GLOBAL PREVALENCE AND INCIDENCE OF SELECTED CURABLE SEXUALLY TRANSMITTED DISEASES: OVERVIEW AND ESTIMATES

WORLD HEALTH ORGANIZATION
This document contains WHO estimates of the prevalence and incidence of some of the curable sexually transmitted diseases (STDs), based on information published in the world scientific literature and in WHO archives. The methodology used was developed by the Office of STD of the WHO Global Programme on AIDS in collaboration with the Rockefeller Foundation, and is the first WHO attempt to estimate STD incidence based on epidemiological modelling. As more data on STD become available, the WHO database will be updated and estimates will be refined.
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Global prevalence and incidence of selected curable STDs

An estimate of the impact of curing or preventing each of the curable STDs has been made by Over and Piot. The model used suggests that by curing or preventing one hundred cases of syphilis among an STD high-risk (core) group, approximately 1,200 HIV infections linked to those one hundred episodes of syphilis could be prevented over the coming 10-year period (Figure 1). For other curable STDs the impact of treatment and prevention is significant, though somewhat less.

Figure 1

Effects on HIV epidemic of curing/preventing
100 STD cases in core and non-core groups

In 1990, using a modified Delphi technique, WHO estimated that in that year there were over 250 million new cases of sexually transmitted diseases. The Delphi technique was chosen at that time because of the lack of information on STDs in many regions. Recently there has been an increase in publications on STD prevalence in developing countries in Africa, Asia, Latin America and the Caribbean. Using this information, and information from other sources such as official STD prevalence estimates from industrialized countries and WHO archival information from country-specific reports, prevalence rates of gonorrhoea, chlamydial infection, syphilis and trichomoniasis were estimated by sex and by (UN standard) region.

Regional adult prevalence for 1995 was calculated using mid-year population estimates of adults 15-49 years of age (Figure 2). Because of a lack of published and archival information on chancroid, no estimates of this disease using this methodology could be made. Likewise, estimates were not made for the viral STDs such as herpes, human papillomavirus and hepatitis B.
Estimated prevalence of curable STD* among adults, mid-1995

Global total: 250 million

* Gonorrhoea, chlamydial infection, syphilis and trichomoniasis

The next step was to estimate the duration of each infection by sex and by region. These estimates were based on the probability of a symptomatic or an asymptomatic person getting treatment for his/her STD. Regional adult STD incidence for 1995 was calculated by dividing the estimated prevalence by the estimated duration of each disease. The results are shown in Figure 3. Table 1 summarizes population, prevalence and incidence data by region.

Estimated new cases of curable STD* among adults, 1995

Global total: 333 million

* Gonorrhoea, chlamydial infection, syphilis and trichomoniasis
Global prevalence and incidence of selected curable STDs

Table 1: Estimated prevalence and annual incidence of curable STDs by region

<table>
<thead>
<tr>
<th>Region</th>
<th>Population 15-49 (millions)</th>
<th>Prevalence (millions)</th>
<th>Prevalence per 1000</th>
<th>Annual Incidence (millions)</th>
<th>Annual Incidence per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>153</td>
<td>8</td>
<td>52</td>
<td>14</td>
<td>91</td>
</tr>
<tr>
<td>Western Europe</td>
<td>211</td>
<td>10</td>
<td>45</td>
<td>16</td>
<td>77</td>
</tr>
<tr>
<td>Australasia</td>
<td>11</td>
<td>0.6</td>
<td>52</td>
<td>1</td>
<td>91</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>251</td>
<td>24</td>
<td>95</td>
<td>36</td>
<td>145</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>254</td>
<td>53</td>
<td>208</td>
<td>65</td>
<td>254</td>
</tr>
<tr>
<td>Northern Africa and Middle East</td>
<td>163</td>
<td>6.5</td>
<td>40</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>Eastern Europe and Central Asia</td>
<td>158</td>
<td>12</td>
<td>75</td>
<td>18</td>
<td>112</td>
</tr>
<tr>
<td>East Asia and Pacific</td>
<td>803</td>
<td>16</td>
<td>19</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>South and South East-Asia</td>
<td>943</td>
<td>120</td>
<td>128</td>
<td>150</td>
<td>160</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,946</strong></td>
<td><strong>250</strong></td>
<td><strong>85</strong></td>
<td><strong>333</strong></td>
<td><strong>113</strong></td>
</tr>
</tbody>
</table>

A more complete description of the methodology used to estimate STD prevalence and incidence is available upon request from the WHO Global Programme on AIDS.

