



TECHNICAL REPORT

Assessing the burden of key infectious diseases affecting migrant populations in the EU/EEA

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This report of the European Centre for Disease Prevention and Control (ECDC) was coordinated by Teymur Noori. The following ECDC experts provided invaluable disease-specific input: Anastasia Pharris (HIV), Andreas Sandgren (TB), Erika Duffell (hepatitis B and C), Gianfranco Spiteri (gonorrhoea and syphilis), Jonathan Suk and Sabrina Bacci (measles and rubella), Wim Van Bortel (malaria and Chagas disease) and Dina Oksen (Chagas disease). Johan Giesecke, Denis Coulibaly, Andrew Amato, Bruno Ciancio and Phillip Zucs (ECDC) also provided extensive reviews of the report and specific guidance in drafting the conclusions.

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Abbreviations

CRS	Congenital rubella syndrome
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EU	European Union
HBV	Hepatitis B virus
HCC	Hepatocellular carcinoma
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
LSE	London School of Economics and Political Science
LSHTM	London School of Hygiene and Tropical Medicine
MSM	Men who have sex with men
MTCT	Mother-to-child transmission
STI	Sexually transmitted infections
TB	Tuberculosis
TESSy	European Surveillance System
UK	United Kingdom
UN	United Nations
US	United States
WHO	World Health Organization

Executive summary

Introduction

Migrant health is receiving increasing attention in Europe and is a priority for ECDC. This summary presents the main findings of an ECDC project to assess the burden of infectious diseases among migrants in the EU/EEA and the completeness, quality and usefulness of data collected by the European Surveillance System (TESSy).

The infectious diseases covered are human immunodeficiency virus (HIV), tuberculosis (TB), hepatitis B, hepatitis C, gonorrhoea, syphilis, measles and rubella, malaria and Chagas disease. These diseases were selected because data disaggregated by migrant status is collected by TESSy or because evidence suggests that they may disproportionately affect migrants in the EU/EEA.

The project used the data from the following sources: TESSy¹; a literature review²; and a survey of disease focal points in EU/EEA countries³. This was supplemented with data from ECDC expert meetings and more recent ECDC surveillance reports. Two categories of variables related to migration were available from TESSy (see Table A):

- Variables that aim to elicit the migration status of affected individuals e.g. either 'country of birth' or 'country of nationality' or 'region of origin'.
- Variables that aim to elicit whether the infection was 'imported' or to ascertain 'probable country of infection'.

Table A. Variables currently collected through TESSy

Variable	HIV	TB	HBV	HCV	Gonorrhoea	Syphilis	Measles	Rubella	Malaria	Chagas Disease *
Country of birth	X	X	X	X	X	X				
Country of nationality	X	X	X	X	X	X				
Probable country of infection	X		X	X	X	X	X	X	X	
Imported			X	X			X	X	X	
Region of origin	X									

The 'country of birth' variable was used whenever possible, as this is deemed to be the most reliable indicator of whether or not an individual is a migrant. Completeness of data on migrant-related variables varies depending on the disease. Data on 'country of birth' of cases were most complete for HIV and TB and less complete for hepatitis B, hepatitis C, gonorrhoea and syphilis. For TB, the geographic origin is classified according to place of birth or if unavailable, is based on citizenship. For measles and rubella, 'country of birth' was poorly reported, but the variable for 'imported' or 'indigenous' case was well reported. In general, variables on 'probable country of infection' were poorly reported.

Key findings

The following provides an overview of the burden of infectious disease, disease trends and modes of transmission in migrant populations in the EU/EEA, based on available data for each specific disease.

Migrant populations in the EU/EEA are disproportionately affected by HIV.

Between 2007 and 2011, migrants represented 40% of reported cases of HIV. Overall, the number of new HIV cases diagnosed in migrants in the EU/EEA increased slightly during 2007–2011, with increases among migrants from Latin America, central and eastern Europe and decreases among migrants from sub-Saharan Africa.

Overall figures mask differences between EU/EEA countries. Between 2007 and 2011, 92% of HIV cases in migrants were reported by countries in western Europe. Most HIV cases reported among migrants were from sub-Saharan Africa and migrants accounted for a significant proportion of HIV cases due to heterosexual transmission in many EU/EEA countries. However, the predominant mode of transmission among migrants also depends on country or region of origin. For example, a high proportion of HIV cases in migrants from Latin America have been

¹ Chagas disease is not currently monitored through TESSy; data is therefore drawn from the literature review only.

² A literature review was conducted for TB, hepatitis B, hepatitis C, gonorrhoea, syphilis, measles and rubella. Separate literature reviews were conducted for malaria and Chagas diseases. Data on HIV is mainly based on TESSy analysis.

³ Three surveys were sent: on hepatitis B and C, gonorrhoea and syphilis, and measles and rubella.

reported in men who have sex with men (MSM). There is also growing evidence that some migrant populations are at risk of acquiring HIV infection after arrival in the EU/EEA.

Late diagnosis of HIV among migrants is a key issue in some EU/EEA countries, and migrants with HIV infection often have poorer clinical and immunological indicators at diagnosis than native-born HIV cases.

Migrant populations in the EU/EEA are also disproportionately affected by tuberculosis (TB).

Although the majority of TB cases in Europe occur in individuals born in the region, TB is also a significant issue among migrant populations. The proportion of TB cases among migrants has increased, from 10% in 2000 to 25% in 2010. Again, overall figures mask differences between EU/EEA countries. In 2011, countries such as Cyprus, Iceland, the Netherlands, Norway, Sweden and the United Kingdom reported more than 70% of TB cases in migrants, while other countries reported few or no cases in migrants.

TB notification rates are higher in foreign-born than native-born populations in most EU/EEA countries and, although overall incidence is declining in the EU/EEA, the opposite is the case among migrants.

The proportion of TB cases achieving successful treatment outcomes at 12 months is lower among migrants than non-migrants. Limited available data also suggest that knowledge of HIV status is lower among migrant TB cases than non-migrant TB cases.

In the EU/EEA, migrant TB cases are mainly from Asia, Africa and other parts of the European region. Country or region of origin depends on migration patterns. For example, in the United Kingdom, 57% of foreign-born TB cases reported in 2010 came from south Asia and 27% from sub-Saharan Africa. In the Netherlands, the main countries of origin of TB cases are Somalia, Morocco and Turkey, which are the most common countries of origin for migrants.

Available data suggest that active TB disease occurs at a younger age in migrants than in the native population and that the risk of extrapulmonary TB is increased two-fold in migrants, but that MDR-TB is less common among foreign-born cases than native-born cases. Available evidence also suggests that concerns about migrants increasing the risk of TB in native populations are unfounded.

Available data suggest that migrants in the EU/EEA are not disproportionately affected by gonorrhoea or syphilis.

Data on gonorrhoea and syphilis disaggregated by migrant status are only available from a few countries. These data show that, in 2010 11% of gonorrhoea cases were in migrants and 50% were in non-migrants and that 7.3% of syphilis cases were in migrants and 55.4% in non-migrants.

The proportion of overall gonorrhoea and syphilis cases among migrants in the EU/EEA remained stable between 2000 and 2010. However, while the ratio of gonorrhoea cases in males and females in non-migrants has remained stable over time, the proportion of cases in females increased among migrants between 2000 and 2010.

Reported data suggest that migrants are around four times more likely to acquire gonorrhoea through heterosexual contact than through MSM contact. The proportion of gonorrhoea cases among sex workers has been consistently higher in migrants than in non-migrants since 2000 and appears to have increased significantly in migrants since 2006. Reported data also show differences in mode of syphilis transmission between migrants and non-migrants, although these differences have reduced over time. Overall, between 2000 and 2010, migrants were slightly more likely to contract syphilis through heterosexual contact than through MSM contact, whereas non-migrants were more likely to contract syphilis through MSM contact than through heterosexual contact.

Hepatitis B, particularly chronic hepatitis infection, is an issue in migrant populations in the EU/EEA.

In 2011, 18 EU/EEA countries provided data on whether cases were 'imported' for 39.1% of all cases reported to ECDC. Of these just over half (52.6%), were recorded as 'imported'. In all, 6.3% of these cases were acute infections and 81.5% were chronic infections. During the period 2006–2010, there was a decrease in notification rates for acute hepatitis B infection in the EU/EEA, but an increasing trend in chronic infections. Again, overall figures mask differences between countries. In 2010, among acute cases of hepatitis B reported, the proportion of imported cases ranged from 0% in Austria, the Czech Republic, Germany, Greece, Hungary and Poland to 69.2% in Finland. Among chronic cases the proportion of imported cases ranged from 0% in Estonia to 96.1% in Sweden.

Although it is difficult to draw definitive conclusions, due to differences in national surveillance systems and incompleteness of data, other evidence indicates that there is a higher prevalence of chronic hepatitis B infection among migrants than among the native-born population. Available data suggest that hepatitis B prevalence is highest among migrants from countries with high and intermediate endemicity in eastern Europe, Asia and sub-Saharan Africa. While hepatitis B cases in native-born populations in the EU/EEA are likely to occur in high-risk groups such as injecting drug users and MSM, cases in migrant populations are more likely to have been acquired in the country of origin and via vertical transmission from mother to child.

It is difficult to draw definitive conclusions about the burden of hepatitis C among migrants in EU/EEA countries as data on acute infections and chronic infections are limited.

However, reported data suggest that the prevalence of chronic infections is higher among 'imported' cases of hepatitis C. There is also some evidence from France, the Netherlands, Spain and the United Kingdom suggesting that prevalence is higher in migrants from endemic countries than in the general population. However, prevalence in these migrant populations was lower than the estimated prevalence in their countries of origin. Insufficient data are available to comment on trends in hepatitis C infection among migrants.

As information on 'country of birth' for measles and rubella cases is not available from TESSy, it is not possible to draw conclusions about the occurrence of measles or rubella among migrants.

Of the 10 271 cases of measles reported through TESSy in 2013, only 2.7% were categorised as 'imported' and 0.3% as 'import-related'. Reasons for measles outbreaks vary between countries but include inadequate vaccination coverage. Studies from some countries suggest that migrant children may be at higher risk because they are less likely to be vaccinated against measles than non-migrant children.

Rubella cases are reported to TESSy as either 'imported', 'import-related', 'indigenous' or of 'unknown origin'. In 2011, 13 countries reported data for this variable. Of the 201 rubella cases reported by these countries, 8.5% were categorised as 'imported'. Some of the few studies on rubella among migrants suggest that there may be a correlation between migrant status and rubella immunity in pregnant women; others identify migration as one of the risk factors for children not being vaccinated against rubella.

Some sub-groups of migrants, particularly those visiting malaria-endemic countries of origin, are at high risk of acquiring malaria.

In EU/EEA countries, 99% of reported cases of malaria are 'imported'. Indigenous cases of malaria in the EU/EEA could be linked to the presence of efficient malaria vectors and favourable conditions for malaria transmission, combined with the arrival and high turnover of migrant seasonal workers from malaria-endemic countries.

In a range of studies, recent immigrants and migrants visiting their home country accounted for between 5.0% and 81% of reported malaria cases; those visiting their country of origin appear to be at higher risk of acquiring malaria. Pregnant women and children among established migrants who visit their home country are at particular risk. The country of origin of migrants also influences the disease profile. For example, *P. falciparum* malaria occurs mainly in migrants whose countries of origin are located in sub-Saharan Africa.

Chagas disease has occurred in Europe as a result of migration from endemic countries in Latin America.

Although the disease is not systematically monitored by countries in the EU/EEA, the number of cases reported has increased in the last decade and available data suggests that prevalence rates are high enough to warrant concern. Spain, Italy, the Netherlands, the United Kingdom, Germany and France have the highest number of estimated cases in Europe.

Conclusions and next steps

Drawing overall conclusions about infectious diseases and migrants in the EU/EEA is challenging, as patterns and trends vary considerably, depending on the disease in question. This is confounded by the diversity of migrants and the changing patterns of migration both to and within Europe. However, it appears that certain sub-groups of migrants are more affected by some infectious diseases (in particular HIV, TB, Chagas disease and, possibly, chronic hepatitis B infection) than the native-born population. Meanwhile the opposite appears to be the case for other infectious diseases. There is limited evidence about transmission of infectious diseases between migrant and native-born citizens.

Accurate information on migrants and migrant health is not available in many European countries. In addition, there are significant limitations in interpreting data relating to migrant health. Comparisons of migrant health across Europe are challenging due to varying definitions of migrants. Calculating disease prevalence and incidence rates in migrants is difficult as migration statistics may not include irregular migrants and, thus, denominators may be underestimated.

Differences in national surveillance systems and gaps in migrant-related data also make it difficult to draw conclusions. TESSy has collected data on country of origin for HIV and TB for some years and efforts have been made more recently to harmonise data collected by national surveillance systems on migrant-specific variables for other diseases, including hepatitis B and C, syphilis, gonorrhoea and measles. However, the type and quality of surveillance data collected still varies between countries and reporting on some migrant-specific variables is poor or absent (see Table B). Determining trends is difficult because of changes in reporting and in the number of countries reporting over time as well as changes in migration patterns.

Table B. Completeness (%) of variables collected through TESSy

Variable	HIV ⁴	TB ⁵	HBV ⁶	HCV ⁷	Gonorrhoea ⁸	Syphilis ⁹	Measles ¹⁰	Rubella ¹¹	Malaria ¹²	Chagas disease*
Country of birth	62	95.6	19.1	14.4	17	26				
Country of nationality	28	96.3	6.8	6.6	4	17				
Probable country of infection	17		20.2	7.6	9	10	3	5	90.1	
Imported			39.1	40.5			82	96	98.7	
Region of origin	62.5									

*Not under EU surveillance

The following sets out ways in which data on migrant health could be improved, for specific diseases and more generally.

- HIV surveillance among migrants could be strengthened through improved completeness and analysis of variables such as country of birth, CD4 cell count at diagnosis, year of arrival, probable country of infection and migrant sub-populations at greatest risk of HIV infection. HIV surveillance data also needs to be disaggregated for migrants and non-migrants in key risk groups such as MSM and people who inject drugs.
- TB surveillance among migrants could be strengthened through improved completeness and analysis of variables such as origin of cases, HIV status and probable country of infection; better data is also needed on latent TB and health determinants.
- Better data is needed on hepatitis B and hepatitis C in migrant populations within the EU/EEA.
- Better understanding is needed of the reasons for the apparent increased risk of gonorrhoea among sub-groups of migrants, particularly women and sex workers, and the relationship between syphilis, sex worker status and HIV co-infection.
- Further investigation would improve understanding of trends and the reasons for apparent increases or decreases in reported cases in migrants.
- Better data on probable country of infection is required for HIV, as migrants appear to be at risk of infection after arrival in the EU/EEA. An objective method for assigning probable country of infection is currently being developed for HIV, which could be applied in all EU/EEA countries. Improved completeness of data on year of arrival would also help to strengthen monitoring of post-arrival acquisition of infectious diseases among migrants.
- More complete data on country of origin or parental country of origin of paediatric TB cases is needed, as children from high-TB-burden countries and children of migrant parents from high-burden countries are at risk of acquiring infection. In most EU/EEA countries, surveillance data for TB cases in children do not distinguish between children born in the host country of foreign-born parents and those born of native parents; this is of concern since the children of migrants may experience similar social, behavioural and environmental risk factors to foreign-born populations.
- There is a need to improve awareness and detection of Chagas disease in Europe to ensure that the disease is diagnosed and treated, and to increase the awareness regarding the prevention of transmission through blood, organ, tissue and cell donation by Latin American donors and congenital transmission in Latin American pregnant women who are infected with *T. cruzi*.
- Increased ECDC collaboration with other agencies in order to obtain updated information on the number of migrants in EU countries would allow calculation of rates and trends based on more accurate denominators, although denominators may still not include irregular migrants. Improved data collection on the number of new migrants per year could make the data more reliable and it could be used to estimate incidence of disease in recently migrated populations.
- European disease-specific networks should be engaged in discussions on what data is already collected at national level, and whether additional migrant-related variables would add value at EU and country level.

In order to address many of these issues, ECDC in partnership with the WHO Regional Office for Europe and the International Organisation for Migration (IOM) is currently developing a public health framework on how to

⁴ 2012

⁵ 2011

⁶ 2011

⁷ 2011

⁸ 2011

⁹ 2011

¹⁰ 2013

¹¹ 2013

¹² 2012

improve the monitoring of infectious diseases in migrant populations within the EU/EEA. The framework will be tailored to the needs of EU/EEA Member States and will build on the 2008 World Health Assembly Resolution (WHA61.17) entitled 'Health of Migrants' [3] and the operational framework outlined by the 2010 Global Consultation [4]. The ECDC/WHO/IOM framework will provide guidance on how to:

- Ensure the standardisation and comparability of data on infectious diseases in migrant populations through the identification of key indicators that are acceptable and useable across countries.
- Increase understanding of trends and outcomes through the appropriate disaggregation and analysis of migrant health information in ways that account for the diversity of migrant populations.
- Promote the inclusion of migration variables in existing censuses, national statistics, targeted health surveys and routine health information systems, as well as in statistics from other sectors.
- Suggest innovative approaches to collecting data on migrants beyond traditional instruments and surveillance.
- Raise awareness of data collection methods, use and dissemination related to migrant health among key stakeholders.
- Provide a template to EU/EEA Member States on how a national monitoring system on migrant health and infectious diseases might look.

1. Introduction

This report summarises the main findings of an ECDC project, which aimed to assess the burden of infectious diseases among migrant populations in the EU/EEA in order to improve policy and public health responses. More specifically, the project aimed to assess the completeness, quality and usefulness of disease-specific and migrant-specific data reported to the European Surveillance System (TESSy). The report therefore also provides an overview of available data on infectious diseases among migrants in the EU/EEA and helps identify evidence gaps.

This report, which is intended to be of interest to national decision-makers, public health professionals and NGOs, builds on a series of technical reports produced by ECDC on migration and infectious diseases, which have focused to date on HIV, TB and vaccine-preventable diseases [1,2].

The report expands the range of diseases and includes more recent data. The infectious diseases covered are HIV, TB, hepatitis B, hepatitis C, gonorrhoea, syphilis, measles and rubella, malaria and Chagas disease. These diseases were selected because data disaggregated by migrant status are available from TESSy or evidence from the scientific literature suggests that migrants in the EU/EEA may be disproportionately affected by these infectious diseases.

This chapter provides a brief overview. Chapter 2 describes the methods used by the project to collect data on the burden of infectious diseases among migrant populations. This is followed by chapters summarising data available on each of the specific infectious diseases. The final chapter summarises the main conclusions and makes recommendations to improve the quality, completeness and comparability of data on infectious diseases among migrants in the EU/EEA.

1.1 Migration and migrant health

The UN Recommendations on Statistics of International Migration define a long-term migrant as a 'person who moves to a country other than that of his or her usual residence for a period of at least a year'¹³. In this report, the UN definition is taken as a starting point, but the specific definitions used in the data analysed and literature cited are adopted where appropriate.

There were an estimated 48.9 million foreign-born residents in the 27 countries of the EU in 2011, amounting to 9.7% of the total population; 32.4 million were born outside the EU and 16.5 million were born in a different EU country [3].

Migration to and within Europe is having an increasing demographic impact in the region. Many EU/EEA countries have significant migrant populations and, in some countries, the migrant population has increased since 1990 (Table 1.1). However, the proportion varies among countries, with some countries such as France and the Netherlands experiencing only a small increase over the period 1990–2010 while other countries, such as Spain, have experienced a marked increase in the proportion of migrants from 2.1 in 1990 to 14.1 in 2010.

Historically, many EU/EEA countries have had longstanding and stable migration patterns based on past relationships with countries outside Europe. However, migration patterns are changing, due in part to changing political and economic situations. For some European countries, migration is a relatively new phenomenon.

¹³ United Nations Department of Economic and Social Affairs. Recommendations on Statistics of International Migration, Revision 1. New York: UN DESA, Statistics Division 1998.

Table 1.1 International migrants as a percentage of the population in Europe 1990–2010 (sorted by percentage in 2010)

	1990	1995	2000	2005	2010
Luxembourg	29.8	31.1	32.2	33.7	35.2
Ireland	6.5	7.3	10.1	14.8	19.6
Cyprus	6.4	7.5	10.2	13.9	17.5
Austria	10.3	12.5	12.5	14.0	15.6
Latvia	24.3	21.2	18.1	16.6	15.0
Spain	2.1	2.6	4.4	10.7	14.1
Sweden	9.1	10.3	11.2	12.3	14.1
Estonia	24.4	21.4	18.2	15.0	13.6
Germany	7.5	11.0	12.2	12.9	13.1
France	10.4	10.5	10.6	10.6	10.7
Netherlands	8.0	9.0	10.0	10.6	10.5
United Kingdom	6.5	7.2	8.1	9.7	10.4
Greece	4.1	5.1	6.7	8.8	10.1
Belgium	9	9.1	8.6	8.5	9.1
Denmark	4.6	5.7	7.0	7.8	8.8
Portugal	4.4	5.3	6.2	7.2	8.6
Slovenia	9.2	10.2	8.8	8.4	8.1
Italy	2.5	3.0	3.7	5.2	7.4
Czech Republic	4.1	4.4	4.4	4.4	4.4
Finland	1.3	2	2.6	3.3	4.2
Lithuania	9.4	7.5	6.1	4.8	4.0
Malta	1.6	1.9	2.3	2.9	3.8
Hungary	3.4	2.8	2.9	3.3	3.7
Slovakia	0.8	2.1	2.2	2.3	2.4
Poland	3.0	2.5	2.1	2.2	2.2
Romania	0.6	0.6	0.6	0.6	0.6

Source: United Nations. *Trends in International Migrant Stock: The 2008 Revision* (United Nations database, POP/DB/MIG/Stock/Rev.2008). New York: United Nations, Department of Economic and Social Affairs, Population Division; 2009.

To the extent that information is available across countries and migrant groups and it is possible to generalise, migrants are often comparatively healthy overall, a phenomenon known as the 'healthy migrant effect' [4]. However, migrants are a very heterogeneous group and some migrant populations seem to be more vulnerable to specific infectious diseases, occupational diseases and poor mental health [5]. In terms of non-communicable disease, migrants to Europe seem to initially have a lower risk of cancer but a higher risk of diabetes and some other diseases, while the risk of cardiovascular disease varies among different groups [6]. Migrants are also at higher risk of maternal and child health problems [7].

These differences reflect a complex set of factors including migration patterns, the demographic profile of migrants, experiences during migration, high-risk behaviour, patterns of disease in migrants' countries of origin, the trauma that can be associated with the causes of migration, and access to health services in both the country of origin and host country [5,8]. Health risks to migrants may also continue for many years after arrival in Europe as a result of travel to visit friends and relatives in countries of origin [9].

In addition, social, economic, cultural and legal factors in the host country can increase the vulnerability of migrants to infectious diseases as well as influencing health-related behaviour. Social factors include discrimination, stigma and isolation. Economic factors include poverty, poor living conditions and unemployment. Cultural factors include language barriers, religion, gender roles, health beliefs, practices and perceptions about health services. Legal factors include lack of entitlement to healthcare, particularly for irregular migrants.

1.2 Access to healthcare

Poor access to healthcare is an important proximal risk factor for poorer health outcomes [8]. In principle, migrants should not be unduly disadvantaged in accessing healthcare compared with the rest of the population [10]. The right of all individuals to health and access to health services is enshrined in international and European legal instruments including the 1946 constitution of the World Health Organization (WHO) [11] and Article 12 of the International Covenant on Economic, Social and Cultural Rights [12]. This right has also been recognised by the European Convention for the Protection of Human Rights and Fundamental Freedoms of the Council of Europe and the European Social Charter. In the EU, the Charter of Fundamental Rights sets out the right of everyone to access preventive healthcare and benefit from medical treatment [13].

However, there is evidence that migrants do not always have equal access to healthcare and more needs to be done to implement these rights [14] and to address the social, economic, cultural and legal barriers that migrants experience. The problems are greatest for asylum seekers and irregular migrants who face legal restrictions to accessing healthcare in several EU countries [15,16]. Migrants may also be particularly affected by administrative challenges in accessing health insurance and by user fees [17]. Language barriers can limit access to services as well as the quality of care. Other barriers include lack of awareness of rights and entitlements, lack of familiarity with the health system, gaps in health literacy, and direct and indirect discrimination [18,19].

1.3 EU action on migrant health

The issue of migrant health is receiving increasing attention in Europe. Of major importance in this respect were the Portuguese EU presidency in 2007, which put the issue on the agenda, and the Spanish EU presidency in 2010. The Portuguese EU presidency held a conference on 'Health and migration in the EU – Better health for all in an inclusive society' in Lisbon in 2007, with the conference conclusions adopted by the Employment, Social Policy, Health and Consumer Affairs Council in December 2007. Under the Spanish EU presidency, migration and health were considered within the overarching theme of health inequalities. This led to the adoption by the European Council of 'Council Conclusions on Equity and Health in All Policies: Solidarity in Health' [20,21], which led, among other actions, to ECDC's work on migrant health. Migrant health, in particular addressing health inequalities, continues to be a priority for ECDC.

Other international and European organisations have also contributed to growing recognition of the issue of migrant health. In November 2007, the Council of Europe Conference of European Health Ministers adopted the 'Bratislava Declaration on Health, Human Rights and Migration' [22]. In 2009, the Assisting Migrants and Communities project, led by the International Organisation for Migration (IOM) and co-financed by the EU and Portugal, held an EU-level consultation on 'Migration Health – Better Health for All' in Lisbon (20). In May 2008, the World Health Assembly adopted a resolution on the health of migrants [23]. In 2010, WHO, IOM and the Spanish Ministry of Health and Social Policy co-convened a 'Global Consultation on Migrant Health' in Madrid [24].

ECDC is currently developing a public health framework, building on the World Health Assembly resolution, to improve the monitoring of migrant health and infectious diseases in the EU/EEA.

1.4 Definition and data challenges

Understanding and meeting the diverse health needs of migrants affected by infectious diseases in Europe is crucial in order to protect both individual and public health [10]. However, accurate information on migrants and migrant health is not available in many European countries and there are significant limitations on interpreting data relating to migrant health. Specific challenges include:

- Comparisons of migrant health across Europe are challenging due to varied definitions of migrants. Not all countries follow the UN Recommendations on Statistics of International Migration definition. Definitions and classifications of migrants are determined by national legislative, administrative and policy factors [25]; migrants may be classified by country of birth, nationality, residency or duration of stay [26].
- Calculating disease prevalence and incidence rates in migrants is difficult as migration statistics may not include irregular migrants and denominators may therefore be underestimated.
- Health information systems or surveys in most EU Member States and EEA countries do not routinely collect or disaggregate data according to migrant status [27]. The European Surveillance System (TESSy) has collected data on country of origin for HIV, TB, syphilis and gonorrhoea for some years. More recently, efforts have been made to harmonise data collected by national surveillance systems on migrant-specific variables such as 'country of birth' or whether a case is 'imported or indigenous' for other diseases including hepatitis B and C, and measles. However, the type and quality of surveillance data collected still varies greatly among Member States and reporting on some migrant-specific variables is poor or absent.
- For measles, importation status is classified as 'imported', 'import-related' or 'indigenous'. The definitions for these variables in TESSy are:
 - 'Imported': having been outside the country of notification during the incubation period of the reported disease, with no links to local transmission identified.
 - 'Import-related': case epidemiologically linked to an imported case – i.e. cases that acquired the infection locally through a direct link to an imported case in the first chain (only) of transmission as supported by epidemiological and/or virological evidence.
 - 'Indigenous case': is a case infected within the country of residence (based on epidemiological and virological evidence) that is not import-related, or any case with an unknown source of infection (no epidemiological or virological evidence).

- There is a lack of data on different types of migrant (e.g. asylum seeker or irregular migrant) and on the extent to which different migrant populations are affected by infectious diseases. Although studies in many European countries suggest that certain groups of migrants are more affected by some infectious diseases than the majority population [1, 28], the data available are limited. Causal factors accounting for increased risk of infectious disease among some migrant populations are poorly understood. Equally, some groups of migrants appear to have reduced rates of certain infectious diseases, but the reasons for this are poorly understood.

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2. Methods

2.1 Introduction

In order to collect, assess and summarise available evidence on the burden of infectious diseases in migrant populations in the EU/EEA, the project used the following data sources:

- The European Surveillance System (TESSy).
- A literature review.
- A survey sent to EU/EEA countries.

The methodology used and limitations identified are described below. Additional data for this report have also been sourced from ECDC meetings with national disease focal points and other experts, and more recent ECDC surveillance reports.

2.2 Analysis of TESSy data

The European Surveillance System (TESSy) is a system for data collection, validation and dissemination which is intended to inform public health action. All EU Member States and EEA countries are formally requested to report data on communicable diseases to TESSy. The 53 diseases and conditions under surveillance share a common set of variables. In addition, disease-specific variables are included to allow for specific analysis, and enhanced surveillance is conducted for selected priority diseases to allow for more in-depth analysis. For this project, TESSy data on HIV, TB, hepatitis B, hepatitis C, gonorrhoea, syphilis, measles and rubella were reviewed. These data included basic demographic data as well as specific migrant-related data. Case-based TB surveillance data were extracted from TESSy covering cases during the years 2000–2010. For the analyses in this report, only case-based data from TESSy were used, not aggregated data collected through WHO's Global TB database (TME). TESSy data on malaria were extracted separately by ECDC for the malaria chapter. Chagas disease is currently not under EU surveillance.

Two categories of variables potentially related to migration were available from the TESSy database (Table 2.1 summarises existing variables currently collected by TESSy):

- Variables that aim to elicit the migration status of affected individuals e.g. either 'country of birth', 'country of nationality' or 'region of origin'.
- Variables that aim to elicit whether the infection was 'imported' and the 'probable country of infection'.

The 'country of birth' variable was used whenever possible to elicit the migration status of affected individuals. This is because an expert panel convened by ECDC in 2011 deemed it to be the most reliable indicator of whether or not an individual is a migrant [1]. The variables 'country of nationality' and 'country of citizenship' were also considered, although these were often poorly reported. 'Region of origin' is a variable in which cases are grouped according to 'country of birth' into geographical regions, such as sub-Saharan Africa. For example, this applies to HIV, where cases from sub-Saharan Africa are used as a proxy for cases originating from high-prevalence countries. In some instances, discrepancies were found between 'region of origin' and 'country of birth' and these are discussed in the findings of the analysis.

Table 2.1 Variables currently collected through TESSy

Variable	HIV	TB	HBV	HCV	Gonorrhoea	Syphilis	Measles	Rubella	Malaria	Chagas disease*
Country of birth	X	X	X	X	X	X				
Country of nationality	X	X	X	X	X	X				
Probable country of infection	X		X	X	X	X	X	X	X	
Imported			X	X			X	X	X	
Region of origin	X									

* Not under EU surveillance

Although 'country of birth' was the preferred variable for analysing migration status, this variable was not equally well reported for all of the diseases with TESSy data available. Data on 'country of birth' of cases were most complete for HIV and TB. Data were less complete for hepatitis B, hepatitis C, gonorrhoea and syphilis and so, while the findings may still be used for analysis of data on these diseases, they should be treated with caution. For TB, the geographic origin is classified according to place of birth or, if unavailable, citizenship. In Denmark, the

parents' place of birth is also used in classifying origin. Similarly, in the Netherlands, the parents' birthplace is notified for case management purposes.

For measles and rubella, the variables on 'country of birth' or 'country of nationality' are not under EU surveillance. However, the variable for 'imported' or 'indigenous' case was well reported for these diseases and for hepatitis B and C. This variable is coded by public health specialists who, based on case history, make a judgment about whether a case was likely to have been acquired in the reporting country (i.e. an indigenous case) or in another country (i.e. an imported case). For measles and rubella, if the infection was acquired from a person who acquired it following recent travel, then the secondary case is classified as 'import-related'. In cases of measles, this variable is a better marker of an individual who has travelled recently than of migrant status, as non-migrants also travel. For hepatitis B and C, due to the longer incubation periods and the asymptomatic nature of the diseases, the 'imported' variable is less likely to be a marker of recent travel but this is still possible. Indeed, for all diseases the use of the 'imported' variable is limited as it is not possible to distinguish between cases in migrants and cases in non-migrant travellers.

Finally, variables on 'probable country of infection' and 'probable region of infection' were, in general, poorly reported. Where available, these variables were considered to check consistency in data trends.

Data from TESSy for the years 1990 to 2011 were analysed using MS Excel 2007. For each disease, the data were screened for possible errors and cleaned accordingly. Differences between countries were first analysed in relation to migrant status. Where possible, trends over time were also analysed to identify whether there was any association between migrant status and issues such as different routes of transmission.

2.3 Literature review

A literature review was conducted for each of the following infectious diseases: TB, hepatitis B, hepatitis C, gonorrhoea, syphilis, measles and rubella. The specific objectives were to:

- Estimate the burden of the disease in migrants within the EU/EEA based on available and relevant data on prevalence, incidence and mortality, highlighting geographical patterns and time trends.
- Establish the burden of disease in migrants by age, gender, country of origin, and other relevant stratifying variables where data are available.
- Identify data gaps and limitations.

Information sources: Studies and other publications were identified by searching electronic databases and relevant websites, scanning reference lists of papers and asking infectious disease experts. Three electronic databases and 18 websites (see Annex 1) were searched during July–September 2012. The database search strategy used a combination of keywords (see Annex 2) for: (i) the disease (ii) the study population (i.e. migrants) and (iii) the study setting (i.e. the EU/EEA). The PubMed search used free text terms combined with Medical Subject Heading (Mesh).

Inclusion criteria: Studies and other publications were considered for inclusion, if they: (i) were descriptive and analytical observational studies, experimental studies, reviews, systematic reviews and meta-analyses, guidelines or published and unpublished policy documents; (ii) were published after 2006; (iii) were published in English; (iv) included data from the EU/EEA; (v) included data on TB, hepatitis B, hepatitis C, gonorrhoea, syphilis, measles and/or rubella. Data from non-EU/EEA publications were considered for inclusion to provide background information only.

Study selection: Eligibility for inclusion was assessed independently by two reviewers. Following an initial screening of all publications identified based on title and abstract, the full text was screened for all selected articles to determine final eligibility. Disagreements between reviewers were resolved by discussion.

Table 2.2 summarises the results of the literature search. Relevant data were retrieved from studies that met the inclusion criteria. Priority was given to recent nationally representative studies and large population-based studies. Although no minimum sample size was defined, small hospital-based studies were only included if no other data were available and their limitations were noted.

Table 2.2 Studies identified by systematic literature review

	TB	HBV	HCV	Syphilis and gonorrhoea	Measles and rubella	Malaria	Chagas
Number of studies identified by initial search	261	319	222	698	185	419	234
Number of studies excluded as duplicates or irrelevant based on title and abstract	167	258	169	655	158	322	172
Number of full text studies assessed for eligibility	94	61	53	43	27	58	62
Number of studies meeting review inclusion criteria	44	33	17	Syphilis – 14 Gonorrhoea - 10	Measles – 15 Rubella - 5	18	28

A separate review of the literature was also conducted for the chapters on malaria and Chagas disease.

2.4 Survey of EU/EEA countries

The purpose of the survey was to:

- Collect relevant data not reported by EU/EEA countries to TESSy and identify literature not captured by the literature review.
- Improve understanding of what data are available on infectious diseases among migrants in these countries.
- Seek country views about the extent to which migrants are affected by infectious diseases.

The survey involved three questionnaires on hepatitis B and C, gonorrhoea and syphilis, and measles and rubella. The questionnaires included open-ended questions on how migrants are defined for surveillance purposes, which infectious diseases particularly affect migrants, whether any additional data are available and, for measles, a request for data on incidence and mortality rates for 2007–2010. The questionnaires were sent out electronically in July–August 2012 to ECDC disease focal points in all EU/EEA countries. Information about which country focal points responded to the questionnaires is included in the disease-specific sections of this report.

2.5 ECDC meetings

This report also draws on data presented at a meeting on migrant health and infectious diseases in October 2012 co-hosted by ECDC and the National Health Institute in Lisbon, Portugal. The purpose of the meeting was to present and seek feedback on the findings of the literature review and the survey and to share country experience and best practice in surveillance, prevention and control of infectious diseases in migrant populations.

In addition, the chapter on HIV draws on data from an ECDC meeting on monitoring HIV among migrant populations in Europe that was held in Madrid in October 2013. The countries presenting data and experience at this meeting were Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Switzerland, and the United Kingdom. Key findings from recent ECDC projects on migrant access to HIV testing and care [2,3] and on acquisition of HIV among migrants after arrival in the EU/EEA are also presented in the chapter.

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3. HIV

This chapter summarises available evidence on HIV infection among migrants in the EU/EEA, based on analysis of TESSy surveillance data for 2007–2011, supplemented by country data presented at an ECDC meeting on monitoring HIV among migrant populations held in Madrid in October 2013. In addition, key findings from recent ECDC projects on migrant access to HIV testing and care and on acquisition of HIV among migrants after arrival to the EU/EEA are presented.

3.1 Introduction

Globally, in 2012, it was estimated that 35 million people were living with HIV and that there had been 1.6 million AIDS-related deaths. The majority of people living with HIV (25 million) are in sub-Saharan Africa, where heterosexual transmission is the main mode of transmission and overall HIV prevalence in the general adult population is estimated to be 4.7% [1].

There are also large numbers of people living with HIV in south and south-east Asia (3.9 million), Latin America and the Caribbean (1.75 million), eastern Europe and Central Asia (1.3 million), and North America (1.3 million) [2]. Although there is variation between and within countries in these regions, HIV prevalence in the general adult population tends to be low, except for the Caribbean, with the majority of new HIV infections concentrated in key populations including MSM and people who inject drugs.

In 2012, 2.3 million people were estimated to have become infected with HIV across the globe, although the number of annual new infections has declined during the period 2001 to 2012. This decline is largely due to increased access to antiretroviral treatment and scale up of interventions to prevent mother-to-child transmission of HIV. Twenty-six countries reported reductions in HIV incidence of more than 50% between 2001 and 2012; 15 of these countries were in sub-Saharan Africa; five in south and south-east Asia; three in Latin America and the Caribbean; and one each in eastern Europe, Oceania, North Africa and the Middle East. In sub-Saharan Africa, the number of new HIV infections among adults has declined by 34% since 2001 [1].

3.2 HIV in the EU/EEA: analysis of surveillance data

HIV remains a significant public health issue in the EU/EEA. For 2011, 28 038 HIV diagnoses were reported by 29 EU/EEA countries. The notification rate per 100 000 population was 5.7 for the EU/EEA overall, but ranged from 0.9 in Slovakia to 27.3 in Estonia [3]. Since the early 1980s, 420 564 HIV cases have been notified in the EU/EEA and the cumulative total of cases reported as known to have died by the end of 2011 was 179 554. In 2011, 39% of HIV cases reported were among MSM, 36% were due to heterosexual transmission and 5.0% were due to injecting drug use.

For HIV, data on the country of birth, nationality, or region of origin of cases have been routinely collected as part of European-level surveillance since 2008. Although the ways in which this information is collected varies between countries, most countries now report 'country of birth' data to TESSy. The analyses reported in this chapter use data on 'geographical origin', based on TESSy variables for country of birth, country of nationality and region of origin. Native-born cases were defined as those where the country of birth or country of nationality were the same as the reporting country. Migrant cases had a country of birth or country of nationality that differed from the reporting country.

Regions for geographical origin of migrant cases included: western Europe¹⁴, central Europe¹⁵, eastern Europe¹⁶, sub-Saharan Africa¹⁷, east Asia and Pacific¹⁸, Australia and New Zealand¹⁹, south and south-east Asia²⁰, North Africa and the Middle East²¹, North America²², Caribbean²³, Latin America²⁴ or unknown or missing.

¹⁴ Andorra (AD), Austria (AT), Belgium (BE), Denmark (DK), Finland (FI), France (FR), Germany (DE), Greece (GR), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Luxembourg (LU), Malta (MT), Monaco (MC), Netherlands (NL), Norway (NO), Portugal (PT), San Marino (SM), Spain (ES), Sweden (SE), Switzerland (CH), United Kingdom (UK) (23 countries). It has also included the following codes: Malvinas (FK), Faroe Islands (FO), Gibraltar (GI), Greenland (GL)

¹⁵ Albania (AL), Bosnia & Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Hungary (HU), Macedonia (MK), Montenegro (ME), Poland (PL), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Turkey (TR) (15 countries)

¹⁶ Armenia (AM), Azerbaijan (AZ), Belarus (BY), Estonia (EE), Georgia (GE), Kazakhstan (KZ), Kyrgyzstan (KG), Latvia (LV), Lithuania (LT), Republic of Moldova (MD), Russian Federation (RU), Tajikistan (TJ), Turkmenistan (TM), Ukraine (UA), Uzbekistan (UZ) (15 countries)

¹⁷ Angola (AO), Benin (BJ), Botswana (BW), Burkina Faso (BF), Burundi (BI), Cameroon (CM), Central African Republic (CF), Cape Verde (CV), Chad (TD), Comoros (KM), Congo (CG), Democratic Republic of Congo (CD), Cote d'Ivoire (CI), Djibouti (DJ), Equatorial Guinea (GQ), Eritrea (ER), Ethiopia (ET), Gabon (GA), Gambia (GM), Ghana (GH), Guinea (GN), Guinea-Bissau (GW), Kenya (KE), Lesotho (LS), Liberia (LR), Madagascar (MG), Malawi (MW), Mali (ML), Mauritania (MR), Mauritius (MU), Mozambique (MZ), Namibia (NA), Niger (NE), Nigeria (NG), Rwanda (RW), Seychelles (SC), Senegal (SN), Sierra Leone (SL), Somalia (SO),

Of 151 890 HIV cases reported by 29 EU/EEA countries²⁵ during 2007–2011, 125 225 (82%) had information about sex and geographical origin; cases with unknown information for sex or geographical origin were excluded from the analysis. Some countries had a high percentage of cases where geographical origin could not be determined. These include Estonia (86% of cases with unknown geographical origin), Latvia (69%), Italy (47%), France (27%), Belgium (27%) and Ireland (20%).

