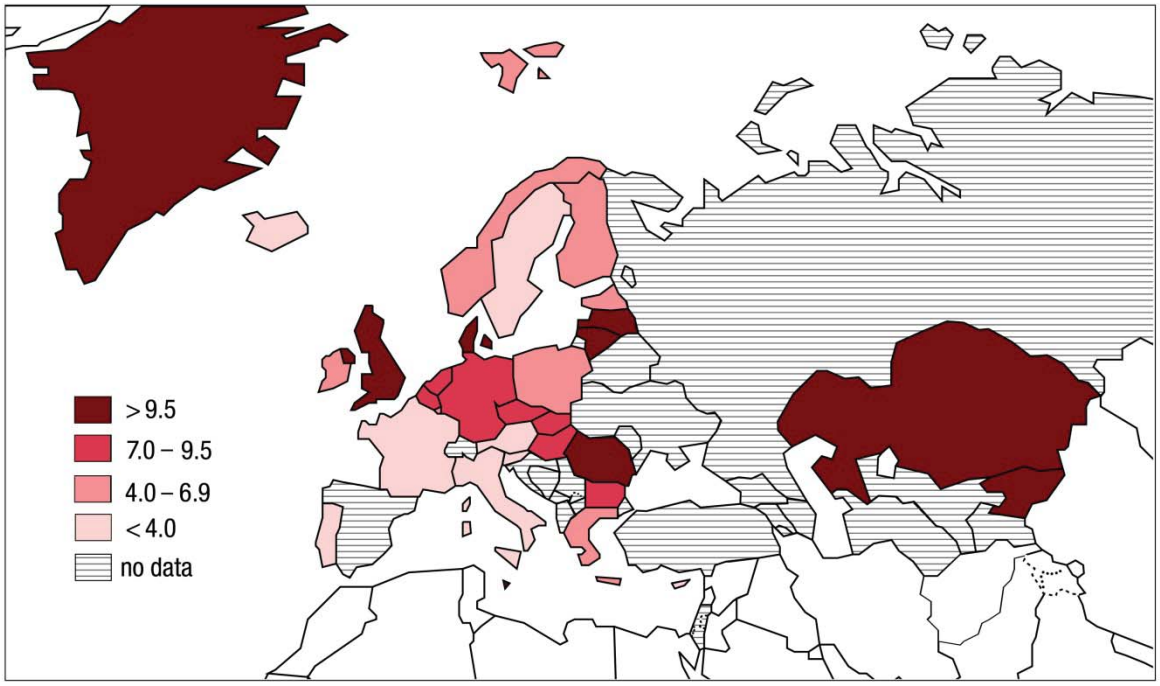
Through the regional online reporting system, almost all countries in the European region routinely report cases of laboratory-confirmed syphilis (Figure 7). As of 2012, prior to establishment of a global STI reporting system for syphilis cases, outside of Europe only 18 countries reported sex-disaggregated syphilis cases online for the 2007–2011 period. Only four countries, Canada, Jamaica, Kyrgyzstan, and the USA, provided online data disaggregated by age, using the 15–24 and 25+ categories.

Figure 7
Female and male syphilis rates (reported cases per 100 000) by quartiles in the European region, 2010

Female



Male



Source: Centralized Information System for Infectious Diseases

Monitoring mother-to-child transmission of syphilis

Although preventable, congenital syphilis is a widespread condition responsible for serious adverse outcomes during pregnancy, delivery, and the neonatal period, including stillbirths and neonatal deaths (Figure 8). WHO estimates that in 2008 approximately 215 000 stillbirths (at >28 week) or early fetal deaths (at 22 to 28 week), 90 000 neonatal deaths, 65 000 cases of prematurity or low birth weight, and 150 000 infections in newborns occurred as a result of the estimated 1.4 million syphilis infections among pregnant women (*11*). These figures point to the critical need for a combination of improved STI control to reduce syphilis prevalence in the general population, routine testing of antenatal care clients, and appropriate treatment of pregnant women found to be infected. Due to a lack of accurate data on actual testing and treatment coverage of syphilis in pregnancy, these estimates relied on expert opinion to estimate the worst, middle, and best case scenarios for testing and treatment coverage.

Effective and inexpensive tools exist to address this serious public health problem. Therefore, in 2007 WHO and partners launched an initiative to eliminate congenital syphilis as a public health problem. Objectives of the initiative are to ensure that by 2015:

- at least 90% of all pregnant women are tested
- at least 90% of all syphilis-infected women receive treatment.

WHO has designated these core indicators – percentage of pregnant women tested and percentage of infected women treated – as well as the congenital syphilis rate and coverage of women with at least one antenatal care (ANC) visit as essential for monitoring and evaluating programme efforts for elimination of mother-to-child transmission (EMTCT) of syphilis (*12*).

These indicators are also required for validation of EMTCT of syphilis (*1*). However, as the validation targets reach beyond 2015, criteria for validation of elimination are more demanding than those set at the launch of the initiative for 2015. Validation of EMTCT of syphilis will be based on a country achieving:

- incidence of congenital syphilis of <50 cases per 100 000 live births
- ANC coverage (at least one visit) of ≥95%
- coverage of syphilis testing of pregnant women of ≥95%
- treatment of syphilis-seropositive pregnant women of ≥95%.

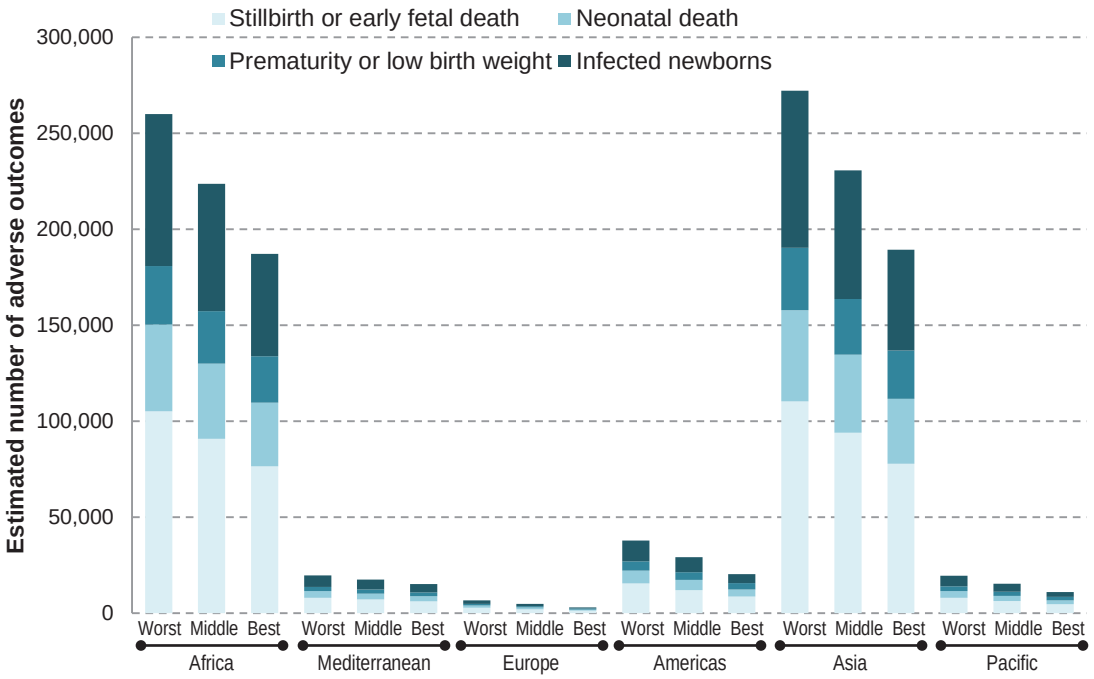
In 14 countries the data for these indicators suggest that the countries may have eliminated MTCT of syphilis (see box). "Elimination" is defined as having reported data that meet or exceed the four validation criteria listed above. Actual elimination cannot be validated, however, until formal regional and global processes for validation have been completed, including an assessment of data quality (*1*) (Annex 7).

14 countries that may have eliminated MTCT of syphilis

- Antigua and Barbuda
- Barbados
- Belarus
- Chile
- Cuba
- Czech Republic
- Denmark
- Grenada
- Kyrgyzstan
- Malta
- Mauritius
- Republic of Moldova
- United Kingdom
- Venezuela

Figure 8

Estimated number of adverse outcomes associated with syphilis in pregnancy in worst, middle, and best case scenarios of testing and treatment coverage in 2008



Source: Newman et al. (*13*)

Indicator 5: Congenital syphilis rate (cases per 100 000 live births)

The congenital syphilis rate is a key indicator for STI control programmes. Unlike other STI case report data, these data are more likely to come from labour and delivery or paediatric services rather than STI or primary care settings. Congenital syphilis is often underreported. Several reasons explain this: definitive diagnosis is complicated even in settings with sophisticated laboratory capacity; congenital infections that result in spontaneous abortions or stillbirth may not be recognized; stillbirths often are not delivered in health facilities; and not all facilities have providers able to diagnose congenital syphilis cases properly (Figure 9).

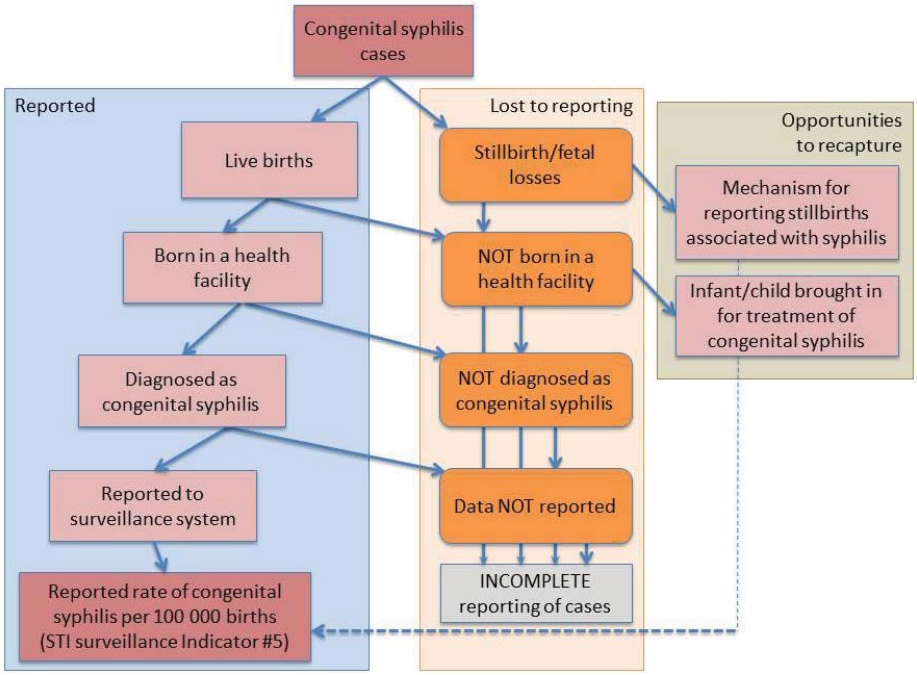
A consultation convened by WHO in 2012 reached consensus on a simplified global surveillance case definition for congenital syphilis,[1] intended to promote standardization (*1*). Many countries have yet to adopt the global surveillance definition, however; there is still wide variation in how congenital syphilis is defined.

Seven countries reported congenital syphilis case rates of ≥50 per 100 000 live births—Argentina, Belize, Brazil, Colombia, Costa Rica, Dominica, and Uruguay. In Uruguay high rates are thought to reflect the strength of the reporting systems in capturing the great majority of cases (Annex 1).

Status of the data: Congenital syphilis

The most complete reporting is in the European region, where congenital syphilis is included in the European online reporting system, and in the Americas, where data are routinely collected at a regional level (Annex 7). In addition, as of 2012, prior to establishment of a global STI reporting system for congenital syphilis cases, 12 countries outside of Europe and the Americas had online data. Worldwide, 51 countries had data available on congenital syphilis for 2010, and 64 countries had data available for at least three of the five years between 2007 and 2011. The differences between case definitions used for the online data and the WHO global case definition include the exclusion of stillbirths, inclusion of children over two years of age, and classification of cases by the year of diagnosis rather than by the year of birth.

Figure 9
Cascade of factors affecting the completeness of reporting of congenital syphilis



[1] Global congenital syphilis surveillance case definition: stillbirth, live birth, or fetal loss at >20 weeks of gestation or >500 grams to a syphilis-seropositive mother without adequate syphilis treatment OR stillbirth, live birth, or child age <2 years with microbiological evidence of syphilis infection. Microbiological evidence of congenital syphilis includes any one of the following: demonstration by dark field microscopy or fluorescent antibody detection of *T. pallidum* in the umbilical cord, the placenta, a nasal discharge, or skin lesion material; detection of *T. pallidum*-specific IgM; or infant with a positive non-treponemal serology titre greater than fourfold that of the mother.

Indicator 6: Percentage of ANC attendees tested for syphilis at first visit

In most countries it is national policy or standard practice to test all pregnant women for syphilis at the first ANC visit. To test nearly all pregnant women for syphilis, a country must have universal ANC coverage (*13*). Even in countries with high ANC coverage and national policies in place, women may not be tested due to a range of barriers such as lack of laboratory capacity, stock-outs of tests, or lack of awareness among providers. In addition, it is important to test pregnant women for syphilis early enough in pregnancy to initiate treatment before an adverse outcome occurs. Most countries do not routinely monitor how early pregnant women seek ANC; testing for syphilis at the first visit is the best proxy indicator for monitoring early testing and treatment.