Syphilis estimates, 1995

During 1995 it is estimated that there will be approximately 12 million new cases of syphilis among adults worldwide, with the greatest number of cases occurring in South and South-East Asia followed by sub-Saharan Africa (Figure 4).

Figure 4

*Estimated new cases of syphilis among adults, 1995*

Global total: 12 million
Facts about syphilis

Syphilis was first described in the sixteenth century. In industrialized countries syphilis apparently declined during the latter half of the nineteenth century. In these same countries, however, there was a sharp rise in incidence after the First World War, but following the Second World War the incidence fell rapidly, coinciding with the availability of improved diagnostic tests and antibiotics. In some industrialized countries syphilis began to rise again in the 1960s and has been increasing steadily in some industrialized and developing countries since then.

Syphilis is the classic example of an STD which can be successfully controlled by public health measures: a simple-to-use and highly sensitive diagnostic test is available, as is a highly effective antibiotic to which resistance has not developed. If untreated, however, syphilis may lead to nerve damage, arterial wall damage, and mental disorientation, and eventually to death.

Treponema pallidum, the causative agent of syphilis, can cross the placental barrier and infect the fetus. There is evidence that in approximately two-thirds of pregnancies, infection spreads across the placental barrier, and that many of these pregnancies end in spontaneous abortion, stillbirth, or perinatal death. Congenital defects may occur in those fetuses which go to term and are delivered. In a study in Ethiopia, for example, pregnant women with a positive serological test for syphilis were shown to have a five times greater chance of having a spontaneous abortion or stillbirth than those who were serologically negative; while in Zambia, 24% of stillbirths could be attributed to syphilis, and congenital syphilis was implicated in 30% of all perinatal infant mortality.

It is generally observed that the incidence of syphilis, as reported by the number of cases treated each year, is highest among the 15-30-year-old group and those persons with the greatest sexual activity, and that incidence decreases with age. Based on reports of new cases of syphilis treated in Chile in 1993, for example, the highest incidence was among 20-24-year-olds, followed by those 25-29 years of age; 15-24-year-olds represented 40% of all cases (Figure 5).

Figure 5

Incidence of syphilis in Chile, by age group, 1993
Gonorrhoea estimates, 1995

During 1995 it is estimated that there will be approximately 62 million new cases of gonorrhoea among adults worldwide, with the greatest number in South and South-East Asia followed, as for syphilis, by sub-Saharan Africa (Figure 6).

Figure 6

Estimated new cases of gonorrhoea among adults, 1995

Facts about gonorrhoea

Gonorrhoea is a common adult disease, though a significant proportion of those with infection (up to 80% among women, 10% among men) are asymptomatic, i.e., they do not have symptoms and therefore they are neither aware of the need for treatment nor of the risk of transmitting the disease to others.

Infected men usually have symptoms and seek treatment spontaneously. Women frequently have only minor symptoms or are asymptomatic, so detection of infection depends mainly on screening by culture, which is costly and requires relatively sophisticated facilities. Few countries operate regular screening programmes and therefore gonorrhoea reporting seldom reflects true levels of infection. Coinfection with chlamydia is very common and treatment with antibiotics is simple and highly effective.