Of the 125 225 cases with known geographical origin during 2007–2011, 49 950 (40%) were in migrants. Among the migrant cases, 54.3% were from sub-Saharan Africa, 12.2% from Latin America, 9.5% from western Europe, 6.0% from central Europe, 5.0% from south and southeast Asia, 4.1% from eastern Europe, 4.0% from the Caribbean and 5.0% from countries in other regions.

Overall during 2007–2011, 92% of cases in migrants were reported by countries in western Europe. Country data presented at the ECDC Madrid meeting in October 2013 on migrant health monitoring confirm the importance of HIV among migrants in the western part of the EU/EEA, and that in some EU/EEA countries migrants with HIV are largely from sub-Saharan Africa (Box 3.1). Data reported by countries for 2011 show that the percentage of cases among migrants varies considerably among countries, ranging from less than 1.0% to over 70% (Figure 3.1).

Box 3.1 HIV cases among migrants in selected western European countries

In Finland, in 2011, 59% of new HIV diagnoses were in people of non-Finnish origin. These people were mainly from Thailand, Russia, Estonia and countries of Africa, including Kenya, Zambia, Congo, Cameroon and Nigeria.

In France, between 2003 and 2011, most new diagnoses were made among heterosexuals, two thirds of whom were born abroad. In 2011, 47% of all new HIV diagnoses were in those born abroad. Of these, 68% were born in sub-Saharan Africa, particularly in Cameroon, Côte d'Ivoire and Congo.

In Germany, between 2001 and 2012, 58% of new HIV diagnoses were among people from Germany, 25% were among people from other countries and in 17% the country of origin was unknown. Of all new HIV diagnoses among people originating from outside Germany, 40% were in people from sub-Saharan Africa. During the same period, 46% of those known to have acquired HIV heterosexually were from sub-Saharan Africa.

In Italy, between 2003 and 2011, the number of new HIV diagnoses per 100 000 population was much higher among non-nationals (>20 per 100 000 in most years) than among Italians (<10 per 100 000).

In the Netherlands, in 2012, people from sub-Saharan Africa accounted for 28% of all new diagnoses of heterosexually acquired HIV.

In Portugal, the percentage of new diagnoses among migrants fell in the 1980s, but then increased from 10.5% in 2000 to 23.5% in 2012. The main reason has been the greater rate of decline of new HIV diagnoses among people born in Portugal than among migrants. A total of 62% of all HIV infections among migrants diagnosed from 1983 to 2013 were in people from sub-Saharan Africa.

In Spain, in 2011, the percentage of people born outside Spain among those newly diagnosed with HIV was 37%. Among those born outside Spain, 57% originated from Latin America and 19% from sub-Saharan Africa.

South Africa (ZA), Swaziland (SZ), Tanzania (TZ), Togo (TG), Uganda (UG), Zambia (ZM), Zimbabwe (ZW) (44 countries) It also includes the following codes: Mayotte (YT), Reunion (RE) (belonging to France)

¹⁸ China (CN), Fiji (FJ), Hong Kong (HK), Japan (JP), Democratic Peoples' Republic of Korea (KP), Republic of Korea (KR), Mongolia (MN), Papua New Guinea (PG), Micronesia (FM), Macao (MO), New Caledonia (NC), French Polynesia (PF), Solomon Island (SB), Timor-Leste (TL), Taiwan (TW), Samoa (WS) (16 countries)

¹⁹ Australia (AU), New Zealand (NZ) (two countries)

²⁰ Afghanistan (AF), Bangladesh (BD), Bhutan (BT), Brunei Darussalam (BN), Cambodia (KH), India (IN), Indonesia (ID), Islamic Republic of Iran (IR), Laos (LA), Malaysia (MY), Maldives (MV), Myanmar (MM), Nepal (NP), Pakistan (PK), Philippines (PH), Singapore (SG), Sri Lanka (LK), Thailand (TH), Vietnam (VN) (19 countries)

²¹ Algeria (DZ), Bahrain (BH), Egypt (EG), Iraq (IQ), Jordan (JO), Kuwait (KW), Lebanon (LB), Libyan Jamahiriya (LY), Morocco (MA), Oman (OM), Qatar (QA), Saudi Arabia (SA), Sudan (SD), Syrian Republic (SY), Tunisia (TN), United Emirates (AE), Yemen (YE), Palestine Territory (PS) (18 countries)

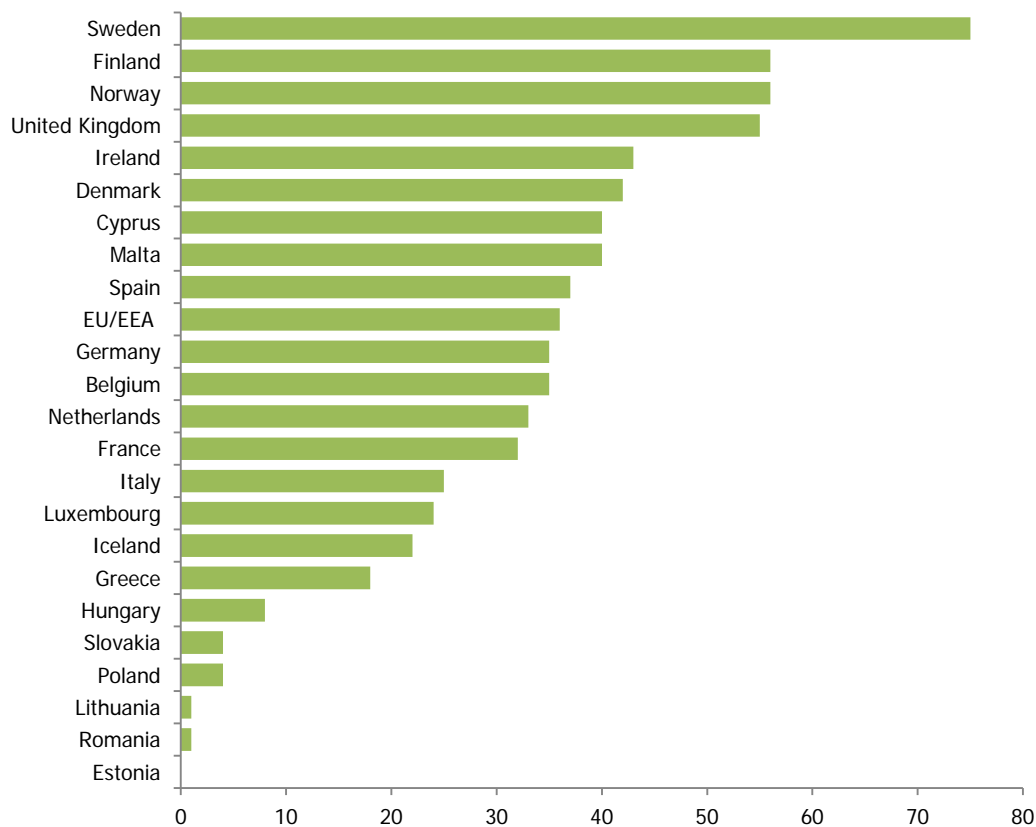
²² Canada (CA), United States (US) (two countries)

²³ Bahamas (BS), Barbados (BB), Cuba (CU), Dominican Republic (DO), Haiti (HT), Jamaica (JM), Trinidad and Tobago (TT), Antigua and Barbuda (AG), Anguilla (AI), Aruba (AW), Bermuda (BM), Bonaire Saint Eustatius and Saba (BQ), Curacao (CW), Dominica (DM), Grenada (GD), Guadeloupe (GP), Saint Kitts and Nevis (KN), Saint Lucia (LC), Martinique (MQ), Montserrat (MS), Puerto Rico (PR), Saint Helene (SH), Sao Tome and Principe (ST), Saint Martin (SX), Turks and Caicos Islands (TC), Saint Vincent & Grenadines (VC), Virgin Islands (VG) (VI) (27 countries)

²⁴ Argentina (AR), Belize (BZ), Bolivia (BO), Brazil (BR), Chile (CL), Colombia (CO), Costa Rica (CR), Ecuador (EC), El Salvador (SV), Guatemala (GT), Guayana Francesa (GF), Guayana (GY), Honduras (HN), Mexico (MX), Nicaragua (NI), Panama (PA), Paraguay (PY), Peru (PE), Suriname (SR), Uruguay (UY), Venezuela (VE) (20 countries)

²⁵ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

Figure 3.1 Proportion of migrants among new reported HIV cases, EU/EEA, 2011



Source: European Centre for Disease Prevention and Control (2013) [10]

Trends in HIV case reports among migrants

The total number of newly reported HIV diagnoses among migrants increased slightly over the period, with 9 676 migrant HIV cases reported in 2007 and 9 937 cases reported in 2011 (Table 3.1).

Due to increased numbers of HIV cases reported among natives during the period 2007–2011, the relative percentage of cases among migrants declined. Migrants accounted for 41.7% of HIV cases reported in 2007 compared with 37.2% in 2011 (Figure 3.2).

Figure 3.2 Percentage of migrants among all HIV cases reported, 2007–2011, EU/EEA (n=125 225)

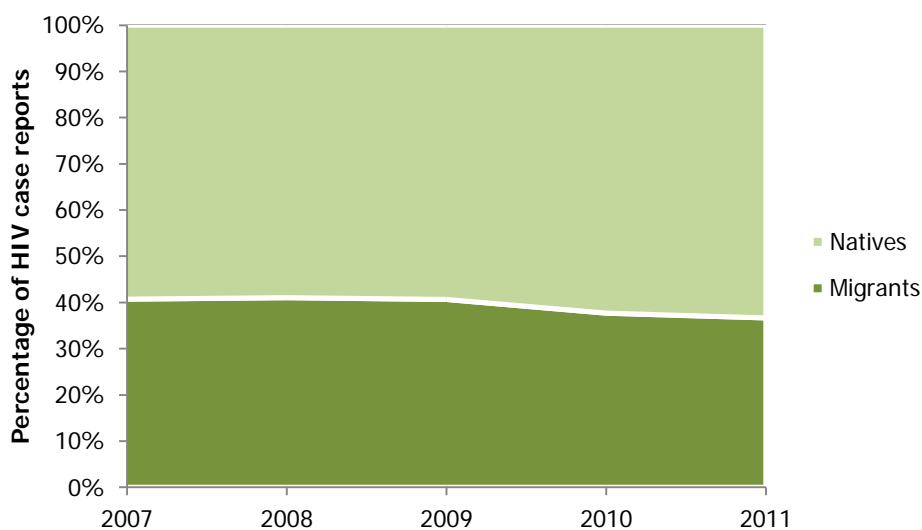


Table 3.1 Reported HIV cases by geographical origin, EU/EEA, 2007–2011

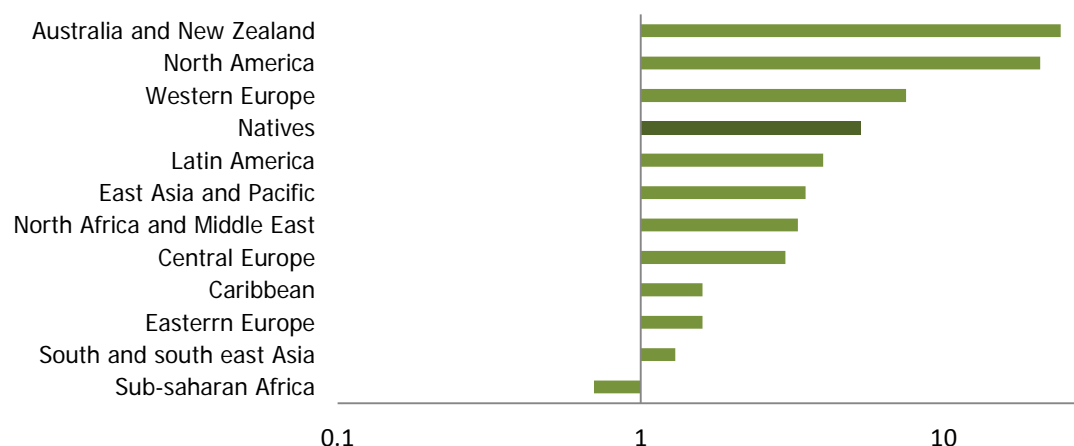
Total	2007	2008	2009	2010	2011	2007-2011
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Natives	13 534 (58.3)	14 110 (58.3)	13 985 (58.9)	16 891 (61.7)	16 755 (62.8)	75 275 (60.1)
Western Europe	883 (3.8)	957 (3.9)	934 (3.9)	969 (3.5)	1 005 (3.8)	4 748 (3.8)
Central Europe	435 (1.9)	527 (2.2)	547 (2.3)	716 (2.6)	798 (3.0)	3 023 (2.4)
Eastern Europe	301 (1.3)	370 (1.5)	404 (1.7)	480 (1.7)	478 (1.8)	2 033 (1.6)
Sub Saharan Africa	5 846 (25.2)	5 794 (23.9)	5 322 (22.4)	5 317 (19.4)	4 884 (18.3)	27 163 (21.7)
East Asia & Pacific	54 (0.2)	94 (0.4)	50 (0.2)	90 (0.3)	67 (0.2)	355 (0.3)
Australia & New Zealand	43 (0.2)	69 (0.3)	54 (0.2)	44 (0.2)	43 (0.2)	253 (0.2)
South & south-east Asia	455 (2.0)	459 (1.9)	480 (2.0)	561 (2.0)	509 (1.8)	2 464 (1.9)
North Africa & Middle East	235 (1.0)	246 (1.0)	232 (1.0)	301 (1.1)	304 (1.1)	1 318 (1.0)
North America	87 (0.4)	107 (0.4)	114 (0.5)	114 (0.4)	124 (0.5)	546 (0.4)
Caribbean	378 (1.6)	368 (1.5)	392 (1.6)	431 (1.6)	383 (1.4)	1 952 (1.6)
Latin America	959 (4.2)	1 117 (4.6)	1 209 (5.1)	1 468 (5.4)	1 342 (5.0)	6 095 (4.9)
Subtotal non-natives	9 676	10 108	9 738	10 491	9 937	49 950
Total	23 210	24 218	23 566	27 382	26 692	125 225

Trends over time varied by geographical origin. The largest overall and proportional decline was among migrants from sub-Saharan Africa; 5 846 reported in 2007 and 4 884 in 2011 (Table 3.1). Cases among migrants from Latin America increased over the same period, from 959 in 2007, peaking at 1 468 in 2010 and decreasing slightly to 1 342 in 2011. There were also increases in cases reported during 2007–2011 among migrants from central and eastern Europe. It is very likely that the changes in case reports by geographical origin reflect changing patterns of migration within and to the EU/EEA, but other factors, such as changed incidence of HIV or uptake of HIV testing may also partially explain the slight changes observed in trends.

Gender

HIV cases in men outnumber those in women in native-born and migrant populations, with the exception of migrants from sub-Saharan Africa. Of all HIV cases reported during 2007–2011 with known geographic origin and gender, 73% (91 355 cases) were among men and the overall male-to-female ratio was 2.7.

In native-born cases, the male-to-female ratio was 5.3. Among those originating from other regions, the male-to-female ratio varied considerably, from 24.3 among migrants originating from Australia and New Zealand to 0.7 among those originating from sub-Saharan Africa (Figure 3.3).

Figure 3.3 Male-to-female ratio in newly diagnosed HIV cases, by region of origin, 2007–2011

The male-to-female ratio for sub-Saharan African migrants diagnosed with HIV in Europe largely mirrors the male-to-female ratio in the region of origin, where HIV prevalence is higher in women. Country presentations at the ECDC Madrid meeting confirmed that prevalence of HIV infection is higher in women than in men from sub-Saharan Africa. For example, in Belgium, since the mid-1990s, the number of newly diagnosed HIV infections originating from sub-Saharan Africa has been higher in women than in men, and in France, 60% of those diagnosed with HIV from sub-Saharan Africa in 2011 were women. However, the greater likelihood that women will be tested for HIV than men, for example during routine antenatal screening, could mean that a larger number of women are more likely to be diagnosed with HIV.

For other regions, HIV infections among men predominate. While this may reflect MSM transmission and high rates of testing among men, it may also reflect gender differences in migration from some regions to the EU/EEA.

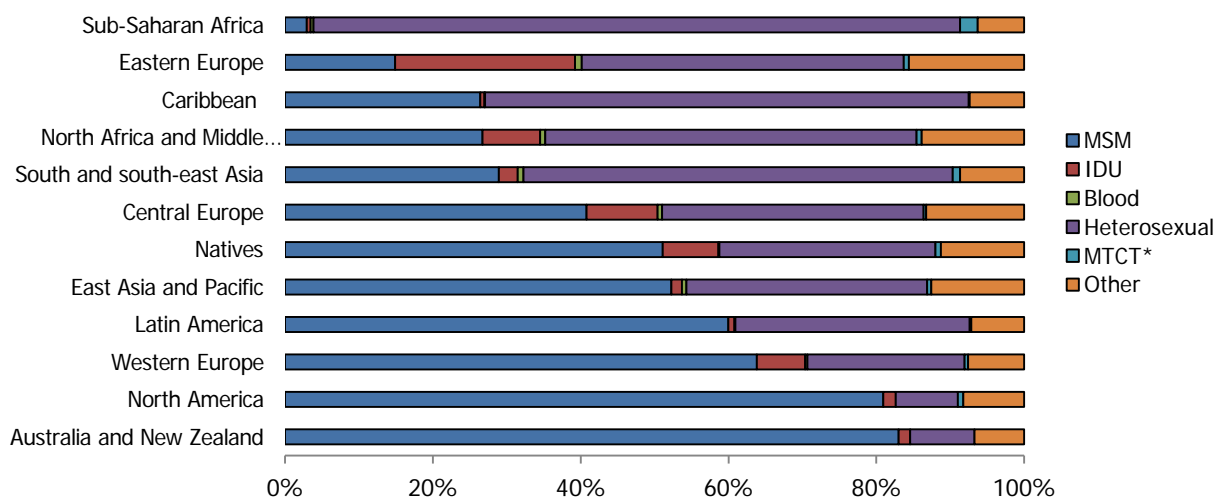
Mode of transmission

Routine annual HIV surveillance conducted by ECDC and WHO Europe shows that in 2012, approximately 40% of HIV cases reported in the EU/EEA were due to sex between men, 34% to heterosexual transmission and 6.0% to injecting drug use. Less than 1.0% of cases reported were due to mother-to-child transmission and the remainder were classified as having an unknown route of transmission.

More than 33% of cases reported as heterosexually transmitted were in people originating from countries in sub-Saharan Africa. However, this proportion varies significantly between countries, with Belgium, Ireland, Malta and Sweden reporting more than 50% of heterosexually transmitted cases in people originating from sub-Saharan Africa, and Bulgaria, Cyprus and Spain less than 20%.

Predominant modes of transmission differ between sub-groups of migrants depending on the region of origin (Figure 3.4). Among new HIV cases reported in migrants from sub-Saharan Africa, 88% were due to heterosexual transmission. Among HIV cases reported in migrants from Latin America, 59% were due to MSM transmission and 33% due to heterosexual transmission. New HIV cases among migrants from eastern Europe were reported as being due to heterosexual (43%), injecting-drug-use (23%) and MSM (16%) transmission. The majority of new HIV cases reported among migrants from western Europe, central Europe, east Asia and the Pacific, Australia and New Zealand were among MSM, while heterosexual transmission was the main transmission category for migrants from south and south-east Asia, North Africa and the Middle East, and the Caribbean.

During the period 2007–2011, 58% of all HIV cases where heterosexual transmission was the reported route of transmission were among migrants, as were 57% of cases of mother-to-child transmission, 23% of cases with MSM as the route of transmission and 20% of cases with injecting drug use as the route of transmission.

Figure 3.4 Reported HIV cases by transmission category and geographical origin, EU/EEA, 2007–2011 (n=125 225)

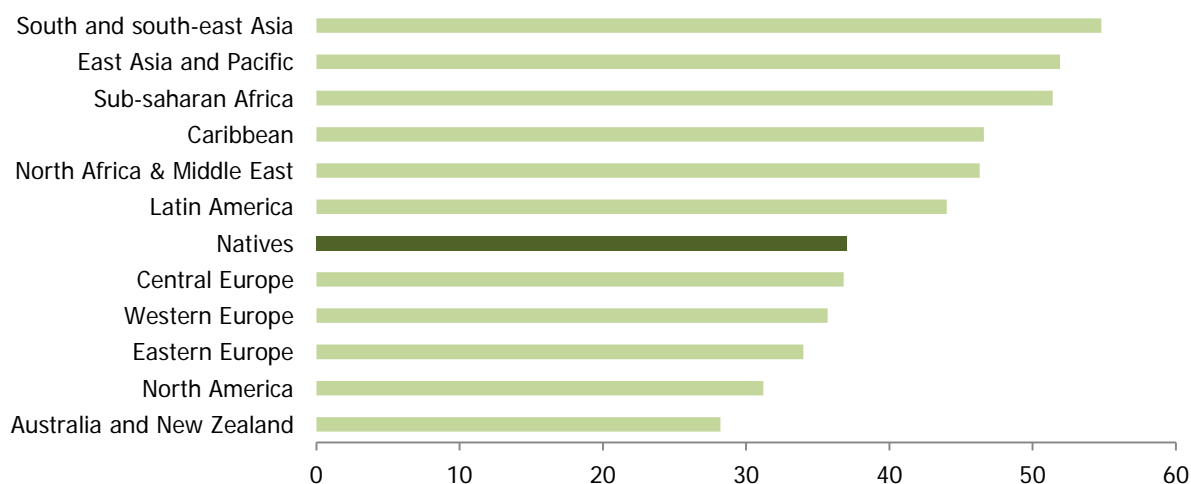
* MCTC – Mother-to-child transmission

Late diagnosis

CD4 cell count information was available for 76 460 (62%) of the cases with known geographical origin. Overall, median CD4 cell count at diagnosis was lower for migrant HIV cases than for native-born cases (302 cells/mm³ vs. 379 cells/mm³).

More than 37% of native-born cases were diagnosed late (i.e. with a CD4 cell count <350 cells/mm³ or AIDS) (Figure 3.5). Only migrants from western Europe, North America, Australia and New Zealand, eastern Europe and central Europe had comparable or lower percentages of late diagnosis than native-born cases.

Migrants originating from other regions had higher percentages of late diagnosis than native-born cases: 44% from Latin America; 46% from North Africa and the Middle East; 46% from the Caribbean; 51% from east Asia and the Pacific; 51% from sub-Saharan Africa; and 55% from south and south-east Asia were diagnosed with CD4<350 cells/mm³ or AIDS. Data presented at the ECDC Madrid meeting also suggest that migrants are more likely to be diagnosed late with HIV than those born in the country (Box 3.2).

Figure 3.5 Percentage of late HIV diagnosis, by geographic origin, EU/EEA, 2007–2011

Box 3.2 Late diagnosis of HIV in migrants

In Belgium, the percentage of migrants from sub-Saharan Africa diagnosed late (CD4 < 350) between 1998 and 2011 ranged from 50–70%. In 2011, the proportion was 51%; this proportion was higher than the mean (42%).

In France, more than one-third of people infected heterosexually were reported to have CD4 < 200 or AIDS at the time of diagnosis. This figure was higher for those born abroad (men 43%; women 30%) than for those born in France (men 38%; women 23%). Data from the Vespa2 study among HIV-infected hospital outpatients showed that rates of late diagnosis (CD4 < 350 or AIDS) (men 62%; women 56%) and diagnosis with advanced disease (CD4 < 200 or AIDS) (men 42%; women 34%) were very high among heterosexual migrants from sub-Saharan Africa. Rates of late diagnosis were particularly high among those diagnosed within one year of migration to France. Due to late diagnosis, it is estimated that there may be 9 000 migrants with undiagnosed HIV in France.

In Greece, rates of late diagnosis (CD4 < 350) or advanced disease (CD4 < 200) were higher among those of African origin (72% and 50% respectively) than those of Greek origin (51% and 29% respectively). Median CD4 count among those with a positive test from 2005 onwards was lower among Africans (218) than among Greeks (378).

In Italy, in 2011, just over one quarter of all new HIV diagnoses were made with a CD4 count < 200; this proportion was over 30% among non-nationals.

In the Netherlands, from 1996 to 2012, percentages of late diagnosis (CD4 < 350) ranged from 60% to 80% among non-Dutch heterosexuals and from 40% to 60% among Dutch heterosexuals.

In Spain, migrants from most regions were more likely to be diagnosed late (CD4 < 350) or with advanced disease (CD4 < 200) than people born in Spain. Migrants from sub-Saharan Africa were the most likely to be diagnosed late.

3.3 HIV testing and access to care

Key principles in the ECDC guidance on HIV testing [4] include ensuring that HIV testing is voluntary and confidential and that informed consent is given. It is also recommended that access to treatment, care and prevention services is ensured for those who test positive. It is specified that this should apply to all individuals at risk of or infected with HIV, including irregular migrants.

Despite this, migrants in many settings across Europe face legal, administrative, cultural and linguistic barriers to accessing HIV testing [5, 6]. Legal and administrative barriers include laws and regulations that prevent irregular migrants from accessing healthcare services in some countries. Cultural and linguistic barriers include racism, xenophobia, and language difficulties. Other barriers that affect migrants and non-migrants include low risk perception, fear and stigma associated with HIV and lack of knowledge about HIV testing policies and information about how the test is performed. An additional barrier is low socio-economic status. For example, data from France presented at the ECDC meeting in Madrid on people living with HIV born in sub-Saharan Africa showed that women had very low levels of education, high and increasing rates of unemployment and a considerable proportion were homeless.

National policies on HIV testing among migrant and ethnic minorities in EU/EEA/EFTA Member States were reviewed [7]. Twenty-two of 31 countries (71%) identified migrants as populations at risk of HIV infection and specifically mentioned people from regions such as sub-Saharan Africa, eastern Europe, the Caribbean, Asia and South America. Only 16 countries recommended HIV testing for specific groups of migrants and, in many cases, the benefits of early HIV detection were highlighted in relation to testing policies. The specific migrant groups identified in national testing policy documents are described in Table 3.2.

Table 3.2 Groups of migrants targeted for HIV testing

Country	Groups mentioned
Belgium	Migrant populations
Bulgaria	Refugees and asylum seekers; persons from high HIV prevalence countries and their sexual partners.
Denmark	Persons from Africa, Asia, South America and eastern Europe.
France	High HIV endemic countries, especially sub-Saharan Africa, Caribbean.
Iceland	All migrants intending to stay for over one year in Iceland as part of general health screening.
Lithuania	Migrant populations.
Luxembourg	People from sub-Saharan Africa, Asia, eastern Europe. Target groups of foreign-origin residents.
Netherlands	High HIV-prevalence countries (sub-Saharan Africa, Surinam, Netherlands Antilles, South America, eastern Europe and Asia); partners of people from HIV endemic area.
Norway	People from high HIV-endemic countries.
Poland	All migrants are offered a voluntary HIV test on arrival as part of general health screening.
Slovakia	All migrants to have an HIV test on arrival as part of general health screening.
Sweden	People from high-HIV endemic areas
Switzerland	People from countries with generalised epidemics.
UK	People from high HIV prevalence countries.

While HIV testing for migrants was not described as mandatory in any country surveyed, a few countries appeared to overtly encourage this practice.

With regard to access to treatment after testing positive, in 2012 as part of reporting on commitments to the Dublin Declaration Partnership to Fight HIV/AIDS in Europe and Central Asia, most EU countries stated that antiretroviral therapy was readily available to migrants. However, only 44% of countries reported that it was available for irregular migrants in their country [8]. Most country-reported barriers were legal or administrative, such as lacking access to health insurance or social security. Additional barriers included language, stigma and fear of deportation.

3.4 Acquisition of HIV after arrival in the EU/EEA

At European level, some data are collected through routine HIV surveillance on probable country of infection. However, these data are heterogeneously assembled and poorly reported; overall completeness in 2012 was only 13.6%. In many countries, this variable is completed based on patient or clinical reports, which can be subjective and imprecise. There is also evidence that these reports may underestimate the proportion of HIV cases assigned to the destination country due to a bias towards assuming that the infection was acquired in the country of origin [9].

A recent ECDC report [10] assessed the evidence for sexual transmission of HIV among migrant populations from countries with generalised HIV epidemics after arrival in the EU/EEA. The literature review²⁶ found evidence of on-going HIV acquisition and transmission after migration to Europe. Figures for the proportion of HIV infections acquired after migration ranged from 2.0% among sub-Saharan Africans in Switzerland to 62% among black Caribbean MSM in the United Kingdom. However, these figures need to be treated with caution as samples were small, there was little incidence data and many were based on mathematical models. In addition, some of the data may not represent the current situation in countries.

The same ECDC report also presented the results of a survey that asked EU/EEA countries if they had estimates of the extent to which HIV acquisition occurred after arrival. Precise estimates were available from Norway and the United Kingdom. In Norway, it was estimated that 14% of migrants diagnosed with HIV in 2011 were likely to have acquired HIV infection post-migration. Data from the United Kingdom for 2010 indicate that 46% of heterosexually acquired HIV infections reported among people born abroad were likely to have been acquired in the United Kingdom – an increase from 24% in 2004 [10]. Data from Public Health England also indicate that 33% of all new HIV diagnoses among MSM were among men born outside the United Kingdom and, of those born abroad, almost half (45%) were born elsewhere in Europe. Data from Spain for 2011 show that most men born outside Spain who acquire HIV as a result of sex with men come from Latin America.

Some data were also presented at the ECDC Madrid meeting in October 2013 on monitoring HIV among migrants. For example, Germany presented data showing that the probable country of infection was Germany in some migrants. The proportion of those that probably acquired HIV heterosexually in Germany between 2003 and 2012 was higher among those from other countries of Europe (53%) and the Americas (33%) than among those from Asia (15%) or sub-Saharan Africa (14%). Italy and Spain also presented data showing that there was evidence of migrants acquiring HIV in the host country. France reported data suggesting that in 2011, at least one quarter of new HIV infections diagnosed among people born in sub-Saharan Africa were likely to have been acquired in

²⁶ A systematic review of the literature identified 27 papers that met the inclusion criteria. These included evidence from the United Kingdom [9]; the Netherlands [5]; France [3]; Spain [3]; Switzerland [2]; Belgium [1] and Italy [1]. Three additional papers also covered the entire WHO European Region.

France. This is higher than the figure for the same year based on clinicians' reports, confirming the findings from the United Kingdom that probable country of infection reported by clinicians in migrants from sub-Saharan Africa underestimates the proportion of HIV infections occurring in migrants in the country to which they have migrated.

Data are available from only a few European countries and various methods have been used to estimate post-migration HIV acquisition. The available evidence, however, suggests that such transmission is occurring and that it needs to be better measured and monitored. This would also require collecting more accurate data on date of arrival in the host country.

3.5 Conclusions

Migrants represented two-fifths of reported HIV cases in the EU/EEA between 2007 and 2011. The number of HIV cases reported among migrants increased slightly over the period, with an increased trend among migrants from Latin America up to 2010; an increased trend throughout the period in central and eastern Europe; and a sustained decreasing trend among migrants from sub-Saharan Africa. The decline in cases from sub-Saharan Africa may reflect reduced incidence of HIV in countries of origin; sub-Saharan Africa saw a decline of 34% in new HIV cases between 2001 and 2012 [1]. Other reasons include changing migration patterns to and within the EU/EEA as a result of the economic crisis, and changes in availability or uptake of HIV testing among migrants in some EU/EEA countries. There have also been changes in the completeness of the variables for calculating geographic origin in some countries over the period, which might slightly influence the trends observed for both native and non-native cases presented in this analysis. Further investigation is required to improve understanding of the reasons for these changes and analysis of surveillance data by geographical origin will need to consider other regions in addition to sub-Saharan Africa.

Overall in the EU/EEA, migrants represent a significant proportion of HIV cases for all modes of transmission. Migrants account for the majority of cases due to heterosexual transmission, but also for more than 20% of cases attributed to sex between men and injecting drug use. Although much of the focus has rightly concentrated on migrants from high-prevalence countries, there is increasing evidence that other groups of migrants, such as MSM from other regions, including Latin America, are particularly vulnerable to HIV. Although numbers of HIV infection among people who inject drugs are relatively low in most EU/EEA countries, there have been increases in some European countries in the number of HIV diagnoses among foreign-born people who inject drugs. Better understanding of migrant sub-groups among high-risk populations is required in order to design and implement targeted prevention programmes.

Related to this is growing evidence that migrants are at risk of HIV acquisition after arrival in the EU/EEA. This includes migrants from countries with generalised HIV epidemics who may acquire HIV infection via heterosexual transmission as well as migrant MSM. Patterns and trends could be better understood through routine analysis of HIV surveillance data per risk group by migrant status and by producing routine estimates of probable country of HIV acquisition using an objective, surveillance-based method.

Migrants to the EU/EEA with HIV infection have poorer clinical and immunological indicators at diagnosis than native-born HIV cases. Specific measures are needed to increase uptake of HIV testing in order to address the difference in late diagnosis observed between migrants and non-migrants. Increasing uptake of testing will also require ensuring that all those who test positive for HIV have access to treatment and care, regardless of migrant status. It is also important to note that some migrants affected by HIV experience are subject to multiple social and economic deprivations, which may also influence access to services.

Data submitted to ECDC for Dublin Declaration reporting show that although many EU/EEA countries identify migrants as an important sub-population in their national response to HIV, few have adequate surveillance systems in place related to HIV among migrants. Countries participating in the ECDC meeting in Madrid in October 2013 did, however, report plans for behavioural or bio-behavioural surveys on aspects of migrant health and HIV.

HIV surveillance among migrants could be strengthened through improved completeness and analysis of variables such as country of birth, CD4 cell count at diagnosis, year of arrival, probable country of infection and route of transmission. This would increase understanding of HIV infection by migrant status over time, probable country of infection, and key migrant sub-populations at greatest risk of HIV infection. Depending on national resources and surveillance systems, sentinel surveillance or repeat cross-sectional surveys could help to provide this evidence. Methods that are becoming increasingly available to measure HIV incidence could also be used to inform HIV prevention programming and resource allocation.

In relation to HIV testing and access to care, EU/EEA countries would benefit from strategies and structures to ensure HIV testing can be easily accessed by migrants at risk of HIV, in order to reduce the proportion of this population that is undiagnosed. It is crucial that HIV testing is linked to HIV treatment and care, regardless of migrants' legal status, to ensure the effectiveness of proactive testing strategies and the benefits of timely treatment.

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7. Alvarez-Del Arco D, Monge S, Caro-Murillo AM, Ramírez-Rubio O, Azcoaga-Lorenzo A, Belza MJ, et al. HIV testing policies for migrants and ethnic minorities in EU/EFTA Member States. *Eur J Public Health*. 2014 Feb;24(1):139-44. doi: 10.1093/eurpub/ckt108. Epub 2013 Aug 5.
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4. Tuberculosis

This chapter summarises available evidence on tuberculosis among migrants in the EU/EEA, based on TESSy surveillance data for the years 2000–2010 and a review of the literature.

4.1 Introduction

Tuberculosis (TB) is a major global public health concern. In 2011, there were an estimated 8.7 million cases of TB globally, corresponding to 125 cases per 100 000 population.²⁷ TB was also responsible for 1.4 million deaths with 430 000 deaths in individuals infected with HIV [1]. Most TB cases occur in low-income settings, predominantly Asia (59%) and Africa (26%), but TB prevention and control remains a challenge in all countries [2].

WHO estimates that 4.3% of all TB cases in 2011 occurred in the European Region, with eastern Europe particularly affected [1]; 18 eastern European countries are defined by WHO as ‘high-priority countries’ and are targeted with specific TB control programmes. Five of these countries – Bulgaria, Estonia, Latvia, Lithuania and Romania – are EU Member States [3,4].

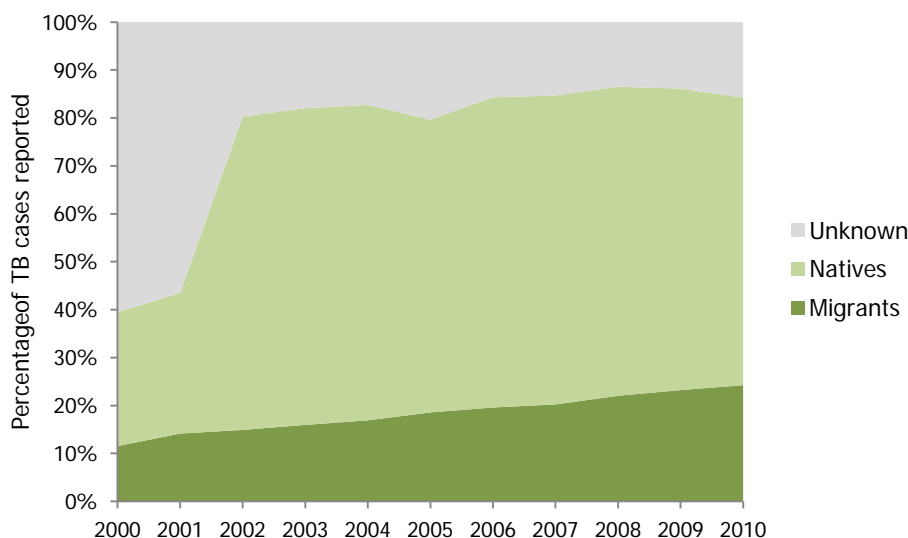
4.2 Tuberculosis in the EU/EEA: analysis of surveillance data

Since 2008, TB surveillance in Europe has been carried out jointly by ECDC and the WHO Regional Office for Europe. Data are provided from national surveillance institutions [5], and data from EU/EEA countries are validated by ECDC [6].

Geographical origin of reported cases is determined by country of birth or, when this information is unavailable, by proxy through citizenship – i.e. citizen or non-citizen of the country [5]. Austria, Belgium, Greece, Hungary and Poland classify origin of cases by citizenship. Denmark and the Netherlands report the birth place of cases’ parents; in Denmark, native-born cases under 26 years of age whose parents were born outside Denmark are classified as foreign-born or migrant cases [5,7].

Figure 4.1 shows that reporting on migration status of TB cases improved from 2002 onwards; information on country of birth was reported for approximately 80% of cases throughout the period 2002–2010.

Figure 4.1 Percentage of TB cases reported in the EU/EEA by migration status and year, 2000–2010



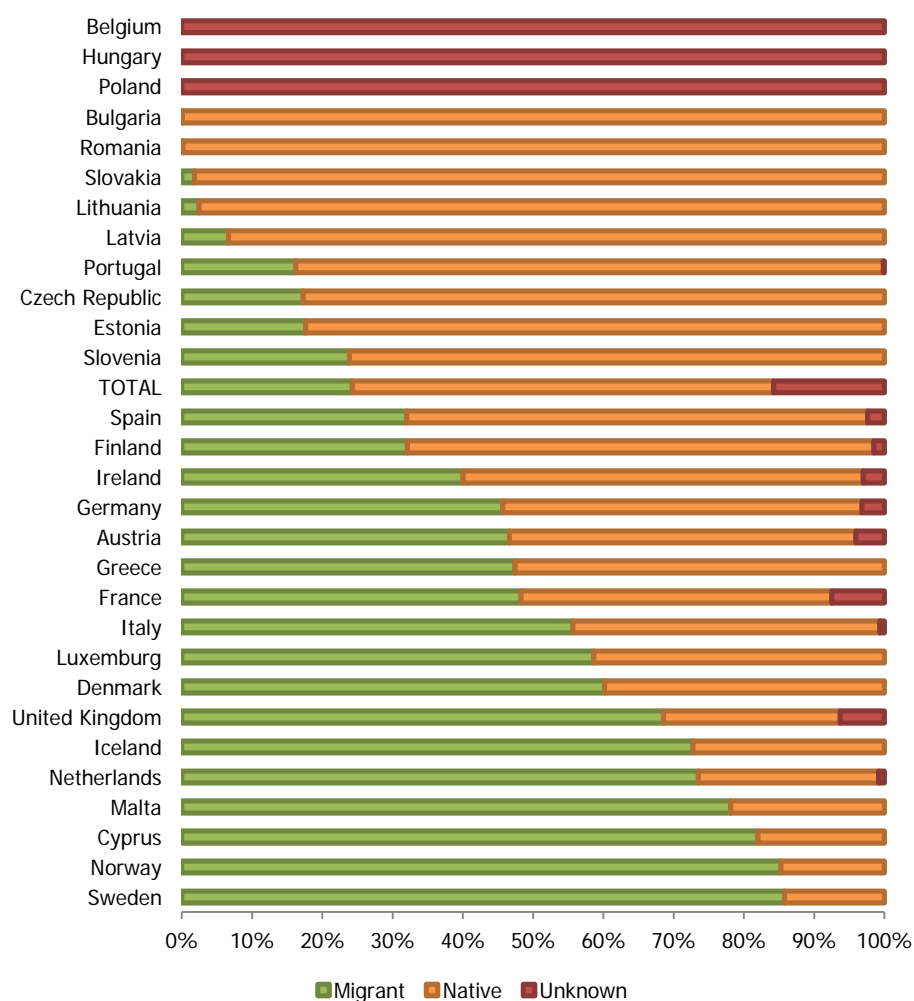
In 2010, 29 EU/EEA countries reported case-based data on migrant status of TB cases to TESSy or aggregated data to the WHO Global TB database (TME) with a data completeness of 98.3% (5). In 2010, the proportion of foreign-origin cases among all TB notifications in the EU/EEA was 25.1%, slightly higher than in 2008 (22.4%) [3] and in 2007 (21%) [6]²⁸.

²⁷ Infection with TB often does not progress to clinical disease. Throughout this chapter, ‘cases’ refers to individuals who have active TB disease.

²⁸ These numbers are from the joint ECDC/WHO TB Surveillance and Monitoring Report 2012, and include data of foreign origin from both TESSy case-based data and aggregated data reported to WHO.

