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GLOBAL PREVALENCE AND INCIDENCE OF SELECTED CURABLE **SEXUALLY TRANSMITTED INFECTIONS** OVERVIEW AND ESTIMATES

WORLD HEALTH ORGANIZATION

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WORLD HEALTH ORGANIZATION
GENEVA
2001

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CONTENTS

Introduction 1

Background 5

Global Estimates 8

Chlamydia estimates, 1999 11

Gonorrhoea estimates, 1999 15

Syphilis estimates, 1999 21

Trichomoniasis estimates, 1999 27

Prevention 30

Antibiotic resistance 30

References 34

LIST OF BOXES

Box 1 Methodology 2

Box 2 Complications of STIs 7

Box 3 Basic facts about Chlamydia 11

Box 4 Basic facts about Gonorrhoea 16

Box 5 Basic facts about Syphilis 21

Box 6 Basic facts about trichomoniasis 27

Box 7 Prevention of STIs 30

LIST OF TABLES

Table 1 Estimated prevalence and annual incidence of curable STIs by region 9

Table 2 Estimated new cases of Chlamydial infections, 1995 and 1999 13

Table 3 Estimated new cases of gonorrhoea infections 1995 and 1999 19

Table 4 Estimated new cases of syphilis, 1995 and 1999 22

Table 5 Estimated new cases of trichomoniasis, 1995 and 1999 29

LIST OF FIGURES

Figure 1 Estimated new cases of selected curable STIs, 1999 1

Figure 2 Estimated new cases of curable STIs, 1999 8

Figure 3 Estimated prevalence of selected curable STIs, 1999 9

Figure 4 Estimated new cases of chlamydia infections, 1999 10

Figure 5 Chlamydia prevalence rates asymptomatic women in European countries, 1992-97 12

Figure 6 Chlamydia prevalence rates pregnant women, Africa 1990s 13

Figure 7 Estimated new cases of gonorrhoea infections, 1999 14

Fgure 8 Estimated gonorrhoea prevalence rates, Western Pacific, 1990s 17

Figure 9 Estimated new cases of syphilis infections, 1999 20

Figure 10 Syphilis prevalence rates in the Baltic countries, 1990-96 23

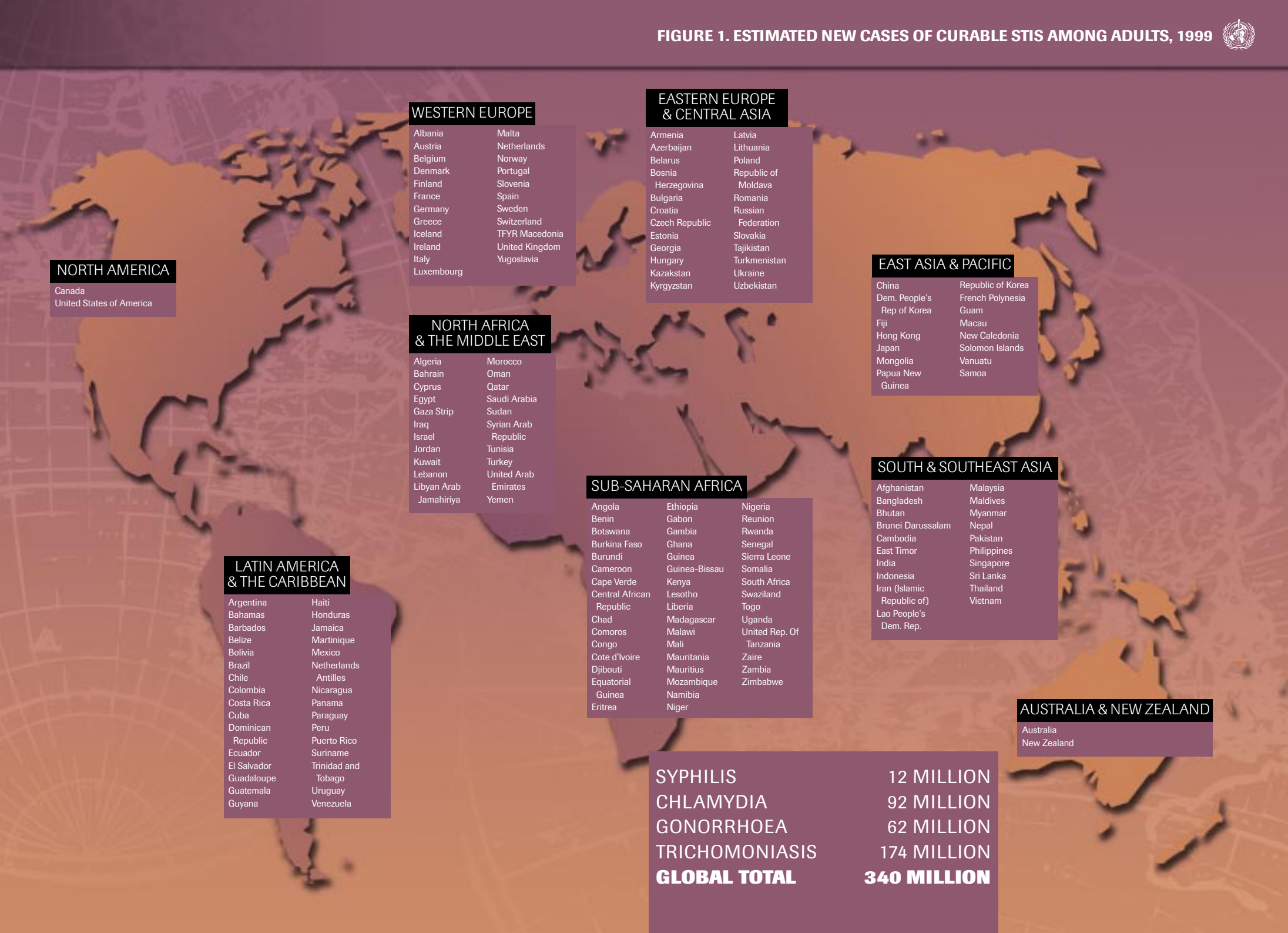
Figure 11 Syphilis prevalence rates in former Soviet Union countries, 1990-96 23

Figure 12 Syphilis prevalence rates, pregnant women in Africa, 1990s 25

Figure 13 Estimated new cases of trichomoniasis, 1999 26

Figure 14 Trichomoniasis prevalence rates pregnant women. Africa 1990s 28

FIGURE 1. ESTIMATED NEW CASES OF CURABLE STIS AMONG ADULTS, 1999



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Suriname
Trinidad and Tobago
Uruguay
Venezuela

AUSTRALIA & NEW ZEALAND

Australia
New Zealand

SYPHILIS	12 MILLION
CHLAMYDIA	92 MILLION
GONORRHOEA	62 MILLION
TRICHOMONIASIS	174 MILLION
GLOBAL TOTAL	**340 MILLION**

INTRODUCTION

Sexually transmitted infections (STIs) are a major global cause of acute illness, infertility, long term disability and death, with severe medical and psychological consequences for millions of men, women and infants.

WHO estimated that 340 million new cases of syphilis, gonorrhoea, chlamydia and trichomoniasis have occurred throughout the world in 1999 in men and women aged 15-49 years.

In 1990, WHO estimated that over 250 million new cases of STIs had occurred that year.[1] The estimation was based in a modified Delphi technique, which was chosen due the limited information on incidence and prevalence of STI available at that time from many regions including sub-Saharan Africa and some parts of Asia.