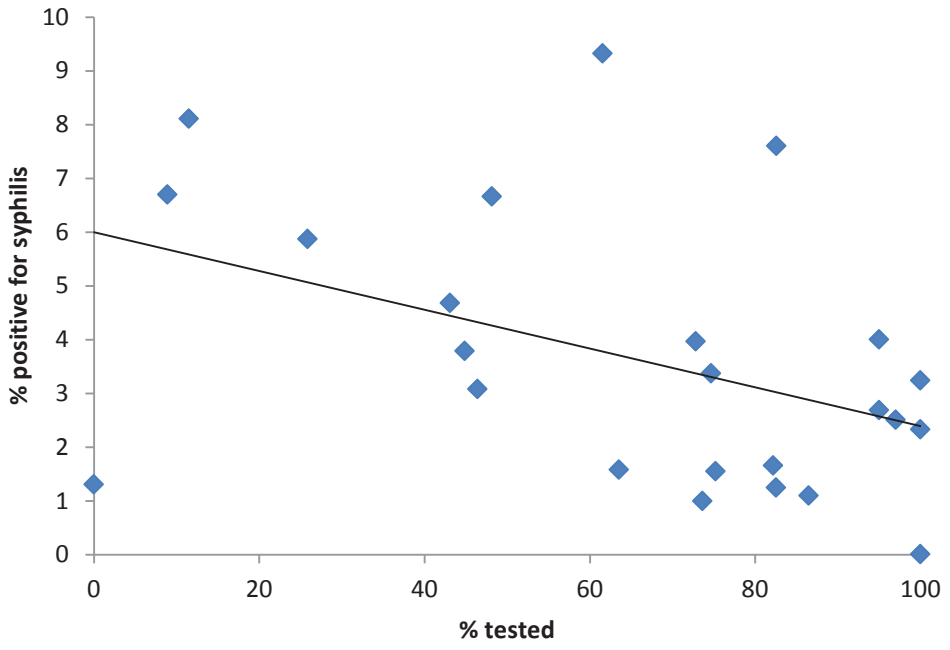
Figure 10 plots data from 24 countries that report syphilis prevalence among ANC attendees to be >1% and that also report data on the percentage of ANC attendees who are tested for syphilis at the first ANC visit. As expected, countries with lower levels of testing (which may indicate weaker syphilis control programmes generally) tend to have higher prevalence of syphilis among pregnant women. Such data suggest that, where syphilis prevalence among ANC attendees is high, resources for syphilis control and congenital syphilis prevention should be prioritized.

Status of the data: Coverage of syphilis testing for ANC attendees

In 2012, 58 countries reported data through GARPR on the percentage of ANC attendees who were tested for syphilis at the first visit. Of these 58 countries, 22 reported that greater than 95% of ANC attendees had been tested for syphilis (Annex 7). Several countries reported marked improvement in the coverage of testing between 2008 and 2011, including Central African Republic, Mongolia, Sri Lanka, and Zimbabwe.

Figure 10

Relationship between percentage of ANC attendees tested for syphilis and reported syphilis prevalence in countries with >1% syphilis prevalence*



Source: Annex 7
Note: As reported for 2011 in GARPR 2012 reports

Pan American Health Organization case study: Assessing data quality to validate elimination of mother-to-child transmission of HIV and congenital syphilis in Latin America and the Caribbean

In 1994 member countries of the Pan American Health Organization (PAHO) committed to eliminating congenital syphilis. In 2010 the members re-affirmed this commitment in a resolution calling for dual elimination of mother-to-child transmission of HIV and congenital syphilis. Since several countries in the region may have achieved or are close to achieving the elimination targets for one or both diseases, PAHO, in collaboration with the United Nations Children's Fund (UNICEF), the CDC, and other partners, began developing a methodology for validating elimination. PAHO has also participated actively in the development of global criteria and processes for validation of EMTCT of HIV and syphilis (*14*).

WHO's proposed global validation methodology includes submission of a report by the candidate country, based on a standard format and an agreed set of programme and impact indicators. Then, external experts will conduct a validation mission to:

- assess the national surveillance system and verify reported data
- assess the national laboratory system and verify the reliability of laboratory data
- assess programmatic aspects related to achievement and sustainability of elimination targets.

The methods used for validation include visits to service delivery sites in selected regions, interviews with national and regional stakeholders, review of databases and reports, triangulation of national data from multiple sources, and recalculation of data.

Two countries in the Americas, Chile and Saint Lucia, pilot-tested implementation of the validation methodology. The pilot-test indicated that the methodology is sufficiently sensitive to identify strengths and challenges in the surveillance, laboratory, and service delivery components on the national level, as well as variations and inequities between regions. In both countries the data verification and triangulation process led to recalculation of some indicators, while other indicators could not be calculated due to gaps in the data.

The validation pilot-tests underlined the critical importance of comprehensive information systems that can reliably collect the data necessary to measure and verify elimination. Challenges to effective verification of elimination included lack of private-sector data, vertical and unlinked data systems that did not allow for easy tracking of mother-infant pairs, and limited analysis and disaggregation of data. Factors that facilitated the verification process included the existence of national mechanisms for data collection, such as, in Chile, collection and storage in a single database of all information regarding confirmed congenital syphilis cases, and the presence of dedicated staff, protocols, and resources to support ongoing data collection, analysis, and reporting.

Indicator 7: Percentage of ANC attendees tested who are positive for syphilis

The rate of congenital syphilis reflects the prevalence of syphilis infection among pregnant women and the percentage of women tested for syphilis and treated if positive. A large number of countries use ANC programme data, e.g. routine monitoring or case reporting systems, to estimate what percentage of pregnant women are positive for syphilis. Monitoring syphilis trends in ANC settings, especially among younger pregnant women, ages 15–24, also provides an indication of new infections, which is helpful for programmatic efforts to prevent sexual transmission of syphilis and HIV.

Seven countries reported a prevalence of syphilis infection among ANC attendees of ≥5% in 2011—Central African Republic, Djibouti, Lesotho, Madagascar, Papua New Guinea, Solomon Islands, and Somalia (Annex 6). In 2008 there were 9 countries reporting rates of ≥5%, in 2009 there were 9, and in 2010 there were 10 countries (Annex 7).

Status of the data: Syphilis prevalence among ANC attendees

Through the 2012 GARPR 89 countries reported syphilis prevalence data among ANC attendees for 2011. Ten countries noted that their data were derived from sentinel surveillance, while 11 countries reported using programme data (Annex 6). The remaining countries reported prevalence but did not specify the source. Of the 89 countries reporting, 7 countries reported using only non-treponemal tests (i.e. rapid plasma reagin or Venereal Disease Research Laboratory test); 15 countries reported using a non-treponemal test along with a treponemal test to diagnose syphilis; and 12 countries reported using treponemal tests alone. Data from three of the four years between 2008 and 2011 are available for 59 countries, allowing assessment of trends in prevalence (Annex 7).

Indicator 8: Percentage of ANC attendees positive for syphilis who are treated appropriately

To avoid transmission to the fetus or infant, syphilis-seropositive pregnant women must receive at least one dose of intramuscular benzathine penicillin. The treatment rate is an important measure of programme effectiveness. Benzathine penicillin is widely available and costs approximately US$0.50 a dose. Thus, all facilities that diagnose syphilis in pregnant women should have the means to treat those women properly.

Twenty-seven of 39 countries reported treating >95% of seropositive pregnant women in 2011 (Annex 7).

Status of the data: Coverage of treatment for syphilis among ANC attendees

Some countries report on treatment coverage based on policy, not on actual service delivery data; this practice overestimates treatment coverage. Reports from countries clearly indicating that they were reporting on policy, not actual data, were not included in this report. Only the data from the remaining 39 countries reporting service delivery data for 2011 are presented here.

Syphilis prevalence among key populations

Indicator 9. Prevalence of syphilis among female sex workers

Indicator 10. Prevalence of syphilis among men who have sex with men

Key populations at high risk—sex workers and men who have sex with men—are important groups in which to monitor trends in syphilis transmission. Due to their greater risk of exposure and their critical role in transmission in sexual networks, these populations are often the focus of HIV and STI prevention efforts, including promotion of condom use, and should also be offered regular testing for STIs, including syphilis testing.

Ten countries reported >10% syphilis prevalence among sex workers (Annexes 8 and 9). Argentina and Papua New Guinea reported syphilis prevalence among sex workers of >20%. Seven countries reported >10% syphilis prevalence among men who have sex with men. Argentina, Bahamas, and Paraguay reported syphilis prevalence of >20% among men who have sex with men.

The Americas region had some of the highest reported levels of syphilis prevalence among both sex workers and men who have sex with men. This is consistent with the relatively high syphilis case rates reported among the general population.

Status of the data: Laboratory-confirmed syphilis prevalence among sex workers and men who have sex with men

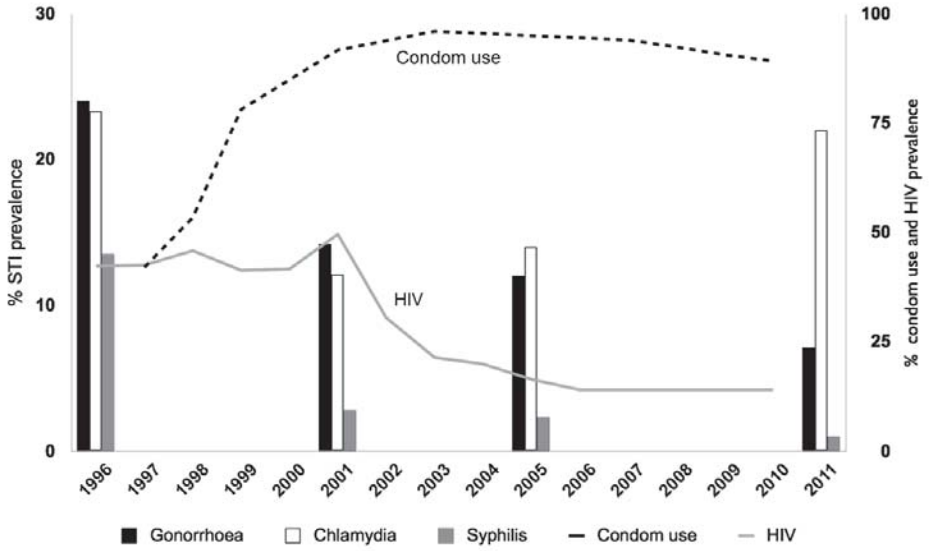
According to GARPR in 2012, 49 countries reported data on syphilis prevalence in sex workers in 2008 to 2011. A similar number of countries, 47, reported data for the same time period on syphilis prevalence in men who have sex with men. The vast majority of the reports on these indicators come from special community-based surveys of these groups (see box). These surveys are conducted in selected sites and may not be representative of the national population of sex workers or men who have sex with men. Only nine countries noted that their data came from routine programmatic information from clinic services focused on sex workers and men who have sex with men (Annex 8). Definitions of sex workers and men who have sex with men may vary among countries.

Cambodia case study: Linkages between STI control among key populations at higher risk and the general population

Following trends in STI prevalence is critical both for STI control and for monitoring how sexual transmission of HIV is changing. In particular, monitoring the epidemic of STIs among key populations such as sex workers and men who have sex with men may provide an early indication of the potential for HIV spread. Cambodia provides a good example of how prevention efforts among sex workers and clients of sex workers controlled a severe HIV epidemic, exceeding 2% HIV prevalence in the general population and 40% prevalence among sex workers. The impact of the 100% Condom Use Programme, started in the late 1990s, could be seen in both HIV prevalence and gonorrhoea and syphilis prevalence among higher-activity sex workers (Figure 11).[1]

[1] The pattern of sex work has changed significantly in Cambodia over the last 10 years, as large numbers of women who were formerly direct, brothel-based sex workers have shifted towards indirect, non-venue-based sex work due to a closure of brothels under new anti-trafficking legislation. To minimize the effect of this changing pattern, these prevalence data reflect changes among "higher activity" sex workers (those with larger numbers of clients).

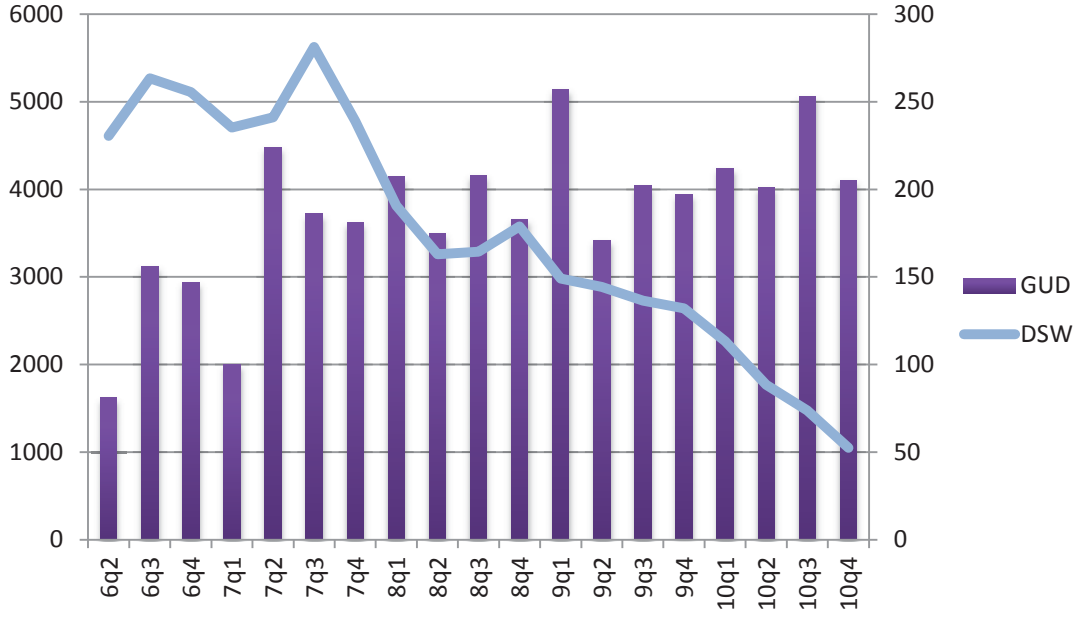
Figure 11
Condom use and HIV and reported STI prevalence among higher-activity sex workers, Cambodia, 1996–2011



Source: NCHADS 1997–2011 (*15*), Ryan et al, 1998 (*16*)

The 100% Condom Use Programme has largely received credit for curbing the epidemic. HIV prevalence in the general population declined substantially. Even after the HIV epidemic receded to below 0.5% in the general population and 20% in sex workers, the government continued monitoring STIs among key populations as an indicator of trends in sexual transmission. Continued monitoring proved crucial when it showed how recent declines in utilization of STI services by direct sex workers appeared to increase STI rates among their clients (Figure 12).

