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TECHNICAL REPORT

REVIEW OF CHLAMYDIA CONTROL ACTIVITIES IN EU COUNTRIES

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SUMMARY

This report illustrates the scope and the findings of Project SCREen, arguably the biggest study to date on chlamydia control activities in the EU. In addition to data from EU Member States, SCREen also collected data from EU candidate countries, EFTA member states, and the USA.

SCREen collected detailed information about chlamydia diagnosis, chlamydia screening, case management, chlamydia prevalence studies, and a host of related public-health topics. It provides deep insights into the strategies that national public health systems employ to stem the tide of chlamydia infections.

In order to categorise countries, the SCREen project also developed a typology of chlamydia control activities, based on the principles of sexually transmitted infection control. This typology could be used in the future to monitor the intensity of chlamydia control activities at the country level and to assist decision-making on which activities should be strengthened or introduced.

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GLOSSARY

Includes terms used in the report and in the Project SCREen questionnaire

Term	Definition
Acceptance rate	The proportion of people offered the screening test that accepts the offer [3].
Active screening	See Proactive screening.
Audit	The sharing, among a group of peers, of information from medical records to assess the quality of patient care against agreed standards [4].
Call-recall screening	See Proactive screening.
Case finding	Includes partner notification, and seeking persons who have been exposed to a high risk of infection [5], e.g. by offering tests to people who have had sexual contact with a known case, or who have been diagnosed with another sexually transmitted infection.
Case management	The care of a person with a sexually transmitted infection, including: history taking; clinical examination; correct diagnosis; early and effective treatment; advice on sexual behaviour; promotion and/or provision of condoms; partner notification and treatment; case reporting; and clinical follow-up as appropriate [6].
Clinical practice guidelines	A written set of systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical conditions [7].

Contact tracing	See Partner notification.
Control of sexually transmitted infections	Reduction of incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction [8].
Dermatovenereology	Clinical specialty providing care for people with sexually transmitted infections and genital dermatoses, within the specialty of dermatology.
Effective screening rate	The proportion of the population eligible for screening who are actually tested [3].
Genitourinary medicine	Clinical specialty providing care for people with sexually transmitted infections, including HIV infection, and a wide range of other genital conditions. Term used in the UK and Scandinavia. Analogous to specialty of venereology.
Guidelines	See Clinical practice guidelines.
Law	Rules of conduct or action prescribed or formally recognised as binding that govern the behaviour of actors (including people, corporations, associations, government agencies, and so on). Punitive action can be taken against those who do not enforce or obey the law [9]. Laws are adopted or ratified by a legislative or parliamentary body that is formally recognised in the constitution.
Monitoring of chlamydia testing	The collection and reporting of data about chlamydia testing or screening activities, which are reported separately from routine surveillance for sexually transmitted infections.
Opportunistic chlamydia testing	Individuals who are attending a health care, or outreach, setting for any reason (not necessarily related to sexual or reproductive health) are offered the opportunity to have a chlamydia screening test.
Out-of-pocket payment	Fee paid by the consumer of health services directly to the provider at the time of delivery. Payments borne directly by the patient. They include cost-sharing (and user-fees) and informal payments to health care providers [10].
Partner notification	The process of informing the sex partners of people with sexually transmitted infections of their potential

	exposure to infection, ensuring their evaluation and/or treatment, and providing advice about preventing future infection [11]. Also known as contact tracing.
Plan	See Strategy.
Policy	A high-level overall directive embracing the general goals and acceptable procedures of a governmental body. Policies represent a statement of political will to establish a definite course of action to guide and determine priorities for present and future decisions. Policies generally do not have the force of law [9]. National strategies (or plans) usually describe how a policy will be implemented. These terms are defined separately.
Primary prevention	Protection of health by personal and communal efforts. This is the task of public health [5]. The aim is to reduce the occurrence of new cases of illness in a population. For sexually transmitted infections, this includes providing information and health education for a population, as well as condoms.
Primary health care	The first level contact with people taking action to improve health in a community [10].
Population-based screening	See Proactive screening.
Population register	A register containing the names and addresses of all residents in a defined area, which can be used by public health services to invite individuals to undergo screening.
Proactive chlamydia screening	A population register is used to select the population thought to be at risk, and individuals are invited to have a chlamydia screening test [12]. Also known as population-based screening, register-based screening, call-recall screening, active screening, or systematic screening.
Public dedicated services	Specialist services provided by public health authorities with clinics specifically for patients with sexually transmitted infections. These might be clinics dedicated to STI patients only, or clinics serving patients with other conditions that are publicly recognised to provide facilities for patients with STI. Includes dermatovenereology, genitourinary medicine, sexually transmitted diseases, venereology clinics.

Recommendations	See Guidelines.
Register-based screening	See Proactive screening.
Regulations	Legally binding control mechanisms that can be issued in conjunction with, or in addition to laws. Regulations can be issued by any number of authorities: governmental, national, ministerial, sub-ministerial, provincial, district, and communal. At the municipal level, regulations are sometimes called ordinances. Regulations and ordinances issuing from governmental entities have the force of law, although circumscribed by the level of the issuing authority [9].
Screening	A public health service in which members of a defined population, who do not necessarily perceive that they are at risk of, or are already affected by, a disease or its complications, are asked a question or offered a test to identify those individuals who are more likely to be helped than harmed by further tests or treatment to reduce the risk of disease or its complications [13].
Screening programme	A continuing organised service that ensures that screening is delivered at sufficiently regular intervals to a high enough proportion of the target population to achieve defined levels of benefit at the population level, while minimising harm [1].
Secondary health care	Specialised ambulatory medical services and commonplace hospital care (outpatient and inpatient services). Access is often via referral from primary health care services [10].
Strategy	A set of measures the government is taking to implement a law or policy, or some aspect of a law or policy, that they see needs particular attention. It often includes milestones, specific objectives or targets that allow for progress to be measured [9].
Surveillance	The ongoing systematic collection and analysis of data and the provision of information which leads to action being taken to prevent and control a disease [14].
Systematic screening	See Proactive screening.

Note: References for definitions used have been given where available. Where no published definition was identified, working definitions agreed by the project team, and provided to project participants, are given.

ABBREVIATIONS

A and E	Accident and emergency medicine department
AIDS	Acquired immune deficiency syndrome
CASI	Computer-assisted self-interview
CATI	Computer-assisted telephone interview
CSW	Commercial sex worker
ECDC	European Centre for Disease Prevention and Control
EFTA	European Free Trade Association
ESSTI	European Surveillance for Sexually Transmitted Infections network
EU	European Union
GDP	Gross domestic product
HIV	Human immunodeficiency virus
HPV	Human papillomavirus
HSG	Hysterosalpingogram
IUSTI	International Union against Sexually Transmitted Infections
KABP	Knowledge, attitudes, behaviours and practices
NAAT	Nucleic acid amplification test
SCREen	Screening for Chlamydia Review in Europe project
SD	Standard deviation
STD	Sexually transmitted disease
STI	Sexually transmitted infection
UK	United Kingdom
USA	United States of America
WHO	World Health Organization
WHO EURO	World Health Organization Regional Office for Europe

1 INTRODUCTION

This chapter summarises existing information about the epidemiology and control of genital chlamydial infections and presents the rationale for, and objectives, of the project.

Public health importance of chlamydia

Chlamydia trachomatis is the cause of the most commonly reported sexually transmitted bacterial infection in many countries in Europe and other industrialised countries [15]. In some countries, including Sweden and the United States of America (USA), chlamydia is the most commonly reported infection of all those that are notifiable. In this report we refer to genital tract infections caused by *C. trachomatis* serovars D to K as chlamydia.

Chlamydia infections in the genital tract are of public health concern because of the potential for severe long-term consequences:

- In women, *C. trachomatis* that ascends from the endocervix to the upper genital tract can cause pelvic inflammatory disease, which can result in scarring and adhesions in the Fallopian tubes and adnexae. This increases the risk of ectopic pregnancy, tubal infertility and chronic pelvic pain [16]. The precise risk of progression from lower to upper genital tract infection is not known because of the methodological difficulties involved in studying this question, but chlamydia is likely to be the commonest preventable cause of such reproductive tract morbidity. Chlamydia has been reported to account for up to two thirds of cases of tubal infertility and a third of ectopic pregnancies [17]. Ascending infection in men can cause acute epididymo-orchitis, but effects on future male fertility are less well understood.
- *C. trachomatis* during pregnancy is associated with premature rupture of membranes, low birth weight, and mid-trimester spontaneous abortion [17]. If transmitted during labour, it can cause ophthalmia neonatorum and atypical neonatal pneumonitis [18].
- HIV is more easily transmitted and acquired in the presence of co-infection with chlamydia because the increased presence of inflammatory cells in the genital tract increases HIV viral load [19].
- Genital chlamydial infection is usually asymptomatic in both women and men, which allows it to be spread unknowingly. The prevalences of unrecognised infection in men and women, estimated from population-based surveys, are similar. Symptomatic infection is, however, more common in men (urethral discharge and dysuria) than women (vaginal discharge, inter-menstrual or post-coital bleeding, or urethral syndrome).

Descriptive epidemiology of chlamydia

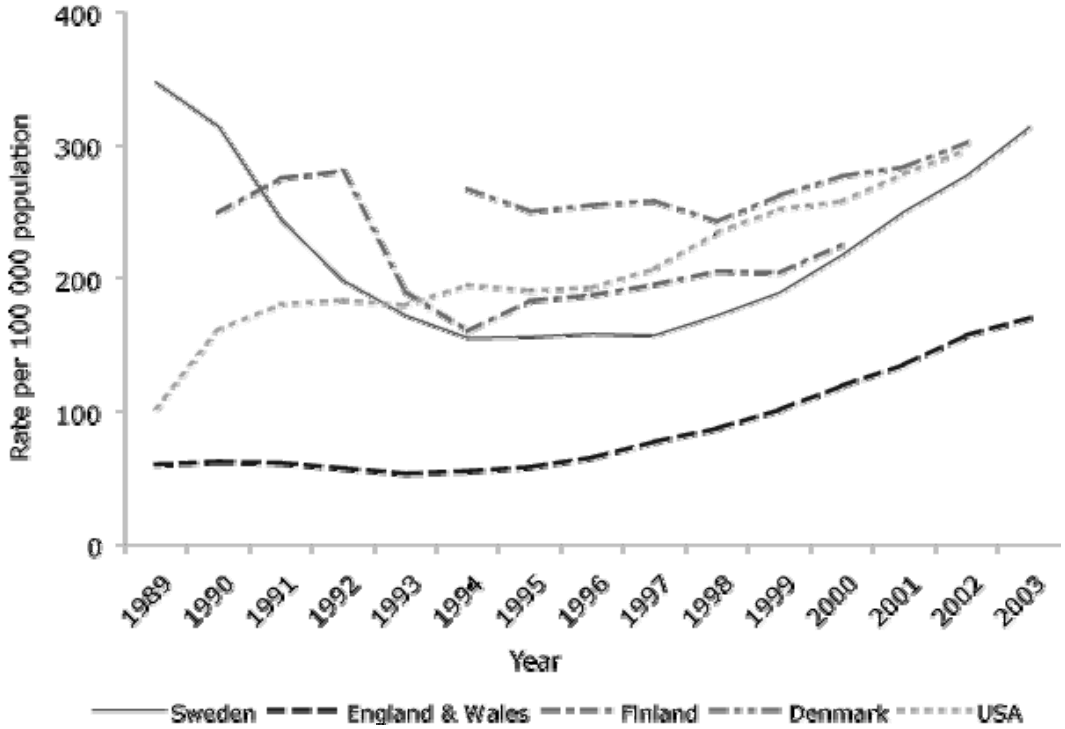
Chlamydia is a widely distributed infection mainly affecting sexually active adults under 30 years old. The age group with the highest reported rates of infection for women is slightly younger than for men, a pattern commonly seen in sexually transmitted infections. Population rates estimated from surveillance data show the highest rates in women aged 15 to 19 years

in the UK and USA and aged 20 to 24 years in Sweden. In all three countries the highest chlamydia rates in men are in 20–24 year olds. These are also the age groups in which rates of heterosexual sexual partner change are highest [20]. Higher chlamydia prevalence is clearly associated with increasing numbers of new sexual partners [21,22]. There are no consistently identified risk factors for chlamydia, apart from age and sexual behaviour.

The prevalence of chlamydia is generally considered to be increasing. There are, however, no prevalence surveys that have been repeated in the same population to know whether this is true or not. Time trends from surveillance data are, however, difficult to interpret. Most national surveillance systems record notified cases, which can only include those that have been diagnosed and reported and there are many factors that can affect these figures. For example, an increase in the reported numbers of cases can reflect a true increase in transmission but might also be caused by an increase in the number of people being tested, an increased detection rate due to more sensitive diagnostic tests, change in testing patterns among people at higher risk of infection, or a combination of these. Rates of infection can also be difficult to compare between countries because of differences in the coverage of notification data and in the completeness of reporting.

Figure 1 shows previously published data summarising surveillance trends in reported chlamydia cases from 1989 to 2003 from Denmark, England and Wales, Finland, Sweden and the USA [15]. Similar trends in other European countries have also been reported [23]. In Sweden and Finland, where testing has been widespread since at least the early 1990s and reporting of chlamydia cases is thought to be fairly complete, chlamydia rates fell in the early 1990s but have been increasing since about 1995. The decline in diagnosis rates in the first half of the 1990s is similar to documented falls in other sexually transmitted infections elsewhere in Europe [24,25], which have been attributed to behavioural change resulting from fear of AIDS and safer sex campaigns [1]. In England and Wales and the USA, where chlamydia testing rates nationally in the early 1990s were lower than in Scandinavia, there has been a continuous increase in reported infection rates. The consistent rise in reported chlamydia rates in Europe and the USA is probably due to a combination of increased testing, use of more sensitive diagnostic tests, and possibly increasing sexual risk-taking-behaviours in young people in general, or more testing among groups of people with risky sexual behaviour.

Figure 1: Rates of reported genital chlamydia infection in selected countries, 1989–2003.



Source: Reference [15]. Swedish Institute for Infectious Disease Control case reports from all settings; Health Protection Agency, England and Wales reports from genitourinary medicine clinics; National Institute for Public Health, Finland case reports from all settings; Epi-News, Statens Serum Institut, Denmark case reports from all settings; Centers for Disease Control and Prevention, Atlanta, United States case reports from all settings.

Interventions to control chlamydia and its consequences

Controlling the spread of infections requires chains of transmission to be broken. For sexually transmitted infections, principles of control include early diagnosis and effective treatment of infected cases (the index case) and, through partner notification, sexual partners who might have infected the case, or might have been exposed to infection subsequently [26]. As part of the control programme, an appropriate system of surveillance that can be used to monitor trends is also required.

Chlamydia is an infection that is difficult to control in populations because:

- it is usually asymptomatic or causes symptoms that are not severe enough to prompt treatment-seeking behaviour, so there is a high prevalence of infection in people who are unknowingly infected in the community;
- chlamydia is not restricted to population groups with known high-risk sexual behaviour, so it is difficult to target interventions;
- sufficiently high levels of regular repeated screening for early detection and treatment are difficult to achieve;

- sexually transmitted infections are stigmatised conditions, so people might avoid seeking treatment, or might avoid telling sexual partners if they feel they will be stigmatised or blamed; and
- governments might not prioritise prevention campaigns because of the stigma and prejudice associated with chlamydia as a sexually transmitted infection, or because of a lack of awareness of its public health importance, and the absence of the kind of patient advocacy group that lobbies for resources for many illnesses.

Partner notification to identify and treat sexual partners is often unsuccessful because:

- healthcare practitioners have too little time to initiate or follow up partner notification, or do not have the skills to take a sexual history and discuss partner notification;
- index cases are unable or unwilling to contact their sexual partner(s); or
- sexual partners are unable or unwilling to access sexual health services, especially if they are asymptomatic.

It is difficult to monitor the effects of preventive interventions because of the difficulties in interpreting routine surveillance data about chlamydia infections, and the lack of agreed criteria for diagnosing and reporting cases of pelvic inflammatory disease, ectopic pregnancy and infertility.

Chlamydia affects individuals, their partnership(s) and their sexual network, and the wider population. The rationale for, and expectations of, benefits of chlamydia control activities therefore need to take into consideration the level at which they are targeted [27]. At the individual level, there is the infection itself and the long-term sequelae, such as infertility. Effective case management should cure the infection, prevent re-infection and acquisition of new infection and might prevent sequelae, but might not have any impact on transmission at the population level. Regarding sexual partnership, partner notification is the appropriate intervention to treat the partner(s), prevent re-infection of the index case and, possibly, onward transmission. Mathematical models suggest that partner notification should have an effect on reducing chlamydia transmission at a population level [28,29], but this is difficult to demonstrate in empirical research studies [30]. To control transmission in wider sexual networks and populations, an effective organised strategy for early detection and treatment would be required. This would also be expected to provide individual and partner level benefits [27].

Symptomatic case management and partner notification

Effective diagnosis and treatment of people with symptoms suggestive of chlamydia, followed by tracing and treatment of their recent sexual partner(s), is good clinical practice at the individual level. However, people with asymptomatic chlamydial infections — the majority of those infected — would not be detected with such an approach. In addition, partner notification is often incomplete, so infected individuals can continue to transmit chlamydia to re-infect an existing partner, or to infect a new sexual partner. Effective symptomatic case management is therefore unlikely to have an impact on chlamydia prevalence or long-term complications when the pool of untreated infection is large.

Screening and screening programmes

Screening is testing for asymptomatic chlamydia to detect and treat infections in people who do not know they are infected, with the intention of preventing future morbidity (see Glossary). The aim of screening for an infectious disease like chlamydia is to interrupt transmission at the population level so that prevalence decreases. By reducing the level of exposure to the infection, there will be fewer infections that progress to cause complications. To achieve these aims, screening, accompanied by treatment of cases and sexual partners, must cover enough of the target population regularly enough to detect and treat re-infections within partnerships, and onward transmission from untreated asymptomatics to new partners.

Screening tests can be offered to individuals who are already presenting to a health service for another reason, providing an opportunity to detect another condition [31]. These opportunistic screening tests are usually taken on a single occasion or at irregular intervals because initial attendance and repeat attendance at the screening site, and repeat offers of testing, are difficult to ensure. People at high risk of infection can therefore be tested infrequently or not at all. Alternatively, people who are regular users of health services, but at low risk of infection, might be tested repeatedly and unnecessarily. This pattern of testing has been observed with opportunistic cervical smear screening [32]. When tests can be offered in multiple different settings to increase the opportunities for an individual to be tested, it is difficult to coordinate quality assurance, monitoring and evaluation of the outcomes [33].

