National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Chlamydia Screening Implementation Netherlands

Impact evaluation and cost effectiveness

Report 210261008/2010

Evaluation team RIVM

National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Chlamydia Screening Implementation Netherlands

Impact evaluation and cost-effectiveness

RIVM Report 210261008/2010

Colofon

Evaluation team RIVM

Contact:
Ingrid van den Broek
Epidemiology & Surveillance
ingrid.van.den.broek@rivm.nl

This investigation has been performed by order and for the account of the Ministry of Health, Welfare and Sports within the framework of 'Interventie en Evaluatieonderzoek' V/210261/01/IE

Abstract

Chlamydia Screening Implementation in the Netherlands: effect-evaluation and cost effectiviness

[The National Institute of Public Health and the Environment (RIVM) evaluated the Chlamydia Screening Implementation (CSI), a large scale programme offering annual screening to more than 300,000 young people in Amsterdam, Rotterdam and South-Limburg. This was the first time such a large group of young people was invited to get tested for STI in the Netherlands. Testing and treating for Chlamydia at large scale aims to bring down the transmission. This trial implementation was set-up to evaluate whether the screening programme was feasible, effective to bring down the prevalence of infections and cost effective. On the basis of this evaluation, the Minister of Health will decide upon a national roll-out of screening. In anticipation of this decision, the program will continue for one year, also enabling further data collection.

The percentage of young people that participated was lower than expected from the start (one out of eight participated) and decreased in subsequent rounds. In the first round 4.2% of participants tested positive for Chlamydia and this decreased to 3.5% in the third year. Predictive modeling showed that screening for ten years will only lead to a small decline in Chlamydia prevalence. If participation rates decrease further, the prevalence will go back towards baseline levels under regular STI-care. The screening is unlikely to be cost effective.

Invitees received a letter explaining how to request a testkit via the internet and send a sample to the laboratory. The programme proved to be technically feasible and participants were enthusiastic about the set-up. 'High-risk-groups' such as young people under 20 years, of non-Dutch ethnic background or from high-risk areas, were less likely to participate, but were more likely to test positive. Questionnaire surveys showed that non-responders often had a plausible reason not to participate (not yet sexually active, not been at risk, tested recently). Participants reported more frequently higher risk sexual behaviour.

Key words:
Chlamydia trachomatis, screening, the Netherlands

Rapport in het kort

Chlamydia Screening Implementatie in Nederland: effect-evaluatie en kosten effectiviteit

Het RIVM heeft de Chlamydia Screening Implementatie (CSI) geëvalueerd, die tussen februari 2008 en mei 2010 jaarlijks aan ruim 300.000 jongeren in Amsterdam, Rotterdam en Zuid-Limburg is aangeboden. Het is voor het eerst in Nederland dat zo'n grote groep jongeren massaal is opgeroepen voor een jaarlijkse soa-test. Door veel mensen te testen en te behandelen wordt Chlamydia minder vaak overgedragen/verspreid. Deze proefscreening is opgezet om te onderzoeken of de screening goed uitvoerbaar is, inderdaad het aantal infecties doet afnemen en kosteneffectief is. Op basis van deze evaluatie beslist de minister van Volksgezondheid of de screening landelijk wordt ingezet. In afwachting hiervan wordt het programma nog een jaar voortgezet, ook om meer gegevens te verzamelen.

Het percentage jongeren dat meedeed was bij aanvang lager dan verwacht (één op de acht genodigden) en liep jaarlijks terug. In de eerste ronde had 4,2% van de deelnemers een Chlamydia-infectie en dit daalde in het derde jaar naar 3,5%. Op basis van modellen wordt geschat dat de screening op de langere termijn, in 10 jaar tijd, slechts tot een lichte daling van Chlamydia-infecties zal leiden. Als de deelname jaarlijks blijft teruglopen, zullen er nauwelijks minder infecties zijn dan bij de bestaande soa-zorg. De screening is daarmee niet kostenbesparend.

De genodigden werd schriftelijk gevraagd om via internet een testkit aan te vragen en een monster naar het lab te sturen. Het programma was technisch goed uitvoerbaar en deelnemers waren er enthousiast over. 'Hoog-risico-groepen', zoals jongeren onder de 20 jaar, van allochtone afkomst of uit hoog-risico-wijken, deden minder vaak mee, maar hadden vaker een Chlamydia-infectie. Uit vragenlijsten bleek dat degenen die niet meededen daar meestal een gegronde reden voor hadden (ze waren niet seksueel actief, hadden geen risico gelopen, of waren recent getest). Deelnemers vertoonden doorgaans in seksueel opzicht risicovoller gedrag.

Trefwoorden:
Chlamydia trachomatis, screening, Nederland

Contents

Summary

The internet-based Chlamydia Screening Implementation (CSI) programme started in three regions (Amsterdam, Rotterdam and South-Limburg) in the Netherlands in April 2008. Young adults (16-29 years old, N=315.000) were invited to participate in two consecutive screening rounds with an interval of one year, by using municipal population registers, in 2008/2009 and 2009/2010. The third round was only partly completed at the time of analysis for the current evaluation (November 2010).

Objectives of the evaluation
The objectives of the evaluation of the CSI programme described here, were to assess the coverage of the programme (numbers of persons reached and participating) and the number of Chlamydia cases found (positivity rates), in order to study the impact of screening on the prevalence of Chlamydia and its long-term reproductive sequelae. The longer-term impact was predicted by using mathematical modelling of epidemiological outcomes, which were further used to estimate the long-term cost-effectiveness of implementation of such a screening programme. A process evaluation has been performed earlier and reported in 2010.

Design of the screening roll-out was adapted for the purpose of evaluation
To optimize the possibilities of an unbiased impact evaluation, the intervention was implemented within a stepped wedge design, i.e. a gradual roll-out in subpopulations representative for the total population, enabling comparisons at different stages of the implementation. Subpopulations or 'blocks' (a number of clusters in the stepped wedge design) were stratified for expected risk for Chlamydia, by equal proportions of clusters labelled as high-, medium- and low-risk based on population characteristics (income level, ethnicity, age group).

Chlamydia Screening proved feasible and was well-perceived
The evaluation has demonstrated that internet-based population screening for Chlamydia is achievable in the Netherlands. Home testing was acceptable to participants, the Municipal Health Service (MHS) managed the roll-out locally very well, IT and logistic processes were appropriately developed, laboratories delivered reports on time and GPs and STI clinics fulfilled their crucial role in achieving successful treatment of positives.

Participation rates were low from the start and decreased with multiple screening rounds
However, the participation rate was much lower than the 30% expected beforehand. The participation was 16% in the first screening round, or 20% when adjusted to the target population of sexually active. The participation rate declined to 12% in the second and 9% in the third round. This decline was higher for repeated invites (10% and 8% in round 2 and 3), but was also visible in newly invited groups.
In the blocks of the stepped wedge design, participation rates in block A (completed three rounds) gradually declined over three rounds, from A1

to A2 to A3, in all three regions; block B1 had similar participation rates to A1, whereas B2 rates were in between A2 and A3. Block C (only entering the screening in round 1) had participation rates lower than A1 and B1 but higher than A2 and B2. This indicates the lower participation rates in consecutive rounds were caused by a combination of overall reduced motivation and lower response at repeated invitations.
In three screening rounds, 24% of invitees participated at least once. Among participants in the first round, 30% participated again when invited for the second round; of people who participated already twice, 51% participated again in the third round.

Higher participation was seen in lower-risk demographic groups but associated with higher-risk behavioural factors
Participation was higher among women, older age groups (20-29), Dutch invitees, in low community risk areas and in high Socio-Economic Status (SES) postcode areas. Participation rates differed between geographic clusters, independent of individual determinants.
Multivariate regression models for participation, including behavioural data from an online general questionnaire, confirmed the above 'low-risk factors' were significantly associated with higher participation, but on the other hand also showed that some behavioural 'high risk factors', such as being in a relationship less than one year or being with someone from non-Dutch origin, and having a history of STI were also associated with higher participation rates.

Rates for repeated participation in the first and second round showed similar associations with demographic and behavioural factors. Men, invitees from Turkish/Moroccan origin or under 20 years old were less likely to participate twice, while people having a relationship shorter than one year, with a non-Dutch partner or concurrent partners were more likely to participate again.

The level of individual sexual risk (calculated by summation of various behavioural risk variables) was higher in CSI participants compared to the average of the general sexually active population of the same age group (from a national sexual health survey). The level of sexual risk among participants in round 2 and 3 was higher than that in round 1, suggesting self-selection of groups at higher risk after repeated invitations. In contrast, the community related factors were less predictive of participation in the second and third screening round.

Positivity rate was overall 4%, declining from round 1 to 2 to 3
A positivity rate of 4.2% was found among participants in round 1. The positivity rates declined in round 2 (4.1%) and round 3(3.5%), although declines were not reaching a significant level. The positivity rates were higher in women, young people under 20 years old, non-Dutch ethnic groups (especially Surinamese/Antillean) and high community risk areas. The decline over the screening-rounds was visible in all three regions, in male and female participants and specifically in higher-risk groups such as high community risk areas, low SES and non-Dutch ethnic groups. People participating repeatedly reduced their chance to get Chlamydia more obviously (reduction from 5-7% to 2-3%).
In the blocks of the stepped wedge design, for positivity rates in block A, a declining trend was seen over three rounds, from A1 to A2 to A3,

in Amsterdam and Limburg (Rotterdam A2 lower); and B2 rates were slightly lower than B1 (not in Rotterdam). Block C had positivity rates slightly lower than A1 but higher than A2, A3 and B2 (not in Amsterdam). This indicates the lower positivity rates in consecutive rounds may have been an effect of the screening and could potentially spill-over to areas not (yet) included in the screening.

In multivariate regression models, the same demographic factors associated with lower screening uptake were also associated with higher Chlamydia positivity, such as younger age, non-Dutch ethnic background, high community risk, low SES, in round 1 as well as round 2. Geographic clusters were not independently associated with positivity rate. Persons who had tested Chlamydia positive in the previous round had a higher chance tot test positive again, especially when they had not participated in the re-screening after six months.

Chlamydia positives were treated adequately, their partners treated or notified but 10% was positive again in a retest

In a questionnaire afterwards, more than 90% of positives said to have visited a doctor and 86% had taken treatment within two weeks after receiving the result of the test. To whom applicable, the majority indicated that their current partner had also been treated at the same time or ex-partners notified, mostly by contacting them directly or (12%) making use of the website for this.

Test packages for rescreening six months after the first test result were returned by two third of positives and one out of ten tested positive again.

The prevalence of self-reported (recent) pelvic Inflammatory Disease (PID) was estimated at 1.6-1.9% among women answering this part of the questionnaire, not different between the three rounds.

CSI's contribution to Chlamydia case-finding in the regions

By comparison of CSI-outcomes with data from surveillance of STI centres and GP networks, we estimated that the number of people tested doubled in the CSI-regions during the CSI-programme. The proportion of Chlamydia cases found in CSI programme was estimated at more than a quarter of all cases found in the screening regions during the course of the first screening round. This proportion reduced to about a sixth in round 3.

Screening procedures were well perceived by participants.

Participants were positive about the set-up of the screening. They appeared to have made informed choices about participating; they were knowledgeable about Chlamydia and participated mainly for their own health. Although some Ct-positives thought the waiting times were long and 10% had some personal problems, more than 95% of them were happy to have participated. Two thirds of the participants were willing to participate again in the next round. In reality we saw that only one third actually did so in round 2.

Non-participants had often made an informed choice not to participate

Almost 70% of non-participants had justified reasons for non-participation: not yet sexually active, recently tested or no (self-perceived) risk of infection. The non-participants were also quite appreciative of the set-up of the screening, but potential barriers for participation were a negative attitude towards the idea of sending a sample by post (26-29% in round 1 and 2 mentioned this) or taking a sample at home (12-20%); the information provided was not clear to everyone (8%). Nearly half of the non-participants were willing to be tested in the future, especially when their perceived risk-status would change. In reality only 5% did so in round 2.

The majority of participants and non-participants stated they were more likely to participate when the interval between screening rounds was one year rather than two or three.

The selection by risk score in South-Limburg worked well

The selection by risk score applied in South-Limburg excluded 37% in round 1 (cut-off point at score 6), 20% in round 2 (cut-off lowered to 5) and 22% in round 3. The higher the risk score, the more likely one was to test positive. The number of invitations needed per Ct-positive case (NNI) was higher in Limburg than in the two cities, but the number needed to screen per case (NNS) was similar as a result of the selection. With lower participation rates (round 3) both NNI and NNS rise.

Population prevalence estimates suggest a small decline during three year CSI in the cities

The prevalence of Chlamydia in the whole population of 16-29 years was estimated by extrapolation of the CSI-results towards the whole population in a weighted analysis taking into account the main demographic characteristics. The population prevalence was estimated at 2.8% in Amsterdam, 3.9% in Rotterdam and 2.4% in South-Limburg during the first round in 2008. The estimated population prevalence declined over the screening rounds in Amsterdam and Rotterdam (in South-Limburg only the maximum estimate declined). These declines, however, were not statistically significant.