Figure 12
Decreasing clinic attendance by direct sex workers (DSW) correlated with increasing case reports of genital ulcer disease (GUD) among men, 2006–2010



Source: NCHADS 2006–2010

Monitoring gonococcal antimicrobial susceptibility

The rapidly changing antimicrobial susceptibility of *Neisseria gonorrhoeae* has created an important public health problem. Because of widespread resistance to other antimicrobials, in many countries only cephalosporin-based regimens are recommended. Increasingly, countries use a combination of a cephalosporin and azithromycin for the co-treatment of gonorrhoea and chlamydia. While azithromycin is included primarily to treat chlamydia, it has the added benefit of providing additional coverage for treating gonorrhoea.

Gonococcal resistance to penicillin and tetracycline first emerged in Asia during the 1970s. It became widespread in multiple regions during the early 1980s. Global efforts to establish routine surveillance of the antimicrobial resistance of gonorrhoea began in the early 1990s. High levels of resistance to quinolones (e.g. ciprofloxacin) appears to have developed by the mid-2000s in several regions, leading countries to revise their treatment guidelines to use third generation oral cephalosporins such as cefixime or injectable cephalosporins such as ceftriaxone. Unfortunately, however, data indicate increasing gonococcal resistance to, and treatment failures with, third generation oral cephalosporins. Several of the gonococcal strains associated with failure of cephalosporin treatment have also demonstrated resistance to other antibiotics and have been classified as multi-drug resistant gonococci.

The GASP network

The Gonococcal Antimicrobial Surveillance Programme (GASP) has documented the emergence and spread of antimicrobial resistance in gonorrhoea since 1992 and has provided evidence to inform national, regional, and global treatment guidelines. The GASP is a worldwide laboratory network that is coordinated by focal points and regional coordinating centres. Each designated regional focal point, in partnership with its WHO regional office, collates data on patterns of antimicrobial susceptibility in gonorrhoea in participating countries. The regional focal points provide technical support to countries to strengthen laboratory capacity and external quality assurance programmes, including maintenance and distribution of WHO reference panels (*17*).

Sustaining this programme is essential but challenging. Antimicrobial resistance surveillance is often lacking or of poor quality in countries with a high burden of gonorrhoea. Also, there is a general lack of reliable antimicrobial resistance data for gonorrhoea globally and thus inadequate knowledge of the extent of the spread of resistant gonococci.

WHO has recently released surveillance standards and updated the WHO reference panels for the external quality assurance programme to enhance global surveillance of multidrug and extended-spectrum cephalosporin drug resistant gonorrhoea (*7*, *18*). The WHO standards describe the microbiological and epidemiologic requirements to ensure the validity of data. In addition, research is underway to develop new molecular technologies and approaches that could be combined with existing methods to improve surveillance data on antimicrobial resistance.

Status of the data: Gonococcal Antimicrobial Susceptibility Programme

Although 62 countries participate in the GASP network, only 50 countries had available data for 2009–2010 on ceftriaxone (or cefixime), azithromycin, and quinolones (Table 3). Data on quinolones are the most widely available data (all countries reporting), whereas data on ceftriaxone (or cefixime) were available for 32 countries and on azithromycin for 29 countries.

Recommendations for monitoring

WHO recommends monitoring gonococcal antimicrobial susceptibility at least once a year as one of the core components of STI surveillance. Antimicrobial susceptibility is measured by minimum inhibitory concentrations—that is, the lowest concentration of an antibiotic that inhibits visible growth of the bacteria. Gonorrhoea isolates for antimicrobial resistance testing should be sampled from sequential confirmed gonorrhoea cases from participating facilities throughout the course

of the year. Men with urethral discharge are often selected for sampling because of the relative ease of collection, higher yield of positive cultures, and lower cost than for sampling women. WHO recommends using data from gonococcal antimicrobial resistance surveillance to refine treatment options and that use of an antibiotic for routine treatment be discontinued when the rate of therapeutic failure and/or of antimicrobial resistance reaches or exceeds 5%.

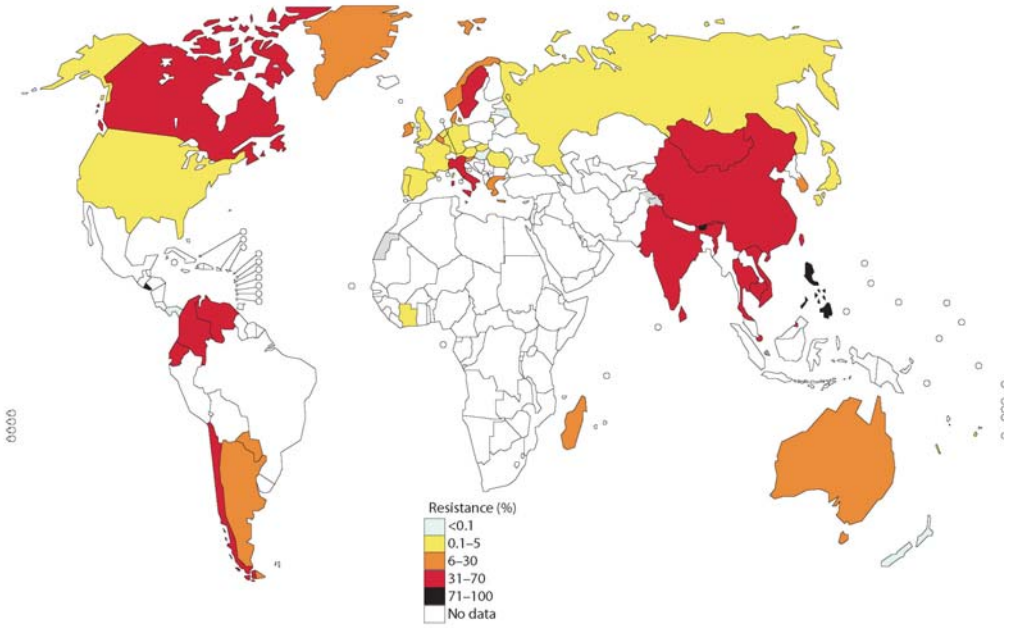
GASP data for 2010 showed that the majority of countries in Asia have a high proportion of penicillinase-producing *N. gonorrhoeae* (PPNG) isolates, which confers resistance to penicillin (Figure 13). High rates of PPNG have also been observed in countries in the Americas. Lower rates of PPNG have been observed in European counties.

Table 3
Number of countries participating in the Gonococcal Antimicrobial Surveillance Programme (GASP) network

WHO Region	Regional GASP focal points	Number of countries participating
Africa	Currently none	5
	Formerly, until February 2012, Sexually Transmitted Infections Reference Centre, National Health Laboratory Service, Johannesburg, South Africa	
The Americas	Sexually Transmitted Infections Reference Centre, National Institute of Infectious Disease, Buenos Aires, Argentina	13 plus Canada and the USA
	University of Saskatchewan, Saskatoon, Canada	
	Division of STD Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, USA	
The Eastern Mediterranean	STD Laboratory, Bacterial Department, National Institute of Hygiene, Rabat, Morocco	1
Europe	Sexually Transmitted Bacteria Reference Laboratory, Health Protection Agency Centre, London, UK	22
	WHO Collaborating Centre for Gonorrhoea and Other STIs, Department of Laboratory Medicine, Microbiology, Örebro University Hospital, Örebro, Sweden	
South-East Asia	WHO GASP South-East Asia Regional Reference Laboratory, VMMC and Safdarjang Hospital, New Delhi, India	6
Western Pacific	WHO Collaborating Centre for STD – South Eastern Area Laboratory Services (SEALS), The Prince of Wales Hospital, Sydney, Australia	15

The most recent published data from GASP participating sites have been collated in this report (Annex 10) (*19, 20, 21*).

Figure 13
Proportion of penicillinase-producing *N. gonorrhoeae* isolates reported in countries, 2010



Source: GASP 2013

The majority of countries in the Americas, Asia, and Europe reported high rates of resistance to ciprofloxacin or other quinolones. Rates of quinolone resistance were low in only a handful of countries (Figure 14).

There are growing reports of decreased susceptibility of *N. gonorrhoeae* to ceftriaxone and cefixime; in 2010, 36 countries reported elevated minimum inhibitory concentration to third-generation cephalosporins (either cefixime (≥0.25 μg/mL) or ceftriaxone (≥0.125 μg/mL)) (Figure 15). The first reported treatment failure to cefixime occurred in Japan in 2002 (*22*), followed by treatment failures in Austria, Canada, France, Norway, South Africa, and the United Kingdom (*23, 24, 25, 26, 27, 28*). In addition, reports of failure to treat pharyngeal gonorrhoea with ceftriaxone have been verified in Australia, Japan, Slovenia, and Sweden (*29, 30, 31, 32*). The majority of reports are from developed countries; surveillance data from resource-constrained settings are scarce. It can be assumed, however, that the treatment failures in these 10 countries represent only the tip of a silent epidemic of antimicrobial resistance.

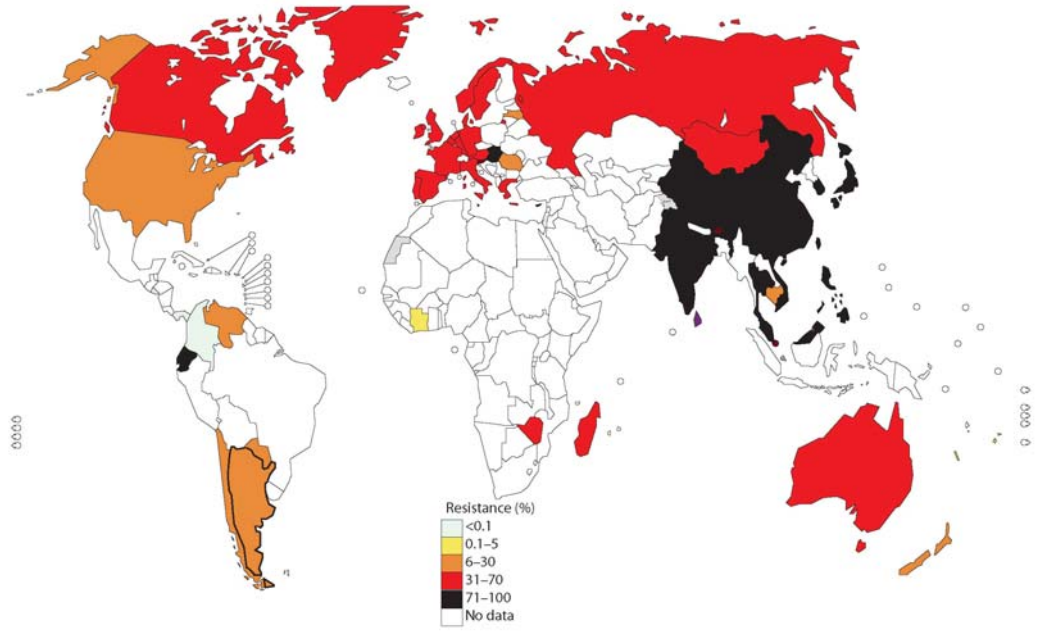
Resistance to spectinomycin is monitored in several countries in the Americas (Argentina and Chile), Asia (Bhutan, Brunei, China, Japan, Mongolia, and Sri Lanka), and some European countries. To date, decreased susceptibility to spectinomycin has been reported in Brunei, China, Mongolia, and the Russian Federation.

Some European countries, Chile, and the USA have identified resistance to azithromycin, which is recommended for use with cephalosporins for dual therapy of gonorrhoea as well as for co-treatment of chlamydia. In most of these countries with data, resistance remains well below the 5% threshold. Few countries in the Americas and Asia have been monitoring azithromycin resistance.

Gonococcal antimicrobial resistance could pose a major challenge to efforts to control gonorrhoea and its complications. To facilitate action against the spread of multi-drug resistant *N. gonorrhoeae*, WHO has launched the *Global action plan to control the spread and impact of antimicrobial resistance in Neisseria gonorrhoeae* (*33*). The global action plan should be implemented within the context of enhanced STI surveillance to facilitate early detection of emerging resistant strains, combined with a public health response to prevent and treat gonococcal infections and to mitigate the impact of cephalosporin-resistant *N. gonorrhoeae* on sexual and reproductive health.

Figure 14

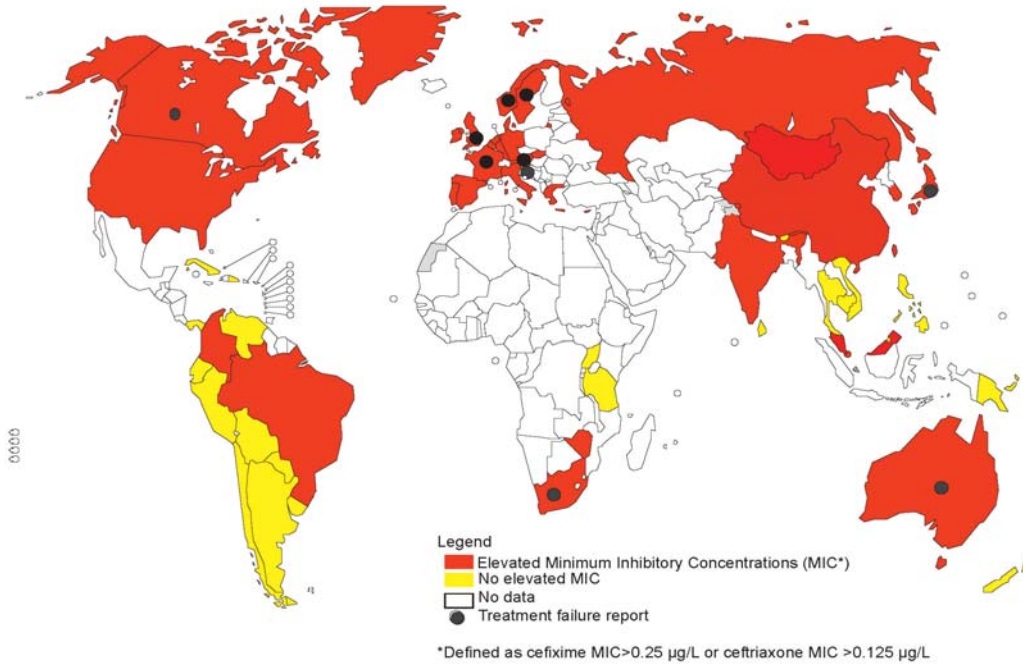
Proportion of *N. gonorrhoeae* strains resistant to ciprofloxacin and/or other quinolones reported in countries, 2010



Source: GASP 2013

Figure 15

Countries with documented elevated minimum inhibitory concentrations to cefixime and/or ceftriaxone, 2010



Source: GASP 2013

Summary and next steps

This document provides a baseline report on what STI surveillance data are available and what is currently known at a global level prior to increased efforts to improve STI surveillance. Surveillance data are available online in some countries across the regions, and the number of countries reporting is increasing over time. However, prior to WHO's establishing a global system, data are not consistently available except in regions with routine collection systems (Europe for general population STI indicators and the Americas for EMTCT of syphilis indicators).