WHO estimates that by successfully treating 100 women for gonorrhoea, among whom one-quarter are pregnant, 25 would be prevented from developing pelvic inflammatory disease and 7 of their newborns would be spared from ophthalmia neonatorum, an eye infection acquired during passage through the birth canal which, if untreated, can result in blindness (Table 2). Serious sequelae such as ectopic pregnancy, chronic pelvic pain and infertility could also be averted by treatment of these women.
Table 2:

Morbidity prevented by treating 100 women
(25% pregnant) for gonorrhoea

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of cases averted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvic inflamatory disease</td>
<td>25</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>1</td>
</tr>
<tr>
<td>Infertility</td>
<td>6</td>
</tr>
<tr>
<td>Ophthalmia neonatorum</td>
<td>7</td>
</tr>
</tbody>
</table>

The complications and sequelae of gonococcal infection have been clearly demonstrated in reports from Cameroon in the mid-1980s, when up to 30% of newborns to women infected with gonorrhoea at the time of delivery developed ophthalmia neonatorum, leading to an overall rate of ophthalmia neonatorum of 4% among all births (Figure 7). The lighter section of the map in Figure 8 shows the infertility belt in West and Central Africa, where up to 40% of women over the age of 45 years have been unable to conceive, due in large part to STD-induced infertility among young women, the potential of which is demonstrated by the 17% rate of gonococcal infection among women attending antenatal clinics in Cameroon in 1984.

Figure 7

Gonorrhoea, infertility and ophthalmia neonatorum in Africa
Global prevalence and incidence of selected curable STDs

Estimates of chlamydial infection, 1995

During 1995 it is estimated that there will be approximately 89 million new adult chlamydial infections worldwide, again with the greatest number in South and South-East Asia followed, as for syphilis and gonorrhoea, by sub-Saharan Africa (Figure 8).

Figure 8

Estimated new cases of chlamydial infections among adults, 1995

Facts about chlamydial infection

Chlamydial infection, like gonorrhoea, is a common adult disease which has asymptomatic rates in women similar to those for gonorrhoea, but higher rates of asymptomatic infection than gonorrhoea in men. Like gonorrhoea, chlamydia has serious sequelae such as pelvic inflammatory disease and infertility. Diagnosis of chlamydial infection is costly and those diagnostic tests which are most sensitive are not generally available in developing country laboratories. Even in industrialized countries laboratory testing is not available in all health facilities, and screening programmes in women at risk of infection are therefore not consistently conducted. As many infections are neither detected nor treated, prevalence rates are high.

Recently developed laboratory tests have, however, made screening programmes for chlamydial infection possible in some industrialized countries. Rates of infection among women attending family planning clinics from 1989 to 1993 in the United States of America, for example, have been shown to vary from 4.5% to 8.5% (Figure 9).

Figure 9

Global total: 89 million
Trichomoniasis estimates, 1995

During 1995 it is estimated that there will be approximately 170 million new cases of trichomoniasis among adults worldwide, with the greatest numbers in developing countries and higher prevalence and incidence rates than for any other STDs in both developing and industrialized countries (Figure 10).
**Facts about trichomoniasis**

Trichomoniasis is one of the most common STDs. It causes symptoms in approximately 50% of infected women. In men, infection is usually urethral and of short duration, but men easily transmit the parasite to women during the short period when they are infected. Diagnosis is made by a wet mount preparation of vaginal or urethral discharge using an ordinary light microscope, and can also be made by culture, a more costly and less widely available test.

There is little recently published information on trichomoniasis, and that which is available is mainly from studies in sub-Saharan Africa. Prospective studies in Malawi and in Zaire have shown an association of the disease with HIV seroconversion in women. These findings, along with its high prevalence worldwide, indicate the attention which must given to trichomoniasis, a disease for which diagnosis is simple and treatment effective.

Prevalence rates of trichomoniasis among African women attending antenatal clinics, range from 12% in Kenya to 47% in Botswana (Figure 11).

**Figure 11**

**Prevalence of trichomoniasis in pregnant women attending antenatal clinics, Africa, 1989-1993**

Prevalence studies of trichomoniasis among male and female secondary school students in Kenya (1991) and Nigeria (1993) ranged from a low of 1.3% in Kenya to a high of 24.7% in Nigeria.
WHO/GPA/STD/95.1

Chancroid

No estimates of chancroid were made using the methodology developed for syphilis, gonorrhoea, chlamydial infection and trichomoniasis. Poor understanding of the epidemiology and natural history of the disease and the absence of a good test make it difficult to undertake prevalence studies and to estimate prevalence and duration of infection.