Block C (not previously screened) of the stepped wedge design showed a higher prevalence than block A3 (two previous screening rounds). Although differences were not statistically significant, a similar effect was visible in each region, suggesting at least short-term impact of two screening rounds on population prevalence. A decline in prevalence was only visible in the age groups 20-24 and 25-29 years.

There was no visible impact of one screening round on the estimated population prevalence.

Modelling ten years CSI: Screening will reduce Ct-prevalence by 20% if participation rate in round 3 stabilizes

A model simulating the spread of Chlamydia over a population with specified sexual contact networks, Chlamydia prevalence and baseline testing and treatment rates fitted for the urban CSI regions (Amsterdam and Rotterdam) and for South Limburg was used to estimate the Ct-prevalence among men and women in the period of 2001 to 2019, comparing the baseline situation (only regular testing at STI centres and GPs) with a 10 years CSI-programme intervention from 2008 onwards. Participation rates during 2008-2010, as based on CSI-outcomes, caused a direct effect on the prevalence (from 2.8% to 1.7% in the cities and from 1.9% to 1.2% in South-Limburg). Assuming the participation rate in CSI in round 3 can be maintained for the multiple screening rounds thereafter, the prediction shows that after ten years of CSI, the difference in Ct-prevalence between baseline and CSI would be 0.6-0.7%. If the participation rate would drop further in fourth and fifth rounds before stabilizing, the difference would be only 0.4-0.5%. Alternative scenarios of screening, i.e. screening women only, screening younger age groups only (16-24 years) and biennial screening, were less effective in bringing down the prevalence in the simulation.

Cost-effectiveness evaluation

The reduction in the number of incident cases of Chlamydia as a result of ten years CSI-programme, predicted in the epidemiological model (with participation rates sustained after three rounds), was used to estimate the number of Major Outcomes Averted (MOA), in a disease progression model calculating the number of complications (PID, chronic pelvic pain, infertility, ectopic pregnancy and neonatal pneumonia/conjunctivitis) prevented by the screening. This included MOA both (1) directly, by treating the Chlamydia cases detected (reduction of 50% of sequelae) and (2) indirectly, due to a reduced number of future Ct-cases by bringing down the transmission. The costs of the CSI programme were balanced with costs of Ct-cases and MOA, i.e. treatment, health care, hospitalizations, as well as productivity losses due to illness.

The first results of this economic model showed that for the cities, the cost per Ct-case was estimated at €630 and the cost per MOA at €3,700. For South-Limburg the costs per Ct-case were estimated at €930 and the cost per MOA at €5,600. Rough estimates of cost per QALY are discussed.

Based on these (first) estimates, we can conclude that CSI is unlikely to be cost effective. The costs per MOA are higher than shown in previous research.

Conclusion and recommendations

Given the low and declining participation rates, only a small impact on population prevalence is predicted, which does not support nationwide roll-out of the CSI-project in its present form. Although a substantial number of Chlamydia infections was detected, the evidence for effectiveness of this screening programme (as measured as a lasting decline in population prevalence) is limited and systematic, internet-based screening in 16-29 year old persons, as implemented, as well as the alternative scenarios (only women, only people < 25 years, two-yearly screening) are unlikely to be cost-effective.

Other recommendations are:

- Extension of the screening programme with one year was decided to facilitate a potential future (adjusted) screening programme, but at the same time it will provide more insight in participation rates of following screening rounds and the long term impact of annual screening.
- More research is needed on the effectiveness of modified screening scenarios in the intervention areas or mixed models of opportunistic and internet-based Chlamydia screening, which could still contain valuable elements of the CSI-programme, such as the CSI-website and developed IT-programme, automatic re-testing of Ct-positives, facilitated (ex-)partner notification.
- Strengthening the care of Ct-infected individuals (including partner notification and prompt treatment) is needed in order to reduce the high rate of reinfections, not only in the context of screening, but also in the setting of regular STI-care.

List of Abbreviations and Definitions

Block: Group of clusters in the Stepped wedge design, submitted to screening in one consecutive period.

Cluster: unit of invitations, town area or village in the screening region

Community risk: expected high, medium or low prevalence of Chlamydia in cluster, based on three population-based indicators: age-profile (proportion of 16-29 years old), ethnic profile (proportions of Surinamese and Antillean residents (known risk groups), and income profile (proportion in lower income category). In South Limburg, the level of urbanization was also taken into account.

CT: *Chlamydia Trachomatis*

CSI: Chlamydia Screening Implementation

Ethnicity: Definition based on country of birth of the person and his/her parents (country of birth of the mother leading).

EUG Extra Uterine Gravitation

GP: General practitioner

IPCI Integrated Primary Care Information

LINH Landelijk Informatie Netwerk Huisartsen – National network of GP's

LMR Landelijke Morbiditeits Registratie, National Hosrpital surveillance

NNI: Number needed to invite

NNS: Number needed to screen

MHS: Municipal Health Service

Participation: Refers to the proportion of persons eligible to be screened within a population who have both invited for screening, who have requested and returned the test kit.

PID Pelvic Inflammatory Disease

PHS: Public Health Service

Round: Screening round, duration one year

Screening: the systematic application of a test or inquiry, to identify individuals at sufficient risk of a specific disorder to warrant further investigation or direct preventive action among persons who have not sought medical attention on account of symptoms of that disorder [ref]

SES: Social Economic Status

SOAP National Surveillance STI centers

STI: Sexually transmitted infection

Evaluation team RIVM

In alphabetical order:

Ingrid van den Broek (Centre for Infectious Diseases Control, Epidemiology and Surveillance, RIVM)
Gerda Doornbos (Expertise Centre for Methodology and Information Services, RIVM)
Katie Greenland (EPIET fellow, Centre for Infectious Diseases Control, Epidemiology and Surveillance, RIVM)
Mirjam Kretzschmar (Centre for Infectious Diseases Control, Epidemiology and Surveillance, RIVM)
Eline Op de Coul (Centre for Infectious Diseases Control, Epidemiology and Surveillance, RIVM)
Eelco Over (Centre for Prevention and Health Services Research, RIVM)
Marianne van der Sande (Centre for Infectious Diseases Control, Epidemiology and Surveillance, RIVM)
Boris Smid (Centre for Infectious Diseases Control, Epidemiology and Surveillance, RIVM)
Anita Suijkerbuijk (Centre for Infectious Diseases Control, Epidemiology and Surveillance, RIVM)
Ardine de Wit (Centre for Prevention and Health Services Research, RIVM)

In cooperation with the CSI-group, the implementing partners:

Jan EAM van Bergen, Lydia L Pars (STI AIDS Netherlands, Amsterdam, the Netherlands)
Christian JPA Hoebe, Elfi EHG Brouwers (Department of Infectious Diseases, South Limburg Public Health Service, Geleen, The Netherlands)
Han SA Fennema, Rik H Koekenbier (Cluster of Infectious Diseases, Department of Research, Online Research and Prevention Unit, Amsterdam Health Service, Amsterdam, the Netherlands)
Hannelore M Götz, Sander M van Ravesteijn (Division of Infectious Disease Control, Rotterdam Rijnmond Public Health Service, Rotterdam, the Netherlands)

1 Introduction

1.1 Background

Early detection and treatment (screening) of infections with Chlamydia trachomatis is a strategy to reduce complications in infected individuals and to limit the spread of the infection in the population. It is an integral component of a broader package of strategies (including information and education on safer sex) aiming to improve sexual health.

Implementing Chlamydia screening in the Netherlands has been a point of debate for several years. In 2004, the National Health Council was reluctant towards implementing nationwide screening in the Netherlands. Then new data were collected in a population survey in four regions in the Netherlands (PILOT CT 2004). These data suggested that screening, especially in the major cities and according to risk profiles, was warranted. The increases in Chlamydia infections seen in recent years also indicated the need for a more active approach. In 2006, the National Health Council advised that a pilot implementation (Gezondheids Raad 2006) should be started. The Minister of Health issued a directive to perform such a pilot implementation.

In 2007, the Chlamydia Screening Implementation programme received funding from ZonMw and preparation of the programme started, with Soa Aids Nederland as coordinating party and Municipal Public Health Service Rotterdam Rijnmond (GGD Rotterdam Rijnmond), Municipal Health Service Amsterdam (GGD Amsterdam) and Municipal Health Service Zuid Limburg (GGD Zuid Limburg) as implementing partners. The Center for Infectious Disease Control (RIVM/CIb) at the RIVM offered to evaluate the programme.

The aim of the Chlamydia Screening Implementation was 1) to make a serious start in Chlamydia screening and 2) to determine feasibility, effectivity and cost-effectivity. The results of this pilot implementation will be crucial for decision-making about the national roll-out of this screening programme in the Netherlands.

The Chlamydia Screening Implementation programme planned a pilot phase over a period of three years with two complete screening rounds and the first part of a third round, which took place in the period 2008 - 2010. The screening programme will continue until the end of 2011, to bridge the time gap until a decision on the future steps of a National Chlamydia Screening will have been taken.

The current report, compiled at the end of the pilot phase (December 2010), communicates the findings of the programme evaluation by the RIVM. Initially, this document is confidential, informing the decision makers at the Ministry of Health and funding agent ZonMw, as well as the implementing partners and advisers. At a later stage,, this report will be made publicly available. It is important to subject these findings to peer review to validate and confirm results and conclusions, and then

publish them in internationally accessible journals in order to share the knowledge gained. Preliminary publication of this report might jeaopardize such publication.

In brief, an overview of the actual figures of the Screening and the participation and positivity rates are provided in the first section of the report, 'Descriptive Epidemiology'; thereafter, more in-depth analysis of these findings are described in the section 'Impact Epidemiology'. The report also encompasses the results of modelling of the expected long-term effect of the Chlamydia Screening Implementation in terms of epidemiological impact on the population prevalence and the translation of this impact into cost-effectiveness.

1.2 Chlamydia Screening Implementation

The internet-based Chlamydia Screening Implementation (CSI) programme started in three regions (Amsterdam, Rotterdam and South-Limburg) in the Netherlands in April 2008. Young adults (16-29 years old) were invited annually to participate in the screening using municipal population registers. Invitations were sent out at such a speed that within the period of one year full coverage of the target population was reached. In 2008/2009 and 2009/2010 two screening rounds were completed; only the first part of the 2010 invitations are included in this evaluation report. The selection criterion for participation in the major cities was sexual activity (i.e. experience with sexual intercourse). For South-Limburg, additional selection criteria were used to include people at higher risk. A detailed description of the CSI design, its aims, and methods is described in a recent publication in BMC Infectious Diseases (Van Bergen et al., 2010).

1.3 Evaluation of the Chlamydia Screening

The evaluation of the Chlamydia Screening consisted of three parts:
1) feasibility assessment,;
2) effectiveness evaluation;
3) modelling of (cost)-effectiveness.

Ad 1] The first part of the 'feasibility assessment' was a process evaluation of the start-up phase which has already been completed (Op de Coul et al, report 2009). This study provided insight into the challenges and problems encountered in the start-up phase at the level of project-implementation, at the municipal health services, laboratories, IT- and logistic partners, as well as the experience of STI care providers, general practitioners and STI centres with the programme.

Another part of the 'feasibility assessment' was the evaluation of acceptability of the screening among participants, as well as reasons for non-response and the perception of non-participants. For this purpose, questionnaires were sent out to participants and non-responders in round 1 and round 2. The results of round 1 have been described more extensively (Greenland et al., in press) and are presented in this report

briefly in the Descriptive Epidemiology section where they are compared to results from round 2.

Ad 2] The effectiveness evaluation first described the main outcome parameters of the screening and thereafter estimates the impact of screening on Chlamydia epidemiology, focussing on determinants for participation and positivity, estimates of population prevalence and a comparison with the numbers tested and diagnosed in usual care.

Ad 3] The last component of the evaluation studies comprises modelling the effect of annual screening over a longer period of time on the epidemiology of Chlamydia in the Netherlands and a cost-effectiveness analysis of the outcomes of the epidemiological model.

1.4 Evaluation methodology

The effect evaluation used the data generated by the Chlamydia Screening Implementation and data obtained from existing sources and regular surveillance systems. Data sources were:
1) the list of invited persons derived from the municipal registry,
2) the general database generated though process-tracking of logistic and ICT-processes (automatic registration of letters sent by postal mail, test-packages scanned at the time of sending and reception, logins on the website and messages sent via the internet),
3) a general questionnaire available on the programme's website which captured information on education level and sexual behaviour of participants,
4) a treatment questionnaire sent to all participants who tested positive,
5) an acceptability questionnaire sent by e-mail to a random selection of participants,
6) a questionnaire for non-participants sent by surface mail to a random number of non-participants,
7) additional datasources from other surveys (e.g. RNG sexual health survey) and
8) surveillance databases (STI-centres, GP surveillance).

For the purpose of the evaluation, we chose a phased implementation of the screening. This so-called 'stepped wedge approach' enables a sequential roll-out in geographical clusters (neighbourhoods).