To develop routine collection systems, WHO headquarters, regional offices, and country counterparts will continue collaborating to implement the Road Map for Strengthening STI Surveillance (Annex 1). Priority activities related to the road map at the global level include continuing to increase the STI data available through the WHO Global Health Observatory, improving STI data collection through the GARPR system, supporting regions to offer training in STI surveillance, and developing tools to facilitate assessment of national surveillance systems. It will be important for the regional level to facilitate training for countries and to identify countries in need of technical support. At the country level governments and key partners should work together to review existing national systems and identify priority areas for improvement.

The most widely available data are related to syphilis in pregnancy. These data suggest that many countries are making great progress in eliminating MTCT of syphilis. In fact, several countries may be eligible to begin processes that will lead to validation of elimination. Most likely, data quality will improve as countries make strides towards elimination.

This baseline report also shows that, although gonococcal antimicrobial susceptibility data are available through GASP for 62 countries, there are still many geographic areas where resistance patterns are unknown. In particular, WHO headquarters and the African regional office (AFRO) are working to establish a stronger GASP network in the African region that will collect information to guide countries' selection of effective gonococcal therapy. Such information is critical, as resistance to third-generation cephalosporins has been noted in at least 36 countries, and treatment failures, in at least 10 countries. WHO also is working with regional reference centres to improve the capacity to collect valid and comparable data monitoring antimicrobial resistance. In addition, distribution and use of WHO reference panels should support laboratory quality assurance systems.

This baseline report and future reports like it will provide information that countries, regions, and global stakeholders can use to strengthen STI surveillance. Investing in these surveillance systems is critical for efforts to reduce the burden of STI and, by preventing HIV infections and reducing the burden of STI sequelae such as stillbirths, neonatal deaths, and infertility, to attain Millennium Development Goals 4, 5, and 6.

Annex 1. Road map for strengthening STI surveillance

Surveillance systems provide information that is critical to the effectiveness and cost-effectiveness of STI control programmes. In an effort to help countries apply the recently updated global STI surveillance guidelines (*7*), WHO has developed a road map for regional and country efforts to strengthen surveillance systems. The road map identifies priority actions over the short to medium term (1–3 years) for building a routine data collection system that can expand and further develop as capacity and needs for STI surveillance evolve. The road map outlines a structure for country, regional, and global reporting, identifies a minimum set of core indicators, provides standardized definitions for core indicators, and includes sample templates for reporting STI data. Materials will be posted on the WHO/RHR web site at: http://www.who.int/reproductivehealth/publications/rtis/en/index.html.

The road map grew out of a series of discussions with global, regional, and country stakeholders as well as the systematic review of STI surveillance data available on the Internet in 2012. The review of online data found that the most commonly shared data on etiologic diagnoses concerned syphilis, gonorrhoea, and congenital syphilis, and the most commonly shared data on STI syndromes concerned urethral discharge and genital ulcer disease (Figure 16). Overall, the most extensive reporting came from the European region. Among low and middle income countries, more than half of countries in the Americas and in Asia and the Pacific region had online data on key STI indicators. Less than one-quarter of countries in the African region routinely share online any of the core STI indicators defined by the global STI surveillance guidelines.

A key limitation of this analysis is that many countries may have and use STI surveillance data but do not regularly make such reports available online. At the same time, however, the paucity of data is real in some countries. It reflects the lack of STI control activities in the public sector or of systems to capture or analyse surveillance data routinely at the national level.

Primary criteria used to select a core set of indicators for the road map included the feasibility of collection and public health importance. Figure 17 summarizes the rationale for the selection of recommended priority STI indicators that all countries should collect and that should be analysed for trends at country, regional, and global levels.

Road map for strengthening STI surveillance

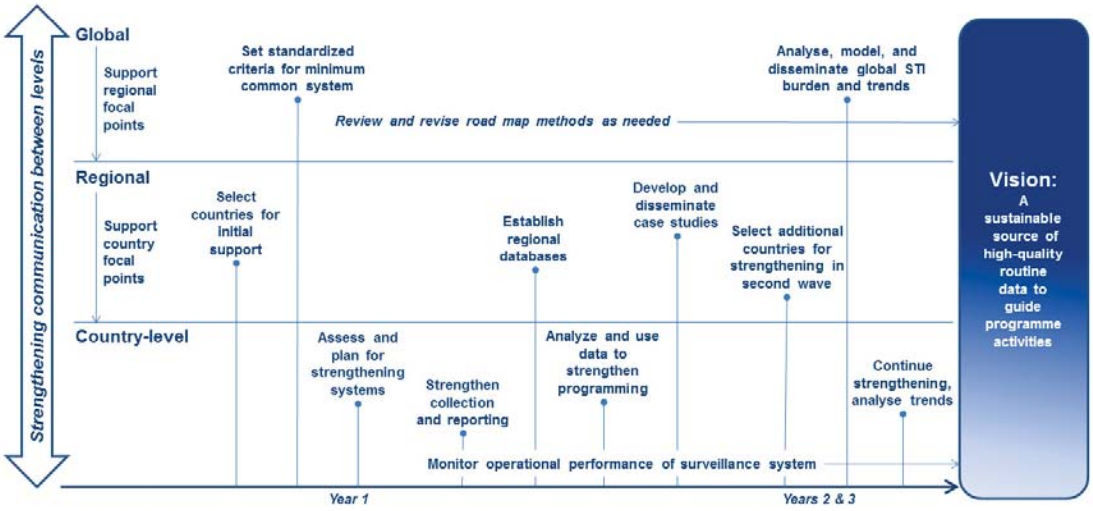
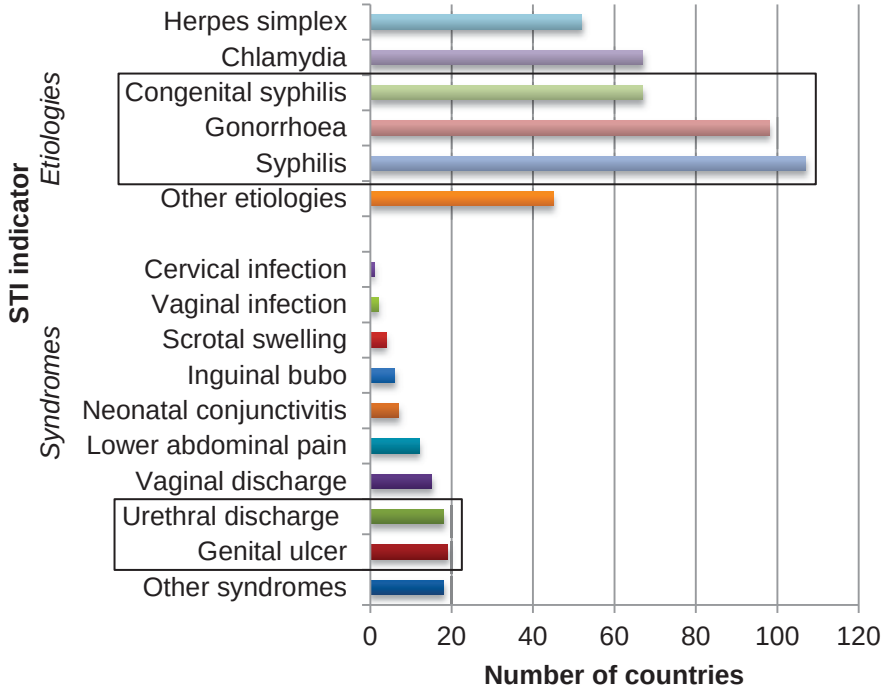
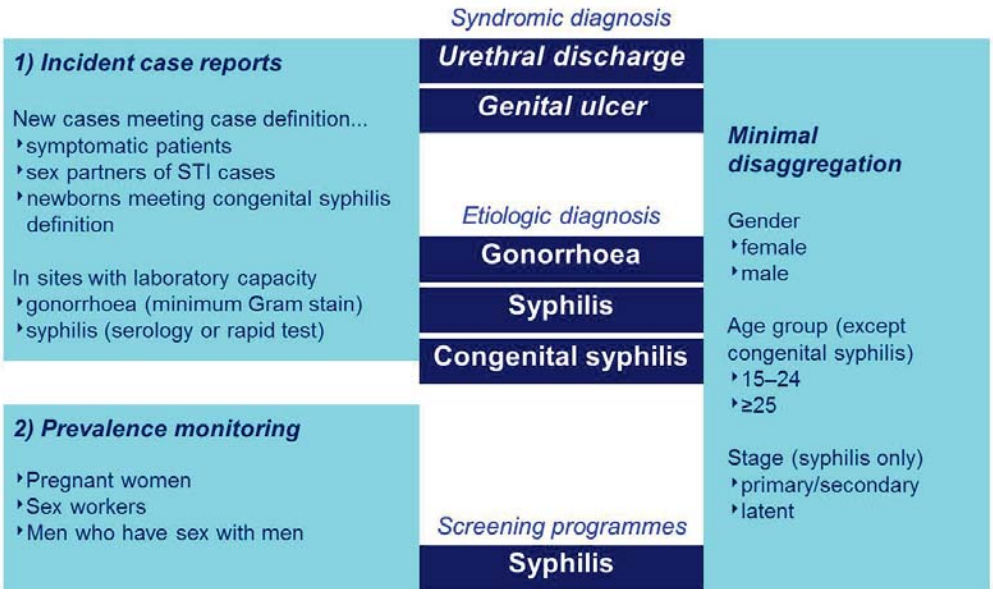


Figure 16
Results of assessment of online STI reporting



Source: WHO online survey, 2012

Figure 17
Core indicators for STI surveillance



As part of the process to strengthen collection, use, and dissemination of STI data, in 2013 WHO is pilot-testing collection of the full set of core indicators through the GARPR system in the WHO Region of the Americas and the WHO Eastern Mediterranean Region and is working to make more STI data available through the WHO Global Health Observatory Data Repository.[1]

The road map calls for rapid assessment at the country level to identify current problems and the most relevant solutions (Table 4).

In addition to supporting priority countries in the various WHO regions, WHO will provide technical support to highlight examples of countries with good STI reporting systems. This support will include sharing innovative applications for use of STI data and helping to address common problems.

Table 4
Current problems and the most relevant solutions for countries to using STI surveillance data well

Problem	Solution
Good data used in country, but not reported to WHO	Develop reporting mechanisms
Good data in country but not analysed or used	Technical support to improve data analysis and use
Guidelines exist, but poor quality, incomplete data in country	Technical support to improve data collection and reporting
No guidelines	Technical support to develop guidelines and build surveillance system

Uruguay case study: Taking steps to strengthen STI surveillance

With support from PAHO and WHO, Uruguay is in the first wave of countries to embark on strengthening STI surveillance. As part of the process to identify high-priority but feasible areas of action, the Ministry of Public Health documented inconsistent reporting and lack of standard definitions and methods for diagnosing cases. The Ministry also noted the lack of routine data on key populations at high risk. In the short term the main objective of efforts to strengthen surveillance is to reinforce routine STI reporting at sentinel sites in five departments that have a high estimated STI burden. In each of five sentinel departments, efforts will be made to improve case reporting and prevalence monitoring at selected reporting facilities.

Priority STIs selected for case reporting include gonorrhoea in men, syphilis by stage (primary/secondary or latent/unknown), and congenital syphilis. Key syndromes to be reported are urethral discharge in men and genital ulcer in both men and women. The sentinel site experience will inform the decision whether eventually to extend syndromic reporting to all health facilities.

The prevalence of syphilis will be monitored among populations for whom routine testing is recommended, including pregnant women, sex workers, and men who have sex with men. In each department facilities that already serve these populations will strengthen syphilis testing. Both case reports and prevalence data will be disaggregated by gender and age group (15–24 and 25+).

The Ministry is making plans to disseminate case definitions and train staff at the sentinel sites. Existing clinic registers and online reporting systems will be adapted to link clinical and laboratory data. PAHO/WHO is assisting the Ministry with plans to evaluate the STI surveillance system and to improve the completeness, timeliness, quality, and use of data.

[1] Available at: http://apps.who.int/gho/data

Annex 2. Data sources and selection of key indicators

This global STI baseline report includes STI surveillance data collected by several different methods.

Data on syphilis in pregnancy, in men who have sex with men, and in sex workers are collected through the WHO HIV Universal Access Reporting system and the Global AIDS Response Progress Reporting (GARPR) system, now merged and jointly called GARPR. GARPR is the annual effort coordinated by the Joint United Nations Programme on HIV/AIDS (UNAIDS), WHO, and the United Nations Children's Fund (UNICEF) to collect surveillance data and assess the status of universal access to critical HIV services.[1]

The Gonococcal Antimicrobial Surveillance Programme (GASP) obtains data through reporting by regional reference laboratories to WHO as well as from published sources in Europe, Asia and the Pacific, and the Americas.