In 1995, using a revised methodology described below, the number of new cases of STIs was estimated to be 333 million.[2] The estimation for 1999 is made using the same methodology that in 1995. Data for the estimation were collected by searching published and unpublished information on prevalence and incidence, both in the literature and in the WHO country files for STIs.

The WHO estimates, although based on a comprehensive survey of the available information, are affected by the quantity and quality of prevalence and incidence data from the different regions, and our knowledge of the duration of infection.

Interpreting the data form prevalence studies and comparing results is further complicated by the

Box 1. Methodology

- **Collection and compilation of database of published and unpublished prevalence data.**
- **Regional prevalence estimates for gonorrhoea, chlamydia and syphilis was calculated using the median prevalence rate from all countries in the region and mid year UN population estimates for adults of 15-49 years of age.**
- **Regional prevalence estimates for trichomoniasis in women was calculated as being two times chlamydia prevalence. For men it was calculated as one tenth of the prevalence in women.**
- **Regional incidence estimates were calculated by dividing prevalence by the duration of disease.**
- **Estimates for duration of infection was made for symptomatic, asymptomatic, treated and untreated adjusted for sex and region.**

A more complete description of the methodology is available upon request from WHO.

nature of the populations studied. Few studies are community-based and the majority of data come from studies carried out in specific populations, such as STI or antenatal clinic attendees. Other limitations are the small samples sizes, the different diagnostic approaches and study designs used.

Data from epidemiological surveys show that within countries and between countries in the same region, the prevalence and incidence of STIs may vary widely, between urban and rural population, and even in similar population groups.

These differences reflect a variety of social, cultural, and economic factors, as illustrated by the HIV epidemic, and also differences in the access to appropriate treatment. In general, the prevalence of STIs tends to be higher in urban residents, in unmarried individuals, and in young adults. STIs tend to occur at a younger age in females than in males, which may be explained by differences in patterns of sexual activity and in the relative rates of transmission from one sex to the other.

At the population level, the spread of an STI depends upon the average number of new cases of infection generated by an infected person. This can be described in terms of the basic or case-reproduction ratio (Ro) which, for an STI,

depends upon the efficiency of transmission (b), the mean rate of sexual partners change (c) and the average duration of infectiousness (D), as expressed in the form

$$Ro = b * c * D$$

The higher the value of Ro the greater the potential for the spread of the infection

BACKGROUND

There are more than 20 pathogens that are transmissible through sexual intercourse. Many of them are curable by appropriate antimicrobial treatment. However, in spite of the availability of effective treatment, bacterial STIs are still a major public health concern in both industrialised and developing countries.

The exact magnitude of the STIs burden is frequently unknown. Although passive STIs surveillance systems exist in some countries, the data is not always reliable or complete. The quality and completeness of the available data and estimates depend on the quality of STIs services, the extent to which patients seek health care, the intensity of case finding and diagnosis and the quality of reporting.

The completeness is further affected by the STIs natural history, since a large number of infections are asymptomatic. Moreover, only part of the symptomatic population seeks health care and even a smaller number of cases are reported. The social stigma that usually is associated with STIs may result in people seeking care from alternative providers or not seeking care at all. As a result, report-based STI surveillance systems tend to underestimate substantially the total number of new cases.

Curable STIs are not only a concern due to the discomfort resulting from the acute infection. Both symptomatic and asymptomatic infections can lead to the development of serious complications with severe consequences for the individuals and for the community. The most serious complications and long term consequences of untreated STIs tend to be in women and new-born babies.

In developing countries, STIs and their complications are amongst the top five disease categories for which adults seek health care. In women of childbearing age, STIs (excluding HIV) are second only to maternal factors as causes of disease, death and healthy life lost[3].

Apart from being serious diseases in their own right, STIs enhance the sexual transmission of HIV infection. The presence of an untreated STD (ulcerative or non-ulcerative) can increase the risk of both acquisition and transmission of HIV by a factor of up to 10. Moreover, the improvement in the management of STIs can reduced the incidence of HIV-1 infection in the general population by about 40%[4] STIs prevention and treatment are, therefore, an important component in HIV prevention strategy.

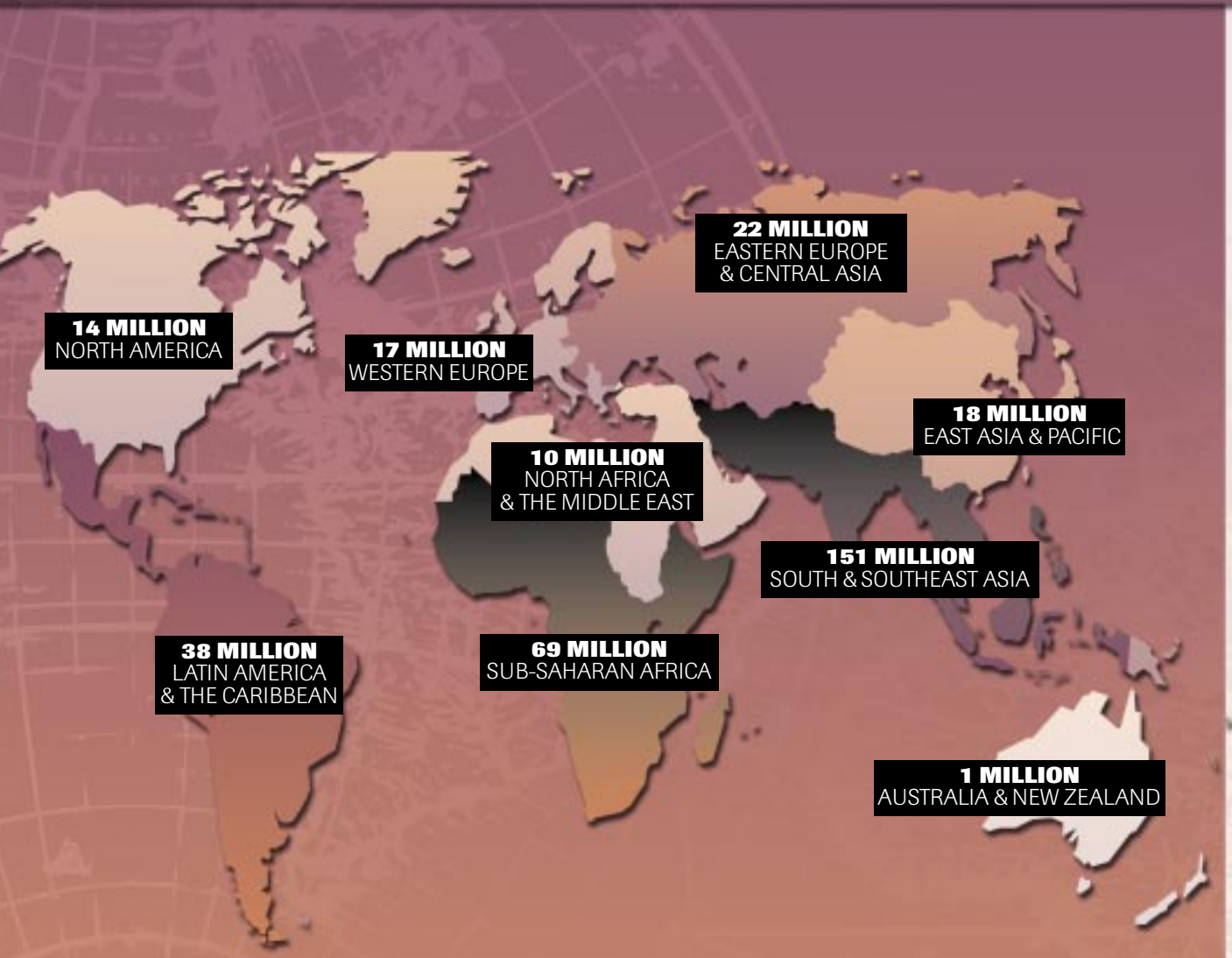
The highest rates of STIs are generally found in urban men and women in their sexually most active years, that is, between the ages of 15 and 35. On average, women become infected at a younger age than men.