An alternative method of delivering screening is to use a register of people in the target population and invite them systematically to be tested [31]. Repeated invitations can then be sent to those eligible after an appropriate interval. The disadvantage of population registers is that they can be inaccurate, so that eligible people do not receive invitations. The uptake of screening by invitation alone, particularly for stigmatised conditions like sexually transmitted infections, might also be lower than needed to interrupt transmission. This is likely at the start of a programme when awareness about the infection and the programme is low.

A screening programme is defined as an ongoing public health service in which screening is delivered to a sufficiently high proportion of the target population at sufficiently regular intervals to achieve a defined level of benefit, while minimising harm, at reasonable cost (see Glossary) [1]. For chlamydia control, the regular coverage of a screening programme would have to be high enough to interrupt transmission, so that a defined reduction in the prevalence of chlamydia and the incidence of its complications could be achieved. A screening programme requires a level of organisation that ensures that the quality of the structures and processes can be assessed and the primary outcomes of the programme can be monitored. The criteria that need to be fulfilled by national screening programmes that are overseen by the National Screening Committee in the UK (Table 1) have been defined by Gray [34].

Table 1: Components of national screening programmes

Characteristic
Cover a defined population
Have a simple set of objectives
Develop valid and reliable criteria to measure performance and produce an annual report
Relate performance to explicit quality standards
Organise quality assurance systems to help professionals and organisations prevent errors and improve performance
Communicate clearly and efficiently with all interested individuals and organisations
Coordinate the management of these activities, clarifying the responsibilities of all individuals and organisations involved

Source: Gray M [34].

These components can be applied to both opportunistic and register-based approaches to the delivery of screening. They can also, in principle, be applied to different types of health systems but will be most easily accomplished where universal coverage is provided by mandatory social insurance.

Randomised controlled trials are agreed to be the best evidence for the effectiveness of clinical or public health interventions. The evidence from randomised controlled trials supporting the effectiveness of chlamydia screening and chlamydia screening programmes to prevent long-term complications and transmission is limited [35]. Randomised trials have shown that if people at high risk of chlamydia, because of young age, demographic characteristics or high risk behaviour, are invited to be screened (proactive, or register-based screening), the incidence of pelvic inflammatory disease one year later can be reduced by about half [35]. There are no trials showing whether this benefit is sustained in future screening rounds. There are also no trials showing whether opportunistic screening offered to people presenting to health services can achieve the same benefits and no high quality evidence that any approach to chlamydia screening reduces transmission in the population. Mathematical models can also help to predict of the impact of screening on incidence and prevalence of chlamydia. Models of chlamydia transmission show that when a certain proportion of the target population is screened regularly (usually once a year) chlamydia prevalence in the population is expected to fall. These models assume that people will be screened repeatedly, so they reflect practice within organised screening programmes. The proportion of the population that needs to be screened and the frequency of screening required to have an impact on prevalence are not known, however. There are no reliable and consistent empirical data and all mathematical models result in very different predictions [36-38]. The mathematical models differ in their programming and in the many assumptions that have to be made because of uncertainty about parameters describing sexual behaviour patterns and *C. trachomatis* transmission and progression.

Chlamydia control activities in Europe

The European Union (EU) now has 27 Member States. The addition of 12 new states in Central and Eastern Europe and the Mediterranean since 2004 has increased cross-border migration. Geographical and labour market mobility are major challenges for the enlarging EU, with young adults and more vulnerable groups in society being more likely to migrate [39]. In the country of arrival, characteristics of immigrants include financial insecurity, loss of contact with supportive social networks and lack of language skills. These vulnerabilities can place young people at risk of sexually transmitted infections and with difficulty accessing health care. Trafficking of women as part of the sex trade has also been reported from new member and candidate EU states, as well as across their borders with non-EU Member States [40], but there are not, as yet, any direct links with outbreaks of sexually transmitted infections. Appropriate and accessible health and social services therefore need to be available in EU countries.

No study to date has examined chlamydia control activities in EU Member States comprehensively. Basic information about chlamydia screening has been summarised for Sweden, the Netherlands, Denmark, England, Finland, Portugal, and Austria [15]. The European STI Surveillance Network (ESSTI) has done surveys about partner notification practices, epidemiology of sexually transmitted infections and surveillance systems in countries that were EU members before May 2004 [23,41,42]. The World Health Organization Regional Office for Europe (EURO) has surveyed general control policies for sexually transmitted infections, but did not ask about chlamydia control specifically [43].

The European Observatory on Health Systems and Policies carried out a review of screening in Europe, published in 2006 and including many new member and candidate states [12]. In this review, public health officials in each state were asked about national policies for screening for breast, cervix and colon cancer, and for HIV, tuberculosis and chlamydia. The review provides a broad overview but details about chlamydia screening were limited. Since the investigators did not use a set definition of screening or screening programme, respondents made their own interpretations, making it difficult to compare responses between countries. Responses to the European Observatory survey have been reproduced from the report [12], 'Screening in Europe' (Appendix 1). The activities reported from selected countries varied from: no screening policy or programme (e.g. Cyprus, Ireland, Latvia, Lithuania); chlamydia testing for diagnostic purposes only (e.g. Czech Republic); opportunistic testing available to both symptomatic and asymptomatic individuals (e.g. Denmark, Finland, Italy, Romania, Sweden, UK); to compulsory screening during pregnancy (Estonia) or for sex workers (Turkey).

The European Centre for Disease Prevention and Control (ECDC) commissioned a review of chlamydia control activities in the Member States to fill gaps in existing knowledge so that recommendations to enhancing chlamydia prevention and control in the region can be developed.

Objectives

The overall aim of this project was to conduct a review of chlamydia control programmes and activities in the Member States and make recommendations for enhancing chlamydia prevention and control in the region. Specific objectives were:

- to collect systematic information about public health activities related to the control of *C. trachomatis* in EU member and candidate states, neighbouring European countries, and the USA;
- to collate information from the same countries about demographic and economic indicators, health systems, chlamydia prevalence and sexual behaviour surveys;
- to create an electronic database as a repository for the data;
- to collect in-depth information about chlamydia control activities from selected European Member States; and
- to make recommendations to ECDC for public health action and for further research.

2 METHODS

The project was called the Screening for Chlamydia Review in Europe (SCREen) and was conducted between November 2006 and August 2007. This chapter describes the methods of data collection and data synthesis.

We conducted a postal questionnaire survey of all EU Member States and candidate states in which negotiation talks had begun at the time that the project commenced (Table 2), and in-depth country visits to public health officials and healthcare providers in selected Member States. The terms of reference for the project also requested information about activities outside the EU, if they contributed to information that would improve the situation in Europe. To increase coverage and generalisability of data about Europe, we therefore invited EU neighbours that are European Free Trade Association (EFTA) Member States. The Terms of Reference for the project requested information from countries outside the EU where these might include information for improving the situation in Europe. We therefore also invited the USA, where national chlamydia testing recommendations have been in place since 1993 [44]. In addition, we collated background data from secondary sources about health system organisation, demographic and economic indicators, chlamydia prevalence and sexual behaviour.

Table 2: Countries invited to take part in review of chlamydia control activities in Europe

EU status	Number	Countries
Members pre-May 2004	15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Sweden, Spain, United Kingdom;
Members post-May 2004	12	Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia;
Candidate countries*	2	Croatia, Turkey;
EFTA member states	4	Iceland, Liechtenstein, Norway, Switzerland;
Other	1	United States of America.

Source: European Free Trade Association

* The former Yugoslav Republic of Macedonia not included, as membership negotiations have not yet begun

Questionnaire

The questionnaire contained eight sections. Decisions about the questions to include were reached by consensus between the study investigators, who included clinicians, public health specialists, and policy experts familiar with the field. Questions were pre-tested for readability among the investigators but were not validated in any other way. Most questions were structured, with categorical responses. Where more detail was required we allowed free text

responses. We developed standard definitions for key terms related to screening and included these with the questionnaire (see glossary).

The sections were as follows:

- guidelines and recommendations for chlamydia testing and case management;
- laboratory diagnosis of chlamydia infections;
- surveillance and monitoring of chlamydia testing;
- chlamydia screening programmes;
- legal and regulatory framework for the control of sexually transmitted infections other than HIV/AIDS;
- payment for services for people with sexually transmitted infections;
- organisation of sexual health services;
- information about the availability of national surveys about sexual behaviour, chlamydia prevalence and surveillance data.

We attempted to identify more than one key informant in each study country because of the range of topics included in the questionnaire. We used lists of country representatives of the International Union against Sexually Transmitted Infections (IUSTI), ESSTI and WHO EURO. Where we could not identify a representative of a country, we asked for help from the informants who took part in the European Public Health Observatory screening review or sought personal contacts of the study investigators.

In January 2007 the questionnaire was sent by e-mail to IUSTI and ESSTI identified informants by the secretariats of these organisations. We sent the questionnaire to the remaining informants by e-mail or by post. The questionnaire was accompanied by a letter of invitation to take part in the study, which listed all the potential informants for that country and asked these informants to contact one another so that they could address specific areas of expertise and return a single coordinated response for each country. We sent multiple reminders by e-mail or post to non-responders and collected completed questionnaires up to 15 August 2007.

Secondary data

We collated background information using published data sources from the internet and journals about:

Demographic, economic and social indicators
(http://epp.eurostat.ec.europa.eu)

Health service organisation and financing
(http://www.euro.who.int/eprise/main/WHO/Progs/OBS/Hits/20020525_1)

Country visits

We visited four countries to collect more detailed descriptive information about specific screening activities. We chose countries by consensus, based on the following sources of information: reported to practise specific chlamydia control activity of interest; whether new (post-2004) or established (pre-2004) EU member state. Two to four SCREen project team

members visited the selected countries. The countries, reasons for selection and dates of visits are shown in Table 3.

Table 3: Selected countries for in-depth visits

Country	Reason for selection	Visit dates
Sweden	Reported to have opportunistic chlamydia screening programme in place for more than 10 years, with increase in case numbers after a period of falling rates.	March 5–9, 2007
Estonia	New EU member state; reported to have compulsory antenatal chlamydia screening.	April 16–19, 2007
The Netherlands	Reported to be introducing pilot of proactive chlamydia screening programme based on annual postal invitations to provide home-collected and mailed specimens.	May 7–8, 2007
England	Reported to have introduced national opportunistic chlamydia screening programme within last five years.	May 17–18, 2007

Database

Information from completed questionnaires was entered into an Access (Microsoft) database, which was designed for the project. Information was entered, wherever possible, as coded numerical variables. Free text responses were also allowed so that country-specific practices could be described. The database recorded data for each country separately and included a reporting feature that allowed tables of any combination of variables to be created. We encouraged key informants to send electronic copies of, or hypertext links to, their own country's guidelines, legislation, surveillance data, sexual behaviour and chlamydia prevalence studies etc. so that the database could become a stand alone resource.

Data analysis, synthesis, and presentation

We described key data from each section of the questionnaire according to country, stratifying according to EU member status, health system type, or per capita gross domestic product where appropriate. We synthesised the questionnaire data further during a three-day meeting of the SCREen project team when key findings from the survey were summarised and discussed.

We reached consensus about five categories of chlamydia control activities. These were based on the principles of infection control as applied to sexually transmitted infections and the criteria reflected increasingly intensive activities that should contribute to the effective management and control of chlamydia infections. Assignment of a country to a category could be determined from information provided in the questionnaire. The categories were mutually exclusive; where the activities of a country spanned different categories, we assigned the lowest because we assumed that more intensive activities could not be accomplished effectively without having more basic activities in place.

Four project team members reviewed the questionnaire data. Two people examined countries ordered alphabetically from Austria to Latvia and the other two examined the remainder. Each person independently assigned each country to a category. Discrepancies were resolved by the decision of a third person, who had not taken part in the initial process. The categories were based on information provided in the questionnaires as of 15 August 2007 and are described in full in the Results. Representatives from all participating countries had an opportunity to review and comment on the draft report from 20 November 2007 to 14 January 2008.

The results are summarised to provide an overview of chlamydia control activities in Europe. Individual countries are identified where this information is necessary for interpretation and context. In other cases, countries have been aggregated into groups. Tables and graphs include only countries in Europe for reasons of geographical coherence. Where comparisons have been made with the USA, these are described in the text.

3 GENERAL RESULTS

This chapter describes the response to the survey and summarises data about the economic background, types of health system, and national control policies for sexually transmitted infections. An Access database contains the results of: all returned questionnaires; chlamydia control activities category; secondary data about economic, demographic, health and healthcare system related data; hypertext links to documents from participating countries about guidelines, laws, policies, strategies related to chlamydia; details of sexual behaviour surveys and chlamydia surveys conducted in each country; and surveillance data for 2005 or 2006. The database has a reporting function that allows comparisons of data across countries.

Response rate

Of 34 selected countries (Table 2), we received responses from 29 European countries and the USA (overall response rate 88%). All 15 EU Member States from before May 2004 and all four EFTA member states responded to the survey. Of 12 EU Member States after May 2004, we did not establish contact with any informant in Cyprus or Slovakia and we did not receive a questionnaire from Poland. Among EU candidate countries we received a completed questionnaire from Turkey but not from Croatia.

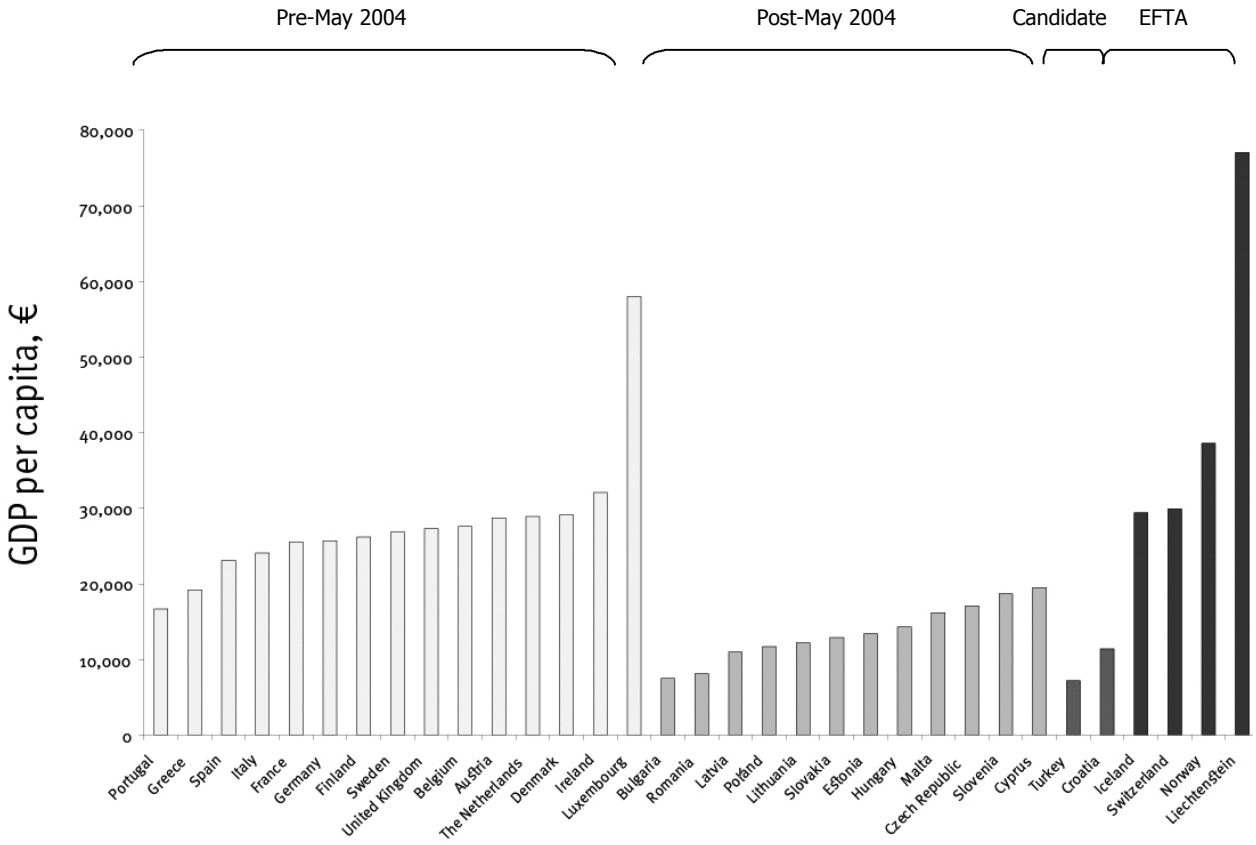
Overview of countries

Economies and health systems

The countries selected for the study included diverse economies, populations and health systems. The longest established EU and EFTA member states have the highest levels of wealth, summarised as per capita gross domestic product. The gross domestic product of EU Member States before May 2004 is about twice that of the newer Member States and three times that of the candidate countries (Figure 2).

The level of economic development and political system affect the organisation, funding and coverage of healthcare services. Health system factors affect the ability of the population to access and pay for their healthcare, including for sexual health services. These factors might also affect the degree to which countries can invest in chlamydia control activities.

Figure 2: Gross domestic product, in € per capita (2005), for EU member and candidate states and selected non-EU countries



Source: European Free Trade Association; European Union.
Group 1 (light grey), per-capita GDP mean (SD) €27,940 (9,182); group 2 (medium grey), €13,550 (3,281); group 3 (dark grey), €9,300 (2,970); group 4 (black), €43,733 (22,597).

Table 4: Healthcare systems in EU member and candidate states and EFTA countries

Healthcare system	EU pre-May 2004	EU post-May 2004	EU Candidate	EFTA member
Bismarck (mandatory health and social insurance)				
Decentralised	Austria, Belgium, France, Germany, Greece*, Ireland[+], Italy, Netherlands	Estonia,	..	..
Centralised	Luxembourg	Czech Republic, Malta, Slovenia	..	..

Healthcare system	EU pre-May 2004	EU post-May 2004	EU Candidate	EFTA member
Beveridge (Social insurance system funded primarily from taxation)				
Decentralised	Denmark, Finland, Portugal, Spain, Sweden, UK	Lithuania	..	Norway
Centralised	..	Hungary	Croatia	Iceland
Semashko/Beveridge (Universal coverage through mix of insurance through taxation and state funding)				
Decentralised	..	Latvia, Poland, Romania, Slovakia	..	..
Centralised	..	Bulgaria, Cyprus,	Turkey	..
Private (Private insurance paid by individual)				
Decentralised	..	..	..	Liechtenstein, Switzerland

* Mixed system, Bismarck/Private; † Mixed system, Bismarck/Segmented (public/private mix).