An idea of the magnitude of the chancroid problem can, however, be provided based on the ratio of syphilis to chancroid in the previous WHO (Delphi) estimates for syphilis and chancroid, and the 1995 estimate for syphilis. Such a comparison suggests that there may be approximately 7 million new cases of chancroid during 1995. As more published data on chancroid becomes available these estimates will be refined.

Facts about chancroid

The genital ulcers produced by chancroid are a major risk factor for HIV transmission, and the incidence of chancroid varies greatly between countries and regions. For example in Swaziland and Kenya 44% (1979)\textsuperscript{19} and 62% (1980)\textsuperscript{20} respectively of genital ulcers were diagnosed as chancroid in STD clinics. In western Algeria chancroid is the most common STD observed and the primary cause of genital ulcer disease.\textsuperscript{21}

Studies among female commercial sex workers in Kenya in 1992 showed that 30% have evidence of having had chancroid infection, as compared to 2% of women attending antenatal clinics.\textsuperscript{22} In India in 1989, chancroid represented 26% of all reported STD. In Latin America and the Caribbean the prevalence of chancroid varies from region to region. In some areas, e.g. French Guyana and northern Brazil, it is reportedly a common cause of genital ulcers. In most industrialized countries chancroid has become rare. With the development of new tests, the diagnosis of chancroid will be easier and more information on its prevalence will become available.

Towards the twenty-first century

Though STDs remain a severe public health problem, especially in developing countries, progress is being made in their control in each region. For example, reported gonorrhoea in Sweden and Norway, each with over ten thousand reported cases of gonorrhoea in 1981, is now approaching zero (Figure 12).\textsuperscript{23,24}
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Figure 12

Reported cases of gonorrhoea, Norway and Sweden

In Costa Rica reported gonorrhoea for both men and women began a steady and sustained decline in 1982, and in Chile reported STDs began to decline in the mid-1980s (Figures 1325 and 1426).

Figure 13

Reported cases of gonorrhoea, by sex,
In Zimbabwe, reported STD in the capital city Harare began a sustained decline in 1991, and in Thailand, declines in reported STD began in 1990 and continue to the present (Figures 15\textsuperscript{27} and 16\textsuperscript{28}).
In other regions, however, such as Eastern Europe and Central Asia, the incidence of STDs is increasing. In Estonia, Latvia, Lithuania, and Russia, for example, reported gonorrhoea has increased since 1991. However, in neighbouring Poland, reported gonorrhoea has declined (Figure 17).
Examples of information on STDs contained in the WHO database

The figures and references which follow are all derived from information contained in the WHO STD database. The figures reflect the variety of sample sizes and of methodologies used to collect this information. As more standardized and refined information becomes available, the WHO estimates will become more accurate.

(1) Syphilis

Information gathered from studies in pregnant women provides a good idea of the prevalence of syphilis in the sexually active general population, and such data are readily available from antenatal syphilis screening programmes. In Latin American and Caribbean countries from which information is available, for example, syphilis prevalence among pregnant women ranged from 1.3% in Honduras to 6.3% in Paraguay in 1991 (Figure 18).34-36

Figure 18

Prevalence of syphilis (positive serological test), pregnant women, Latin America and the Caribbean, 1987-1991

In three countries of East Asia, the Pacific and South and South-East Asia for which data are available, prevalence rates of syphilis among pregnant women range from 0.6% in Korea (1986) to 14.2% in Fiji (1987) (Figure 19).37-39
Data showing syphilis prevalence in men representing the general population are scarce. Figure 20\textsuperscript{34, 40-42} shows results from studies carried out in males which also provide, though probably not as reliably as figures for pregnant women, an approximation of syphilis prevalence in the general population.