Data for other STI indicators—gonorrhoea, syphilis in adults, urethral discharge, and genital ulcer disease—have not been routinely collected at the global level and, therefore, are not currently available for analysis. In order to access the large amount of case report data collected in individual countries but not yet routinely reported regionally or globally, data available online were collated as part of the baseline assessment of existing STI surveillance practices. This included a general search of the web sites of countries and ministry of health, national statistics offices, and other sources to determine what STI-related indicators countries are currently reporting, including the source of data, type of disaggregation, and years reported. WHO regional advisors assisted with translation of reports from Spanish, French, and Russian. This search finished in November 2012 and was complemented by a quick online scan for updates in March 2013. This initial global STI report includes the data obtained from this retrospective online review.

Additional data on congenital syphilis case rates came from the WHO European Region online reporting system, the Centralized Information System for Infectious Diseases.[2] The WHO Regional Office of the Americas also collects congenital syphilis data. These data were used for this analysis, although they are currently available only upon request.

Data analysis and conventions

Once the key indicator list was decided, the relevant case report data from 2007 through 2011 found through online searches were collated, and standardized rates were calculated. The country case rate is an incidence measure defined as the number of new cases of each syndrome or confirmed etiology divided by the country's sex-specific population ages 15 years and older (presented as a rate per 100 000). For example,

> Urethral discharge rate (cases per 100 000 male adults) =
>
> (100 000 X the number of cases of urethral discharge among males) / (the number of males >15 years)

Case numbers came from country reports, while denominator data for calculation of rates for gonorrhoea, syphilis in adults, urethral discharge, and genital ulcer disease came from demographic data files published by the United Nations Department of Economic and Social Affairs (*34*). Case rates for congenital syphilis were based on the total number of live births and were not disaggregated by sex. Estimates of live births came from the WHO Global Health Observatory Data Repository[3] for all countries except those in the European region, where live birth estimates came from the WHO European Region Health for All database.[4]

In this report data tables are generally organized by WHO region (*35*) and then alphabetically by country name. Some indicators are also analysed by grouping countries by income status, using World Bank classifications (*36*). To aid interpretation, the source of data is described when available,

[1] http://www.unaids.org/en/dataanalysis/knowyourresponse/globalaidsprogressreporting/
[2] http://data.euro.who.int/cisid/?TabID=307909
[3] http://apps.who.int/gho/data/node.main
[4] http://www.euro.who.int/en/what-we-do/data-and-evidence/databases/european-health-for-all-database-hfa-db2).

e.g. whether GARPR data come from routine programme sources or from special studies or surveys. Regional teams have reviewed all the data presented in this report.

Interpretation of case reports

Interpreting how case reporting rates reflect the epidemiology of STIs in the general population is challenging for several reasons. Case rates depend heavily on norms of health-care seeking behaviour among individuals infected with STIs, screening practices, and the availability of syndromic- or etiologic-based diagnostic services in each country. Case definitions may vary; for example, some countries may not include stillbirths in their case definition for congenital syphilis. Differences in resources for, policies on, and enforcement of STI case reporting also can greatly affect the proportion of infections reported. Case reporting in many countries may be limited to public-sector facilities or to facilities at a specific level of capacity (e.g. district hospitals).

Due to such factors influencing the completeness of reporting, care must be taken when comparing case rates between countries. For the most part, case rates may give an indication of the minimum possible level of STIs in a population. The general assumption is that even relatively strong case reporting systems in resource-rich countries face significant underreporting (*9*).

Within a country, when the system for STI clinical management is stable (i.e. no significant change in diagnostic or screening protocols and no change in reporting practices), trends in case reports can indicate a trend in STI infections among the general population. However, even trends within a country should be viewed with caution. For example, if a new HIV and/or STI prevention programme is initiated to encourage regular reproductive health check-ups or to increase use of services, case rates may appear to increase when, in fact, they have not.

Annex 3. Reported rates of genital ulcer in males and females and urethral discharge in males (cases per 100 000 adults)

WHO Region	Country	Genital ulcer rate Females					Genital ulcer rate Males					Urethral discharge rate Males				
		2007	2008	2009	2010	2011	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
AFR	Burkina Faso	156	171	186	202	+	93	112	126	130	141	256	247	264	296	319
AFR	Gambia		246	373				174	193				572	834		918
AFR	Senegal		157		75			88		40			208		176	
AFR	Swaziland				694					849					2095	
AFR	Zimbabwe											5140	3868	3499	3954	3896
AMR	Bolivia	111		98	75	69	40		43	39	49	102	98	80	94	103
AMR	Guatemala				2					3						
AMR	Guyana	46	46	79			15	18	22							
AMR	Jamaica			77	61				56	57				733	742	
EMR	Djibouti			3					3					192		
EMR	Oman											11	11	11	8	
SEAR	Bhutan				35					48					311	
SEAR	Maldives	99	14	33	25	26	108	9	8	11	3	123	32	33	49	7
SEAR	Myanmar													5		
WPR	Cambodia	+	3	4	2	3	12	5	7	5	5	257	82	90	104	90

Source: WHO online survey 2012

+ data available but suppressed as suspected aberrant value

Note: Case rates were calculated using demographic data from the United Nations Department of Economic and Social Affairs (*34*).

Annex 4. Reported rates of gonorrhoea in males (cases per 100 000 male adults)

WHO Region	Country	2007	2008	2009	2010	2011
AFR	Burkina Faso	0.4	1.6	1.6	1.9	0.4
AFR	Congo			58.6		
AFR	Mauritius				16.7	
AFR	Senegal				0.0	
AMR	Canada*	42.3	42.9	36.7		
AMR	El Salvador			19.4		
AMR	Paraguay	3.2	2.4	2.3		
AMR	United States*	138.1	124.6	110.9	113.5	98.7
EMR	Lebanon		0.5		0.3	
EMR	Oman*	5.9	5.8	4.2	5.8	
EMR	Qatar*	2.8	2.8	3.0		
EUR	Armenia		26.8	28.5	25.9	
EUR	Austria*	1.0	1.4	0.9	2.8	
EUR	Belarus			77.7		
EUR	Belgium*	9.8	12.5	12.9	12.9	
EUR	Bulgaria	4.2	4.4	5.2	3.1	
EUR	Cyprus*	0.9	0.4	1.3	4.4	
EUR	Czech Republic*	17.9	13.7	11.6	11.9	
EUR	Denmark*	12.8	14.1	18.7	15.6	
EUR	Estonia*	12.3	10.2	10.2	7.6	
EUR	Finland*	7.1	7.1	8.0	8.4	
EUR	France*	0.8	0.8	1.3	1.5	
EUR	Greece*	4.0	4.1	3.2	5.2	
EUR	Hungary*	19.3	15.8	16.3	21.9	
EUR	Iceland*	9.4	8.6	14.9	7.5	15.0
EUR	Ireland*	20.5	20.5	19.2	25.3	
EUR	Italy*	0.5	0.5	0.7	0.9	
EUR	Kyrgyzstan	39.2	36.4	29.2	36.8	
EUR	Latvia	57.6	39.9	35.7	30.1	
EUR	Lithuania*		34.0	23.9	21.4	
EUR	Luxembourg*	0.5	5.9	1.9	1.4	
EUR	Malta*	22.9	20.4	25.9	24.0	19.9
EUR	Montenegro			0.4		
EUR	Netherlands*	20.6	22.0	27.3	31.0	

WHO Region	Country	2007	2008	2009	2010	2011
EUR	Norway*	10.6	13.0	11.6	17.8	
EUR	Poland*	1.9	1.6	2.3	1.7	
EUR	Portugal*	1.5	1.3	2.2	1.7	
EUR	Republic of Moldova	95.0	90.4	83.5		
EUR	Romania	7.7	6.1	6.1	4.8	
EUR	Slovakia*	2.7	5.4	5.8	4.2	
EUR	Slovenia*	4.3	4.5	2.9	4.8	
EUR	Sweden*	13.2	14.7	11.6	15.3	
EUR	United Kingdom*	50.1	42.4	45.3	49.4	
SEA	Sri Lanka					2.3
WPR	Japan*		14.8	13.2		
WPR	New Zealand*				30.7	80.8
WPR	Republic of Korea*	179.2	150.5	103.3	106.2	106.1
Median – high-income countries		10.2	12.5	11.6	8.4	
Median – low- and middle-income countries		5.0	5.8	5.2	5.8	

Source: WHO online survey 2012, Centralized Information System for Infectious Diseases for European countries

*Indicates countries in high-income category

Note: Case rates were calculated using demographic data from the United Nations Department of Economic and Social Affairs (*34*).

Annex 5. Reported sex-specific rates of syphilis (cases per 100 000 adults)

		Females					Males				
WHO Region	Country	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
AFR	Burkina Faso	0.4	2.7	2.6	2.5	3.1	0.1	0.6	0.6	0.6	0.3
AFR	Mauritius				1.1					1.8	
AFR	Senegal				42.3					1.3	
AMR	Canada*	1.0	1.3	1.1			6.4	7.7	9.0		
AMR	Cuba			11.8	11.6				17.9	18.5	
AMR	El Salvador			4.9					4.2		
AMR	Guyana		0.0					0.0			
AMR	Jamaica			38.1	36.2				19.3	15.9	
AMR	Paraguay	120.5	87.1	70.7			21.3	25.2	20.5		
AMR	United States*	1.3	1.7	1.7	1.3	1.1	8.0	9.2	9.5	9.5	9.8
EMR	Lebanon		0.2		0.2			0.1		0.3	
EMR	Oman	4.4	1.8	1.8	2.0		4.5	3.7	1.4	1.3	
EMR	Qatar	2.9	1.7	2.7			0.7	1.8	1.8		
EUR	Austria*	1.1	1.0	1.4	1.2		0.5	0.7	0.2	0.4	
EUR	Belarus			19.0					27.6		
EUR	Belgium*	1.3	1.6	1.7	2.1		7.6	8.9	9.0	8.8	
EUR	Bulgaria	5.4	4.7	4.6	5.7		7.5	7.7	7.9	8.0	
EUR	Cyprus*	0.7	1.6	2.0	1.1		1.6	1.5	1.3	3.2	
EUR	Czech Republic*	1.1	1.1	4.1	2.8		3.5	6.5	11.1	7.1	

		Females					Males				
WHO Region	Country	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
EUR	Denmark*	0.2	0.4	0.5	2.0	1.3	3.8	6.2	10.5	15.6	15.6
EUR	Estonia*	8.6	5.7	3.6	4.8		4.7	6.3	6.3	6.6	
EUR	Finland*	2.7	3.1	2.1	3.0		5.5	6.1	6.4	5.6	
EUR	France*	0.1	0.1	0.1	0.1		2.2	2.1	2.0	2.2	
EUR	Germany*	0.7	0.6	0.4	0.5		8.4	8.2	7.1	7.8	
EUR	Greece*	0.7	0.6	0.6	0.6		3.3	2.5	4.6	4.2	
EUR	Hungary*	2.8	3.8	3.0	2.8		3.9	9.0	8.5	9.0	
EUR	Iceland*	0.0			0.6	0.0	0.0			1.9	1.2
EUR	Ireland*	1.1	0.9	0.5	0.5		2.5	5.6	4.8	4.7	
EUR	Italy*	0.7	0.7	0.7	0.3		3.0	2.7	2.6	2.0	
EUR	Kazakhstan		38.8		32.7			43.7		36.4	
EUR	Kyrgyzstan	33.9	29.7	27.2	20.4		34.3	33.8	37.5	27.3	
EUR	Latvia	13.6	10.1	6.8	3.1	3.9	16.6	13.4	10.9	9.7	8.8
EUR	Lithuania		8.7	8.4	8.3			13.9	14.3	15.9	
EUR	Luxembourg*	1.4	0.5	0.5	0.0		5.1	5.5	5.8	5.7	
EUR	Malta*	2.2	2.2	1.1	2.7	5.3	4.6	6.2	9.6	11.2	19.4
EUR	Montenegro			0.4					0.8		
EUR	Netherlands*	0.9	0.9	0.8	0.8		8.5	10.2	8.9	8.6	
EUR	Norway*	0.0	0.2	0.2	0.3		3.1	2.6	3.6	5.4	
EUR	Poland*	1.2	1.2	1.7	1.4		4.0	4.5	6.0	4.1	
EUR	Portugal*	0.7	0.6	0.4	0.8		1.7	1.5	2.8	3.1	

WHO Region	Country	Females 2007	Females 2008	Females 2009	Females 2010	Females 2011	Males 2007	Males 2008	Males 2009	Males 2010	Males 2011
EUR	Republic of Moldova	76.1	70.3	69.0			104.4	97.0	94.4		
EUR	Romania*	20.7	21.3	16.8	9.2		24.2	21.0	17.6	9.8	
EUR	Slovakia*	2.9	4.1	5.7	6.6		3.6	5.6	6.7	7.3	
EUR	Slovenia*	0.5	0.4	0.4	0.5		3.0	6.8	5.0	4.0	
EUR	Sweden*	0.9	1.0	1.0	0.8		5.0	3.1	3.4	3.9	
EUR	United Kingdom*	1.6	1.5	1.3	1.1		12.3	11.4	11.0	9.9	
SEAR	Bhutan		3.1	2.6				4.6	5.2		
SEAR	Sri Lanka					3.6					6.4
WPR	Japan*		0.3	0.3				1.1	0.9		
WPR	New Zealand*					0.7					3.9
WPR	Republic of Korea*					29.4					31.7
Median – high-income countries		2.2	2.1	1.8	2.4		2.8	3.1	3.5	3.0	
Median – low- and middle-income countries		9.5	8.7	6.8	4.4		12.0	13.4	10.9	8.8	

Cells outlined indicate data which are also available disaggregated by age (15–25, 25+)

Cells shaded indicate cases defined as early syphilis

Source: WHO online survey 2012, Centralized Information System for Infectious Diseases for European countries

*indicates countries in high-income category

Note: Case rates were calculated using demographic data from the United Nations Development Programme (*23*).