Organisation of and payment for sexual health care services

In some countries arrangements for payment for sexual health services differs from the system for other conditions. This makes all management free for patients using specialist dermatovenereology, genitourinary medicine or sexually transmitted disease clinics in some countries where tests or antibiotics might otherwise be payable by the patient in whole or in part (e.g. Finland, France, some parts of Germany, Iceland, Ireland, inpatient treatment in Latvia, Spain, Norway, the Netherlands, UK). In Estonia, patients with health insurance (94% of the population) pay a minimum contribution towards the cost of the consultation. Testing for sexually transmitted infections is free but the patient pays for 50% of the treatment costs. Chlamydia is specifically exempt from patient charges in Belgium (if under 20 years old or symptomatic), Iceland, Malta (in Maltese residents being treated with doxycycline), Norway, Sweden, and the UK (if tested as part of the National Chlamydia Screening Programme in England or in a specialist sexual health clinic). In other countries, treatment is only reimbursed if total healthcare costs have exceeded a certain pre-determined level, the 'franchise', e.g. Switzerland. In these countries, testing and treatment for some people with sexually transmitted infections might not be covered.

4 CHLAMYDIA CASE MANAGEMENT

This chapter presents data about the range of chlamydia case management guidelines used in the countries participating in project SCREen. We also describe how partner notification services are provided in participating countries. We asked whether a clinical practice guideline for the management of diagnosed chlamydia cases, recommended by a recognised national professional body, was in use in each country. If so, we asked which group(s) of professionals were the audience for the guideline, whether or not the guideline included recommendations about the diagnosis, antibiotic treatment, partner notification, clinical follow-up, and reporting of cases. We also asked about any recommendations for repeat or follow-up testing of people with a diagnosed chlamydia infection. Additional information about partner notification and the clinical settings in which chlamydia testing was conducted was collected.

Clinical practice guidelines

Among the 29 European countries that participated in project SCREen, 17 had at least one national clinical practice guideline published by a nationally recognised professional organisation by 15 August 2007. There were 31 different guidelines in total, 30 of which were produced by professional or public health organisations. In addition, the USA has a published guideline. There were 12 European countries in which no national guideline for the management of diagnosed chlamydia cases was in use by the end of the data collection period (Table 5). Guidelines are in the process of development and publication in Bulgaria (due January 2008), Greece (publication date unknown) and Finland (development due to begin spring 2008). In Finland, chlamydia testing is included in guidelines about women presenting for termination of pregnancy, since 2001, and women taking post-coital contraception since 2006.

The extent to which guidelines cover the different groups of practitioners who may treat chlamydia is shown in Table 5. Of countries that had at least one recommended guideline, the newer EU Member States and EFTA countries tended to have a guideline that was intended to cover all healthcare practitioners. The USA has a guideline produced by the Centers for Disease Control and Prevention that also applies to all healthcare practitioners and settings. Of guidelines intended for specialist groups of practitioners, most were developed by and intended only for specialists in dermatovenereology/genitourinary medicine.

Of guidelines from both Europe and the USA which were intended to be used by all healthcare practitioners (n=11), antibiotic treatment was covered by 10, diagnostic tests by eight, and partner management and follow-up by nine. Reporting of diagnosed cases for surveillance was covered in six guidelines.

Table 5: Coverage of chlamydia case management guidelines in Europe

Guideline audience	EU Member State before May 2004 (n=15)	EU Member State after May 2004*, or candidate*† (n=10)	EFTA member (n=4)
All practitioners, same guideline for all (n=6)	..	Estonia, Hungary, Lithuania, Romania	Iceland, Norway
All practitioners + separate guideline for specific practitioner groups‡ (n=4)	Belgium, Sweden, The Netherlands	Czech Republic	..
Dermatovenereology/genitourinary only (n=3)	Austria, France, Italy	..	..
Primary care only (n=1)	Denmark	..	..
Antenatal/urology only (n=1)	Germany	..	..
Dermatovenereology/genitourinary + other§ (n=2)	UK	Latvia	..
No guideline¶ (n=12)	Finland, Greece, Ireland, Luxembourg, Portugal, Spain	Bulgaria, Malta, Slovenia, Turkey	Liechtenstein, Switzerland

Source: European Free Trade Association; European Union.

* No information about Croatia, Cyprus, Poland, Slovakia.

† Includes Turkey.

‡ Includes any combination of dermatovenereology/genitourinary medicine, primary care, gynaecology, youth clinics, municipal health services.

§ Includes gynaecology (Latvia), tests done for chlamydia screening programme (UK(England only)).

¶ No guideline implemented by 15 August 2007. Bulgaria (all practitioners, due January 2008), Finland (development due to begin spring 2008), Greece (all practitioners, no set publication date).

In countries that had a guideline for all practitioners, there were often additional separate guidelines developed by and for different specialist groups of practitioners. The content of these was sometimes inconsistent. In the Netherlands, for example, a guideline for all practitioners is published by the Institute for Healthcare Quality. There are also four separate case management guidelines for primary care, dermatovenereology/genitourinary medicine, gynaecology, and municipal health services, developed by professional organisations. Each guideline covers all aspects of case management (except reporting) but the age groups of

people eligible for testing differ, and recommendations about repeat testing differ between guidelines.

Among 30 European guidelines that had been written and published by a nationally recognised professional body, the use of six was recommended by the national ministry of health, 18 were recommended by specific professional organisations, and the use of six was left up to the practitioner (Table 6). The USA guideline is recommended by the government. The level of recommendation in Table 6 is hierarchical. Where respondents noted that use of the guideline was recommended by more than one group, e.g. by a professional body, and was left up to the individual practitioner, we have included the highest level only. There were no marked differences in the distribution of level of recommendations according to EU membership status, GDP, population size or health system type.

Table 6: Recommendations for the use of chlamydia case management guidelines in Europe, according to guideline audience

Guideline type and level of recommendation (n=31)	EU Member State before May 2004	EU Member State* after May 2004 or candidate*	EFTA member
All practitioners (n=10)			
Ministry of health	Belgium, The Netherlands	Romania	..
Professional body	Sweden	Hungary	..
Up to the practitioner	..	Czech Republic, Estonia, Lithuania	Iceland, Norway
Dermatovenereology (n=8)			
Ministry of health	..	..	..
Professional body	Austria, France, Italy, Sweden, The Netherlands, UK	Czech Republic, Latvia	..
Up to the practitioner	..	..	..
Primary care (n=3)			
Ministry of health	Denmark	..	..
Professional body	Belgium, The Netherlands	..	..
Up to the practitioner	..	..	..
Gynaecology/antenatal (n=5)			
Ministry of health	..	..	..

Guideline type and level of recommendation (n=31)	EU Member State before May 2004	EU Member State* after May 2004 or candidate*	EFTA member
Professional body	Belgium, Germany, Sweden, The Netherlands	Latvia	..
Up to the practitioner	..	..	..
Other (n=4)			
Ministry of health	The Netherlands[†], UK[‡]	..	..
Professional body	Germany[§]	..	..
Up to the practitioner	Sweden[¶]	..	..

Source: European Free Trade Association; European Union.

Note: Member States can have multiple guidelines, but only the highest level of recommendation is included.

* No information about Croatia, Cyprus, Poland, Slovakia.

† Guideline for municipal health services, where services for managing sexually transmitted infections are available.

‡ Applies to England only; guidance about chlamydia testing with the National Chlamydia Screening Programme for practitioners in non-genitourinary medicine clinic settings.

§ Guideline for urologists.

¶ Guideline for practitioners in youth health clinics.

Of the ten countries with a guideline applicable to all practitioners, a government or professional body recommended its use in Belgium, the Netherlands and Sweden, EU countries that were Member States before May 2004. In newer EU Member States and EFTA member states, the use of guideline was more likely to be left up to practitioners themselves. Guidelines for particular groups of healthcare practitioners were usually developed and recommended by specific professional bodies.

Recommendations and reasons for repeat testing for chlamydia following treatment differed between countries and according to the group of professionals addressed by the guideline (Table 7). The IUSTI European guideline for the management of chlamydial infection suggests that microbiological follow-up is not necessary if the infection has been treated with doxycycline or azithromycin [45]. Six countries (Denmark, Estonia, Iceland, Italy, Romania, and Sweden) did not recommend repeat testing in any guideline, and two countries with multiple guidelines did not recommend repeat testing in at least one guideline (German guidelines for urologists and Dutch guidelines for all practitioners and for gynaecologists).

Table 7: Recommendations for repeat chlamydia testing in Europe

Guideline audience*	Not recommended	Reason for repeat test		
		Test of cure (Interval)	Re-infection (Interval)	Confirm +ve
All practitioners (n=9)	Estonia, Iceland, Romania, Sweden, The Netherlands	Hungary (4 wk) Lithuania (4 wk) Norway (>5–6 wk)	Norway (>5–6 wk)	Czech Republic
Dermato-venereology/ genitourinary (n=7)	Italy	Austria (not known) Czech Rep (vary by test) Latvia (4–8 wk) UK (if pregnant)	France (12–26 wk) The Netherlands (12 wk)	..
Gynaecology/ antenatal (n=3)	The Netherlands	Latvia (4–8 wk)	Germany (20 wk preg)	..
Primary care (n=3)	Denmark	..	The Netherlands (if symptoms)	Belgium
Other (n=3)	Germany	..	The Netherlands (12 wk) UK (>5 wk, x1/year)†	UK†

Source: European Free Trade Association; European Union.

Note: Member States can have multiple guidelines and multiple reasons for repeat testing. Information for some guidelines not available. Preg = pregnancy; wk = weeks.

* No information about Croatia, Cyprus, Poland, Slovakia.

† Applies to England only; guidance about chlamydia testing with the National Chlamydia Screening Programme for practitioners in non-genitourinary medicine clinic settings.

Repeat testing was recommended in eight guidelines as a test of cure. The IUSTI European guideline states that if a test of cure is being performed, the timing depends on the diagnostic test (two weeks after completion of therapy for non-nucleic acid amplification tests, three to four weeks after treatment for nucleic acid amplification tests). The time intervals for tests of cure varied between countries but were generally consistent with the IUSTI guideline and the diagnostic tests used. Seven guidelines recommended testing for re-infection after variable time intervals or indications. In the IUSTI European guideline, tests for re-infection are recommended several months after treatment. In the USA, repeat testing for re-infection is recommended 3–12 months after an initial positive test. In two countries with specific guidelines for chlamydia testing in pregnant women, repeat testing for re-infection at 20 weeks of pregnancy was recommended in Germany, and a test of cure at 4–8 weeks was

recommended in Latvia. Three guidelines (Belgium, Czech Republic and UK) recommend confirmatory testing for *C. trachomatis* of reactive specimens in the laboratory (Table 7).

In all guidelines the responsibility for repeat testing was either with the patient alone or with the doctor, who should undertake the test if the patient attended again. No guideline recommended that individuals for whom repeat testing was indicated should be sent a reminder. In the UK, repeat testing was also recommended for people who had an initial negative test if they change sexual partners, as part of the National Chlamydia Screening Programme in England. No guideline recommended repeated chlamydia testing at regular intervals.

Audit of adherence to guidelines, a professional activity intended to improve the quality of clinical care (see glossary), was only practised in genitourinary medicine clinics in the UK, and was only compulsory within the National Chlamydia Screening Programme in England.

Availability of chlamydia testing

Chlamydia testing was available in a wide variety of clinical and non-clinical settings, including all 26 participating European countries that have specialist clinics for the treatment of people with suspected sexually transmitted infections (Table 8). In all 29 participating European countries, chlamydia testing was available in gynaecology clinics, and in 17 countries it was the most likely setting for chlamydia testing. Chlamydia testing was also available in most countries in urology, primary care and family planning clinics. In five countries, chlamydia testing kits could be bought over the counter in pharmacies or other over-the-counter outlets.

Practitioners in settings where chlamydia testing could be carried out were not always covered by guidelines for chlamydia clinical case management. For example, there were 16 countries where chlamydia testing was available in gynaecology clinics, but in which there was no clinical guideline available for gynaecologists (i.e. no guideline applicable to all practitioners or no specific guideline for gynaecologists). In nine of the countries with no guidelines for gynaecologists, this is the most common setting for chlamydia testing to take place. For each non-specialist setting where chlamydia testing was available, about half to two-thirds of participating countries did not have a guideline applicable to practitioners in that setting (Table 8). Half (12/26) of participating European countries with specialist dermatovenereology/genitourinary medicine/sexually transmitted disease clinics did not have a guideline for practitioners in these clinics.

Table 8: Provision of chlamydia testing and clinical guidelines in settings other than specialist dermatovenereology, genitourinary medicine or sexually transmitted diseases clinics in Europe

Setting	Chlamydia testing available	Most common setting*	Practitioners not covered by guideline† n (%)
Gynaecology	29	17	16 (55)
Dermatovenereology	26	2	12 (46)
Urology	25	3	17 (68)
Primary care	23	11	13 (58)
Family planning	22	2	13 (59)
Internal medicine	11	0	7 (64)
A and E	10	0	6 (60)
Pharmacy	5	0	Not known‡

A and E = Accident and emergency department.

* Countries could rank more than one setting as the most likely place for testing, so total is more than the number of countries.

† Denominator is number of countries in which testing is available at each setting.

‡ Questionnaire did not ask whether guidelines covered non-clinical settings.

Partner notification

Partner notification (contact tracing) services to identify and treat the sexual partners of diagnosed chlamydia cases are agreed to be an essential part of chlamydia case management. We asked participants about the clinical settings in which partner notification services were available (Table 9). We assumed (but did not ask specifically in the questionnaire) that in countries that had dedicated specialist clinics (26/29 participating European countries) partner notification was usually done in the clinic, either by the practitioner or by specialist health advisers or contact tracers based in the clinic. We did not ask whether the method for eliciting and contacting sexual partners was done mostly by patient referral, provider referral or contract referral. A previous survey by ESSTI found that, in specialist clinics, patient referral was used in 14 of 15 EU Member States studied [41].

In most non-specialist settings where chlamydia testing was offered, partner notification was reported to be initiated in the clinic. In a minority of countries, respondents explicitly noted that no partner notification took place. This was most likely in family planning clinics.

Table 9: Partner notification services for people diagnosed with chlamydia in Europe

Setting of diagnosis	Number of countries	Partner notification initiated...			
		In clinic	By referral†	Not done	No response
Gynaecology	29	14‡	7‡	4	5
Specialist clinics	26	26	0	0	0
Urology	25	15‡	4‡	4	3
Primary care	23	14§	7§	1	3
Family planning	22	11‡	3‡	5	4
Internal medicine	11	7	2	1	1
A and E	10	3	4	1	2
Pharmacy	5	1‡	2‡	1	2

A and E = Accident and emergency department.

† Referral to contact tracers at specialist clinic or municipal health services.

‡ In one country, partner notification at the clinic/pharmacy and referral to specialist clinic mentioned.

§ In two countries, partner notification at the general practice and referral to specialist clinic mentioned.

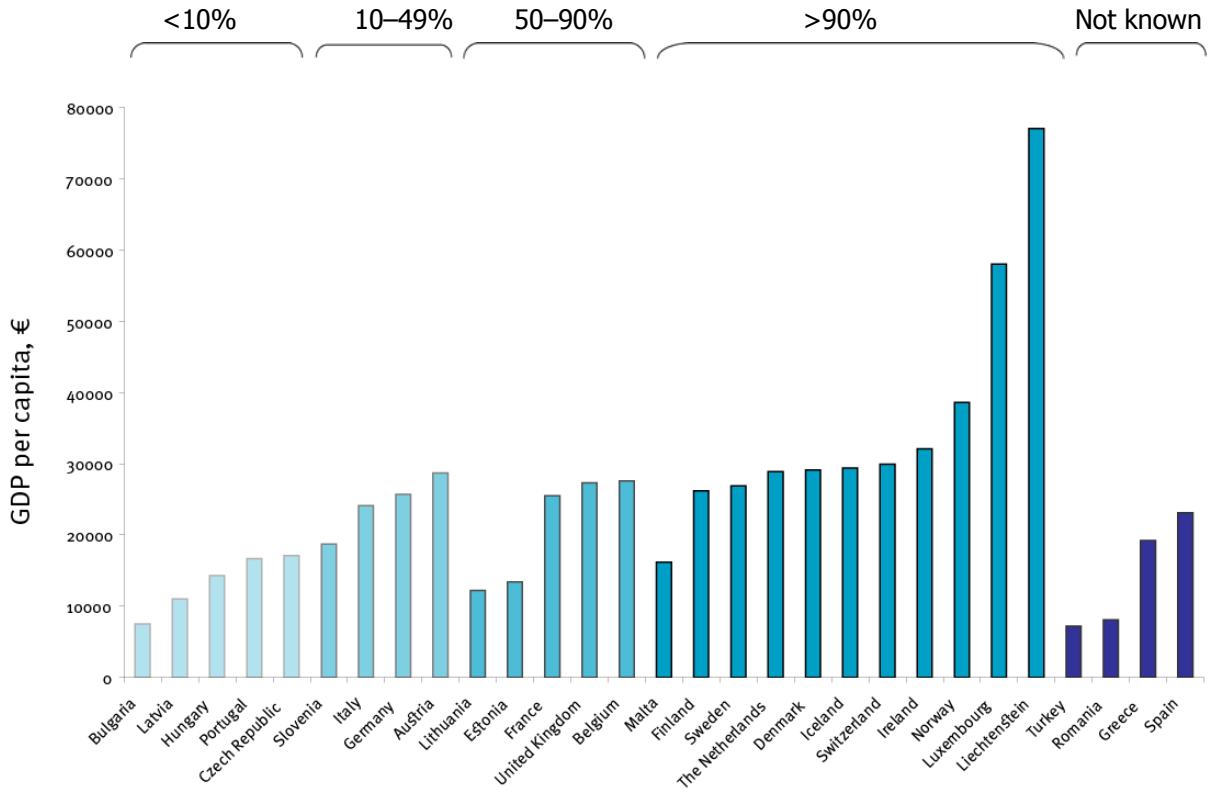
5 LABORATORY DIAGNOSIS AND SURVEILLANCE FOR *CHLAMYDIA TRACHOMATIS*

This chapter summarises data collected about the laboratory methods used to diagnose *Chlamydia trachomatis* infections and the systems in place for monitoring trends in diagnosed infections. We asked about the availability and coverage of nucleic acid amplification tests, the number of laboratories testing for chlamydia, the availability of home testing and participation in quality assurance schemes.

Laboratory diagnosis

Nucleic acid amplification tests were available to some extent in all but one country (Bulgaria) but were not always widely available for routine testing. In nine countries, fewer than 50% of chlamydia tests were by nucleic acid amplification test (Figure 3).

Figure 3: Proportion of chlamydia specimens tested using a nucleic acid amplification test, by GDP per capita in € (2005) and by country



Note: <10%, mean €13,320 (SD €4,060); 10–49%, mean €24,300 (SD 4,192); 50–90%, mean €21,200 (SD 7,722); >90% mean €35,666 (SD 17,140); Turkey, Romania, Greece, Spain: % not known.

