

HIV / AIDS

Kolářová M., EPI
Autumn 2017

HIV disease continues to be a serious health issue for parts of the world.

Worldwide, there were **about 2.1 million new cases of HIV in 2015**.

About **36.7 million people are living** with HIV around the world, and as of June 2016, 17 million people living with HIV were receiving medicines to treat HIV, called antiretroviral therapy (ART).

An estimated **1.1 million people died** from AIDS-related illnesses in 2015.

Sub-Saharan Africa, which bears the heaviest burden of HIV/AIDS worldwide, accounts for **65% of all new HIV** infections.

Other regions significantly affected by HIV/AIDS include Asia and the Pacific, Latin America and the Caribbean, and Eastern Europe and Central Asia.

Fosfolipid membrane

gp120 surface glykoprotein

gp 41 transmembrane glykoprotein

p 17M protein - matrix

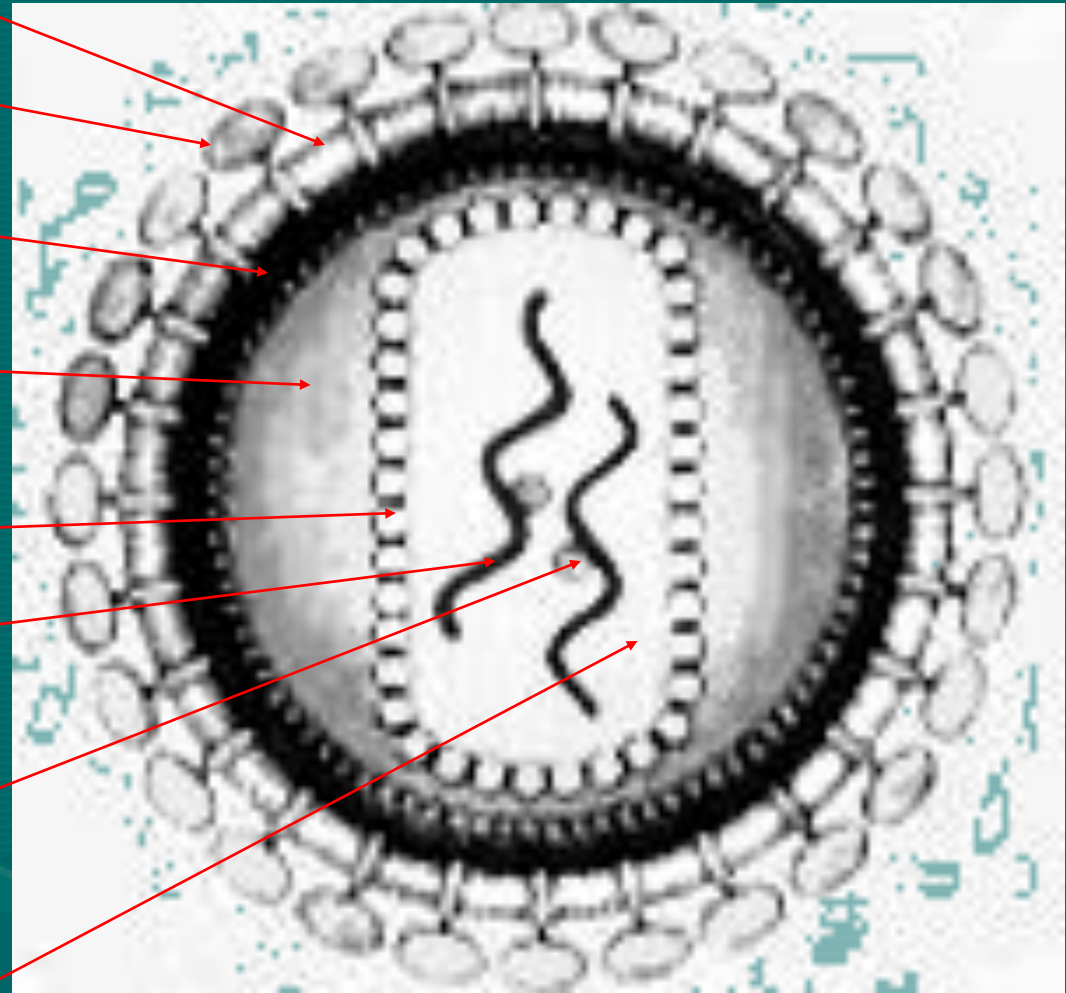
p 24 protein – nucleocapsid core

RNA genome

reverzní transkriptáza

p 7, p 9

proteiny on the nucleic acide



HIV/AIDS

Etiology:

HIV - Human Immunodeficiency Virus is classed with the **Retroviridae family, Lentivirus genus**. HIV occurs in two types: HIV - 1 and HIV - 2. Both types have similar epidemiological features, but different serological response and geographic distribution. .

The source of infection

Only infected people are the sources of infection, in either the sick with manifestations of AIDS or a latent infection, (ARC - AIDS-Related Complex, PGL - Persistent Generalised Lymphadenopathy) or a symptomless carrier.

Route of transmission

Blood - borne By blood derivatives and HIV- contaminated blood.

Use of **contaminated** needles and syringes in drug administration.

Sexually-transmitted, when injury of the mucosa and bleeding occur.

Sexually transmitted Through sperma, vaginal secrets in homo and heterosexual intercourse.

From mother to child (15 to 30 %) Vertical transmission - prenatally, perinatally or possibly through the mother's milk.

Susceptibility

General.

Preventive measures:

Health education promoting a responsible approach to sex - use of condoms.

- To prevent contamination of blood tins and derivatives.
- Supporting the programme of taking/giving needles and syringes from/to intravenous drug addicts.

Virus classification

Group: Group VI (ssRNART)

Family: *Retroviridae*

Genus: *Lentivirus*

Species: *Human immunodeficiency virus 1*

Species: *Human immunodeficiency virus 2*

Diagram of HIV is different in structure from other retroviruses.

It is about 120 nm in diameter (120 billionths of a meter; around 60 times smaller than a red blood cell) and roughly spherical.

HIV primarily infects vital cells in the human immune system such as helper T cells (specifically CD4+ T cells), macrophages and dendritic cells.

HIV infection leads to low levels of CD4+ T cells through three main mechanisms:

- **firstly**, direct viral killing of infected cells;
- **secondly**, increased rates of apoptosis in infected cells;
- **and thirdly**, killing of infected CD4+ T cells by CD8 cytotoxic lymphocytes that recognize infected cells.

When CD4+ T cell numbers decline below a critical level, cell-mediated immunity is lost, and the body becomes progressively more susceptible to opportunistic infections.

The AIDS epidemic was discovered June 5, 1981, when the U.S. Centers for Disease Control and Prevention (CDC) reported a cluster of *Pneumocystis carinii pneumonia* (now classified as *Pneumocystis jiroveci pneumonia*) in five homosexual men in Los Angeles.

The disease was originally dubbed **GRID**, or Gay-Related Immune Deficiency, but health authorities soon realized that nearly half of the people identified with the syndrome were not homosexual men.

In 1982, the CDC introduced the term AIDS to describe the newly recognized syndrome, though it was still casually referred to as GRID.

In 1983, scientists led by Luc Montagnier at the Pasteur Institute in France first discovered the virus that causes AIDS. They called it lymphadenopathy-associated virus (LAV).

A year later a team led by Robert Gallo of the United States confirmed the discovery of the virus, but they renamed it human T lymphotropic virus type III (HTLV-III).

The dual discovery led to considerable scientific disagreement, and it was not until President Mitterrand of France and President Reagan of the USA met that the major issues were resolved.

In 1986, both the French and the U.S. names for the virus itself were dropped in favour of the new term, human immunodeficiency virus (HIV).