Over and Piot[5] have shown the economic implication of early detection and treatment of STIs. They have estimated that the cure or prevention of 100 initial cases of gonorrhoea in the non-core groups prevents a total of 426 future cases of gonorrhoea in the next 10 years. If the 100 cases prevented are extracted from the core group, the number of cases averted rises to 4278.

Box 2. Complications of STIs

In adults	In children
Pelvic inflammatory disease	Congenital syphilis
Ectopic pregnancy	Pneumonia
Infertility	Prematurity, low birth weight
Cervical cancer	Blindness
Spontaneous abortion	Stillbirth

FIGURE 2. ESTIMATED NEW CASES OF CURABLE STI AMONG ADULTS, 1999



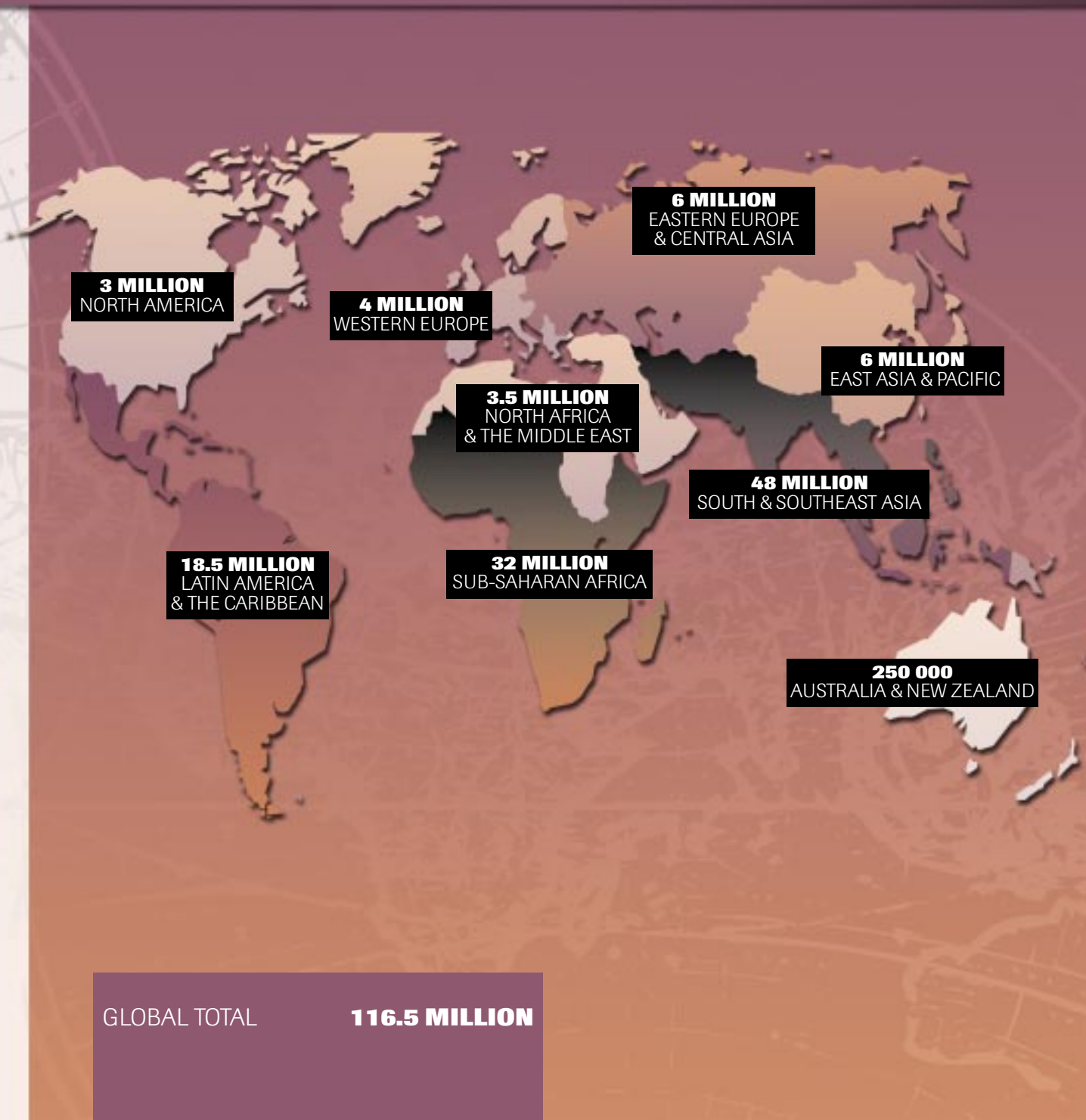
GLOBAL ESTIMATES

WHO estimates that 340 million new cases of STIs have occurred worldwide in 1999. The largest number of new infections occurred in the region of South and Southeast Asia, followed by sub-Saharan Africa and Latin America and the Caribbean. However, the highest rate of new cases per 1000 population has occurred in sub Saharan Africa.

Table 1. Estimated prevalence and annual incidence of curable STIs by region

Region	Population 15-49 (million)	Prevalence (million)	Prevalence per/1000	Annual Incidence (million)
North America	156	3	19	14
Western Europe	203	4	20	17
North Africa & Middle East	165	3.5	21	10
Eastern Europe & Central Asia	205	6	29	22
Sub Saharan Africa	269	32	119	69
South & South East Asia	955	48	50	151
East Asia & Pacifiic	815	6	7	18
Australia & New Zealand	11	0.3	27	1
Latin America & Caribbean	260	18.5	71	38
Total	**3040**	**116.5**		**340**

FIGURE 3. ESTIMATED PREVALENCE OF CURABLE STI AMONG ADULTS, 1999



CHLAMYDIA

Chlamydia is a common cause of pelvic inflammatory disease with subsequent risk for infertility. The higher prevalence of chlamydia observed amongst female adolescents (24.1%-27%),[6,7] and the association with young age[8] highlight the important role that screening of sexually active female play in the prevention of infertility.

In 1996 genital chlamydial infection was the most commonly reported notifiable infectious disease in the United States with an annual point estimates of approximately 3 million cases[9],

Box 3. Basic facts about Chlamydia

- **70–75% of women infected with Chlamydia trachomatis are symptom free. Even in men, the rate of asymptomatic chlamydia infection is higher than the rate of asymptomatic gonorrhoea infection.**
- **Clinical manifestations: mucosal inflammation of the urogenital tract, throat or rectum in both males and females. Neonatal eye infection and pneumonia.**
- **Complications: in women, pelvis sepsis leading to abscess formation, chronic and recurrent pelvic inflammatory disease, ectopic pregnancy, infertility and chronic pelvic pain. In men, chronic genital tract infection, possibly resulting in infertility. In children, pneumonia and eye infection.**
- **Diagnosis: Requires sophisticated equipment, is costly and not always available in developing country laboratories.**