Data shown for the United Kingdom represent average for England, Wales and Northern Ireland. Scotland has 100% NAAT;

Difference between mean GDP in countries with <10% compared with >90% chlamydia tests by NAAT, p=0.0134.

There was statistical evidence of an association between increasing per capita gross domestic product and an increasing proportion of chlamydia specimens tested using nucleic acid amplification tests (p=0.0134). In addition, countries with a higher GDP were more likely than those with lower GDP to have introduced the technology in the 1990s and to have achieved coverage of more than 75% of tests performed using nucleic acid amplification tests before 2000.

Most countries (19/29) either had a national quality assurance system or had at least one laboratory that took part in an international scheme in 2006. Countries in which laboratories took part in diagnostic quality assurance schemes were more likely to also have clinical guidelines for at least one group of health professionals (15/19) than those that did not (4/10, p=0.036). Of ten countries that did not take part in any laboratory quality assurance for chlamydia diagnostics, four were EU Member States before May 2004, and only one of these countries had guidelines for chlamydia case management (Table 10). Only one country in six (16%) with no quality assurance had access to a tissue culture service for chlamydia compared with half of those taking part in quality assurance.

Table 10: Characteristics of countries according to participation in quality assurance for chlamydia diagnostics in Europe

	EU Member State before May 2004 (n=15)	EU Member State* after May 2004 or candidate* (n=10)	EFTA member (n=4)
National or international quality assurance	11	6	2
Guidelines for case management	*9*	*5*	*1*
Nucleic acid amplification tests >90%	*4*	*1*	*2*
Lab providing tissue culture	*7*	*3*	*0*
No national or international quality assurance	4	4	2
Guidelines for case management	*1*	*2*	*1*
Nucleic acid amplification tests >90%	*1*	*0*	*1*
Lab providing tissue culture	*0*	*1*	*0*

Source: European Free Trade Association; European Union.

* No information about Croatia, Cyprus, Poland, Slovakia.

Surveillance for chlamydia

Most countries have a system for surveillance of chlamydia infections (Table 11). The most common system was a statutory requirement for all laboratory-diagnosed chlamydia cases to be reported. This was the predominant system in EU Member States that had joined after May 2004 and in EFTA countries. In EU Member States from before May 2004 there was more heterogeneity; there were several countries with sentinel surveillance systems, or with reporting only from dermatovenereology/genitourinary medicine/sexually transmitted disease clinics. In EU Member States, about a third of the countries did not publish surveillance data about chlamydia, irrespective of whether they became members before or after May 2004 (Figure 4). In the USA, numbers of positive chlamydia cases are compulsorily reported from laboratories for routine surveillance. A chlamydia prevalence monitoring project collects and reports data about numbers of positive cases and numbers of tests taken in participating publicly-funded family planning clinics, prenatal clinics, STD clinics, correction facilities, and other clinics funded as part of the Infertility Prevention Project (see Chapter 6).

Table 11: Organisation of main national surveillance system for chlamydia infections in Europe

	EU member before May 2004 (n=15)	EU member* after May 2004 or candidate* (n=10)	EFTA member (n=4)
Compulsory reporting of all lab diagnosed chlamydia from any setting	Denmark, Finland, Ireland, Luxembourg, Sweden	Estonia, Hungary, Latvia, Lithuania, Malta, Slovenia, Turkey	Iceland, Liechtenstein, Norway, Switzerland§
Optional reporting of all lab diagnosed chlamydia	UK‡	Bulgaria, Czech Republic	..
Compulsory reporting of chlamydia diagnosed in selected settings†	Belgium, France, Germany, Greece, Italy, The Netherlands, UK‡	..	Switzerland§
No reporting system‡	Austria, Portugal, Spain	Romania	..
Number of tests reported	Denmark, France Germany, Sweden, The Netherlands	Lithuania	Iceland, Norway

Source: European Free Trade Association; European Union.

* No information about Croatia, Cyprus, Poland and Slovakia.

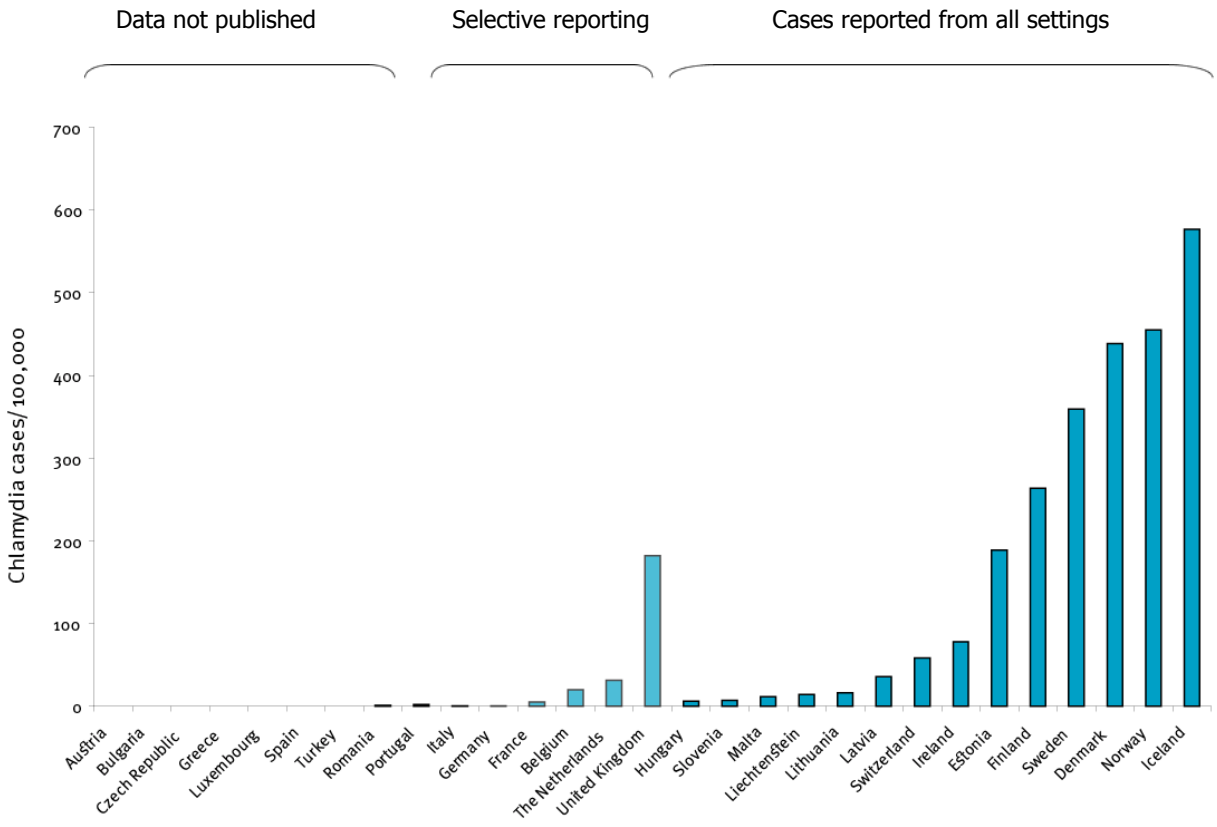
† Includes countries from which main routine surveillance comes from dermatovenereology/genitourinary medicine/sexually transmitted disease clinics only and countries with sentinel surveillance systems.

‡ UK has multiple sources of surveillance data. Main routine surveillance is from genitourinary clinics. Laboratory reporting of positive cases is voluntary. Data about positive chlamydia tests and the number of tests taken are available in England only from National Chlamydia Screening Programme.

§ Switzerland has multiple sources of surveillance data. Main routine surveillance consists of compulsory reports from laboratories. Sentinel surveillance data from dermatovenereology cljnics and private gynaecologists are also available.

Participating countries were asked to provide the number of chlamydia cases in the most recent year for which surveillance data were available. Figure 4 shows the rate of chlamydia diagnoses by country, according to whether the country publishes surveillance data or not, and whether data are reported from selected laboratories or clinics, or from systems in which all diagnosed cases should be reported. The numerator is the total number of chlamydia cases from the most recent year available (2005 or 2006). The denominator is the total country population (2006).

Figure 4: Rate of diagnosed chlamydia cases per 100,000 population in Europe, 2005 or 2006



Note: Figure includes data from all countries that provided data about reported chlamydia cases in 2005 or 2006. Countries with no apparent cases either did not provide data, or did not have data available.

There is a very wide range in the recorded diagnosed incidence of chlamydia between countries. This is linked to the coverage of case reporting. Countries with reporting from

selected settings tend to have lower chlamydia diagnosis rates than those where cases are reported from all settings. The UK has a high chlamydia diagnosis rate, even though the surveillance data include only cases diagnosed in genitourinary medicine clinics, because of the large number of clinics across the country. There is also great variability in diagnosed chlamydia case rates in the large group of countries where reporting of diagnosed cases is compulsory. This is unlikely to reflect differences in chlamydia prevalence in the different populations. The data include only cases that have been diagnosed and reported. Because most chlamydia infections are asymptomatic, the figures represent the availability and intensity of chlamydia testing, and the completeness of reporting.

Examining the proportion of chlamydia specimens that tested positive provides more information about the rate of chlamydia in the tested population. Few countries, however, report the denominator data on the number of performed chlamydia tests. This is the case for surveillance systems for many infectious diseases, which usually only record the number of diagnosed cases. Only nine participating countries reported that information on the number of chlamydia tests taken is available for the main source of routine surveillance data (Table 11), and seven of these provided data. Table 12 shows how the chlamydia positivity rate and the rate of chlamydia testing, expressed as the number of chlamydia tests per 100,000 total population, vary in these countries.

Table 12: Data from routine surveillance, in European countries that collect denominator data on chlamydia testing, 2005 or 2006

Country	Population	Chlamydia cases, n	Chlamydia tests, n	Chlamydia positivity, %	Test rate /100,000	Testing and reporting practice
France	61,538,322	3,058	83,268	3.7	135	Specimens tested by sentinel laboratories only (3% of all in country).
Lithuania	3,403,284	556	6,690	8.3	197	Tests done in all settings. Testing available in multiple settings.
Norway	4,640,219	21,113	275,203	7.7	5,931	Tests done in all settings. Testing available in multiple settings.
Portugal	10,569,592	220	2,766	8.0	26	Tests done in all settings. Testing available in multiple settings.
Slovenia	2,003,358	141	4,473	3.2	223	Tests done in all settings. Testing available in multiple settings.
Sweden	9,047,752	32,516	441,573	7.4	4,880	Tests done in all settings. Testing available in multiple settings.
The Netherlands	16,334,210	5,146	49,755	10.4	305	Tests done in sexually transmitted disease clinics only (all 36 in country).

These data need to be interpreted in conjunction with information on the source population and the completeness of reporting. Even then, comparisons between countries are of limited

value. For example, the testing rate in France appears low because the tests reported from the sentinel laboratories included in the Renachla system represent about 3% of all laboratories testing for chlamydia in France. If the laboratories are a random sample, the testing rate across the country could be similar to that in Norway and Sweden, where the surveillance systems includes all chlamydia cases diagnosed in any clinical setting. Differences in the chlamydia positivity rates cannot be interpreted without knowing more about the profile of people being tested. We did not collect information about whether or not data from behavioural surveillance are available.

In the UK and the USA, chlamydia positivity data from specific screening activities are monitored separately from routine case surveillance systems. In both countries, opportunistic tests are offered to a defined target population attending selected settings (see Chapter 6 for details). In the UK, the English National Chlamydia Screening Programme reported 96,890 screening tests taken in sexually active under 25-year-olds (79,494 in women, 17 396 in men) in the year 2005/06. The chlamydia positivity rate was 10.1% (10.2% in women, 10.1% in men) [2]. In 2006, the US median chlamydia test positivity rate in 15- to 24-year-old women screened at selected family planning clinics was 6.7% (range between states 2.8% to 16.9%). The numbers of tests and cases were not reported [46].

6 CHLAMYDIA CONTROL ACTIVITIES IN EUROPE AND THE USA

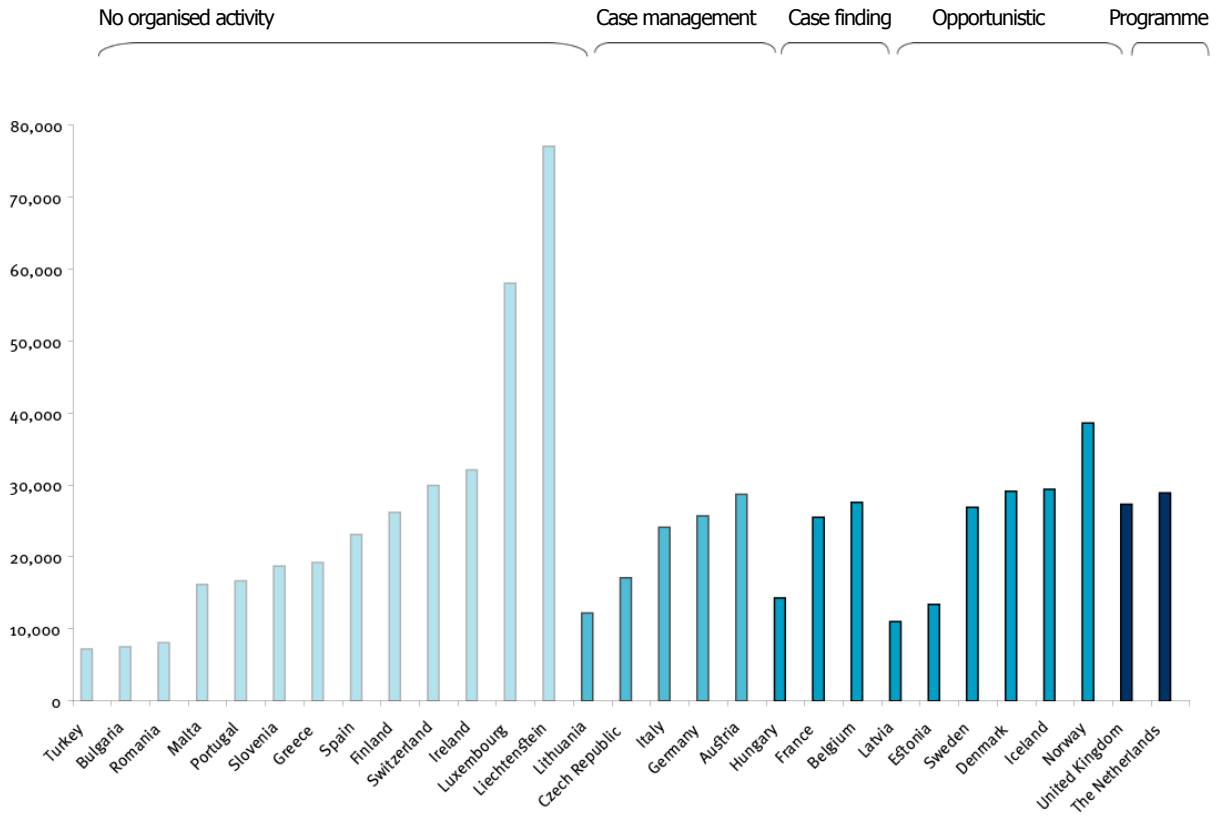
In this chapter we show how information about the guidelines, chlamydia testing and partner notification services provided in countries taking part in project SCREen was synthesised to categorise chlamydia control activities. We also report the details of existing and planned chlamydia screening programmes in the Member States.

The five categories of chlamydia control activities and their definitions are shown in Table 13. There was no consistent association between the per-capita GDP of a country and the intensity of chlamydia control activities. The group with no organised activity included countries in Europe with the highest (Liechtenstein and Luxembourg) and lowest (Turkey and Bulgaria) per-capita GDP. The mean GDP in this group was similar to that of countries reported to have opportunistic or organised screening available (Figure 5).

Table 13: Classification of chlamydia control activities

Category	Criteria	Comments
No organised activity	No guidelines for effective diagnosis and management of diagnosed chlamydia cases.	Countries were put in this group when there were no case management guidelines, even if more intensive activities were reported.
Case management	Guidelines for at least one group of healthcare professionals, endorsed by an appropriate professional organisation. Guidelines cover minimum of diagnostic tests and antibiotic treatment.	Category includes countries that state that guidelines cover partner management, but which are not adhered to in practice.
Case finding	Case management guidelines, plus: guidelines cover partner notification; guidelines include offer of chlamydia testing for sexual contacts of people with chlamydia or another sexually transmitted infection.	Countries were put in this group if testing for partners is recommended, even if — in practice — partner notification was said not to be done in some settings.
Opportunistic testing	Case finding, plus: guidelines state that at least one specified group of asymptomatic people is offered chlamydia tests; guidelines include a list of asymptomatic people to whom chlamydia testing should be offered.	Groups of asymptomatic people offered chlamydia tests vary by country.
Screening programme	Opportunistic testing, plus: organised chlamydia screening available to a substantial part of the population within the public health system.	Planned programmes with clear objectives and a concrete start date can be included in this category.

Figure 5: Category of chlamydia control activity by country and per-capita GDP in €, for countries participating in project SCREen



Note: No organised activity, per-capita GDP mean (SD) €26,728 (21,180); case management, €21,786 (5,814); case finding, €20,950 (9,405); opportunistic testing, €24,733 (10,534); screening programme, €28,100 (1,131).

No organised chlamydia control activity

The largest category (n=13) was of countries with no current organised chlamydia control activities (Table 14, Figure 5). This included 12 countries with no nationally recommended case management guidelines published by the end of project SCREen. Guidelines are being developed in Bulgaria, Finland and Greece. Romania was also categorised in this group, for despite the fact that case management guidelines for all practitioners are available, implementation is restricted to carrying out routine chlamydia diagnostics due to limited laboratory capacity (M van der Laar, personal communication). This group included six countries that stated that there were plans to introduce chlamydia screening programmes (Table 16), even though there were no guidelines for practitioners regarding the appropriate management of index cases with diagnosed chlamydia or their sexual partner(s).