AIDS – Acquired ImmunoDeficiency Syndrome

SIDA – Syndrome d'ImmunoDeficiencie Acquise

SPID – Syndrom Priobretěného ImunoDeficita

HIV - Human Immunodeficiency Virus

- Three of the earliest known instances of HIV-1 infection are as follows:
- A plasma sample taken in 1959 from an adult male living in what is now the Democratic Republic of Congo.
- HIV found in tissue samples from a 15-year-old African-American teenager who died in St. Louis in 1969.
- HIV found in tissue samples from a Norwegian sailor who died around 1976.

- Although a variety of theories exist explaining the transfer of HIV to humans, no single hypothesis is unanimously accepted, and the topic remains controversial.
- The most widely accepted theory is so called 'Hunter' Theory according to which transference **from chimp to human most likely occurred when a human was bitten by a chimp or was cut while butchering one, and the human became infected.**

▪

In 2005 alone, AIDS claimed an estimated 2.4–3.3 million lives, of which more than 570,000 were children.

It is estimated that about 0.6% of the world's living population is infected with HIV.

A third of these deaths are occurring in sub-Saharan Africa, retarding economic growth and increasing poverty.

Subtypes:

HIV 1 - group "M" (major) – subtypes A, B, C, D, E, F, G, H, I, ...
(expected other)

Subtypes:

A – West and Middle Africa

B – Europe, North and sud America, Thailand

C – Sud Africa, Indie

D – Middle Africa

E – Middle Africa, Thailand, Indie

F – Brazillie, Romania, Zair

G – Middle Africa

H – Gabun, Zair

I – Africa

ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS) AND HUMAN IMMUNODEFICIENCY VIRUS (HIV) INFECTION

Clinical Criteria (AIDS)

- Any person who has any of the clinical conditions as defined in the European AIDS case definition for:
 - — Adults and adolescents ≥ 15 years
 - — Children < 15 years of age

Laboratory Criteria (HIV)

- — Adults, adolescents and children aged ≥ 18 months
- At least one of the following three:
 - — Positive result of a HIV screening antibody test or a combined screening test (HIV antibody and HIV p24 antigen) confirmed by a more specific antibody test (e.g. Western blot)
 - — Positive result of 2 EIA antibody test confirmed by a positive result of a further EIA test
 - — Positive results on two separate specimens from at least one of the following three:
 - — Detection of HIV nucleic acid (HIV-RNA, HIV-DNA)
 - — Demonstration of HIV by HIV p24 antigen test, including neutralisation assay

- — Isolation of HIV
- — Children aged < 18 months
- Positive results on two separate specimens (excluding cord blood) from at least one of the following three:
 - — Isolation of HIV
 - — Detection of HIV nucleic acid (HIV-RNA, HIV-DNA)
 - — Demonstration of HIV by HIV p24 antigen test, including neutralisation assay in a child ≥ 1 month of age

Epidemiological Criteria NA

Case Classification

- A. Possible case NA
- B. Probable case NA
- C. Confirmed case
 - — HIV infection
 - Any person meeting the laboratory criteria for HIV infection
 - — AIDS
 - Any person meeting the clinical criteria for AIDS and the laboratory criteria for HIV infection

Antiretroviral treatment reduces both the mortality and the morbidity of HIV infection, but routine access to antiretroviral medication is not available in all countries.

If untreated, eventually most HIV-infected individuals develop AIDS (Acquired Immunodeficiency Syndrome) and die; however about one in ten remain healthy for many years, with no noticeable symptoms.

- Since the beginning of the pandemic, three main transmission routes for HIV have been identified:
- Sexual route. The majority of HIV infections are acquired through unprotected sexual relations. Sexual transmission can occur when infected sexual secretions of one partner come into contact with the rectal, genital or oral mucous membranes of another.

Blood or blood product route. This transmission route can account for infections in intravenous drug users, hemophiliacs and recipients of blood transfusions (though most transfusions are checked for HIV in the developed world) and blood products. It is also of concern for persons receiving medical care in regions where there is prevalent substandard hygiene in the use of injection equipment, such as the reuse of needles in Third World countries. HIV can also be spread through the sharing of leaches.

Health care workers such as nurses, laboratory workers, and doctors, have also been infected, although this occurs more rarely.

People who give and receive tattoos, piercings and scarification procedures can also be at risk of infection.

Mother-to-child transmission (MTCT). The transmission of the virus from the mother to the child can occur in utero during the last weeks of pregnancy and at childbirth. In the absence of treatment, the transmission rate between the mother and child is 25%. However, where drug treatment and Caesarian section are available, this can be reduced to 1%. Breast feeding also presents a risk of infection for the baby.

- HIV-2 is transmitted much less frequently by the MTCT and sexual route than HIV-1.

HIV has been found at low concentrations in the:
saliva,
tears and
urine of infected individuals,
but there are no recorded cases of infection by
these secretions and the potential risk of
transmission is negligible.

The use of physical barriers such as the latex condom is widely advocated to reduce the sexual transmission of HIV.

Spermicide, when used alone or with vaginal contraceptives like a diaphragm, actually increases the male to female transmission rate due to inflammation of the vagina;

it should not be considered a barrier to infection.

HIV does not survive long outside the human body (such as on surfaces), and it cannot reproduce outside a human host.

It is not spread by:

- Mosquitoes, ticks, or other insects.
- Saliva, tears, or sweat that is not mixed with the blood of an HIV-positive person.
- Hugging, shaking hands, sharing toilets, sharing dishes, or closed-mouth or “social” kissing with someone who is HIV-positive.
- Other sexual activities that don’t involve the exchange of body fluids (for example, touching).

- **The chance that an HIV-negative person will get HIV from oral sex with an HIV-positive partner is extremely low.**
- Oral sex involves putting the mouth on the penis (fellatio), vagina (cunnilingus), or anus (anilingus). In general, there's little to no risk of getting or transmitting HIV through oral sex.
- Factors that may increase the risk of transmitting HIV through oral sex are ejaculation in the mouth with oral ulcers, bleeding gums, genital sores, and the presence of other sexually transmitted diseases (STDs), which may or may not be visible.
- You can get other STDs from oral sex. And, if you get feces in your mouth during anilingus, you can get hepatitis A and B, parasites like *Giardia*, and bacteria like *Shigella*, *Salmonella*, *Campylobacter*, and *E. coli*.

The risk of health care workers being exposed to HIV on the job (occupational exposure) is very low, especially if they use protective practices and personal protective equipment to prevent HIV and other blood-borne infections. For health care workers on the job, the main risk of HIV transmission is from being stuck with an HIV-contaminated needle or other sharp object. However, even this risk is small. Scientists estimate that the risk of HIV infection from being stuck with a needle used on an HIV-infected person is less than 1%.

Kaposi's sarcoma in a 20-year old man who had AIDS.



New“ strategy under N. Ramjee, 2006

A, B, C, D, E, F, G, H, (I)

A – abstinence

B – be faithful – být si vzájemně věrný, buď věrný

C – kondom (mužský kondom)

C = také femidom neboli kondom

D – diafragma (poševní) with spermicid

D – dental dam – dentální rouška

E – exposure prophylaxis

F – **female initiated microbicides**

G – **genital tract infections** – therapy

H – **HSV 2 suppression** Herpes simplex 2

I – „**imunity induced by vaccine**“ ?????

Conclusions (1)

- HIV infection is of major public health importance in Europe, with evidence of continuing transmission in specific populations with no clear signs of overall decrease.
- Half of the HIV infections were diagnosed as late presenters with CD4 cell counts less than $350/\text{mm}^3$ blood.
- Heterogeneity exists in HIV epidemics in the EU/EEA:
 - Men who have sex with men accounted for majority of cases;
 - One third of heterosexual cases have direct links to sub-Saharan Africa (areas with a generalised epidemic);
 - Despite low levels of HIV reported in IDU, increases continue in Greece and Romania.