Each region was stratified into blocks of neighbourhoods (clusters) expected to have a high, medium or low prevalence of Chlamydia based on three population-based indicators: age-profile (proportion of 16-29 years old), ethnic profile (proportions of Surinamese and Antillean residents (known risk groups), and income profile (proportion in lower income category). In South-Limburg, the level of urbanization was also taken into account. These strata are hereafter called high, medium and low 'community risk'. Clusters were randomized per risk-strata to receive the intervention in three phases (Block A, B and C receiving the invitation three, two, or one time(s), with the aim of including comparable proportions of high-, medium- and low-risk clusters in each of these Blocks.

The schedule in Figure 1.1 shows the timing of invitations per block for Amsterdam and Rotterdam; blocks A and C comprised 1/6th of the population and block B 2/3rd.

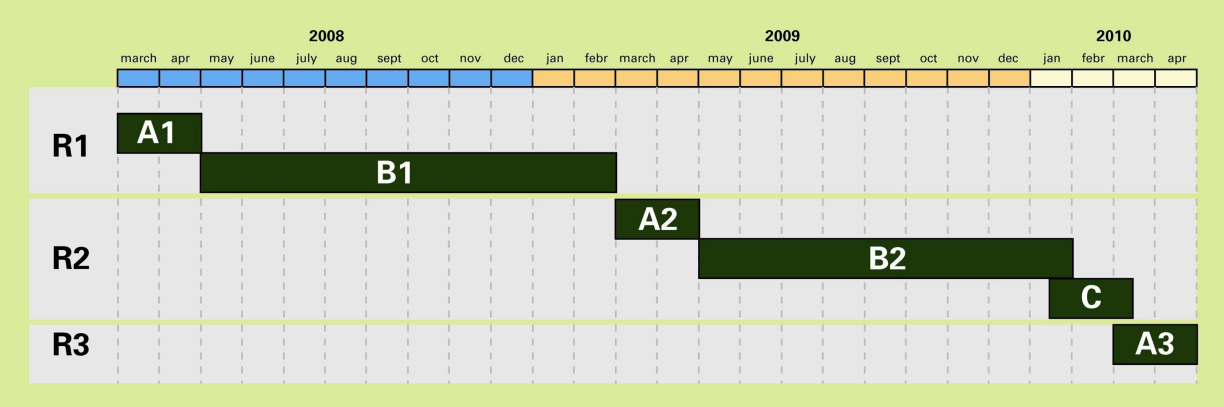

Figure 1.1. Timeline of invitations per block of clusters in Amsterdam and Rotterdam. R1=round 1, R2=round 2, R3=round 3 (see also Appendix).

In Limburg an adapted scheme was used, with blocks A, B and C of equal sizes and timing of invites blockwise added per round (round 1: block A, round 2: block A and B, round 3: block A, B and C).

The design enabled us to obtain insight into the effectiveness of screening (e.g. decreasing prevalence) after one or two screening rounds, the importance of local social and sexual networks in sustaining transmission; and the effect of screening on populations that have not yet received the intervention (ecological time trends). (For more details: Van den Broek et al., 2010; Van Bergen et al., 2010.)

For the analyses in the current report, complete data from round 1 and round 2 are included, but data from only a proportion (one sixth) of the population invited to the third round is included (Amsterdam and Rotterdam: block A; Limburg all invited persons).

In general, screening invitation letters were sent by the municipal health service. However, to investigate whether participation was affected by the origin of the invitation, a small group of people (n=5807) in Amsterdam (ten areas: high and medium community risk) received invitations from their general practitioner instead. In total, 15,035 invitations were sent in those areas.

For participation in South-Limburg, an area with a lower expected prevalence than the cities based on earlier estimates (Van Bergen et al., 2005), we administered a short online questionnaire to select people with higher-risk behaviour. The questionnaire and points scored per answer were the result of a prediction rule modelled on data from the earlier pilot screening (Götz et al., 2005). South-Limburgers who used the login codes provided in their invitation letters to log on to the website were first asked to complete the questionnaire and, depending on the score attained, could thereafter request a test package.

2 Results: descriptive epidemiology

2.1 Screening participation

- The *response rate* (invitees requesting a test package via the Chlamydia website) decreased from 21%, to 14% and 11% in the three consecutive rounds. One in five persons requesting a test package did not return a sample.
- The *participation rate* decreased from 16% (round 1) to 12% (round 2) and 9% (round 3)
- Participation rates among new invitees also decreased between rounds 1 and 3 (from 16% to 14% to 10%).
- Participation was highest among women, over 25 year olds, and in low community risk areas.
- Participation rates were slightly higher among persons invited by the general practitioner than persons invited by the public health service.

2.1.1 Participation rates in each round

Overview of participation: all rounds

Participation in the three rounds together was 13.1%, varying per subgroup and area (Figure 2.1). In total, 256,417 invitation letters were sent in screening round 1, 301,623 in screening round 2 and 80,763 of round 3 invitations were included in the current analyses. See Figures 2.7, 2.8 and 2.9 respectively for flow charts detailing round-specific participation rates.

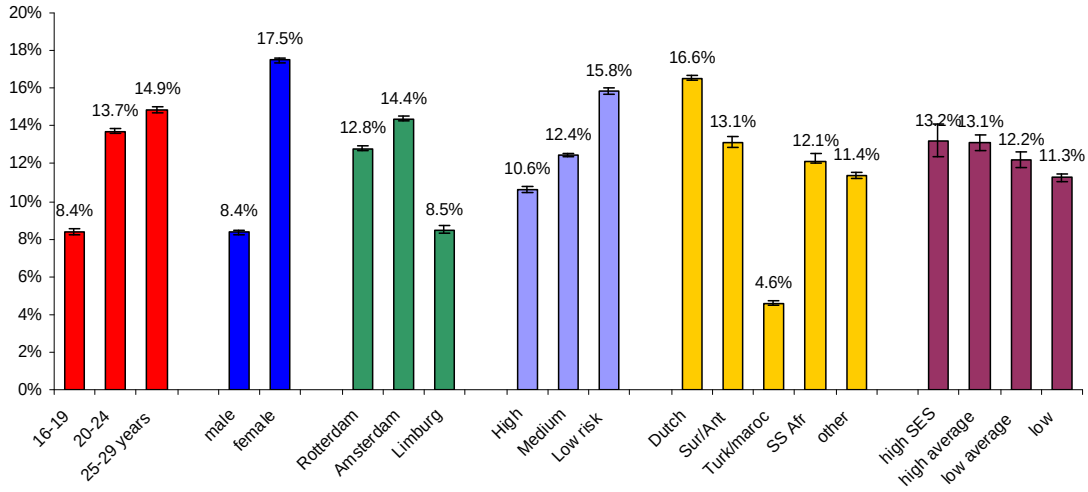

Figure 2.1. Overall participation rate in the three screening rounds by subgroup (numerator: number of samples returned to the laboratory; denominator: number of invitations sent). SES data were available from round 1 and 2 only.

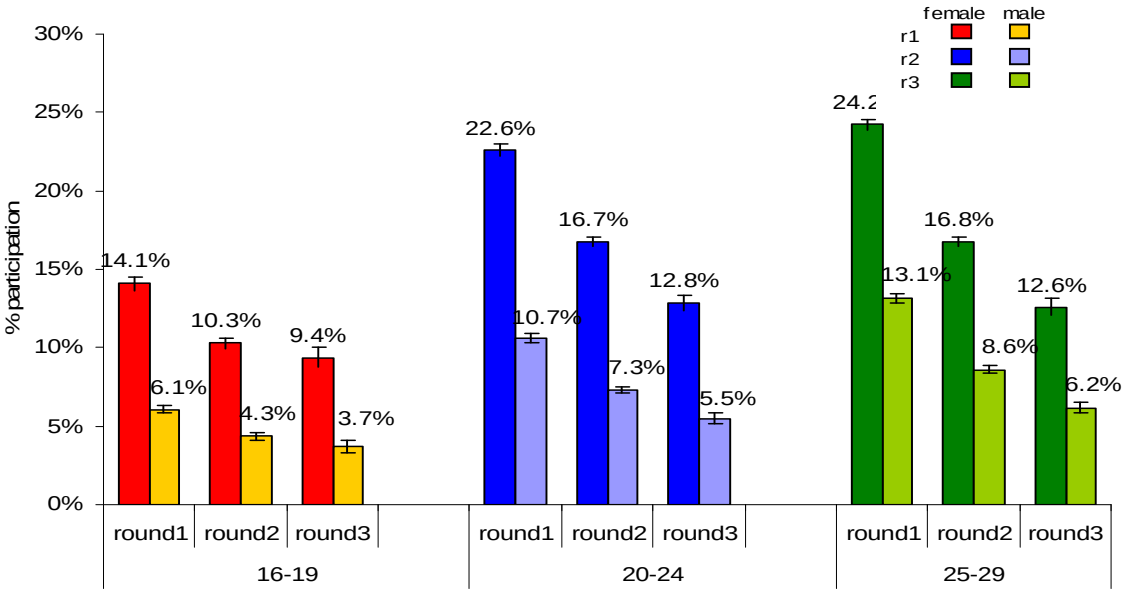

Figure 2.2. Participation rate in the three screening rounds by age-class and gender (numerator: number of samples returned to the laboratory; denominator: number of invitations sent).

Participation was highest in the first round (16.3%), decreasing to 11.5% in round 2 and 8.8% in round 3. Participation was higher in the older age groups than in the younger ones and higher among women than in men in all three rounds (Figures 2.2 and 2.3). Participation rates declined in the three regions per round (Figure 2.4).

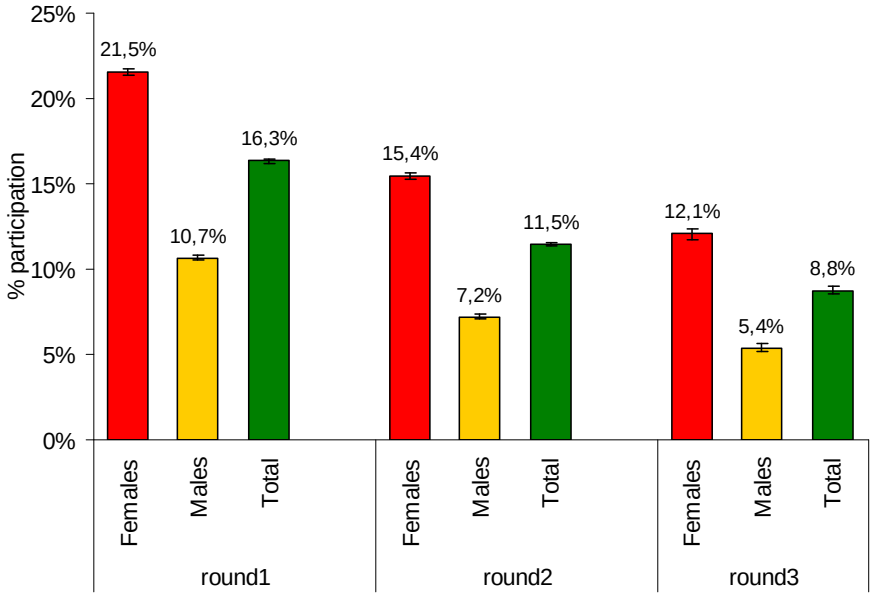

Figure 2.3. Participation rate (%), by screening round and gender.

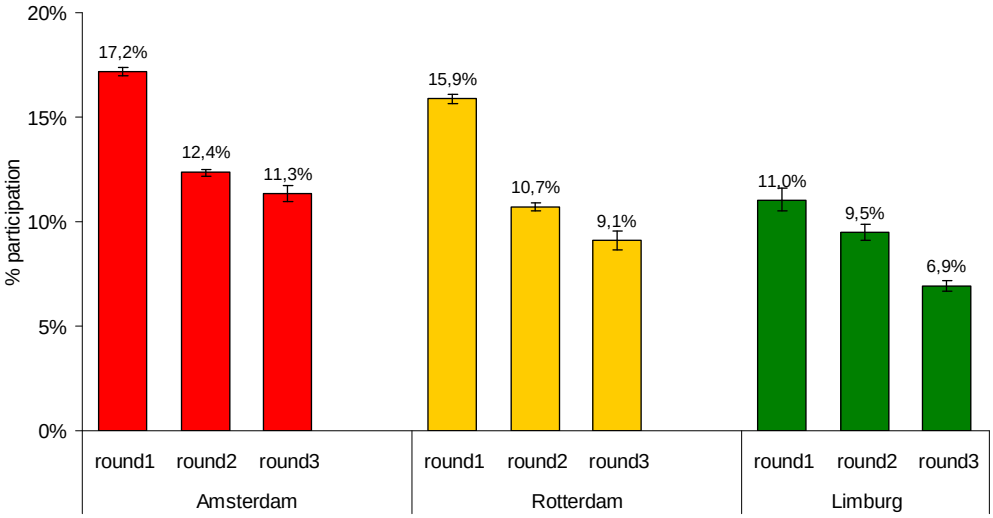

Figure 2.4. Participation rate (%), by screening round and region.