Table 14: Level of chlamydia control activities for European countries participating in project SCREen

Country	Comments
No organised chlamydia control activity	
Bulgaria	Case management guideline, planned publication January 2008. Screening programme planned.
Finland	Case management guideline planned for development 2008. Opportunistic programme planned.
Greece	Case management guideline under development. Publication date not known. Screening programme planned.
Ireland	No case management guideline.
Liechtenstein	No case management guideline.
Luxembourg	No case management guideline. Opportunistic screening programme planned.
Malta	No case management guideline.
Portugal	No case management guideline.
Romania	Case management guideline for all practitioners, but very limited facilities for testing in practice.
Slovenia	No case management guideline. Screening programme planned.
Spain	No case management guideline.
Switzerland	No case management guideline.
Turkey	No case management guideline. Screening programme planned.
Case management for diagnosed chlamydia cases	
Austria	Case management guideline for dermatovenereology clinics. Chlamydia testing available in other settings but partner notification done in primary care only.
Czech Republic	Case management guideline for all practitioners deals with diagnosis but not treatment or partner notification. Partner notification reported to be by referral to specialist clinic.
Germany	Case management guideline for gynaecology (pregnant women) and urology. Chlamydia testing not done in primary care. Partner notification reported to be done by practitioner in gynaecology (where most tests are done), urology, internal medicine, but not in family planning clinics.
Italy	Case management guideline for dermatovenereology clinics. Chlamydia testing for symptomatic people only. Chlamydia testing and partner notification available in other settings.
Lithuania	Case management guideline for all practitioners includes partner management, but no list of who should be offered chlamydia testing and, in practice, said not to take place.
Case finding for partners of diagnosed chlamydia cases	
Belgium	Partner management included in guideline for primary care (where most tests are done) and gynaecology. Primary care guideline includes testing only for female partners of symptomatic men.
France	Case management guideline for dermatovenereology clinics. Testing recommended for partners of cases with sexually transmitted infection. Chlamydia testing available in many other settings and partner notification reported be done by patient referral initiated by practitioner. Screening programme planned.
Hungary	Case management guideline for all practitioners, including chlamydia testing for all sexual partners of symptomatic STI patients. In practice, partner notification might not take place.
Opportunistic testing for selected asymptomatic individuals	
Denmark	Guideline includes opportunistic chlamydia testing in primary care (where most tests are done) for asymptomatic people with frequent sex partner change, women under 26 before intrauterine device insertion or hysterosalpingogram. Also annual postal invitation for screening in two communities.
Estonia	Guideline for all practitioners includes opportunistic testing for pregnant women and asymptomatic people with frequent sex partner change, clients of CSW, following sexual assault.
Iceland	Guideline for all practitioners includes opportunistic testing for women presenting for termination of pregnancy, egg and sperm donors.
Latvia	Opportunistic testing recommended for pregnant women. Partner management included in guideline for dermatovenereology and gynaecology, including chlamydia testing for partners of STI patients. Partner notification done by practitioner or by referral to specialist clinic.
Norway	Guideline for all practitioners includes opportunistic testing for women presenting for termination of pregnancy or antenatal care, under 25s with recent partner change, and partners of people with STI. Plans for proactive chlamydia screening by postal invitation following randomised controlled trial in one region.
Sweden	Multiple guidelines for different practitioners. Include opportunistic testing for asymptomatic people with target groups differing between counties.
Organised chlamydia screening programme	
The Netherlands	Pilot chlamydia screening programme began March 2007. Annual postal invitation for chlamydia screening to all 16–29 year olds in three regions, due to begin March 2008.
UK (England)	Opportunistic chlamydia screening offered to all sexually active under 25 year olds attending various clinical and non-clinical settings (depending on health district). Rolled out 2003 to March 2007.

Case management for diagnosed chlamydia

There were five countries in this group, all EU Member States (Austria, Czech Republic, Germany, Italy and Lithuania). The guidelines recommended in these countries apply only to dermatovenereology clinics (Austria and Italy), to pregnant women visiting gynaecology clinics, and patients at urology clinics in Germany. However, chlamydia testing in these countries was usually widely available in other clinical settings (Table 8). We included the Czech Republic in this group; the National Reference Laboratory has published guidelines about chlamydia diagnosis, but not treatment, and the Society of Dermatology and Venereology has guidelines about chlamydia diagnosis for dermatovenereology clinic practitioners. Partner notification for cases diagnosed in primary care, gynaecology and urology in the Czech Republic is reported to be by referral to these specialist clinics. The guidelines, however, do not state that partners of diagnosed chlamydia cases, or people with another diagnosed sexually transmitted infection, should be offered a chlamydia test.

Case finding for partners of infected cases

Three EU Member States (Belgium, France and Hungary) were included in this category. Case management guidelines for most countries were reported to cover partner notification, but countries were only categorised as undertaking case finding if the guidelines explicitly stated that partners of diagnosed chlamydia (or cases or people with another sexually transmitted infection) should be offered chlamydia testing. In practice, therefore, there might be some misclassification between countries categorised as having case management guidelines and those reporting additional case finding activities. In Belgium, the guidelines include offering testing to women who have a male partner with symptoms of urethritis, but not to male partners of symptomatic women. In France, asymptomatic patients who have a partner with a diagnosed sexually transmitted infection are recommended to be offered a test for chlamydia. Partner notification is usually initiated by the practitioner in a range of different clinical settings. In Hungary, case management guidelines recommend chlamydia testing for asymptomatic partners of chlamydia cases, but partner notification was reported not to be undertaken in the main diagnostic settings.

Opportunistic chlamydia testing

Six countries specified groups of asymptomatic people that were eligible for chlamydia testing on attendance at selected healthcare settings. In these countries, case finding was also an explicit part of the management of chlamydia cases. The groups offered chlamydia testing were different in all countries (Table 14) but most commonly included sexually active adolescents and young adults with multiple sexual partners or a recent change of partner, and women undergoing uterine instrumentation. In Estonia (see Country Focus: Estonia) and Latvia, chlamydia testing during pregnancy is recommended. Chlamydia testing is also recommended during pregnancy in Germany (categorised as providing case management, see above).

Sweden is included in this group. Opportunistic chlamydia testing takes place across Sweden in a variety of clinical settings, and partner notification is mandatory. The groups of

asymptomatic individuals to whom chlamydia testing is offered differ by county, but commonly include women seeking contraception and all attenders at youth clinics. These activities were not considered by key informants in Sweden to constitute an organised chlamydia screening programme (see Country Focus: Sweden) and do not fulfil published definitions of organised screening [34].

Denmark was categorised as providing opportunistic chlamydia testing. Most chlamydia testing takes place in primary care, where guidelines state that asymptomatic people with frequent sexual partner change and women undergoing transcervical procedures should be offered chlamydia tests. There are, in addition, two communities in the country (out of a total of 16) where proactive chlamydia screening has been introduced. In Frederiksberg Kommune (since 2001; women 18–19 years old and men 22 years old) and Frederiksborg Amt (since 2005; women and men 21–22 years old) postal invitations are sent to the target population. The limited coverage and lack of objectives meant that Denmark was not considered as having an organised chlamydia screening programme. In Norway, where opportunistic chlamydia testing is widespread, there are plans to introduce a proactive chlamydia screening programme based on the use of mailed home-collected specimens (Table 16).

The categories of people to whom opportunistic chlamydia testing is offered in Europe are consistent with the suggested indications for testing in the IUSTI Europe guideline which includes: screening of women under 25 years of age; individuals with new or multiple partners who report non-use or inconsistent use of barrier contraception; pregnant women; and the exclusion of infection before medical intervention [45]. In the USA, current recommendations from the Preventive Services Task Force recommend opportunistic testing of non-pregnant and pregnant women at increased risk of chlamydia [47]. Indicators of risk include: being sexually active and aged 24 years and under; a history of chlamydial or other sexually transmitted infection; new or multiple sexual partners; inconsistent condom use; and exchanging sex for money or drugs.

Organised chlamydia screening programmes

Existing programmes

In two countries key informants reported that there was established chlamydia screening programmes or an ongoing pilot programme covering a substantial part of the population, and which aimed to prevent the sequelae and limit transmission of *C. trachomatis* infection (Table 15).

In England (the largest country in the UK; see Country Focus: England), chlamydia screening was introduced in 2003 and rolled out across the country by 2007. Screening tests are offered opportunistically to sexually active women and men aged below 25 years old attending selected healthcare settings, depending on the area and, in some places, through outreach activities at universities and sporting events. The recommended interval between screening tests is one year if the previous test was negative, or after a change of sexual partner. People with a positive test are recommended to have a test for re-infection at least five weeks after treatment (Table 7). There are no established programmes in other parts of the UK, but opportunistic testing is recommended for selected groups in Scotland [48].

In the Netherlands (see Country Focus: Netherlands), a pilot programme in three regions of the country began in March 2007. Chlamydia screening will be delivered using a proactive register-based approach, with annual postal invitations sent to men and women aged 16–29 years, starting in or around March 2008. Details of the programmes are summarised in Table 15.

Table 15: Chlamydia screening programme characteristics in England and the Netherlands

Characteristic	The Netherlands	UK
Name	Chlamydia Screening Implementation project	National Chlamydia Screening Programme in England
Organisation	Proactive (pilot)	Opportunistic (established)
Implementation dates	Project started March 2007; screening to start March 2008	2003–2007
Coverage	Regional (Amsterdam, Rotterdam, South Limburg)	Regional (all primary care trusts in England)
National screening body	RIVM-Centre for Infectious Disease Control	National Screening Committee
Chlamydia screening overseen by	RIVM, STI-AIDS Foundation, screening implementation group	Department of Health, Health Protection Agency, regional Strategic Health Authorities
Objectives*	To implement and evaluate a systematic selective chlamydia screening programme that aims to reduce complications and limit onward transmission	To control chlamydia through early detection and treatment of asymptomatic infection; to prevent development of sequelae; and reduce onward disease transmission
Target population*	16–29-year-old sexually active women and men.	Asymptomatic men and women under 25 years old who have ever been sexually active
Identification of target population	Postal invitation using municipal population register	Attendance at selected health care settings, or other designated screening opportunities; no formal enumeration
Coordination system*	Yes, under development	Local organisation; regional and national management

Characteristic	The Netherlands	UK
Performance measures*	Proportion of eligible population offered a test; proportion accepting test; proportion with repeat testing; proportion of positive results; partner treatment rate; population chlamydia prevalence; incidence of complications	Percent of eligible population screened and re-screened; proportion of positive tests; partner treatment rate; incidence of complications (planned)
Quality standards*	Yes, under development	For logistics, clinical, laboratory and data aspects
Quality assurance system*	Yes, under development	Under development
Communication system*	Internet communication with participants; communication plan for public and professionals under development	Under development
Annual report*	Yes	Yes

* Features of screening programmes adapted from Gray (2004) [34].

In the USA, in addition to recommendations for opportunistic testing, there are organised chlamydia control activities with national coverage that show some of the characteristics of screening programmes [34]. The Infertility Prevention Programs in the ten Health and Human Services Regions aim to offer young women (under 26 years old, attending public family planning clinics) screening tests for chlamydia, to prevent the potential sequelae of untreated infection.

The programmes monitor the proportion of those eligible who are offered a test and records the proportion of positive results. The Infertility Prevention Programs do not reach a substantial proportion of the target population (part of the Project SCREen definition for the 'organised screening programme' category, Table 13) because they are implemented only in publicly funded family planning clinics. The programmes do not fulfil all the criteria for national screening programmes suggested by Gray because there are no national quality standards against which to measure performance, and no coordination, communication or quality assurance systems.

Planned chlamydia screening programmes

Another nine countries reported plans to introduce organised chlamydia screening programmes in the future (Table 16). Four programmes are planned to be delivered using an opportunistic approach (Finland, France, Greece and Luxembourg), compared with one (Norway) planned as a proactive, register-based programme. In four countries the organisational approach has not yet been decided. In four countries, the target population for the screening programme includes specific groups at high risk of chlamydia, such as sex

workers (Greece, Turkey), Roma (Bulgaria), and attenders of sexually transmitted disease clinics (France, Greece).

Table 16: Summary of planned chlamydia screening programmes in EU Member States

Country	Organisation	Coverage	Target population	Objectives
Bulgaria	Not decided	Regional	Roma	Not decided
Finland	Opportunistic	National	Women starting contraceptive pills or seeking an abortion	Not decided
France	Opportunistic	National	People visiting STI clinics, anonymous voluntary counselling and testing sites	Reduce complication rates in women
Germany	Not decided	National	Young women (15–25 years)	Not decided
Greece	Opportunistic	National	Sex workers; attenders of STI clinic at Andreas Sygros Hospital	Not decided
Luxembourg	Opportunistic	National	Not decided	Reduce chlamydia prevalence in the population by offering treatment to positive participants
Norway	Proactive	Regional	Not decided	Not decided
Slovenia	Not decided	National	Not decided	Not decided
Turkey	Not decided	National	Sex workers	Not decided

Monitoring the results of chlamydia control activities

We asked key informants in all participating countries whether or not there were performance targets for monitoring chlamydia control activities. We also asked about potential information sources that could be used to monitor the primary results, including routine data on complications of chlamydia infections and data on studies measuring the population prevalence of chlamydia or prevalence in specific populations. For countries that reported an existing or planned chlamydia screening programme, we also asked what the performance indicators were.

Three countries (France, England, UK, and the Netherlands) reported existing or planned performance targets. In England, as part of the national screening programme, data about the proportions of eligible people screened and chlamydia positivity rates are collected, but there are no performance indicators measuring the primary outcomes of the screening programme (reduced reproductive tract complications and transmission). In the Netherlands, proposed indicators include changes in population prevalence and pelvic inflammatory disease incidence as well as uptake of repeated screening invitations. The specific indicators in France were not reported. In these three, and another ten countries, routine data about

complications that can be caused by chlamydia are collected (Table 17). Most of these countries collect data on pelvic inflammatory disease, ectopic pregnancy, infertility and epididymitis. In five countries (Czech Republic, Denmark, Finland, Sweden, and the United Kingdom), informants stated that individual chlamydia test data could be linked to case records of complications for epidemiological studies.

Table 17: European countries reporting routine data collection about complications that can be caused by genital chlamydia infection

Country	Pelvic inflammatory disease	Ectopic pregnancy	Infertility	Epididymitis	Existing or planned screening programme
Belgium	Yes	No	No	No	No
Czech Republic	Yes	Yes	Yes	Yes	No
Denmark	Yes	Yes	Yes	Yes	No
Estonia	Yes	Yes	Yes	Yes	No
Finland	No	Yes	Yes	No	Yes
France	No	Yes	No	No	Yes
Ireland	Yes	Yes	Yes	Yes	No
Slovenia	Yes	Yes	Yes	Yes	Yes
Sweden	Yes	Yes	Yes	Yes	No
Switzerland	Yes	Yes	Yes	Yes	No
The Netherlands	Yes	Yes	Yes	Yes	Yes
Turkey	Yes	Yes	Yes	Yes	Yes
United Kingdom	Yes	Yes	Yes	Yes	Yes

Note: All other countries reported no data or did not answer the question.

Informants from four countries that reported plans to introduce chlamydia screening (Bulgaria, Germany, Greece and Norway), reported that routine data about the complications of chlamydia were not collected. Information about the availability of data about chlamydia prevalence is presented in Chapter 7.

7 ADDITIONAL INFORMATION

Sexual behaviour

We aimed to identify representative population-based data about sexual behaviour from European countries so that we could compare key measures across countries. Key informants provided information about studies conducted in their own countries, and we supplemented this information with an electronic literature search and search of our own databases. The data could be categorised according to the type and coverage of the survey (Table 18). Further details of surveys for individual countries are included in Appendix 3.

Table 18: Sexual behaviour survey data available from general European countries

Survey type	Countries	Comments
Large and comprehensive sexuality surveys	Belgium, Finland, France (adults and adolescents), Ireland, Norway, Slovenia, Switzerland (adolescents), UK	Most surveys conducted in the early 1990s. Repeated surveys in France, Finland, Norway, UK.
Knowledge, attitudes, behaviour and practices surveys	Croatia, Czech Republic, Estonia, France, Germany, Greece, Hungary (youth), Italy, The Netherlands, Portugal, Spain, Sweden, Switzerland	Usually oriented towards HIV/AIDS related behaviours. Repeated surveys (more than five), establishing behavioural surveillance in France, Germany, The Netherlands, Sweden, Switzerland.
Adolescent health surveys, including questions on sexual behaviour	WHO HBSC survey countries* Luxembourg	Limited questions, not including numbers of sexual partners. HBSC survey generally not mentioned by respondents in countries with specific surveys on sexuality.
Adult health surveys, including questions on sexual behaviour	Malta	..
Reproductive health surveys, including questions on sexual behaviour	Czech Republic, Iceland, Romania, Slovenia.	Most commonly conducted in central Europe in early 1990s.
STI prevalence surveys, including questions on sexual behaviour	Belgium, Denmark, Germany, Poland	..
Surveys in specific population groups	Bulgaria (Roma men)	..
No published data on sexual behaviour identified	Cyprus, Iceland, Liechtenstein, Turkey	..

Note: Countries appear in more than one category if multiple types of survey data are available.

* WHO HBSC – World Health Organization Health and Behaviour of School-age Children survey. Most recent data available from 2001/02, including Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Slovakia, Slovenia,

Spain, Sweden, Switzerland, The Netherlands, and the UK. Most recent survey 2005/06 also includes data from Bulgaria, Iceland, Luxembourg, and Turkey.

Many countries in Europe have conducted surveys on sexuality or sexual health. The methods range from comprehensive surveys of sexual attitudes and lifestyles among the general population to sets of questions on sexual behaviour inserted in health questionnaires addressed to adolescents, to surveys conducted among particular population subgroups such as sex workers, to men who have sex with men, and to minority ethnic groups. We attempted to extract comparable data from retrieved studies. Differences in the age and source of populations studied and in the phrasing of questions made it impossible to provide directly comparable data about indicators of sexual behaviours associated with chlamydia infection, such as numbers of recent sexual partners, rates of sexual partner change, and condom use.

Chlamydia prevalence

We asked key informants to provide information on published studies on chlamydia prevalence, which we supplemented by an electronic literature search. For each country we selected one study that, in our judgement, provided the most representative information about chlamydia in the general population (Table 19). If there was no population-based survey, we selected the most representative study including patients at healthcare settings. Studies that included asymptomatic individuals were included, if possible.

There were seven countries that had examined a sample of the general population (Denmark, France, Norway, Slovenia, Sweden, the Netherlands and UK). These provide fairly consistent results, with chlamydia prevalence of 1.4–3.0% in overall populations aged 18–44 years old, examined from household surveys. Studies with higher estimated population prevalence rates (Denmark, Norway, Sweden) tended to have lower response rates, suggesting some selection bias in those participating. Prevalence rates were similar in women and men. We did not identify any population prevalence survey that had been repeated over time, so we could not report on trends in chlamydia prevalence in any European country. In studies among student populations, estimated prevalence tended to be low. Chlamydia prevalence estimates in studies of healthcare attenders were difficult to compare but tended to be lower in asymptomatic patients.