Conclusions (2)

- Interventions should be based on evidence and tailored to the local epidemiological situation and vulnerable populations such as MSM, IDU and migrant populations.
- Wider access and uptake of HIV counselling and testing is needed to ensure earlier diagnosis and access to treatment – both to improve the longer term treatment outcomes for the individuals but also to prevent or reduce further transmission in the community.

Global summary of the AIDS epidemic | 2015

Number of people living with HIV in 2015

Total	36.7 million	[34.0 million – 39.8 million]
Adults	34.9 million	[32.4 million – 37.9 million]
Women (15+)	17.8 million	[16.4 million – 19.4 million]
Children (<15 years)	1.8 million	[1.5 million – 2.0 million]

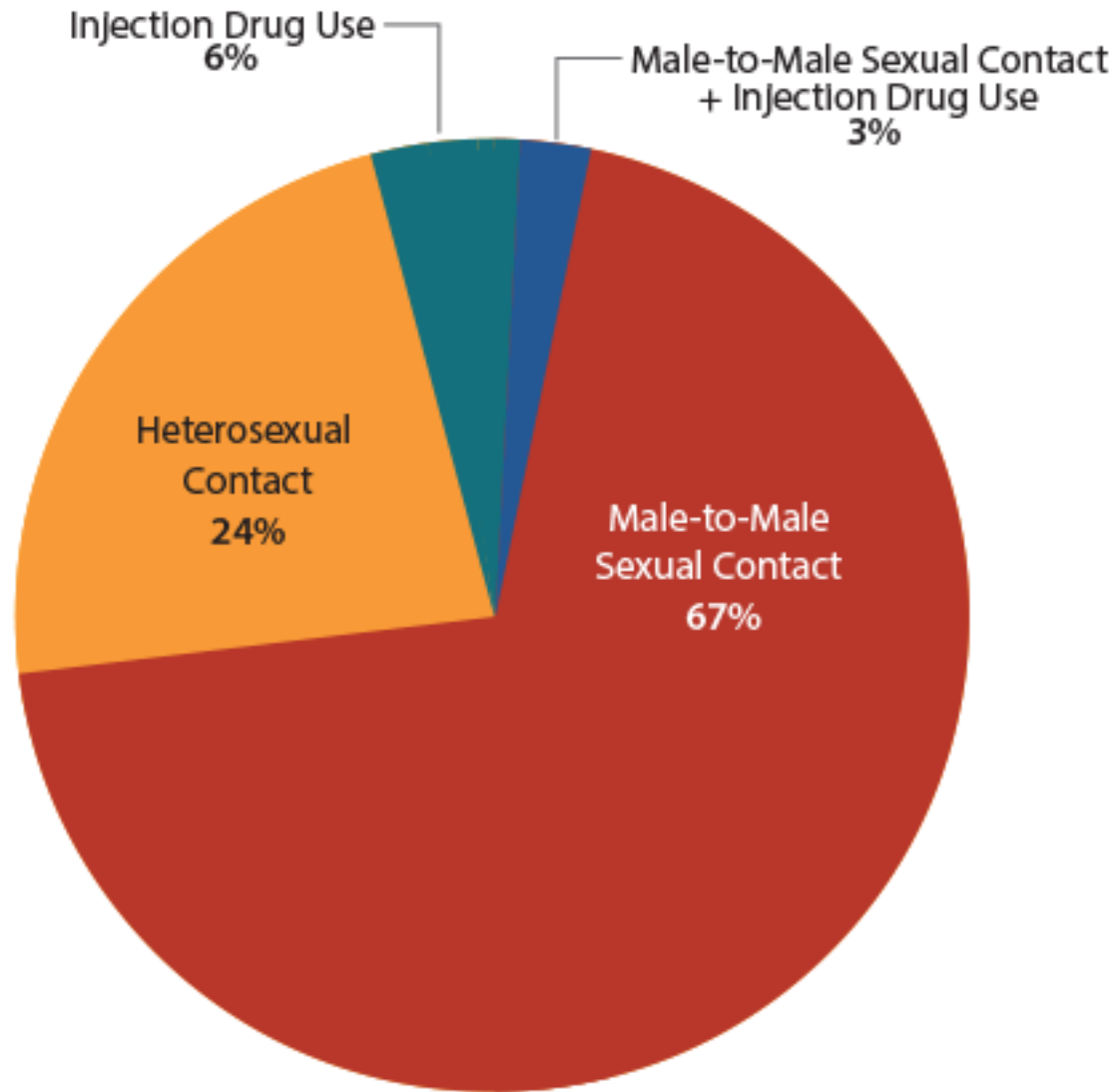
People newly infected with HIV in 2015

Total	2.1 million	[1.8 million – 2.4 million]
Adults	1.9 million	[1.7 million – 2.2 million]
Children (<15 years)	150 000	[110 000 – 190 000]

AIDS deaths in 2015

Total	1.1 million	[940 000 – 1.3 million]
Adults	1.0 million	[840 000 – 1.2 million]
Children (<15 years)	110 000	[84 000 – 130 000]

New HIV Diagnoses by Transmission Category (2015, n=39,513)



Vertical transmission -CDC

HIV and AIDS Diagnoses

Approximately 8,500 women living with HIV give birth annually.

Most (73%) of the estimated 174 children in the United States who were diagnosed with HIV in 2014 got HIV through perinatal transmission.

Most (88%) of the estimated 104 children in the United States diagnosed with AIDS in 2014 got HIV through perinatal transmission.

Living With HIV

Of the estimated 1,999 children living with perinatal HIV at the end of 2013, 1,298 (65%) were black/African American, 312 (16%) were Hispanic/Latino,^b and 212 (11%) were white.

At the end of 2013, an estimated 9,131 adults and adolescents (aged 13 and older) were living with HIV acquired through perinatal transmission. Of these, 60% (5,495) were black/African American, 23% (2,093) were Hispanic/Latino, and 12% (1,118) were white.

Deaths

An estimated 4,998 children ever diagnosed with AIDS have died since the beginning of the epidemic through the end of 2013 (includes only those under age 13 at time of death).^c

Almost all of them (91%) got HIV through perinatal transmission.