FIGURE 4. ESTIMATED NEW CASES OF CHLAMYDIAL INFECTIONS AMONG ADULTS, 1999

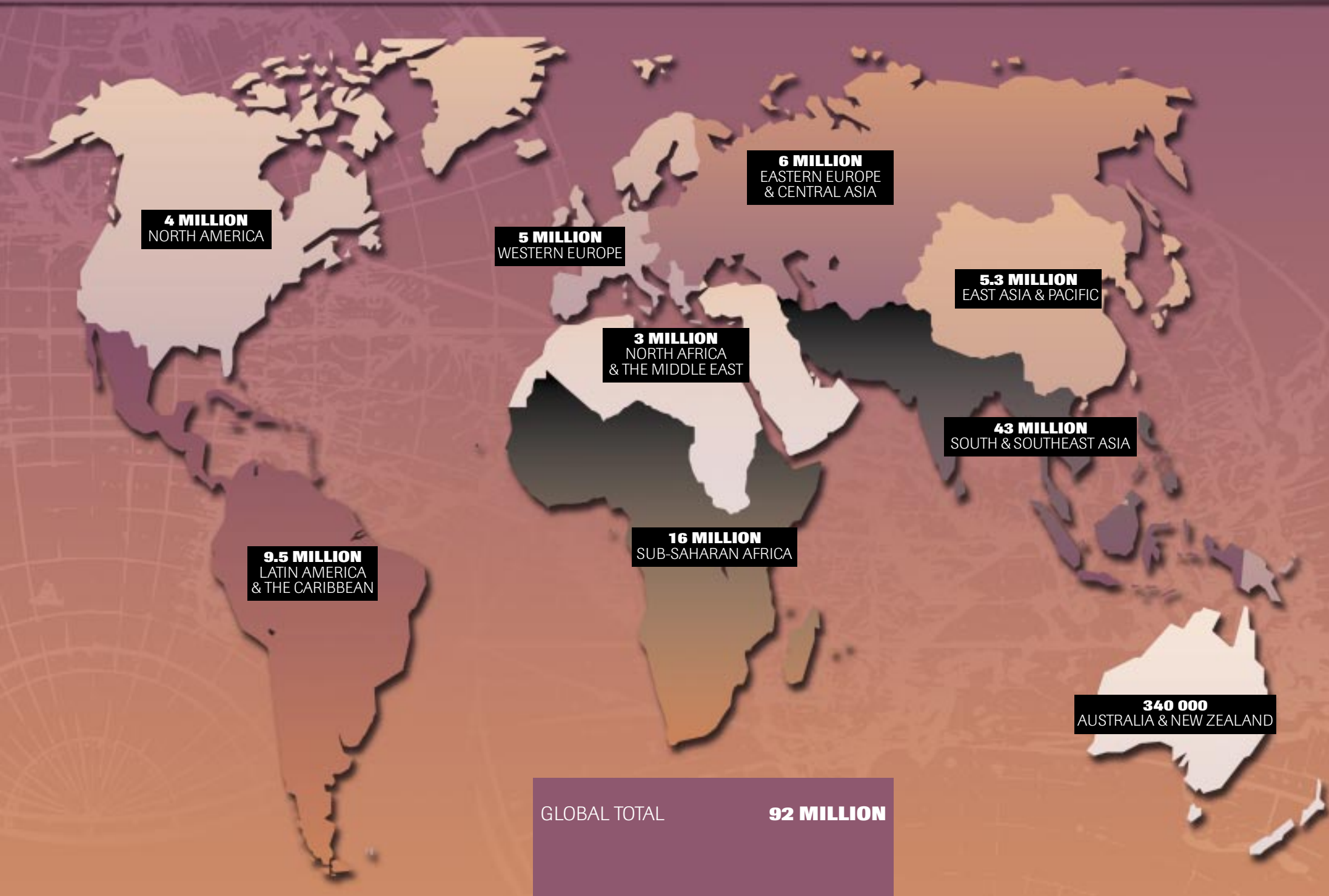
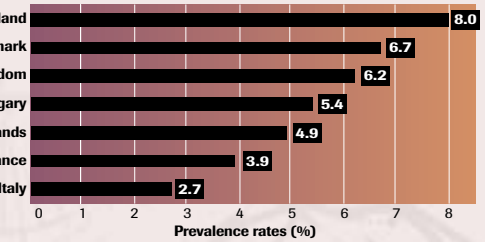


Figure 5. Chlamydia prevalence rates (%) amongst asymptomatic women in European countries, 1990s

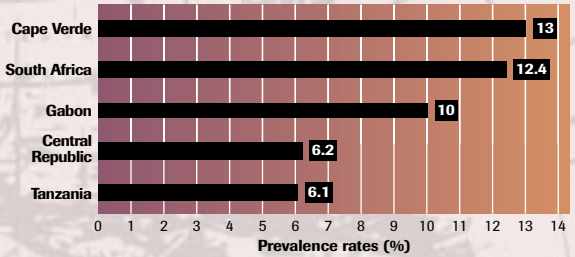


In Western Pacific, studies amongst pregnant women have shown a prevalence rate that ranges from of 5.7% in Thailand[10] up to 17% in India[11]. One study in a rural population in Papua New Guinea showed a prevalence rate of 26%[12].

In Australia, number of STI notified in 1998 was higher than in 1997. Chlamydia infection was the most common STI notified and the third highest for all notifiable diseases.[13]

In Europe, prevalence of chlamydia infection amongst pregnant women ranges from 2.7% in Italy to 8% in Iceland, with low prevalence and incidence rates in the Nordic countries, following a wide scale screening programmes in the 1970s (Figure 5).[14, 15, 16, 17, 18, 29, 20]

Figure 6. Chlamydia prevalence rates (%) pregnant women in African countries, 1990s



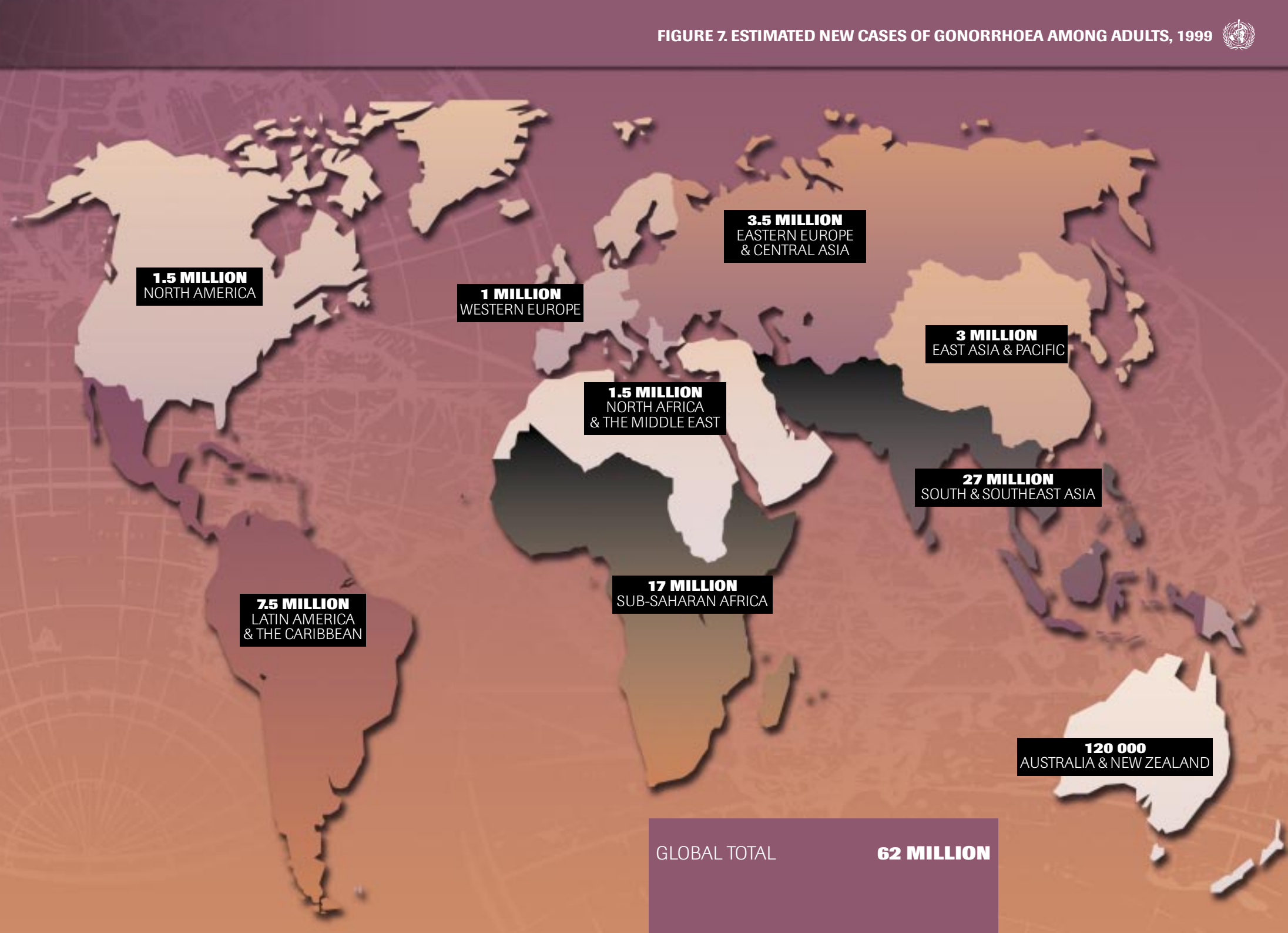
Prevalence studies from Latin America and Caribbean, show rates from 1.9% amongst teenager in Chile[21], 2.1% amongst pregnant women in Brazil[22], and 12.2% amongst attendees to family planning clinics in Jamaica.[23]