Table 19: Selected studies of chlamydia prevalence in general population or specified settings in European countries

Country	Year	Women, % (N)	Men, % (95% CI, N)	Age group (years)	Population studied
General population					
Denmark [49]	2002	7.1% (5.7–8.8, N=1175)	5.8% (4.5–7.4, N=1033)	21–23	General population, postal
France [50]	2007	1.6% (1.0–2.5, N=1445)	1.4% (0.8–2.6, N=1135)	18–44	General population, telephone survey
Norway (unpublished)	2005	6.7% (5.2–8.5, N=980)	5.8% (4.2–7.8, N=673)	18–25	General population, postal

Country	Year	Women, % (N)	Men, % (95% CI, N)	Age group (years)	Population studied
Slovenia [51]	2004	1.6% (1.0–2.7, N=764)	3.0% (1.9–4.6, N=683)	18–49	General population, household survey
Sweden	2006	4.6%(2.8–6.4, n=542)	6.0%(3.6–8.4, N=364)	15–35+	General population, postal
The Netherlands [22]	2005	2.5%(2.0–3.0, N=5421)	1.5%(1.1–1.8, N=2918)	15–29	General population, postal
UK [52]	2001	1.5%(1.1–2.1, N=2055)	2.2%(1.5–3.2, N=1474)	18–44	General population, household survey
Students enrolled in classroom settings					
Czech Republic [53]	2001	3.7%(1.6–7.1, N=217)	..	15–20	High school students
Germany [54]	2005	5.8%(2.2–12.2,N=103)	2.2% (0.1–11.8, N=45)	Mean 23.2	University students
Luxembourg (unpub.)	2006	2.3% (1.4–3.6, N=792)	0.9% (0.3–2.1, N=534)	Under 25	High school students
Spain [54]	2001	0.0% (0.0–0.5, N=590)	..	Mean 19.4	University students
Healthcare setting, asymptomatic					
Belgium [55]	2003	5.0%(3.5–6.5, N=787)	..	14–40	GP patients, consecutive
Bulgaria [56]	1998	6.1% (3.3–10.0, N=231)	4.3% (2.3–7.5, N=236)	16–50	Health care setting
Greece [57]	2005	2.9% (2.6–3.3, N=8834)	0% (0–8.2, N=35)	18–55	F, gynaecology clinics M, STD clinic
Switzerland [58]	2002	2.5%(1.8–4.2, N=772)	..	Under 35	Gynaecology, asymptomatic
Healthcare setting, symptomatic, mixed or unknown					
Finland [59]	2003	3.5% (2.5–4.7, N=1198)	..	Not reported	Family planning clinics
Ireland [60,61]	2006/4	3.7% (N=945)	5.9%(3.6–8.2, N=393)	F, 15–50 M, 17–35	F, antenatal (asympt.), M, orthopaedic (mixed)
Lithuania [62]	2001	8.4% (6.8–10.3, N=1008)	..	Under 45	Gynaecology clinics
Portugal [63]	2002	4.6% (3.4–6.0, N=1108)	..	14–30	Family planning clinics, women having pelvic exam
Turkey [64]	2005	3.4% (2.0–5.3, N=533)	..	18–52	Gynaecology clinics

Note: No studies identified from Austria, Croatia, Cyprus, Estonia, Iceland, Latvia, Liechtenstein, Malta, Poland, Romania, Slovakia.

Asympt. – asymptomatic; F – female; M – male; unpub. – unpublished;

95% confidence intervals estimated from crude data if not reported in publication.

8 DISCUSSION AND RECOMMENDATIONS

Summary of main findings

Project SCREen, covering the European Union member and candidate states, EFTA member states and, for comparison purposes, the USA, collected detailed information about chlamydia diagnosis, management, partner management, chlamydia screening, surveillance, background information about health systems organisation, sexual behaviour surveys and chlamydia prevalence studies. The response rate was 88% (30/34) for the countries invited to participate.

We found that 17 of 29 participating European countries had at least one published clinical practice guideline recommended by a national body that dealt with some aspects concerning the case management of people infected with chlamydia. The 12 countries in which no clinical guideline was recommended were distributed evenly between EU Member States before May 2004 (Finland, Greece, Ireland, Luxembourg, Portugal and Spain), EU Member States after May 2004 or candidate countries (Bulgaria, Malta, Slovenia, Turkey), and EFTA member states (Liechtenstein, Switzerland). Three EU Member States (Bulgaria, Greece and Finland) are in the process of publishing or developing guidelines. Among countries with guidelines, EU Member States that joined the Union on 1 May 2004 were more likely to have a guideline covering all practitioners. Guidelines for specific groups were most often developed by and for dermatovenereologists, genitourinary medicine, or sexually transmitted disease specialists.

In most countries, chlamydia testing was available in a variety of clinical settings, in addition to clinics providing specialist services for people with sexually transmitted infections. Chlamydia testing was available at gynaecology practices or clinics in all participating countries; in 23 countries it was part of primary care. In five countries, chlamydia testing was available from pharmacies or other over-the-counter outlets. In about half of the countries where chlamydia testing was reported to be available in a specific setting, the practitioners in that specialty were not covered by a clinical guideline. Partner notification was often reported not to be done in these settings. Where partner notification was provided, it was reported most frequently to be initiated by the practitioners themselves or by referral to a specialist clinic.

Nucleic acid amplification tests were available to some extent in all but one country. In nine countries, fewer than 50% of samples were tested using nucleic acid amplification tests. Higher levels of coverage of these tests were associated with a higher per-capita GDP (mean €13,320 in countries with <10% tested by nucleic acid amplification test compared with mean €35,666 in countries with >90%). Ten countries (four EU Member States before May 2004, four Member States after 2004 or candidate countries, and two EFTA member states) did not take part in any quality assurance scheme for chlamydia diagnostics. These countries were less likely to have clinical guidelines for case management, or access to laboratories providing chlamydia tissue culture than countries taking part in quality assurance.

Most countries had a system for reporting diagnosed chlamydia infections to public health authorities, but about a third did not publish these data routinely. The most frequent

surveillance system was statutory reporting of all laboratory-diagnosed cases. There was more heterogeneity in the types of system in EU Member States from before May 2004 than among more recent members. Only nine countries collected data about the denominator (the number of chlamydia tests performed). The rate of testing and chlamydia positivity rates in these countries varied widely. Some differences could be understood with additional information available on the type of system and settings/target groups for testing.

The categories of chlamydia control activity were: no organised activity (13 countries: Bulgaria, Finland, Greece, Ireland, Liechtenstein, Luxembourg, Malta, Portugal, Romania, Slovenia, Spain, Switzerland and Turkey); case management (five countries: Austria, Czech Republic, Germany, Italy and Lithuania); case finding (three countries: Belgium, France and Hungary); opportunistic testing (six countries: Denmark, Estonia, Iceland, Latvia, Norway and Sweden); organised screening (two countries: the Netherlands and the UK (England only)). There was no consistent association between the intensity of chlamydia control and per-capita GDP of participating countries. The distinction between countries with case management guidelines and case finding activities was difficult to make because it was difficult to ascertain how much partner notification activity was taking place.

There were two European countries with an ongoing (England, UK, opportunistic) or pilot (the Netherlands, proactive) screening programme for chlamydia. Another nine countries stated plans to introduce a screening programme with opportunistic (Bulgaria, Finland, France, Greece and Luxembourg), proactive (Norway), or undecided (Germany, Slovenia and Turkey) organisation. Five of these countries (Bulgaria, Finland, Luxembourg, Slovenia and Turkey) are among those with no current case management guideline for chlamydia. In addition, chlamydia screening restricted to pregnant women is practised in Estonia and Latvia, and postal invitations for chlamydia screening are sent annually to 18–19 or 21–22-year-olds in two regions in Denmark.

In 13 countries, routine data about clinical complications that can be caused by chlamydia are available. Most of these countries collect data about pelvic inflammatory disease, ectopic pregnancy, infertility and epididymitis.

Sexual behaviour and chlamydia prevalence surveys have not been conducted in all countries. Large comprehensive surveys on sexuality have been conducted in Belgium, Finland, France (adults and adolescents), Ireland, Norway, Slovenia, Switzerland (adolescents) and the UK. Population chlamydia prevalence surveys have been conducted in Denmark, France, Norway, Slovenia, Sweden, the Netherlands and the UK.

Strengths and limitations

One of project SCREen's major strengths lies in the fact that it included 22 of the 27 EU Member States, one of the two EU candidate countries, four EFTA member states, and the USA. The coverage of information on chlamydia control activities in developed countries is therefore broad and comparable. We also asked key informants from different disciplines to help complete the questionnaire to obtain information as accurate as possible about diverse areas of policy and practice. The level of detail on activities that contribute to chlamydia control allowed us to develop a system of categorisation, so that countries with similar kinds

of activities could be grouped. The level of detail required to complete the questionnaire was also a weakness because some questions — for example the coverage of nucleic acid amplification tests for chlamydia diagnosis and the ranking of importance of different settings for chlamydia diagnosis — were not completed by several countries. In addition, despite the structured nature of the questions, respondents still found room for different interpretations. This might have led to misclassification of countries for some activities. We could not compensate for this entirely. However, we tried to obtain clarification from informants when responses within the questionnaire for a particular country appeared inconsistent. Key informants also had an opportunity to comment on the draft report and make corrections.

A weakness of this study is that it can only give an overview of chlamydia control activities at the national level. In some countries, decisions about healthcare funding and priorities are devolved to regional levels, and chlamydia control activities might differ between regions. We only had the opportunity to ask in-depth questions about regional differences in chlamydia-control activities during country visits to selected EU Member States. Some countries might have been misclassified in the categorisation of chlamydia control activities, and countries included in the same category might have, in practice, different levels of activity. We tried to make the process as objective as possible by assigning two people who independently put countries in a category. In a survey of this kind, however, decisions were based on documented existence and content of recommendations and policies. It is possible that national organisations or governments recommend the use of clinical practice guidelines, but that practitioners do not follow it. Audit of clinical practice against guidelines is only practised in the UK, so these data are not readily available. Furthermore, there is no proven correlation between the intensity of chlamydia control and impact on transmission, and there is no objective outcome indicator that can be compared across countries.

Comparison with other studies

Project SCREen is likely to be the most comprehensive survey of national activities related to chlamydia management, prevention and control, and the first study to categorise countries according to the intensity of chlamydia screening activities. The detailed information on chlamydia control in our study complements that available from more general surveys published by ESSTI about epidemiological trends [23], surveillance systems [42] and partner notification policies [41] for all sexually transmitted infections in countries that became EU Member States before May 2004. WHO has also surveyed control policies and programmes for all sexually transmitted infections across the European Region, which includes the newer EU Member States and EFTA [43]. The European Observatory on Health Systems and Policies conducted a review of screening programmes in all current EU Member States in 2006 (Appendix 1) [12]. The WHO EURO and European Observatory studies are compared with Project SCREen in more detail below.

The WHO EURO survey included 45 countries in 1998–99 [43]. Project SCREen covered 26 of these countries. In 15 out of 26 countries included in both surveys there were case management guidelines for chlamydia and for sexually transmitted infections in general. There were seven countries that did not have guidelines for all sexually transmitted infections in 1998–99 (Austria, Belgium, Germany, Iceland, Italy, Norway and the UK) [43], but reported to Project SCREen in 2007 that there were guidelines for chlamydia for at least one group of

healthcare professionals. Conversely, in four countries guidelines for sexually transmitted infection management were reported to exist, but no chlamydia-specific guidelines were reported in our study (Bulgaria, Greece, Slovenia and Turkey). For surveillance systems, three countries reported systems for sexually transmitted infections to WHO EURO [43], but had no system in place for chlamydia infections (Austria, Portugal and Spain). These inconsistencies might have occurred because of changes in the availability of guidelines over time, differences in the phrasing of questions, or because guidelines for chlamydia are separate from those for other sexually transmitted infections.

The information provided by the European Observatory on Health Systems and Policies survey [12] and Project SCREen should be seen as complementary. The European Observatory surveyed general information about screening programmes for many different conditions, whilst Project SCREen covered only chlamydia screening programmes as part of chlamydia control activities. The descriptive methods used in the European Health Observatory survey provide some information about chlamydia control activities that were not captured by the Project SCREen questionnaire (Table 20). The data collected by Project SCREen provides more recent and detailed information about ongoing and planned chlamydia screening programmes, using mainly structured questions with standard definitions for terms such as screening, screening programme, and opportunistic. Project SCREen also provided separate information on countries that offer opportunistic testing for specific population groups which fall short of meeting the definition of a screening programme.

Table 20: Major differences in chlamydia control activities in EU Member States reported to surveys by Project SCREen and European Observatory on Health Systems and Policies

Country	European Observatory on Health Systems and Policies, 2005	Project SCREen, 2007
Finland	Systematic screening for first year university students organised by Finnish Student Health Services.	No current screening or clinical guidelines reported. Plans for opportunistic screening to be offered to women seeking contraception and abortion.
Greece	No data available on chlamydia in Greece. Surveillance system and pilot chlamydia project planned.	National guideline for chlamydia case management aimed at all healthcare practitioners being developed by Hellenic Centre for Disease Control and Prevention. Surveillance of positive chlamydia cases from main sexually transmitted disease clinic at Andreas Sygros Hospital. Planned screening for sex workers and attenders at sexually transmitted disease clinic at Andreas Sygros Hospital.
The Netherlands	No national screening programme for chlamydia.	Proactive screening pilot project began in March 2007. Annual postal invitation in three regions due to begin.

Country	European Observatory on Health Systems and Policies, 2005	Project SCREen, 2007
Romania	Plans to introduce a chlamydia screening strategy after conducting a pilot survey in women under 25 years old.	No further plans for pilot survey.
Slovakia	No national screening policy for chlamydia. Some pharmaceutical companies have websites and information.	No questionnaire returned
Turkey	Registered sex workers subject to chlamydia screening twice a week, funded by government.	Plans for screening of sex workers.

Factors affecting the implementation of chlamydia control activities

Economic resources do not seem to be the main driver of decisions about the priority assigned to chlamydia control in the EU Member States, other European countries and the USA. The lack of a consistent association between indicators of wealth or type of health system and chlamydia control activities was striking. Among the countries with no organised activities directed to the management and control of chlamydia were those with the highest per-capita GDP in Europe. Conversely, there were countries with moderate per-capita GDP that had clear guidance about case finding for partners of infected cases and specified groups of people for whom opportunistic testing was recommended. Only the extent of use of nucleic acid amplification tests for chlamydia diagnosis was clearly associated with the economic position of the country, with richer countries having greater coverage. Even so, participation in quality control schemes for molecular diagnostics was not universal, and countries not taking part were as likely to be established EU Member States as Members that joined the Union later.

Clinical practice guidelines need to be disseminated effectively to increase the chances of their use in daily practice [65]. Endorsement by a national organisation or ministry of health and universal guidelines covering all practitioners might help with implementation. Countries that had joined the EU more recently were most likely to have guidelines that covered all healthcare practitioners, possibly reflecting the centralised organisation of health services in Eastern European countries before they became independent. Countries that reported the existence of guidelines to Project SCREen might therefore not be implementing them, particularly when their use was reported to be at the discretion of the practitioner. However, the availability of a guideline shows that the importance of a coherent approach to the management of chlamydial infection has been considered. Guidelines also allow current practice to be audited against the recommendations in the guideline, and plans of action to be developed to improve adherence [66]. Audit was not a requirement in any of the countries surveyed, but was widely used within the UK National Health Service.

Comparing chlamydia control activities across the EU

The wide range of policies and practices identified by the Project SCREen survey seems to reflect the lack of agreement about the most appropriate chlamydia control measures. The categorisation system developed for the Project provided a way of systematically examining the approaches taken across EU Member States and other countries. The categorisation was based on standard infection control principles [26], starting from the management of the diagnosed case, through case finding to identify contacts, up to screening of asymptomatic groups and organised screening programmes. This categorisation showed some interesting inconsistencies in the types of activities being conducted. The most extreme cases were countries that stated plans to introduce organised screening programmes, but had no nationally recognised guidelines concerning the management of diagnosed cases or their partners. Other countries had guidelines, but they did not cover practitioners in the settings where chlamydia was most likely to be diagnosed.

The visits to four countries (Estonia, Sweden, the Netherlands and England, UK; see Country Focus 1–4) allowed us to obtain accurate information about the nature and implementation of chlamydia control activities. The findings from Sweden are particularly noteworthy. Sweden was chosen because it is widely assumed to have had organised chlamydia screening for more than 10 years (Table 3) [67,68]. Key informants explained that there is no chlamydia screening programme (see Country Focus: Sweden). Chlamydia control activities in Sweden are funded and implemented by each county. All chlamydia testing is opportunistic, with no recommendations for repeat testing. These activities lack the characteristics of a national screening programme because there are no agreed objectives, target population, coordination, quality assurance or performance targets [34]. The high per capita rates of chlamydia testing (Table 12) are the result of guidelines that recommend opportunistic testing for specific groups of asymptomatic people. Similar rates of testing were reported by Norway, which also has no chlamydia screening programme.

Implications of existing evidence for chlamydia control in Europe

The research evidence showing that organised chlamydia screening programmes reduce population-level transmission of chlamydia or complications associated with chlamydia in the medium to long term is limited [1]. Before considering introducing a screening programme, evidence of effectiveness from high-quality randomised controlled trials is required [33,34]. For chlamydia, this would mean trials showing that screening — offered for at least two rounds and organised in the way in which the planned programme is intended to be delivered — results in reduced morbidity and chlamydia transmission at reasonable cost, and that the benefits outweigh the harms [1]. Published trials suggesting that population-level chlamydia screening can prevent pelvic inflammatory disease have only studied the effects of a single offer of screening delivered through a register-based approach [69,70]. The Chlamydia Screening Implementation project in the Netherlands will be the first to evaluate the effects of multiple rounds of proactive register-based chlamydia screening using a randomised design (J. van Bergen, personal communication).

Principles of good clinical practice suggest that diagnosed chlamydia cases should be managed in accordance with an evidence-based clinical guideline covering the components of comprehensive case management, according to the World Health Organization [6,71]. These include correct diagnosis, effective treatment, counselling for risk avoidance and risk reduction, promotion of condoms and the notification and treatment of sexual partners. For the European region as a whole, case management guidelines covering diagnosis, treatment and partner management are available to be used in their original form or as a basis for developing national guidelines [45].

The results of Project SCREen suggest that there is a particular need for partner notification to be better integrated into the management of chlamydia at all levels of care. While only one of 17 countries that had a nationally recommended clinical practice guideline did not cover partner notification (Czech Republic), practitioners in many settings are not covered by any guidelines (Table 8). Partner notification is recommended but not put into practice in several countries. In addition, failure to treat all recent sexual partners of diagnosed cases of chlamydia is strongly associated with a further episode of chlamydia [72].

Longitudinal studies suggest that up to 30% of women with a previously treated episode of chlamydia experience re-infection, persistent infection, or newly acquired chlamydia infection in the next year [72]. This finding suggests that women (and probably men) who have been diagnosed with chlamydia should be invited to have a repeat test after treatment to look for evidence of re-infection, persistent infection or new infection. The interval until the repeat test is not well-determined. In Project SCREen, intervals for repeat testing to prevent re-infection vary from five weeks to six months (Table 7). European IUSTI guidelines suggest 'several months following treatment' [45] and the US Centers for Disease Control and Prevention guidelines suggest 'three months after initial treatment, or when they next seek care within three to 12 months of the initial episode' [73].