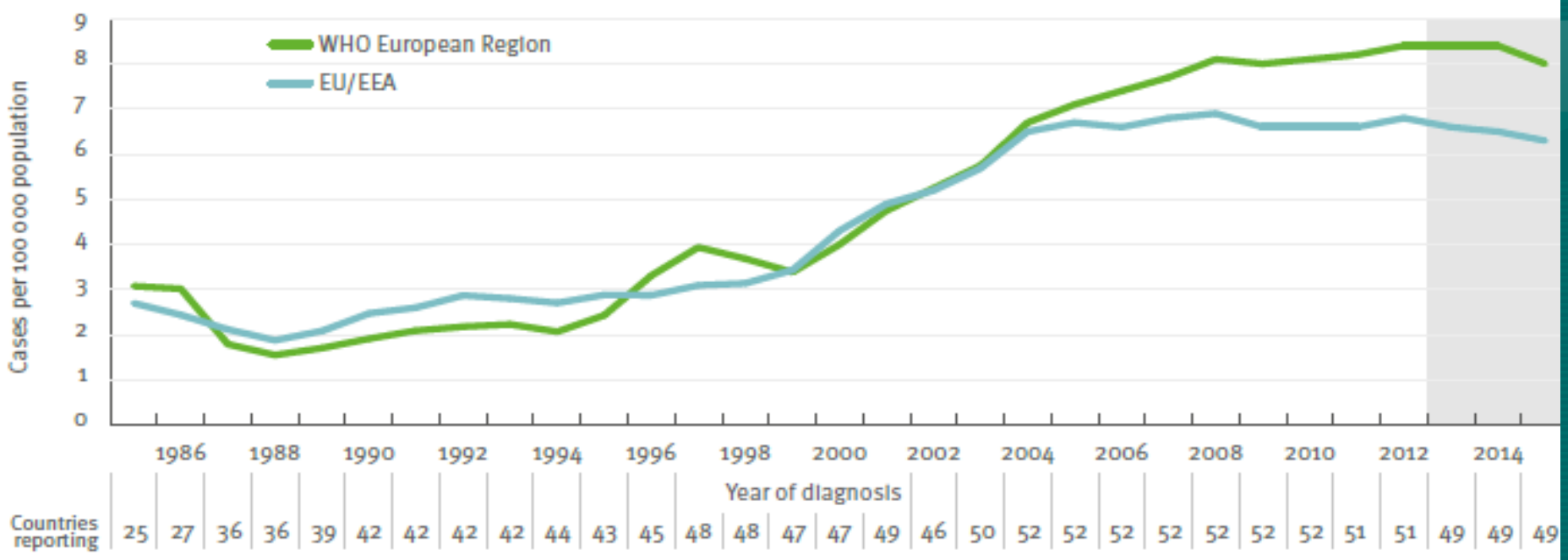


2015

HIV/AIDS surveillance in Europe

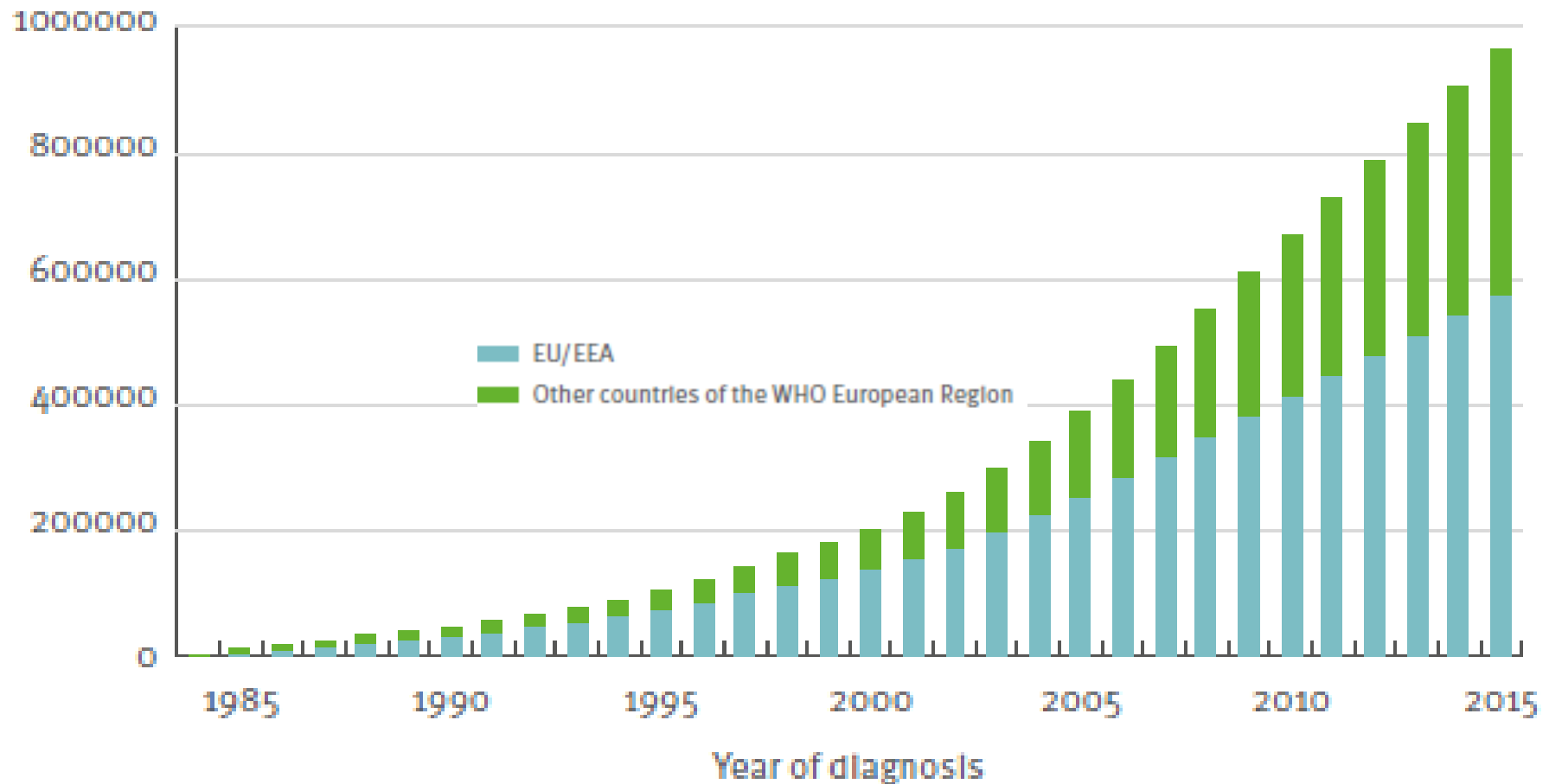
Among the 49 reporting countries³ the rate was
 7.6 per 100 000 population
 and 6.3 per 100 000 for the EU/EEA

Figure A: Rate of new HIV diagnoses per 100 000 population, by year of diagnosis and adjusted for reporting delay, in the EU/EEA and the WHO European Region*, 1985–2015



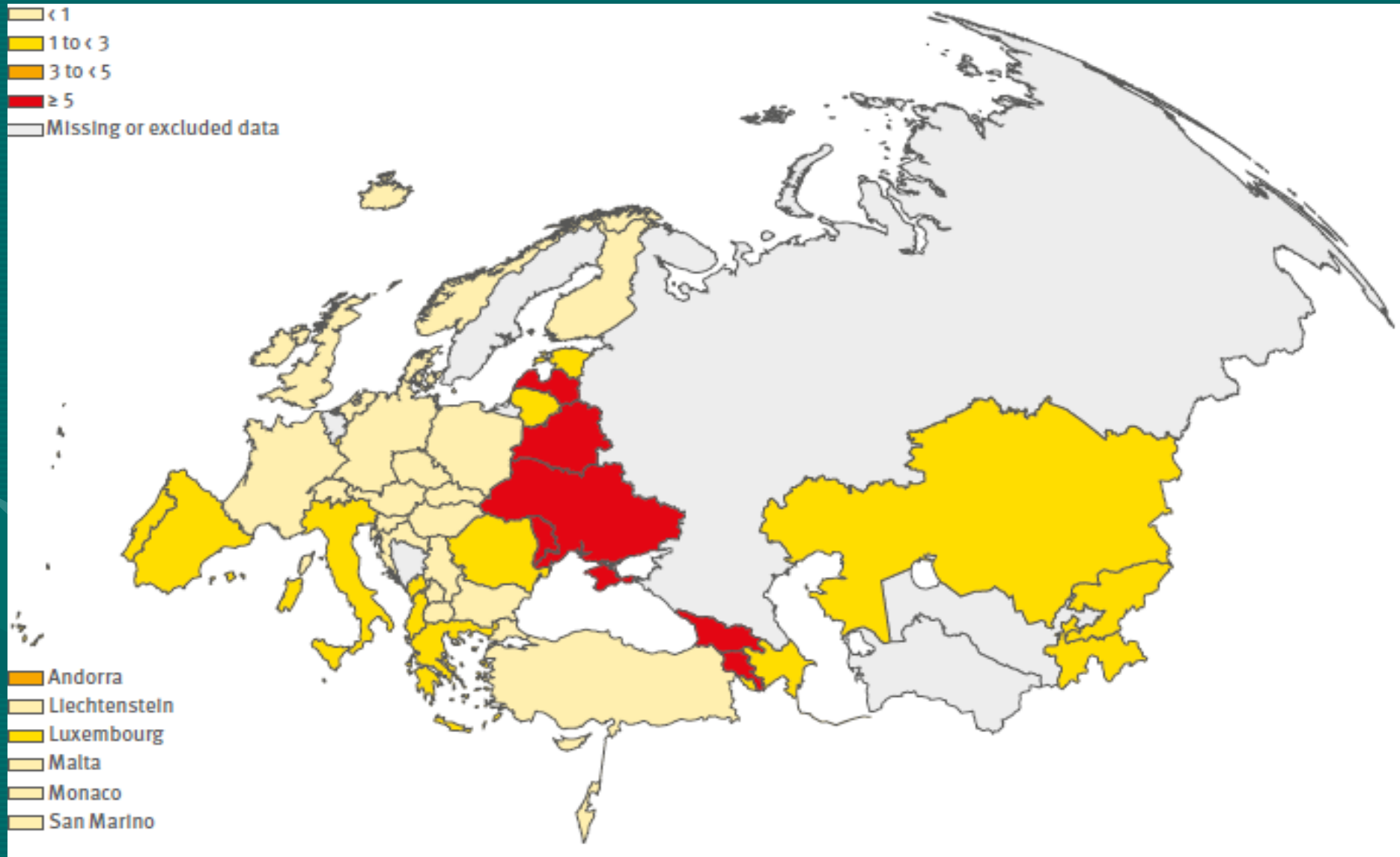
■ Rates may increase in the coming years due to reporting delays
 * Data from Russia are not included