In Africa, studies amongst pregnant women have revealed a prevalence rate from about 6% in Tanzania to 13% in Cape Verde, (Figure 6).[24, 25, 26, 27, 28]

Table 2. Estimated new cases of chlamydial infections (in million) among adults, 1995 and 1999

	1995			1999		
Region	**Female**	**Male**	**Total**	**Female**	**Male**	**Total**
North America	2.34	1.64	**3.99**	2.16	1.77	**3.93**
Western Europe	3.20	2.30	**5.50**	2.94	2.28	**5.22**
North Africa & Middle East	1.28	1.67	**2.95**	1.44	1.71	**3.15**
Eastern Europe & Central Asia	2.92	2.15	**5.07**	3.25	2.72	**5.97**
Sub Saharan Africa	8.44	6.96	**15.40**	8.24	7.65	**15.89**
South & South East Asia	20.28	20.20	**40.48**	23.96	18.93	**42.89**
East Asia & Pacific	2.63	2.70	**5.33**	2.74	2.56	**5.30**
Australia & New Zealand	0.17	0.12	**0.30**	0.17	0.14	**0.30**
Latin America & Caribbean	5.12	5.01	**10.13**	5.12	4.19	**9.31**
Total	**46.38**	**42.77**	**89.15**	**50.03**	**41.95**	**91.98**

FIGURE 7. ESTIMATED NEW CASES OF GONORRHOEA AMONG ADULTS, 1999



GONORRHOEA

In Western Europe, a significant decline of incidence of gonorrhoea has been observed during the years 1980-91 down to below 20 per 100 000 for gonorrhoea.[29]

However, since mid 1990s, an increase in cases of gonorrhoea has been observed in England and Wales, with a 35% increase in male cases and a 32% rise in female cases between 1995-97.[30] Significant increases in diagnoses of uncomplicated gonorrhoea were seen in most age groups between 1995 and 1998, with the largest average annual increases in the 16 to 19 years old of both sexes, and those over 34 years of age.[31]

In Sweden, trends in the incidence of gonorrhoea showed a steady decline with a incidence of 2.4 per 100 000 inhabitants in 1996. However, in 1997 the number of new cases was 17% higher than in 1996, which represents the first increase since 1976. The upward trend has persisted in 1998. The ratio male: female has been unchanged since 1995, with 80% of cases amongst male.[32]

In USA, between 1981 and 1996 the incidence of reported gonorrhoea decreased 71.3%, from 431.5 to 124.0 cases per 100 000. Rates amongst blacks were 35% times higher than among whites

in 1996, compare with 11 times higher in 1981. Among women the highest rates was observed in the 15-19 years old group and in men in the 20 to 24 year olds.[33]

An important increased in gonorrhoea rates has been seen in Eastern Europe, in the newly independent states of the former soviet union, with the highest rate in Estonia, Russia and Belarus (111, 139 and 125 per 100 000 respectively).

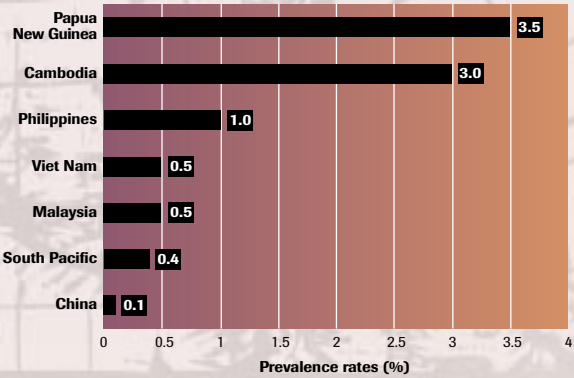
In the Baltic countries, the average age of patients suffering from STI is decreasing as shown in a study looking the epidemiological situation in the Baltic countries for the period 1990-94.[34]

Box 4. Basic facts about Gonorrhoea

Gonorrhoea is a common STIs, although up to 80% of women and 10% of men are asymtomatic.

- **Clinical manifestations: inflammation of the mucous membranes of the urogenital tract, throat or rectum. Neonatal eye infection**
- **Complications: In women, pelvic infection leading to infertility, ectopic pregnancy, chronic pelvic inflammatory disease, chronic pelvic pain in women. In men, urethral strictures. In both sex, septicaemia, arthritis, endocarditis and meningitis. In new-born infant, eye infection can lead to blindness.**
- **Diagnosis: Needs sophisticated equipment, is costly and not always available in developing country laboratories.**

Figure 8. Estimated gonorrhoea prevalence rate (%) in adults over 15 years of age, 1990s



In the Western Pacific the highest estimated prevalence rates for gonorrhoea (3% or greater) are found in Cambodia and Papua New Guinea In other countries, estimated rates are below 1%[35] (Figure 8).