Annex 6. Prevalence of syphilis among ANC attendees reported for 2011

WHO Region	Country	Prevalence of syphilis among ANC attendees (%)	Type of data	Type of test used
AFR	Algeria	1.9	2008 sentinel survey	
AFR	Benin	0.2		
AFR	Burkina Faso	1.9	Programme	
AFR	Cameroon	0.6	Sentinel survey	
AFR	Cape Verde	0.3		
AFR	Central African Republic	7.6	Sentinel survey	Treponemal test
AFR	Gabon	1.0		
AFR	Kenya	1.6		Treponemal test
AFR	Lesotho	9.3		
AFR	Madagascar	5.9		TPHA confirmed
AFR	Malawi	4.0		TPHA confirmed
AFR	Mauritius	0.4	Programme	TPHA confirmed
AFR	Namibia	1.9	Sentinel survey	RPR & treponemal confirmed
AFR	Niger	2.7		
AFR	Rwanda	1.6		
AFR	Sao Tome and Principe	0.9		TPHA confirmed
AFR	Seychelles	0.1		TPPA
AFR	South Africa	1.5	Sentinel survey	RPR only
AFR	Togo	1.2	Sentinel survey	
AFR	United Republic of Tanzania	3.8		
AFR	Zambia	4.7		Treponemal test
AFR	Zimbabwe	1.7		
AMR	Anguilla	0.0		
AMR	Antigua and Barbuda	0.0		RPR only
AMR	Argentina	1.1	Programme	VDRL
AMR	Bahamas	1.1	Programme	Treponemal confirmed
AMR	Barbados*	0.5	Programme	Treponemal confirmed
AMR	Belize	0.8		
AMR	Bolivia	1.6		

WHO Region	Country	Prevalence of syphilis among ANC attendees (%)	Type of data	Type of test used
AMR	Brazil	1.6	Sentinel survey	VDRL
AMR	Cayman Islands	0.0		
AMR	Chile	0.2	Programme	VDRL
AMR	Colombia	1.0		
AMR	Costa Rica	0.3		VDRL, FTA-ABS
AMR	Cuba	0.1		VDRL, TPPA
AMR	Dominica	2.3		
AMR	Ecuador	0.3		Non-treponemal test only
AMR	El Salvador	0.2		
AMR	Granada	0		
AMR	Guatemala	0.3		
AMR	Honduras	0.7	Programme	
AMR	Jamaica	1.3		
AMR	Mexico	0.1	Programme	
AMR	Montserrat	0.0		
AMR	Nicaragua	0.2		
AMR	Paraguay	3.4		Treponemal and non-treponemal
AMR	Peru	0.3		Quantitative treponemal, RPR
AMR	Saint Lucia	0.7		
AMR	Saint Vincent and the Grenadines	0.7		
AMR	Uruguay	1.8	Programme	
EMR	Djibouti	8.1		
EMR	Morocco	0.6	Sentinel survey	Treponemal and non-treponemal
EMR	Oman*	0.1		VDRL, TPHA confirmed
EMR	Somalia	8.7	Sentinel survey	
EMR	Sudan	1.3	Sentinel survey	Non-treponemal only
EMR	United Arab Emirates*	0.0		
EMR	Yemen	0.4		
EUR	Belarus	0.0		
EUR	Cyprus*	0.0		
EUR	Czech Republic*	0.1		

WHO Region	Country	Prevalence of syphilis among ANC attendees (%)	Type of data	Type of test used
EUR	Denmark*	0.0		Treponemal and non-treponemal
EUR	Georgia	0.0		
EUR	Germany*	0.2	National reference lab reporting only	TPHA or TPPA, VDRL or KBR tests and IgM tests
EUR	Kyrgyzstan	0.0		Treponemal and non-treponemal
EUR	Lithuania	0.1	Programme	
EUR	Malta*	0.5		Treponemal and non-treponemal
EUR	Moldova	0.3		RPR, TPHA
EUR	Poland*	0.0		
EUR	Tajikistan	0.0		
EUR	United Kingdom*	0.2		
SEAR	DPR Korea	0.0		
SEAR	Maldives	0.1		TPHA confirmed
SEAR	Myanmar	0.5		
SEAR	Sri Lanka	0.1		VDRL, TPPA
SEAR	Thailand	0.1		Treponemal and non-treponemal
WPR	Cambodia	0.1		Treponemal, RPR
WPR	China	0.2		
WPR	Fiji	4.0	Service records from selected sites	
WPR	Malaysia	0.1	Programme	
WPR	Mongolia	2.5		
WPR	Palau	1.3		
WPR	Papua New Guinea	6.7		TPHA only
WPR	Philippines	0.1		
WPR	Samoa	0.0		
WPR	Solomon Islands	6.7	Data from capital only	
WPR	Vanuatu	3.1		
WPR	Viet Nam	0.1	Data from selected sites	

Source: Reported for 2011 through GARPR 2012 reporting system
*Indicates countries in high-income category
ANC = antenatal care; FTA-ABS = fluorescent treponemal antibody absorption (treponemal antibody test); IgM = immunoglobulin M; KBR = Bei der Komplementbindungsreaktion (complement fixation test); RPR = rapid plasma regain; TPHA = treponema pallidum hemaglutination assay; TPPA = treponema pallidum particle agglutination assay; VDRL = Venereal Disease Research Laboratory

Annex 7. Cascade of indicators for elimination of mother-to-child transmission of syphilis

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Africa																	
Benin	85.8	2012				0.3			0.2								
Botswana	93.6	2007				2.5	1.3										
Burkina Faso	94.9	2010		0.9		2.4	2.1	1.4	1.9		100	0.3	0.1	0.1	0.6	0.1	*Treponema pallidum* among <4 years, stillbirths or fetal losses not included
Burundi	98.9	2010	0.7			1.5	1.4										
Cameroon	84.7	2011					0.6		0.6								
Cape Verde	94.9	2006	100		93.4	0.6			0.3		100						
Central African Republic	57.3	2006	53.5	71.9	82.6	7.6	5.9	10.0	7.6	99.9	97.8						
Chad	42.6	2010					7.3										
Comoros	NA		95.0			2.3											
Congo	92.6	2012												0.4			Venereal syphilis cases among <4 years
Côte d'Ivoire	90.6	2012	92.1			0.4	0.2	0.2									
Democratic Republic of the Congo	88.8	2010		2.1	4.2	2.0	2.0	3.3		100							
Equatorial Guinea	NA			35.8				14.0		98.8							
Eritrea	NA					1.1				100							

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Ethiopia	33.9	2011	1.6			2.7		2.2									
Gabon	NA		100	95.0	95.0	2.4	0.9	0.6	1.0		100						
Ghana	86.7	2008		9.0	32.0	6.0	6.1	3.4		98.2							
Guinea	88.4	2007	30.8			1.5	1.5										
Guinea-Bissau	93.0	2010	0.4			4.8		1.1									
Kenya	91.5	2009		58.8	64.0	1.9		1.8	1.6								
Lesotho	91.8	2009		66.9	62.0	1.4		1.6	9.3	100	79.2						
Liberia	79.3	2007		10.9				13.6		100							
Madagascar	86.3	2009	12.0	84.7	26.0	9.1	7.7	6.0	5.9	16.6	55.8						
Malawi	94.7	2010			95.0		1.1	1.1	4.0		100						
Mali	70.4	2006	4.8			4.0	4.0	2.4									
Mauritius	NA			100	100		0.2	0.1	0.4	100	100				0.0		Cases among <10 years; stillbirths or fetal losses not included
Mozambique	90.6	2011	63.6	66.7		7.9	6.9	5.7									
Namibia	94.6	2007	98.9	93.8		3.4	2.3	1.7	1.9								
Niger	46.1	2006			95.0		2.6		2.7								
Rwanda	98.0	2010	74.4	75.2	75.0	1.6	1.6	1.5	1.6								
Sao Tome and Principe	97.5	2009	98.4	89.2	75.0	0.9	0.4	0.4	0.9	100	100						
Senegal	93.3	2011										0.1			0.6		Cases among <4 years; stillbirths or fetal losses not included
Seychelles	NA		100	100		0.1		0.0	0.1								

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Sierra Leone	91.1	2010					0.4	1.4									
South Africa	NA			74.5			3.9	2.2	1.5								
South Sudan	NA			3.3				8.5									
Swaziland	96.8	2010		34.8		4.5	4.7	8.3									
Togo	50.7	2010		4.6		1.3	1.1	1.2	1.2								
United Republic of Tanzania	87.8	2010		78.1	45.0	6.9	4.4	2.8	3.8		100						
Zambia	93.7	2007		43.3	43.0	5.2	5.1	5.3	4.7	95.0	100						
Zimbabwe	89.8	2011	12.6	56.1	82.0	3.4	0.6	4.3	1.7								
Americas																	
Anguilla														0.0	0.0		
Antigua and Barbuda	100	2009		100	100		0.7	0.5	0	100			0.0	0.0	0.0		
Argentina	91.4	2006	90	84.4	90.9	1.4	1.4	1.3	1.1	65.6	74.1	111.1	84.4	93.2	94.6		
Aruba													82.1	0.0	0.0		
Bahamas	98.0	2008			100				1.1		100						
Barbados*	100	2008		99.9	82.6			0.4	0.5	80	100			35.0	0.0		
Belize	99.3	2008	91.0	90.4	92.0	0.9		1.4	0.8	50	67.3	0.0	13.4	0.0	78.4		
Bermuda														0.0	0.0		
Brazil	97.3	2010	86.4	75.1		1.6			1.1		80.6	165.7	178.3	199.8	220.9		
Canada*	100	2007										0.0	0.3	2.1			
Cayman Islands												0.0		0.0	0.0		
Chile	NA		100	100	100	0.2	0.2	0.2	3.2	100	100	26.7	27.5	25.4	25.3		
Colombia	97.0	2010	62.0	85.4	73.6		1.1	0.6	1.0	71.6	89.4	203.5	202.5	218.9	231.0		
Costa Rica	98.8	2010		85.0	87.7			1.4	0.3	37.5	73.3	123.3		95.1	94.2		
Cuba	100	2009		100	100		0.8		0.1	100	97.1	0.0	0.9	0.0	2.7		

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Dominica	100	2009			100		0.4		2.3					163.7	245.5		
Dominican Republic	96.0	2010				0.5	0.4	0.5									
Ecuador	84.1	2007	24.6	67.8				0.1	0.1				49.1	39.8	38.5		
El Salvador	94.0	2008		63.6	49.7	0.1	0.3	0.5	0.2	14.8	24.2	7.2	16.9	16.9			
Grenada	100	2009		100			5.3	3.7		96.6				0.0	0.7		
Guatemala	93.0	2009	0.8	13.5	21.0	0.8	0.5	4.2	0.3		100	0.7	0.4	12.9	2.8		Syphilis complicating pregnancy, childbirth and the puerperium
Guyana	85.7	2009	100	100	88.0	0.7	0.2	0.2		100		0.0	0.0	0.0	0.0		
Haiti	84.5	2006	74.1	68.4		5.0		4.7		80.5							
Honduras	83.9	2006	39.5	41.5		1.2	1.2	1.5		100		91.3		15.8			
Jamaica	98.7	2009	77.8	73.1	83.0	1.6		1.6	1.3			5.7	19.1	7.7	11.9		
Mexico	95.8	2009	45.8				0.3		0.1			7.2	8.2	7.1	6.5		Hospital admissions for congenital syphilis
Montserrat												0.0		0.0	0.0		
Nicaragua	90.2	2007		31.6		0.6	0.4	0.5	0.2	9	100	2.1	7.1				
Panama												24.2	45.6	20.0			
Paraguay	96.1	2008	71.8	52.7		4.6	3.4	4.5	3.4	4		269.4	297.4	253.3			Includes cases diagnosed in children over 2 years
Peru	95.4	2011	71.0	72.1		0.5	0.3	0.3	0.3	90.1	90.1		72.6	62.1	48.3		
Saint Kitts and Nevis														0.0	0.0		

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Saint Vincent and the Grenadines	99.5	2008							0.7				104.3	0.0	0.0		
Suriname															0.0		
Trinidad and Tobago	95.3	2006	100	97.8		1.4	1.7	0.1		100		290.4	227.5				
Turks and Caicos														0.0	0.0		
USA*	NA											10.1	10.1	9.7	8.8		
Uruguay	96.2	2007		94.6	96.0			1.3		23.9		248.2	458.7	522.2	211.1	147.5	
Venezuela	NA			96.1				1.9		100		66.3	48.0	28.3			
Eastern Mediterranean																	
Algeria	89.4	2006				0.8			1.9								
Djibouti	81.0	2006	96.5	63.3	11.5	0.8	0.5	0.2	8.1								
Iran (Islamic Republic of)	98.0	2005			0.0												
Iraq	83.8	2006		27.3		0.0		0.0									
Jordan	98.8	2007	0.8	0.0		0.0	0.0										
Morocco	77.1	2011				1.1		0.6									
Oman*	99.4	2010	98.5	99.4	99.0	0.0	0.0		0.1			0.0	0.0	0.0	0.4		Includes cases among <12 years diagnosed at MOH STI clinics
Qatar*	91.0	2012										0.0	3.3	5.5			Cases among <5 years
Saudi Arabia*	98.0	2011	100		100	0.1											
Somalia	22.0	2006		8.5				1.3	8.7								
Sudan	NA			3.3			3.5	2.2	1.3								
United Arab Emirates*	100	2011	100	100					0				0.5				