Participation rate: new invitees vs. repeat invitees

The participation rate among individuals newly invited to the screening decreased round by round: from 16.3% (round 1), to 13.7% (round 2) and 10.0% (round 3) (Figure 2.5). Participation in round 2 was higher among people who received an invitation for the first time (13.7%, N=96,969) than among those who received the invitation for the second time (10.4%, N=204,647). Participation rates were lower again among those invited for the third time, decreasing to 8.3% in round 3 (Figure 2.5). For block A (better comparable over three rounds), patterns were similar except that the participation rate among the newly invited in round 2 (15.4%) was similar to round 1 (15.5%).

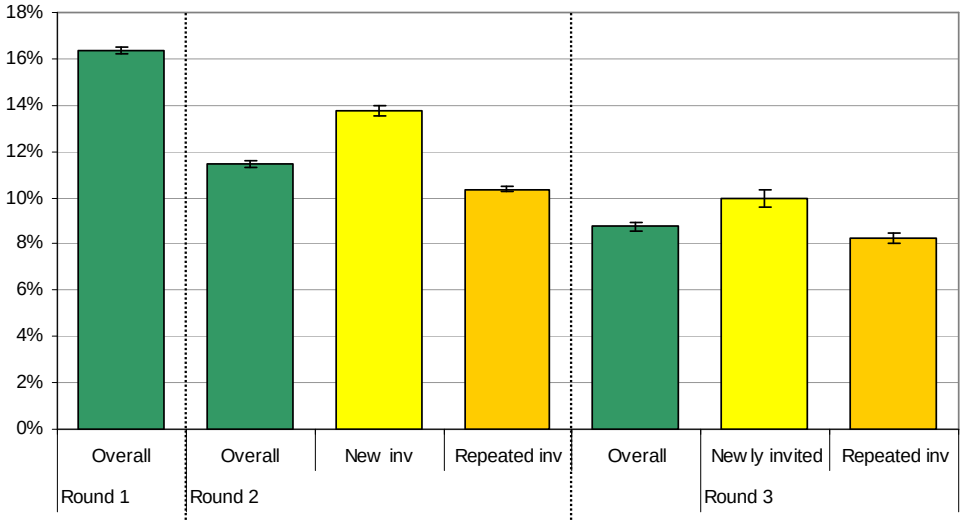

Figure 2.5. Participation rates in the three screening rounds by type of invitee (new or repeat).

Individuals who had already participated in one or two previous rounds were much more likely to participate in the subsequent round: in round 2, 30% of the persons who participated in round 1 and were invited again sent a sample to the laboratory; in round 3 participation was 28% among persons who received a second or third invitation and had also participated in round 1 or in round 2 (Figure 2.6).

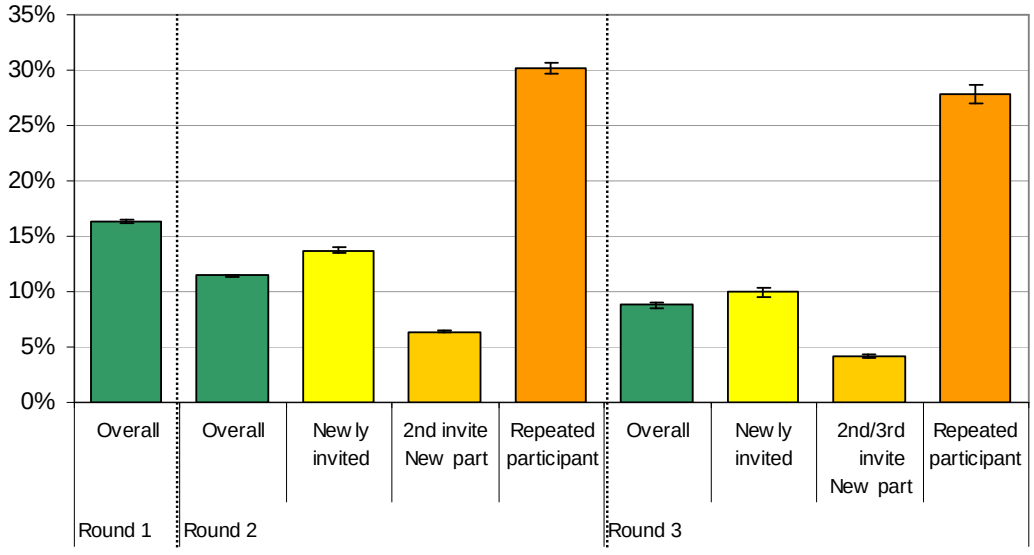

Figure 2.6. Participation rates in the three screening rounds by participation in previous round(s).

Round 1: participation rate
(A1 and B1 in Amsterdam and Rotterdam; A1 in South-Limburg)
In round 1, 20.6% of invitees responded to the invitation by requesting a test package online. Of these, 79.3% returned the sample to the laboratory. The overall participation rate (returned samples) was 16.3%: 17.2% and 15.9% in Amsterdam and Rotterdam respectively, and 10.9% in South-Limburg (where screening eligibility was determined by a risk score). (see Figure 2.7)

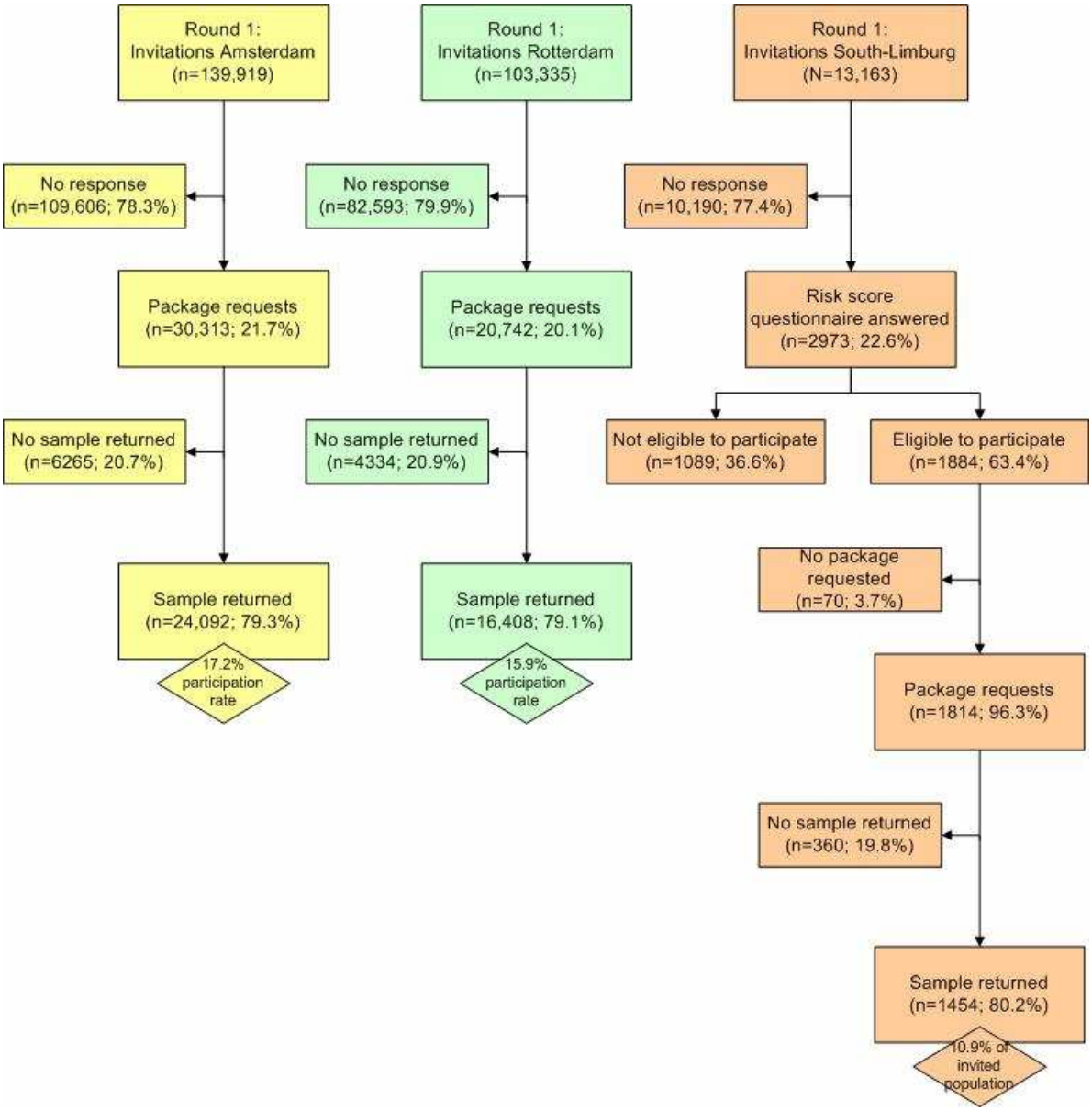

Figure 2.7. Flow chart of participation in screening round 1 by region: Amsterdam, Rotterdam and South-Limburg.

Participation was not uniform across all population subgroups: more women than men participated (21.6% vs 10.7%). Participation rates were lowest in the youngest age group (16-17 years: 7.9%, 25-29 years: 19.0%). Non-Dutch ethnic groups showed lower participation rates than the indigenous Dutch population (21.3%), varying from 18.1% among Antilleans to 5.1% among Moroccans (M: 5.0%, F: 5.1%). Participation was higher in areas with the lowest community risk: low (19.9%), medium (15.4%), and high (13.1%). Highest participation rates were seen among women of Dutch origin (28.7%). The SES score (proxy for socioeconomic status) was also related to participation rate; in higher SES areas participation rates were higher. See also section 2.1.5.

Participation among sexually active individuals

Using data from RNG sexual Health surveys (2006 and 2009) on proportions sexually active by age, the participation rates in round 1 were corrected for the target group of screening, i.e. including only people who had started to be sexually active. The participation rate among sexually active 16-29 year olds (the group targeted by the screening) was estimated at 19.5%; 15% in the youngest age group (16-17 years) (Table 2.1). The adjusted participation rates were calculated for the first round only, but similar proportional increases when selecting only sexually active are expected for round 2 and 3.

Table 2.1. Adjusted participation rates (target population: sexually active individuals) in round 1.

Age	% sexually active*	Crude participation rate (all invitees)	Adjusted participation rate (sexually active population)	Adjusted participation rate (male)	Adjusted participation rate (female)
16	39.6	6.5	**16.2**	10.7	22.2
17	60.6	9.0	**14.9**	13.4	19.3
18	64.3	11.1	**17.2**	9.2	20.4
19	66.7	12.8	**19.0**	10.4	22.3
20	86.9	14.8	**16.9**	10.5	23.9
21	85.1	16.0	**18.8**	11.3	24.6
22	91.3	17.0	**18.6**	12.1	25.4
23	87.5	17.8	**20.3**	13.6	25.1
24	88.9	18.2	**20.5**	13.6	25.2
25	90.1	17.8	**19.8**	13.2	25.6
26	90.1	19.0	**21.1**	13.7	28.0
27	87.4	19.2	**21.9**	15.0	28.4
28	92.0	19.3	**21.0**	14.9	26.7
29	95.4	18.4	**19.3**	13.7	24.7
Total	80.9	**16.3**	**19.5**	**12.9**	**25.1**

* Adjustments based on RNG data. Data 16-24 years: sex under 25 study (Rutgers Nisso Group 2006, sexual health survey among young people, 12-25 years of age, nationally representative by age, gender, ethnicity, education level and level of urbanisation). Data 25-29 years: RNG study 2009, similar sexual health survey among 15-70 year old people).

Round two: participation rate
(A2, B2 and C in Amsterdam and Rotterdam; A2 and B2 only in South Limburg)

In the second screening round, 13.9% of invitees responded to the invitation by requesting a test package online. Of these, 18.2% did not return the sample. Overall, 11.5% of the invitees participated a decline of 30% compared to the first round. Participation rates in round 2 were 12.4%, 10.7% and 9.5% in Amsterdam, Rotterdam and South Limburg respectively (See Figure 2.8).