In Australia, notification of gonoccocal infection doubled since 1991.[36]

In Africa, prevalence rates of gonorrhoea have shown rates amongst pregnant women as low as 0.02 in Gabon[37], 3.1% in Central African Republic[38] and 7.8% in South Africa.[39]

Studies conducted amongst patients with urethral/vaginal discharge or dysuria showed a prevalence rate for gonorrhoea of 5.7% in Benin[40], 8.4% in Tanzania[41] and 17.1% in Malawi.[42]

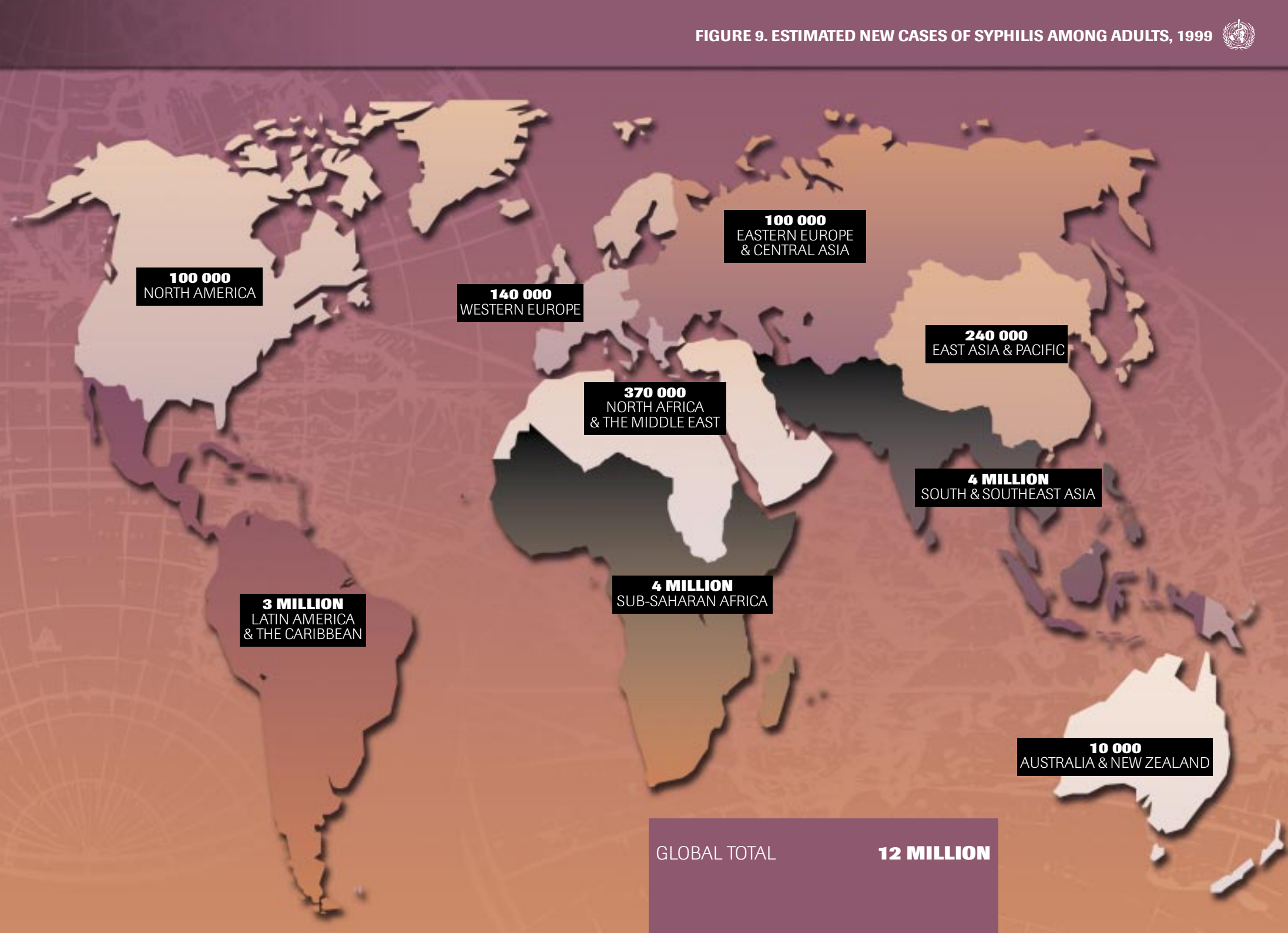
Amongst symptomatic patients, the prevalence rate for gonorrhoea in African countries have ranged from 5.7% in Benin to 17.1 in Malawi

In children, untreated gonococcal ophthalmia can cause blindness. According to historical data, around 3% of new-borns with gonococcal ophthalmia will develop complete blindness if untreated, and 20% will have corneal damage of some degree.

Table 3. Estimated new cases of gonorrhoea infections (in million) in adults, 1995 and 1999

	1995			1999		
Region	**Female**	**Male**	**Total**	**Female**	**Male**	**Total**
North America	0.92	0.83	**1.75**	0.84	0.72	**1.56**
Western Europe	0.63	0.60	**1.23**	0.63	0.49	**1.11**
North Africa & Middle East	0.77	0.77	**1.54**	0.68	0.79	**1.47**
Eastern Europe & Central Asia	1.16	1.17	**2.32**	1.81	1.50	**3.31**
Sub Saharan Africa	8.38	7.30	**15.67**	8.84	8.19	**17.03**
South & South East Asia	14.55	14.56	**29.11**	15.09	12.12	**27.20**
East Asia & Pacifii	1.47	1.80	**3.27**	1.68	1.59	**3.27**
Australia & New Zealand	0.07	0.06	**0.13**	0.06	0.06	**0.12**
Latin America & Caribbean	3.67	3.045	**7.12**	4.01	3.26	**7.27**
Total	**31.61**	**30.54**	**62.15**	**33.65**	**28.70**	**62.35**

FIGURE 9. ESTIMATED NEW CASES OF SYPHILIS AMONG ADULTS, 1999



SYPHILIS

In Western Europe, syphilis prevalence has declined substantially since the peak after the second World War, with incidence rates below 5 per 100 000 in the majority of countries.[42, 43, 44]

In the USA, trends of congenital syphilis began to decline in 1992 after an increase that follow a national syphilis epidemic in 1980s and early 1990s. Rates of congenital syphilis declined from

Box 5. Basic facts about Syphilis

Syphilis is the classic example of a STI that can be successfully controlled by public health measures due to the availability of a highly sensitive diagnostic test and a highly effective and affordable treatment.

Clinical manifestations: ulceration of the uro-genital tract, mouth or rectum, If untreated, this is followed by a more generalised infection which is usually characterised by disseminated muco-cutaneous lesions. There may be fever and general malaise, as well as hair loss and mild hepatitis.

Complications: pregnancy wastage (abortion, premature delivery, and stillbirth) neonatal or congenital syphilis that occurs in about a third of new-born babies of women with untreated syphilis. Disorders of the musculo-skeletal, cardiovascular and nervous systems in the final stage of the disease (tertiary syphilis)

Diagnosis: Screening test is simple and relatively cheap but not always available in developing country laboratories.

78.2 in 1992 to 20.6 per 100 000 live births in 1998, with high rate in the south-eastern United States and among minority racial/ethnic populations. The trend observed is parallel with the trend for primary and secondary syphilis.[46]

In contrast with the decline in rates observed in Western Europe, since 1989 there has been an alarming increased of the rates in the newly independent states of the former Soviet Union. Syphilis incidence has increased from 5-15 per 100 000 observed in 1990 to as high as 120-170 per 100 000 of population in 1996[47] (Figure 10 and 11).[48]

Table 4. Estimated new cases of syphilis (in million) amongst adults, 1995 and 1999

	1995			1999		
Region	**Female**	**Male**	**Total**	**Female**	**Male**	**Total**
North America	0.07	0.07	**0.14**	0.054	0.053	**0.107**
Western Europe	0.10	0.10	**0.20**	0.069	0.066	**0.136**
North Africa & Middle East	0.28	0.33	**0.62**	0.167	0.197	**0.364**
Eastern Europe & Central Asia	0.05	0.05	**0.10**	0.053	0.052	**0.105**
Sub-Saharan Africa	1.56	1.97	**3.53**	1.683	2.144	**3.828**
South & South East Asia	2.66	3.13	**5.79**	1.851	2.187	**4.038**
East Asia & Pacifii	0.26	0.30	**0.56**	0.112	0.132	**0.244**
Australasia	0.01	0.01	**0.01**	0.004	0.004	**0.008**
Latin America and Caribbean	0.56	0.70	**1.26**	1.294	1.634	**2.928**
Total	**5.55**	**6.67**	**12.22**	**5.29**	**6.47**	**11.76**