Of the 29 reporting countries, 24 countries reported on country of birth. Austria and Greece reported on citizenship and Belgium, Hungary and Poland did not report case-based data to TESSy on country of birth or citizenship, but submitted aggregated data to WHO. Of the 73 994 total cases for which case-based data were reported in 2010, 24.3% (17 947 cases) were classified as 'foreign origin' or migrant, 60% (44 374 cases) as 'native origin' and 15.8% (11 673 cases) as 'unknown'²⁹ (Figure 4.2).

Figure 4.2 Percentage of TB cases reported in the EU/EEA Member States by migration status, 2010



In 11 of 29 countries providing data on origin of cases, the percentage of foreign origin cases was greater than 50% in 2010 (Table 4.1). Sweden, Norway and Cyprus reported the highest percentages of migrant cases among total TB notifications. In contrast, in the five high-priority countries (Bulgaria, Estonia, Latvia, Lithuania and Romania) most cases were of native origin.

²⁹ These numbers are from a separate data analysis of case-based data extracted from TESSy and do not include cases for which only aggregated data were available.

Table 4.1 TB cases by geographical origin and sex ratio in EU/EEA in 2010

Country	Criterion	Native			Foreign ^a			Unknown			Total	
		N	(%)	Sex ratio (M:F) ^a	N	(%)	Sex ratio (M:F) ^a	N	(%)	Sex ratio (M:F) ^a	N	Sex ratio (M:F) ^a
EU/EEA												
Austria	citizenship	385	(56.0)	1.7	299	(43.5)	1.4	4	(0.6)	1.0	688	1.5
Belgium	citizenship	506	(45.4)	1.7	609	(54.6)	2.1	0	(0.0)	-	1115	1.9
Bulgaria	birthplace	2647	(99.9)	1.9	2	(0.1)	1.0	0	(0.0)	-	2649	1.9
Cyprus	birthplace	11	(18.0)	1.8	50	(82.0)	1.3	0	(0.0)	-	61	1.3
Czech Republic	birthplace	561	(82.7)	1.7	117	(17.3)	2.7	0	(0.0)	-	678	1.8
Denmark ^b	birthplace	143	(39.8)	1.8	216	(60.2)	1.2	0	(0.0)	-	359	1.4
Estonia	birthplace	271	(82.4)	2.8	58	(17.6)	2.4	0	(0.0)	-	329	2.7
Finland	birthplace	217	(66.4)	1.5	105	(32.1)	1.6	5	(1.5)	1.5	327	1.5
France	birthplace	2264	(44.3)	1.3	2469	(48.3)	1.8	383	(7.5)	1.4	5116	1.5
Germany	birthplace	2213	(51.1)	1.7	1978	(45.7)	1.4	139	(3.2)	1.6	4330	1.6
Greece	citizenship	258	(52.8)	2.0	231	(47.2)	3.3	0	(0.0)	-	489	2.5
Hungary	citizenship	1720	(98.8)	1.8	21	(1.2)	4.3	0	(0.0)	-	1741	1.8
Iceland	birthplace	6	(27.3)	1.0	16	(72.7)	0.5	0	(0.0)	-	22	0.6
Ireland	birthplace	243	(56.9)	1.7	171	(40.0)	1.4	13	(3.0)	3.3	427	1.6
Italy	birthplace	1418	(43.6)	1.4	1809	(55.7)	1.3	22	(0.7)	2.7	3249	1.4
Latvia	birthplace	872	(93.4)	2.0	62	(6.6)	1.7	0	(0.0)	-	934	2.0
Lithuania	birthplace	1891	(97.6)	2.5	47	(2.4)	3.7	0	(0.0)	-	1938	2.5
Luxembourg	birthplace	12	(41.4)	2.0	17	(58.6)	1.4	0	(0.0)	-	29	1.6
Malta	birthplace	7	(21.9)	2.5	25	(78.1)	2.1	0	(0.0)	-	32	2.2
Netherlands	birthplace	275	(25.6)	1.3	789	(73.5)	1.3	9	(0.8)	0.8	1073	1.3
Norway	birthplace	50	(14.7)	2.1	289	(85.3)	1.1	0	(0.0)	-	339	1.2
Poland	citizenship	7463	(99.4)	2.2	46	(0.6)	2.5	0	(0.0)	-	7509	2.2
Portugal	birthplace	2197	(83.7)	2.0	425	(16.2)	2.1	4	(0.2)	N/F	2626	2.0
Romania	birthplace	21040	(99.8)	2.3	38	(0.2)	1.1	0	(0.0)	-	21078	2.3
Slovakia	birthplace	431	(98.2)	1.9	8	(1.8)	7.0	0	(0.0)	-	439	2.0
Slovenia	birthplace	131	(76.2)	1.5	41	(23.8)	2.7	0	(0.0)	-	172	1.7
Spain	birthplace	4652	(65.6)	1.8	2268	(32.0)	1.6	169	(2.4)	1.8	7089	1.7
Sweden	birthplace	96	(14.2)	1.0	579	(85.8)	1.2	0	(0.0)	-	675	1.2
United Kingdom	birthplace	2131	(25.1)	1.3	5816	(68.6)	1.3	536	(6.3)	1.5	8483	1.3
Subtotal EU/EEA		54111	(73.1)	2.0	18601	(25.1)	1.5	1284	(1.7)	1.5	73996	1.8

Source: European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis surveillance and monitoring in Europe 2012. Stockholm: European Centre for Disease Prevention and Control 2012 [5].

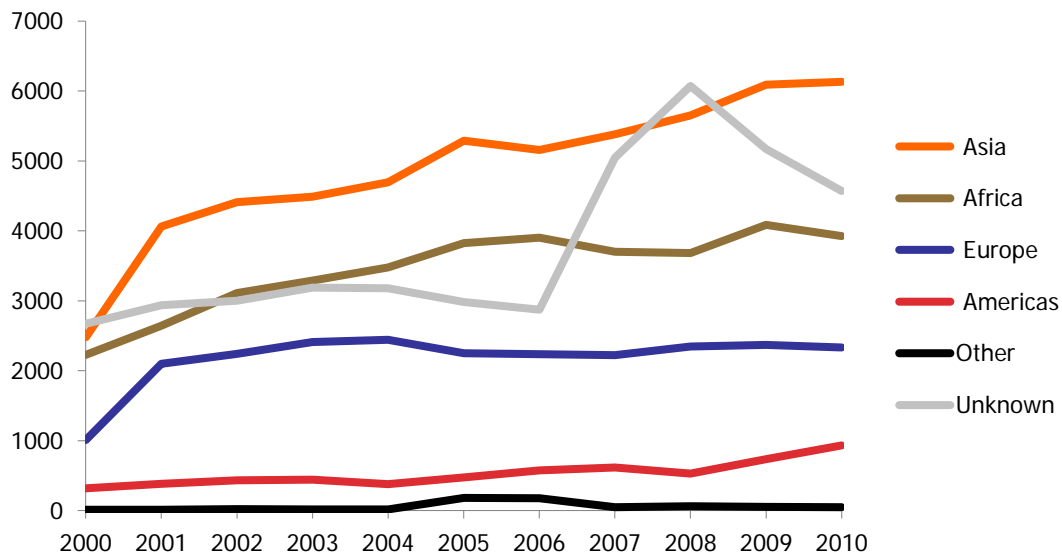
With reference to the absolute number of TB cases, the overall decrease observed in recent years has not been reflected in migrant populations. Only Belgium, Denmark, Estonia, Germany, Luxembourg and Slovenia report a decrease in TB cases of foreign origin, 11 countries report an increase and ten countries report no major changes over time [5]. Cyprus and Sweden are the only two EU countries that consistently report increasing trends in overall TB notification rates, which are thought to be mainly driven by cases of foreign origin [5].

Analysis of country of birth³⁰ shows that in 2010, migrant TB cases in the EU/EEA occurred largely among those born in Asia (34%), followed by those born in Africa (22%) and Europe (13%). Country of birth was not recorded for 25% of migrant cases. Trends have been relatively stable over time, with the exception of an increase in the percentage of cases with unknown country of birth between 2006 and 2008 (Figure 4.3).

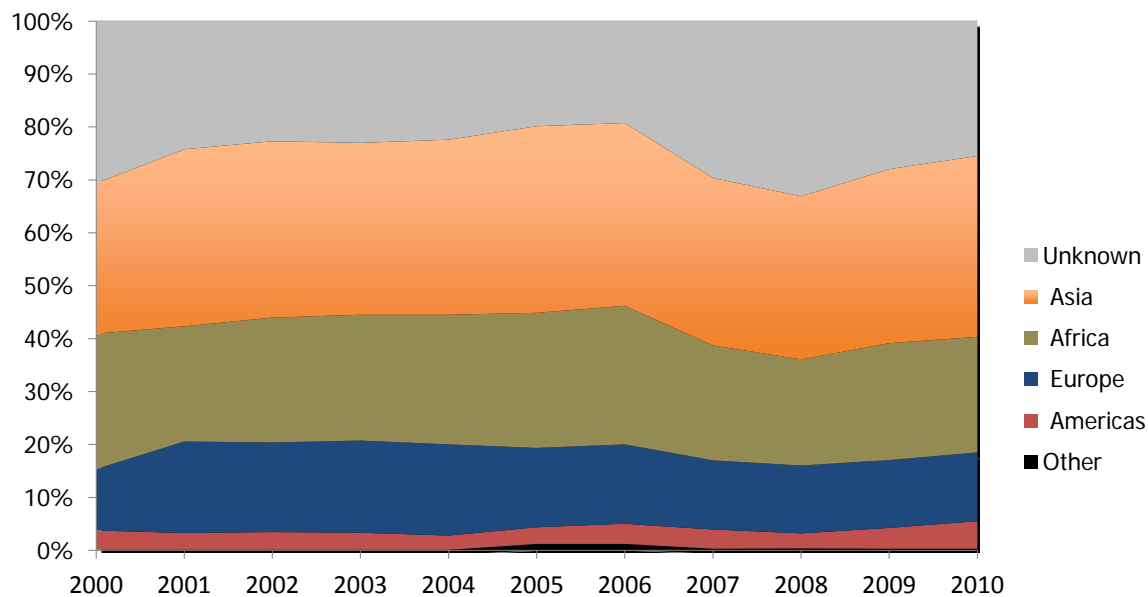
³⁰ Based on UN classification tables (<http://unstats.un.org/unsd/methods/m49/m49regin.htm>)

Figure 4.3 Migrant TB cases reported in the EU/EEA by region of birth and year, 2000–2010
A. Absolute numbers, B. Percentages

A.



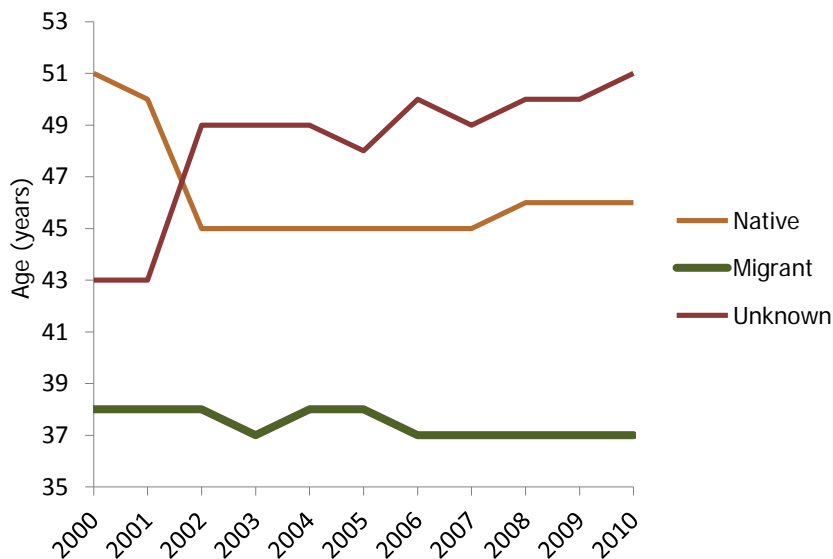
B.



Age and gender of TB cases in migrants

Migrant cases of TB were approximately nine years younger (mean=37.5 years) than native cases (mean=46.3 years) on a more or less consistent basis between 2002 and 2010 (Figure 4.4).

Figure 4.4 Mean age of TB cases reported in the EU/EEA by migration status and year, 2000–2010

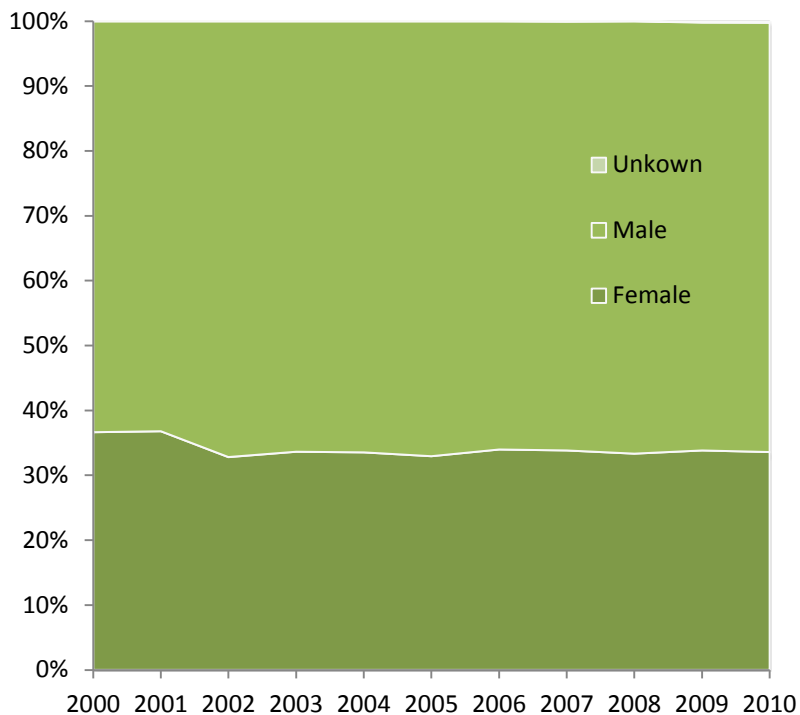


Between 2000 and 2010, the percentage of male TB cases was higher both in migrants and non-migrants. However, the proportion of male migrant cases was slightly lower, at 58%, than the proportion of male native-born cases, at 66% (see Figure 4.5). The difference appears to be greater in migrants in some EU/EEA countries (Table 4.1) [5,8]. In 12 countries, the male-to-female ratio was higher in foreign-born cases than in native-born cases [5].

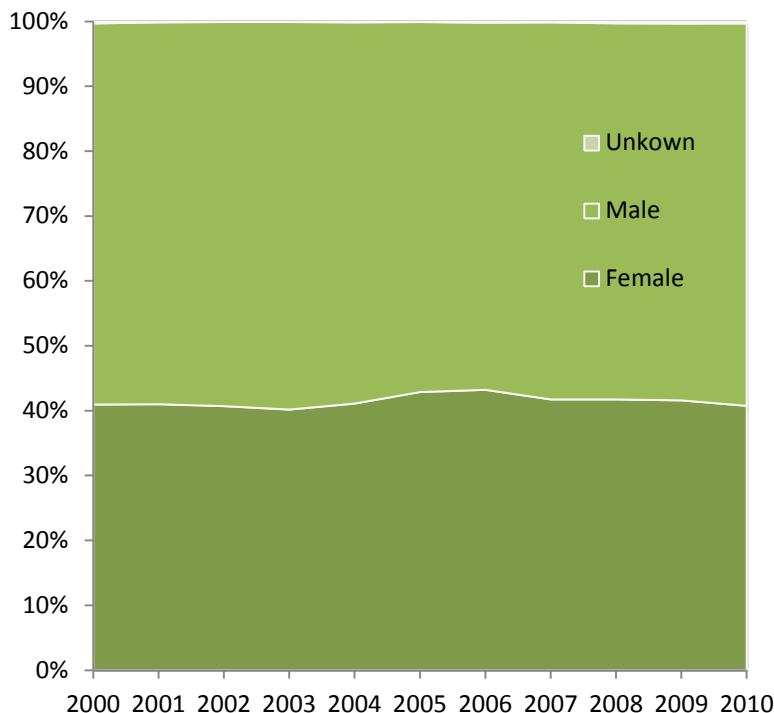
Figure 4.5 Gender of TB cases reported in EU/EEA by migration status and year, 2000–2010

A. natives, B. migrants

A.



B.

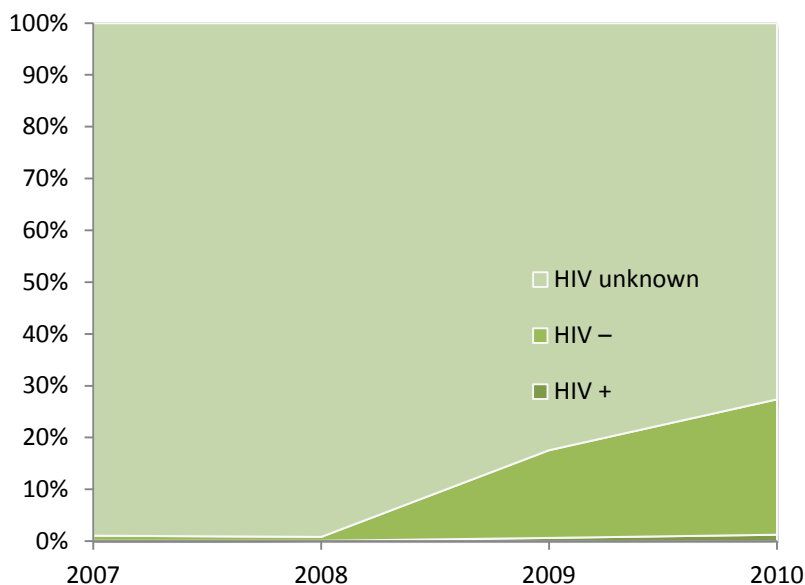


Co-infection with HIV

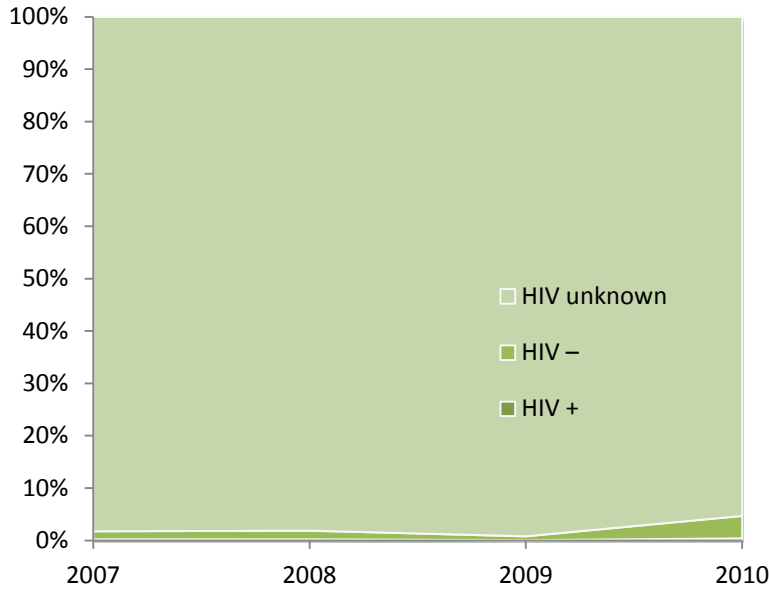
In 2010, 6.0% of TB cases notified in the EU/EEA with known HIV status had TB-HIV co-infection [5]. These numbers are based on both aggregated and case-based data. Between 2000 and 2010, very limited case-based data on TB cases were reported for which both HIV status and migrant status were available. Stratifying cases reported from 2007 to 2010 by HIV status and origin showed that 0.25% of TB cases in migrants were known to be HIV-positive, compared with 0.48% of TB cases in non-migrants (Figure 4.6). However, during this period, the percentage of migrants with unknown HIV status was higher, at 97%, than the percentage in non-migrants (89%), so it is not possible to directly compare these two datasets. The difference between migrants and non-migrants in terms of the proportion of TB cases with known HIV status remains an important observation. In 2010, HIV status was known in only 4.7% of migrant TB cases, compared with 27% in native-born TB cases.

Figure 4.6 Reported cases with TB and HIV co-infection by migration status and year, EU/EEA, 2007–2010. **A. natives, B. migrants**

A.



B.



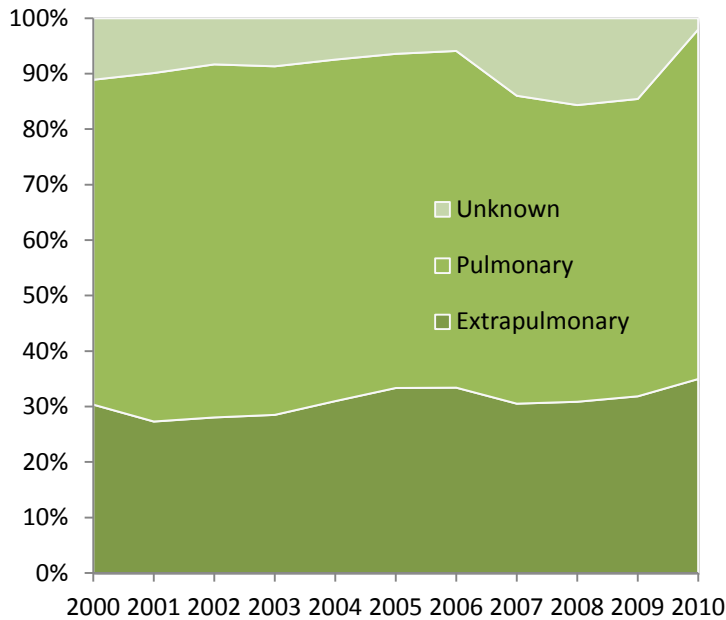
Extrapulmonary TB

The average percentage of extrapulmonary TB between 2000 and 2010 was 14.4% in natives and 31.1% among migrants. These percentages have been stable over time (Figure 4.7).

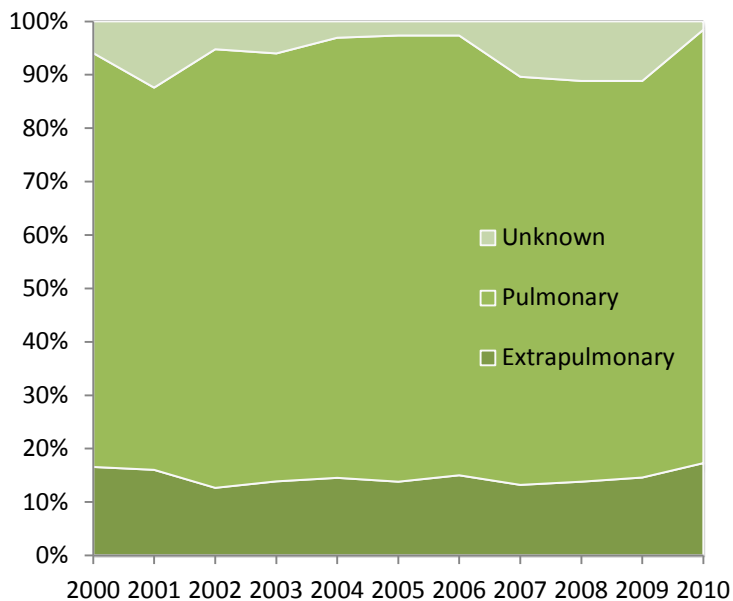
Figure 4.7 Percentage of extrapulmonary TB by migration status and year, EU/EEA, 2000–2010

A. natives, B. migrants

A.



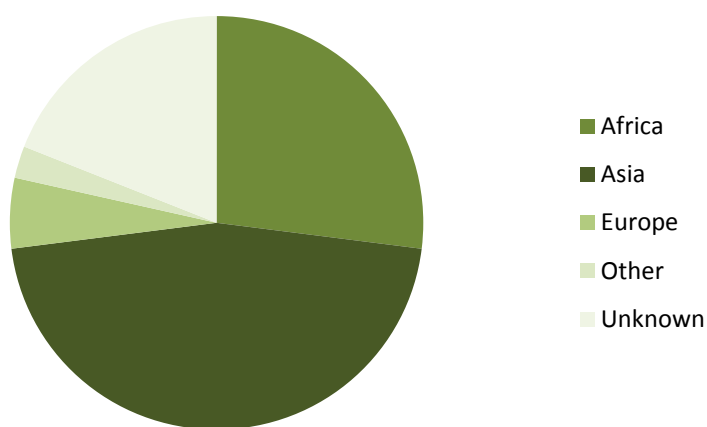
B.



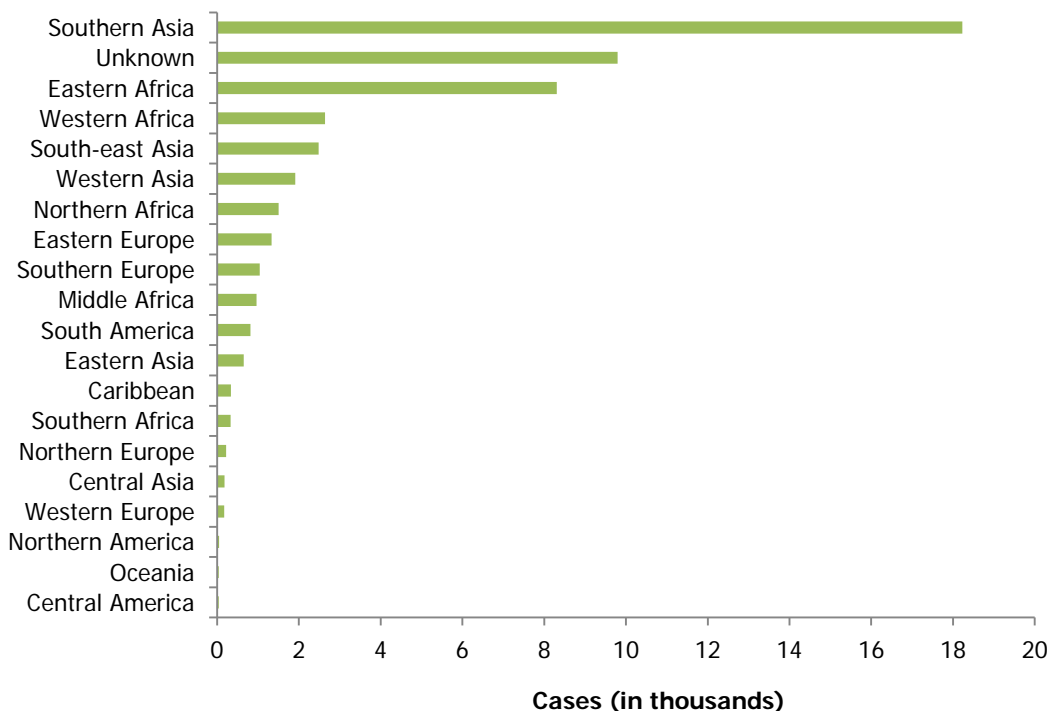
The largest percentage (46%) of extrapulmonary TB in migrants occurred in cases born in Asia (Figure 4.8A) whereas the same subset of migrants accounted for only 34% of TB cases overall. Closer analysis of sub-regions (Figure 4.8B) reveals that the burden of extrapulmonary TB is concentrated among cases born in southern Asia.

Figure 4.8 Extrapulmonary TB cases in migrants by country of birth of migrants, EU/EEA, 2000–2010. A. Overall regions (as a %), B. Sub-regions

A.



B.

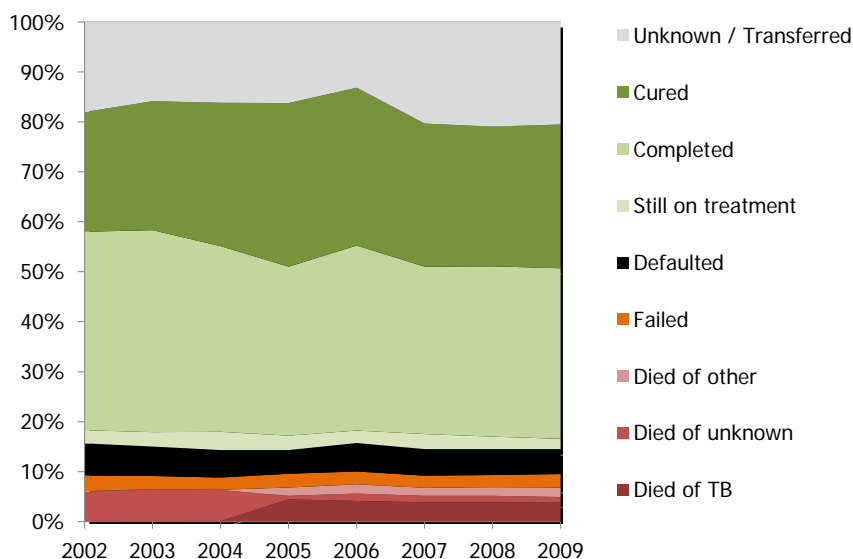


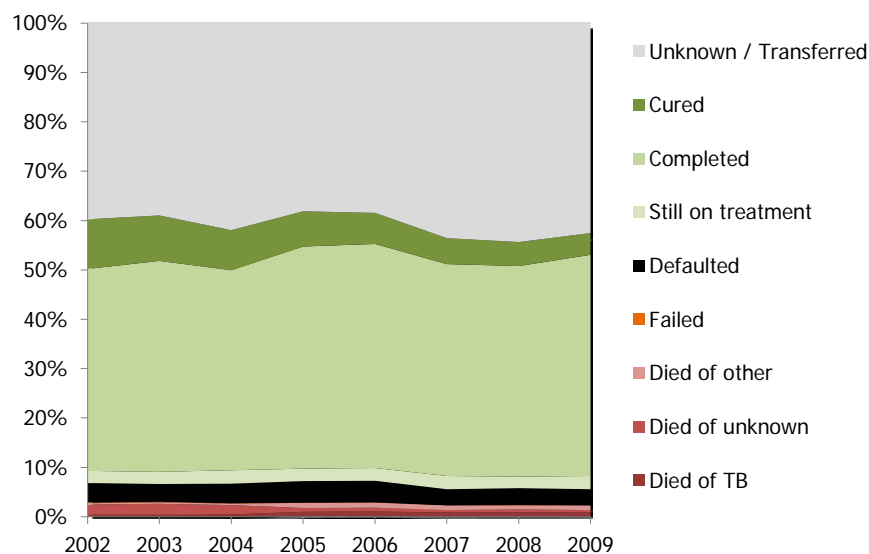
The percentage of cases successfully completing treatment is higher in those who are native born (65%) than in migrants (50%). However, the percentage of cases that died, failed or defaulted is also higher in those who are native born (15%) than in migrants (8.0%). The percentage of cases that has an unknown treatment outcome or was transferred is twice as high in migrants as in those who are native born (Figure 4.9). Since the treatment outcome at 12 months is unknown for a higher percentage of migrant patients, data for the two groups are not entirely comparable.

The high proportion of migrants with unknown treatment outcomes at 12 months does not allow firm conclusions to be drawn on treatment success or failure. One reason for the high percentage of unknown or transferred cases could be the higher mobility of migrants including, for example, migrants who are diagnosed with TB but are then deported from the country without TB treatment follow-up. Another possible reason could be that migrants may be more reluctant to attend follow-up visits. This indicates an important area for future research.

Figure 4.9 TB outcomes at 12 months by migration status and year, EU/EEA, 2002–2009
A. natives, B. migrants

A.



B.**Multidrug-resistant TB (MDR-TB)**

Data reported for 2010 show that at EU/EEA level, the proportion of TB cases resistant to isoniazid, rifampicin or both is lower in foreign-born cases than in native-born cases (Tables 4.2 and 4.3). However, in several countries, the opposite is observed and the proportion of MDR-TB (defined as resistance to isoniazid and rifampicin) among foreign-born cases is higher than the proportion among native-born cases (Tables 4.2 and 4.3). In 2010, for the EU/EEA overall, 1 447 MDR-TB cases were reported, representing 4.6% of all culture-confirmed cases with known drug susceptibility testing results against at least isoniazid and rifampicin [5]. MDR-TB is less common among foreign-born cases than among native-born cases [5]. Among MDR-TB cases for which origin is known, 3.1% of foreign-born cases with drug susceptibility results had MDR-TB, compared with 6.8% of native-born cases [5].

The highest percentage of MDR-TB is found in cases born in Eurasian countries (14.3%), followed by those born in northern Europe (13.9%), central Asia (12%) and eastern Europe (10.7%).

Table 4.2 Anti-TB drug resistance among all TB cases of foreign origin, EU/EEA, 2010

Country	Criterion	Cases with DST results	Cases resistant to at least ^a :					
			Isoniazid		Rifampicin		Isoniazid and rifampicin (multidrug resistant)	
			N	(%)	N	(%)	N	(%)
Austria	citizenship	207	31	(15.0)	15	(7.2)	15	(7.2)
Belgium	citizenship	444	40	(9.0)	19	(4.3)	18	(4.1)
Bulgaria	birthplace	2	2	(100.0)	2	(100.0)	2	(100.0)
Cyprus	birthplace	29	1	(3.4)	0	(0.0)	0	(0.0)
Czech Republic	birthplace	82	12	(14.6)	12	(14.6)	7	(8.5)
Denmark	birthplace	176	12	(6.8)	1	(0.6)	1	(0.6)
Estonia	birthplace	40	9	(22.5)	7	(17.5)	7	(17.5)
Finland	birthplace	78	14	(17.9)	6	(7.7)	5	(6.4)
France	birthplace	-	-	-	-	-	-	-
Germany	birthplace	1256	140	(11.1)	47	(3.7)	39	(3.1)
Greece	citizenship	101	5	(5.0)	0	(0.0)	0	(0.0)
Hungary	citizenship	4	1	(25.0)	0	(0.0)	0	(0.0)
Iceland	birthplace	13	5	(38.5)	0	(0.0)	0	(0.0)
Ireland	birthplace	112	9	(8.0)	3	(2.7)	2	(1.8)
Italy	birthplace	1676	199	(11.9)	81	(4.8)	76	(4.5)
Latvia	birthplace	46	12	(26.1)	3	(6.5)	3	(6.5)
Lithuania	birthplace	33	14	(42.4)	11	(33.3)	11	(33.3)
Luxembourg	birthplace	14	0	(0.0)	0	(0.0)	0	(0.0)
Malta	birthplace	13	3	(23.1)	1	(7.7)	1	(7.7)
Netherlands	birthplace	593	57	(9.6)	11	(1.9)	11	(1.9)
Norway	birthplace	243	27	(11.1)	9	(3.7)	8	(3.3)
Poland	citizenship	17	2	(11.8)	1	(5.9)	1	(5.9)
Portugal	birthplace	179	17	(9.5)	9	(5.0)	9	(5.0)
Romania	birthplace	6	0	(0.0)	0	(0.0)	0	(0.0)
Slovakia	birthplace	4	0	(0.0)	0	(0.0)	0	(0.0)
Slovenia	birthplace	38	0	(0.0)	0	(0.0)	0	(0.0)
Spain	birthplace	-	-	-	-	-	-	-
Sweden	birthplace	449	52	(11.6)	18	(4.0)	18	(4.0)
United Kingdom	birthplace	3232	223	(6.9)	58	(1.8)	50	(1.5)
Total EU/EEA		9087	887	(9.8)	314	(3.5)	284	(3.1)

DST: Drug Susceptibility Testing

^a Any resistance to isoniazid, rifampicin, ethambutol or streptomycin; expressed as a percentage of cases with DST results available at least to isoniazid and rifampicin. Testing for ethambutol and streptomycin not routine in all countries.

Source: European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis Surveillance and Monitoring in Europe 2012. Stockholm: European Centre for Disease Prevention and Control 2012 [5].

Table 4.3 Anti-TB drug resistance among all TB cases of national origin, EU/EEA, 2010

Country	Criterion	Cases with DST results	Cases resistant to at least ^a :					
			Isoniazid		Rifampicin		Isoniazid and rifampicin (multidrug resistant)	
			N	(%)	N	(%)	N	(%)
Austria	citizenship	262	12	(4.6)	0	(0.0)	0	(0.0)
Belgium	citizenship	381	11	(2.9)	5	(1.3)	1	(0.3)
Bulgaria	birthplace	964	109	(11.3)	68	(7.1)	54	(5.6)
Cyprus	birthplace	8	0	(0.0)	0	(0.0)	0	(0.0)
Czech Republic	birthplace	338	7	(2.1)	9	(2.7)	2	(0.6)
Denmark	birthplace	105	11	(10.5)	1	(1.0)	1	(1.0)
Estonia	birthplace	218	73	(33.5)	57	(26.1)	56	(25.7)
Finland	birthplace	165	3	(1.8)	1	(0.6)	1	(0.6)
France	birthplace	-	-	-	-	-	-	-
Germany	birthplace	1357	59	(4.3)	10	(0.7)	8	(0.6)
Greece	citizenship	68	4	(5.9)	2	(2.9)	2	(2.9)
Hungary	citizenship	566	53	(9.4)	21	(3.7)	19	(3.4)
Iceland	birthplace	6	1	(16.7)	0	(0.0)	0	(0.0)
Ireland	birthplace	138	4	(2.9)	1	(0.7)	0	(0.0)
Italy	birthplace	897	61	(6.8)	17	(1.9)	9	(1.0)
Latvia	birthplace	669	186	(27.8)	84	(12.6)	84	(12.6)
Lithuania	birthplace	1330	451	(33.9)	304	(22.9)	299	(22.5)
Luxembourg	birthplace	6	0	(0.0)	0	(0.0)	0	(0.0)
Malta	birthplace	3	0	(0.0)	0	(0.0)	0	(0.0)
Netherlands	birthplace	186	12	(6.5)	1	(0.5)	0	(0.0)
Norway	birthplace	31	2	(6.5)	0	(0.0)	0	(0.0)
Poland	citizenship	-	-	-	-	-	-	-
Portugal	birthplace	1044	51	(4.9)	10	(1.0)	10	(1.0)
Romania	birthplace	5343	786	(14.7)	555	(10.4)	502	(9.4)
Slovakia	birthplace	230	9	(3.9)	1	(0.4)	1	(0.4)
Slovenia	birthplace	117	0	(0.0)	0	(0.0)	0	(0.0)
Spain	birthplace	-	-	-	-	-	-	-
Sweden	birthplace	75	4	(5.3)	2	(2.7)	0	(0.0)
United Kingdom	birthplace	1076	60	(5.6)	10	(0.9)	8	(0.7)
Total EU/EEA		15583	1969	(12.6)	1159	(7.4)	1057	(6.8)

DST: Drug Susceptibility Testing

^a Any resistance to isoniazid, rifampicin, ethambutol or streptomycin; expressed as a percentage of cases with DST results available at least to isoniazid and rifampicin. Testing for ethambutol and streptomycin not routine in all countries.

Source: European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis Surveillance and Monitoring in Europe 2012. Stockholm: European Centre for Disease Prevention and Control 2012 [5].

4.3 TB in migrant populations in the EU/EEA: literature review findings

This section includes data from studies identified by the literature review, including studies conducted at local level or on sub-groups of the population, and from country presentations at the ECDC migrant health workshop.

Country of origin and age of foreign-born TB cases

In 2007, overall, two-thirds of foreign-origin TB cases in the EU/EEA came from countries in Asia or Africa and 6.0% from countries of the former Soviet Union [6]. In a study from Italy, the distribution of geographical origin of cases reflected patterns of migration [9]. In the United Kingdom, 57% of TB cases in migrants reported in 2010 came from south Asia and 27% from sub-Saharan Africa [10]. In the Netherlands, a recent study identified the main countries of origin of TB cases in migrants as Somalia, Morocco and Turkey [11], which are among the main countries of origin of the migrant population at large. In Italy, the largest share of TB cases in migrants comes from the Middle East (36.6%) and Africa (21.7%). Country experts at the ECDC workshop [12] reported that 8.4% of the total cases notified in Germany in 2010 were born in countries of the former Soviet Union and 36.2% were born in other countries.

The literature shows findings similar to surveillance data with respect to the age of TB cases in migrants and non-migrants. TB cases in migrant populations tend to be younger than native-born cases [9,11,13]. In 2010, more than 50% of the TB cases of foreign origin notified in the EU/EEA were in young adults aged 25–44 years, whereas approximately 50% of the native origin cases were in those aged 45–64 years or older [6]. This possibly reflects the different age structure of migrant and native populations in Europe as well as the different natural history of TB in the two populations. TB infection in migrants tends to occur earlier in life than in native-born subjects and predominantly occurs in their country of origin [8].

TB notification rates and trends among migrants

TB notification rates among migrants vary across Europe and within different study timeframes, but in most EU/EEA countries they are higher in foreign-born than native-born populations [11,13,14]. For example, national surveillance data from France in 2009 showed that TB notification rates in those who were foreign-born were over eight times higher than in those born in France (35.1/100 000 vs. 4.3/100 000) [12].

In Germany, which has a high number of migrants, the TB notification rate in 2005 in the foreign-born population of one Land was 27.4/100 000, 5.4 times higher than in native-born Germans [13]. In Italy, data from regional surveillance systems indicated TB notification rates in foreign-born subjects to be 100.7/100 000 (83.9/100 000 when the estimated 20% of irregular migrants were added to the denominator), whereas the notification rate among native-born Italians was 6.5/100 000 [9]. However, it is important to note that interpretation of TB notification rates in migrants is challenging [9]; migration statistics do not include irregular migrants, so denominators may be underestimated.

The United Kingdom is one of a few European countries where the overall TB notification rate has not decreased since 2000. The rate in the foreign-born population rose from 75.5/100 000 in 2000 to 81.6/100 000 in 2010 but remained stable at approximately 4/100 000 in the UK-born population during the same period [14]. Analysis of notification rates and percentages of foreign-born cases and their association with migration flows and countries of origin of migrants in 21 EU/EEA countries found that the United Kingdom, in contrast to other countries with high immigration rates, hosts many migrants from high-TB-burden countries. A total of 10% of migrants in the United Kingdom come from countries with an estimated TB incidence of $\geq 250/100\ 000$. Other countries, such as Germany, Italy and Spain, generally did not receive migrants from countries with very high TB incidences, and these host countries have experienced decreasing TB notification rates [15].