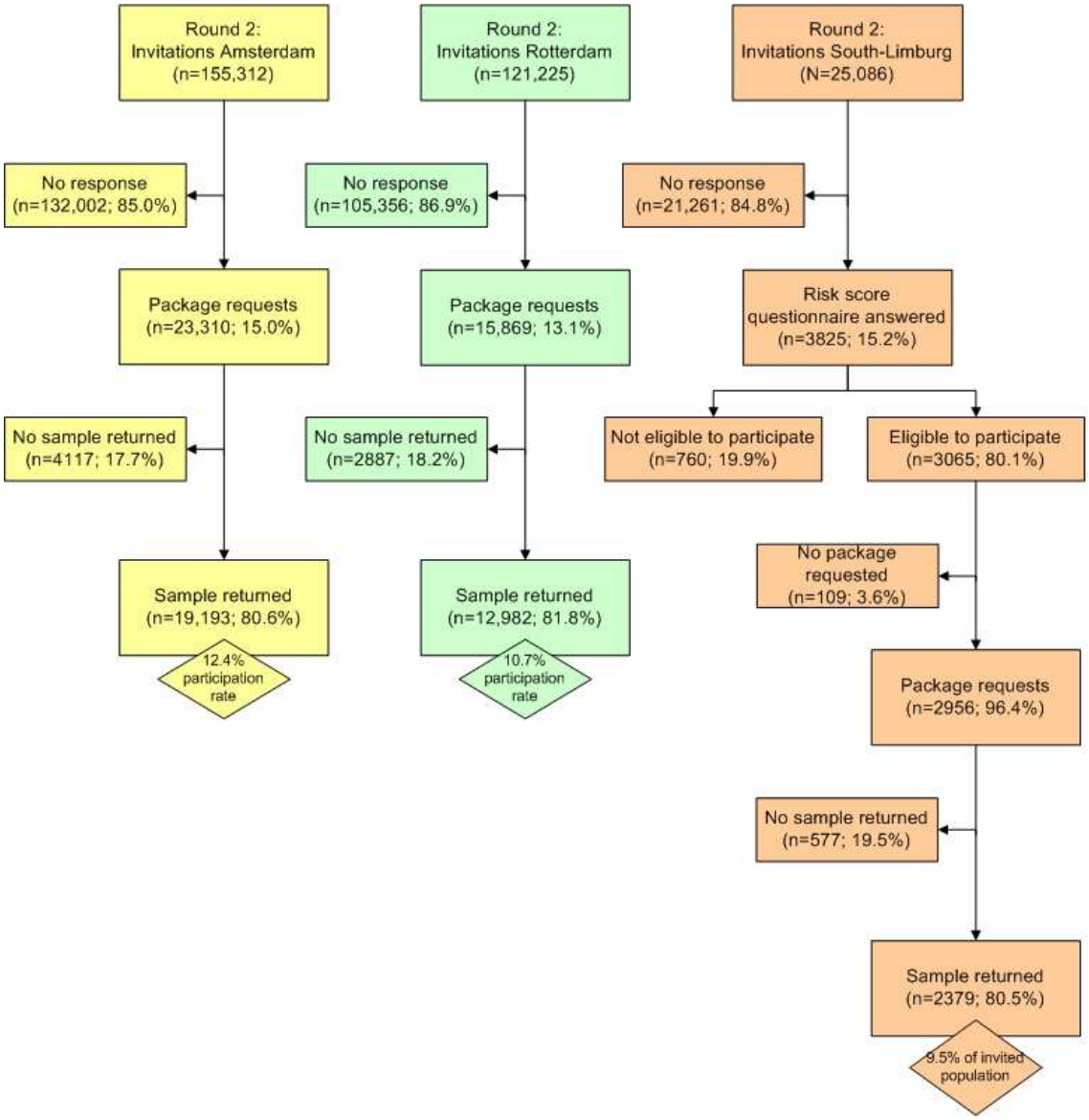

Figure 2.8. Flow chart of participation in round two by region: Amsterdam, Rotterdam and South-Limburg.

As in round 1 participation was higher among women than men (15.4% vs. 7.2%), and the youngest invitees (aged 16-19) participated the least (7.2% participated). Among non-Dutch ethnic groups participation rates varied between 13.3% (Antilleans) and 3.6% (Moroccans). Of the

indigenous Dutch population, 14.7% participated. Participation was once again highest in areas with low community risk: low (13.9%), medium (10.8%) and high (9.5%), and high SES (13.7% vs. 9.6% low SES).

Round 3: participation rate
(A3 in Amsterdam and Rotterdam; A3, B3 and C in South-Limburg)

The overall package request rate was 10.5% in round 3 and 19.4% of these did not return the sample. The overall participation rate in round 3 was 8.8% (M: 5.4%, F: 12.1%), a further decline of 25% compared to round 2. Participation rates in round 3 were 11.3%, 9.1% and 6.9% in Amsterdam, Rotterdam and South-Limburg respectively (Figure 2.9.).

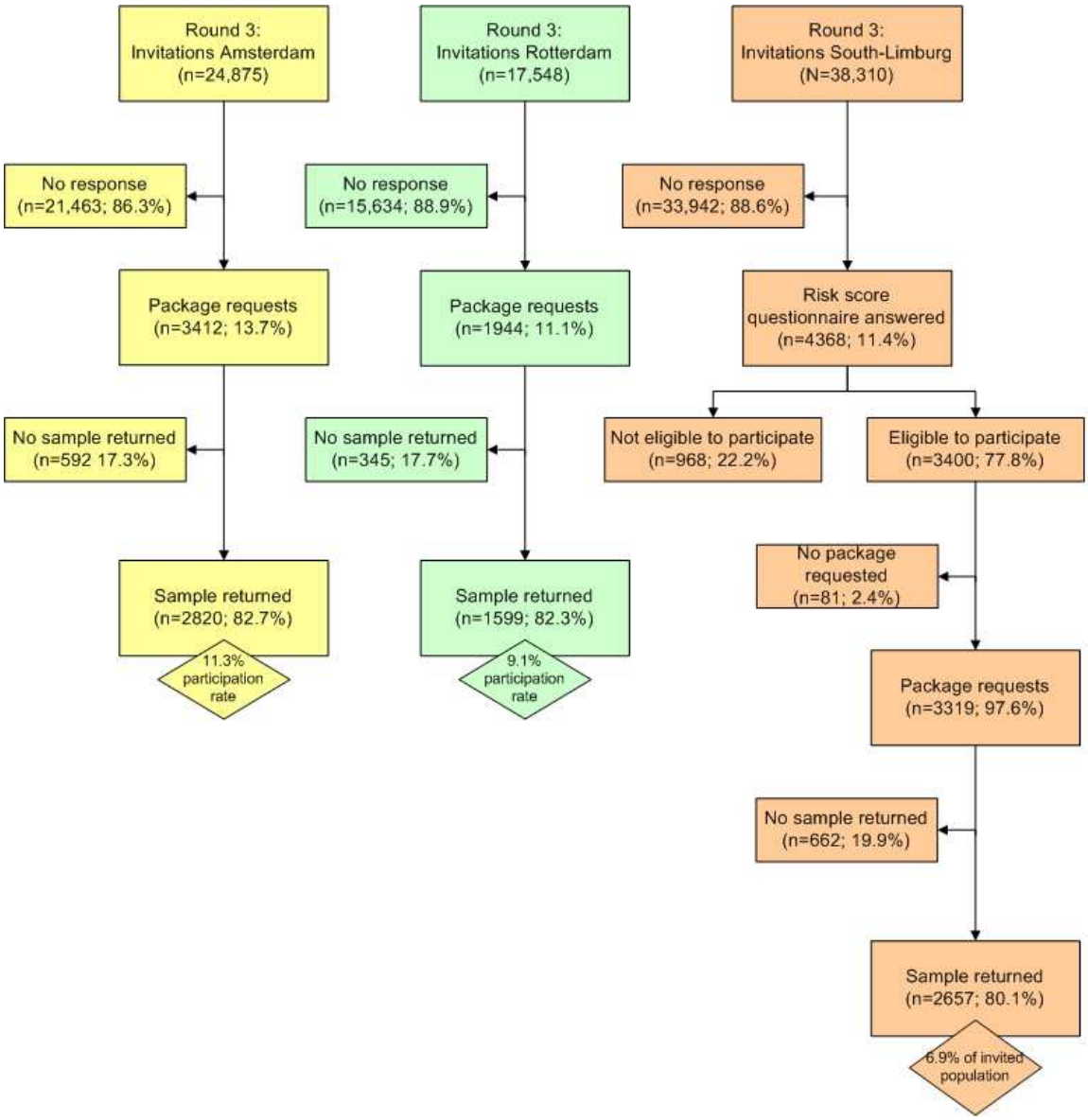

Figure 2.9. Flow chart of participation in round 3 by region: Amsterdam, Rotterdam and South-Limburg.

2.1.2 Invitations sent by GP or PHS

The response rate to the invitations by the GP was higher than the response rate when invitations were sent by the public health service (PHS) in round 1 in 7 out of 9 town areas in Amsterdam where this was piloted (overall GPs: 16.2% (range: 13.7 - 29.1%); overall PHS: 14.9% (13.2-21.6%), p=0.023). Multivariate analyses showed no significant effect of GP invitations (analyses based on a selection of neighbourhoods where invitations were sent by GPs and PHS).
In round 2 the difference was not significant (GP: 10.3% participation and MHS 10.0%), in round 3 only one of these town areas had completed invitations at the time of analysis.

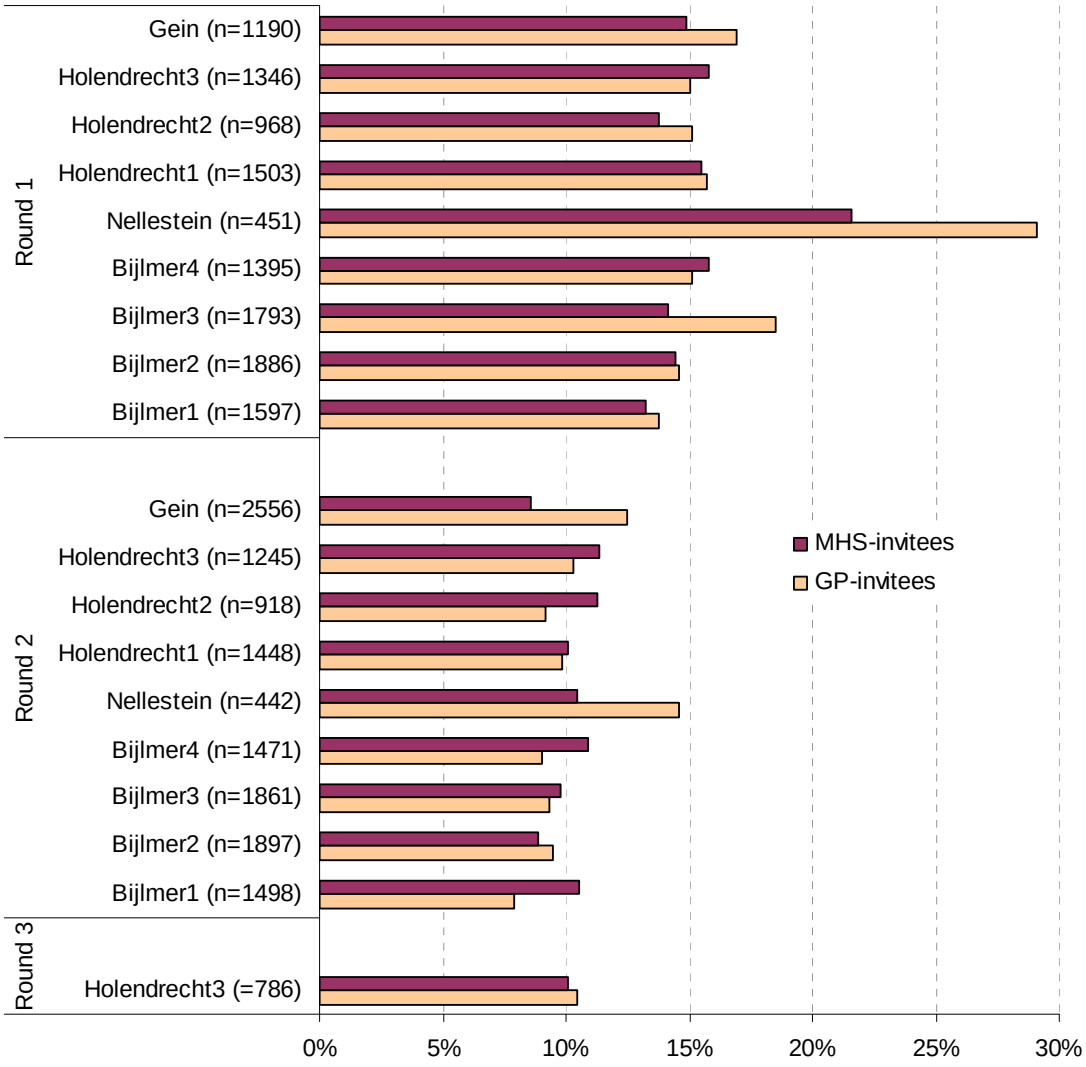

Figure 2.10. Participation rate by GP or PHS invitation in inner-city areas of Amsterdam where invitations were also sent by the GP.

A potential difference in screening acceptability due to being invited by the GP or PHS could not be explored in the acceptability study (see

section 2.1.8) because participants' recollections of who had invited them were discrepant with invitation records; only 14% of acceptability survey participants invited by the GP reported having been invited in this way (when asked in a questionnaire sent three months after invitation).

2.2 Chlamydia test outcomes

- In total 3,436 Chlamydia positives were found among the 83,651 persons tested in three rounds, i.e. 4.0% positivity rate.
- Overall, a decreasing trend in positivity rates was observed from 4.2% the first screening round to 4.1% in the second and 3.5% in the third.
- Higher positivity rates were found in women, young people (<20 yrs), non-Dutch ethnic groups and high community risk areas.