Figure 10. Syphilis prevalence rates (%) in Baltic countries, 1990–96

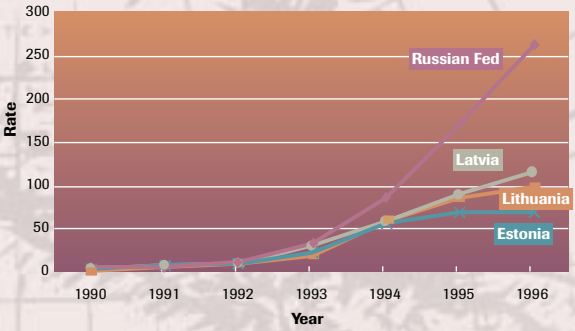
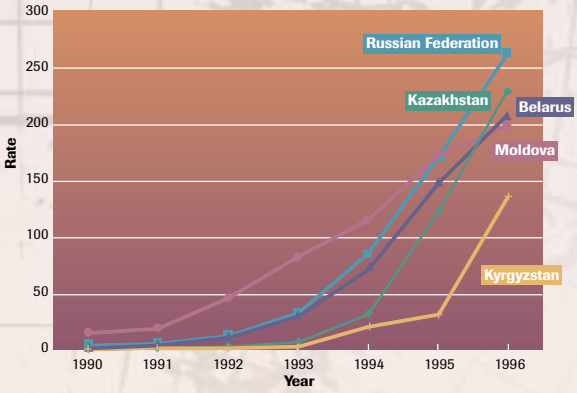


Figure 11. Syphilis prevalence rates (%) in former Soviet Union countries, 1990–96



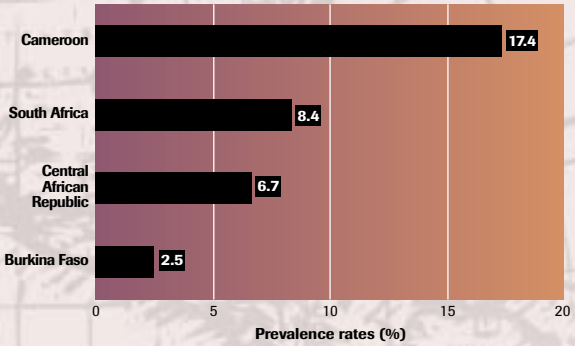
In the Western Pacific, relatively high syphilis prevalence rates are found in Cambodia (4%), Papua New Guinea (3.5%) and the South Pacific (8%).[49]

In Mongolia, syphilis rates showed a decreasing trend during 1983-93 from 70 to 18 cases per 100 000 population, followed by an increase to 32 cases per 100 000 in 1995, with a 1.5 – 3.0 fold higher rate amongst the 15-24 age group.[50]

In the eastern Mediterranean Region, in 1997, the highest syphilis prevalence rate amongst pregnant women was reported by Djibouti (3.1%), followed by Morocco (3.0%) and Sudan (2.4%). Amongst blood donors, the highest prevalence was seen in Morocco (1.3%), followed by Qatar (1.1%).[51]

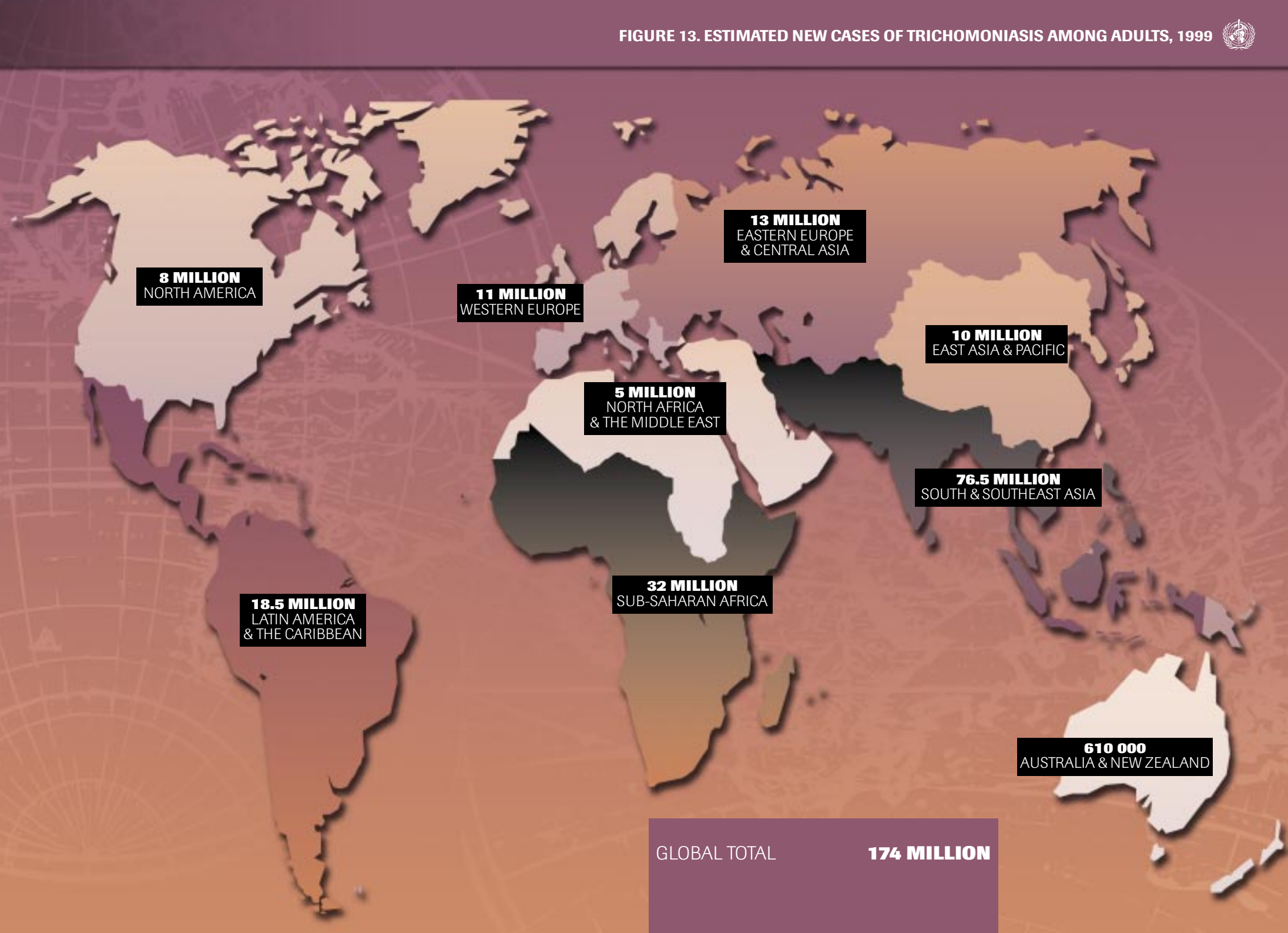
In Africa, syphilis prevalence rates amongst pregnant women varies from 2.5% in Burkina Faso to 17.4% in Cameroon (Figure 12).[52, 53, 54, 55]

Figure 12. Syphilis prevalence rates (%), pregnant women in Africa, 1990s



Prenatal screening and treatment of pregnant women for syphilis is cost-effective, even in areas of prevalence as low as 0.1%. In South Africa, peri-natal death was 19.4 times more likely if incomplete treatment or not treatment at all was received.[56]

FIGURE 13. ESTIMATED NEW CASES OF TRICHOMONIASIS AMONG ADULTS, 1999



TRICHOMONIASIS

In spite of the fact that trichomononiasis is the most common of STIs, data on prevalence and incidence are limited.