The optimum screening interval following a negative chlamydia test has not been established [47]. The incidence rate of chlamydia in women with an initial negative test who presented in general practice or at a family planning clinic in England was estimated to be 5–6% per year [72]. The US Centers for Disease Control and Prevention [73], US Preventive Services Task Force [47] and National Chlamydia Screening Programme in England [74] recommend annual screening for eligible sexually active adults. The frequency of regular screening, however, has not been determined in either country.

In countries where opportunistic chlamydia testing is widespread, the average interval appears to be much longer than a year. In a cohort of 15–24-year-old women followed for 15 years in Uppsala County, Sweden, 70% had ever been tested for chlamydia, but half of these had only been tested once and less than 1% had been tested 10 times or more [75]. In a Norwegian cohort of women followed for a mean of eight years who had been tested for chlamydia at least once, only 20% were screened every 18 months or less [76]. If these findings are considered together with predictions from dynamic mathematical modelling studies showing that high annual coverage is required to produce sustained reductions in chlamydia prevalence [36,38], it is possible that the uptake of regular screening in practice has been insufficient to control chlamydia transmission over time in any country [1].

Conclusion

Project SCREen was able to collect detailed information about chlamydia control activities from most EU Member States, all EFTA member states and the USA. We have documented a wide range of chlamydia control activities, and ongoing and planned screening programmes. We also developed a typology of chlamydia control activities, based on the principles of sexually transmitted infection control, which we used to categorise countries. This typology could be used to monitor the intensity of chlamydia control activities at country level and to assist decision-making about which activities should be strengthened or introduced.

COUNTRY FOCUS: ESTONIA – CHLAMYDIA SCREENING IN PREGNANCY

Testing for sexually transmitted infections has been a part of routine antenatal care in Estonia for many years. In 2003, chlamydia was added to this list of infections, which includes syphilis, gonorrhoea, hepatitis B, and HIV infection. Chlamydia testing is part of the guideline for antenatal care written by the Estonian Society for Gynaecology (most recent version published 2006). A chlamydia test (with a nucleic acid amplification test) is offered at the first antenatal visit; women with positive tests are treated with erythromycin, and women are given a prescription or antibiotics for their partner.

Figure 6: Map of Estonia

Source: http://www.foreignoffice.gov.uk

The test and management are provided as part of a package of free antenatal treatment. A similar protocol exists to provide chlamydia testing to women prior to surgical termination of pregnancy or insertion of an intrauterine device. Positive chlamydia test results are reported to the Health Protection Inspectorate, which collects surveillance data and reports these to the Ministry of Social Affairs.

Estonia (Figure 6) has a population of 1.3 million, and two thirds of the population live in the capital city of Tallinn, or in Tartu, the second largest city. Estonia became independent from the former Soviet Union in 1992 and joined the EU in May 2004. Following a health sector reform in the 1990s, healthcare is provided through social insurance, with centralised planning and referral to most services via a general practitioner. There have been major gains in health since independence, with infant mortality rates falling from around 20 in the 1990s to five per 1000 live births in 2005.

Antenatal chlamydia screening in Estonia is delivered opportunistically. High levels of coverage can be achieved because most women present early for antenatal care, obstetricians undertake chlamydia testing routinely, and only one test per pregnancy is required, unless there is a risk of re-infection, persistence or new infection. There is, however, no specific monitoring of numbers of positive chlamydia tests or of chlamydia positivity rates,

no specific quality assurance, and no formal oversight of chlamydia screening. This approach is typical of antenatal testing for infections in many European countries.

Chlamydia testing is available in healthcare settings other than obstetrics and gynaecology clinics in Estonia, particularly dermatovenereology and family planning clinics. Estonian guidelines for the management of sexually transmitted infections are produced by a multidisciplinary group (based on the US Centers for Disease Control and Prevention guidelines), with the most recent revision published in 2007. Treatment services for patients with possible sexually transmitted infections are not as visible as specialists would like. In dermatovenereology clinics, there are no dedicated sessions, and patients often have to ask to see the doctors who specialise in venereology by name. Few men who have sex with men are seen in these clinics. Doctors and nurses also report that partner notification is not provided in dermatovenereology clinics as effectively as it could be because of a lack of time, resources and specialised staff. Another reported reason for sub-optimal partner notification is a rejection of intensive and intrusive practises of the Soviet era, particularly for syphilis. Patient referral initiated by a doctor is now the main partner notification method, but without follow-up to check on the outcomes.

Youth counselling centres are a relatively recent addition to sexual health services in Estonia. There are 18 clinics in the country, funded through the health insurance system and coordinated by the Estonian Sexual Health Association (a member of the International Planned Parenthood Federation). Their main function is to provide contraceptive and abortion counselling services. Chlamydia testing is offered to young women undergoing gynaecological examination. In the clinic in Tartu, 95% of visitors are female and about 40% are screened for chlamydia each year. The number of chlamydia cases has remained stable at around 450 per year since 2002, but the number of women screened has increased from 3,380 in 2002 to 6,673 in 2006.

There are no plans to introduce organised screening for chlamydia in Estonia. Funding for prevention and control of sexually transmitted infections other than HIV is limited. Estonia has a well-developed strategy for HIV prevention, supported by the Global Fund for AIDS, TB and Malaria. Other sexually transmitted diseases are, however, not part of this strategy because injecting drug use is the major route of transmission for HIV infection in Estonia.

COUNTRY FOCUS: SWEDEN – OPPORTUNISTIC TESTING NATIONWIDE

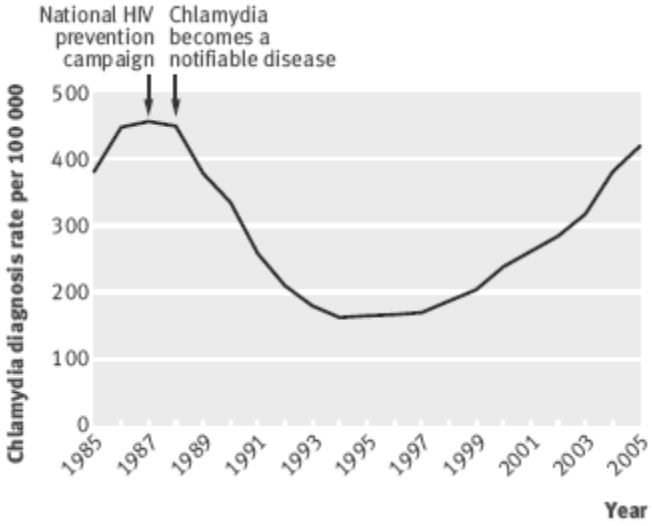
Sweden was the first country in the world to make free testing, treatment and partner notification for chlamydia available throughout the country, and to have a national diagnostic and reporting system. Opportunistic testing and treatment are offered in a variety of clinical settings; over 90% of specimens are now tested using nucleic acid amplification tests, and positive cases are reported by both clinician and laboratory to an electronic surveillance system run by the Swedish Institute of Infectious Disease Control (Smittskydinstitutet). Laboratories also report the numbers of chlamydia tests done twice a year, so chlamydia

positivity rates can be monitored. Although Sweden has one of the highest rates of chlamydia testing in Europe (Table 12), chlamydia infection rates have been rising over the past decade.

Chlamydia became a notifiable infection in 1988. The Swedish infectious disease law required physicians to offer a free chlamydia test to people at risk, with treatment and partner notification for those found to be positive. These requirements have wrongly been interpreted as the start of a national screening programme.

The activities in Sweden, described above, are not organised nationally as a chlamydia screening programme. According to the National Board of Health and Welfare (Socialstyrelsen), which is the overall supervisory, coordination and regulatory organisation for healthcare in Sweden, there is no national policy about chlamydia prevention and control and no plans to introduce a chlamydia screening programme. A new national strategy to combat HIV/AIDS and certain other diseases mentions the rise in other sexually transmitted infections but does not include specific targets to reduce chlamydia rates.

Figure 7: Chlamydia rates in Sweden, 1985 to 2005



Source: [1]

The fall in chlamydia rates in Sweden in the late 1980s and early 1990s (Figure 7) was widely attributed to chlamydia screening. In the absence of an organised screening programme and low uptake of regular testing, alternative explanations, such as behavioural change due to HIV/AIDS, are also plausible. A rising trend in chlamydia rates has also been seen in countries such as Norway and Denmark that have widespread opportunistic chlamydia testing but no organised screening programme.

Sweden is a Scandinavian country with 21 counties for its population of 9 million. The healthcare system is decentralised to the county level. Decisions about resources and activities aimed at chlamydia control are made by the county medical officer, who has responsibility for all infectious disease control. The National Board of Health and Welfare is

the overall body with the power to act on reports from the county medical officers and surveillance data from the Swedish Institute of Infectious Disease Control.

Figure 8: Advert for 'Chlamydia Monday' in Stockholm

Decentralisation means that chlamydia control activities are funded and implemented at county level without central coordination or supervision. The groups of people for whom chlamydia testing is recommended, the organisation of partner notification services and the types of service therefore differ between counties. In Stockholm, for example, awareness about chlamydia testing has been raised by having an annual 'Chlamydia Monday', an initiative which started in 2000 (Figure 8). A similar event was tried in Örebro county but discontinued because of the low yield of additional positive results.

Chlamydia testing has been available in youth clinics since it became widely available nationally. Youth clinics were established some 20 to 30 years ago in all counties in Sweden to improve access to contraception and sexual health services for adolescents. Young people are told about the clinics and many classes visit them as part of school-based sex education, but 90% of clinic visitors are female.

Sweden is the only country in Europe where partner notification for people diagnosed with chlamydia is compulsory. The numbers of sexual partners elicited by medical social workers who are trained to conduct partner notification are high, and follow-up efforts intensive. For example, in Uppsala county genitourinary medicine clinic in October 2006, the social worker obtained details of 225 partners from 79 chlamydia cases. Partners that do not attend within one to two weeks receive letters or phone calls, and in the few cases where there is still no response, details are passed to the county medical officer. There has been recent concern, however, that physicians do not always initiate partner notification themselves or refer the patient to a clinic. In some counties, such as Västerbotten, partner notification is being centralised with patients referred to medical social workers to improve outcomes.

The continuing transmission of chlamydia in Sweden has been further complicated by the recent emergence of a mutant strain of *C. trachomatis* [77]. This strain escapes detection by two of the most widely-used nucleic acid amplification tests. What appeared to be a fall in reported chlamydia rates in 2006 turned out to be due to the failure to detect up to 7,000 chlamydia infections [78]. No public health measures to re-test people in the most affected areas were instituted. The emergence of this strain, however, led to a change in the design of nucleic acid amplification tests for chlamydia, which now have to include target sequences from two separate parts of the genome. Exactly where the new variant occurred first and how many cases of ectopic pregnancy and infertility have resulted will never be known.

COUNTRY FOCUS: ENGLAND, UK – NATIONAL CHLAMYDIA SCREENING PROGRAMME IN ENGLAND

England's National Chlamydia Screening Programme (NCSP) began its rollout in 2003, and by the end of 2007 chlamydia screening in the target population of sexually active men and women will have commenced in all health districts. The programme is opportunistic, with all sexually active women and men under 25 years old who attend participating healthcare settings or screening events in selected non-clinical locations eligible for chlamydia testing every year. Testing is by nucleic acid amplification test, and partner notification is required as part of case management.

In 2005/6 about 100,000 chlamydia tests were done in the 26 programme areas enrolled at the time (about a quarter of the eventual total); 10.2% of tests in women and 10.1% of tests in men were positive [2]. A target uptake of 15% of sexually active 16–24 year olds in each programme area has been set for the year 2007/8. Coverage is calculated by dividing the number of screens by the estimated eligible population. Of note, tests done in genitourinary medicine clinics are excluded from these totals as they are regarded as diagnostic rather than screening tests. This differs from estimates in other countries taken from surveillance data, which cannot differentiate between screening and diagnostic tests and might therefore overestimate the coverage of screening.

A National Screening Committee in the UK advises the government on the introduction of new programmes and oversees the performance of national screening programmes. When demand for chlamydia screening was growing in the late 1990s, the National Screening Committee advised the government that pilot studies of chlamydia screening should be

carried out. The Department of Health then set up the NCSP as part of its National Strategy for Sexual Health in England. The NCSP is now a communicable disease programme overseen by the Health Protection Agency (the organisation that collates communicable disease surveillance data) and managed centrally by a Chlamydia Operations Group. Separate plans for chlamydia screening are being considered in Scotland, Wales and Northern Ireland.

A key feature of chlamydia screening activities in different NCSP areas is their diversity. We visited chlamydia screening coordinators in a variety of settings in south London (Lambeth, Southwark) and north London (Enfield) where screening is established, and Oxford, where it was being planned. In established programme areas, screening in contraception clinics contributes with the highest proportion of tests. Participation of general practice surgeries (family physicians) is more variable, with some areas (e.g. Southwark, south London) achieving high screening uptake and others screening few eligible people, particularly men.

Outreach activities, such as testing in universities, prisons, shopping centres, or other community venues such as youth centres, are used to a variable extent. While there is no national system for the call and recall of the target population, the use of general practice patient registers has been tested in some areas to invite people in the target age group to be screened. There is, at present, no national guidance about how annual repeat screening is to be implemented or monitored.

In most programme areas, such as Lambeth and Oxford, the local chlamydia coordinator provides treatment, partner notification and (sometimes) further testing of positives. The chlamydia screening offices are usually based in community settings, such as contraception clinics or specialist genitourinary medicine clinics.

The flow of data to chlamydia co-ordinators varies between manual copying of results to electronic delivery of results, with significant impact on the local capacity to manage positives. As coverage increases it is likely that models of care will adapt, and the number of positives might exceed the capacity of local chlamydia screening offices.

Alongside the NCSP, the 'Chlamydia Pathfinder' project has been commissioned by the Department of Health to provide chlamydia screening in the high street to people who might not attend routine health care settings. The pilot project is taking place in London, with a nationwide chain of retail pharmacy services (Boots) advertising free chlamydia testing to 16–24-year-olds. Although not officially part of the NCSP, it works to the same protocol. Pharmacy staff ask customers about symptoms, provide the test, dispense treatment and carry out partner notification. Test results are sent to customers directly from the laboratory. According to the head pharmacist we interviewed, this was an excellent development for motivated pharmacists, and a good way to provide efficient access to screening for the target group. In the first year of the project about 15,000 tests were received from over 200 stores; less than the maximum capacity of the service (50,000 tests), with 48% of kits given out being returned [79]. People tested were likely to be at the older end of the target population, female, and well-educated. It was not reported whether these people had previously been offered chlamydia testing, but this group as a whole is likely to be regular users of healthcare services. Results of the final evaluation of the pilot project, carried out in July 2007, are awaited.

COUNTRY FOCUS: THE NETHERLANDS – PROACTIVE CHLAMYDIA SCREENING IMPLEMENTATION PROJECT

A Chlamydia Screening Implementation (CSI) project will start in the Netherlands in January 2008. The intervention uses a proactive register-based population screening approach to invite the target population to be screened regularly for chlamydia.

A previous large pilot study in four cities of the Netherlands found that municipal population registers were a highly accurate and feasible resource for sending out postal invitations requesting young adults to mail self-collected specimens to a laboratory; about 40% of those invited returned a specimen [22]. The Dutch Health Council rejected a national screening programme using this method because prevalence outside urban areas was judged to be too low.

Figure 9: Postal home-sampling kit for chlamydia, used in a previous Dutch study

Figure 10: Map of the Netherlands

In the CSI project, the municipal population registers will be used in all programme areas, but enrolment for screening will depend on population density. In Amsterdam and Rotterdam (high population density) all 16–29-year-old women and men will receive a postal invitation to log on to a website and request a home-sampling kit. In South Limburg (low population density) the same age group will receive an invitation to undertake an online risk assessment using a score that has been shown to identify individuals at high risk of chlamydia [80]. People with a score above the defined cut-off will be asked to request a home-sampling kit (Figure 9).

The CSI project involves a three year implementation and evaluation of the feasibility, effectiveness and cost-effectiveness of chlamydia screening in the programme areas. Implementation will be phased in target populations through cluster randomisation so that chlamydia prevalence can be compared between groups. The project will be the first to investigate the impact of repeated rounds of annual invitations for chlamydia screening.

Most chlamydia screening in the Netherlands currently takes place in general practice, which is covered by a specific clinical guideline for case management. Some general practitioners in the CSI project in Amsterdam will send out personal invitations to their own practice population rather than the municipality doing this on their behalf. General practitioners will also be encouraged to continue offering opportunistic chlamydia tests to selected populations if they have not responded to the postal invitation. The Dutch Ministry of Health will use the results of the CSI project to decide whether internet-based postal screening should be introduced throughout the Netherlands.

APPENDIX 1: EUROPEAN OBSERVATORY ON HEALTH SYSTEMS AND POLICIES SUMMARY OF CHLAMYDIA SCREENING PROGRAMMES IN EUROPE, 2006

Reproduced from reference [12] (Annexe 1 and Annexe 2).