TB transmission by origin of cases

Several studies from Belgium, Italy, Spain and the Scandinavian region used both traditional epidemiological approaches and molecular techniques to study the transmission dynamics and cluster characteristics of TB cases by country of origin [13, 16–21]. The attribution of transmission in mixed clusters of native-born and foreign-born cases varies greatly between studies and countries. In some studies, for example in Germany, the reported probability of TB transmission from foreign to native subjects in mixed clusters was low [8,13,21]. This may be due to low levels of social mixing between the two populations as well as the efficacy of targeted prevention programmes [8, 13].

Some authors reported no evidence of significant TB transmission between migrants and native citizens, suggesting that the fear that the presence of migrants would increase TB in native populations was unjustified [8,13]. A large nationally representative study in Denmark showed that TB transmission was 2.5 times more likely to occur from Danes to migrants than vice versa [8]. In contrast, data from Spain estimated that in mixed clusters 50% of index cases were foreign-born [16], suggesting that transmission between communities might be a public

health concern in some countries [18]. Moreover, in a large proportion of studies, when foreign-born cases are part of a cluster, they are more likely to belong to a cluster composed of other foreign-born cases only, although there are differences between studies in different countries [13,16–21]. This indicates that social mixing behaviour might differ between countries and settings and will have an effect on the groups among which TB is transmitted.

Active TB disease in migrants

Active TB disease in migrants can be the result of: i) reactivation of infection acquired previously in the country of origin; ii) recent infection acquired in the host country; or iii) recent infection during travel to country of origin [22].

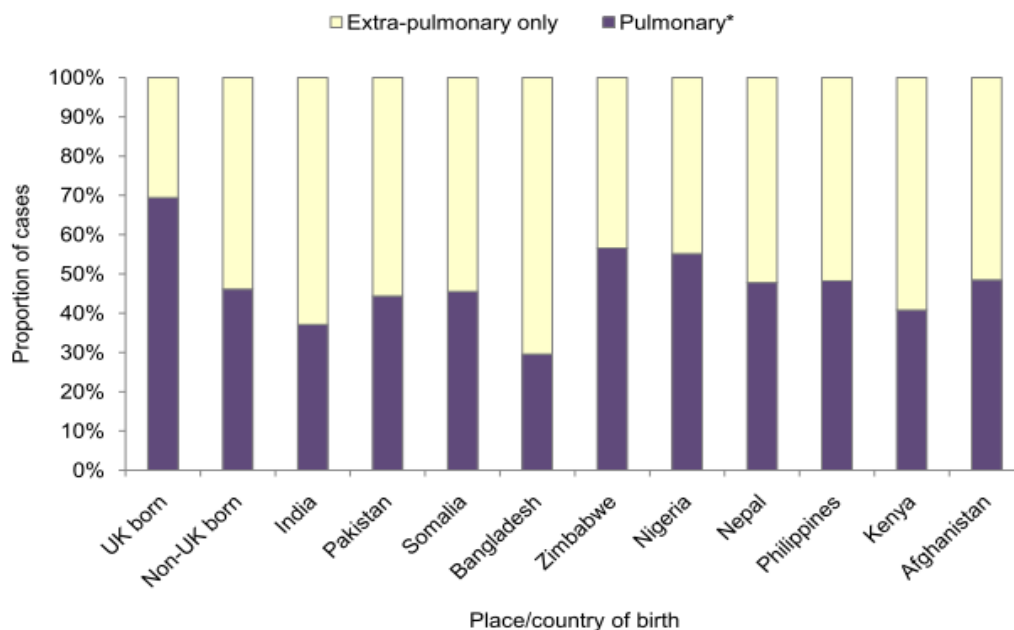
Data from the national TB surveillance system in the United Kingdom indicate that 77% of TB cases among foreign-born individuals are diagnosed two or more years after arrival in the host country [10]. In contrast, surveillance data from France presented during the Lisbon meeting [12] showed that the TB notification rate in foreign-born individuals was higher in the first two years after entering France than later among all categories of migrants. Similarly, data from Spain showed that in urban areas, around 50% of foreign-born TB cases were diagnosed within the first two years after arrival [6]. This could suggest that the patterns of infection transmission and disease development are different, depending on the country and the settings in which migrants live. The determinants for these observed differences between countries are insufficiently understood.

Extrapulmonary TB

Evidence from a number of countries suggests that extrapulmonary TB is associated with being foreign-born [23]. In 2010, in the United Kingdom, 54% of foreign-born TB cases had extrapulmonary TB, compared with 31% of TB cases born in the United Kingdom. Surveillance data also indicate that extrapulmonary TB is more frequent in foreign-born subjects several years after entry to the host country [10]. The contribution of extrapulmonary TB to the overall burden of TB in the United Kingdom according to migrants' country of birth is presented in Figure 4.10.

In the Netherlands, notification data for the period 1993–2001 showed that TB cases that were not Dutch citizens were more likely to have extrapulmonary TB [24]. During the study period, the absolute number of Dutch citizens with extrapulmonary TB decreased (rate ratio per year 0.96, 95% CI 0.94–0.98) while the absolute number of non-Dutch citizens with extrapulmonary TB increased (rate ratio per year 1.06, 95% CI 1.04–1.07) [24].

Figure 4.10 TB case reports by site of disease (when known) and place of birth for UK-born and non-UK born cases for the ten most common countries of birth: UK, 2010



*with and without extra-pulmonary TB

Source: Health Protection Agency. Migrant Health: Infectious diseases in non-UK born populations in the UK. An update to the baseline report - 2011. London. Health Protection Agency. 2011 [10]

Multidrug-resistant TB

Multi-drug resistant (MDR) TB is a major public health concern in the EU/EEA, especially in eastern European [25,26]; Estonia, Latvia and Lithuania are high MDR-TB burden countries.

Few large nationally representative studies have specifically addressed the issue of MDR-TB in migrant populations within EU/EEA countries. Most data is from hospital-based studies reporting data by country of origin. In Germany, in a study of 184 MDR-TB patients identified through the network of hospitals participating in the Tuberculosis Network European Trials group (TBNET), 80.2% were from the former Soviet Union [27]. In Finland, among all culture-verified incident MDR-TB cases diagnosed between 1994 and 2005, 73.7% (14 cases) were of foreign origin, mainly from Russia and Estonia [28].

TB and HIV co-infection

A systematic review reported that HIV co-infection ranges from 0.0% to 15% across EU/EEA countries [29]. However, reporting of HIV status in TB cases is known to be incomplete in many EU/EEA countries. Co-infection is especially common among certain marginalised populations, such as homeless people, people who inject drugs and some migrant groups [29]. Foreign-born individuals represented more than 80% of notified TB-HIV co-infected cases in England and Wales, and more than 60% in Belgium, France and the Netherlands. In Denmark, nearly 60% of TB-HIV co-infected cases were migrants. Lower percentages, of approximately 30%, were reported in Italy and Spain. The fact that northern EU/EEA countries receive immigrants from countries with higher TB and HIV burdens than Italy and Spain may explain this difference [29, 30].

Figure 4.11 TB case reports and rates by place of birth, UK, 2000–2012



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Source: PHE, 2013: *Tuberculosis in the UK 2013 report*. London.

A 2011 survey assessed current practices for monitoring HIV-TB co-infection in the EU/EEA [31]. Eighteen of the 25 countries that responded reported collecting HIV status on individual TB cases [31].

Paediatric TB

In 2010, in the EU/EEA, 19% (560 cases) of TB cases notified in children under 15 were foreign-born (in the case of the Netherlands and Denmark, origin of the parent is also used in classifying origin). Only Austria, Norway and Sweden reported a higher number of foreign-born TB cases than native-born TB cases among children under 15 years (

Table 4.4) [5].

Between 2000 and 2009, 15.3% of paediatric TB cases notified in the EU/EEA were foreign-born; the proportion was higher in low TB incidence (<20 cases per 100 000) EU/EEA countries (29.2%) than in high TB incidence (≥20 cases per 100 000) EU/EEA countries (0.6%) [32]. Overall, these percentages are lower than in the general

population. However, this may reflect data limitations, as in most countries, with the exception of Denmark and the Netherlands [5] and Germany (reported at the Lisbon migrant meeting), surveillance data do not distinguish between children born in the host country of foreign-born parents and those born of native parents. This is of concern since children of migrants may experience similar social, behavioural and environmental risk factors to foreign-born populations [32]. Defining the children of migrants as native-born might in part explain the differences observed between the percentages of foreign-born TB cases in the general and the paediatric population.

Data on TB in children are available from some countries including Sweden, Denmark, the United Kingdom, Spain and Greece [33–38]. For example, 61% of laboratory-confirmed TB cases among children notified between 2000 and 2009 in Stockholm were from high-TB-burden countries and 25% were born in Sweden, but had parents from high-burden countries [35]. Similar figures were reported from Denmark [36]. In the United Kingdom, 30% of notified TB cases between 1999 and 2006 in children aged under 16 were born outside the country [33]. In London, the figure was 47.6% [39]. The most common countries of origin were Somalia, Pakistan, India, Zimbabwe and the Philippines. TB incidence in children born outside the United Kingdom was 37.3/100 000 compared with 2.5/100 000 in children born in the United Kingdom. In Spain, the percentage of foreign-born paediatric TB cases increased from 2.0% in 1978–1987 to 6.0% in 1988–1997 and 46% in 1998–2007 [34], reflecting changes in migration patterns in the country.

Children from high-TB-burden countries are at risk of acquiring infection before arrival [35]. In the United Kingdom, the median period between arrival and TB diagnosis in migrant children is two years [33]. Data from Spain and Denmark show that when TB is acquired in the host country, most transmission occurs within the household [34, 36]. However, in recent years, in these countries and in Sweden, index cases have increasingly been identified among friends and others outside the household [34,35].

Table 4.4 TB cases in children (<15 years old), by country, age group and origin, EU/EEA, 2010

Country	Native origin				Foreign origin				Unknown				Total	
	0–4		5–14		0–4		5–14		0–4		5–14		N	(%)*
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)		
EU/EEA														
Austria	3	(12.0)	4	(16.0)	7	(28.0)	10	(40.0)	1	(4.0)	0	(0.0)	25	(3.6)
Belgium	24	(32.9)	21	(28.8)	15	(20.5)	13	(17.8)	0	(0.0)	0	(0.0)	73	(6.5)
Bulgaria	59	(27.2)	158	(72.8)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	217	(8.2)
Cyprus	0	(0.0)	0	(0.0)	2	(100.0)	0	(0.0)	0	(0.0)	0	(0.0)	2	(3.3)
Czech Republic	1	(33.3)	1	(33.3)	0	(0.0)	1	(33.3)	0	(0.0)	0	(0.0)	3	(0.4)
Denmark [†]	5	(23.8)	11	(52.4)	2	(9.5)	3	(14.3)	0	(0.0)	0	(0.0)	21	(5.8)
Estonia	7	(16.7)	5	(83.3)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	6	(1.8)
Finland	1	(16.7)	1	(16.7)	0	(0.0)	4	(66.7)	0	(0.0)	0	(0.0)	6	(1.8)
France	86	(37.1)	65	(28.0)	25	(10.8)	46	(19.8)	6	(2.6)	4	(1.7)	232	(4.5)
Germany	58	(36.7)	49	(31.0)	12	(7.6)	33	(20.9)	3	(1.9)	3	(1.9)	158	(3.6)
Greece	14	(42.4)	7	(21.2)	7	(21.2)	5	(15.2)	0	(0.0)	0	(0.0)	33	(6.7)
Hungary	3	(27.3)	8	(72.7)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	11	(0.6)
Iceland	0	-	0	-	0	-	0	-	0	-	0	-	0	(0.0)
Ireland	5	(23.8)	10	(47.6)	2	(9.5)	4	(19.0)	0	(0.0)	0	(0.0)	21	(4.9)
Italy	80	(39.2)	36	(17.6)	19	(9.3)	67	(32.8)	2	(1.0)	0	(0.0)	204	(6.3)
Latvia	23	(50.0)	23	(50.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	46	(4.9)
Lithuania	20	(21.7)	71	(77.2)	1	(1.1)	0	(0.0)	0	(0.0)	0	(0.0)	92	(4.7)
Luxembourg	1	(100.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	1	(3.4)
Malta	0	-	0	-	0	-	0	-	0	-	0	-	0	(0.0)
Netherlands	9	(26.5)	11	(32.4)	2	(5.9)	11	(32.4)	0	(0.0)	1	(2.9)	34	(3.2)
Norway	2	(18.2)	0	(0.0)	0	(0.0)	9	(81.8)	0	(0.0)	0	(0.0)	11	(3.2)
Poland	20	(32.3)	42	(67.7)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	62	(0.8)
Portugal	16	(30.8)	26	(50.0)	2	(3.8)	8	(15.4)	0	(0.0)	0	(0.0)	52	(2.0)
Romania	306	(37.1)	511	(62.0)	5	(0.6)	2	(0.2)	0	(0.0)	0	(0.0)	824	(3.9)
Slovakia	4	(36.4)	7	(63.6)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	11	(2.5)
Slovenia	2	(66.7)	0	(0.0)	0	(0.0)	1	(33.3)	0	(0.0)	0	(0.0)	3	(1.7)
Spain	218	(48.0)	133	(29.3)	32	(7.0)	67	(14.8)	2	(0.4)	2	(0.4)	454	(6.4)
Sweden	4	(8.5)	1	(2.1)	9	(19.1)	33	(70.2)	0	(0.0)	0	(0.0)	47	(7.0)
United Kingdom	103	(26.7)	151	(39.1)	12	(3.1)	89	(23.1)	13	(3.4)	18	(4.7)	386	(4.6)
Subtotal EU/EEA	1068	(35.2)	1352	(44.5)	154	(5.1)	406	(13.4)	27	(0.9)	28	(0.9)	3035	(4.1)

Source: European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis Surveillance and Monitoring in Europe 2012. Stockholm: European Centre for Disease Prevention and Control 2012 [5]

As disseminated and extrapulmonary forms of TB are more common in children than in adults, clinical symptoms may be less specific [40]. In addition, laboratory and radiological diagnosis can be challenging in the paediatric population [41]. As a result, TB in children is usually identified through screening and active case finding (i.e. contact tracing rather than clinical symptoms). Extrapulmonary TB has been reported more frequently among paediatric TB cases of foreign origin in some settings [36], but not in others [33].

There is only partial data available on drug resistance in foreign-born and native-born paediatric cases due to the low number of culture-confirmed paediatric TB cases with data on origin and drug susceptibility.

4.4 Conclusions

The collection and analysis of TB data in the EU/EEA by ECDC since 2008 represents an important step towards the harmonisation of surveillance systems.

At EU/EEA level, and in the joint ECDC-WHO TB surveillance report, population denominators for migrants are not available and notification rates are not stratified by origin of cases. However, surveillance data and evidence from the literature review for a few countries that have estimated the migrant population size suggest that TB notification rates in foreign-born populations are higher than in native-born populations. Furthermore, despite an overall decrease in numbers of TB cases in the EU/EEA between 2006 and 2010, the number of TB cases among migrants has increased. The percentage of TB cases in migrants has increased from 10% in 2000 to around 25% in 2010.

The increase in the proportion of foreign-born cases has affected the overall TB situation in some EU/EEA countries, where the number of notified TB cases has remained stable in the native-born population, whilst increasing among migrants. In countries with a low level of TB in the native-born population, TB in migrants has a more profound effect on overall trends in TB notification rates. Cyprus and Sweden are the only two EU countries that consistently report increasing trends in overall TB notification rates, thought mainly to be driven by cases of foreign origin [5]. However, although TB represents a particular burden among migrants in the EU/EEA, in some countries there is no clear evidence to suggest that the presence of migrants with TB increases the burden of TB in the native population.

Available data suggest that the distribution of cases by country of origin reflects the pattern of migration. The majority of migrant TB cases are in individuals born in Asia, Africa and in migrants from the eastern part of the wider WHO European Region. However, country of birth was not recorded for 25% of migrant cases.

Active TB disease occurs at a significantly younger age in migrants than in the native population (on average nine years younger), with a slightly increased percentage of cases in female migrants than is the case among natives. Available data also suggest that migrants have a two-fold increased risk of extrapulmonary TB. Analysis of surveillance data suggests that MDR-TB is less common among foreign-born cases than among native-born cases [5].

Migrants have twice as many unknown treatment outcomes at 12 months, and are also less likely to have successful treatment outcomes than natives. This may reflect greater mobility than in the native-born population, deportation before treatment is completed, or barriers to follow-up care and adherence to treatment among migrants. Further investigation to determine the reasons is warranted.

Available data also suggest that the difference between migrants and non-migrants in terms of the proportion of TB cases with known HIV status remains significant. In 2010, HIV status was known in only 4.7% of migrant TB cases compared with 27% in native-born TB cases, and this is an issue that needs to be addressed.

Efforts made in recent years to strengthen and harmonise TB surveillance systems in the EU/EEA and capture migrant-specific information have led to a greater understanding of the association between migration and TB. Nevertheless, additional steps are needed to strengthen national surveillance systems by improving data completeness on geographical origin of cases. In addition, better data are needed on the epidemiology of latent TB in migrants and the extent to which health determinants and living conditions in the host country influence migrants' vulnerability to TB.

At EU/EEA level, TB notification rates have declined over the last decade, due largely to the decrease experienced in high-incidence countries. Nevertheless, further efforts are needed to ensure a continued decline in notification rates in order to reach the goal of TB elimination in the EU/EEA. To achieve this will require a comprehensive approach to TB prevention and control that addresses both TB disease and individuals with latent TB infection who constitute the reservoir for future TB disease. Individuals originating from countries with a very high TB burden pose challenges for prevention and control efforts in some Member States. Priority must be given to addressing these challenges and ensuring that all individuals have the right to prompt, high-quality TB care.

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5. Hepatitis B

This chapter summarises available evidence on hepatitis B among migrants in the EU/EEA, based on TESSy surveillance data, a review of the literature and a survey of EU/EEA countries.

5.1 Introduction

Infection with hepatitis B virus (HBV) affects the liver and can result in chronic infection, which may lead to liver cirrhosis and hepatocellular carcinoma (HCC). The natural history of HBV infection is influenced by the age at which an individual is infected. Neonatal infections are mostly asymptomatic but usually lead to chronic infection, whereas infections in adults are more likely to result in symptomatic acute hepatitis, but are associated with a lower risk of persistent infection [1].

Worldwide, an estimated two billion people have been infected with hepatitis B virus (HBV) at some point in their lives and 360 million of them are estimated to have chronic infection [2]. In the WHO European Region, 14 million people are estimated to have chronic hepatitis B and HBV is responsible for 36 000 deaths annually [3]. WHO classifies countries according to HBV endemicity, based on the prevalence of hepatitis B surface antigen (HBsAg) in the population. Endemicity is classified as high in countries with a general population HBsAg prevalence above 8.0%, intermediate where this prevalence is between 2.0% and 8.0%, and low where HBsAg prevalence is below 2.0% [2]. High-prevalence areas include sub-Saharan Africa, central and south-east Asia, the Pacific and South America. Southern parts of eastern and central Europe, the Middle East and India are classified as intermediate prevalence and western Europe and North America are classified as low prevalence areas [3].

In areas of high endemicity, HBV transmission occurs predominantly through vertical transmission from mother to child at birth or through horizontal transmission during childhood [4-6]. In areas of low endemicity, transmission usually occurs later in life and is most common among high-risk populations such as people who inject drugs and MSM [2]. In low-prevalence areas of Europe, migrants from countries with high and intermediate prevalence account for a high proportion of reported cases of chronic hepatitis B infection [7-10]. Guidelines for health professionals in some EU/EEA countries identify migrants as at high risk of being infected with or transmitting HBV [9,11,12].

5.2 Hepatitis B in the EU/EEA: analysis of surveillance data

There is considerable variation in hepatitis B surveillance systems between EU/EEA countries in terms of case definitions used and the type of data collected [13, 14]. In some countries, only acute viral hepatitis is notifiable. Consequently, it is difficult to compare data across countries.

The EU case definition for hepatitis B was revised in 2012. The revised definition is based on laboratory criteria only and captures both acute and chronic cases, which are differentiated from each other [15]. In 2013, ECDC published its first report on enhanced surveillance of hepatitis B and C, which includes data from EU/EEA countries for the period 2006–2011 [15]. All EU/EEA countries, with the exception of Liechtenstein, reported surveillance data during this period, although some countries were unable to report for the whole period.

In 2011, a total of 17 025 cases of hepatitis B were reported in 28 EU/EEA countries³¹, resulting in an overall crude rate of 3.5 per 100 000 [15]. Six countries used previous EU case definitions for HBV and hence only provided data on acute cases. Four countries – Denmark, Germany, Italy and Luxembourg – used national case definitions. Eighteen countries provided data according to the revised EU case definition; however, five of these countries – France, Hungary, Lithuania, Portugal and Romania – only reported acute cases.

Notification rates for acute cases ranged from <0.1/100 000 in Portugal to 2.4/100 000 in Latvia and were generally lower than notification rates for chronic cases, which ranged from <0.1/100 000 in Romania to 14.4/100 000 in Norway. During the period 2006–2011, there was an overall decline in notification rates for acute infection across EU/EEA countries, but the opposite trend was observed for reported chronic infections [15]. The decline in acute infections is likely to reflect the widespread implementation of immunisation programmes in European countries [16]. As chronic hepatitis is largely asymptomatic until the late stage of disease, the reported figures reflect trends in testing, but it is possible that the increase in reported chronic infections could also be related to increased immigration from countries with high endemicity [17]. HBV-related cirrhosis and hepatocellular carcinoma (HCC) mortality are higher in migrants than in native populations [7-10] and the proportion of chronic infections reported in migrants is increasing [16].

Four variables included in the enhanced surveillance dataset provide some information on the frequency of hepatitis B cases among migrants: 'imported' (whether or not the case was considered to have acquired the

³¹ No cases were reported by Belgium and Liechtenstein.

infection outside the reporting country); 'country of birth'; 'country of nationality'; and 'probable country of infection' [15]. However, data completeness for these four variables was poor. Data were available in 2011 for only 39.1% of all cases for the 'imported' variable, 20.2% for 'probable country of infection', 19.1% for 'country of birth' and 6.8% for 'country of nationality'.

Despite these limitations, the available data related to migrant status support a link between chronic infections and migration. Country of birth and country of nationality were compared to reporting country as a proxy to establish whether or not HBV cases might have been acquired outside the reporting country. Based on available data, in 2011, the proportion of cases in which the reporting country was different from the country of birth or nationality was greater than the proportion in which the reporting country was the same: 3 882 cases or 22.9% compared with 1 256 cases or 7.4%. For 35.4% of the acute cases with complete information, the reporting country was different from the country of birth or nationality, and in 26.9% of cases, it was the same. The difference was more marked for chronic cases where for 22% of cases the reporting country was different from the reported country of birth or country of nationality, and for 3.1% of cases it was the same.

In 2011, 18 EU/EEA countries provided data on whether cases were 'imported', 'indigenous' or of 'unknown' origin for 6 662 cases (39.1% of all cases reported to ECDC). Of these 6 662 cases, 3 507 (52.6%) were recorded as 'imported'. There was considerable variation in the percentage of imported cases between acute and chronic infections: 6.3% of acute cases were recorded as imported compared with 81.5% of chronic cases (Table 5.1). Among acute cases, the proportion of imported cases ranged from 0% in Austria, Czech Republic, Germany, Greece, Hungary and Poland to 69.2% in Finland. Among chronic cases, the proportion of imported cases ranged from 0.0% in Estonia to 96.1% in Sweden. Some of this variation between countries is likely to be related to differences in data completeness and fluctuations caused by low numbers in some countries. However, fairly complete data on importation status from Sweden and the Netherlands suggest that a high proportion of their reported cases are imported which may reflect migration patterns.

Table 5.1 Number and proportion of hepatitis B cases classified as 'imported' by disease status in EU/EEA countries in 2011

Country	Acute		Chronic		Unknown	
	Total number of cases with valid information	% imported	Total number of cases with valid information	% imported	Total number of cases with valid information	% imported
Austria	75	0.0	380	7.1	72	1.4
Cyprus						
Czech Republic	191	0.0				
Denmark	16	6.3	236	87.7	4	100.0
Estonia	15	6.7	27	0.0		
Finland	13	69.2	129	94.6		
France	62	16.1				
Germany	688	0.0			105	0.0
Greece	38	0.0				
Hungary	65	0.0				
Iceland						
Ireland	37	35.1	125	93.6	3	66.7
Italy						
Latvia	54	3.7				
Lithuania	60	1.7				
Luxembourg						
Malta	3	66.7	32	56.3		
Netherlands	146	17.1	1378	87.2	18	33.3
Norway	54	50.0	698	95.7		
Poland	102	0.0				
Portugal						
Romania						
Slovakia	93	1.1	76	1.3		
Slovenia						
Spain					520	0.0
Sweden	86	25.6	1023	96.1	27	92.6
United Kingdom*			11	100.0		
Total	1798	6.3	4115	81.5	749	5.1

*Excluding Scotland.

Information on probable country of infection was only available from 15 countries for 3 443 cases of hepatitis B reported in 2011. For 3 340 (97%) of these cases, the probable country of infection reported was different from the country reporting the case.

An exploration of transmission route was undertaken for the 'imported' variable, which had the greatest data completeness of all the 'migration' variables. There was some variation in the reported transmission route depending on whether or not the case was imported. Among 1 600 cases reported as having been imported, for which data on mode of transmission were available, 1 163 cases (72.7%) were classified as mother-to-child transmission; 99.6% of these cases were chronic [15]. Among cases classified as not being imported, 185 were reported to have been infected through heterosexual transmission (77.8% acute), 136 through injecting drug use (66.2% acute), and 116 through nosocomial transmission (83.6% acute).

5.3 Hepatitis B in migrant populations in the EU/EEA: literature review findings

A study comparing hepatitis B surveillance in six countries identified a range of variables used to capture migrant status. These include country of birth of the case, country of birth of the case's parents, citizenship and ethnic group [16]. Another study has highlighted the challenge of capturing data on irregular migrants who do not come into contact with the health system [4].

Much of the recent published literature on hepatitis B infections among migrant populations in the EU/EEA is from the Netherlands. National surveillance data for 2002–2005 showed that 77% of chronic infections were in foreign-born patients, predominantly from high- and intermediate-prevalence countries [18]. Other surveillance data from the Netherlands have found that the proportion was higher in urban settings with higher proportions of migrant residents [4,19].

Published studies from Italy, Germany and Spain, Norway, Denmark, Greece and the United Kingdom based on screening and surveillance data all show a higher prevalence of chronic infection among migrants than in the indigenous population [16, 20–27]. In a prospective study in Denmark among pregnant women, HBsAg prevalence was higher among those who were foreign-born. Among 140 376 pregnant women enrolled, prevalence was 0.01% in Danish women and 2.74% in foreign-born women. The study found that women from south-east Asia had the highest prevalence at 14.5% [28].

A recent meta-analysis assessed the prevalence of chronic infection in migrants in European countries [9]. Chronic HBV infection was defined as the presence of HBsAg, assuming that this represented imported chronic infection. Although there are assumptions in this approach, as studies vary in their methodology across countries, it is a useful attempt to pool data and derive some estimates. The authors estimated that almost 3.5 million migrants and refugees were chronically infected with HBV. The percentage of migrants with chronic hepatitis B infection ranged from 3.7% in Spain to 6.9% in Ireland [9], with the largest numbers in Germany (284 000 cases), Italy (201 000 cases), the United Kingdom (194 000 cases), Spain (128 000 cases) and France (114 000 cases).

This meta-analysis found that the prevalence of HBV infection in migrants mirrored the prevalence in their country of origin [9]. In particular, prevalence of chronic infection was higher in migrants from east Asia and the Pacific (11.3%, 95% CI 9.1–11.8) and sub-Saharan Africa (10.3%, 95% CI 10.3–12.4), intermediate in migrants from eastern Europe (5.8%, 95% CI 4.3–7.9) and central and south Asia (4.6%, 95% CI 2.6–7.8), and lower in migrants from Latin America (1.7%, 95% CI 1.1–2.7) and the Middle East and North Africa (1.7%, 95% CI 1.1–2.7) (9).

A systematic review considered reports of HBsAg seroprevalence from 102 countries and combined the data using meta-analytical techniques [29]. It also assessed whether or not the prevalence of hepatitis B infection among migrants and the 'in-country' population were comparable. In 35 of the 49 countries for which comparison was possible, the pooled seroprevalence in migrants did not differ from the prevalence in 'in-country' populations. In ten countries – Fiji, Egypt, India, Iran, Morocco, Pakistan, Philippines, Somalia, Thailand and Zimbabwe – the pooled rate in the in-country population was higher, and in four countries – Afghanistan, Cambodia, Ethiopia and Senegal – it was lower. It is possible that for the countries where the pooled rate was lower, migrants were of higher socio-economic status and for the countries where it was higher migrants may have come from refugee situations.

Evidence from the United Kingdom challenges the assumption that prevalence in migrants mirrors the prevalence in their country of origin and the findings of the meta-analysis [5, 30]. A recent study showed that HBV prevalence in migrants of different origins in the United Kingdom was lower than that in their countries of origin [30]. This was further confirmed by a review of studies from the United Kingdom, which found that the ratio between estimated prevalence in countries of origin and in the host country was 1:0.76 [5].

Molecular epidemiology studies conducted in the Netherlands showed that genotypes of chronic HBV infection in migrants corresponded with HBV genotypes common in their countries of origin [4], suggesting that migrants from highly-endemic countries are likely to have acquired their infection at birth or during childhood prior to migration. Among different migrant populations, refugees and asylum seekers from certain countries appear to be at higher

risk of HBV infection compared with indigenous and other migrant populations [9]. One possible interpretation of these findings is that refugees are at higher risk of transmission after childhood compared with other migrant populations [31].

Also in the Netherlands, studies indicate that there has been an increase in recent years in the number of acute HBV infections acquired through heterosexual contact, with evidence that both migrants and people having sexual relationships with migrants may account for this increase [32]. Surveillance data from Amsterdam showed that the incidence of acute infection is higher among those who are foreign-born (4.3/100 000) and who are the children of migrants (3.7/100 000) than among native Dutch citizens (1.6/100 000) [33]. In the United Kingdom, routine laboratory surveillance data for the period 1995–2000 suggest that the incidence of acute HBV infection in people of southern Asian origin was 2.2 times higher than in the general population; the difference was estimated to be greater in children [23].

5.4 Survey of EU/EEA countries

Twenty-one of the 30 EU/EEA countries responded to the survey and 20 countries answered the question about whether hepatitis B was a particular issue among migrants in their country. Ten responded that it was an issue, seven that it was not, and three that there was no information available. In countries reporting hepatitis B as an issue among migrants, cases of chronic infection were mainly reported in migrants from countries with high or intermediate endemicity in sub-Saharan Africa and Asia.

Ten of the 21 countries reported that they collect information on the migrant status of hepatitis B. Eight of these ten countries collect data on country of birth³². Malta reported that the focus of public health efforts in this area was on irregular migrants.

In Greece, the mandatory notification form for hepatitis B cases includes a field for migrant status. The term 'migrant' refers to people who were born in a foreign country but are living and working in Greece. People who are visiting Greece are recorded on the notification form as 'travellers'. A total of 657 acute HBV cases were reported between 2004 and 2011. Information on migrant status was available for 627 cases, of which 147 (23.4%) were of foreign nationality. Among cases with foreign nationality, information on migrant status was available for 134 cases. Of these, 127 (94.8%) were migrants.

Ireland requests information on country of birth, duration of residence in Ireland and asylum seeker status in its enhanced surveillance system for hepatitis B, but there is no specific category for 'migrants'. For notifications of chronic hepatitis B, the majority of cases, where information is provided, were born in an endemic country, mostly in sub-Saharan Africa, central and eastern Europe and Asia. Of the 1 187 cases of chronic hepatitis B in the period 2007–2010 for which information on region of birth was available, 30.8% came from sub-Saharan Africa, 20.1% from central Asia and 15.3% from east Asia and the Pacific. For the same period, information on region of birth was available for 86% of the 224 acute cases of hepatitis B. Of these, 75.4% came from western Europe.

In Sweden, about 80% of all chronic hepatitis B cases reported had contracted the disease abroad. It was reported that these cases are mainly in migrants who are infected prior to arrival.

In Norway, between 90% and 95% of reported notifications of chronic hepatitis B are among migrants born in countries with high endemicity. It was noted that the countries of origin of migrants vary over time. For the last few years, most chronic hepatitis B cases in migrants have been coming from Somalia, Eritrea, Afghanistan, Vietnam, the Philippines and Thailand. It was also reported that about 60% of these cases were males.

In the Netherlands, hepatitis B is found mainly in first-generation migrants from countries with high and intermediate endemicity in the Mediterranean, for example, Turkey, and in south-east Asia, especially China.

In France, chronic hepatitis B was reported to be a particular issue for migrants, especially for those born in sub-Saharan Africa. In 2004, HBsAg prevalence was estimated at 0.55% (CI95%: 0.32- 0.93) among the population born in mainland France; the highest estimated prevalence was among migrants born in sub-Saharan Africa [5.25% (CI95%: 2.89-9.35)] and in India [2.68% (CI95%: 0.34-18.39)]. HBsAg prevalence was estimated at 0.92% (CI95%: 0.37-2.25) among migrants born in other Asian countries and was lower among migrants born in North Africa [0.24% (CI95%: 0.09- 0.64)] and in southern Europe [0.39% (CI95%: 0.04-3.64)]. In addition, 75% of the 'new' (i.e. first contact) patients seeking care for chronic hepatitis B in hepatology university hospital wards between 2008 and 2010 were born outside France (sub-Saharan Africa 42%; North Africa 8.0%; Middle East 4.0%; other Asian countries 12%; other countries: 9.0%).

³² Four countries that had reported collecting information on migrant status (three of which had reported country of birth as the variable) did not submit any data on country of birth to the TESSy database in 2010. Of these, France noted that it only began collecting data on country of birth in 2012.

5.5 Conclusions

Data available from surveillance systems combined with the literature review and the country survey suggest that HBV infection, particularly chronic hepatitis B, is a major health issue for migrant populations in the EU/EEA. Although incomplete, data reported to ECDC through enhanced surveillance indicate that for many countries, a high proportion of chronic cases can be attributed to inward migration of cases from countries with high-endemicity. The data also suggest that many of the cases in migrant groups may have acquired their infection through mother-to-child transmission. Evidence from the literature review and the survey supports these findings and also indicates that there is a higher prevalence of chronic hepatitis B among migrants than among the indigenous population in the EU/EEA.

High rates of chronic hepatitis B among migrants in Europe reflect the large global burden of hepatitis B and migration to Europe of individuals from countries where prevalence of HBV is high. A significant proportion of new migrants to Europe come from countries of higher hepatitis B endemicity. Most HBV-infected persons from countries of higher endemicity become infected at birth or during early childhood, when the risk for chronic HBV infection is greatest.

Due to differences in national surveillance systems and the incompleteness of data, it is difficult to draw definitive conclusions or to make meaningful cross-country comparisons. In addition, migrant-specific variables have limitations and so, even with more data available, would not provide a complete picture of HBV among migrants. For example, imported cases may also include infections acquired by native residents when travelling to an endemic country.

Research and public health should give more attention to the association between hepatitis B and migration [34]. More specifically, a better understanding of hepatitis B risk factors and their distribution among migrants is essential to provide the basis for planning, implementation and evaluation of measures to reduce the burden of disease in this population. Further strengthening of surveillance systems in the EU/EEA is a priority, in particular to improve data on hepatitis B among migrant populations and monitor trends over time. In addition, most studies in the published literature have been conducted in a limited number of countries and evidence is needed from a wider range of EU/EEA countries. This is because the relationship between risk of hepatitis B infection and country of origin means that host countries with different migration patterns will face different challenges in hepatitis B control.

Finally, an EU-wide approach to screening would be beneficial, as would greater efforts to ensure that migrants have access to HBV diagnosis and appropriate follow up. Many migrants are likely to be unaware of their HBV status. Consideration should therefore be given to HBsAg testing of all persons born in countries with HBsAg prevalence of $\geq 2.0\%$, referral of infected persons for treatment care and of close contacts for testing and vaccination. This strategy is likely to be cost-effective and to capture a high proportion of foreign-born persons living with chronic hepatitis B in Europe. European countries will need to be provided with clear evidence-based and tailored guidance.

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6. Hepatitis C

This chapter summarises available evidence on hepatitis C among migrants in the EU/EEA, based on TESSy surveillance data, a review of the literature and a survey of EU/EEA countries.

6.1 Introduction

Infection with hepatitis C virus (HCV) affects the liver and can result in a broad spectrum of adverse disease outcomes. Acute hepatitis C infection is asymptomatic in the majority of cases and will resolve spontaneously in around 25% of cases. Those unable to clear the virus will develop chronic hepatitis C infection [1]. An estimated 10–15% of chronically infected individuals develop cirrhosis and are at higher risk of eventually developing HCC [1,2,3].

The World Health Organization estimates that worldwide, 3.0% of the population have been infected with hepatitis C virus and that more than 150 million people have chronic infection. Over 350 000 people are reported to die each year as a result of HCV-related liver diseases. The three countries most affected are Egypt, Pakistan and China, with estimated HCV prevalences of 22%, 4.8% and 3.2%, respectively [2]. In Europe, HCV prevalence is low and is estimated to range from 0.1–5.6% among the general population [3]. The highest prevalences are in southern and eastern European countries.

HCV is transmitted by infected blood, mainly through injecting drug use. Other routes of transmission include sexual activity, blood transfusion, nosocomial transmission and, more rarely, vertical transmission [1,2]. In the past 15 years, several factors have affected HCV transmission and trends in Europe: safety of blood transfusions; improvements in infection control practices in healthcare settings; levels of injecting drug use; accessibility of needle exchange services and immigration from endemic areas [4]. Improvements in the safety of blood transfusions and in healthcare have contributed to a decrease in the burden of infection. Since the introduction of blood screening for transfusion in 1991, hepatitis C infections in Europe have occurred mainly in high-risk groups such as injecting drug users and MSM. Infections have also been reported among migrants [4], although data on HCV among migrants is limited [3].

6.2 Hepatitis C in the EU/EEA: analysis of surveillance data

Surveillance systems for hepatitis C vary among EU/EEA countries in terms of the case definitions used, data collected and reporting systems [3, 5]. In 2006, a review found that all 27 EU/EEA countries had a surveillance system in place for hepatitis C [5].

The EU 2008 case definition was revised in 2012. The revised case definition is based on laboratory criteria only and differentiates between acute and chronic cases [6]. In 2013, ECDC published its first report on enhanced surveillance of hepatitis C, which includes data from EU/EEA countries for the period 2006–2011 [6]. All EU/EEA countries, with the exception of France and Liechtenstein, reported data, although some countries were unable to report for the whole period.

In 2011, a total of 29 896 cases of hepatitis C were reported in 26 EU/EEA countries³³, a reporting rate of 7.8/100 000 [6]. Fifteen countries were able to report data according to the revised EU case definition. However, three of these countries – Hungary, Lithuania and Malta – were only able to report acute cases. Seven countries used the previous EU 2008 case definition. In general, data from countries using the previous EU definition are considered comparable with data reported using the revised case definition, as the two case definitions differ only slightly (with the new definition including an extra serological marker). National experts at the ECDC migrant health meeting in October 2012 [7] confirmed that it is difficult to differentiate between acute and chronic hepatitis C infection.

Of all notified cases in 2011, 1.3% (398 cases) were classified as acute infections and 9.7% (2 913) as chronic infections; 81.4% (24 337) were classified as 'unknown' and 7.5% (2 248) could not be classified by disease status due to the format of the data provided [6].

Four variables were included in enhanced surveillance that can potentially provide data on the frequency of hepatitis C cases among migrants: 'imported'; 'country of birth'; 'country of nationality'; and 'probable country of infection' [6]. However, data completeness for these four variables was poor.

Country of birth and country of nationality data were compared to reporting country as a proxy to identify whether HCV cases might have been acquired outside the reporting country, but data on the country of birth and country of nationality variables were poor. Based on available data in 2011, for 10.5% of acute cases with complete information, the reporting country was different from the country of birth or nationality, and for 45.9% of cases, it

³³ Data were not reported by Belgium, France, Liechtenstein and Spain.

was the same. For chronic cases there was very little difference: for 12.1% of cases, the reporting country was different to the reported country of birth or country of nationality, and for 14.1% of cases, it was the same.

Only 17 countries reported data on importation status for 12 111 cases in 2011. Of these 12 111 cases, only 1 006 (8.3%) were recorded as 'imported'. Of these 1 006 cases, 1.5% [15] were acute infections, 29.2% (294) were chronic infections and 69.3% (697) were of unknown status [6]. Information on probable country of infection was incomplete and is also of limited value.

6.3 Hepatitis C in migrant populations in the EU/EEA: literature review findings

Some information on hepatitis C epidemiology among migrants is available from surveys and small-scale community and hospital studies, but the published evidence available is limited.

Much of the published literature on hepatitis C infection among migrant populations in the EU/EEA is from the Netherlands. A recent modelling analysis estimated that migrants from endemic countries accounted for more than 50% of hepatitis C infections in the Netherlands and that the prevalence in this group was 2.0% compared with 0.2% in the general population [8]. The modelling indicated that only individuals born in high HCV-endemicity countries form a risk group. Based on the situation in the Netherlands, the researchers concluded that immigration from endemic countries significantly contributes towards the epidemiology of HCV in European countries.