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Yemen	47.0	2006							0.4								
Europe																	
Albania	97.3	2009										0.0			0.0		
Andorra	NA											0.0	0.0	0.0	0.0	0.0	
Armenia	99.1	2010	81.5		85.4							2.5	7.3	6.8			
Azerbaijan	76.9	2006	100			0.0						4.6	7.2	2.0	4.2	6.6	
Belarus	99.4	2005	100		98.0	0.1	0.1		0.0		100	1.0		0.0	1.9	1.8	
Bosnia and Herzegovina	98.9	2006											2.9		0.0		
Bulgaria	NA											49.1	29.6	37.1			Counted by year of diagnosis
Croatia*	NA												0.0	2.2			
Cyprus*	99.2	2007							0.0			0.0	0.0	0.0	0.0	0.0	
Czech Republic*	98.1	2010			100		0.1		0.1		100	2.6	1.7	1.7	1.7	4.6	
Denmark*	NA				94.0				0.0	100	100	1.5	0.0	0.0	6.3	1.6	Counted by year of diagnosis
Estonia	94.5	2011										6.3	0.0	0.0	6.3	0.0	
Georgia	97.6	2010	88.0		88.0	0.1			0.0			10.1	0.0	4.7	3.2	13.8	
Germany*	NA		97.1				0.3	0.3	0.2	31.3	33.3	1.0	0.3	0.5	0.1	0.3	
Greece*	NA												0.8	0.0	1.7	2.6	Counted by year of diagnosis
Hungary*	NA		100									3.1	3.0	1.0	1.1	0.0	
Iceland*	NA											0.0	0.0	0.0	0.0	0.0	
Ireland*	99.8	2010										0.0	0.0	0.0	1.4		
Israel*	NA													0.0	0.0	0.6	
Italy*	98.2	2009										1.6	0.2	2.1	0.7	0.5	
Kazakhstan	98.0	2006	100			2.2						5.3					

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Kyrgyzstan	96.6	2006	100		92.0		0.1		0.0		100	17.8		13.3	10.0		
Latvia	97.3	2010										0.0	4.2	9.2	5.2	0.0	
Lithuania	NA								0.0			3.1	5.7	10.9	5.6	0.0	
Luxembourg*	NA													0.0	0.0	0.0	
Malta*	NA				100			0.2	0.5	100	100	0.0	0.0	0.0	0.0	0.0	
Monaco	NA												+				
Montenegro	97.4	2005										0.0	0.0	0.0	0.0	0.0	
Netherlands*	NA		100			0.1						0.0					
Norway*	NA											0.0	0.0	0.0	0.0	0.0	
Poland*	NA								0.0			1.0	0.0	2.9	4.4		
Portugal*	NA											20.5	13.4	13.1	10.9	10.3	
Republic of Moldova	98.0	2005			100	0.3	0.3	0.4	0.3	100	100	5.3	12.8	2.5	7.4	12.8	
Romania	NA		30.1			1.6	1.6					12.1	4.1	3.1	2.8	4.6	
Russian Federation	NA													0.1			
San Marino*	NA														0.0		
Serbia	98.9	2010										1.5	0.0	2.8	0.0	1.5	
Slovakia*	NA							0.1		94.0	100	7.3	3.5	3.3	5.0	1.6	
Slovenia*	NA											0.0	0.0	0.0	0.0	0.0	
Spain*	NA											4.1	1.9	2.8	0.8	1.3	
Sweden*	NA											0.0	0.9	2.7	0.9	0.9	
Switzerland*	NA											1.3	5.2	1.3	3.7	0.0	
Tajikistan	88.8	2007	100		57.7	0.8			0.0		100	0.5	0.5	2.0	1.0		
Macedonia	94.0	2006										0.0					
Ukraine	98.5	2007										3.8	2.2			0.8	

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
United Kingdom*	NA		95.5		96.7	0.2	0.2	0.2	0.2			0.5	0.4	0.0	0.0		
Uzbekistan	98.7	2006				1.1	0.0										
Asia																	
Bangladesh	49.8	2011				0.6											
Bhutan	74.4	2010			95.0			1.0					0.0	5.4			Cases among <5 years reported from basic health units and hospitals
DPR Korea	100	2009							0.0								
India	75.1	2008	52.4	65.4		2.3	0.4	0.3		86.2							
Indonesia	93.3	2007				5.8	1.2										
Maldives	99.2	2009		41.7	82.7		0.0	0.0	0.1								
Myanmar	83.1	2010	10.2	8.1	9.7	2.0	0.7	0.7	0.5	100							
Sri Lanka	99.4	2007	45.9	98.0	96.0	0.0	0.0	0.0	0.1	66.2	90					0.5	Reported from public STI clinics
Thailand	99.1	2009				0.2	0.1	0.1	0.1		100						
Timor-Leste	84.4	2010		0.0													
Western Pacific																	
Australia*	97.1	2009										0.5	0.5				
Brunei Darussalam	100	2011	100	100	100			0.3									
Cambodia	89.1	2010	6.0		39.0	0.2	0.1	0.4	0.1	100							
China	94.1	2010			83.5	0.3	0.5	0.4	0.2								
Fiji	100	2005	100	100	72.8	5.1		2.8	4.0	98.3							
Kiribati	100	2005		100			5.6										

Country	% of pregnant women with at least 1 ANC visit		Indicator 6 % of ANC attendees tested for syphilis			Indicator 7 % of ANC attendees positive for syphilis				Indicator 8 % of infected ANC attendees treated		Indicator 5 Congenital syphilis rate (cases per 100 000 live births)					
	%	Year	2008	2010	2011	2008	2009	2010	2011	2010	2011	2007	2008	2009	2010	2011	Case definition comments
Lao People's Democratic Republic	71.0	2010				0.0	0.8										
Malaysia	83.4	2010	94.0	98.7	98.3	0.1	0.1	0.1	0.1	100	100	0.0					
Mongolia	99.0	2010	80.2	82.9	97.0	1.9	2.0	2.2	2.5	94.7	99.4						
Papua New Guinea	64.7	2011			9.0	2.4	5.8	7.0	6.7								
Philippines	91.1	2008					0.2	0.2	0.1	74.3	43.3						
Republic of Korea*	100	2009														1.7	
Samoa	93.0	2009		100				2.3		100	100						
Solomon Islands	73.9	2007		72.8	48.1			6.7	6.7	45.3							
Vanuatu	84.3	2007			46				3.1								
Viet Nam	93.7	2010				0.2	0.2		0.1								

Shading: All data for a given country are highlighted if the country has data for all four validation indicators that meet the global minimum criteria validation of elimination of MTCT of syphilis.

Source: GARPR/Universal Access Reports 2008, 2009, 2010, 2011

Note: Congenital syphilis case rates were calculated using numbers of live births from the United Nations Department of Economic and Social Affairs (*34*) as the denominator in all regions except Europe, where the WHO Health for All numbers of live births were used.

* indicates countries in high-income category

+ data available but suppressed as suspected aberrant value

Annex 8. Reported prevalence of syphilis among sex workers (SW) and men who have sex with men (MSM) in 2011

WHO region	Country	Prevalence in SW (%)	Sample size/# of tests	Comments on data source	Prevalence in MSM (%)	Sample size/# of tests	Comments on data source
AFR	Angola	3.7	489	Survey data, one border site, transactional SW 15-24	0.3	311	2011 survey, Luanda data only
AFR	Cameroon	17.5	999	2010 survey, 10 regions	0.4	462	Survey data, 2 sites
AFR	Cape Verde	8.2	122				
AFR	Central African Republic				5.5	91	Survey data, noted: ~10% refusal rate
AFR	Kenya	0.9	593	Survey data, Nairobi data only	0.7	563	Survey, Nairobi data only
AFR	Madagascar	15.6	2102		5.4	945	
AFR	Mauritius	4.4	294	2010 survey	5.8	362	2010 survey
AFR	Niger	4.0	451				
AFR	Seychelles					176	2011 survey
AFR	Zimbabwe	12.2	180				
AMR	Argentina	22.4	1094	Facility-based survey	20.1		2009 survey report
AMR	Bahamas		5		44.1	34	
AMR	Bolivia	5.2	9795	Programmatic data	18.9	201	Programmatic data
AMR	Brazil	2.5	2521	Survey data, 10 cities	missing	missing	
AMR	Chile	10.4	14 910	Programmatic data			
AMR	Costa Rica				13.7	300	Survey data, Costa Rica metro area
AMR	Dominican Republic	7.0	1251	2008 survey	7.0	1387	2008 survey
AMR	Ecuador				6.5	62	2010 report
AMR	El Salvador	17.5	594	2010 survey, San Salvador data only	12.1	516	2010 survey, San Salvador data only
AMR	Guatemala	1.4	2731		0.7	141	
AMR	Mexico	2.1	11 946	Programmatic data	14.6	4864	Programmatic data

WHO region	Country	Prevalence in SW (%)	Sample size/# of tests	Comments on data source	Prevalence in MSM (%)	Sample size/# of tests	Comments on data source
AMR	Nicaragua	2.1	830	Survey data, weighted	2.0	943	Survey data, weighted
AMR	Paraguay	16.5	942	Selected sites	24.6	932	
AMR	Trinidad and Tobago	10.8	102	Programmatic data	8.9	90	Programmatic data
EMR	Morocco	17.7	1431	2011 survey	8.4	659	2010 survey
EMR	Somalia	3.4	237	2008 survey			
EMR	Yemen		301	2010 survey, Al Hodiedah city data only			
EUR	Armenia	3.1	250		1.3	270	
EUR	Belarus	0.6	545		1.1	1034	
EUR	Belgium	1.0	960	Programmatic data, selected sites	7.7	1471	Programmatic data
EUR	Bosnia and Herzegovina	4.0	150	Survey data, selected sites	0.6	168	Survey data, selected sites
EUR	Bulgaria	9.6	700	Annual survey, selected sites	4.4	520	Annual survey, selected sites
EUR	Czech Republic	2.1	2300	Survey data			
EUR	Estonia		210	2011 survey, selected sites			
EUR	Germany				8.1	11 636	Programmatic data
EUR	Kyrgyzstan	10.4	537	2010 survey	5.7	88	2010 survey
EUR	Lithuania				1.9	595	Programmatic data
EUR	Moldova				12.1	182	2010 survey
EUR	Netherlands	0.2	4928	2010 programmatic data	2.3	19 470	2010 programmatic data
EUR	Tajikistan	9.6	812	Survey data	5.1	350	Survey data
EUR	The former Yugoslav Republic of Macedonia	1.1	180	Survey data, unweighted	0.5	382	Survey data, weighted
EUR	United Kingdom				2.5	58674	Programmatic data, England only
SEAR	Uzbekistan	5.4	3359		1.3	150	
SEAR	Bangladesh	3.8	3970	2011 survey, 13 sites	1.5	400	2011 survey, selected sites

WHO region	Country	Prevalence in SW (%)	Sample size/# of tests	Comments on data source	Prevalence in MSM (%)	Sample size/# of tests	Comments on data source
SEAR	Indonesia	8.6	22 048	Programmatic data	17.5	976	Programmatic data
SEAR	Myanmar	3.9	990	2011 survey	2.5	400	2011 survey
SEAR	Nepal	0.7	593	2011 survey	1.5	400	2009 survey
SEAR	Sri Lanka	2.4	619	2011 survey	11.7	213	
SEAR	Thailand	0.5		Survey data, weighted			
SEAR	Timor-Leste	9.8	133	2011 survey	7.1		2011 survey
WPR	Cambodia	2.1	4517	Programmatic data			
WPR	China	2.8	204 592		7.8	37084	
WPR	Malaysia	0.6	1080	Facility-based sample		367	Facility-based sample
WPR	Mongolia	18.3	858	2009 survey	4.6	196	2011 survey
WPR	Papua New Guinea	21.1	171	Survey data, Port Moresby data only, weighted			
WPR	Singapore	0.7	4677	Programmatic data	18.4	386	2010 report
WPR	Viet Nam	0.9	1089	2011 survey	2.7	1069	2011 survey

Cells highlighted in blue indicate data from programmatic sources rather than survey based data

Source: GARPR 2012, most recent data available.
MSM = men who have sex with men; SW = sex worker

Annex 9. Syphilis prevalence among female sex workers (FSW) and men who have sex with men (MSM) reported by countries for multiple years

WHO region	Country	Syphilis prevalence among FSW (%)			Syphilis prevalence among MSM (%)		
		2008	2010	2011	2008	2010	2011
AFR	Comoros	7.1	0.5				
AFR	Gabon	6.0	2.1				
AFR	Madagascar	12.1	12.2	15.6			5.4
AFR	Niger		2.3	4.0			
AMR	Argentina	25.8	22.4		16.9	20.5	
AMR	Chile	0.2	6.3	10.4			
AMR	Colombia	18.0			7.7	3.3	
AMR	Costa Rica		12.9			13.7	13.7
AMR	Dominican Republic	9.0	5.1	7.0	7.8	7.0	
AMR	El Salvador		2.7	17.5		6.2	12.1
AMR	Guatemala	6.0	4.8	1.4	3.0	16.7	0.7
AMR	Honduras	6.4	1.5			12.9	
AMR	Jamaica	6.2	1.2		5.5	15.0	
AMR	Nicaragua		5.3	2.1		6.4	2.0
AMR	Paraguay		14.6	16.5	10.4	18.8	24.6
AMR	Trinidad and Tobago		31.8	10.8		11.6	8.9
EMR	Morocco	16.9	9.4	17.7	23.3	16.8	8.4
EMR	Somalia		3.4	3.3			
EMR	Yemen	4.9		0			
EUR	Belgium		0.2	1.0		7.7	7.7
EUR	Bosnia and Herzegovina	7.2		4.0	0.7		0.6
EUR	Germany	5.6	2.3		18.6	8.1	8.1
EUR	Italy				14.9	9.1	
EUR	Kyrgyzstan	32.4		10.4	13.0		5.7
EUR	Lithuania	5.7			3.6		1.8
EUR	Netherlands	0.2		0.2	3.9		2.3
EUR	Republic of Moldova	13.3	8.9		6.5	12.1	
EUR	Tajikistan	12.6	11.5	9.6			5.1