Vaginal trichomoniasis has been associated with increased HIV virus seroconversion in women[57]. Additionally, trichomoniasis is associated with adverse birth outcomes as premature delivery or rupture of the membranes and low birth weight.[58]

Recently, a study conducted in the Democratic Republic of Congo amongst HIV positive and negative pregnant women, show that trichomona vaginalis was isolated twice as often in HIV sero-positve women. In addition, trichomoniasis was associated with low birth weight in the group of HIV sero-negative women.[59]

Box 6. Basic facts about trichomoniasis

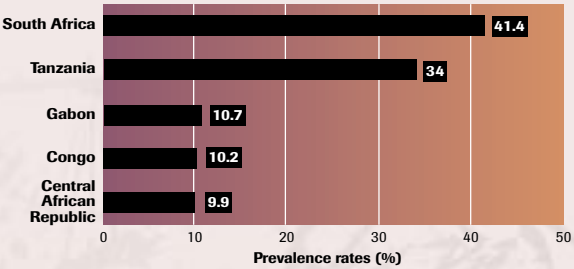
It is the most common STI worlwide. It causes symptoms in approximately 50% of infected women. In men, infection is usually urethral and of short duration, but men easily transmit the parasite to women during the short period when they are infected.

Clinical manifestations: vaginitis and occasionally male urethritis

Complications: trichomonas infections have no systemic complications but there is evidence that vaginal trichomonas infection facilitates the spread of HIV infection

Diagnosis: Test not always available in developing country laboratories

Figure 14. Trichomoniasis prevalence rate (%), pregnant women in African countries, 1990s



Trichomoniasis prevalence rates amongst pregnant women in Latin America and Caribbean in the 1990s ranges from 2.1% in Brazil[60], 3.6% in Barbados[61], 8% in Nicaragua[62] and 27,5% in Chile[63].

Prevalence studies amongst pregnant women in Africa show rates from 9.9% in Central African Republic to 41.4 in South Africa (Figure 14).[64, 65, 66, 67, 68]

Few prevalence studies have been conducted amongst men. Recently, a study in Malawi shows a prevalence of 20.8% with symptomatic men and 12.2% with asymptomatic[69]. Another study amongst male patients with urethral discharges in Egypt shows a prevalence rate of 28.8% and 8.2% with men suffering from impotence and infertility.[70]

Table 5. Estimated new cases of trichomoniasis (in million) among adults, 1995 and 1999

	1995			1999		
Region	**Female**	**Male**	**Total**	**Female**	**Male**	**Total**
North America	3.78	4.23	**8.01**	3.90	4.29	**8.18**
Western Europe	5.30	5.76	**11.06**	5.09	5.52	**10.62**
North Africa & Middle East	2.32	2.22	**4.54**	2.35	2.25	**4.60**
Eastern Europe & Central Asia	4.90	5.17	**10.07**	6.36	6.75	**13.11**
Sub-Saharan Africa	15.07	15.35	**30.42**	15.93	16.19	**32.12**
South & South East Asia	39.56	35.87	**75.43**	40.06	36.36	**76.42**
East Asia & Pacific	4.83	4.53	**9.36**	4.91	4.61	**9.51**
Australasia	0.29	0.32	**0.61**	0.29	0.32	**0.61**
Latin America & Caribbean	8.52	9.10	**17.62**	8.79	9.50	**18.30**
Total	**84.57**	**82.55**	**167.12**	**87.68**	**85.78**	**173.46**

PREVENTION OF STIs

The scale of the STI problem is to great to be dealt with in specialised STD centres alone, and steps must be taken to expand and integrate STI management in primary health and other health facilities.

The objectives of STI prevention and care are to reduce the prevalence of STI by interrupting their transmission, reducing the duration of infection and preventing the development of complications in those infected.

Box 7. Prevention of STIs

Primary prevention

- Health education and promotion of safer sex and risk reduction
- Information campaigns on the association between HIV and other STIs
- Promotion of condoms

Secondary prevention

Aim to reduce the prevalence by shortening the duration of disease by:

- Promotion of early health care seeking behaviour
- Accessible, effective and acceptable care
- Education and counselling
- Early detection and treatment of asymptomatic infections through case finding and screening

NEISSERIA GONORRHOEA AND ANTIBIOTIC RESISTANCE

Genital tract gonorrhoea can be treated successfully by single dose therapy if the causative organism is susceptible to the antibiotic used. The capacity of Neisseria gonorrhoea to develop resistance is, however, one barrier to the use of effective treatment, so that treatment regimens must be tailored to the prevalence of antimicrobial resistance in each country.

Worldwide the major trends in antimicrobial resistance are related to the penicillin and quinolones. There are areas with high proportion of high-level resistance to tetracycline, an antibiotic frequently used in developing country, even if a not recommended therapy for gonorrhoea. There have been sporadic reports of isolates resistant to spectinomicin as well as of decreasing susceptibility to third generation cephalosporins.

The data collected during seven-year from the regional surveillance programme in Western Pacific WHO Region (GASP), even if with significant interregional differences, show that the proportion of quinolone-resistant gonococci is in a continuing trend in 11 of 13 countries in which quinolone resistance was assessed. The increase in resistance

has been substantial in some countries: in Hong Kong a rise from 3.3% in 1994 to 49% in 1998, in Singapore from 0.3% in 1993 to 7% and in Australia from < 0.1% 0in 1993 to 5.6% in 1997. The widespread resistance of gonococcus to penicillin, still remains at high level, while the percentage of isolate high-resistant to tetracycline is particularly elevated (70%) in Singapore and Solomon Islands[71].

Significant increasing trend of ciprofloxacin resistance was also found in India and Japan, where a low level of penicillin resistance was detected.[72, 73]

In the USA the gonococcal isolate surveillance programme (GISP) report for 1997 recorded, overall, the presence of 33.4% of strains resistant to the penicillin, tetracycline, or both. Resistance to fluoroquinolones, one of the currently recommended treatments for gonorrhoea, is rare with the exception of Ohio State in which decreased susceptibility persists at 16%.[74] A higher prevalence in penicillin and tetracycline was noted in south American countries and Caribbean with low level of quinolone resistance.

The data from national surveillance programmes in Western Europe indicate a decreased prevalence of penicillin resistant gonococci in the last years (31%

in Sweden, 8% in Netherlands, 13% France, 19% Denmark, 6% Finland, 0.8% Scotland). In contrast the number of fluoroquinolone resistant gonococci is increasing: ciprofloxacin resistance was detected in 3.2% of strains in Netherlands, 3% in France, 9% in Denmark, 1% in Finland, 0.8% in Scotland. Tetracycline resistance was observed in a high proportion of strains. Resistant gonococcal strains are often isolated from imported case.[75, 76, 77, 78, 79, 80]

Studies from a number of African countries on small samples indicate that penicillin resistance is broadly diffused among isolates; data on fluoroquinolone resistance are scantly, because of the inconstant use of these drugs. The majority of isolates exhibit resistance to tetracycline including high-level resistance.[81]

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