Another study in the Netherlands that analysed data from three population-based surveys and one survey of pregnant women found the overall HCV prevalence to be between 0.3% and 0.6% (128), with 34% of cases (4 860 out of 14 195 total cases) in non-western migrants. First generation, non-western migrants were more likely to be HCV-positive than western migrants and the indigenous Dutch population. There was very little difference in prevalence rates in children of non-western migrants and other population groups [9]. Molecular analysis showed non-western migrants to be infected with HCV strains rarely found in Europe and concluded that transmission probably occurred in the country of origin, causing introduction but no further transmission of the strains in the Netherlands [9]. The HCV prevalence in migrants was, however, lower than the prevalence in their countries of origin, especially in those from Morocco, Surinam and Turkey who account for a considerable proportion of migrants in the Netherlands. The authors suggest that this may be due to migrants' shorter exposure to HCV in their country of origin, the healthy migrant effect or over-estimation of the burden of HCV in the country of origin [9].

A community-based study in the United Kingdom, which assessed HCV prevalence in migrants from south-east Asia, found similar results [10]. Overall, the prevalence in migrants from south-east Asia was 1.6% compared with 0.5% in the general population of the United Kingdom [11]. Migrants from Pakistan were at especially high risk; prevalence in this sub-group was 2.7% [10]. Lower prevalence was found in migrants from Bangladesh and India at 0.6% and 0.2%, respectively [10]. However, the prevalence of HCV in migrant populations was lower than the estimated prevalence in Bangladesh, India and Pakistan and, as in the Dutch study [9], the authors concluded that HCV prevalence in migrants in host countries cannot be estimated reliably based on HCV prevalence in their countries of origin.

A small-scale hospital-based study in Spain reported HCV prevalence to range from 0.4–0.9% among migrants from Latin America, 1.9% among migrants from North Africa and from 9–15% among migrants from sub-Saharan Africa and eastern Europe [12–16].

In France, immigration was found to be an independent risk factor for HCV infection (OR=4.46, $p<0.001$) in a sample of 944 individuals of low socio-economic status screened by general practitioners in Lyon [17].

6.4 Survey of EU/EEA countries

Twenty-one countries responded to the survey. Ten of these countries reported that they collect information on migrant status of cases and eight countries that they collect data on country of birth.

Of the 20 countries that answered the question about whether hepatitis C is a particular issue among migrants in their country, only France, Slovakia and the United Kingdom reported that it was an issue. The response from France reported that in 2004, HCV prevalence was estimated at 0.73% (CI95%: 0.52–1.02) among the population born in mainland France, whereas it was estimated at 10.17% (CI95%: 2.40–34.23) among migrants born in the Middle East, 3.12% (CI95%: 1.50–6.35) among those born in sub-Saharan Africa, 1.37% (CI95%: 0.34–18.39) among those born in Asian countries and 1.11% (CI95%: 0.50–2.45) among those born in North Africa. The response from the United Kingdom noted that hepatitis C is more common in migrants from south Asian countries.

6.5 Conclusion

Available evidence from surveillance data, modelling and surveys suggests that hepatitis C is an issue among migrants in the EU/EEA, but there is insufficient data to quantify the extent of the problem. Enhanced surveillance by ECDC is an important step towards harmonisation of national surveillance systems and improving the quality of available data on hepatitis C. More needs to be done to strengthen surveillance systems in order to allow meaningful comparisons across countries and improve data completeness on disease status and migrant-specific variables.

Routine surveillance will not, however, provide a complete picture. Additional studies are required to determine the epidemiology of hepatitis C among migrant populations in the EU/EEA as well as to identify and explain differences between HCV in migrants in the host country and the country of origin. It would also be useful to assess whether screening various migrant groups for HCV in different countries would be feasible or cost-effective in reducing adverse events due to HCV infections.

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7. Gonorrhoea

This chapter summarises available evidence on gonorrhoea among migrants in the EU/EEA, based on TESSy surveillance data, review of the literature and a survey of EU/EEA countries.

7.1 Introduction

Gonorrhoea is a sexually transmitted infection (STI) caused by *Neisseria gonorrhoeae* bacteria. The World Health Organization estimates that 106 million new gonorrhoea infections occur globally every year, with the highest estimated incidence rates in the African and west Pacific regions [1]. Urethral infections in men and uro-genital infections in women are the main presenting feature, but a broad spectrum of clinical presentations can occur, including systemic dissemination with fever and skin and joint involvement. Throat and ano-rectal infections also occur. Urethral symptoms and vaginal discharge may appear after a short incubation (2-7 days following exposure), but in women cervicitis may remain without symptoms. Once a diagnosis is made, uncomplicated gonorrhoea is usually cured by a single dose of a suitable antibiotic, although resistance is a major problem. Partner notification and treatment is essential to curtail transmission. If untreated, infections may lead to severe secondary sequelae, including pelvic inflammatory disease, first trimester abortions, ectopic pregnancy, and infertility [2]. *N. gonorrhoeae* infections also play a role in facilitating HIV transmission [3].

Surveillance data in Europe indicate that rates of gonorrhoea are higher among men and young adults; heterosexual transmission accounts for the majority of cases, however in recent years, transmission among MSM has been increasing in many countries and now accounts for 33% of cases. Increasing trends are reported in most European countries and this appears to be linked to increased reports of cases among MSM [4].

7.2 Gonorrhoea in the EU/EEA: analysis of surveillance data

Since 2009, ECDC has coordinated enhanced surveillance of STIs in Europe. Data on gonorrhoea in 2010 were available from all EU/EEA countries except Germany and Liechtenstein.

In 2010, 31 983 cases of gonorrhoea were reported in the EU/EEA, an increase from 30 924 in 2006 (Table 7.1) [5]. This corresponds to a notification rate of 10.4 per 100 000 population. Rates ranged from 1.5/100 000 or less in Bulgaria, Luxembourg, Poland and Portugal to 30/100 000 in the United Kingdom.

The gonorrhoea notification rate in men, at 17.1/ 100 000, was nearly three times higher than in women (6.4/100 000). More than 40% of cases were reported in young adults aged 15–24 years and 29% of cases were reported in MSM.

Between 2006 and 2010, notification rates of gonorrhoea cases in the EU/EEA declined by 5.0%, from 10.9/100 000 to 10.4/100 000. However, trends vary between countries, decreasing in a number of central and eastern European countries that previously reported very high rates, but increasing in others.

Table 7.1 Number and rate of gonorrhoea cases reported in the EU/EEA by country and year, 2006–2010

Country	2010				2009		2008		2007		2006	
	National coverage	Report type	Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population	
			Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	N	C	339	-	143	-	263	-	131	-	171	-
Belgium*	Y	C	752	-	734	-	718	-	585	-	535	-
Bulgaria	Y	A	116	1.5	191	2.5	178	2.3	149	1.9	165	2.1
Cyprus*	Y	C	23	-	7	-	2	-	5	-	8	-
Czech Republic	Y	C	744	7.1	716	6.8	809	7.8	1108	10.8	1087	10.6
Denmark	Y	C	482	8.7	563	10.2	409	7.5	352	6.5	414	7.6
Estonia	Y	C	108	8.1	126	9.4	146	10.9	176	13.1	280	20.8
Finland	Y	C	255	4.8	237	4.4	198	3.7	192	3.6	231	4.4
France*	N	C	463	-	394	-	236	-	217	-	196	-
Germany	-	-	-	-	-	-	-	-	-	-	-	-
Greece	N	A	312	2.8	164	1.5	208	1.9	201	1.8	190	1.7
Hungary*	Y	A	1170	-	872	-	892	-	1041	-	916	-
Ireland	Y	A	614	13.7	433	9.7	444	10.1	417	9.7	431	10.2
Italy*	Y	C	251	-	213	-	154	-	152	-	258	-
Latvia	Y	C	343	15.3	433	19.1	500	22	670	29.4	746	32.5
Lithuania	Y	C	315	9.5	391	11.7	533	15.8	471	13.9	437	12.8
Luxembourg	Y	C	3	0.6	6	1.2	18	3.7	1	0.2	4	0.9
Malta	Y	C	47	11.4	62	15	50	12.2	52	12.8	33	8.1
Netherlands*	Y	C	2815	-	2426	-	1969	-	1830	-	1778	-
Poland	Y	A	301	0.8	402	1.1	285	0.7	330	0.9	395	1
Portugal	Y	C	89	0.8	114	1.1	67	0.6	74	0.7	53	0.5
Romania	Y	C	479	2.2	622	2.9	631	2.9	815	3.8	1348	6.2
Slovakia	Y	C	125	2.3	172	3.2	152	2.8	81	1.5	66	1.2
Slovenia	Y	C	44	2.1	30	1.5	40	2	42	2.1	34	1.7
Spain	Y	A	1944	4.2	1954	4.3	1897	4.2	1698	3.8	1423	3.3
Sweden	Y	C	840	9	610	6.6	722	7.9	642	7	657	7.3
United Kingdom	Y	A	18 580	30	17 400	28.2	16 451	26.9	18 631	30.7	18 801	31.1
EU total	-	-	31 554	10.4	29 415	10	27 972	9.7	30 063	10.7	30 657	11
Iceland	Y	C	18	5.7	47	14.7	25	7.9	24	7.8	31	10.3
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	411	8.5	269	5.6	301	6.4	238	5.1	236	5.1
Total	-	-	31 983	10.4	29 731	9.9	28 298	9.6	30 325	10.6	30 924	10.9

Y: Yes; N: No; A: Aggregated data report; C: Case-based report; -: No report

*Countries with sentinel systems (rates not calculated)

Source: European Centre for Disease Prevention and Control. Annual Epidemiological Report 2012.

National surveillance systems for STI, including gonorrhoea, in Europe are diverse. Data collection systems differ in terms of source of data, type of data (aggregate or case-based data), coverage (sentinel system or comprehensive) and period of availability (Table 7.2). In addition, reporting is voluntary in some countries and compulsory in others [1].

In 2010, Germany and Liechtenstein did not report data on gonorrhoea. Case-based data were reported by 21 of the 28 countries that reported gonorrhoea data to TESSy. Bulgaria, Greece, Hungary, Ireland, Poland, Spain and the United Kingdom reported aggregated data, which cannot be used to identify cases in migrants. Of the 21 countries that reported case-based data, 11 reported on country of birth. Data on gonorrhoea cases by country of birth for the year 2010 is shown in Figure 7.1³⁴.

³⁴ Luxembourg reported case-based data in 2008 and 2009 but not in 2010. Data from Luxembourg are included in the subsequent analyses of the average European trends between 2000 and 2010.

Table 7.2 Data source, type and period of gonorrhoea surveillance data in EU/EEA countries, 2010

Country	Data source	Compulsory (Cp)/ voluntary (V)/other (O)	Comprehensive (Co)/ sentinel (Se)/other (O)	Active (A)/passive (P)	Case based (C)/ aggregated (A)	Data reported by				National coverage
						Laboratories	Physicians	Hospitals	Others	
Austria	AT-STISentInella	V	Se	A	C	Y	N	N	N	N
Belgium	BE-LABNET	V	Se	A	C	Y	N	-	-	Y
Bulgaria	BG-STI	Cp	Co	P	A	-	-	Y	Y	-
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y
Czech Republic	CZ-STD	Cp	Co	A	C	N	Y	Y	N	Y
Denmark	DK-STI_CLINICAL	Cp	Co	P	C	N	Y	N	N	Y
Estonia	EE-GONOCOCC	Cp	Co	P	C	Y	Y	Y	Y	Y
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y
France	FR-STI	V	Se	A	C	Y	Y	Y	Y	N
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	A	Y	Y	Y	N	N
Hungary	HU-STD SURVEILLANCE	Cp	Se	P	A	N	Y	N	N	Y
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y
Ireland	IE-AGGR_STI	Cp	Co	P	A	Y	Y	Y	N	Y
Italy	IT-NRS	Cp	Co	P	C	Y	Y	Y	N	Y
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	N	Y
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	Y	Y	N	N	Y
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y
Netherlands	NL-STI	V	Se	P	C	N	Y	N	N	Y
Norway	NO-MSIS_B	Cp	Co	P	C	Y	Y	Y	-	Y
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	N	Y
Portugal	PT-GONOCOCCAL	Cp	Co	P	C	N	Y	N	N	Y
Romania	RO-RNSSy	Cp	Co	P	A	N	N	Y	N	Y
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y
Slovenia	SI-SPOSUR	Cp	Co	P	C	N	Y	N	N	Y
Spain	ES-STATUTORY_DISEASES_STI_AGGR	Cp	Co	P	A	N	Y	N	N	-
Sweden	SE-SMINET	Cp	Co	P	C	Y	Y	N	N	Y
United Kingdom	UK-GUM	Cp	Co	P	A	N	N	N	Y	Y
United Kingdom	UK-LAB	O	Co	P	A	Y	N	N	N	N

Type: aggregated (A), case-based (C)

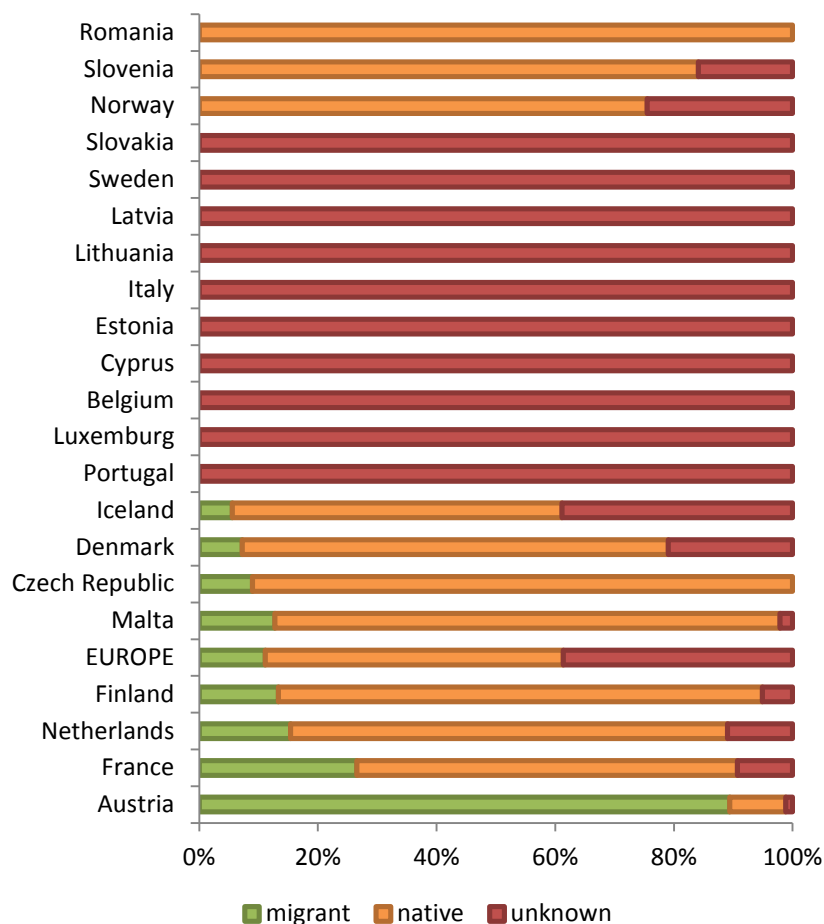
Legal: voluntary reporting (V), compulsory reporting (Cp), other (O)

Coverage: sentinel system (Se), comprehensive (Co)

* All physicians should report to the national register in Italy, but less than 10% do – there is no comprehensive system.

** Data from two different data sources were submitted for Spain; data from the ES microbiological (sentinel laboratory system) were not used in the tables.

Source: European Centre for Disease Prevention and Control. Annual Epidemiological Report 2012.

Figure 7.1 Migrant status of gonorrhoea cases based on 'country of birth', EU/EEA, 2010

Source: TESSy database

In 2010, case-based data were reported to TESSy for 8 992 cases of gonorrhoea in Europe (Figure 7.1). Of these cases, 1 002 (11.1%) were in migrants and 4 514 (50.2%) were in those who were native-born; no information on country of birth was available for the remaining 3 476 cases (38.7%).

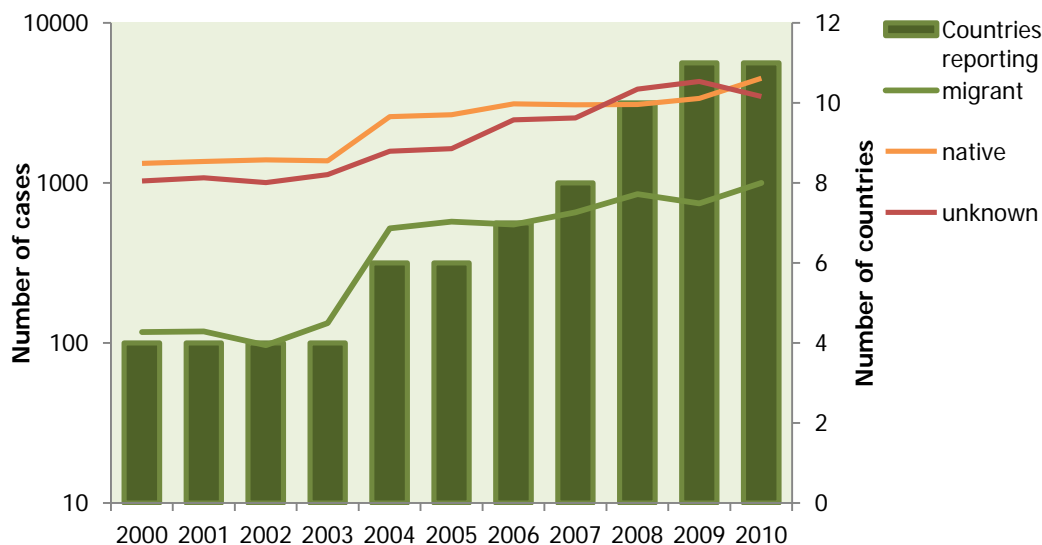
As Figure 7.1 shows, the situation differs considerably between countries. For example, in Romania, all of the 479 cases reported were in individuals born in Romania, while in Austria, 303 (89.4%) of the 339 cases reported were in individuals born outside the country. However, Austria reports data from a sentinel clinic which targets sex workers (see Table 7.2), and these cases are therefore not representative of the general population. France and the Netherlands also report data from sentinel surveillance systems. Nationally representative surveillance data on gonorrhoea by migrant status for 2010 is available from only eight countries reporting to TESSy. Three of these countries reported no cases in migrants and Iceland reported only one such case. The remaining four countries reported between 6% and 13% of cases as born abroad. In 2010, almost half (46%) of the cases born outside the reporting country came from another European country; South American (18%), North American (13%), Asian (11%) and African (10%) countries accounted for the remaining cases for which country of birth or country of nationality had been reported.

Trends in gonorrhoea infection among migrants

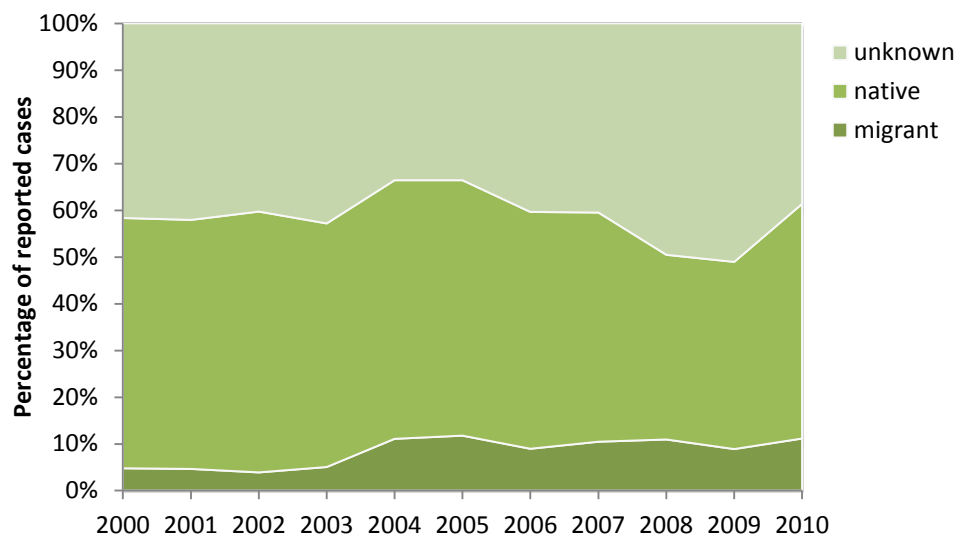
Trends in absolute numbers of cases reported (Figure 7.2) appear to suggest that gonorrhoea incidence has increased since 2000. However, the increase is due to more countries reporting data to TESSy and more countries reporting case-based rather than aggregated data. Analysis of case-based data reported shows that the proportion of gonorrhoea cases among migrants has remained stable at around 8.0% since 2004.

Figure 7.2 Reported number of gonorrhoea cases by migration status and year, 13 European countries, 2000–2010. **A:** Absolute frequency and number of countries reporting data on migration (note logarithmic scale on y-axis); **B:** Relative frequency (%)

A.



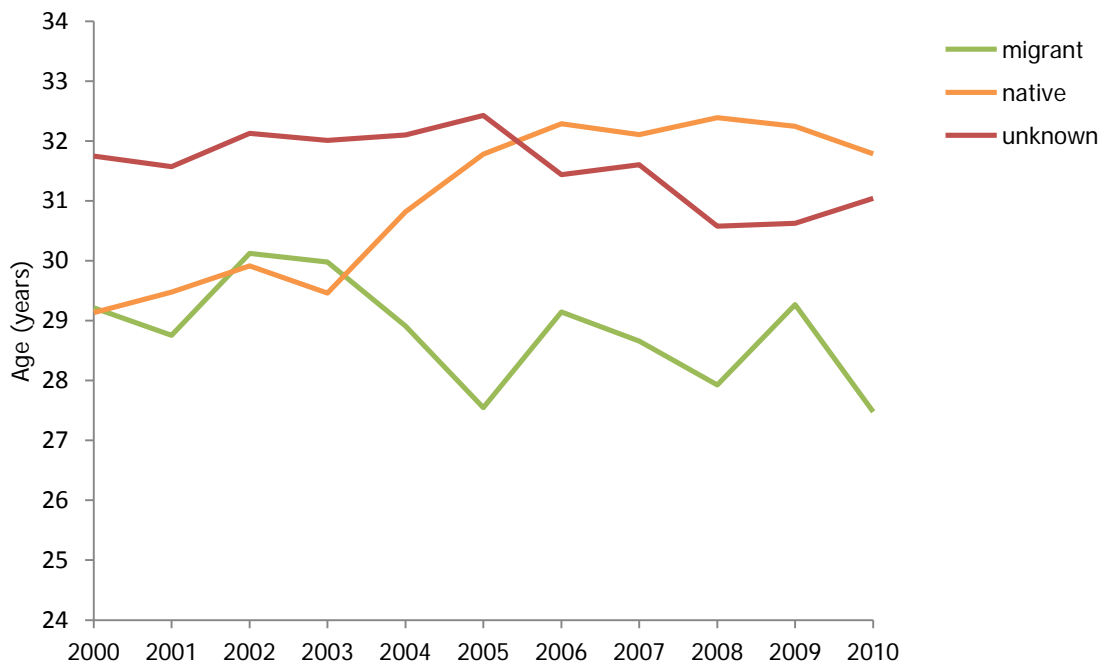
B.



Age and gender of gonorrhoea cases in migrants

Across all reporting countries, the average age of gonorrhoea cases in 2000 was similar among migrants (29.2 ± 7.3 years) and those who were born in the country (29.1 ± 10.0 years). Trends between 2000 and 2010 appear to show a small, but noticeable divergence between the mean ages of these two sub-groups (Figure 7.3). In 2010, gonorrhoea cases in migrants were younger than cases in non-migrants (27.5 ± 7.9 years compared with 31.7 ± 11.3 years).

Figure 7.3 Average age (years) of gonorrhoea cases by migration status and year, 13 European countries, 2000–2010



Age trends in three countries that consistently reported data on the age of migrants and non-migrants between 2000 and 2010 – the Czech Republic, Denmark and Finland – show that the average age of gonorrhoea cases is similar in both sub-groups (Figure 7.4). Migration-related differences in the age of gonorrhoea cases in other countries may reflect the increase in reporting of case-based data as well as differences in migration patterns across Europe.

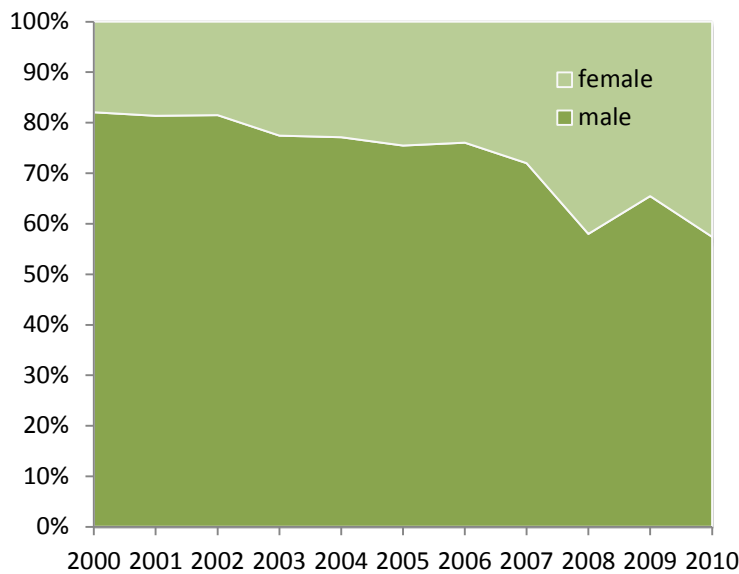
Figure 7.4 Average age (years) of gonorrhoea cases by migration status and year in the Czech public, Denmark and Finland, 2000–2010



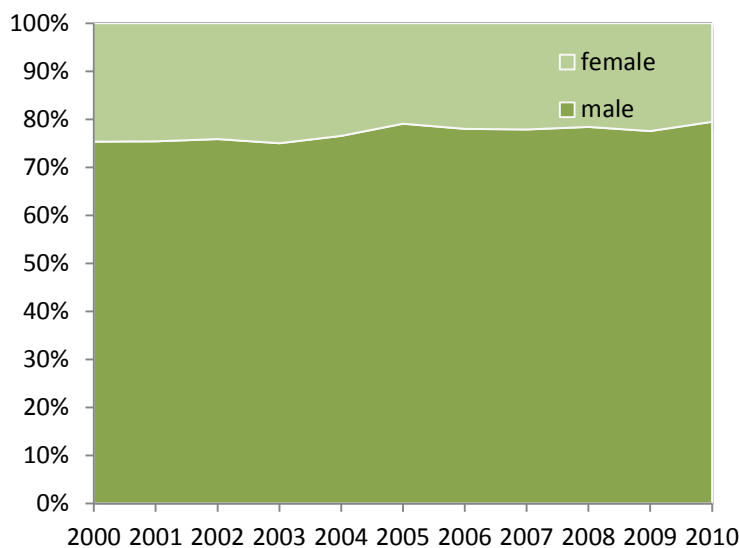
Case-based data reported to TESSy in 2010 show that cases of gonorrhoea are more frequently reported among males than females: three times as many cases are reported among non-migrants and twice as many among migrants (Figure 7.5). This ratio has remained stable over time among non-migrants. However, among migrants the proportion of cases in females has increased, from 18% in 2000 to 43% in 2010. Again, it is important to note that data over this timeframe are not directly comparable because of the increase in the number of countries reporting case-based data.

Figure 7.5 Percentage of reported gonorrhoea cases by gender, migration status and year, 13 European countries*, 2000–2010. **A: Migrants; B: Natives**

A.



B.



*Countries included: Austria, Czech Republic, Denmark, Finland, France, Iceland, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania and Slovenia.

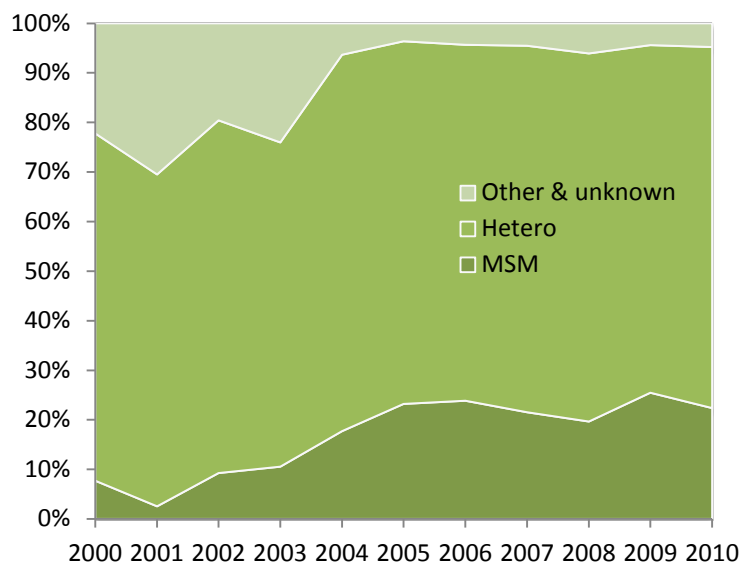
Modes of transmission among migrants and non-migrants

Reported case-based data (Figure 7.6) show that the contribution of different risk groups to gonorrhoea transmission differs between migrants and non-migrants, with a larger proportion of transmission occurring among MSM for non-migrants. The proportion of transmission among MSM also appears to have been slowly increasing among both groups between 2004, when reporting improved significantly, and 2010.

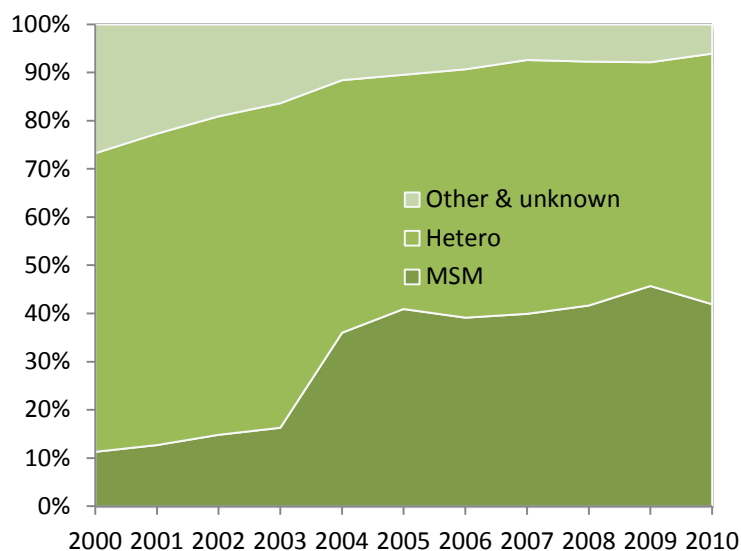
Between 2004 and 2010, among non-migrants, the percentage of cases acquired through heterosexual contact fluctuated between 46–53%, whereas the percentage acquired through MSM contact increased from 36–42%. However, among migrants, heterosexual contact remains the predominant mode of transmission; migrants are around four times more likely to acquire gonorrhoea through heterosexual contact than through MSM contact. Only a small proportion of cases were reported with an unknown mode of transmission.

Figure 7.6 Percentage of reported gonorrhoea cases by mode of transmission and year, 13 European countries*, 2000–2010. A: Migrants; B: Natives

A.



B.



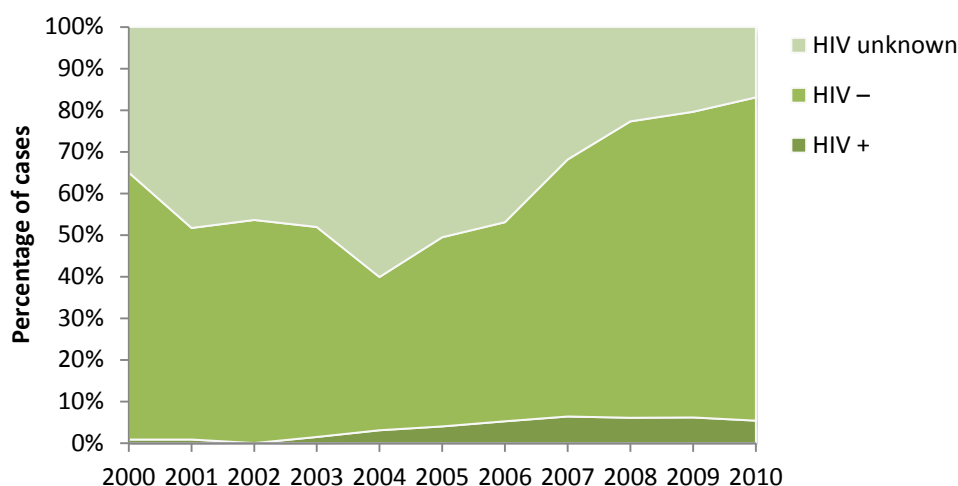
*Countries included: Austria, Czech Republic, Denmark, Finland, France, Iceland, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania and Slovenia.

Co-infection with HIV

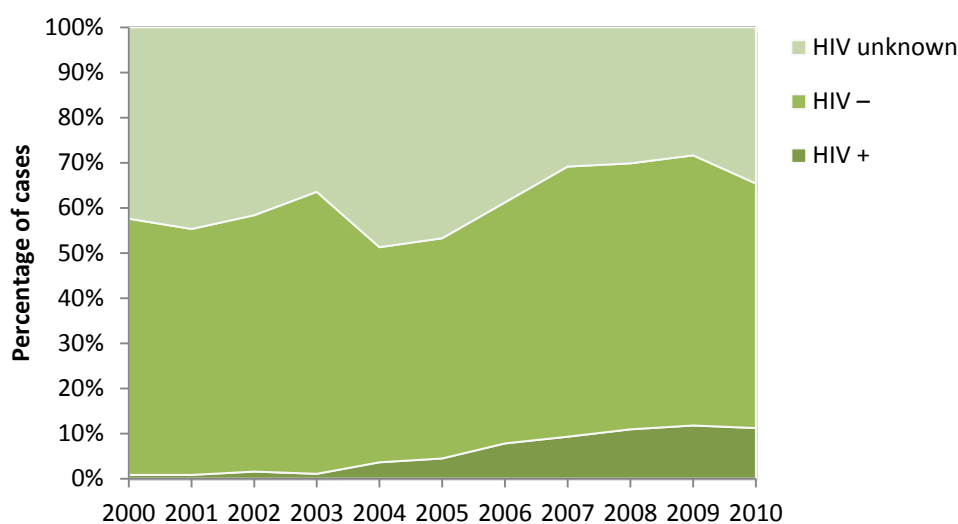
Case-based data included HIV status in 63% of gonorrhoea cases reported between 2000 and 2010. HIV status was known in 67% of migrant cases and 62% of native-born cases. During this period, among cases with known HIV status, HIV prevalence was 7.4% among migrants and 11.7% among non-migrants. If cases with unknown HIV status are excluded, HIV prevalence was relatively stable between 2004 and 2010 among migrant gonorrhoea cases but increased among non-migrant cases from 8.4% in 2005 to 17.1% in 2010 (Figure 7.7). Again, this may be due to improved reporting rather than changed disease patterns.

Figure 7.7 Percentage of reported gonorrhoea cases by HIV status and year, 13 European countries*, 2000–2010. A: migrants; B: natives

A.



B.



*Countries included: Austria, Czech Republic, Denmark, Finland, France, Iceland, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania and Slovenia.

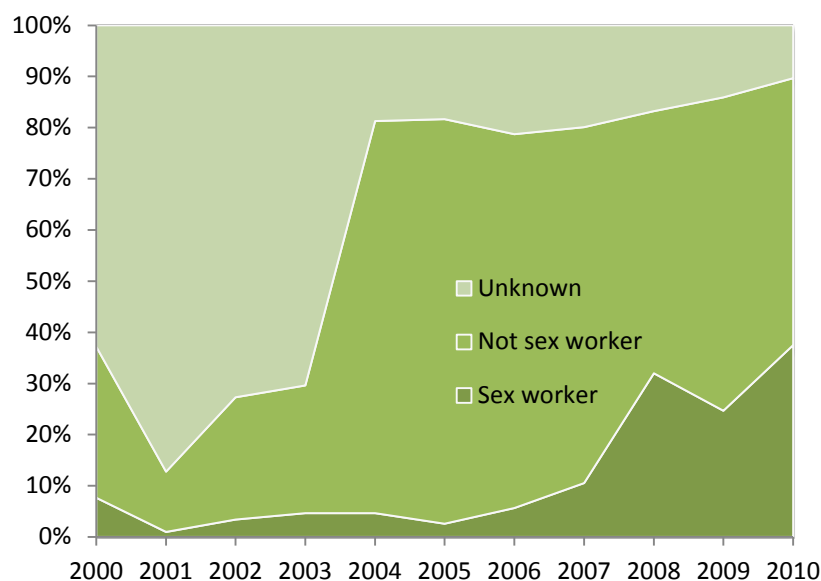
Sex workers and gonorrhoea in migrants and non-migrants

Across all countries reporting case-based data on gonorrhoea between 2000 and 2010, the proportion of cases with known sex worker status increased from 7.0% in 2000 to 43% in 2010. Six countries – Austria, the Czech Republic, Denmark, Lithuania, Luxembourg and the Netherlands – reported sex worker status reasonably consistently, providing data on 65% of all cases throughout the decade. Migrant status by country of birth was reported for 87% of cases with known sex worker status.

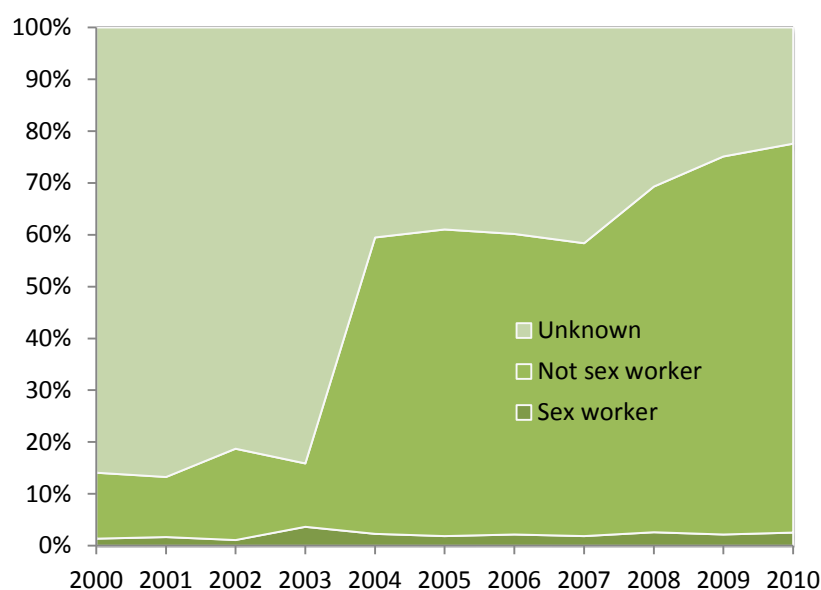
Analysis of these data (Figure 7.9) indicates that the percentage of sex workers among gonorrhoea cases was consistently higher in migrants than in non-migrants between 2000 and 2006 – with an average of 4.2% in migrant cases and 2.1% in non-migrant cases. The percentage of sex workers among migrants with gonorrhoea appears to have increased since 2006, reaching 37% in 2010, whereas it has remained the same in non-migrant gonorrhoea cases. However, data and trends should be interpreted with caution, because data on sex worker status are missing for the majority of cases or are limited to sentinel surveillance sites, and because of changes in reporting over time.

Figure 7.8 Reported cases of gonorrhoea by sex worker status and year, six European countries*, 2000–2010. A: migrants; B: natives

A.



B.



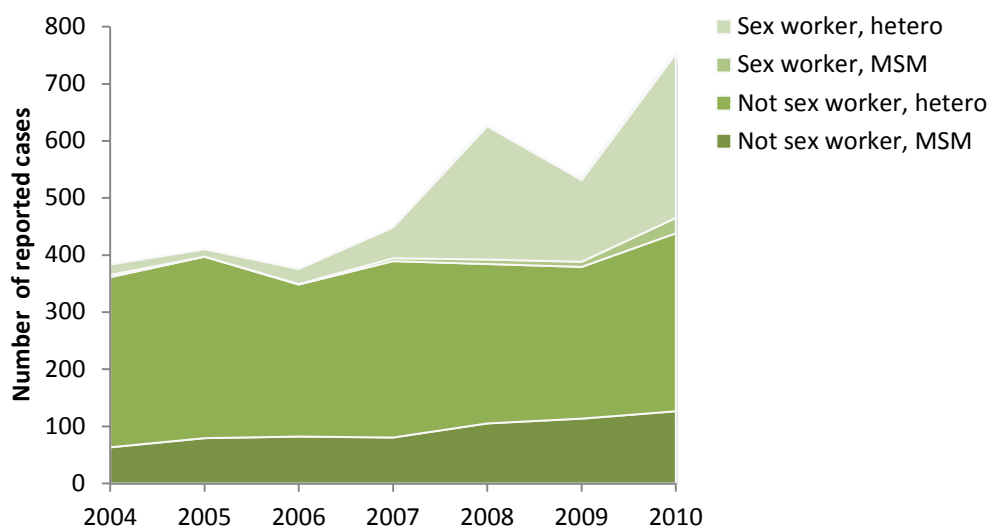
*Countries included: Austria, the Czech Republic, Denmark, Lithuania, Luxembourg and the Netherlands.

Limited data are available on sex worker status, country of birth and HIV co-infection; all three variables are only known for 2.0% of all gonorrhoea cases reported through sentinel sites serving high-risk populations. Among gonorrhoea cases for which data on all three variables were available, mean HIV prevalence was 1.3% among migrant sex workers and 4.9% among non-migrant sex workers over the period 2000–2010.