Cumulative number of new diagnosis in the EU/EEA and other countries of the WHO European Region



* Data from Russia not included

AIDS diagnoses reported per 100 000 population 2015



HIV infections diagnosed, 2012

Characteristics of reported cases EU/EEA

Number of HIV diagnoses 29 381

Diagnoses per 100 000 population 5.8

Percentage aged 15–24 years 10.6%

Male-to-female ratio 3.2

Transmission mode (percentage)

Heterosexual 33.8%*

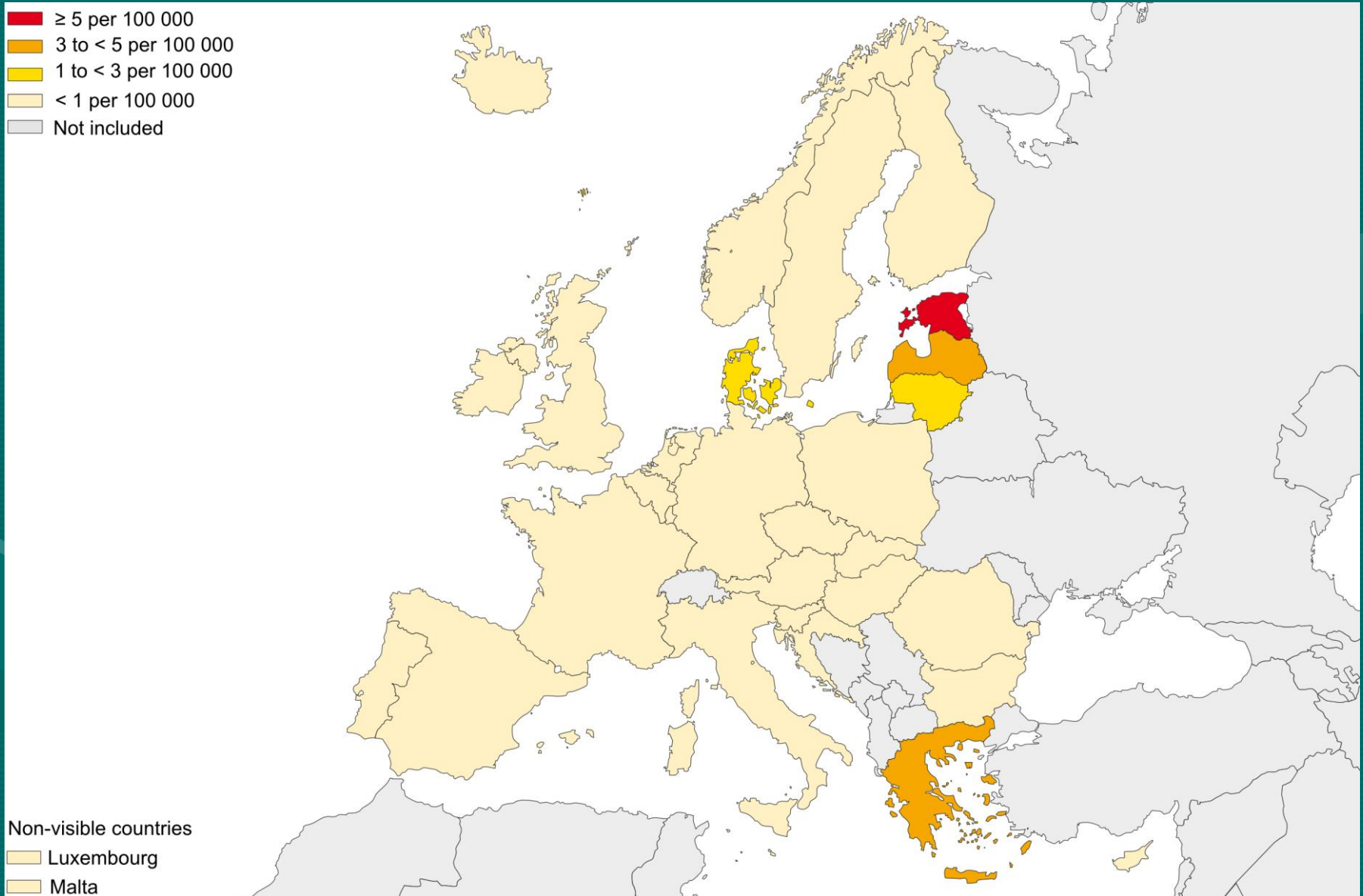
Men who have sex with men 40.4%

Injecting drug use 6.1%

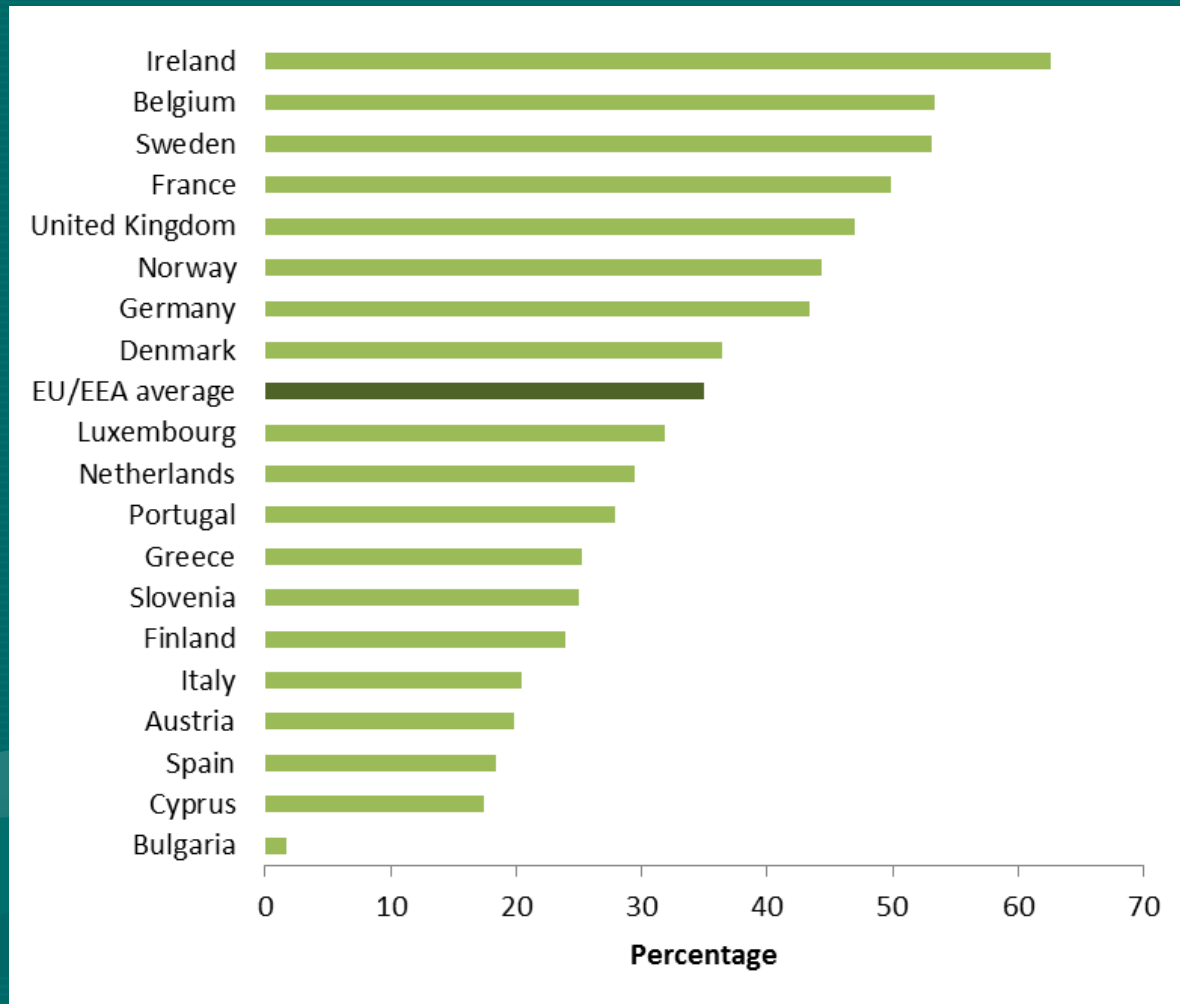
Unknown 18.7%

HIV infections diagnosed and reported, 2012

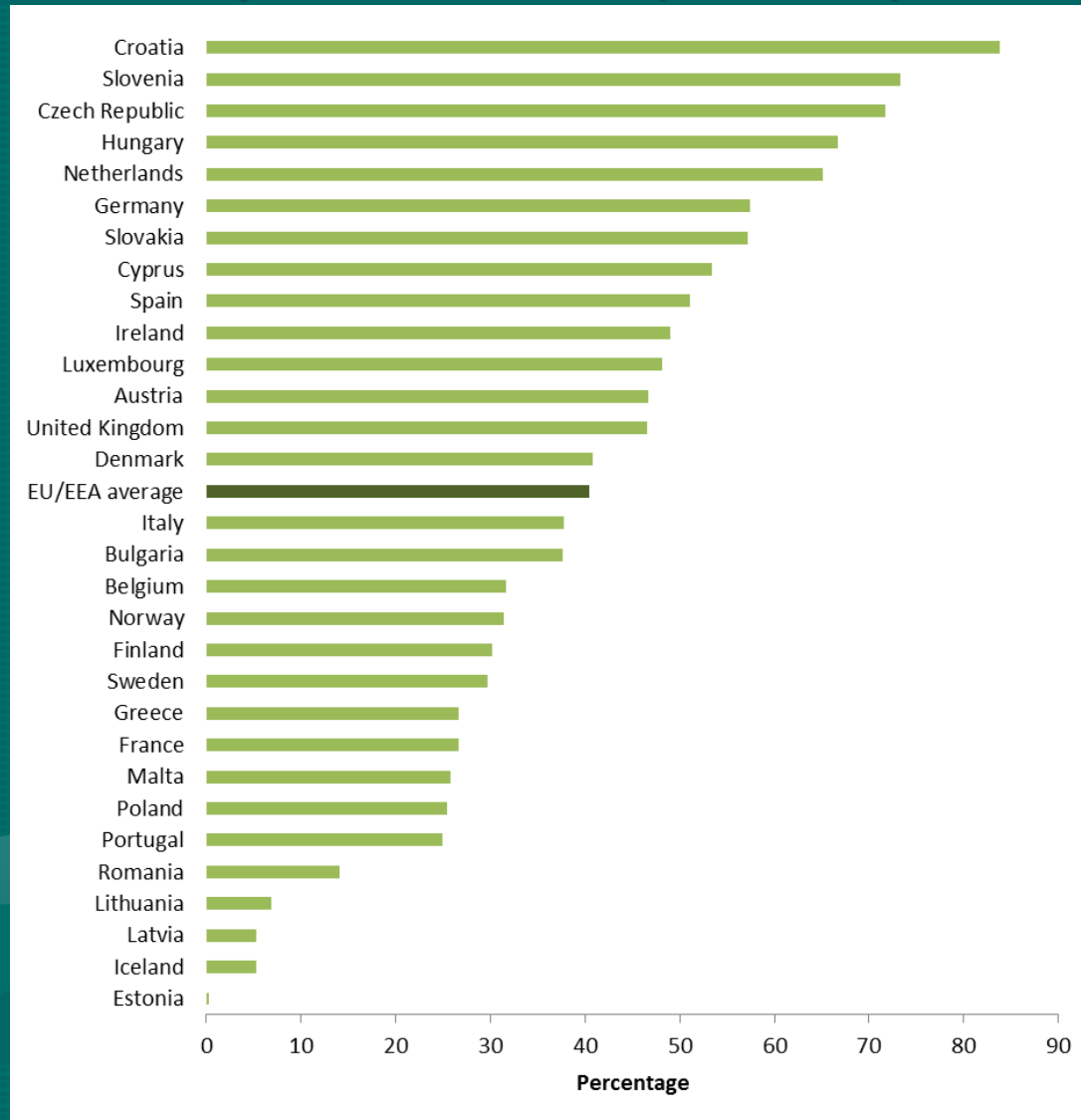
Injecting drug use, EU/EEA



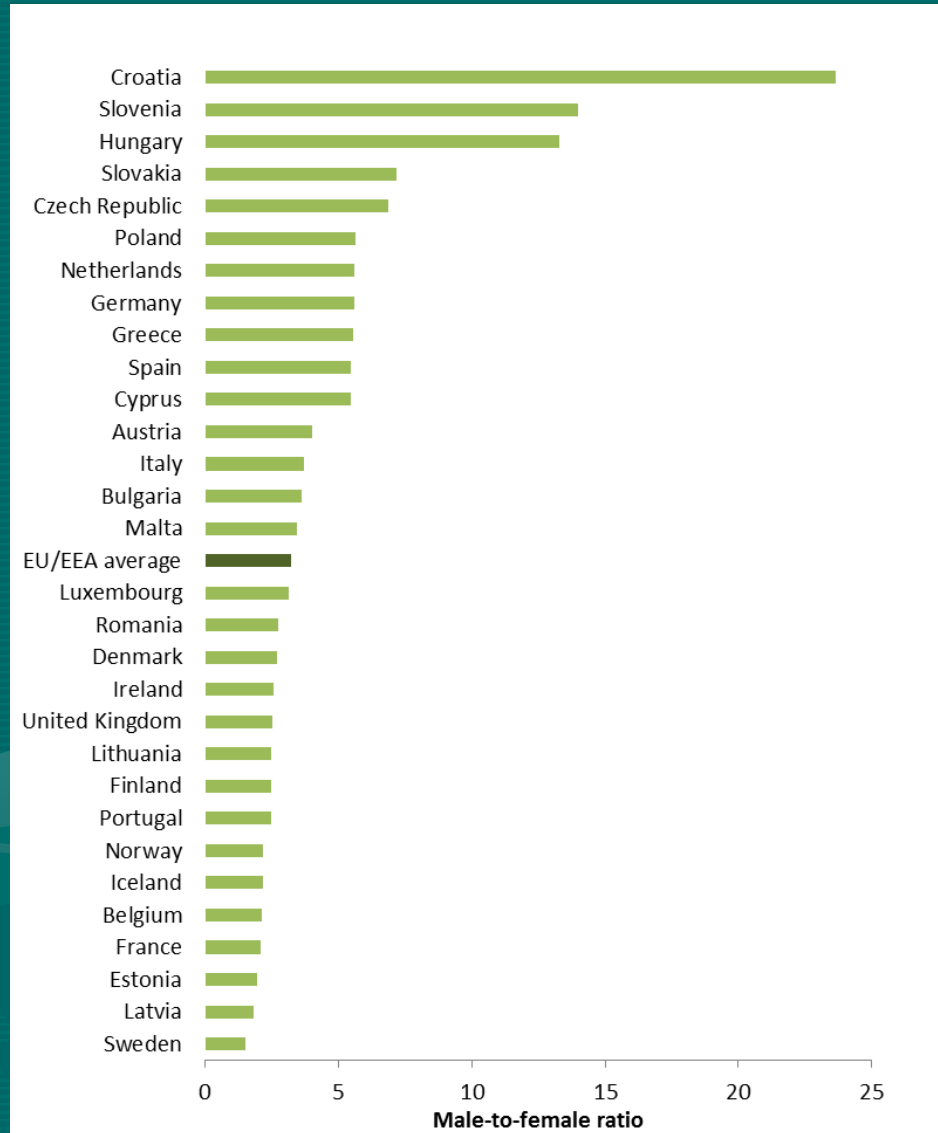
HIV diagnoses in persons originating from countries with a generalised epidemic among all the heterosexually acquired infections, 2012 (n=9 944)