Figure 19
Prevalence of syphilis (positive serological test) in pregnant women, Fiji, Korea and Malaysia, 1987-1989

Figure 20
Prevalence of syphilis (positive serological test) in men, 1990-1992
In Figure 21 syphilis prevalence in men attending STD clinics for any reason and screened for syphilis is shown. In this group, in which the main complaint is not necessarily a genital ulcer, the syphilis prevalence is relatively high, reflecting the frequent association of syphilis with other STDs.

Figure 21

Prevalence of syphilis (positive serological test) in men attending STD Clinics, 1990-1992

Persons with certain occupations, such as long-distance truck driving and commercial sex work, appear to be at especially high risk of syphilis and other STD. African long-distance truck drivers, for example, have been reported to have prevalence rates of syphilis as high as 15%, placing them at high risk for HIV infection or, if they are already infected, increasing their risk of transmission to others (Figure 22). 13, 46-50

Figure 22

Prevalence of syphilis (positive serological test) syphilis in African truck drivers, 1989-1993
Likewise, commercial sex workers in North Africa and the Middle East have been reported to have high prevalence rates of syphilis: 47% in Somalia (1991), 46% in Djibouti (1994) and 23% in Sudan (1988) (Figure 23).51-53

![Figure 23](image)

Prevalence of syphilis (positive serological test) in sex workers, Djibouti, Somalia and Sudan, 1988-1994

(2) Gonorrhoea

Recent information from studies of pregnant women and family planning clinic attenders in Cameroon and three other sub-Saharan African countries suggests that gonorrhoea remains a priority health problem among women. During the period 1990-1993, for example, prevalence rates of symptomatic and asymptomatic gonorrhoea among women attending antenatal clinics in Cameroon was approximately 12%, and ranged from 3.8% in Côte d’Ivoire to 14% in Botswana (Figure 24).50,54-56

![Figure 24](image)

Prevalence of gonorrhoea in pregnant women and family planning attenders, sub-Saharan Africa, 1990-1992
Gonorrhoeal infection among pregnant women is a significant public health problem in South and South-East Asia and the Pacific, where rates in three countries during the 1980s ranged from less than 1% in Malaysia to 12% in Thailand (Figure 25).57-58

![Figure 25: Prevalence of gonorrhoea in pregnant women, South and South-East Asia and the Pacific, 1987-1992](image)

As for syphilis and the other STDs, rates of gonorrhoeal infection are often higher among certain occupational groups. In Kenya, for example, rates of gonorrhoea among female sex workers were shown to be high in 1984, and varied from 20% for sex workers who solicited upper class clients in hotels to 63% among those who solicited clients on the streets (Figure 26).59

![Figure 26: Gonorrhoea prevalence among sex workers, Kenya, 1984](image)
Global prevalence and incidence of selected curable STDs

(3)  **Chlamydia**

Rates of chlamydial infection in South and South-East Asia, Latin America and the Caribbean, and sub-Saharan Africa are likewise relatively high. Among young women in Thailand, for example, rates have been found to be approximately 3%, much higher than the rate of 0.1% for gonorrhoeal infection and 0.6% for positive syphilis serology, while rates among pregnant women in El Salvador (1991) have been shown to be as high as 44% and those in rural Botswana (1990) as high as 49% (Figure 27).  

**Figure 27**

Prevalence of chlamydial infection in women

![Graph showing prevalence of chlamydial infection in women in Botswana, El Salvador, and Thailand.](image)

Rates of chlamydial infection among commercial sex workers are also high in Asia, as shown in Nanjing Province, China, in 1993, where 21% of commercial sex workers were infected as compared to 10% of adults attending STD clinics, 3% of antenatal clinic attenders and 1% of sexually active men (Figure 28).
Screening in men using ELISA tests also reveals relatively high prevalence rates among different populations and regions, varying from 1% in Canada to 12% in Austria (Figure 29).\textsuperscript{11,61-69}

**Figure 29**

Prevalence of chlamydial infection in men, 1990-1994
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