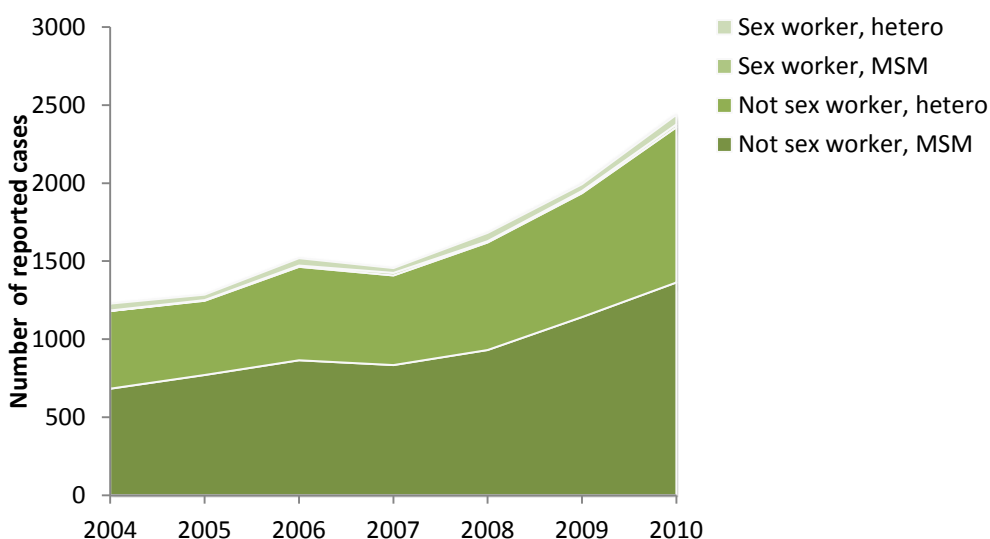
As available data suggest that gonorrhoea cases among migrant sex workers may be increasing in some countries, association with modes of transmission was also analysed. Figure 7.10 shows that, in the six countries with the most reliable reporting on sex worker status (Austria, the Czech Republic, Denmark, Lithuania, Luxembourg and the Netherlands), heterosexual and MSM sex workers accounted for between 29 and 42% of gonorrhoea cases where sexual orientation and sex worker status were reported among migrants since 2008, but for less than 4.0% of gonorrhoea cases in non-migrants.

Figure 7.9 Reported gonorrhoea cases by sex worker status, mode of transmission and year, six European countries*, 2004–2010. A: migrants B: natives

A.



B.



*Countries included: Austria, the Czech Republic, Denmark, Lithuania, Luxembourg and the Netherlands

7.3 Gonorrhoea in migrant populations in the EU/EEA: Literature review findings

Additional data on gonorrhoea among migrants in Europe identified by the literature review are mainly from studies at STI clinics in urban centres.

Most studies found no significant differences in rates of gonorrhoea between migrants and non-migrants in a range of risk populations. For example, a prospective study of 220 individuals of African origin who had recently migrated to Portugal found a gonorrhoea prevalence of 1.8%, similar to the prevalence in non-migrant Portuguese populations at high risk of STI [6]. In the Netherlands, data on MSM visiting outpatient clinics in Amsterdam between 2008–2009 showed no difference in gonorrhoea rates by nationality [7]. A study of injecting drug users in Spain found no difference in gonorrhoea rates between Spanish-born individuals and migrants [8]. However, a study of self-referred attendees at an STI clinic in Barcelona, Spain, found that foreign-born heterosexual men had higher rates of gonorrhoea than Spanish heterosexual men [9].

Studies among sex workers have also found no significant differences in gonorrhoea prevalence between migrants and non-migrants. Studies in urban settings in Spain found no difference in gonorrhoea infection by sex worker country of origin [10]. Similarly, in the United Kingdom, although type of client, access to healthcare and other risk factors differed between UK-born and non-UK born sex workers, there was no statistically significant difference in

prevalence of STI, including gonorrhoea, between the two populations. Among migrant sex workers, length of stay in the United Kingdom was not associated with risk of infection [11]. Data from the Genitourinary Medicine Clinic Activity Dataset, covering 2 305 sex workers seeking healthcare in England, showed that foreign-born sex workers were less likely to be diagnosed with gonorrhoea than native-born sex workers [12].

7.4 Survey of EU/EEA countries

Twenty-three of the 30 EU/EEA countries responded to the survey. Of these, nine reported that they collect information related to migration for cases of gonorrhoea. All nine countries collect information on country of birth; the Czech Republic and Denmark also distinguish between short-term and long-term stay and Denmark also identifies 'second-generation migrants'.³⁵

Of the 22 countries that answered the question as to whether gonorrhoea is a particular issue among migrant groups, five countries responded that it is an issue (Box 7.1). Twelve countries responded that it is not an issue and five countries said that they had insufficient data to be able to respond to the question.

Box 7.1 Country responses on gonorrhoea infections among migrants

- In the Czech Republic, 9.0% of all infections with gonorrhoea in the last five years were reported to have been among 'foreigners on long-term stay'.
- In Italy, according to the sentinel surveillance system based on STI clinics, gonorrhoea prevalence among migrants from 1991–2010 was 10.1% compared with 5.6% among non-migrants.
- In Norway, 76 (21%) of the 367 notified cases of gonorrhoea in 2011 were in migrants.
- In Spain, according to the sentinel surveillance system based on STI clinics, during the period July 2005–December 2009, 31.6% of gonorrhoea cases were among those born outside Spain.
- In the United Kingdom, data collected from genitourinary medicine clinics in England indicated that 23% of cases of gonorrhoea in 2011 were among people born outside the UK.

7.5 Conclusion

Data on gonorrhoea by migrant status are only available from 11 European countries. These data show that in 2010, 11% of cases of gonorrhoea were in migrants and 50% were in non-migrants; no information on country of birth was available for the remaining cases. Nationally representative surveillance data on gonorrhoea by migrant status for 2010 are available from only eight countries reporting to TESSy; three of these countries reported no cases in migrants, one country reported one case; and the remaining four countries reported between 6.0% and 13% of cases as born abroad. The proportion of migrants among gonorrhoea cases remained stable between 2004 and 2010.

The average age of gonorrhoea cases is similar in migrants and non-migrants, but notification rates are higher in males than females in both groups. However, while the percentage of females in non-migrants has remained stable between 2000 and 2010, it has increased among migrants.

Data reported to TESSy suggest that there are marked differences between migrants and non-migrants with respect to mode of transmission of gonorrhoea and the percentage of gonorrhoea cases among sex workers. In non-migrants, the percentage of cases acquired through heterosexual contact has remained at around 55% whereas the proportion acquired through MSM contact has increased to 42%; migrants are around four times more likely to acquire gonorrhoea through heterosexual contact than through MSM contact. The percentage of sex workers among gonorrhoea cases has been consistently higher in migrants than in non-migrants since 2000 and appears to have increased significantly in migrants since 2006. However, data from the literature review (based on a limited number of studies of STI clinic attendees and specific population groups considered to be at higher risk of STI, such as sex workers, injecting drug users and MSM), show little difference in gonorrhoea rates between migrants and non-migrants.

Available data are limited and partly contradictory and it is therefore difficult to draw clear conclusions about gonorrhoea in migrants in the EU/EEA. While there appear to be differences in the distribution of cases between migrants and non-migrants, it is not possible to determine the actual burden of disease without accurate denominators. Understanding of gonorrhoea infection in migrants can only be improved if countries invest in collecting standardised case-based data with information on countries of origin. The quality of data on sex work and HIV co-infection also needs to improve to enable better analysis in order to monitor the apparent increased risk in specific sub-groups of migrants.

³⁵ In six countries it was not possible to establish from survey responses whether migration-related information was collected.

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8. Syphilis

This chapter summarises available evidence on syphilis among migrants in the EU/EEA, based on TESSy surveillance data, a review of the literature and a survey of EU/EEA countries.

8.1 Introduction

Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum*. Humans are the only reservoir and, apart from congenital cases, the only epidemiologically relevant mode of transmission is by direct contact with treponema-rich, open lesions and contaminated secretions from a patient. After an incubation period of 10 to 90 days (three weeks on average) clinical symptoms appear. At first a primary lesion at the site of infection (chancre), then a series of eruptions on mucous membranes and skin (secondary syphilis), followed by long periods of latency (latent or tertiary syphilis). If untreated, many years after the initial infection, tertiary syphilis lesions might finally appear (visceral, multi-organ involvement, including serious vascular and neurological damage). Mother-to-child transmission can result in foetal death, perinatal death or congenital syphilis. The latter can be without symptoms or present stigmata or determine multi-organ pathology.

Syphilis is reported more often among 25–34 year olds in the EU/EEA and rates are higher among men. MSM contribute 42% of cases. Overall rates of syphilis infection in the EU/EEA have been decreasing since 2001. This reflects the large decreases in the number of reported cases in eastern Europe which previously reported very high rates of syphilis. These countries have undergone a period of significant change in healthcare and surveillance systems during this time. In western Europe, however, rates of reported cases have increased in many countries [1-4]. These trends appear to be linked to increased cases among MSM.

8.2 Syphilis in the EU/EEA: analysis of surveillance data

Since 2009, ECDC has coordinated enhanced surveillance of sexually transmitted infections (STI) in Europe. Data on syphilis in 2010 were available from all EU/EEA countries except Liechtenstein.

In 2010, 17 884 cases of syphilis were reported in 29 EU/EEA countries (Table 8.1), a figure which had been decreasing since 2006, when 20 533 cases were reported (Table 8.1). In 2010, the majority of cases were notified in Germany, Romania, Spain and the United Kingdom. The overall notification rate was 4.4 per 100 000 population [1-3]. Notification rates were below 3/100 000 in Greece, Iceland, Ireland, Luxembourg, Norway, Poland, Portugal, Slovenia and Sweden. The highest rates were reported by Lithuania (10.4/100 000), Romania (8.3/100 000) and Denmark (7.5/100 000) [1].

In 2010, a total of 59 cases of congenital syphilis were notified in 21 EU/EEA countries. Most of these cases were reported by four countries: Poland (18 cases); Portugal (11 cases); Italy (eight cases); and Romania (six cases). The overall rate was 2.5 cases per 100 000 live births. However, it is important to note that many countries do not report data on congenital syphilis; differences in data completeness and representativeness also mean that caution should be exercised when making comparisons across countries.

The syphilis notification rate in men, at 6.6/100 000, was more than three times higher than in women (1.8/100 000). Most cases were in those aged over 25 years; 17% of all notified cases were in young adults aged 15–24 years. More than half (55%) of cases with information on transmission category were reported in MSM, the main population risk group for syphilis.

Table 8.1 Numbers and rates of syphilis cases reported in the EU/EEA by country and year, 2006–2010

Country	2010				2009		2008		2007		2006	
	National coverage	Report type	Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population		Reported cases and rate per 100 000 population	
			Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	N	C	59	-	62	-	61	-	58	-	25	-
Belgium*	Y	C	502	-	486	-	480	-	403	-	288	-
Bulgaria	Y	A	460	6.1	420	5.5	419	5.5	440	5.7	490	6.3
Cyprus*	Y	C	20	-	15	-	14	-	10	-	13	-
Czech Republic	Y	C	459	4.4	697	6.7	342	3.3	205	2	75	0.7
Denmark	Y	C	413	7.5	255	4.6	151	2.8	92	1.7	77	1.4
Estonia	Y	C	67	5	57	4.3	71	5.3	78	5.8	125	9.3
Finland	Y	C	200	3.7	194	3.6	211	4	185	3.5	127	2.4
France*	N	C	600	-	534	-	563	-	599	-	478	-
Germany	Y	C	3 028	3.7	2 730	3.3	3 187	3.9	3 277	4	3 161	3.8
Greece	N	A	241	2.1	259	2.3	155	1.4	197	1.8	141	1.3
Hungary*	Y	A	504	-	489	-	549	-	393	-	559	-
Ireland	Y	C	94	2.1	96	2.2	119	2.7	62	1.4	133	3.2
Italy*	Y	C	640	-	916	-	923	-	1 001	-	935	-
Latvia	Y	C	122	5.4	175	7.7	236	10.4	305	13.4	483	21
Lithuania	Y	C	345	10.4	326	9.7	326	9.7	275	8.1	336	9.9
Luxembourg	Y	C	13	2.6	13	2.6	12	2.5	14	2.9	10	2.1
Malta	Y	C	25	6.1	16	3.9	19	4.6	11	2.7	13	3.2
Netherlands*	Y	C	695	-	711	-	792	-	657	-	806	-
Poland	Y	A	914	2.4	1 255	3.3	929	2.4	847	2.2	933	2.4
Portugal	Y	C	179	1.7	150	1.4	98	0.9	112	1.1	124	1.2
Romania	Y	C	1 792	8.3	3 252	15.1	4 006	18.6	4 245	19.7	5 661	26.2
Slovakia	Y	C	333	6.1	294	5.4	228	4.2	152	2.8	89	1.7
Slovenia	Y	C	40	2	47	2.3	63	3.1	31	1.5	16	0.8
Spain	Y	A	2 909	6.3	2 496	5.4	2 545	5.6	1 936	4.4	1 711	3.9
Sweden	Y	C	196	2.1	182	2	166	1.8	237	2.6	167	1.8
United Kingdom	Y	A	2 911	4.7	3 215	5.2	3 309	5.4	3 561	5.9	3 486	5.8
EU total	-	-	17 761	4.5	19 342	4.9	19 974	5.1	19 383	5	20 462	5.3
Iceland	Y	C	5	1.6	0	0	2	0.6	1	0.3	4	1.3
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	118	2.4	76	1.6	56	1.2	61	1.3	67	1.4
Total	-	-	17 884	4.4	19 418	4.9	20 032	5	19 445	4.9	20 533	5.3

Source: [1]

Excluding congenital syphilis

*Countries with sentinel systems (rates not calculated)

Report type: aggregated (A), case-based (C)

National coverage: yes (Y), no (N)

National surveillance systems for STI, including syphilis and congenital syphilis, differ across Europe. Nominated institutions in each country report national data to TESSy [2]. Collection systems vary in terms of source of data, type of data (aggregate or case-based data), coverage (sentinel system or comprehensive) and period of availability (Table 8.2). In addition, reporting is voluntary in some countries and compulsory in others [2].

Table 8.2 Data source, type and period of syphilis surveillance data in EU/EEA countries

Country	Data source	Compulsory (Cp)/ voluntary (V)/other (O)	Comprehensive (Co)/ sentinel (Se)/other (O)	Active (A)/passive (P)	Case based (C)/ aggregated (A)	Data reported by				National coverage
						Laboratories	Physicians	Hospitals	Others	
Austria	AT-STISentInella	V	Se	A	C	Y	N	N	N	N
Belgium	BE-LABNET	V	Se	A	C	Y	N	-	-	Y
Bulgaria	BG-STI	Cp	Co	P	A	-	-	Y	Y	-
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y
Czech Republic	CZ-STD	Cp	Co	A	C	N	Y	Y	N	Y
Denmark	DK-STI_CLINICAL	Cp	Co	P	C	N	Y	N	N	Y
Estonia	EE-PERTUSSIS/SHIGELLOSIS/SYPHILIS	Cp	Co	P	C	Y	Y	Y	Y	Y
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y
France	FR-STI	V	Se	A	C	Y	Y	Y	Y	N
Germany	DE-SURVNET@RKI-7.3	Cp	Co	P	C	Y	N	N	N	Y
Greece	GR-NOTIFIABLE_DISEASES	Cp	O	P	A	Y	Y	Y	Y	N
Hungary	HU-STD SURVEILLANCE	Cp	Se	P	A	N	Y	N	N	Y
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y
Ireland	IE-SYPHILIS	Cp	Co	P	C	Y	Y	Y	N	Y
Italy	IT-NRS	Cp	Co	P	C	Y	Y	Y	N	Y
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	N	Y
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	Y	Y	N	N	Y
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y
Netherlands	NL-STI	V	Se	P	C	N	Y	N	N	Y
Norway	NO-MSIS_B	Cp	Co	P	C	Y	Y	Y	-	Y
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	N	Y
Portugal	PT-SYPHILIS	Cp	Co	P	C	N	Y	N	N	Y
Romania	RO-RNSSy	Cp	Co	P	A	N	N	Y	N	Y
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y
Slovenia	SI-SPOSUR	Cp	Co	P	C	N	Y	N	N	Y
Spain	ES-STATUTORY_DISEASES_STI_AGGR	Cp	Co	P	A	N	Y	N	N	-
Sweden	SE-SMINET	Cp	Co	P	C	Y	Y	N	N	Y
United Kingdom	UK-GUM	Cp	Co	P	A	N	N	N	Y	Y
United Kingdom	UK-LAB	O	Co	P	A	Y	N	N	N	N

Source: European Centre for Disease Prevention and Control. Annual Epidemiological Report 2012. Reporting on 2010 surveillance data and 2011 epidemic intelligence data. Stockholm: ECDC. 2012.

Type: aggregated (A), case-based (C);

Legal: voluntary reporting (V), compulsory reporting (Cp); Other (O)

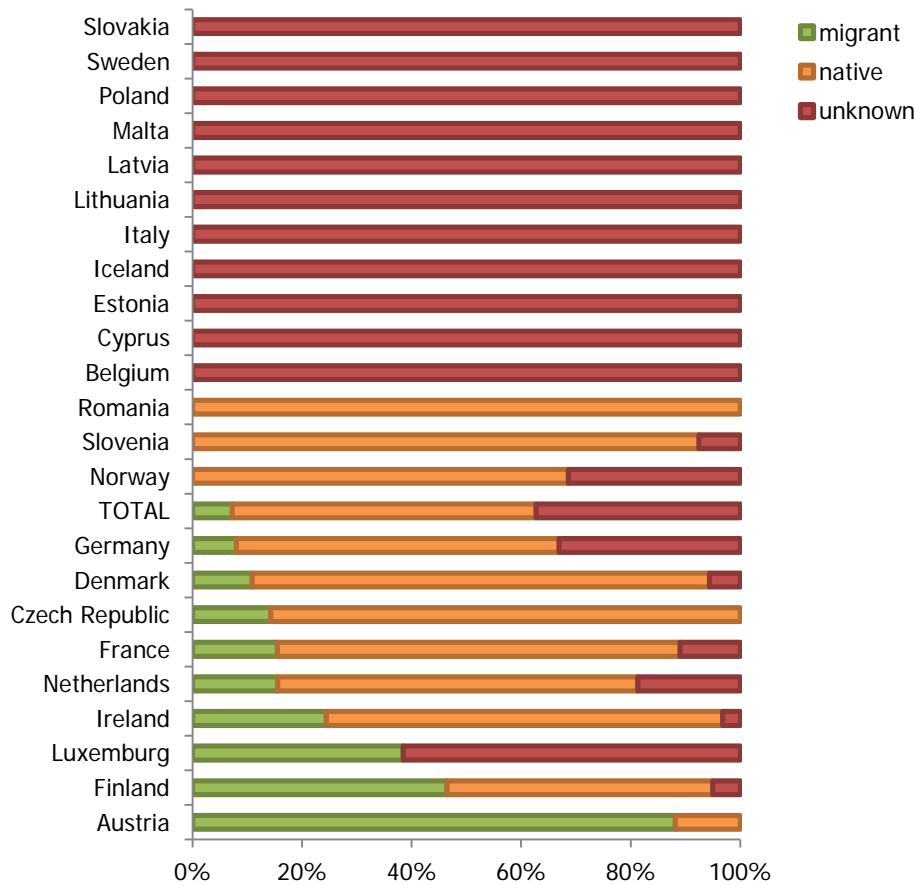
Coverage: sentinel system (Se), comprehensive (Co), Other (O)

* All physicians should report to the national register in Italy but less than 10% do – there is no comprehensive system.

** Data from two different data sources were submitted for Spain; data from the ES_microbiological (sentinel laboratory system) were not used in the tables.

In 2010, 23 of the 29 countries that reported syphilis data to TESSy reported case-based data. Bulgaria, Greece, Hungary, Romania, Spain and the United Kingdom reported aggregated data, which cannot be used to identify cases in migrants. Of the 23 countries that reported case-based data, 12 reported on country of birth. Data on syphilis cases by country of birth for the year 2010 is shown in Figure 8.1.

Figure 8.1 Reported syphilis cases by reporting country and migrant status, EU/EEA, 2010



In 2010, case-based data were reported to TESSY for 9 991 syphilis cases in Europe (Figure 8.1). Of these cases, 728 (7.3%) were in migrants and 5 536 (55.4%) were in non-migrants; no information on country of birth was available for 3 727 cases (37.7%). However, as Figure 8.1 shows, the situation differs considerably among countries. For example, in Romania, all of the 1 815 cases reported were in individuals born in Romania, while in Austria, 52 of the 59 cases reported were in individuals born outside the country. It is important to note that Austria reports data from a sentinel clinic which targets sex workers (Table 8.2), and these cases are therefore not representative of the general population. France and the Netherlands also only use sentinel surveillance.

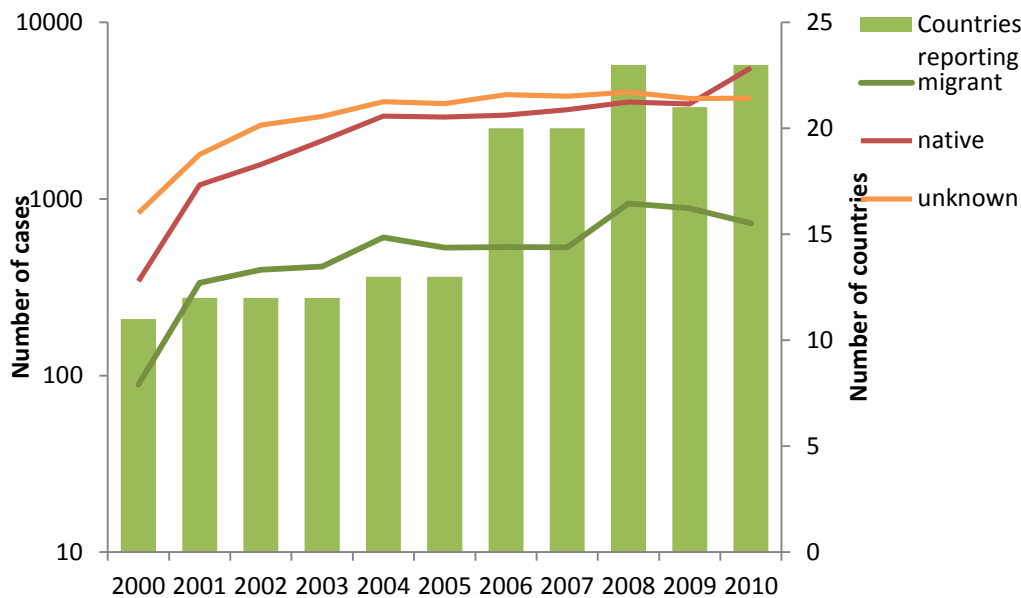
Reliable nationally representative surveillance data on syphilis by migrant status for 2010 are only available from nine countries reporting to TESSy. Three of these countries reported no cases in migrants. Luxembourg reported five cases among migrants and eight with unknown origin but did not report any cases born in the country. The remaining five countries – Czech Republic, Denmark, Germany, Finland and Ireland – reported between 8.0% and 46.5% of cases as born abroad. Of cases born abroad in 2010, 55% were born in another European country. The remainder were mainly born in Asian (13%), African (11%), South American (11%) or North American (9.0%) countries.

Trends in syphilis cases among migrants

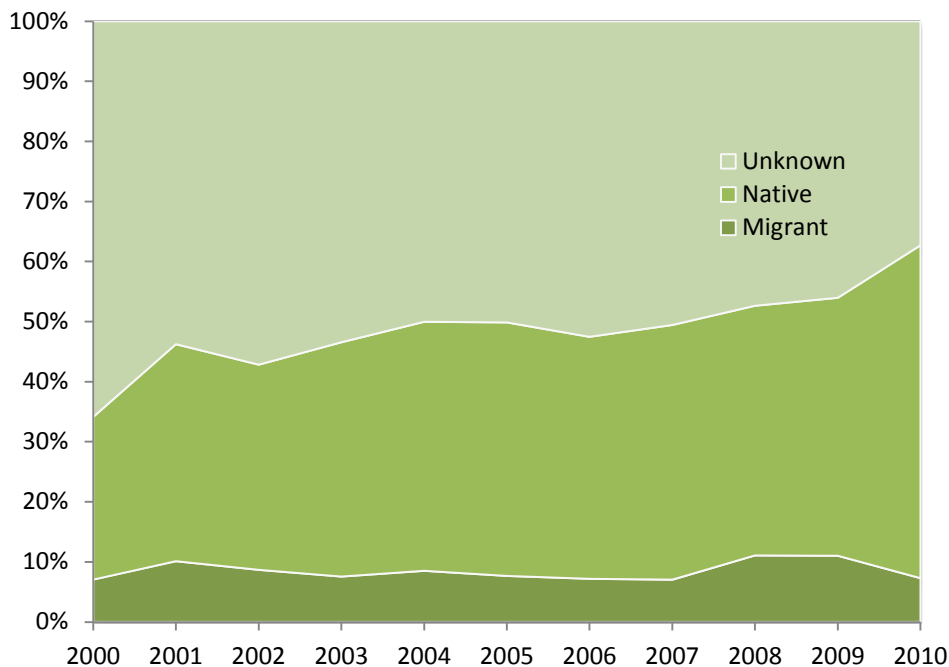
Trends in absolute numbers of cases reported (Figure 8.2) appear to suggest that syphilis incidence has increased since 2000. However, this apparent increase reflects the increase in the number of countries reporting data and the number of countries reporting case-based data to TESSy. Analysis of case-based data reported shows that the proportion of syphilis cases among migrants has remained stable at around 8.5%.

Figure 8.2 Reported number of syphilis cases by migration status and year, 24 European countries, 2000–2010. A: Absolute frequency and number of countries reporting data on migration (note logarithmic scale on y-axis). B: Relative frequency (%)

A.



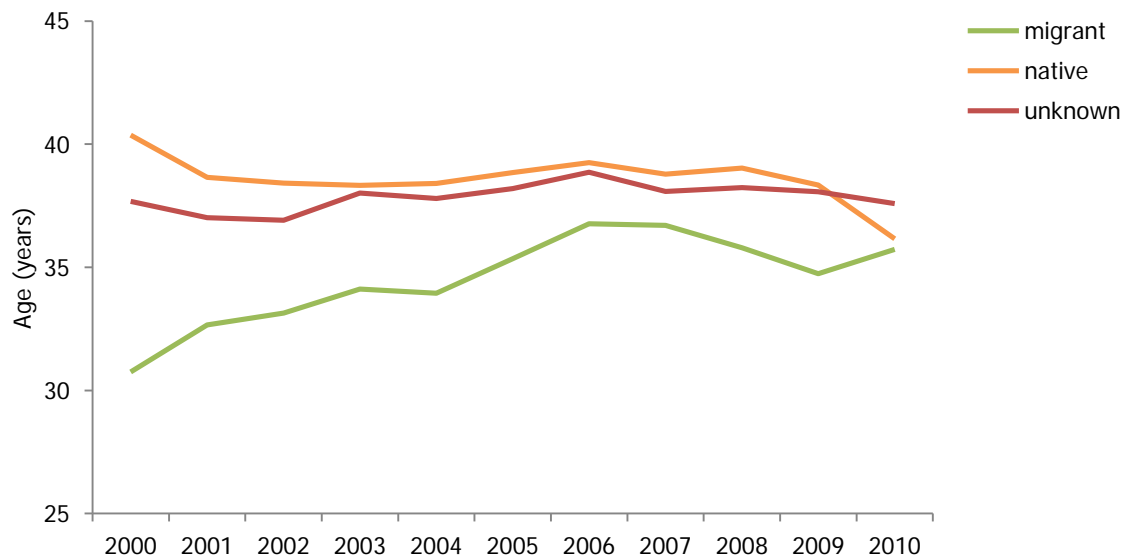
B.



Age and gender of syphilis cases in migrants

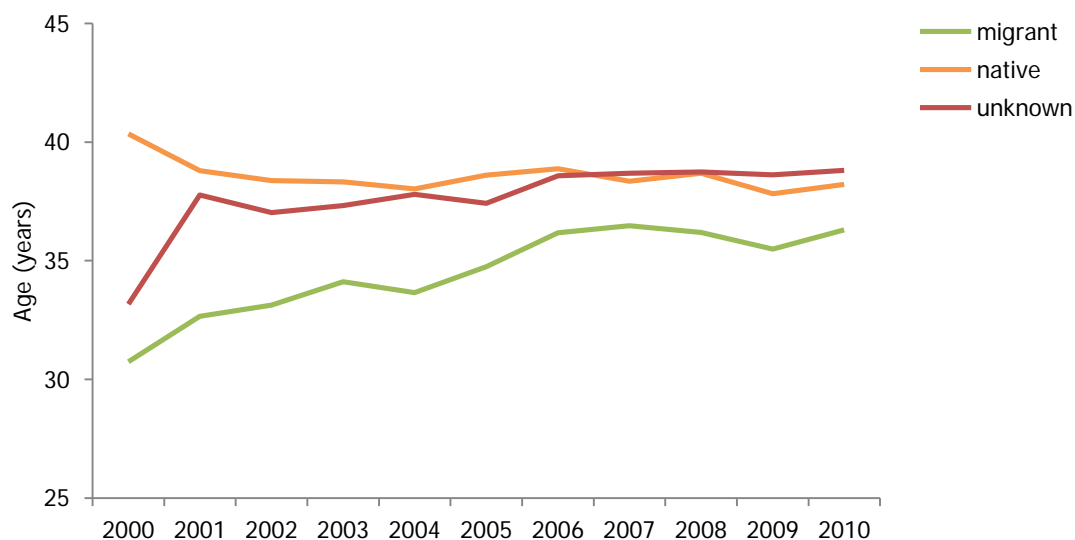
Across all reporting countries, the average age of syphilis cases in 2010 was similar in migrants ($35.7 \pm \text{SD } 11.1$ years) and non-migrants (36.1 ± 12.1 years). This is in contrast to the marked difference seen in 2000, when migrant cases were aged on average 30.7 ± 7.79 years, while non-migrants were on average ten years older, at 40.4 ± 16.5 years. Overall, between 2000 and 2010 a gradual convergence in the ages of the two sub-groups has been observed (Figure 8.3). However, it is important to note that only a few countries reported data in 2000; the number of countries reporting had increased by 2010.

Figure 8.3 Average age (years) of syphilis cases by migration status and year, 14 European countries, 2000–2010



Age trends in five countries that consistently reported data on the age of migrants and non-migrants between 2000 and 2010 – Czech Republic, Denmark, Finland, France and Germany – also suggest a gradual convergence in the average age of gonorrhoea cases in both sub-groups (Figure 8.4). These data are, however, from the countries reporting the largest number of cases and are therefore driving the trend.

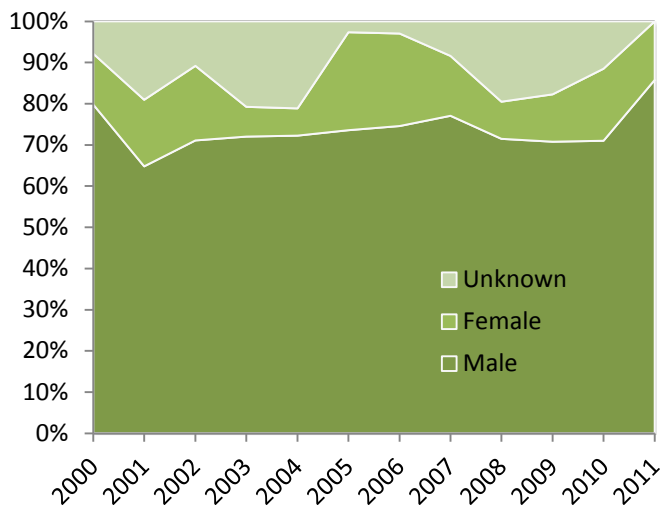
Figure 8.4 Average age (years) of syphilis cases by migration status and year in the Czech Republic, Denmark, Germany, Finland, France, 2000–2010



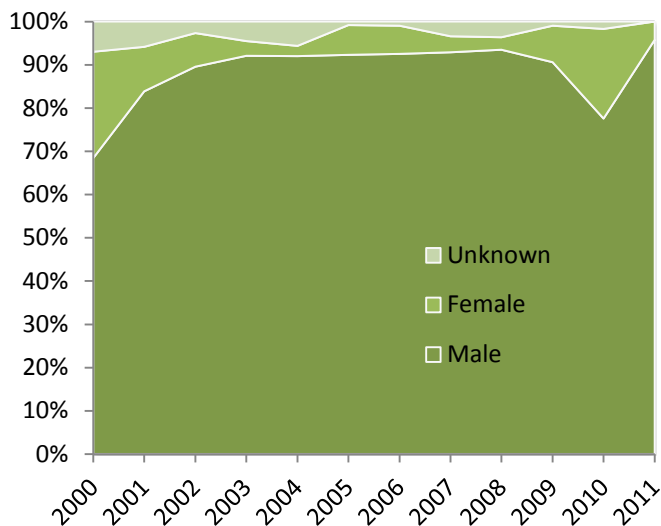
Case-based data reported to TESSy in 2010 show that notification rates of syphilis are higher in males than in females, around ten times higher among non-migrants and five times higher among migrants (Figure 8.5). This ratio has remained relatively stable over time in both sub-groups.

Figure 8.5 Percentage of reported syphilis cases by gender, migration status and year, 14 European countries*, 2000–2010. A: Migrants; B: Natives

A.



B.



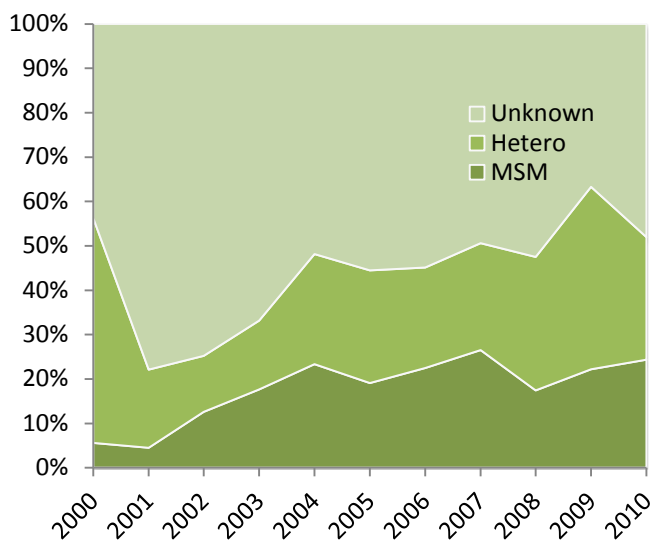
Countries included: Austria, Czech Republic, Denmark, Finland, France, Germany, Ireland, Luxembourg, Latvia, Malta, Netherlands, Norway, Romania and Slovenia.

Modes of transmission among migrants and non-migrants

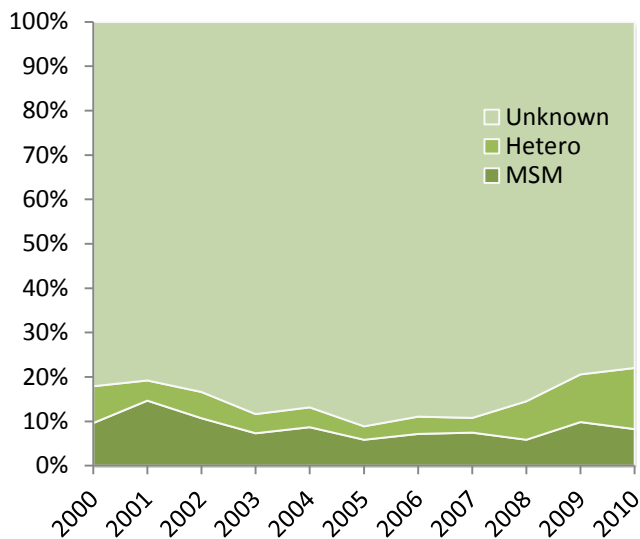
Reported case-based data (Figure 8.6) show that overall, between 2000 and 2010, migrants were slightly more likely to contract syphilis through heterosexual contact (57%) than through MSM contact (43%). In contrast, non-migrants were more likely to contract syphilis through MSM contact (65%) than through heterosexual contact (35%). Modes of transmission of syphilis, and differences in modes of transmission between migrant and non-migrant sub-groups, have remained relatively stable over time. There is a significant proportion of cases with unknown mode of transmission.

Figure 8.6 Percentage of reported syphilis cases by mode of transmission and year, 14 European countries*, 2000–2010. A: Migrants; B: Natives

A.



B.

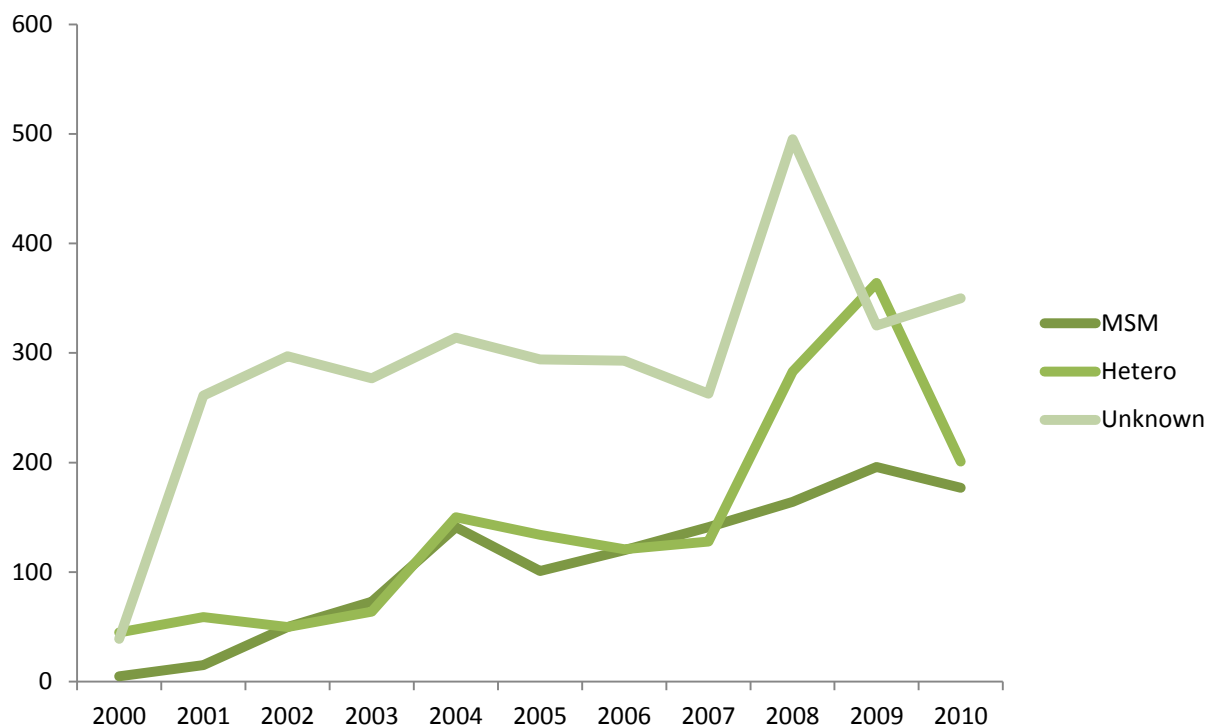


*Countries included: Austria, Czech Republic, Denmark, Finland, France, Germany, Ireland, Luxembourg, Latvia, Malta, Netherlands, Norway, Romania and Slovenia.

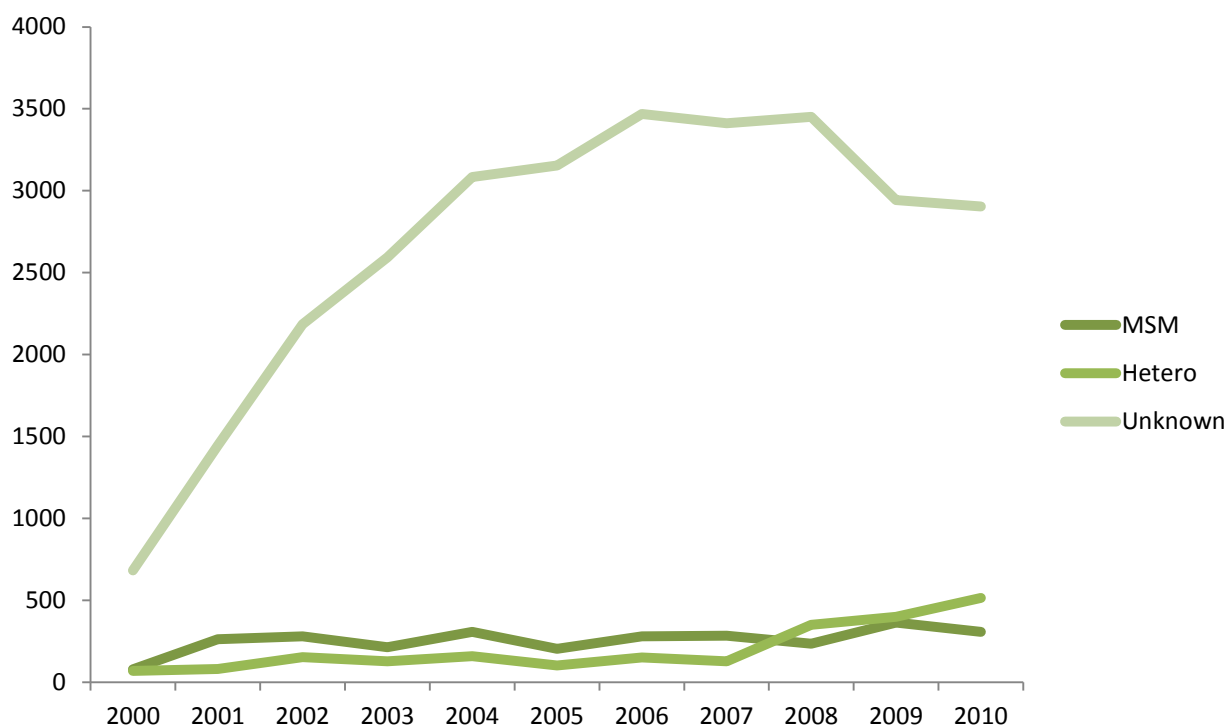
Between 2009 and 2010, there was a small increase in the number of non-migrants contracting syphilis through heterosexual contact among the 14 countries analysed. By 2010, heterosexual contact (60%) had overtaken MSM contact (40%) as the main mode of transmission in this sub-group (Figure 8.7). However, this may reflect changes in the number of countries reporting case-based data over time.