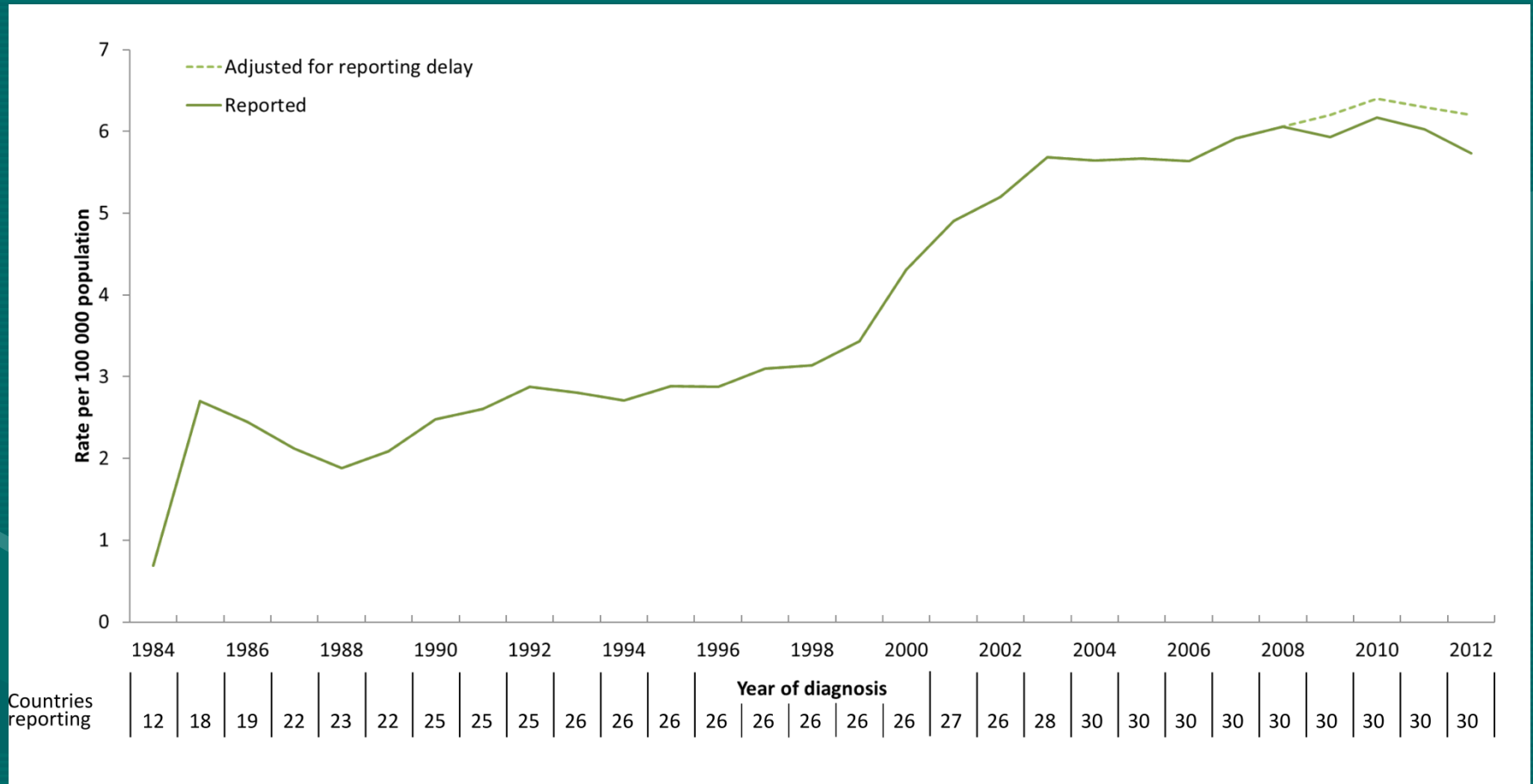
HIV diagnoses in MSM among all reported HIV cases, by country, EU/EEA, 2012 (n=29 381)



Male-to-female ratio of HIV infections, by country, EU/EEA, 2012 (n=29 327)