2.2.1 Positivity rates

Positivity rate over the three rounds

In the first round, 1780 Chlamydia infections were diagnosed among screening participants, giving an overall positivity rate of 4.2%: 1280 infections were found among women (4.4%) and 500 among men (3.8%). In the second screening round the overall Ct-positivity was 4.1% (n=1405, F: 4.2%, M: 3.8%), decreasing to 3.5% (n=251, M 3.1%; F 3.8%) in the third round. The overall positivity rate in all three rounds was 4.1% (n=3436/83,651; individuals who tested in more than one round are included separately for each round in the denominator). The positivity rate was higher among young people under 20 years, women, participants from Rotterdam and Limburg, high community risk areas, participants of Surinamese/Antillean and Sub-Saharan African origin or those living in low SES-areas (Figure 2.11).

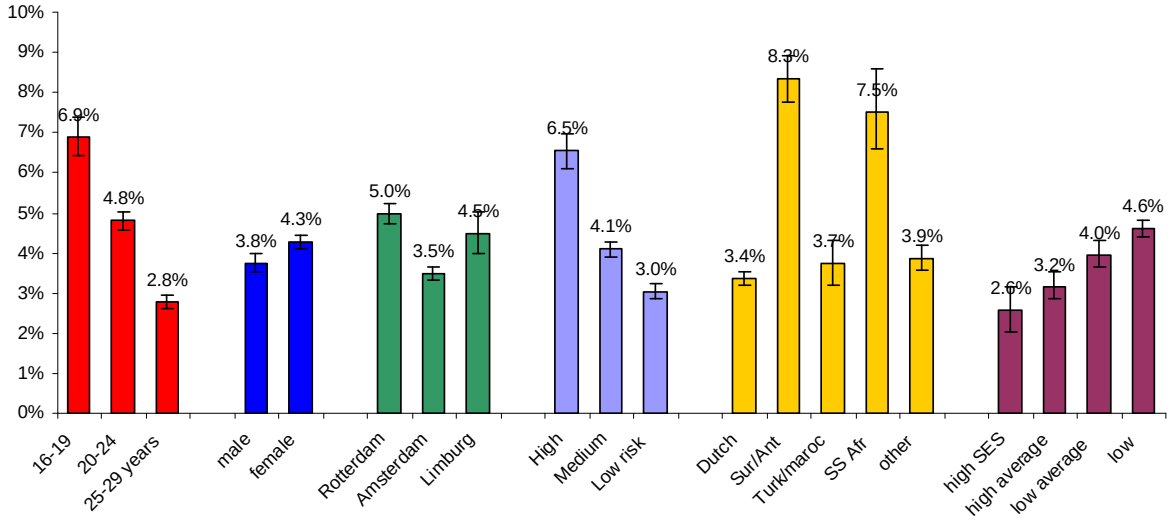

Figure 2.11. Overall positivity rate in the three screening rounds by subgroup (numerator: number of positive tests; denominator: number of samples returned to the laboratory). SES data were available from round 1 and 2 only.

Positivity rates in different subgroups

The overall decrease in positivity from round 1 to round 2 and 3 among participants was significant in the total population. Differences between positivity rates by gender were observed in each round (Figure 2.12) as well as within age classes (Figure 2.13). Overall, the positivity was highest in the youngest age group (16-19 years) and Ct-positivity rates were highest for girls of 16-19 years old (8.0%). With increasing age, positivity rates became more similar for both genders (25-29: 3%) (Figure 2.13). In subgroups by age, gender, region and community risk, the decline was also present but not significant (Figures 2.12 -2.15).

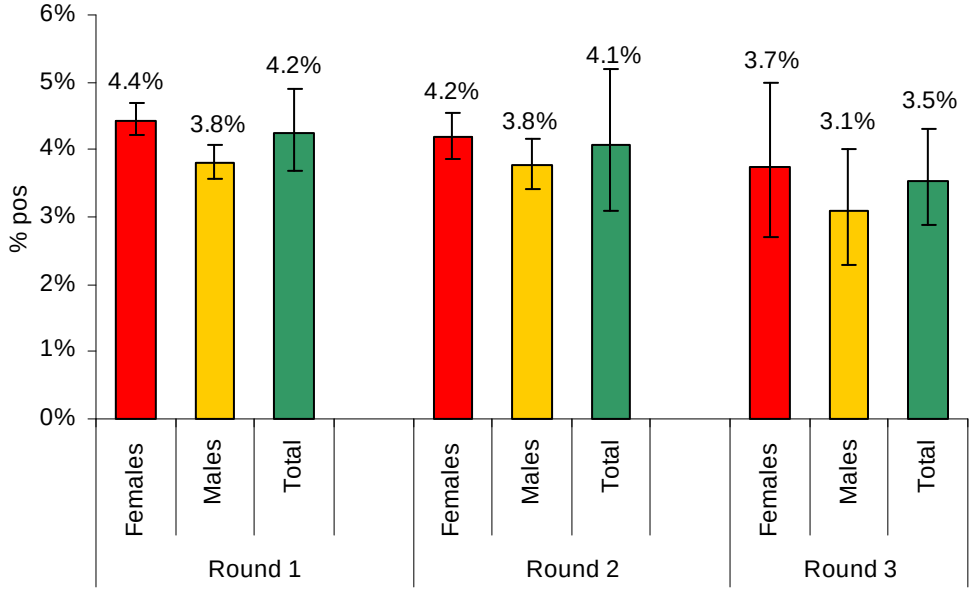

Figure 2.12. Positivity rates (%), by screening round and gender.

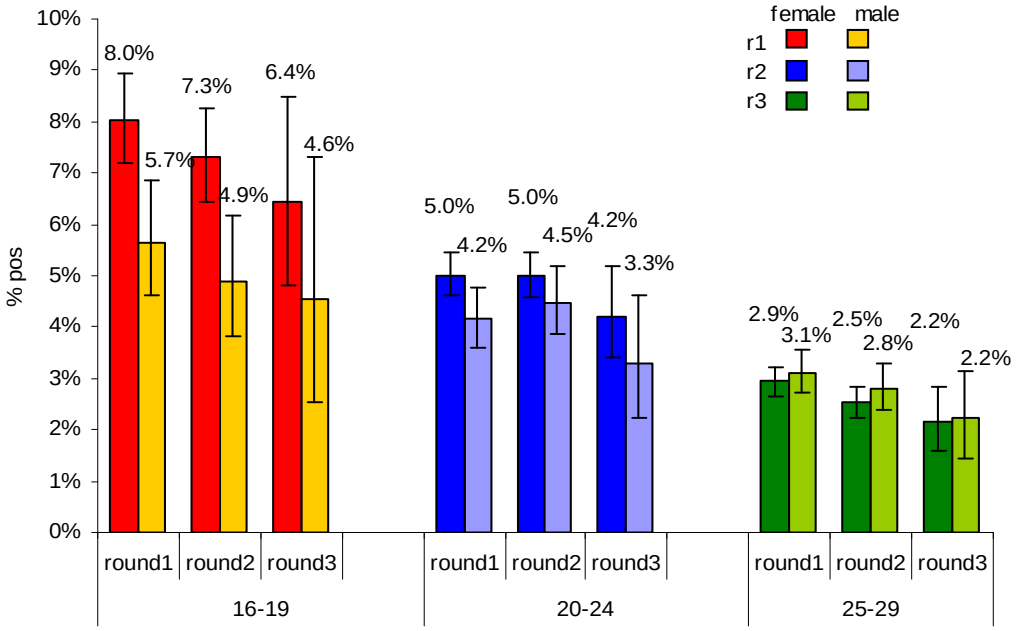

Figure 2.13. Proportion of positive cases by age and gender over the three screening rounds.

Positivity rates were initially higher in Rotterdam and Limburg (both 5.1% in round 1) than in Amsterdam (3.6% in round 1) and this difference remained over the three rounds (Figure 2.14). The positivity rate was higher in the regions with high community risk than in medium-risk areas and in low-risk areas. The decrease in positivity rate in the consecutive screening rounds was more pronounced in the high-risk areas (Figure 2.15).

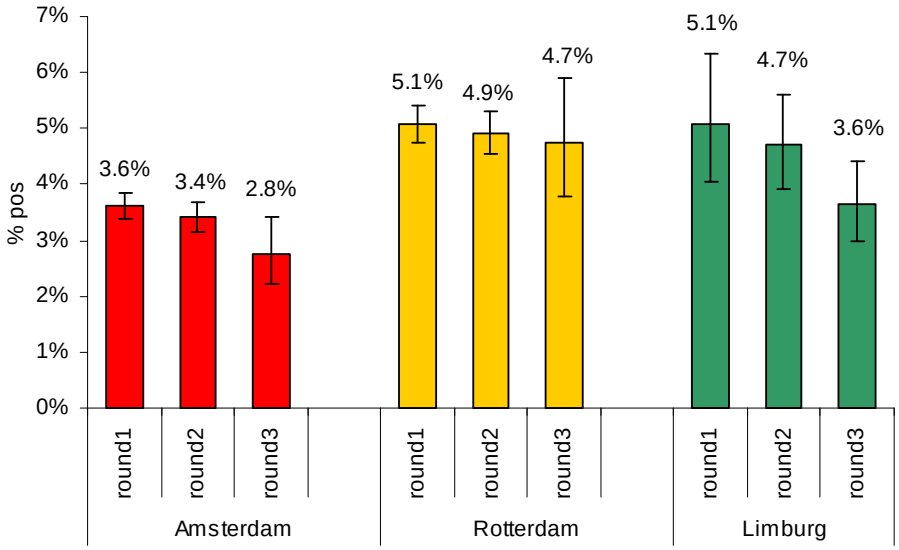

Figure 2.14. Positivity rate (%), by screening round and region.

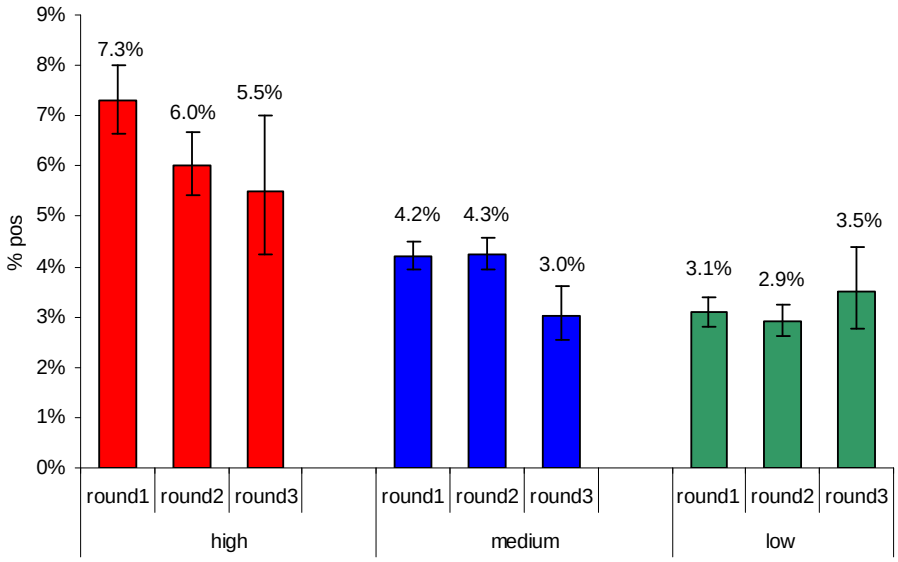

Figure 2.15. Positivity rate (%), by screening round and community risk level.

Based on answers to the general questionnaire, the overall positivity rate among non-Dutch was 5.7% (M: 5.5%; F: 5.8%). Highest positivity rates were observed in Surinamese/Antillean men (9.7%) and women (8.4%) and women from sub-Saharan Africa (9.2%). (See also next section.) Having a non-Dutch partner increased the risk of being diagnosed with a Chlamydia infection independent of one's own ethnic background, especially in women. Ct-positivity was almost 10% among non-Dutch women with a non-Dutch steady partner. Higher educated people had a reduced likelihood of infection than those with a medium or low education (high: 3%, low/medium: ≥ 9%).

Positivity rate: new vs. repeat participants

The positivity rate was lower among persons who had participated also in a previous round (Figure 2.16). There were 2,1% of invitees who participated in all three rounds (n=2776 out of 133,618 persons invited in three rounds, including all invitees at time of analysis). In this group, the positivity rate dropped from 6.0% in round 1 to 3.3% in round 2 and 2.9% in round 3 (Figure 2.17).