Figure 8.7 Number of reported syphilis cases by mode of transmission and year, 14 European countries*, 2000–2010. A: Migrants; B: Natives

A.



B.



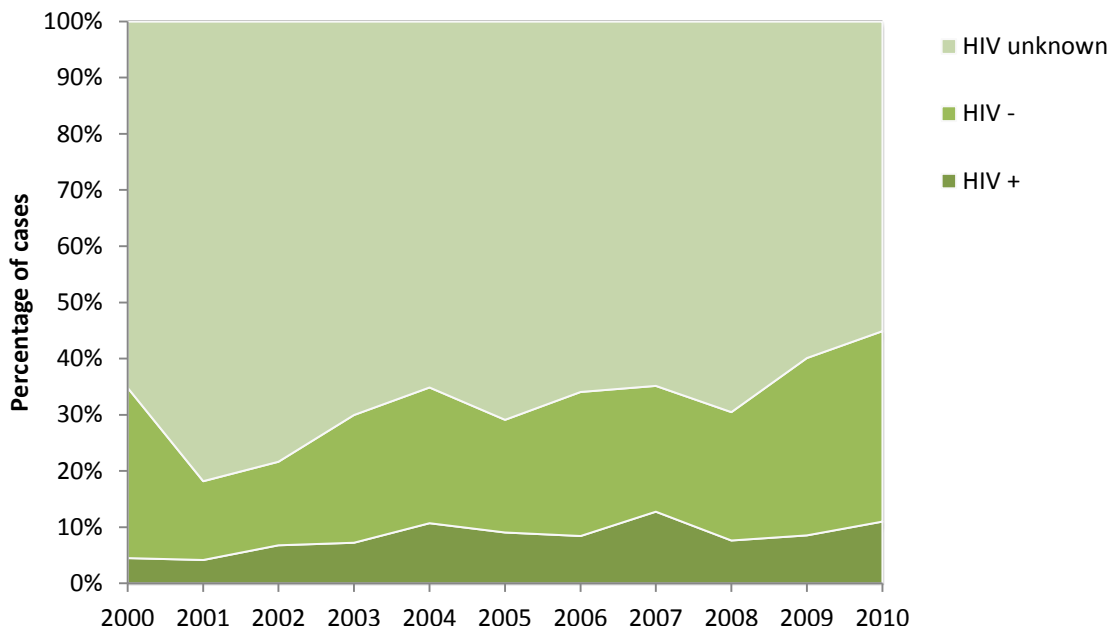
* Countries included: Austria, Czech Republic, Denmark, Finland, France, Germany, Ireland, Luxembourg, Latvia, Malta, Netherlands, Norway, Romania and Slovenia.

Co-infection with HIV

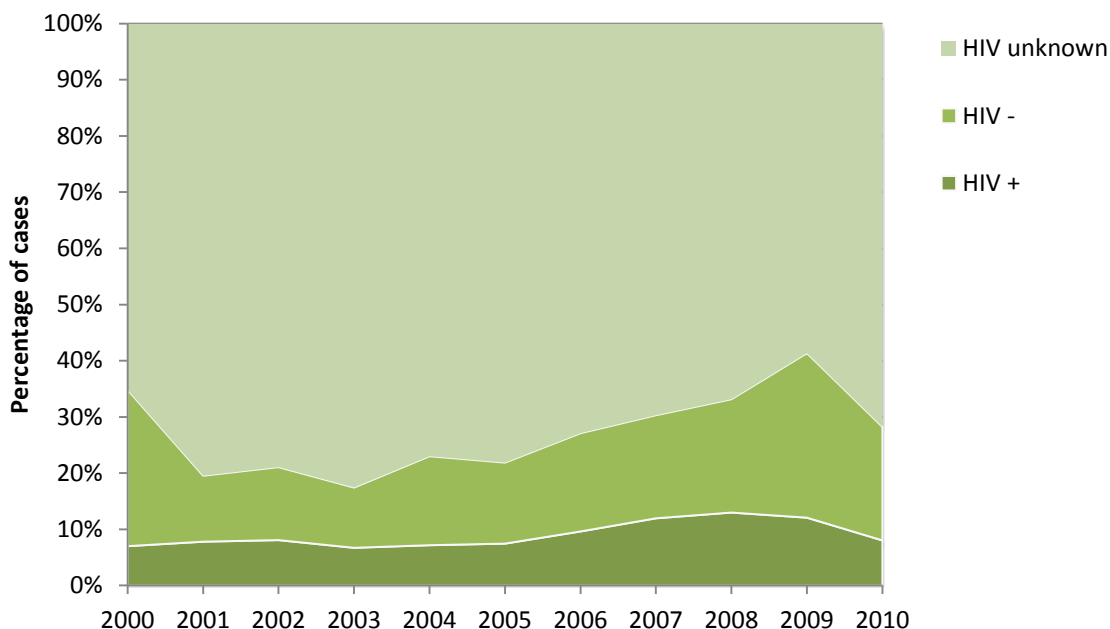
Case-based data included HIV status in 29% of syphilis cases reported between 2000 and 2010. HIV status was known in 33% of migrant cases and 28% of native-born cases. During this period, of the cases with known HIV status, HIV prevalence was 26% among migrants and 34% among non-migrants. This proportion has been relatively stable over time (Figure 8.8).

Figure 8.8 Percentage of reported syphilis cases by HIV status and year, 14 European countries*, 2000-2010: A: migrants; B: natives

A.



B.



*Countries included: Austria, Czech Republic, Denmark, Finland, France, Germany, Ireland, Luxembourg, Latvia, Malta, Netherlands, Norway, Romania and Slovenia.

In six countries that consistently reported syphilis cases with a high percentage of known HIV status – Austria, the Czech Republic, Denmark, France, Ireland and the Netherlands – HIV status was known in 81% of all cases, in 77%

of cases in migrants and 83% of cases in non-migrants. Among these countries, in cases with known HIV status, the prevalence of HIV was 26% among migrants and 33% among natives; the difference in prevalence between these sub-groups has been relatively stable over time.

However, these data should be interpreted with caution as the six countries mainly report data from sentinel surveillance systems. In addition, the difference most likely reflects differences in the predominant mode of transmission. As discussed above, transmission of syphilis through MSM contact is more common than transmission through heterosexual contact among non-migrants; in most of these six countries, MSM contact is also the predominant mode of HIV transmission. Transmission through MSM contact appears to be the main predictor of syphilis and HIV co-infection. Among those who contracted syphilis via heterosexual contact in these six countries, HIV prevalence was 7.9% in migrants and 5.6% in non-migrants; among those who contracted syphilis via MSM contact, HIV prevalence was 44% in migrants and 42% in non-migrants. Migration status does not seem to have a strong independent effect on syphilis and HIV co-infection.

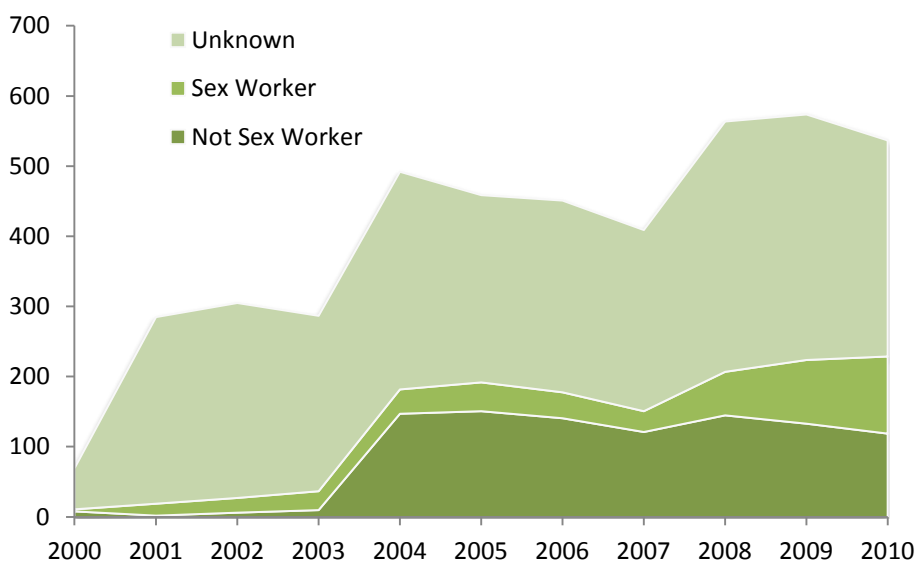
Sex workers and syphilis in migrants and non-migrants

Across all countries reporting case-based data on syphilis to TESSy between 2000 and 2010, the proportion of cases in which data on sex worker status had been collected increased from 2.0% in 2000 to 17% in 2009. Nine countries – Austria, Cyprus, the Czech Republic, Denmark, Germany, Ireland, Lithuania, Malta and the Netherlands – reported sex worker status reasonably consistently, providing data on 22% of all cases throughout the decade. Migrant status by country of birth was reported for 76% of cases with known sex worker status.

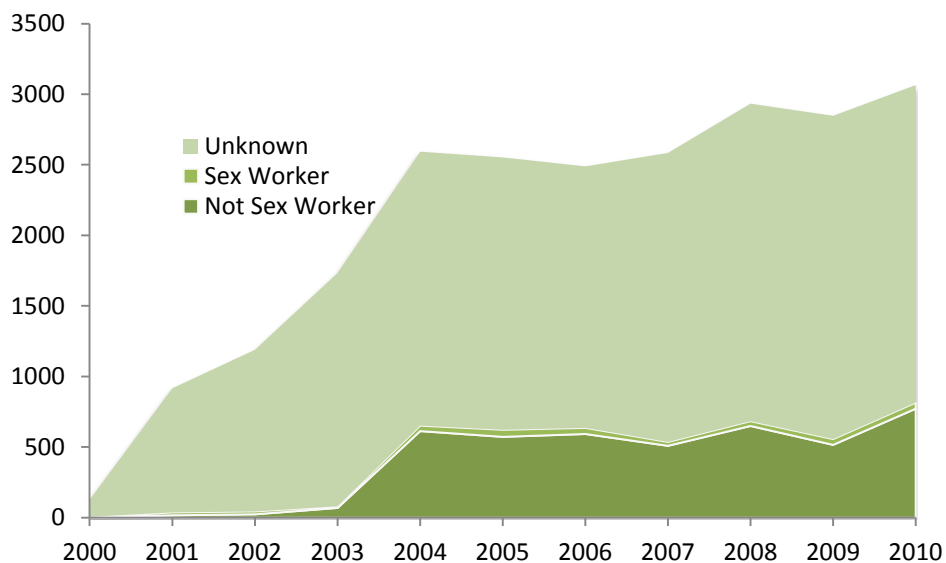
Analysis of these data (Figure 8.9) indicates that the proportion of sex workers among syphilis cases was slightly higher in migrant cases than in non-migrant cases and that this proportion increased over time. However, data and trends should be interpreted with caution, because data on sex worker status is missing for the majority of cases or is limited to sentinel surveillance sites, and because of changes in reporting over time.

Figure 8.9 Reported cases of syphilis by sex worker status and year, nine European countries*, 2000–2010. A: migrants; B: natives

A.



B.

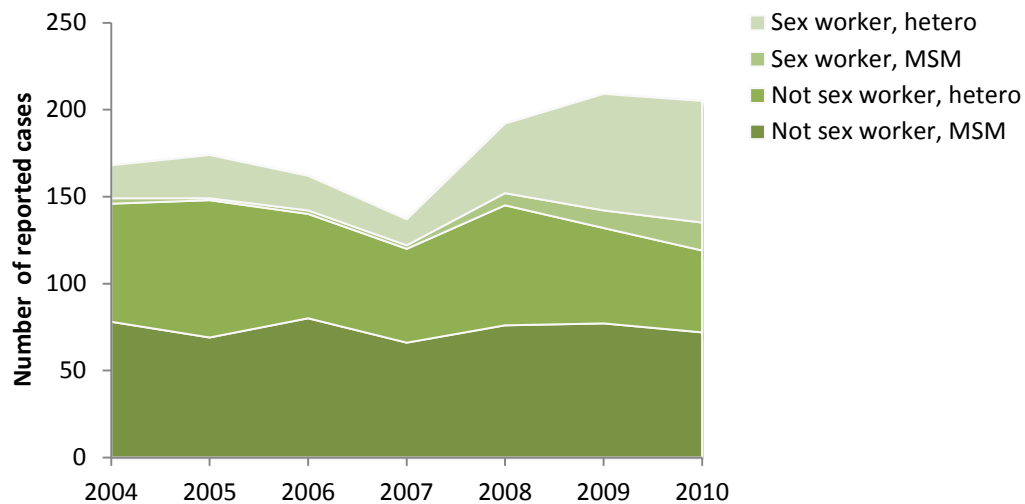


*Countries included: Austria, Cyprus, Czech Republic, Denmark, Germany, Ireland, Lithuania, Malta and the Netherlands.

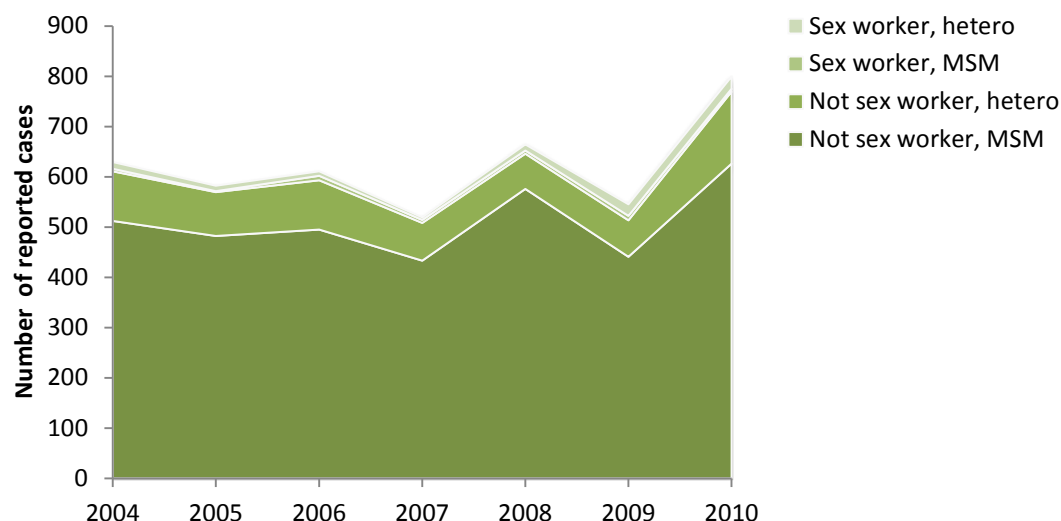
Figure 8.10 shows that the absolute number of migrant sex workers among syphilis cases in these nine countries increased between 2000 and 2010.

Figure 8.10 Reported syphilis cases by sex worker status, mode of transmission and year, nine European countries*, 2004–2010. A: migrants; B: natives

A.



B.



*Countries included: Austria, Cyprus, Czech Republic, Denmark, Germany, Ireland, Lithuania, Malta and the Netherlands.

8.3 Syphilis in migrant populations in the EU/EEA: literature review findings

Additional data on syphilis among migrants in Europe was identified by the literature review. Data sources included hospital- and STI clinic-based studies and migrant screening programmes.

Two hospital-based studies found a higher risk of syphilis in some sub-groups of migrants. For example, a retrospective study in a university hospital in Madrid, Spain found that migrants from South America and the Caribbean were at high risk of syphilis; 41% of syphilis diagnoses between 2003 and 2007 were in migrants from countries in these regions [4]. A study of patients hospitalised in Prague in the Czech Republic between 1999 and 2005 found that 20% were migrants, predominantly from other parts of eastern Europe. The authors commented that immigration from other eastern European countries might be contributing to the syphilis epidemic currently being experienced in the country [5]. A subsequent study in Prague found a similar proportion of migrants among 232 patients diagnosed with syphilis in 2009, most of whom were either from Slovakia or Ukraine [6].

Some data is available from migrant screening in Italy, Spain and Portugal. For example, migrants attending a tropical medicine unit during the period 2001–2004 in Barcelona, Spain were screened for syphilis; 6.4% of 2 464 migrants, who were predominantly from sub-Saharan Africa, had a positive syphilis serology [7]. Similar figures were found by a prospective study of migrants from sub-Saharan Africa at their first consultation in Portugal [8]. Data from Italy are based on smaller sample sizes. Syphilis screening of 365 migrants in a region of northern Italy showed a prevalence of 2.5% [9], a rate lower than that found in Spain and Portugal, but higher than in the Italian population overall [10]. The migrant population in this Italian study mainly came from South America, south-east Asia (46.3%) and eastern Europe (35.6%). A cross-sectional study in a refugee centre in southern Italy reported that 1.5% of 529 asylum seekers screened had positive syphilis serology [10]. Differences in syphilis prevalence observed in these studies may reflect in part differences in countries of origin.

Studies based on data from STI clinics have found no significant differences in rates of syphilis between migrants and the overall population. A study on sexual attitudes and lifestyles of the eastern European population in London [11] found that, among those attending genito-urinary medicine clinics in 2006–2007, men from eight countries – Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia – were more likely to be diagnosed with syphilis than men born elsewhere (1.0% vs. 0.4%). No differences were observed in the female population [11]. The proportion of syphilis infections recorded as acquired through MSM contact did not differ by country of birth [12]. More recent data from the same study showed that eastern European MSM reported a syphilis prevalence of 7.3% [13].

Some data are available on sex workers. A cross-sectional study in London to assess differences in STI risk factors between sex workers from eastern Europe, the former Soviet Union and the United Kingdom reported an overall syphilis prevalence of 2.2%. The likelihood of infection was higher in migrant sex workers from eastern Europe and the former Soviet Union but the difference was not statistically significant [14]. More recent data from 2 305 sex workers attending 207 sexual health clinics in London showed an overall prevalence of syphilis of 0.1% and no difference in prevalence between migrant and non-migrant sex workers [15].

Little data is available for comparing congenital syphilis in migrant and non-migrant populations. A nationally representative study conducted between 2006 and 2007 in 406 maternity clinics in Italy showed that, while the majority of infected mothers were of foreign origin, the risk of infection for new-borns was not higher in migrants than in non-migrants [17]. Among migrant mothers, 32% were not screened during pregnancy and 32% had a previous diagnosis of syphilis, of which 80% were inadequately treated [16]. Another Italian prospective study, in Bologna, found an overall syphilis prevalence in women of 0.44% [18] but higher prevalence among foreign-born women: 4.3% in women from eastern Europe and 5.8% in women from Central and South America [17].

8.4 Survey of EU/EEA countries

Twenty-three of the 30 EU/EEA countries responded to the survey. Of these, ten reported that they collect information related to migration for syphilis cases. All ten of these countries collect information on country of birth. The Czech Republic and Denmark also distinguish between short-term and long-term stay; and Denmark also identifies 'second-generation migrants'.

Of the 22 countries that answered the question about whether syphilis was a particular issue among migrant groups, seven responded that it is an issue (Box 8.1). Twelve countries responded that it is not an issue. Three countries said that they had insufficient data to be able to respond to the question.

Box 8.1 Country responses on syphilis among migrants

- In the Czech Republic, 24% of all infections with syphilis in the last five years were reported to have been among 'foreigners on long-term stay'. Information was not provided on the data source.
- In Denmark, pregnant women from countries in the Middle East and North Africa were reported to be strongly represented among those with syphilis.
- In Ireland, 71.1% of early syphilis cases were among those born in Ireland; the second most frequently reported country of birth was Brazil (5.1%). Information was not provided on data source and year.
- In Norway, of the 130 notified cases of syphilis in 2011, 24% were in migrants.
- In Spain, according to the sentinel surveillance system based on 15 STI clinics and the prison health department, during the period July 2005 to December 2009 the proportion of syphilis cases in those born outside Spain was 32.8%.
- In Sweden, 55–60% of syphilis cases where county of birth was known were born abroad. Among those born abroad, Somalia, Thailand, Mongolia, Romania, Eritrea, Chile and India were the most frequent countries of birth. However, it was unclear to which years these data referred.
- In the United Kingdom, according to data collected from genito-urinary medicine clinics in England, 35% of syphilis cases in 2011 were among people born outside the United Kingdom.

8.5 Conclusion

Data on syphilis by migrant status are only available from a few European countries. Only 23 of the 29 countries that reported data to TESSy in 2010 reported case-based data and only 12 reported on country of birth of gonorrhoea cases. Case-based data reported in 2010 show that of the total of 9 991 syphilis cases, 7.3% were in migrants and 55.4% were in non-migrants. No information on country of birth was available for the remaining 37.7% of cases.

Nationally representative surveillance data on syphilis by migrant status for 2010 are available from only nine countries reporting to TESSy. Three of these countries reported no cases in migrants, one had a very low number of migrant cases and a high number of cases of unknown origin, and five reported between 8.0% and 46.5% of cases as born abroad. No information is available about whether cases in migrants were contracted in the host country or in the country of origin.

Case-based data reported between 2000 and 2010 suggest that the proportion of migrants among syphilis cases has remained stable over time. The average age of syphilis cases was similar in migrants and non-migrants, but notification rates were significantly higher in males than in females in both groups, with stronger gender differences among non-migrants.

Reported data also show differences in mode of transmission between migrants and non-migrants, although these differences have reduced over time. Overall, between 2000 and 2010, migrants were slightly more likely to contract syphilis through heterosexual contact than through MSM contact, whereas non-migrants were more likely to contract syphilis through MSM contact than through heterosexual contact. This may, however, reflect the increase in the number of countries reporting case-based data as well as changes in screening and testing patterns over time. Transmission through MSM contact appears to be the main predictor of syphilis and HIV co-infection. Migration status does not seem to have a strong independent effect on syphilis and HIV co-morbidity.

Data from hospital-based studies suggest that migrants from some regions, for example, those from South America and the Caribbean in Spain and from eastern Europe in the Czech Republic, may be at higher risk of syphilis infection, while data from STI clinics in London, United Kingdom, suggested that men from some eastern European countries were more likely to be diagnosed with syphilis. TESSy data show a higher proportion of sex workers among cases of syphilis in migrants than non-migrants. However, a study in London found no significant difference in risk of syphilis between migrant and non-migrant sex workers.

Overall, available data are limited both by lack of evidence in the peer-reviewed literature and by poor-quality data on migrants in TESSy. Results may therefore not be representative of the situation in the EU/EEA and should be interpreted with caution. Surveillance systems in the EU/EEA need to be strengthened and harmonised in order to improve understanding of syphilis infection in migrants.

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9. Measles and rubella

This chapter summarises available evidence on measles and rubella among migrants in the EU/EEA, based on TESSy surveillance data, a review of the literature and a survey of EU/EEA countries.

9.1 Introduction

Measles

Measles is a highly contagious disease. Vaccination is the most effective way to prevent transmission. The recommended age for measles vaccination ranges from 9–15 months. A second dose is necessary as 2.0–5.0% of children aged over 12 months do not respond to the first dose. Because of the highly contagious nature of the disease, WHO recommends vaccination coverage in excess of 95% [1] to ensure that such high coverage interrupts transmission chains. As measles can only be transmitted by acute cases, it is in theory eradicable [2]. Intensive surveillance and vaccination efforts have led to measles elimination in the Americas; other regions of the world are aiming to eliminate the disease by 2020 or sooner. However, measles remains a major global cause of childhood death and disability, particularly in sub-Saharan Africa [3, 4].

Measles is a notifiable disease in all 28 EU Member States. Despite a significant decline in reported cases in the WHO European Region (from 200 000 in 1994 to 7 411 in 2009), the goal of elimination by 2010 was not met. Measles is now targeted for elimination in the region by 2015 [5, 6]. In the EU/EEA countries the number of cases actually increased from 4 899 in 2006 to 10 362 in 2013. Most of the reported measles infections in Europe in 2005–2009 were in unvaccinated or previously uninfected individuals, with recent outbreaks concentrated in remaining pockets of susceptible individuals [7,8]. In 2010, an outbreak of measles in Bulgaria led to over 24 000 cases [9]. In 2011, measles outbreaks were reported in 36 countries in the region [5], with most cases occurring in EU countries. The highest absolute number of cases in 2011 was reported in France, mainly in children and young adults who were unvaccinated or whose vaccination status was unknown [10]. In the 12-month period from January 2013 to December 2013, over 10 000 cases of measles were reported in EU/EEA countries [11].

Measles remains an important cause of morbidity and mortality in the European region. Between January and October 2011, nine deaths were reported due to measles; six in France and one each in Germany, Kyrgyzstan and Romania [5]. Between January 2013 and December 2013, three deaths were reported [11].

Measles outbreaks and deaths continue in the region because vaccination coverage remains below the recommended level, leaving some vulnerable groups unvaccinated [12]. There are also significant differences in coverage among European countries, with rates generally lower in western than in eastern Europe [13].

Rubella

Although rubella usually only causes mild illness in children, infection can be more severe in infants and adults, and it can cause stillbirths and birth defects when contracted in early pregnancy. Congenital rubella syndrome (CRS) occurs in up to 85% of cases where rubella infection was acquired in the first trimester of pregnancy. Rubella is the leading cause of congenital malformation in newborn infants in Europe [3,4].

An effective vaccine has been available since the 1970s and rubella is also targeted for elimination in the WHO European Region by 2015 [5,6]. As with measles, this depends on achieving vaccination coverage of 95% or more [14]. Since 2000, several countries have reported outbreaks of rubella. Between 2008 and 2011, outbreaks were reported in Austria, Bosnia and Herzegovina, Kyrgyzstan, Poland, Russia and Ukraine [15] (WHO Europe, 2011). Between January 2013 and December 2013, over 39 000 cases of rubella were reported in the EU, with 99% of the cases reported by Poland [11].

9.2 Measles and rubella in the EU/EEA: analysis of surveillance data

Measles

National surveillance systems for measles are in place. Countries in the WHO European Region report monthly to WHO on cases of measles [1]; EU/EEA countries have reported monthly data on measles to ECDC since September 2011, and ECDC shares the data with the WHO European Region to avoid double reporting. Surveillance for measles and other vaccine preventable diseases in EU/EEA countries was conducted by EUVAC.NET from 1998–2011 before being transferred to ECDC.

Table 9.1 shows the number and notification rate (per million) of measles cases by month as reported by 30 EU/EEA countries in 2013 [11]. During this period, a total of 10 271 cases were reported, mostly by Germany (17%), Italy (22%), the Netherlands (24%), Romania (10%) and the United Kingdom (18%). In ten countries, the measles notification rate was less than one case per million population during the last 12 months.

Table 9.1 Number and notification rate (per million) of measles cases by country and month, 2013, EU/EEA countries

Country	2013												Total cases	Cases per million	Total lab-positive cases
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Austria	4	8	8	11	11	5	0	6	5	9	3	5	75	8.9	46
Belgium	3	2	5	5	13	6	2	2	0	0	0	0	38	3.4	6
Bulgaria	0	0	0	0	6	7	2	0	0	1	0	NR	16	2.2	13
Croatia	0	0	0	0	0	0	0	1	0	0	0	0	1	0.2	0
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
Czech Republic	0	3	3	4	3	1	0	0	0	0	0	NR	14	1.3	13
Denmark	3	0	8	6	0	0	0	0	0	0	0	0	17	3.0	13
Estonia	0	0	1	1	0	0	0	0	0	0	0	0	2	1.5	2
Finland	1	0	0	0	1	0	0	0	0	0	0	0	2	0.4	0
France	26	22	23	46	37	34	25	13	13	15	11	7	272	4.2	121
Germany	9	9	44	136	499	391	306	127	108	76	47	20	1772	21.7	1018
Greece	2	1	0	0	0	0	0	0	0	0	0	NR	3	0.3	3
Hungary	0	0	1	0	0	0	0	0	0	0	0	0	1	0.1	1
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
Ireland	1	4	0	4	10	7	2	4	2	16	6	1	57	12.4	33
Italy	83	204	213	210	360	386	199	73	42	38	175	233	2216	36.4	1149
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
Lithuania	0	0	0	0	27	7	0	0	1	0	0	NR	35	11.6	0
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
Malta	0	0	2	0	0	0	0	0	0	0	0	0	2	4.8	2
Netherlands	1	4	10	5	18	295	700	408	441	470	147	NR	2499	149.4	798
Norway	0	0	1	0	0	7	0	0	0	0	0	0	8	1.6	8
Poland	4	9	7	20	12	17	10	3	1	1	1	1	86	2.2	56
Portugal	0	0	0	1	0	0	0	0	0	0	0	0	1	0.1	1
Romania	208	219	181	146	80	105	59	26	9	22	19	0	1074	50.3	816
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
Slovenia	0	0	0	0	0	0	1	0	0	0	0	0	1	0.5	1
Spain	5	15	13	15	15	18	31	8	4	3	0	0	127	2.7	105
Sweden	4	8	9	1	8	16	6	0	0	0	0	0	52	5.5	50
United Kingdom	274	269	358	479	233	124	81	22	15	28	13	4	1900	30.7	1894
Total	628	777	887	1090	1333	1426	1424	693	641	679	422	271	10271	20.1	6149

NR: Data not reported. Lichtenstein does not report.

Notification rates were calculated using the most recent population estimates available from Eurostat (2012).

Countries with a notification rate ≥ 1 per million population are highlighted in green. The target is an incidence of less than one case per million population per year (including confirmed, probable and possible cases, but excluding imported cases).

Achieving this target is consistent with progress towards elimination, but does not define elimination or confirm that it has been achieved. In the table, all cases (endemic, imported, import-related) are included for the calculation of the notification rate.

For countries that did not report data for all 12 months, notification rates might be underestimated.

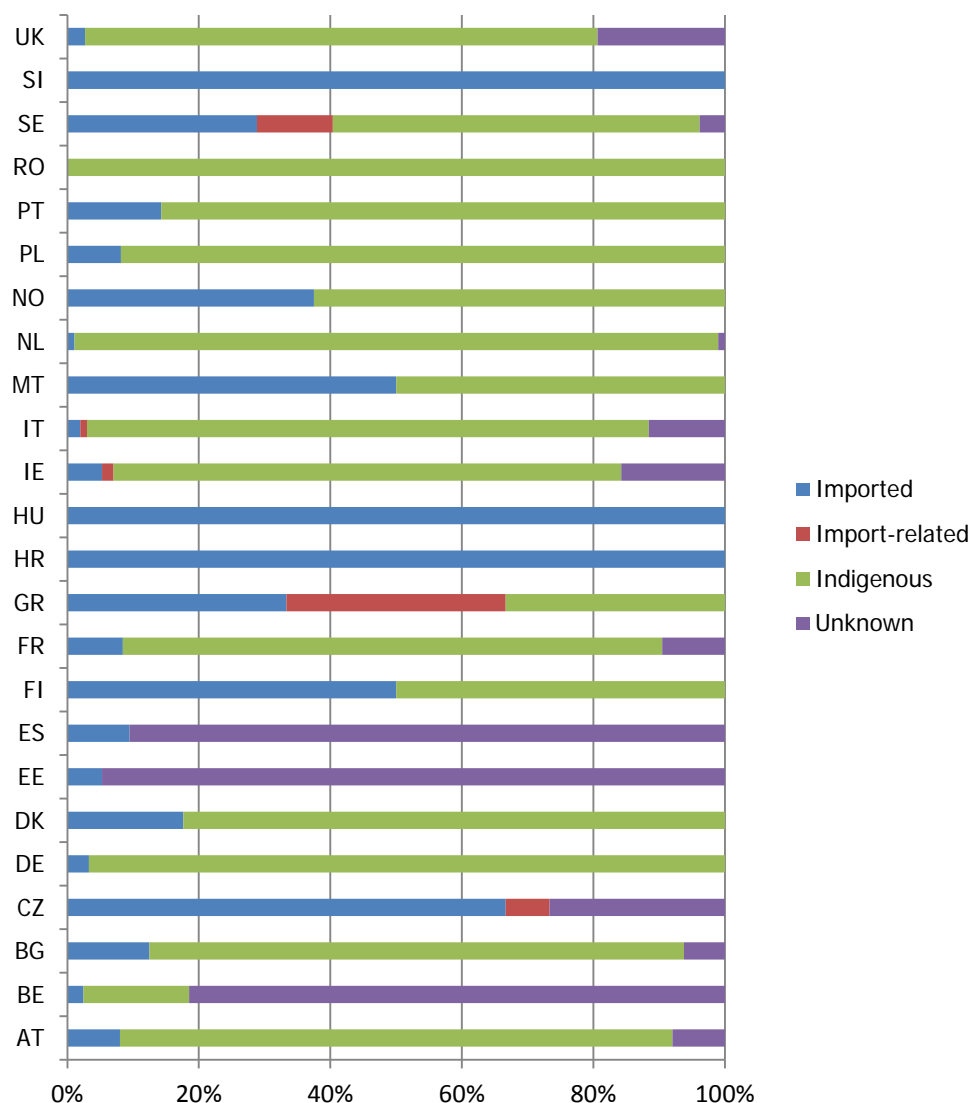
All confirmed, probable, possible or unknown cases, as defined by the EU 2008 case definitions, are included.

For measles, information on 'country of birth' is not available through TESSy. It is therefore not possible to draw conclusions about the occurrence of measles among migrants. Measles cases reported through TESSy are classified as 'imported', 'import-related', 'indigenous' or of 'unknown origin'. The definitions for these variables in TESSy are:

- 'Imported': having been outside the country of notification during the incubation period of the reported disease, with no links to local transmission having been identified.
- 'Import-related': is a case epidemiologically linked to an imported case, i.e. cases that acquired the infection locally through a direct link to an imported case in the first chain (only) of transmission as supported by epidemiological and/or virological evidence.
- 'Indigenous case': is a case infected within the country of residence (based on epidemiological and virological evidence) and not import-related, or any case with unknown source of infection (no epidemiological or virological evidence).

Of the 10 271 cases of measles reported through TESSy in 2013, only 2.7% (278 cases) were categorised as 'imported' and a further 0.3% (34 cases) as 'import-related'. Of the remaining cases reported, 88.9% (9 132 cases) were recorded as 'indigenous' and 8.1% (827 cases) as of 'unknown origin' (see Figure 9.1). As discussed in Chapter 2, in cases of measles, this variable is a better marker of an individual who has travelled recently than of migrant status, as non-migrants also travel. This means it is not possible to distinguish between cases in migrants and cases in non-migrant travellers.

Figure 9.1. Importation status of measles cases by country, 2013, EU/EEA countries reporting case based data



Source: TESSy.

Note: Lithuania reported aggregated data and importation status was unknown for all cases as this information is not collected with aggregated data.

The proportion of 'imported' or 'import-related' cases is high in countries that have a low total number of cases, such as Czech Republic, Greece, Croatia, Hungary, Malta, Norway, Slovenia and Sweden. These countries reported a total of 83 measles cases in 2013, of which 33 were categorised as 'imported'. In contrast, the proportion of 'imported' or 'import-related' cases is low in countries that accounted for the majority of measles cases in 2013.

Rubella

National surveillance systems for rubella are in place in most EU/EEA countries, which report data to TESSy, except for Belgium, France and Germany. During the period July 2011 to June 2012, a total of 22 835 cases were reported to TESSy by 27 EU/EEA countries [6]³⁶. Most of these cases were reported by Romania and Poland – 17 517 and

³⁶ Data was not reported by France, Germany or Belgium.

5 106 cases respectively [6]. Incidence appears to be increasing. Between January 2013 and December 2013, 38 847 cases were reported, 99% of these by Poland [11].

As with measles, information on 'country of birth' is not available from TESSy, so it is not possible to draw conclusions about the occurrence of rubella among migrants. Rubella cases are reported to TESSy as either 'imported' 'import-related', 'indigenous' or of 'unknown origin'. In 2011, 13 countries reported data for this variable. Of the 201 rubella cases reported by these countries, 8.5% (17 cases) were categorised as 'imported', 47.3% (95 cases) as 'indigenous' and 44.3% (89 cases) as of 'unknown origin'. In 2013, 99% of the cases were reported by Poland in an aggregated format and information on importation status was not available.

9.3 Measles and rubella in migrant populations in the EU/EEA: literature review findings

Measles

The literature review identified 15 studies on measles among migrants in Europe that met the inclusion criteria. In some of these studies, migrants are conflated with religious or ethnic minorities, so there is little information specifically about migrants. In other studies, cases are defined as 'imported' or 'indigenous' and, as noted above, this variable is a better marker of an individual who has travelled recently than of migrant status.

One study analysed national surveillance data from 32 European countries for 2006–2007 for a total of 12 132 reported cases of measles. Of these, only 210 cases (1.7%) were reported as 'imported'; 117 (56%) were from another European country and 43 (20%) were from Asia [7]. The same study commented that measles outbreaks in Europe in 2005–2009 had been reported in some population groups, including Roma, Sinti, Traveller and specific religious communities as well as in migrants [7].

Some reports on measles outbreaks discuss ethnic minorities, but do not specify whether these are recent migrants. In France, for example, a 2008–2010 outbreak was reported to have particularly affected Roma and nomadic populations, but it was not clear whether these were migrants, non-migrant itinerant groups or both [16]. Similarly, a report on a measles outbreak in Ireland in 2009–2010 noted that two-thirds of the cases were in unvaccinated individuals and that the majority were from the Traveller community or 'others from eastern Europe', but did not state explicitly whether these were migrants [17]. More specific information is included in a report on a measles outbreak in Greece in 2010, which noted that Roma communities had a disproportionately high case load and that they came from both Greece and Bulgaria [18].

Another study shows that reasons for measles outbreaks vary between countries, and that outbreaks affect a range of population groups [7]. For example, populations affected by measles outbreaks have included Roma in Bulgaria and Romania, orthodox Jewish communities in Belgium and specific religious groups in Germany and the Netherlands [7]. Reasons for outbreaks highlighted by experts include low vaccination coverage, particularly among migrant groups in France, factors influencing uptake of vaccination such as lack of access to healthcare and lack of engagement of healthcare professionals, and a limited, but increasing EU-wide anti-vaccination sentiment.

Studies from some countries suggest that migrant children may be at higher risk because they are less likely to be vaccinated against measles than non-migrant children. A German study, using data from the representative German Health Interview and Examination Survey for Children and Adolescents, found that foreign-born children were three times as likely to be unvaccinated [19,20,21]. A Spanish study found a statistically significant difference in immunisation rates between indigenous and immigrant children for both primary vaccination coverage (96.5% vs. 85%) and primary vaccination and booster dose coverage (88.6% vs. 78.3%) [22]. Other studies in Spain have also reported lower vaccination rates among immigrant children [23]. However, a study in a prison setting in Switzerland found that having spent one's childhood in sub-Saharan Africa and being born before 1982 were protective factors associated with immunity to measles [24].

Inadequate vaccination coverage, linked to poor access to health services for migrants and other populations, is identified as a major reason for measles outbreaks in Europe. Factors limiting access to health services include cultural and language barriers, socio-economic exclusion and discrimination [7]. In many countries, children in some ethnic minorities and in disadvantaged families, both of which may include migrants, are less likely to be vaccinated [13]. Having parents who do not speak the language of the host country is a key risk factor for low vaccination coverage among children [25,26]. Studies highlight the need to improve vaccination coverage, including among adults and those seeking work or visiting who may not come into contact with the health system [13,22,23].

Rubella

The literature review identified five studies on rubella among migrants that met the inclusion criteria. Several studies were from Spain. One of these studies, which covered the period 2006–2010, found that migrant pregnant women were less likely to have antibodies against rubella than non-migrant pregnant women (92% vs. 97%); migrant women from Latin America, Asia, sub-Saharan Africa and North Africa had the lowest levels of immunity

[27]. Another study in the region of Catalonia also found a statistically significant difference in the prevalence of rubella antibodies between migrant and native-born pregnant women (89% vs. 94.9%) (28). Similar findings were also reported by a study of 13 136 pregnant women in the region of Aragon, which found that foreign-born women aged 15–19 years were most likely to lack rubella immunity, particularly if they were from Asia, although this finding was not statistically significant [29].

A study in Sweden also found a correlation between migrant status and rubella immunity. The study analysed a dataset of 34 074 pregnant women in and around southern Stockholm for whom place of birth had been recorded, covering the period 2004–2006. Low levels of immunity were found in 2.8% of Swedish-born women, 3.5% of those born in other Nordic countries and 7.7% of those born elsewhere [30].

Targeting pregnant women for rubella vaccination, particularly those born elsewhere, has been proposed as one way to increase rubella immunity and thus to prevent CRS [27,29].

Other studies have identified migration as one of the risk factors for children not being vaccinated against rubella [19,20,22,23]. Factors contributing to low vaccination coverage in migrant children are similar to those identified above for measles.

9.4 Survey of EU/EEA countries

Twenty-two of the 30 EU/EEA countries responded to the survey. Of these, 13 reported that they collect information related to migration for measles cases using the variable 'country of birth' and 11 reported that they did the same for rubella. Greece and Spain noted that tourists or visitors were excluded from the migrant category.