WHO region	Country	Syphilis prevalence among FSW (%)			Syphilis prevalence among MSM (%)		
		2008	2010	2011	2008	2010	2011
EUR	United Kingdom					3.1	2.5
EUR	Uzbekistan	13.2		5.4	1.4		1.3
SEAR	Bangladesh	4.5	4.2	3.8	1.0	1.0	1.5
SEAR	Indonesia	15.0	6.1	8.6	4.0	8.0	17.5
SEAR	Myanmar	5.5		3.9	14.0		2.5
SEAR	Nepal	1.0	1.0	0.7	2.3	1.5	
SEAR	Sri Lanka		3.0	2.4		4.7	11.7
SEAR	Thailand	8.9	0.6	0.5	21.6		
SEAR	Timor-Leste		8.8	9.8		5.3	7.1
WPR	Cambodia	2.3	2.3	2.1	1.7	0.9	
WPR	China	2.7	2.9	2.8	12.1	8.4	7.8
WPR	Lao PDR	0.6	0.6				
WPR	Mongolia	20.8	18.3		11.0	5.4	4.6
WPR	Singapore	0.6	1.1	0.7		21.1	18.4
WPR	Viet Nam	2.5%	1.6	0.9	0.9	1.1	2.7

Source: GARPR/Universal Access Reports 2008, 2010, 2011

Annex 10. Reported percentage of gonococcal isolates with resistance to azithromycin and ciprofloxacin/quinolones and elevated minimum inhibitory concentrations of cefixime (>0.25 µg/ml) or ceftriaxone (>0.125 µg/ml), 2009 and 2010

	Ceftriaxone				Azithromycin				Quinolones			
	2009		2010		2009		2010		2009		2010	
Region and country	Number of isolates	%	Number of isolates	%	Number of isolates	%	Number of isolates	%	Number of isolates	%	Number of isolates	%
SEAR (*19*)												
Bhutan	179	0	181	2.21					179	96.1	179	96.1
India	37	10.8	51	3.92		0			37	97.3	37	10
Sri Lanka	72	0	75	0					72	90.3	72	90.3
Thailand			720	19.9					540	77.0	540	97.6
WPR (*19*)												
Australia	3997	4.8	3220	2				< 1	3220	42.5	3997	34.7
Brunei	397	0.51	389	0.3					387	93.0	396	93.2
Cambodia	76	3.95	6	0				0	6	66.7	6	125
China	1398	55.8	1026	36.9					1026	10	1026	125.5
Fiji		0	541	0.37					541	0.2	336	0.6
Hong Kong	947	23.3	1366	0					1366	52.2	947	98.6
Japan	403	20.3	263	0					263	79.8	403	73.2
Korea	82	29.3	61	47.5					61	91.8	82	95.1
Malaysia	17	0	10	10					10	8	17	88.2
Mongolia	690	19.1	150	30.7					150	74.7	690	34.5
New Caledonia			81	0					79	1.3	197	

	Ceftriaxone				Azithromycin				Quinolones			
	2009		2010		2009		2010		2009		2010	
Region and country	Number of isolates	%	Number of isolates	%	Number of isolates	%	Number of isolates	%	Number of isolates	%	Number of isolates	%
New Zealand	72	0	234	0					234	35.0	72	29.2
Papua New Guinea	0		54	0					0		59	
Philippines	59	0	40	0					40	97.5	160	74.4
Singapore	160	1.25	160	0				0	180	76.7	86	10
Tonga	0		4	25								
Viet Nam	86	0	80	0					80	10		
AMR (*20*)										**Ciprofloxacin**		
Argentina	310	0	316	0	310	2.9			310	22.9		
Bolivia	13	0										
Brazil	120	0							120	1.7		
Chile	463	0	508	0	463	45.6			463	46.2		
Colombia	25	0							25	24.0		
Cuba	40	0							40	35.0		
Ecuador	7	0	6	0					7	85.7		
Peru	40	0							40	6		
Uruguay	44	0			44	9.1						
Venezuela	15	0	14	0					15	46.7		
Paraguay	3	0	13	0								
Canada			155	31.0								
USA	5630		5693	0.1		0.2		0.5		9.6[1]		12.5
(cefixime)		1.4										

[1] The value for quinolones more generally was 20.1.

Region and country	Ceftriaxone 2009 Number of isolates	Ceftriaxone 2009 %	Ceftriaxone 2010 Number of isolates	Ceftriaxone 2010 %	Azithromycin 2009 Number of isolates	Azithromycin 2009 %	Azithromycin 2010 Number of isolates	Azithromycin 2010 %	Quinolones 2009 Number of isolates	Quinolones 2009 %	Quinolones 2010 Number of isolates	Quinolones 2010 %
EUR (*21*)	**Cefixime**											
Austria	104	21.2	110	22.7	104	28.8	110	1	104	79.8	110	61.8
Belgium	110	6.4	110	3.6	110	14.5	110	2.7	110	67.3	110	6
Cyprus			12	5			12				12	10
Denmark	119	15.1	96	20.8	119	46.2	96	16.7	119	69.7	96	68.8
France	104	1.9	111	1.8	104	18.3	111		104	43.3	111	32.4
Germany	45	2.2	109	11.9	45		109	8.3	45	73.3	109	58.7
Greece	110		97	13.4	110	8.2	97	6.2	110	67.3	97	63.9
Hungary							14				14	78.6
Ireland			88	4.5			88	1.1			88	35.2
Italy	70	18.6	105	5.7	70	28.6	105	8.6	70	75.7	105	58.1
Latvia	9				9		20	5.0	9	11.1	20	1
Malta	22				22	4.5	29		22	90.9	29	82.8
Netherlands	114	0.9	215	3.3	114	2.6	215	4.2	114	49.1	215	40.5
Norway	110	0.9	46	6.5	110	1.8	46	26.1	110	8	46	34.8
Portugal	79		72	1.4	79		72	5.6	79	34.2	72	37.5
Romania							78	2.6			78	9.0
Slovakia	15		88	14.8	15	6.7	88	29.5	15	10	88	90.9
Slovenia	24	8.3	28	25.0	24	8.3	28	17.9	24	79.2	28	71.4
Spain	103		101	15.8	103	5.8	101	9.9	103	65.0	101	60.4
Sweden	108	2.8	84	7.1	108	10.2	84	2.4	108	71.3	84	69.0
United Kingdom	120		222	3.2	120	4.2	222	0.5	120	35.0	222	32.0

Source: GASP 2013

References

1 *Global guidance on criteria and processes for validation of elimination of mother-to-child transmission (EMTCT) of HIV and syphilis.* Geneva, WHO, in press.

2 *Global incidence and prevalence of selected curable sexually transmitted infections – 2008.* Geneva, World Health Organization, 2012.
http://www.who.int/reproductivehealth/publications/rtis/stisestimates/en/index.html

3 *Accelerating progress towards the health-related Millennium Development Goals*. Geneva, WHO, 2010.
http://www.who.int/topics/millennium_development_goals/MDG-NHPS_brochure_2010.pdf

4 *Progress report. Reproductive health strategy to accelerate progress towards the attainment of international development goals and targets*. Geneva, WHO, 2010.
http://whqlibdoc.who.int/hq/2010/WHO_RHR_10.14_eng.pdf

5 *Global strategy for the prevention and control of sexually transmitted infections: 2006–2015.* Geneva, WHO, 2006. http://whqlibdoc.who.int/hq/2006/WHO_RHR_06.10_eng.pdf

6 *The global elimination of congenital syphilis: Rationale and strategy for action.* Geneva, WHO, 2007.
http://whqlibdoc.who.int/publications/2007/9789241595858_eng.pdf

7 *Strategies and laboratory methods for strengthening surveillance of sexually transmitted infections – 2012.* Geneva, World Health Organization, 2012.
http://www.who.int/reproductivehealth/publications/rtis/9789241504478/en/index.html

8 *Global AIDS response progress reporting: monitoring the 2011 political declaration on HIV/AIDS: guidelines on construction of core indicators: 2012 reporting.* Geneva, Joint United Nations Programme on HIV/AIDS, 2011.
http://www.unaids.org/en/media/unaids/contentassets/documents/document/2011/JC2215_Global_AIDS_Response_Progress_Reporting_en.pdf

9 *Prevalence and incidence of selected sexually transmitted infections, Chlamydia trachomatis, Neisseria gonorrhoeae, syphilis and Trichomonas vaginalis: methods and results used by WHO to generate 2005 estimates.* Geneva, WHO, 2011. http://whqlibdoc.who.int/publications/2011/9789241502450_eng.pdf

10 European Centre for Disease Prevention and Control, World Health Organization Regional Office for Europe. *HIV/AIDS surveillance in Europe 2011*. Stockholm, European Centre for Disease Prevention and Control, 2012.

11 Newman L et al. Global estimates of syphilis in pregnancy and associated adverse outcomes: Analysis of multinational antenatal surveillance data. *PLOS Medicine*, 2013 10(2):e1001396.

12 *Methods for surveillance and monitoring of congenital syphilis elimination within existing systems*. Geneva, World Health Organization, 2011. http://whqlibdoc.who.int/publications/2011/9789241503020_eng.pdf

13 *Global Health Observatory Data Repository*, Geneva, World Health Organization, (http://apps.who.int/gho/data, accessed 26 February 2013).

14 *2012 progress report: elimination of mother-to-child transmission of HIV and congenital syphilis in the Americas.* Washington, DC, Pan American Health Organization, 2013.

15 *Quaterly reports, 1997–2011*. Phnom Penh, National Center for HIV/AIDS, Dermatology and STD. (https://www.nchads.org, accessed 25 June 2013).

16 Ryan CA et al. Cambodia: explosive spread of HIV-1 and sexually transmitted diseases. *The Lancet*, 1998, 351:1175.

17 *Global surveillance network for gonococcal antimicrobial susceptibility.* Geneva, World Health Organization, 1990. WHO/VDT/90-452.

18 Unemo M et al. Phenotypic and genetic characterization of the 2008 WHO *Neisseria gonorrhoeae* reference strain panel intended for global quality assurance and quality control of gonococcal antimicrobial resistance surveillance for public health purposes. *Journal of Antimicrobial Chemotherapy*, 2009, 63:1142-1151.

19 Lahra M. Surveillance of antibiotic resistance in *Neisseria gonorrhoeae* in the WHO Western Pacific and South-East Asian Regions, 2010. Communicable Diseases Intelligence Quarterly Report, 2012, 36(1):95–100.

20 Starnino S et al. Retrospective analysis of antimicrobial susceptibility trends (2000-2009) in *Neisseria gonorrhoeae* isolates from countries in Latin America and the Caribbean shows evolving resistance to ciprofloxacin, azithromycin and decreased susceptibility to ceftriaxone. *Sexually Transmitted Diseases,* 2012, 39:813–821.

21 Cole M et al. The European gonococcal antimicrobial surveillance programme, 2009. *Eurosurveillance,* 2011, 16(42):pii=19995. http://www.eurosurveillance.org/images/dynamic/EE/V16N42/art19995.pdf

22 Yokoi S et al. Threat to cefixime treatment of gonorrhea. *Emerging Infectious Diseases*, 2007, 13:1275-1277.

23 Unemo M et al. First *Neisseria gonorrhoeae* strain with resistance to cefixime causing gonorrhoea treatment failure in Austria. *Eurosurveillance,* 2011, 16(43):pii=19998.

24 Allen VG et al. *Neisseria gonorrhoeae* treatment failure and susceptibility to cefixime in Toronto, Canada. *The Journal of the American Medical Association,* 2013, 309:163-170.

25 Unemo M et al. High-level cefixime- and ceftriaxone-resistant *N. gonorrhoeae* in France: novel penA mosaic allele in a successful international clone causes treatment failure. *Antimicrobial Agents and Chemotherapy,* 2012, 56:1273-1280.

26 Unemo M et al. Two cases of verified clinical failures using internationally recommended first-line cefixime for gonorrhoea treatment, Norway, 2010. *Eurosurveillance,* 2010, 15(47):pii=19721.

27 Lewis DA et al. Phenotypic and genetic characterization of the first two cases of extended-spectrum-cephalosporin-resistant *Neisseria gonorrhoeae* infection in South Africa and association with cefixime treatment failure. *Journal of Antimicrobial Chemotherapy,* 2013, 68:1267-1270.

28 Ison CA et al. Gonorrhoea treatment failures to cefixime and azithromycin in England, 2010. *Eurosurveillance,* 2011, 16(14):pii=19833.

29 Chen M et al. Failure of 500 mg ceftriaxone to eradicate pharyngeal gonorrhoea, Australia. *Journal of Antimicrobial Chemotherapy,* 2013, 68(6):1445-1447.

30 Unemo M, Golparian D, Hestner A. Ceftriaxone treatment failure of pharyngeal gonorrhoea verified by international recommendations, Sweden, July 2010. *Eurosurveillance,* 2011, 16(6):pii=19792.

31 Unemo M et al. Treatment failure of pharyngeal gonorrhoea with internationally recommended first-line ceftriaxone verified in Slovenia, September 2011. *Eurosurveillance,* 2012, 17(25):pii=20200.

32 Ohnishi M et al. Is *Neisseria gonorrhoeae* initiating a future era of untreatable gonorrhea? Detailed characterization of the first strain with high-level resistance to ceftriaxone. *Antimicrobial Agents and Chemotherapy*, 2011, 55:3538-3545.

33 *Global action plan to control the spread and impact of antimicrobial resistance in Neisseria gonorrhoeae.* Geneva, World Health Organization, 2012.

34 *World Population Prospects, the 2010 Revision.* New York, United Nations Department of Economic and Social Affairs, 2010. Available at: http://esa.un.org/unpd/wpp/index.htm (accessed 26 June 2013).

35 *About WHO: WHO—its people and offices*. Geneva, World Health Organization, 2013. (http://www.who.int/about/structure/en/index.html, accessed 26 June 2013).

36 *How we classify countries.* Washington, DC, The World Bank. (http://data.worldbank.org/about/country-classifications, accessed 26 June 2013).

For more information, please contact:

Department of Reproductive Health and Research
World Health Organization
Avenue Appia 20, CH-1211 Geneva 27, Switzerland
Fax: +41 22 791 4171
E-mail: reproductivehealth@who.int
www.who.int/reproductivehealth

ISBN 978 92 4 150589 5