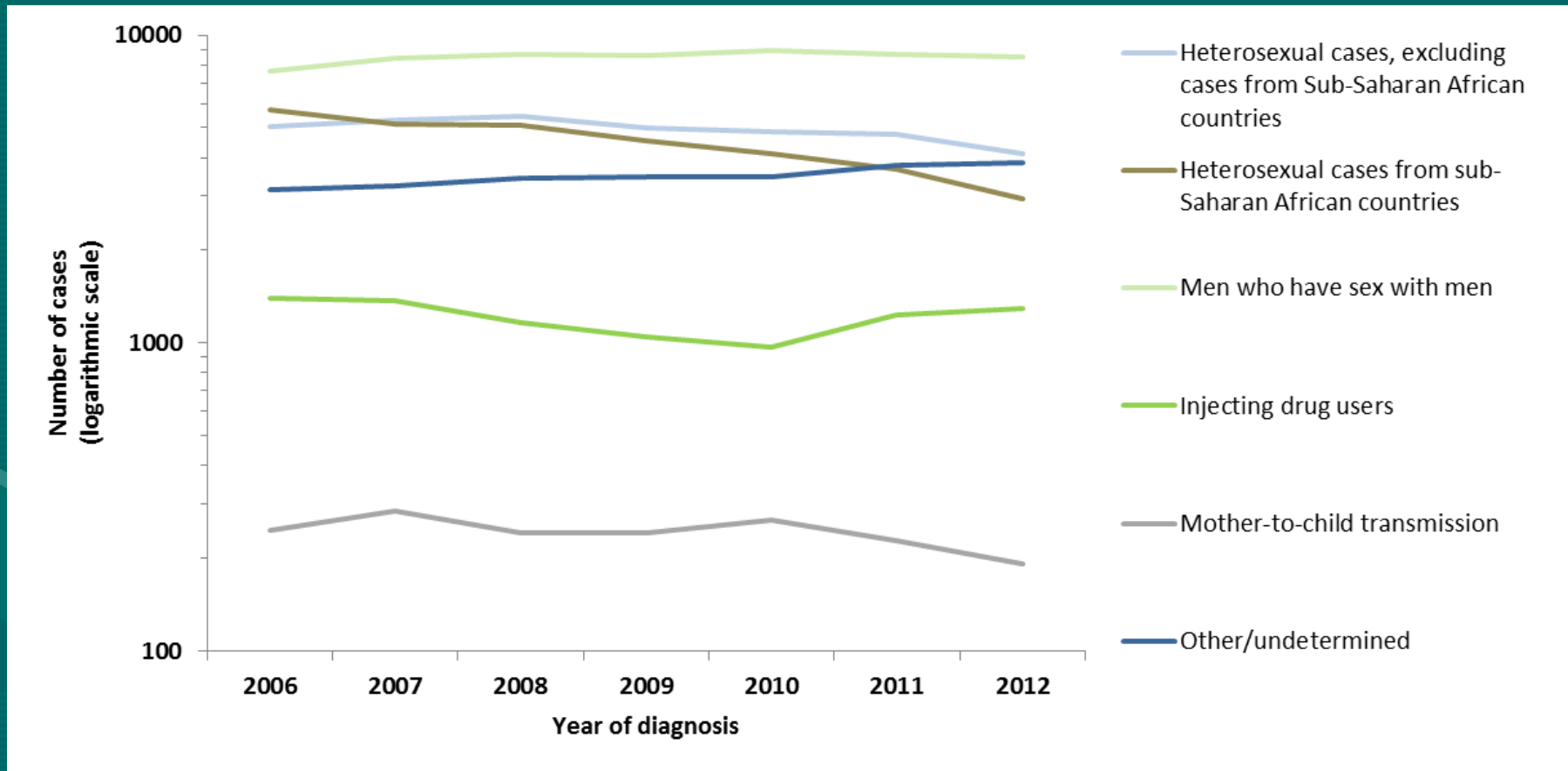


Rate of reported HIV diagnoses, by year of diagnosis, in the EU/EEA, 1984–2012



HIV infections reported, 2006-2012

Transmission mode and origin, adjusted for reporting delay



Predominant transmission mode: men who have sex with men

Data were not included or not available from Estonia, Poland, Spain, Italy.

Celkový stav vyšetřování HIV protilátek v ČR

Kumulativní údaje k 30.10.2017

HIV POZITIVNÍ PŘÍPADY V ČR

PODLE ZPŮSOBU PŘENOSU, KLINICKÉHO STADIA A POHLAVÍ

Kumulativní údaje ke dni

31.10. 2017

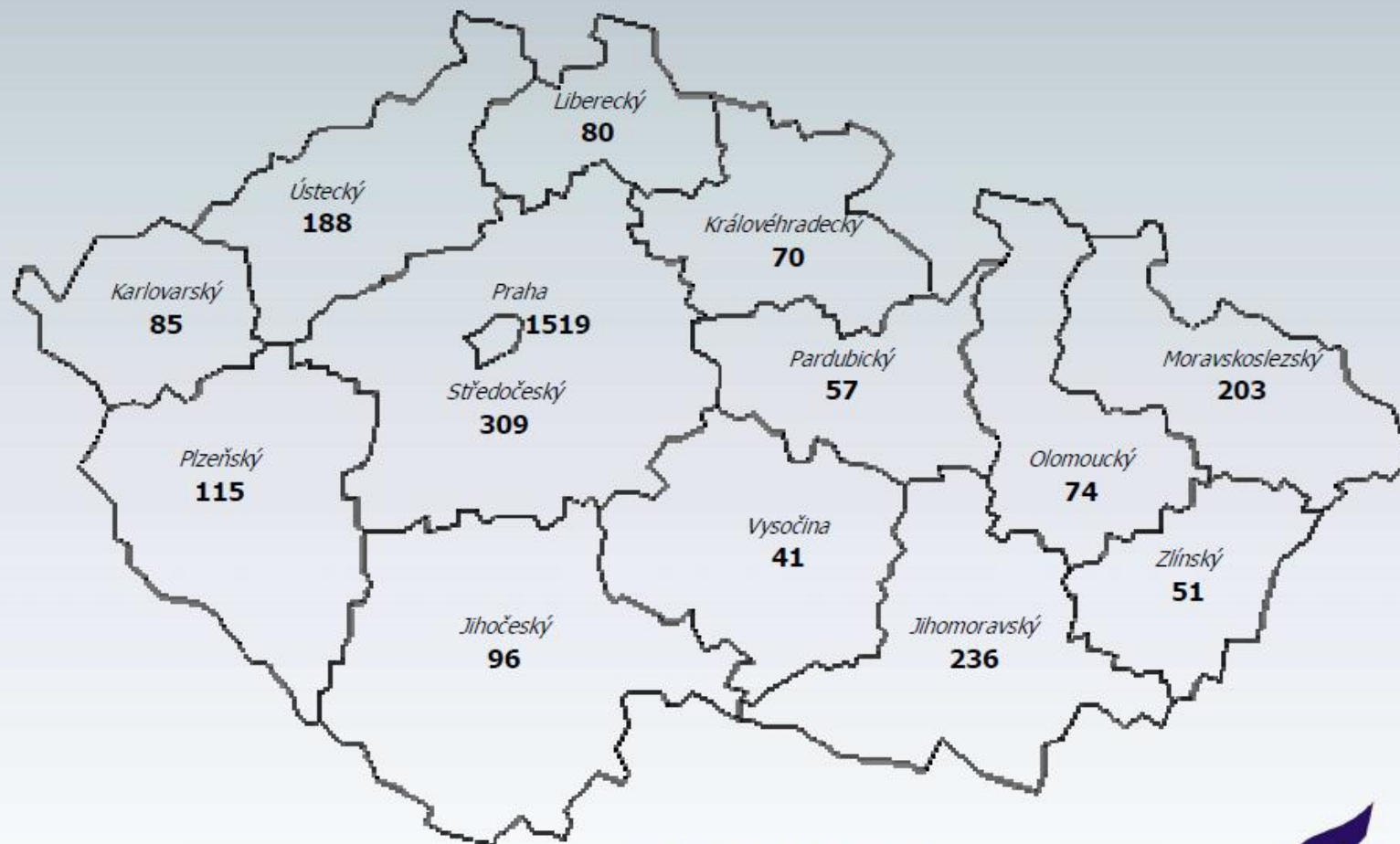
ZPŮSOB PŘENOSU	CELKOVÝ POČET			KLINICKÉ STADIUM								
	HIV+			asymptomatické			sympt. non-AIDS			AIDS		
	muži	ženy	celkem	muži	ženy	celkem	muži	ženy	celkem	muži	ženy	celkem
Homosexuální / bisexuální	2067	0	2067	1587	0	1587	207	0	207	273	0	273
Injekční uživatelé drog (IUD)	83	29	112	36	21	57	14	1	15	33	7	40
IUD + homosexuální / bisexuální	63	0	63	43	0	43	8	0	8	12	0	12
Hemofilici	17	0	17	1	0	1	7	0	7	9	0	9
Příjemci krve a krevních přípravků	12	3	15	3	0	3	4	0	4	5	3	8
Heterosexuální	367	384	751	204	239	443	41	52	93	122	93	215
Matka - dítě	4	5	9	4	3	7	0	1	1	0	1	1
Nozokomiální	2	3	5	2	2	4	0	0	0	0	1	1
Jiný	4	1	5	2	1	3	0	0	0	2	0	2
Nezjištěný	66	14	80	49	13	62	2	0	2	15	1	16
Celkem občané ČR / rezidenti	2685	439	3124	1931	279	2210	283	54	337	471	106	577
Cizinci	294	135	429	241	120	361	17	7	24	36	8	44
Celkem HIV+	2979	574	3553	2172	399	2571	300	61	361	507	114	621

HIV INFEKCE V ČESKÉ REPUBLICE

PODLE KRAJE BYDLIŠTĚ V DOBĚ PRVNÍ DIAGNÓZY HIV

(občané ČR a cizinci s trvalým pobytem)

Kumulativní údaje za období
1.10.1985 - 31.10.2017



HIV + CELKEM 3124

HIV / AIDS V ČESKÉ REPUBLICE

(občané ČR a cizinci s trvalým pobytem)

Kumulativní údaje za období

1.1.1986 - 31.10.2017