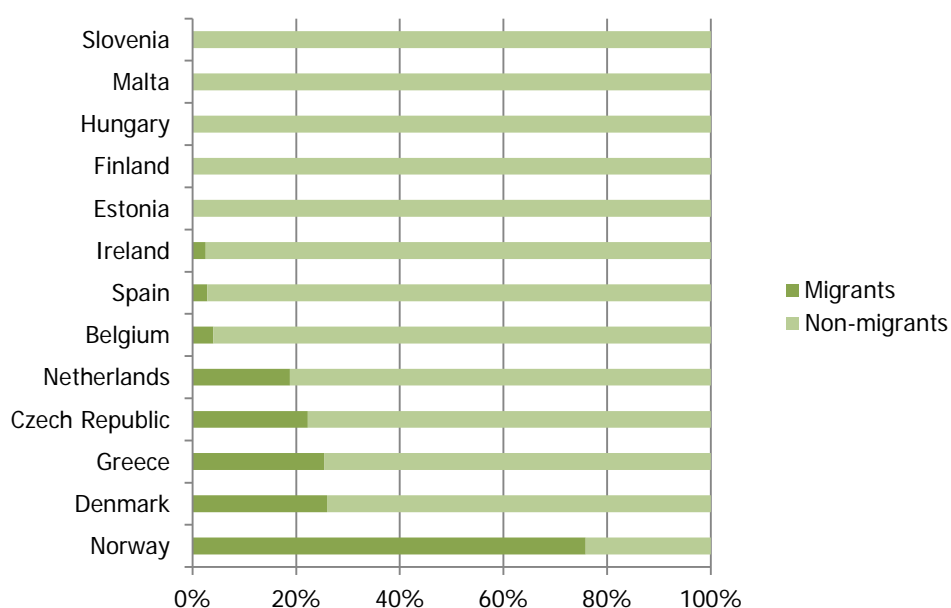
In the 13 countries that collected information on the migrant status of measles cases, 7.9% of cases (72 of 909) in 2010 were among migrants. Overall, during the period 2007–2010, 7.1% of cases (142 of 1 995) were among migrants (see Figure 9.2). One measles-related death was reported in a migrant case of measles in the Netherlands in 2009. Only Greece, the Netherlands and Norway reported the vaccination status of measles cases in responses to the survey.

In the 11 countries that collected information on the migrant status of rubella cases, none of the 37 rubella cases in 2010 was among migrants. Overall, during the period 2007–2010, 3.9% of cases (10 of 245) were among migrants; these cases were in Denmark, Greece, Ireland, Norway and Spain.

Measles reporting was based on mandatory notification systems and case-based data. In Belgium, measles data do not include information on migration status for Brussels or for the French-speaking community; measles also only became a notifiable disease in 2010. In Ireland, data on country of birth was only available for 18% of measles cases during the period 2007–2010.

In response to a question about data available on migrants, several national focal points noted that data on measles and rubella are incomplete. Respondents in Greece, Malta and Slovenia noted that incomplete data may be the result of migrants not seeking healthcare. Respondents from the Netherlands and Norway highlighted incomplete information on the vaccination status of migrants.

Figure 9.2 Migrant status of measles cases by country of birth, 2007–2010



9.5 Conclusion

Limited information is available on measles among migrants in Europe. Routine national surveillance data reported to ECDC do not include country of birth; cases are categorised as ‘imported’, ‘import-related’, ‘indigenous’ or of ‘unknown origin’. Importation status should not be used as a proxy for migration status. This is more of an indication of whether or not a person has travelled during the incubation period of the disease. Nevertheless, reported data show that most measles cases in Europe are either indigenous or of unknown origin. For example, in 2013, only 2.6% of reported cases were categorised as imported. This finding is corroborated by the survey of EU/EEA countries: in the 13 countries that collect information on country of birth for measles cases, cases in migrants accounted for 7.1% of all cases during the period 2007–2010.

However, outbreaks of measles and studies identified by the literature review suggest that some migrant population groups may be at elevated risk, including older children and young adults and those who are socially and economically disadvantaged, mainly because of low vaccination coverage. Although few studies specifically identify migrants as being at increased risk, available data suggest that, in some countries, migrants represent a disproportionately large share of cases and migrant children have lower rates of vaccination coverage than their non-migrant peers. This highlights the need for greater efforts to improve vaccination coverage, including catch-up vaccination, by improving the reach of immunisation services and ensuring that migrants and other vulnerable populations have access to healthcare [12,31,32].

Limited information is also available on rubella among migrants in Europe. As for measles, routine national surveillance data reported to ECDC do not include country of birth; cases are categorised as ‘imported’, ‘import-related’, ‘indigenous’ or of ‘unknown’ origin. Reported data show that most rubella cases in Europe are either indigenous or of unknown origin; in 2011, only 8.5% of reported cases were categorised as imported. This finding is confirmed by the survey of EU/EEA countries. In the 11 countries that collect information on country of birth for rubella cases, cases in migrants accounted for 3.9% of all cases during the period 2007–2010.

Few studies have investigated rubella among migrants. Those available provide evidence that levels of rubella immunity may be lower among pregnant women born abroad and that migrant children may have lower levels of vaccination. These findings suggest that health systems could also do more to improve vaccination coverage, including ensuring that migrants have access to healthcare.

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10. Malaria

This chapter summarises available evidence on malaria and malaria among migrants in the EU/EEA, based on a review of the literature.

10.1 Introduction

Malaria is one of the leading global causes of morbidity and mortality, with an estimated 207 million cases and more than 627 000 deaths worldwide in 2012 [1]. It is caused by infection with a parasitic protozoan of the genus *Plasmodium* and transmitted through the bite of an infected *Anopheles* mosquito. Five species of *Plasmodium* can infect humans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae* and *Plasmodium knowlesi*.

Malaria was eliminated from the EU in the 1970s by a combination of environmental modifications, early detection and treatment of cases, and mosquito vector control. In countries directly neighbouring the EU, malaria transmission has declined significantly. Armenia and Turkmenistan were recently certified as 'malaria free'; Azerbaijan, Tajikistan, and Turkey are in the 'elimination phase' and Georgia, Kyrgyzstan and Uzbekistan are in the 'prevention of reintroduction phase' [1].

In EU/EEA countries, malaria is now primarily linked with travel to malaria-endemic regions and immigration from these regions to Europe (i.e. imported cases). Sporadic indigenous cases in the EU are linked to airport and baggage malaria, blood transfusion or autochthonous transmission (cases locally acquired from native *Anopheles* vector species) [2]. In Greece, for example, cases due to autochthonous transmission of *P. vivax* have been reported since 2009.

10.2 Malaria in the EU/EEA: analysis of surveillance data

In the EU, malaria is a notifiable disease [3]. In 2011, 26 EU/EEA countries reported 5 482 confirmed cases of malaria through TESSy³⁷. This does not include cases reported in overseas territories or departments [4]. TESSy data suggest that the overall confirmed case rate remained stable between 2006 and 2011 at around 1/100 000. Of all confirmed malaria cases reported in 2011, 99% were imported. Only Greece reported indigenous cases due to transmission by native *Anopheles* vector species. These cases are associated with the presence of efficient malaria vectors and favourable conditions for malaria transmission, combined with the arrival and high turnover of migrant seasonal workers from malaria-endemic countries [4].

TESSy data do not enable a distinction to be made between imported cases in non-migrant travellers and tourists from migrants because migrant-specific variables are missing.

10.3 Malaria in migrant populations in the EU/EEA: literature review findings

Review of the literature suggests that a substantial proportion of imported malaria cases in the EU/EEA occur among recent immigrants from malaria-endemic countries and among more settled migrants and their families who have travelled to visit friends and relatives in malaria-endemic home countries.

In a range of studies, recent immigrants accounted for between 5.0% and 35% of reported malaria cases, while migrants visiting their home country accounted for 30–81% of cases (Table 10.1). Those visiting their country of origin appear to be at higher risk of acquiring malaria [5-7] and, in general, the country where malaria was acquired corresponds to the country of origin [8]. In some countries, such as the Netherlands and the United Kingdom, the decline in malaria incidence has largely been attributed to a decrease in malaria among migrants visiting their country of origin [9,10].

Migrants visiting their country of origin

There are a number of reasons why migrants visiting their country of origin may be at higher risk of acquiring malaria. They are more likely to visit rural areas, where there is a higher risk of malaria transmission, and to stay for longer periods. Uptake of pre-travel advice and chemoprophylaxis is lower among migrants visiting their home country than among other travellers. Although migrants may be well informed about malaria transmission, they can face difficulties in accessing health services and cost is a significant reason for not seeking pre-travel advice and prophylaxis [11-15]. Misconceptions about life-long immunity against malaria are also a factor [5,6].

³⁷ Data were not available for Denmark, Iceland, Italy and Liechtenstein.

Malaria in pregnancy increases the risk of maternal and foetal mortality and morbidity, and a number of studies identify pregnant women as a particular risk group among recent immigrants and migrants who visit malaria-endemic home countries [16]. A hospital-based retrospective study in Spain found that pregnant women from sub-Saharan Africa, who had recently arrived or had travelled to visit friends and relatives, are at risk for malaria [17]. Another study found that pregnancy was associated with prolonged *P. falciparum* infection in women who had visited friends and relatives in malaria-endemic countries [18].

Imported malaria in children is mainly reported among recent immigrants and children in migrant families visiting friends and relatives [19,20]. A study in Italy found that children with malaria who had visited malaria-endemic countries had higher parasitaemia, significantly lower platelet counts, longer parasite clearance time and longer duration of fever than those who had recently migrated [21]. Similar results were found in other studies, which concluded that children who visit malaria-endemic countries of origin are a high risk group for severe malaria (see for example, 5, 22). A study in the Netherlands showed that children of migrants were less likely to use malaria chemoprophylaxis than Dutch children [19]. In addition, malaria symptoms in children, particularly fever and vomiting, can be confused with the symptoms of common childhood illness, delaying correct diagnosis [23].

Malaria and recent immigrants

With respect to recent immigrants, some studies suggest that they may be protected by acquired immunity and are likely to be asymptomatic, although in the absence of re-infection their immunity is likely to decrease and symptoms could occur [18]. There is some evidence that, even if immunity is progressively lost, it still offers some degree of protection after a long period of time without exposure to infective *Anopheles* bites. This has been observed in migrants who stay in non-endemic countries for at least four years, irrespective of the frequency of visits to their country of origin [24]. Moreover, they are less likely to develop complications or a fatal outcome compared to non-immune travellers [5,25]. Other studies have concluded, however, that migrants who visit malaria-endemic countries of origin are a risk group for severe malaria [16].

Several studies showed that, while malaria in recent immigrants is often asymptomatic, the parasites may persist for up to 28 months after arrival in the host country and detection is often only possible using molecular techniques [8,22,26,27]. In a French study, factors associated with prolonged *P. falciparum* infection – defined as manifestation of malaria more than 59 days after arrival – included being a recently arrived immigrant and being a pregnant woman [18].

10.4 Conclusion

Recent immigrants from malaria-endemic countries and more established migrants and their families who visit malaria-endemic countries of origin account for an important proportion of imported cases of malaria in the EU/EEA. A migrant's country of origin influences the disease profile. For example, *P. falciparum* malaria occurs mainly in migrants who originate from countries in sub-Saharan Africa.

More established migrants and their families who visit their home country appear to be at higher risk than recently arrived migrants; pregnant women and children are at particular risk. Available evidence suggests that greater efforts are needed to increase uptake of pre-travel advice and chemoprophylaxis by migrants and their families [28], including addressing cost barriers, and ensuring that they are aware of loss of acquired immunity, the risks of staying for long periods in rural malaria-endemic areas and the need for pregnant women and children to be protected.

Health services need to consider the possibility of *P. falciparum* malaria in pregnant women who have visited malaria-endemic countries in sub-Saharan Africa, even in the absence of malaria symptoms, particularly in women with unexplained anaemia. Health professionals also need to consider the possibility of malaria infection in children of migrants who have visited malaria-endemic countries, particularly those with symptoms that could be caused by malaria.

Prolonged and asymptomatic infection in recently arrived immigrants is also a public health concern, given the potential for onward autochthonous transmission in areas of Europe where native *Anopheles* vector species are present. Ensuring that recently arrived immigrants have access to healthcare and that health professionals are aware of the possibility of asymptomatic infection is important in order to limit the risk of autochthonous transmission.

Finally, better data are needed on the extent of malaria in recent immigrants and migrants who travel to malaria-endemic countries of origin. TESSy does not include variables on the migration status of affected individuals. Collecting information on country of birth and residence, destination and purpose of travel, and use of chemoprophylaxis would improve understanding of risk groups for imported malaria in the EU/EEA. This in turn would help to improve the targeting of preventive measures to reduce the burden of disease in these groups.

Table 10.1 Overview of the studies reporting malaria among immigrants and migrants visiting friends and relatives (VFR) in malaria-endemic countries of origin

Study [Ref]	Country	Period	Type of study and data source	No. of malaria cases	Relative importance of <i>P. falciparum</i> and <i>P. vivax</i>	Percentage of malaria cases among (recent) immigrants or VFR	% of children with malaria	% migrants/ VFR of children with malaria	Comments
[29]	Italy, Brescia	2006-2010	Analysis of the regional infectious diseases database	193	PF: n/a PV: n/a	Foreign-born: 78%	N/A	N/A	Age standardised rate ratio (foreign versus native-born): 21.1 (95%CI 14.6-30.4)
[30]	Belgium	2003-2008	Retrospective study of hospital admissions	80	PF: 86% PV: 7.0%	VFR: 30%	N/A	N/A	
[31]	UK	2010	Retrospective study of the UK enhanced surveillance data for malaria	838	PF: 72% PV: n/a	VFR: 81%	N/A	N/A	
[32]	Finland	2003-2011	Prospective nationwide survey of imported malaria	265	PF: 72% PV: 19%	Recent immigrants: 15% VFR: 29%	N/A	N/A	
[33]	EuroTravNet	2010	Retrospective analysis	594	PF: 75% PV: 13%	Recent immigrants: 5.0% VFR: 54%	N/A	N/A	
[34]	Spain, Barcelona	1990-2008	Analysis of the malaria registry of the Public Health Agency of Barcelona	174	PF: 70% PV: 14%	VFR: 62%	Study focused on patients under 20 years	N/A	
[11]	UK, Scotland	2003-2008	Retrospective study of hospital admissions	252	PF: 69% PV: 16%	VFR: 35% of 241 cases for information was available			
[12]	Italy	1998-2007	Retrospective study of hospital admissions	291	PF: 78% PV: 17%	Recent immigrants from malaria endemic country: 12% VFR: 33%			
[35]	Europe, EuroTravNet	2008	Travellers attending the EuroTravNet core sites	371	PF: 69% PV: 8 %	VFR: 66%	N/A	N/A	
[36]	Finland	1997 - 2008	Analysis of the National Infectious Disease Register (NIDR) Finland	484	PF: 61% PV: 22%	VFR (foreign-born): 42%	15%	72%	
[16]	Spain	2005 - 2008	Retrospective study of hospital admissions	57	PF: 95% PV: n/a	Recent immigrants: 35% VFR: 62%	16%	100%	
[22]	Spain	1995 - 2007	Retrospective study of child hospital admissions	60	PF: 72% PV: 2.0%	Recent immigrants: 77% VFR: 23%	This study focused on children only	N/A	No cases of children in tourists
[6]	Italy	2000-2006	Retrospective study of data collected through the national reporting system	5219	PF: 83% PV: 8.0%	Foreigners: 14% VFR: 57%	N/A	N/A	
[37]	France	2002-2003	Prospective study in returning travellers	54	PF: 67% PV: 26%	VFR: 41%	N/A	N/A	
[13]	UK, London	2000-2004	Retrospective study of 'walk-in' clinic	337	PF: 84%	VFR: 47% (based on information of 313 cases)	N/A	N/A	
[38]	Italy, Parma	2000-2007	Hospital based study	159	PF:81% PV: 4.0%	Foreigners: 91%	N/A	N/A	
[19]	The Netherlands	2003-2005	Hospital-based Dutch paediatric surveillance system	32	PF: 81%	Recent immigrants: 25% VFR: 47%	This study focused on children (0–18 years) only	N/A	
[39]	Switzerland, Zurich	2004-2005	Hospital GeoSentinel site	27		Recent immigrant: 24% VFR: 82%	N/A	N/A	

PF: *Plasmodium falciparum*PV: *plasmodium vivax*

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11. Chagas disease

This chapter summarises available evidence on Chagas disease among migrants in the EU/EEA, based on a review of the literature.

11.1 Introduction

Chagas disease or American Trypanosomiasis is a vector-borne disease caused by the *Trypanosoma cruzi* parasite. An estimated 10 million people are infected worldwide. Chagas disease is endemic only in the 21 Latin American countries where the vector is present. However, as a result of migration from Latin America, Chagas disease has occurred in Europe. During the last decade an increasing number of cases have been reported in Belgium, France, Italy, Spain, Switzerland and the United Kingdom. There have also been reports of sporadic cases in Austria, Croatia, Denmark, Germany, Luxembourg, the Netherlands, Norway, Portugal, Romania and Sweden [1].

Blood and organ donation as well as congenital transmission (transmission from mother to child) are the main transmission risks in non-endemic countries [1].

An infected individual can be asymptomatic for up to 30 years and many migrants are therefore unaware that they have the infection [2]. Common pre-migration risk factors for infection include being from an endemic area, having lived in rural areas of Latin America, having lived in adobe housing, having an infected relative, having had a blood transfusion in an endemic country and prior knowledge of the vector [3-12]. A post-migration risk factor for transmission is having a mother born in an endemic country [6,12].

11.2 Chagas disease in migrant populations in the EU/EEA: literature review findings

Chagas disease and Latin American migration to Europe

Migration flow from Latin America to Europe has decreased since the economic crisis in 2008, but the population of Latin American migrants has remained more or less constant [13]. Spain has around 2.3 million Latin American migrants and Italy around 314 000. France, Germany, the Netherlands and the United Kingdom all have over 100 000 Latin American migrants. Women make up a significant proportion of the Latin American population in Europe, which increases the risk of congenital transmission [14].

Irregular migrants are a concern in relation to Chagas disease in Europe. One study estimated that almost 45% of cases in Europe are likely to be in irregular migrants [15], many of whom do not have access to healthcare. For example, according to the EC CLANDESTINO project, around half a million irregular Latin American migrants live in Spain [16], where irregular migrants no longer have access to healthcare. Irregular migrants are also more likely than regular migrants to be from poor rural areas of Latin America where Chagas disease is endemic [16].

Illegal migration is expected to increase as a result of the economic crisis and increased unemployment in southern Europe [14,16]. The severe impact of the economic crisis in southern Europe may also result in Latin American migrants moving north in search of work [17], increasing the risk of Chagas disease in other parts of Europe.

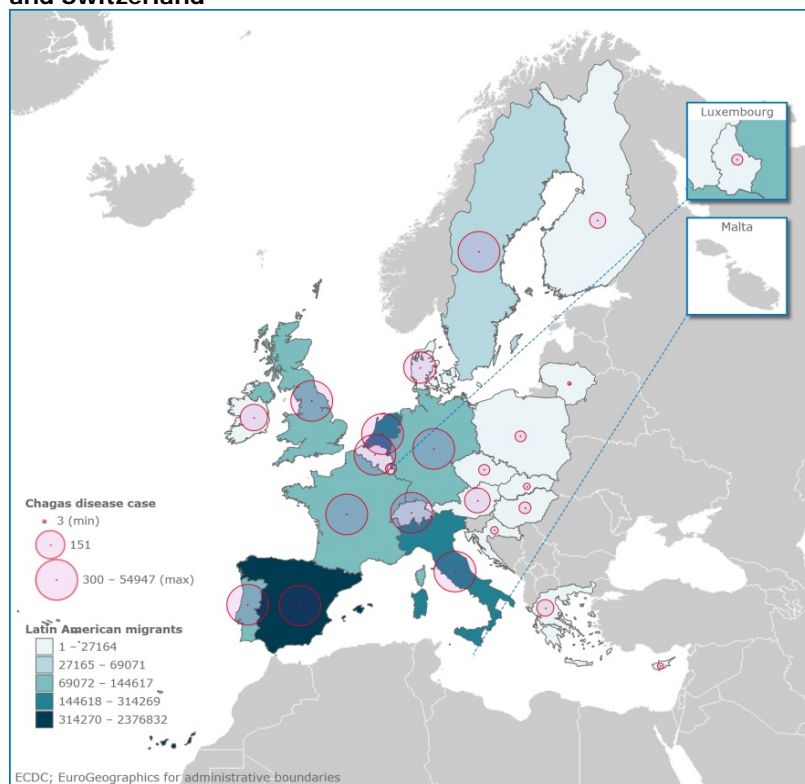
Prevalence of Chagas disease among migrants in Europe

Chagas disease is not systematically monitored by countries in the EU/EEA and there is no European-wide surveillance system to which cases can be reported. Cases may not be detected, as there is little awareness of Chagas disease and most health professionals are not trained to diagnose and manage it [15,18]. Assessment of the situation in Europe is based on estimates of the number of Latin American migrants in Europe and estimates of prevalence in endemic countries (Table 11.1 and Figure 11.1) and should, therefore, be treated with caution.

Table 11.1 Estimated number of Chagas disease cases in Latin American migrants in Europe

Source	Guerri-Guttenberg et al. (2008) (19)75	Schmunis (2010) (1)	WHO (2009) (18)	Basile et al. (2011) (15)
Number of Chagas disease cases	24 001–38 708	100 958	>80 000	68 318–123 078

Figure 11.1 Estimated cases of Chagas disease and number of Latin American migrants in the EU/EEA and Switzerland



Note: Using World Bank 2010 estimates for the Latin American migrant population in Europe and Pan American Health Organization (PAHO) Chagas disease prevalence estimates for endemic countries in Latin America, it was possible to make an assessment of Chagas disease prevalence in Europe. PAHO prevalence estimates have been used for estimating prevalence in Europe previously [15, 18]. There were an estimated total of 71 952 Chagas disease cases for Europe.

Most studies on Chagas disease in Europe have been conducted in Spain, which has been the main destination for Latin American migration to Europe in the last decade. Several have assessed prevalence among pregnant women. One study found a prevalence rate of 4.0% in 3 839 pregnant Latin American women in Madrid who were tested for *T. cruzi* infection from 2008 to 2010 [3]; the congenital transmission rate was 2.6%. Another large hospital-based study, which tested 1 350 pregnant Latin American women from 2005 to 2007, found a prevalence rate of 3.4% and a congenital transmission rate of 7.3% [6]. A third study, which tested 1 975 Latin American women and newborns over a one-year period in Valencia, found a prevalence rate of 11.4% and a congenital transmission rate of 3.5% [4].

Other studies among Latin American migrant populations in general have found higher prevalence rates, possibly due to selection bias. For example, a study that tested 1 146 Latin Americans in Madrid attending hospitals found a prevalence rate of 31% [5]; another study conducted in two centres for imported diseases in Barcelona found a prevalence rate of 41% in a sample of 489 Latin Americans [20]. A cross-sectional study of a Paraguayan and Bolivian population living in Elche, Spain found a prevalence of 6.5% [7].

Prevalence data is also available from studies in other European countries. An Italian screening programme that included migrants, expatriates, travellers to endemic regions and children born to *T. cruzi* seropositive mothers attending a tropical disease centre had 876 participants, of whom 4.2% were *T. cruzi* positive [8]. In Switzerland, studies show prevalence rates ranging from 2% to 12.8% and generally found that Latin American migrant participants were often irregular and awaiting regularisation [9-12]. A French study in the Île de France region found a prevalence of 23.6% in a sample of Latin American migrants [21]. A Belgian screening programme in two medical centres found four *T. cruzi* positive patients a year on average [22]. A study in the Netherlands estimated that there were between 726 and 2 929 *T. cruzi* seropositive migrants, most of whom would originate from Suriname [23]. Another study estimated that there were between 3 042 and 3 401 Chagas disease cases in Italy [24].

In a study by the French blood bank, Établissement Français du Sang in the Île de France region, 9.7 in 100 000 blood donors tested were *T. cruzi* positive [25]. In Spain, a screening programme implemented by the Catalanian blood bank found a prevalence of 0.62% [26].

Chagas disease in Europe and blood screening

EU directive 2004/33 on technical requirements for blood and blood components mentions Chagas disease as a deferral criterion for donors of whole blood and blood components. However, currently in the EU, only France, Spain and the United Kingdom conduct systematic screening for *T. cruzi* infection in blood donors. In Belgium, Germany and Italy pre-transfusion questionnaires are distributed to all potential donors.

EU directive 2006/17 on technical requirements for the donation, procurement and testing of human tissues and cells stipulates that suspicion of *T. cruzi* infection based on patient history requires additional testing. France, Italy, Spain and the United Kingdom have implemented measures to prevent transmission via organ, tissue and cell transplantation [18].

11.3 Conclusion

In Europe, Chagas disease is not systematically monitored, but available data suggest that prevalence rates are high enough in some countries to warrant concern. Spain, Italy, the Netherlands, the United Kingdom, Germany and France have the highest number of estimated cases in Europe.

Key issues to be addressed are preventing transmission through blood, organ, tissue and cell donation by Latin American donors and congenital transmission in Latin American pregnant women who are infected with *T. cruzi*. However, only France, Italy, Spain and the United Kingdom are currently addressing transmission risks.

There is a need to improve awareness and detection of Chagas disease in Europe and to improve access to healthcare for both legal and irregular Latin American migrants, to ensure that the disease is diagnosed and treated.

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12. Conclusions

The extent to which migrants in the EU/EEA are affected by infectious diseases

Drawing overall conclusions about infectious diseases and migrants is challenging, as patterns and trends vary considerably, depending on the disease in question, and given the diversity of migrants and changing patterns of migration both to and within Europe. Migrants are more affected by some infectious diseases than the native-born population; the opposite appears to be the case for other infectious diseases. The predominant mode of transmission for some diseases also differs between migrant and non-migrant populations in the EU/EEA.

Differences in national surveillance systems and gaps in data also make it difficult to draw conclusions. More data, and more complete data about the migrant status of cases reported, are available for some diseases and less for others. Due to changes in reporting and in the number of countries reporting, it is also difficult to determine trends in infectious diseases among migrants. The following summarises conclusions on the extent to which migrants in the EU/EEA are affected by infectious diseases, based on available evidence:

Migrant populations in the EU/EEA are disproportionately affected by HIV and there has been a slight increase in the number of new cases diagnosed in migrants. Available data show that migrants represented 40% of reported HIV cases between 2007 and 2011. Overall, the number of new HIV cases diagnosed among migrants in the EU/EEA went up slightly during the period 2007–2011, with increases among migrants from Latin America, central and eastern Europe and decreases among migrants from sub-Saharan Africa. Changes observed in the EU/EEA may reflect changes in the incidence of HIV among migrants from some regions (for example, sub-Saharan Africa saw a 34% decline in new HIV cases between 2001 and 2012), changes in migration to or within the EU/EEA or changes in the availability or uptake of HIV testing among migrants in some EU/EEA countries. However, broadly speaking, the majority of HIV cases reported among migrants in the EU/EEA continued to be reported in migrants from sub-Saharan Africa.

Overall in the EU/EEA, migrants represent a significant proportion of HIV cases for all modes of transmission. Migrants account for the majority of cases due to heterosexual transmission, but also for more than 20% of cases attributed to sex between men and injecting drug use. The predominant mode of transmission among migrants also depends on country or region of origin. For example, a high proportion of HIV cases in migrants from Latin America and East Asia and the Pacific have been reported in MSM. Better understanding of sub-groups of migrants among high-risk populations is required. There is also growing evidence that migrants are at risk of HIV acquisition after arrival in the EU/EEA.

Migrants to the EU/EEA with HIV infection have poorer clinical and immunological indicators at diagnosis than native-born HIV cases. Specific measures are needed to increase uptake of HIV testing in order to address the difference in late diagnosis observed between migrants and non-migrants.

Migrant populations in the EU/EEA are also disproportionately affected by TB and the proportion of TB cases among migrants has increased. Although the majority of TB cases in Europe occur in individuals born in the region, TB is also a significant issue among migrant populations. In 2010, migrants represented 25% of reported TB cases, increasing from 10% in 2000. In most EU/EEA countries, TB notification rates are higher in foreign-born than native-born populations. Migrants with TB are mainly from Asia, Africa and other parts of the European region. However, country of birth was not recorded for 25% of migrant cases.

Available data suggests that active TB disease occurs at a younger age in migrants than in the native population, that the risk of migrants acquiring extrapulmonary TB is twice as high, but that MDR-TB is less common among foreign-born cases than among native-born cases. Migrants have twice as many unknown treatment outcomes at 12 months, and are also less likely to have successful treatment outcomes than natives. In 2010, HIV status was known in only 4.7% of migrant TB cases compared with 27% in native-born TB cases. Available evidence also suggests that concerns that migrants increase the risk of TB in native populations are unfounded.

Limited available data suggest that migrants are not disproportionately affected by gonorrhoea. However, national surveillance systems for STI in Europe are diverse and data on gonorrhoea by migrant status are only available from a few countries. These data show that 11% of gonorrhoea cases were in migrants and 50% were in non-migrants; no information on country of birth was available for the remaining cases. The proportion of gonorrhoea cases among migrants remained stable between 2000 and 2010. The average age of gonorrhoea cases is similar in migrants and non-migrants, but notification rates are higher in males than in females in both groups. While the percentage of females in non-migrants remained stable between 2000 and 2010, it increased among migrants.

There are differences between migrants and non-migrants with respect to mode of transmission of gonorrhoea and the proportion of gonorrhoea cases among sex workers. In non-migrants, the proportion of cases acquired through heterosexual contact has remained at around 55% and the proportion acquired through MSM contact at around

45%. Migrants are around four times more likely to acquire gonorrhoea through heterosexual contact than through MSM contact. The proportion of gonorrhoea cases among sex workers has been consistently higher in migrants than in non-migrants since 2000 and appears to have increased significantly in migrants since 2006. However, data from studies among high-risk populations show little difference in gonorrhoea rates between migrants and non-migrants, although few studies were identified.

Limited available data also suggest that migrants are not disproportionately affected by syphilis. Data on syphilis by migrant status are only available from a few European countries. Case-based data reported in 2010 show that of the total 9 991 syphilis cases, 7.3% were in migrants and 55.4% were in non-migrants; no information on country of birth was available for the remaining cases. The proportion of syphilis cases among migrants has remained stable over time. The average age of syphilis cases was similar in migrants and non-migrants, but notification rates were significantly higher in males than in females in both groups, with stronger gender differences among non-migrants.

Reported data show differences in mode of syphilis transmission between migrants and non-migrants, although these differences have reduced over time. Overall, between 2000 and 2010, migrants were slightly more likely to contract syphilis through heterosexual contact than through MSM contact, whereas non-migrants were more likely to contract syphilis through MSM contact than through heterosexual contact. Transmission through MSM contact appears to be the main predictor of syphilis and HIV co-infection; migration status does not seem to have a strong independent effect on syphilis and HIV co-morbidity.

Hepatitis B, particularly chronic hepatitis, is an issue in migrant populations in the EU/EEA. Available data suggests that hepatitis B prevalence is highest among migrants from high and moderate endemic countries in eastern Europe, Asia and sub-Saharan Africa. In 2011, 18 EU/EEA countries provided data on whether cases were 'imported' for 39.1% of all cases reported to ECDC. Of these just over half (52.6%), were recorded as 'imported'. A total 6.3% of these cases were acute infections and 81.5% were chronic infections. During the period 2006–2010, there was a decrease in notification rates for acute hepatitis B infection in the EU/EEA, but the opposite trend in chronic infections. However, it is difficult to draw definitive conclusions from the surveillance data, due to its incompleteness. Other evidence indicates that there is a higher prevalence of chronic hepatitis B infection among certain migrant groups than among the native population, with cases mainly reported in migrants from countries with high or intermediate endemicity.

While hepatitis B cases in native-born populations in the EU/EEA are most likely to occur in high-risk groups such as injecting drug users and MSM, cases in migrant populations are more likely to have been acquired in the country of origin and via vertical transmission from mother to child.

It is difficult to draw definitive conclusions about the burden of hepatitis C in migrant groups in EU/EEA countries. Lack of reliable and complete data on the country of origin of cases make it difficult to compare HCV in migrant and non-migrant populations. There is some evidence from France, the Netherlands, Spain and the United Kingdom suggesting that prevalence is higher among migrants from endemic countries than among the general population. However, prevalence in these migrant populations was lower than the estimated prevalence in their countries of origin. Insufficient data are available to comment on trends in hepatitis C infection among migrants.

Information on country of birth for measles and rubella cases is not available from TESSy and it is therefore not possible to draw conclusions about the occurrence of measles or rubella among migrants. Reported data suggest that most measles and rubella cases in Europe are reported as either indigenous or of unknown origin. Reasons for measles outbreaks vary between countries but include inadequate vaccination coverage, linked to poor access to health services. Studies from some countries suggest that migrants may be at greater risk and that migrant children may be more exposed because they are less likely to be immunised against measles than non-migrant children. Few studies have investigated rubella among migrants. Those that have provide evidence that levels of rubella immunity may be lower among pregnant women born abroad and that migrant children may have lower levels of vaccination.

Some sub-groups of migrants, particularly those visiting malaria-endemic countries of origin, are at high risk of malaria. In EU/EEA countries, 99% of reported malaria cases are imported. Review of the literature suggests that a substantial proportion of imported malaria cases in the EU/EEA occur among recent migrants from malaria-endemic countries and among more settled migrants and their families who have travelled to visit friends and relatives in malaria-endemic countries of origin. In a range of studies, recent immigrants and migrants visiting their home country accounted for between 5.0% and 81% of reported malaria cases; those visiting their country of origin appear to be at greater risk of acquiring malaria. Pregnant women and children among established migrants who visit their home country are at particular risk. A migrant's country of origin also influences the disease profile. For example, *P. falciparum* malaria occurs mainly in migrants who originate from countries in sub-Saharan Africa.

Indigenous cases of malaria in the EU/EEA could be linked to the presence of efficient malaria vectors and favourable conditions for malaria transmission, combined with the arrival and high turnover of migrant seasonal workers from malaria-endemic countries. Ensuring that recently arrived immigrants have access to healthcare and that health professionals are aware of the possibility of asymptomatic infection is important to limit the risk of autochthonous transmission (cases locally acquired from native *Anopheles* vector species).

Chagas disease has occurred in Europe as a result of migration from endemic countries in Latin America. Although Chagas disease is not under surveillance at EU/EEA level, the number of cases reported has increased in the last decade and available data suggest that prevalence rates are high enough to warrant concern. Spain, Italy, the Netherlands, the United Kingdom, Germany and France have the highest numbers of estimated cases in Europe. There is some evidence to suggest that irregular migrants from Latin America may be at elevated risk.

Data and evidence gaps

Although efforts have been made to harmonise data collected by national surveillance systems on migrant-specific variables such as 'country of birth', the type and quality of surveillance data collected still varies among EU/EEA countries and reporting on some of these variables is poor (See Table 12.1).

Table 12.1 Completeness (%) of variables collected through TESSy

Variable	HIV ³⁸	TB ³⁹	HBV ⁴⁰	HCV ⁴¹	Gono- rrhoea ⁴²	Syphilis ⁴³	Measles ⁴⁴	Rubella ⁴⁵	Malaria ⁴⁶	Chagas Disease*
Country of birth	62	95.6	19.1	14.4	17	26				
Country of nationality	28	96.3	6.8	6.6	4	17				
Probable country of infection	17		20.2	7.6	9	10	3	5	90.1	
Imported			39.1	40.5			82	96	98.7	
Region of origin	62.5									

*Not under EU surveillance

This report has highlighted areas where evidence is limited, suggesting that there is a need for better data collection and more research in order to improve understanding of the epidemiology of infectious diseases among migrants in Europe. The following are some of the specific issues requiring further investigation.

Epidemiology of specific diseases, in particular malaria, hepatitis B and C and gonorrhoea. Better data are needed on the extent of malaria in recent immigrants and migrants who travel to malaria-endemic countries of origin; information on country of birth and residence, destination and purpose of travel, and use of chemoprophylaxis would improve understanding of risk groups for imported malaria in the EU/EEA and help to improve the targeting of preventive measures. Improved understanding of hepatitis B and C among migrants is also needed to plan, implement and evaluate measures to reduce the burden of disease in this population. Additional studies are required to determine the epidemiology of hepatitis C among migrant populations in the EU/EEA as well as to identify and explain differences between first and second-generation migrants. Available data also need to be strengthened in order to improve understanding of gonorrhoea infection in migrants and non-migrants and to monitor the apparent increased risk in specific sub-groups of migrants, in particular women and sex workers.

Trends in infectious diseases among migrants. The difficulty in determining trends is due to changes in reporting, changes in the number of countries reporting, and changes in migration patterns. Further investigation is warranted to improve understanding of the reasons for apparent increases or decreases in reported cases among migrants. Greater collaboration with other agencies in order to obtain updated information on the number of migrants in EU countries would also allow calculation of rates and trends based on more accurate denominators, although denominators may still not include irregular migrants. It is, however, likely that data on the number of new migrants per year are better collected and more reliable. This can be used to estimate incidence of disease in recently migrated populations. Introducing variables such as length of stay in a country may also enable better definition of migrant populations in TESSy analyses. However, this variable may not be known by those submitting data, unless specific national surveillance protocols include this and other migrant variables.

Data on country of origin or parental country of origin of paediatric TB cases. Children from high-TB-burden countries and children of migrant parents from high-burden countries are at risk of acquiring infection. In most EU/EEA countries, surveillance data for TB cases in children do not distinguish between children born in the host

³⁸ 2012

³⁹ 2011

⁴⁰ 2011

⁴¹ 2011

⁴² 2011

⁴³ 2011

⁴⁴ 2013

⁴⁵ 2013

⁴⁶ 2012

country of foreign-born parents and those born of native parents; this is of concern since the children of migrants may experience similar social, behavioural and environmental risk factors to foreign-born populations.

Improving data collection and completeness for variables related to migrants and HIV. HIV surveillance among migrants could be strengthened through collection and/or improved completeness and analysis of variables such as country of birth, country of nationality and probable country of infection, CD4 cell count at diagnosis, year of arrival, and migrant sub-populations at greatest risk of HIV infection. Given the observed increase in numbers of HIV cases reported among migrants from Latin America, central and eastern Europe between 2007 and 2011, analysis of surveillance data by geographical origin will need to consider other regions in addition to sub-Saharan Africa, and HIV surveillance data also need to be stratified by migration status for MSM and other risk populations such as people who inject drugs. Data on probable country of infection could be enhanced if an objective method for assigning this were to be applied across EU/EEA countries –this is currently being developed [1]. Adding a variable on 'year of arrival' would help to strengthen monitoring of post-arrival acquisition of infectious diseases among migrants.

Improving data collection and completeness for variables related to migrants and TB. Although completeness of key migrant variables such as country of birth and country of nationality are very high, TB surveillance among migrants could be strengthened through improved completeness and analysis of variables such as HIV status and probable country of infection. Better data are also needed on latent TB and health determinants.

Developing a framework to improve the monitoring of infectious diseases affecting migrant populations in the EU/EEA. In order to address many of the issues identified in this report, ECDC in partnership with the WHO Regional Office for Europe and the International Organisation for Migration is currently developing an evidence-based public health framework to improve the monitoring of infectious diseases among migrant populations in the EU/EEA. The framework will be tailored to the needs of EU/EEA Member States and build on the 2008 World Health Assembly Resolution (WHA61.17) entitled 'Health of Migrants' [2] and the operational framework outlined by the 2010 Global Consultation [3]. The ECDC/WHO/IOM framework will in part provide guidance on how to:

- Ensure the standardisation and comparability of data on infectious diseases in migrant populations by identifying key indicators that are acceptable and useable across countries.
- Increase understanding of trends and outcomes through the appropriate disaggregation and analysis of migrant health information in ways that account for the diversity of migrant populations.
- Promote the inclusion of migration variables in existing censuses, national statistics, targeted health surveys and routine health information systems, as well as in statistics from other sectors.
- Suggest innovative approaches to collecting data on migrants beyond traditional instruments and surveillance.
- Raise awareness of data collection methods, use and dissemination related to migrant health among key stakeholders.
- Provide a template to EU/EEA Member States on how a national monitoring system on migrant health and infectious diseases might look.

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4. Health of Migrants: The way forward – Report of a global consultation, Madrid, Spain, 3-5 March 2010. http://www.who.int/hac/events/consultation_report_health_migrants_colour_web.pdf

Annex 1. Databases and websites searched

Databases searched:

PubMed/Medline, Web of science, Cochrane Library [date last searched: 24 September 2012]

Websites searched:

Central European Forum for Migration and Population Research (Poland), Center for Health and migration (Austria), Danish Research Centre for Migration, Ethnicity and Health (MESU), European Centre for Disease Prevention and Control (ECDC), Eugate, European Research Centre on Migration and Ethnic Relations (ERCOMER), EU-Level Consultation on Migration Health, Health Protection Agency (HPA), Global Forum on Migration and Development (GFMD), Global migration group, International Organization for Migration (IOM), Migrant and Ethnic Health Observatory, National Health Service (NHS), United Nations Population Fund (UNFPA), UPHA (European Public health association), World Health Organization (WHO), World Health Organization, Regional office for Europe (WHO-EURO)

Annex 2. Search strategy key words used

Diseases

- Chagas disease: Chagas, *Trypanosoma cruzi*, American trypanosomiasis, benznidazole, nifurtimox
- Enteric fevers: enteric fever*, *Salmonella* Typhi, *Salmonella* Paratyphi, typhoid fever, paratyphoid fever
- Hepatitis B: Hepatitis B, HBV, viral hepatitis.
- Hepatitis C: Hepatitis C, HCV, viral hepatitis.
- Measles and rubella
- Malaria: malaria, *Plasmodium vivax*, *ovale*, *malariae*, chloroquine, artemisinin, *Anopheles*
- Sexually transmitted infections (congenital syphilis and gonorrhoea): *Neisseria*, gonorrh*, syphil*, *Treponema*, pallidum
- Tuberculosis: Tuberculosis, TB, *Mycobacterium tuberculosis*, BCG, Bacillus Calmette-Guerin, tuberculin, Multi-drug-resistant tuberculosis, extensively drug-resistant, MDR, XDR.

Study population

Migration, immigration, emigration, migrant*, immigrant*, emigrant*, foreign-born, foreign born, foreigner*, asylum seeker*, refugee*, irregular, citizen*, citizenship, nationalit*

EU/EEA

Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France
Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta,
Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom, Great Britain,
England, Wales, Scotland, EU, EU/EEA, Europe*.