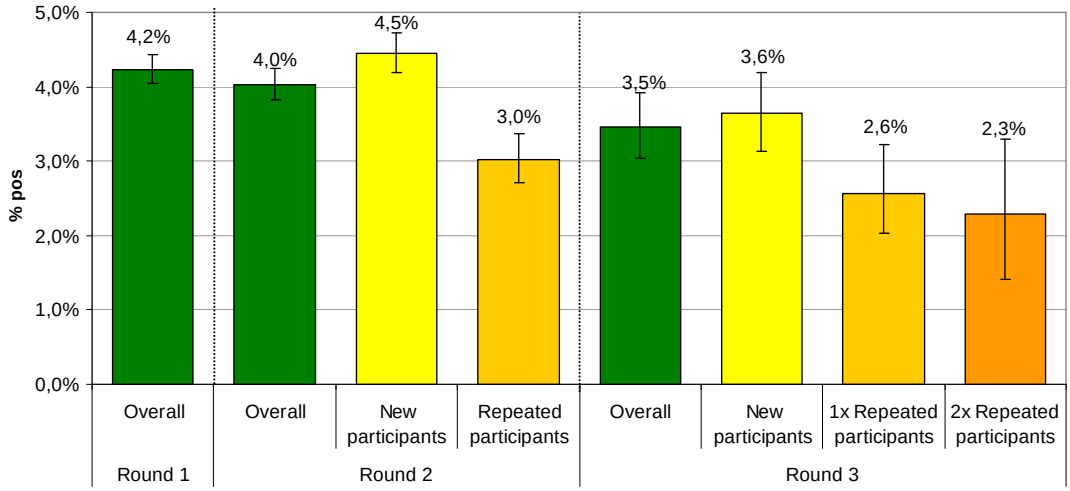

Figure 2.16. Positivity rate (%), in new and repeated participants

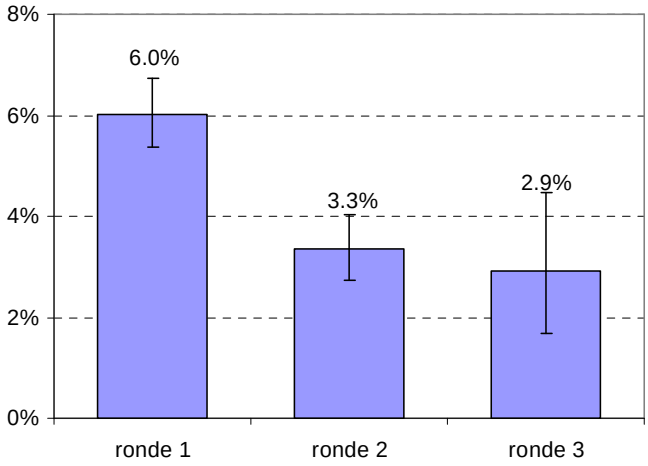

Figure 2.17. Positivity rate (%), in participants in all three rounds (n=2776).

2.2.2 Participation and positivity in different ethnic groups and by SES

- Participation levels were highest in high SES groups but positivity was highest in low SES groups.
- Positivity rates were highest among ethnic groups who participated the least, particularly among people with Turkish, North African, sub-Saharan African and Surinamese/Antillean ethnic backgrounds.

Non-Dutch ethnic groups showed lower participation rates than the Dutch (9.6% vs. 16.8% Dutch over all rounds), whereas positivity rates were higher in non-Dutch versus Dutch (5.4 % versus 3.4%). We wanted to investigate whether socioeconomic status or other demographic factors could explain part of this difference. [The results reported in this section are based on analysis run in August 2010, which could give small differences with tables in the annex].

There is an obvious difference between the various ethnic groups, i.e. we saw a remarkably low participation (4.5%) in persons from Turkey and Morocco (including other countries from North Africa). Positivity rates were highest in the Surinamese, Antillean and Aruban (8.8%) and Sub-Saharan African (8.3%) participants (see Table 2.2).

Table 2.2. Participation and positivity of participants by ethnicity. Number of invitees as denominator for participation.

	Dutch	Turkish and North African (Moroccan)	Surinamese, Antillean and Aruban	Sub-Saharan African	Western, other	Non-Western, other
Participation rate						
Round 1	21.6%	5.6%	15.7%	13.6%	15.5%	10.9%
Round 2	14.8%	3.9%	11.3%	11.0%	11.0%	8.0%
Round 3*	9.9%	3.1%	10.2%	7.7%	8.1%	6.7%
Overall	*16.8%*	*4.5%*	*13.2%*	*11.8%*	*12.4%*	*9.1%*
Positivity rate						
Round 1	3.0%	3.9%	9.4%	9.4%	4.2%	3.9%
Round 2	3.1%	4.0%	8.3%	7.7%	3.3%	4.1%
Round 3*	3.3%	2.3%	6.4%	5.1%	3.1%	2.9%
Overall	*3.1%*	*3.8%*	*8.8%*	*8.3%*	*3.7 %*	*3.9%*

Persons with a higher socioeconomic status (SES) showed higher participation rates, but lower positivity rates compared to persons with a lower SES (Figure 2.18). This association is less clear in the third round of CSI.

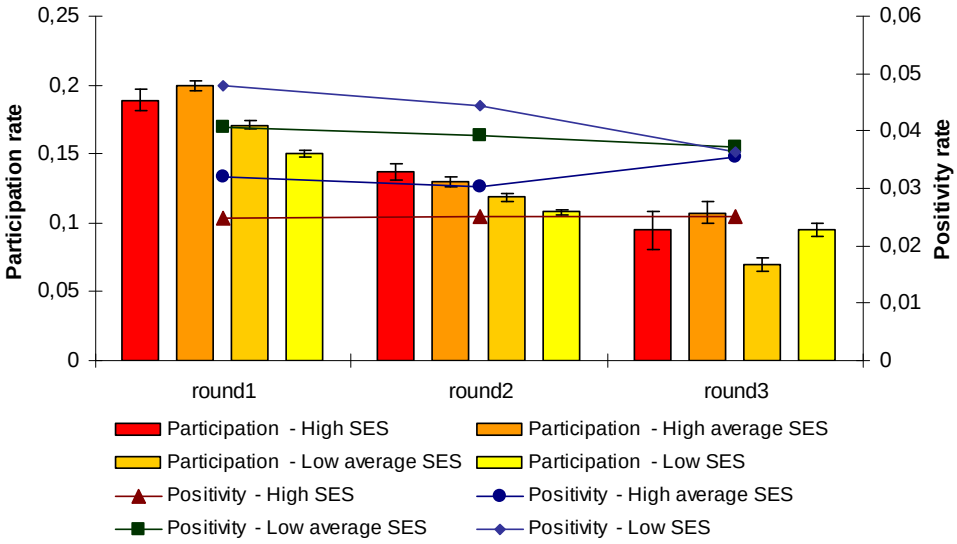

Figure 2.18. Participation and positivity by socioeconomic status (SES). Denominator for participation is the number of invitees.

The positivity rates were lower in high SES groups than in lower SES groups for all ethnic groups, except the Surinamese/Antillean population, where a high positivity rate was observed across all SES classes (Figure 2.19, round 1). In round 2, similar trends within high and low SES groups were observed although the differences between ethnic groups were less pronounced.

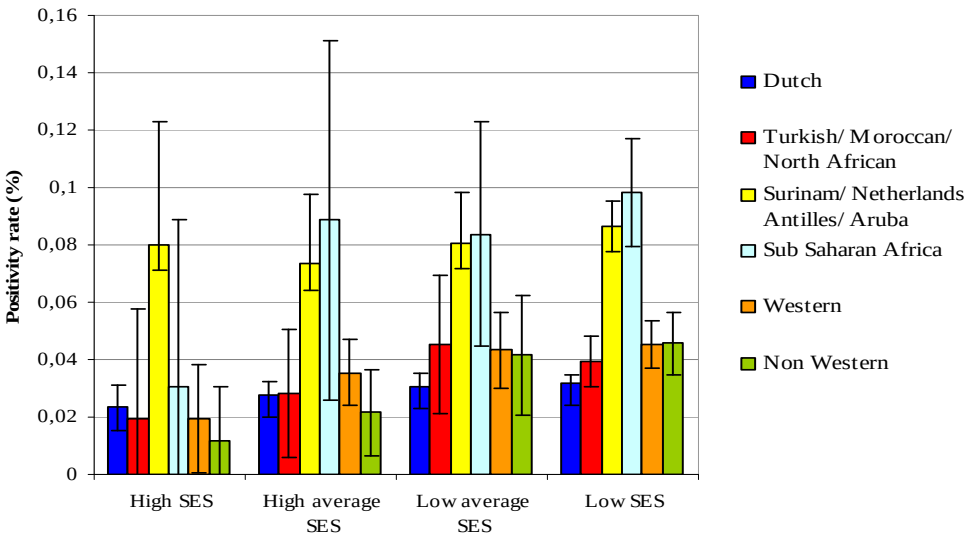

Figure 2.19. Positivity rates (%) of different ethnic groups by SES, round 1.

Overall, participation was lower in Rotterdam than in Amsterdam. Dutch populations in Rotterdam had significantly higher positivity rates ($p<0.05$) than in Amsterdam in all three rounds of CSI. In round 1 and 2 the positivity rates were also significantly higher in Rotterdam in persons originating from the Netherlands Antilles, Sub-Saharan Africa and (in round 1 only) North Africa (including Morocco) than in Amsterdam.

2.3 Follow-up

2.3.1 Reinfections

- Two thirds of the Ct-positives in screening round 1 and 2 made use of the retest sent by CSI; one third of the positives participated again after 1 year in the regular screening.
- One out of 10 was positive when retested. Risk profiles for people who became reinfected were quite similar to those for single Ct-infections.

At higher risk for reinfections were young people (<20 years), specific ethnic minorities (i.e. Netherlands Antillean, Turkish, sub-Saharan Africa). They occurred more often in Rotterdam, and in high-risk areas (Figure 2.20) and (unexpectedly) in high average SES groups (Appendix A3).

Nearly all (97.6%; 1738/1780) first round Ct-positives received a new test package after six months, of whom 67.6% returned a second sample (M: 66.7%, F: 68.0%). Overall 8.3% were again Ct-positive (n=97, M: 7.1%, F: 8.7%) (Figure 2.21). The majority (85.9%) of round 1 Ct-positives were also invited for round 2. Among the 33% of round 1 Ct-positives who also participated again in round 2, 7.6% tested positive again. Most of them (87%) had also been tested in the retest round of six months after the first test. Of the group who also tested in the retest, 6.2% tested positive.

In the second screening round, 1317 of the 1405 Ct-positives (93.7%) received a new test package after six months. Of these, 63.3% returned a second sample to the laboratory (M: 58.0%, F: 65.4%) and 9.8% of these were again Ct-positive (M: 10.7%, F: 9.5%).

In total, 156 infections were found by retesting 1737 people (see Figure 2.21).

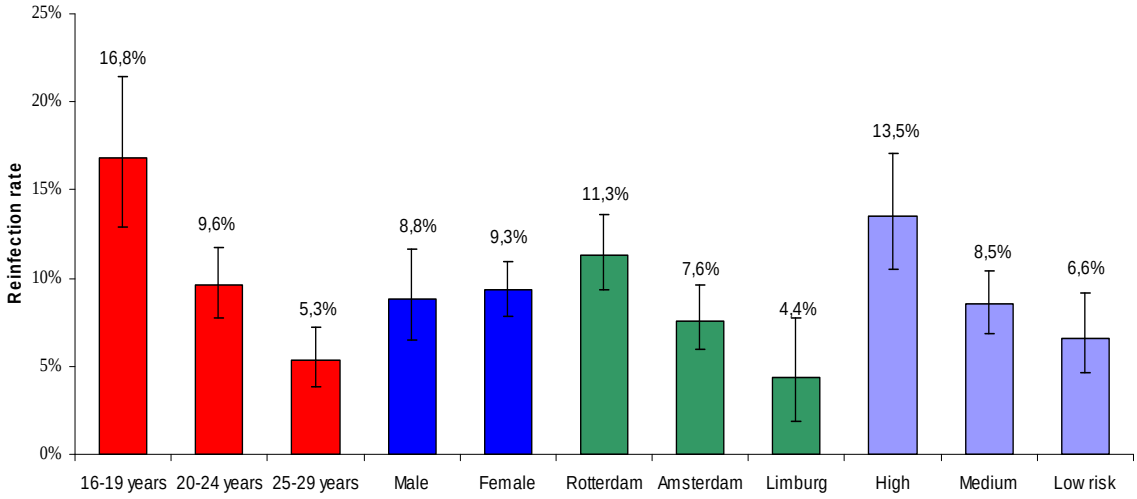

Figure 2.20. Chlamydia reinfection rate in round 1 and round 2 (combined).