Countries	Chlamydia screening programme
Austria	No information available.
Belgium	Chlamydia is one of the organisms that have to be reported by the 115 sentinel microbiology laboratories representing 59% of all recognised private or hospital microbiology laboratories in 2004. It must be reported to the Scientific Institute of Public Health, which follows the trends in numbers of isolates of different organisms reported to the network in order to carry out surveillance of infectious diseases. This registration is financed by the federal state.
Bulgaria	Chlamydia is not explicitly mentioned in the information about screening programmes. No other information is available.
Croatia	Not included in review.
Cyprus	None.
Czech Republic	Tests for chlamydia are done only as part of the diagnostic process in individual cases. There is no specific screening programme.
Denmark	As with all other sexually transmitted diseases (STDs), testing for chlamydia is offered at every GP surgery and at larger hospitals. Whether the present screening option should be changed to a strategy where all young people in the age group 16–25 years are offered a yearly home test is under consideration. A home test will also be offered to partners when known. This strategy is intended to reduce the frequency of chlamydia and the number of urogenital infections, infertility, ectopic pregnancy and chronic abdominal pain. The strategy will be cost-effective after the fourth year of screening. Because of concerns about stigmatisation, home tests are generally well accepted by the target group, who should have immediate access to information and advice. All three diseases are being kept under surveillance by the State Serum Institute. The screening tests and, if needed, the treatment, are free of charge with costs covered by the county councils.
Estonia	Testing for chlamydia is compulsory during pregnancy.
Finland	The national screening policy for chlamydia is opportunistic. Only Finnish Student Health Services (YTHS) organise systematic screening for chlamydia for first-year university students and for students making gynaecological visits. For first-year university students screening is undertaken in conjunction with a physical examination. Finnish Student Health Services are financed mainly by the National Social Insurance Institute (KELA in Finnish) and students.
France	In 2003, the Ministry of Health asked the National Agency for Evaluation in Healthcare (ANAES) to evaluate the opportunity to set up a national policy for chlamydia screening. ANAES recommended the adoption of an opportunistic strategy for screening, targeting the population at risk in centres for birth planning and education (Centres de planification et d'éducation familiale), in centres for free and anonymous screening (CDAG), in anti-venereal diseases dispensaries (Dispensaires anti-vénériens: DAV), in centres for abortion, and in centres for mother and child care. Chlamydia screening should be offered to males and females under the age of 30 who are sexually active, who have changed sexual partner in the last 12 months, or whose partner may be infected with a sexually transmitted disease. Particular attention should

Countries	Chlamydia screening programme
	be given to people who do not have regular contact with the healthcare system. ANAES also recommended pilot studies in general practice to evaluate the prevalence of the chlamydia infection, and to actively promote the use of condoms in the general population. The reduction of chlamydia prevalence (and other STDs) is one of the 100 objectives of the Public Health Act of August 2004, but the means of achieving this goal are not described.
Germany	There is no national policy on screening for HIV or chlamydia. Case-finding for HIV or chlamydia infections is paid for by statutory health insurance in the presence of indicative complaints or symptoms. Screening is encouraged during pregnancy and recommended in 'risk groups' by professional guidelines but is subject to the decision of the physician and patient ('opportunistic'). With regard to HIV, there is a national policy not to encourage testing, but to focus on practical protection messages (condoms, risk prone situations, negotiation skills, as well as solidarity with those affected). Many other countries use both voluntary counselling and testing strategies. The German and Dutch public education systems, for example, encourage voluntary counselling and are silent about testing to try to avoid a reduction in safe behaviour. For the same reason, testing was even proactively discouraged among homosexuals in the early and mid-1990s. In general, written education materials are provided and balance testing is recommended if long-term partners want a child or want to choose another contraceptive. There is extensive information about test validity, test characteristics, the window period and recommendations for support and future behaviour. HIV and chlamydia were never defined as 'sexually-transmittable infections' (STIs) in a legal sense since this would have meant until 1999 that legal options to perform compulsory testing and treatment could have been applied to 'non-compliant' STI patients under treatment or to 'promiscuous people suspected of spreading the disease'. The Infectious Diseases Act of 2000 abolished the 1956 compulsory regulations for all STIs, which, in practice, had rarely been applied.
Greece	There are no data available on chlamydia in Greece. On the basis of several interviews conducted by our team at the University of Athens with officials at the Ministry of Health and KEEL, it was reported that KEEL is in the process of developing a registry of sexually and communicable diseases including chlamydia, known as Sexually Communicable Diseases Surveillance. The aim is to develop a monitoring system for chlamydia, financed exclusively by KEEL. A pilot project is designed and will be implemented in the near future at the Andreas Sygros Hospital in Athens as well as at the Aphrodisiac Hospital in Thessalonica.
Hungary	Opportunistic screening for chlamydia is available.
Iceland	Not included in review.
Ireland	No national screening policy.
Italy	Routine screening for asymptomatic infection is recommended for adolescent women who are sexually active and for women at high risk of infection. However, this is left to local health authorities and, ultimately, to the decision of individual doctors.
Latvia	There is no specific programme for screening of chlamydia.
Liechtenstein	Not included in review.
Lithuania	There is no national screening policy for chlamydia. Tests are performed opportunistically according to clinical symptoms and are paid for by the patient.
Luxembourg	Not included in review.
Malta	At present, Malta does not carry out organised screening for chlamydia. Screening is only carried out on symptomatic cases. All testing is done using PCR (Roche Amplicor).

Countries	Chlamydia screening programme
The Netherlands	There is no national screening programme for HIV or chlamydia. However, all pregnant women can undergo an HIV test as part of antenatal and postnatal screening; the local public health agencies (GGDs) are in charge of HIV testing of specific risk groups. The GGDs have set up voluntary HIV screening for men and women in high-risk groups (homosexuals, drug addicts, prostitutes).
Norway	Not included in review.
Poland	No information available.
Portugal	Screening is opportunistic. Chlamydia is not specially targeted in the national programmes, but is treated within the group of sexually transmitted diseases. Screening is usually done through the Pap test, with guidelines on frequency of testing. There is no population register to allow for targeting and recalling patients, nor do current information systems allow for that.
Romania	Screening for chlamydia is currently opportunistic. The National Strategy for the Prevention and Control of Sexually Transmitted Infections recommends that symptoms of chlamydia should be treated, being cheaper than the laboratory test. However, the intention is to introduce a screening strategy after conducting a pilot survey on chlamydia screening for women under 25 years old who have not been pregnant and who are at risk of developing STIs. The results of the pilot should lead to the development of a cost-effective screening strategy.
Slovakia	Slovakia has no national screening policy for chlamydia. Some pharmaceutical companies have websites with information and advice lines.
Slovenia	A national policy of screening for chlamydia is under development at the moment. Several cross-sectional studies were performed for chlamydia in women and guidelines for routine screening are being developed.
Spain	There is no specific chlamydia screening programme. However, the control and prevention of sexually transmitted diseases are included among the objectives of the HIV Infection and AIDS Multisectoral Plan 2001–2005, which states as goals: 'to intensify activities for prevention, early diagnosis and treatment of infections associated with drug use, hepatitis, tuberculosis and STDs, as well as HIV, from health centres and drug abuse treatment services' ('Prevention in intravenous drug users'); and 'to offer comprehensive care to women that includes early detection of STDs (herpes, chlamydia and HPV) and cervical cancer.' In 1990 a chlamydia screening programme was implemented in the Family Planning Centre Miguel Servet in La Coruña. The main objective of the programme was to reduce the prevalence of chlamydia in the area (at that time the prevalence rate among women was 5.1%). Specific aims included the reduction of the prevalence by 50% during the first year (1990–1991) and then by an additional 50% during the next two years (1992–1993) to reach a prevalence rate of 1.2–1.3%. Currently, screening for chlamydia and HIV is opportunistic with pregnant women being offered tests, as are those displaying risk behaviours.
Sweden	National strategies for the entire area of health and sexuality are presently lacking and will be developed by the National Institute of Public Health. In addition, work has been initiated on establishing an action plan for the prevention of unwanted pregnancies. This is based on preventive work carried out under provisions of the Communicable Diseases Act, the Health and Medical Services Act and the public health policy of the National Institute of Public Health with respect to HIV and STIs, as well as within the framework of various regional/local programmes. Currently, screening for chlamydia and HIV is opportunistic with pregnant women being offered tests, as are those displaying risk behaviours.
Switzerland	Not included in review.

Countries	Chlamydia screening programme
Turkey	Only registered sex workers are subject to screening for chlamydia (routine checks are done twice a week), which is financed from the government budget.
United Kingdom	Opportunistic screening for chlamydia is offered to those aged 25 and under who access to sexual health services.

Note: The wording in this table is reproduced verbatim from the original reference. Some terminology and institutional names might have changed since then.

APPENDIX 2: TERMS OF REFERENCE FOR ECDC REVIEW OF CHLAMYDIA CONTROL ACTIVITIES

The work will be carried out in the tenderer's own premises/consultants home basis.

The tenderer will be working with the ECDC STI project leader to do the following:

- Review of the existing chlamydia control programmes/activities in the Member States. This should include objectives, case finding strategies, target populations, geographic coverage, laboratory methods, case management, epidemiological data, basic costs, and particularly outcomes. The socio-behavioural environment related to STI (e.g. general trends in sexual behaviours, public awareness) should also be examined in order to assess chlamydia control in broader perspective. A particular attention should be paid to the progress and any difficulties of long-term programmes (more than 10 years); such programmes outside the EU should also be examined where these would provide key information for improving the situation in Europe;
- Comparison of the various chlamydia control strategies and identification of their strengths and weaknesses;
- Recommendations for public health action and for further research both at national and European level. Specific recommendations for ECDC should be developed.

The work should include country visits to four to six selected Member States for in-depth discussions with public health officials and experts.

The tenderer will liaise closely with the European STI Surveillance (ESSTI) scheme to avoid duplication of work already carried out by that network.

The work will be provided in a comprehensive report.

The deadline for completion is February 2007.

The tenderer reports to the Head of the Unit for Scientific Advice.

APPENDIX 3: SEXUAL BEHAVIOUR SURVEYS CONDUCTED IN GENERAL POPULATION SAMPLES IN EUROPE, IDENTIFIED BY PROJECT SCREen

Country	Type of survey	Population	Years [reference]	Comment
WHO HBSC countries	Self-administered questionnaire	High school students, 15 years old; target 1,500 in each country	2001–2002 [81]	Questions limited to age at first sexual intercourse, condom use at last sex, contraception
Austria	No individual country survey identified			
Belgium	Self-administered questionnaire	Female patients (<40 years old and sexually active) of 46 GPs offered opportunistic chlamydia screening (N=787)	2001–2002 [82]	Chlamydia screening study, not representative of the general population
	Phone survey	Representative population sample 15–59 years (N=3733)	1993 [83]	Comprehensive survey on sexuality
Bulgaria	Oral questionnaire	Representative sample of male Roma in Sofia, 14–37 years (N=324)	2001 [84]	
Croatia	Self-administered questionnaire	Metropolitan high school students 15–19 years; two waves, 1997 and 2001 (N=2070 and 1972, respectively)	1997, 2001 [85]	
Cyprus	No survey identified			
Czech Republic	Not reported	Representative sample of female 15–24 years (N=4497)	1993	Reproductive health survey
	Not reported	Representative survey of youth 12–18 (N=1011)	1994	International survey (Bulgaria, Czech Rep., Croatia, Slovenia, Slovak Rep.)
	Self administered questionnaire	Representative sample of third year secondary school students in Brno (N= 805)	1997[86]	KABP
Denmark	Interview: structured questionnaire	Representative sample of women aged 20–29 years (N=11088)	1991–1993 [87]	Investigation of human papillomavirus and other risk factors for cervical cancer
	Self-administered questionnaire	Representative sample of men / women 21–23 years in Aarhus County (N= 1033/1175)	1997 [88]	Chlamydia screening study
Estonia	Self-administered questionnaire in schools and mailed for adults	Representative sample of children and youth 10–29 years (N=5982)	2002–2003 [89]	KABP
Finland	Self-administered interview, mailed questionnaire	Representative surveys of people aged 18–54 years in 1971 (N=2188), 18–74 in 1992 (N=2250), 18–81 in 1999 (N=1496)	1971, 1992, 1999 [90]	Self-administered + interview in 1971 and 1992, mailed questionnaire in 1999

Country	Type of survey	Population	Years [reference]	Comment
France	Self-administered + interview questionnaire	Representative sample population aged 20+ (N=2625)	1970 [91]	Comprehensive sexuality studies. KABPs have also been conducted in 1992, 1994, 1998, 2001, 2004 [95]
	Phone survey (CATI, 1992, 2006)	Representative sample population aged 18-69 years (N=20000 in 1992, 12364 in 2006)	1992 [92], 2006 [93]	
	Phone survey	Representative sample of youth (ACSJ) 15-18 years (N=6175)	1994 [94]	
Germany	Phone surveys (CATI)	Representative sample 16–44 years old (N=about 3600 in 2005	1989–2005 (yearly) [96]	Repeated KABP, HIV/AIDS related Chlamydia prevalence studies in selected population have been conducted
Greece	Oral questionnaire	Non representative sample youth 18–25	2000 [97]	KABP
	Interview+ self-administered questionnaire	Representative sample gen. Pop 15–64 in Athens (N=1200)	1989 [98]	KABP
Hungary	Self-administered questionnaire	Representative sample of secondary schools (students), N=3486	1996–97 [99]	Specific study on sexuality and related risk behaviours
	Self-administered questionnaire	Representative sample of secondary students in Budapest	1999 [100]	Health survey with questions on sexuality
Iceland	Postal questionnaire	National representative sample of 17–20-year-olds, stratified by sex with overrepresentation of women, (N=1703)	1996 [101]	Sexuality/ reproductive health survey
Ireland	Phone survey (CATI)	Representative sample of adult population (18–64), (N=7441)	2004-2005 [102]	Comparability with UK National Survey of Sexual Attitudes and Lifestyles
Italy	Self-administered questionnaire	Quota sampling in public venues in four provinces, age 18–49	2002 [103]	KABP (two previous KABP were conducted during the nineties)
Latvia	Self-administered questionnaire	Representative sample of school children aged 11–15, (15-year-olds: N=1265)	1997–98 [104]	General health questionnaire (Health and Behaviour of School Children, WHO cross national study)
Liechten-stein	No survey identified			
Lithuania	No individual country survey identified			
Luxem-bourg	Self-administered questionnaire	Representative sample of school children aged 11–15 years	2002 [105]	General health questionnaire (Health and Behaviour of School Children, WHO cross national study)
Malta	Self-administered questionnaire	Representative sample of the population aged 16 and over (N=5510)	2002 [106]	General health questionnaire

Country	Type of survey	Population	Years [reference]	Comment
Norway	Self-administered questionnaire, postal	Representative sample of population 18–60 (1987, 92), 18–49 (1997, 2002) (N= about 10,000 per wave)	1987, 1992, 1997, 2002 [107]	Sexuality/ reproductive health survey
	Self-administered questionnaire	Representative sample of youth 13–19 years	1992, 2002 [108]	
Poland	Self-administered questionnaire	Sexually active girls, 16–19 years, (N=249), city outpatient clinic of Warsaw	2002–2004 [109]	Chlamydia screening study, not representative of the general population
Portugal	Self-administered questionnaire	Representative sample of 6th to 10th grade school children (N=about 5000)	1998, 2002, 2006 [110]	General health questionnaire (Health and Behaviour of School Children, WHO cross national study) including questions on sexuality
	Interview + self-administered questionnaire	General population sample 18–49 (N=2471)	1991[98]	KABP
Romania	Oral questionnaire	Representative sample of female (N= 4500 in 2004) and male (N= 2500 in 2004) residents	1993, 1999, 2004 [111]	Reproductive health survey
		Representative sample of youth 15–24 years	1996	
Slovakia	No individual country survey identified			
Slovenia	Interviews and self-administered questionnaire	Representative sample of 18–49-year-olds, with oversampling of 18–24 (N=about 1700)	1995-1996 1999-2001 [112]	Fertility survey Comprehensive sexuality survey
Spain	Self-administered questionnaire (CASI)	Representative sample of 18–49-year-olds (N=10838)	2003 [113]	Survey on heath and sexual habits (with regards to Aids)
Sweden	Self-administered, mailed questionnaire	Random sample of Swedish general population aged 16–44 (N=4000 in the first three surveys, 6000 in 2003)	1989, 1994, 1997, 2000, 2003[114].	KABP associated with STIs and HIV/AIDS
	Self-administered questionnaire	17-year-old school attenders (about 2000) and non-attenders (about 200),	1990[115,116]	Survey on adolescent sexuality
Switzer-land	Phone survey (CATI)	Representative sample of the general population 17–45 years old (N=2800) (17–30 until 1990)	1987–1990 (yearly), 1992, 1994, 1997, 2000, 2007 [117,118]	Repeated KABPs
	Self-administered questionnaire	Representative sample of 15–20 adolescents (college and apprenticeship)	1992, 2004 [119]	Survey on adolescent health including questions on sexuality
	Self-administered questionnaire (CASI)	Youth 16–19 years old (college and apprenticeship, stratified sample) (N=4328)	1994-1996 [120]	Survey on adolescent sexuality and relationships

Country	Type of survey	Population	Years [reference]	Comment
The Nether-lands	Participatory action research	Sample of 12–25-year-olds (N=5000)	2005 [121]	Survey 'Sex under 25'
	Interview	Representative sample of general population aged 18–50 (N=1001)	Repeated surveys (N=1000) 1987–1993 [122]	KABP
Turkey	No survey identified			
UK	Face-to-face computer assisted and self-administered (CASI)	Probability sample of population 16–44 years of age (N=about 11000 in each)	1990–91 [123] and 1999–2001 [124]	National Survey of Sexual Attitudes and Lifestyles, comprehensive sexuality survey
USA	Face-to-face+ self-administered questionnaire	Probability sample of community-dwelling persons 57–85 years old (N=3005)	2005–2006 [125]	Comprehensive sexuality survey
	Face-to-face + audio-CASI	Probability sample of household population 15–44 (N=12571)	2002–03 [126]	National Survey of Family Growth
	Self-administered questionnaire	National school-based survey grade 9–12 (N=13953)	Every two years, 1991–2005 [127]	Youth Risk Behavior Surveillance
	Face-to-face + self-administered questionnaire	National household sample, population 18–59 (N=3432)	1992 [128]	National Health and Social Life Survey, comprehensive sexuality survey

Table includes studies selected by SCREen project team as containing most representative data about sexual behaviour in each country.

WHO HBSC — World Health Organization Health and Behaviour of School-age Children survey. Data available from 2001/02 survey, including, Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Ireland, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, the Netherlands, UK. Most recent survey 2005/06 (data not yet available) also includes data from Bulgaria, Iceland, Luxembourg, Turkey.

CASI — computer assisted self-interview; CATI — computer-assisted telephone interview; KABP — knowledge, attitudes, behaviours and practices.

APPENDIX 4: LIST OF ORGANISATIONS VISITED AS PART OF COUNTRY VISITS FOR PROJECT SCREen

Sweden

Country visit 5–9 March 2007, by Nicole Bender and Nicola Low:

ECDC, Stockholm

National Board of Health and Welfare, Stockholm

Swedish Institute for Infectious Disease Control, Stockholm

Youth clinic, Uppsala

Genitourinary medicine clinic, Uppsala University Hospital

Department of Clinical Microbiology, Uppsala University Hospital

Estonia

Country visit 16–19 April 2007, by Jackie Cassell and Nicola Low as part of an ECDC mission. Only locations directly relevant to chlamydia screening included here:

National Institute for Health Development, Tallinn

Health Protection Inspectorate, Tallinn

Dermatovenereology clinic, Tartu University Hospital

Antenatal clinic, Tallinn and Tartu University Hospitals

Youth counselling centre, Tartu

England

Country visit 17–18 May 2007, by Nicole Bender, Jackie Cassell, Nicola Low, Judith Stephenson

Department of Health Sexual Health team and National Chlamydia Screening Programme team, London

National Screening Committee, London

Chlamydia screening offices, Stockwell, Lambeth, Enfield, Oxford

Boots chlamydia Pathfinder project, London

The Netherlands

Country visit 7–8 May 2007, by Nicola Low and Judith Stephenson

Municipal Health Service, Amsterdam

Sexually transmitted diseases clinic, Amsterdam

General practice surgery, Amsterdam

Royal Institute for Environmental and Public Health, Bilthoven

Municipal Health Service, Rotterdam

Ministry of Health, The Hague

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