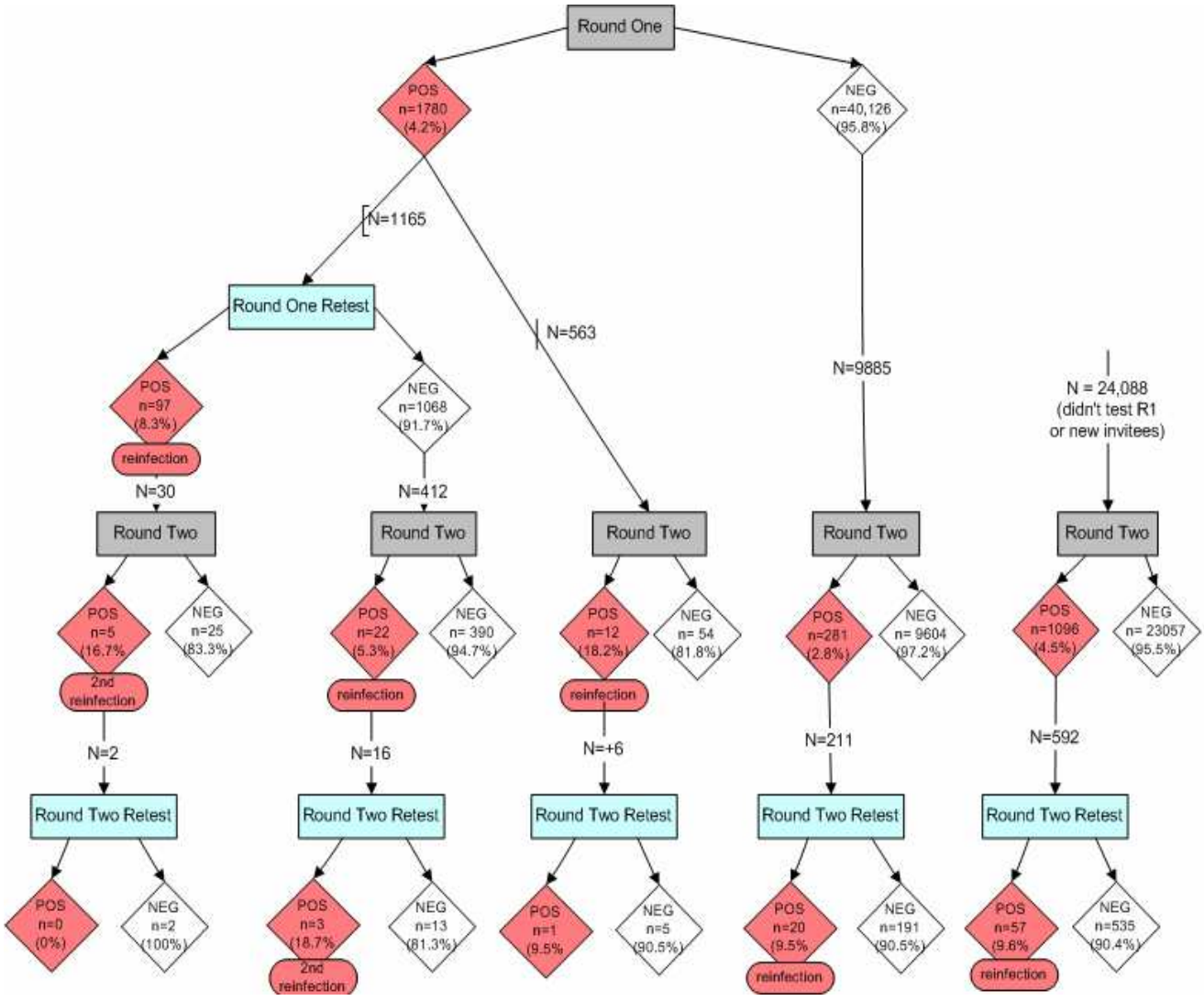

Figure 2.21. Flow chart of Chlamydia reinfections in round 1 and 2 (including the retest six months after a positive test result).

2.3.2 Treatment and (ex-)partner notification among Ct-positives

- The majority (86%) of Ct-positive participants in the screening were treated within two weeks after checking their test-result online.
- 80% of Ct-positives with a current relationship reported direct partner-treatment.
- The option to notify ex-partners via the website was used by 16% of Ct-positives with past relationships.
- One third of ex-partners notified in this way participated via the screening programme, 28% of whom were Ct-positive.

Screening participants were notified when their test result was available online (by e-mail or SMS when e-mail address and/or telephone number were provided). More than 80% of respondents checked the result within three days (82% in round 1, 87% in round 2 and 91% in round 3), 95% had checked within two weeks.
A small number of positives never checked their result: 5% in round 1 (n=93), 4% in round 2 (n=56) and 6% in round 3 (n=14). Persons who had not checked their result within a reasonable time after being notified that results were available, were informed that they tested positive by postal mail, i.e. a letter sent by the PHS. In Rotterdam 121 letters were sent to Ct-positives in Amsterdam 96 and in South-Limburg 17 (overall 7% of Ct-positives).

Persons who tested positive for Chlamydia were asked to fill in a questionnaire 10 days after they received and checked their online test result. The response rate to the questionnaire was 47% in the first round (790/1780 Ct-test positives) and 40% in the second round (566/1405) and 39% in round 3 (99/251). The responses for each round were similar and therefore combined results for both rounds are shown here.

Visit to doctor and treatment
The median number of days between checking the result online and visiting the doctor was four days (range 0-200 days). Altogether, 91% of positives indicated having seen a medical doctor, of whom 82% consulted a GP,15% went to an STI clinic and 3% went elsewhere. Of the remaining 9% who did not go for treatment (n=127), 44% indicated not to have had time (yet), 31% could not find the referral letter, 25% had another reason (Figure 2.20) Only two persons reported not going for treatment because they didn't have any symptoms.

Among the 91% of Ct-positives who saw a medical doctor, 94% reported having taken treatment, 3% had not (yet) taken treatment and 3% did not answer the question (Figure 2.22). Overall, 86% of Ct-

positives were treated (94% of 91% who sought treatment). Among those who took medication, 86% took it the same day or the day after the doctors visit and 94% reported taking it within three days. Fourteen days after visiting the doctor all people who reported being treated had taken their treatment.

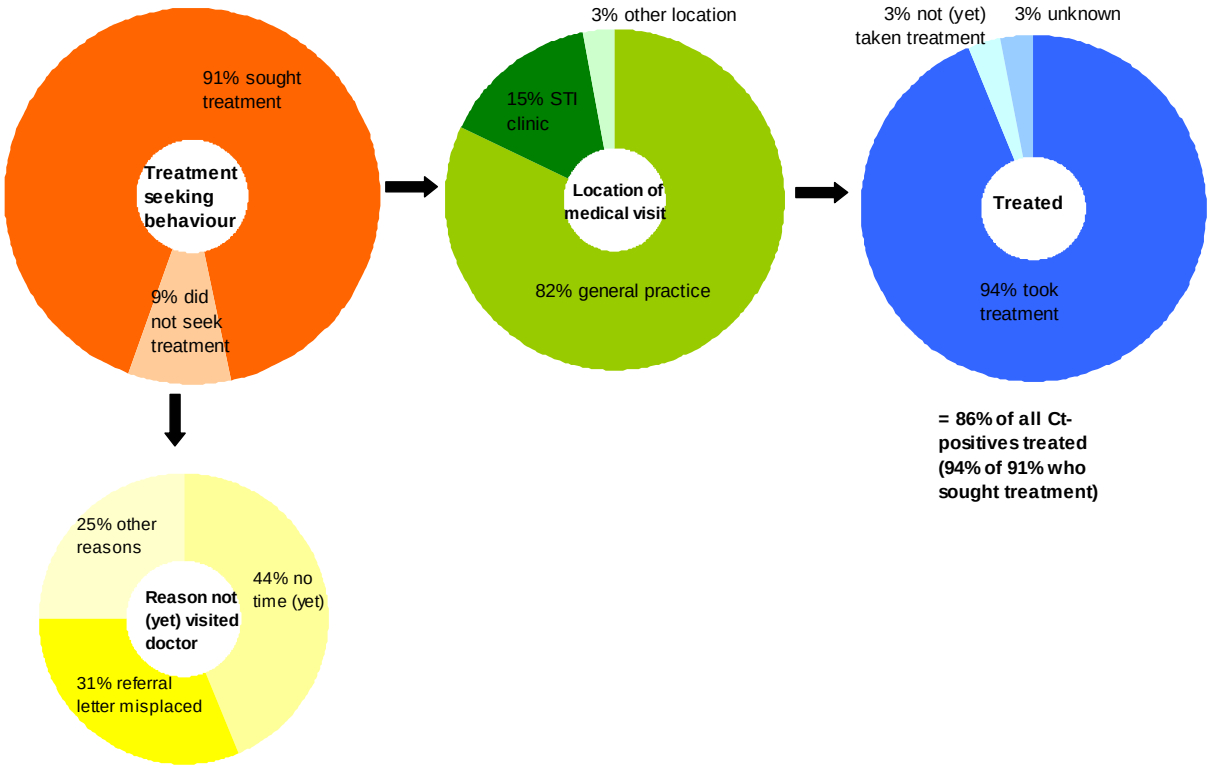

Figure 2.22. Management of Ct-positive individuals identified in the first two screening rounds.

(Ex-)Partner treatment and notification

Sixty-five percent of respondents of the treatment questionnaire (Ct-positives) reported having a current partner, of whom 80% indicated that their partner was treated for Chlamydia at the same time as them (standard practice is to treat partners of index patients without testing). Altogether about 65% of all participants had a current partnership. In the three rounds together (total 3436 Ct-positives) we can therefore estimate that 1787 of a potential 2233 partners of index patients were treated.

About 68% of Ct-positives reported having past relationships, of whom 75% reported having notified their ex-partner(s), either by contacting him/her directly (83%), informing them via the STI clinic (0.5%) or making use of the possibility to anonymously notify ex-partners via the Chlamydia screening website (16%), so that they could request a test kit for themselves.

In the first screening round, 212 screening participants (about 18% of estimated 1210 Ct-positives with ex-partners) notified 391 ex-partners via the Chlamydia screening website. In total, 108 (28%) of the notified ex-partners participated, among whom 29 (27%) were Ct-positive. In the second round, 251 ex-partners were notified by 150 participants (about 16% of 955 positives reporting ex-partners). Of those, 82 participated (33%) and 24 tested positive (29%). In the third round so far, 15 screening participants informed 33 ex-partners, of whom 14 participated and 3 were positive.

2.3.3 Self reported PID

- 1.6-1.9% of all female screening participants may have had a recent PID.
- The proportion reporting a recent PID did not differ between Ct-positives and Ct-negatives.

From December 2008, a few questions on (self-reported) PID were added to the general questionnaire. The main question was phrased as: 'have you been diagnosed with a pelvic infection* in the last 12 months?
(* this means an infection in the ovaries or the uterus, not the bladder). The question appeared at the end of the general questionnaire in which no questions were obligatory. When the above question was answered affirmatively, two more questions followed on diagnosis and treatment.

Altogether, 4238 women answered this question (977 in round 1, 2673 in round 2 and 588 in round 3), i.e. a response rate of 10.6% among female screening participants who filled in the general questionnaire (n=40.034).
A bias may have been created by selective response by women with experience with PID. Furthermore, we asked whether they had a PID in the last 12 months, but some women who had an episode of PID in the more distant past may have 'told their story' here as well.

Burden of PID
A total of 69 women (1.6% of respondents) answered 'yes' to having been diagnosed with a pelvic infection in the last year. Ninety-three percent answered 'no' and the remaining 5.2% responded 'I don't know for sure.' Among these 221 'unsure' individuals, 15 were potential PID cases, describing either ovarial infections checked by ultrasound (echoscopy) or other related medical procedures, or reporting symptoms analogous to infection. These 15 individuals may have had a recent PID which would increase the burden of PID among respondents to 1.9%. Other women often stated not being sure because it was never tested, and described a variety of complaints (many self-diagnosed), including other medical problems (e.g. complaints of abdominal pain, symptoms of vaginal infections, results of cervical tests for cancer screening).

The proportion of women with a (potential) recent PID was not different between women who tested negative and positive in the screening (1.7% versus 1.5% respectively) and did not vary much across the three screening rounds.

PID diagnosis

Of the women who stated they had had a PID, about half had been diagnosed by the GP and the other half in the hospital, 18% with laparoscopy. Of the women who were not sure if they had a PID, more than two thirds had only been to their GP for diagnosis (NB question not filled in by everyone).

PID treatment

Twenty percent of those who had a PID said they had not received any treatment, 23% had taken a single-dose antibiotic, while 30% had completed a 10-14 day course of antibiotics, others had had another, not-specified treatment. Of the women in the group who were not sure if they had a PID, more than 50% said they had not been treated for it, 21% had received a single dose antibiotic and 7% a 10-day course of antibiotics.

2.4 Acceptability and non-response

2.4.1 Acceptability of screening among participants

- More than 90% of participants evaluated the set-up of the screening positively (sampling at home, posting samples, receiving results via the internet) and were happy they took part, regardless of test results.
- People who only participated in the second round most frequently said they 'forgot' or 'had no time' to participate the previous year.

To assess the acceptability of CSI internet-based Chlamydia screening using home-testing kits, online questionnaires were administered to a proportion of participants who provided their e-mail addresses (51% and 47% of participants in round 1 and round 2 respectively) at the time of package request. We performed a weighted analysis, taking into account response rates and sampling schemes.

Round 1 results

The questionnaire response rate was 63% (3508/5590). Participants most commonly reported participating for their own health (63%), 28% of participants participated out of curiosity, 2% at their partner or family's request and the remaining 7% for other reasons (often mentioned: to support the research; see Table 2.3). Participants were positive about all aspects of the screening design (Figure 2.23).

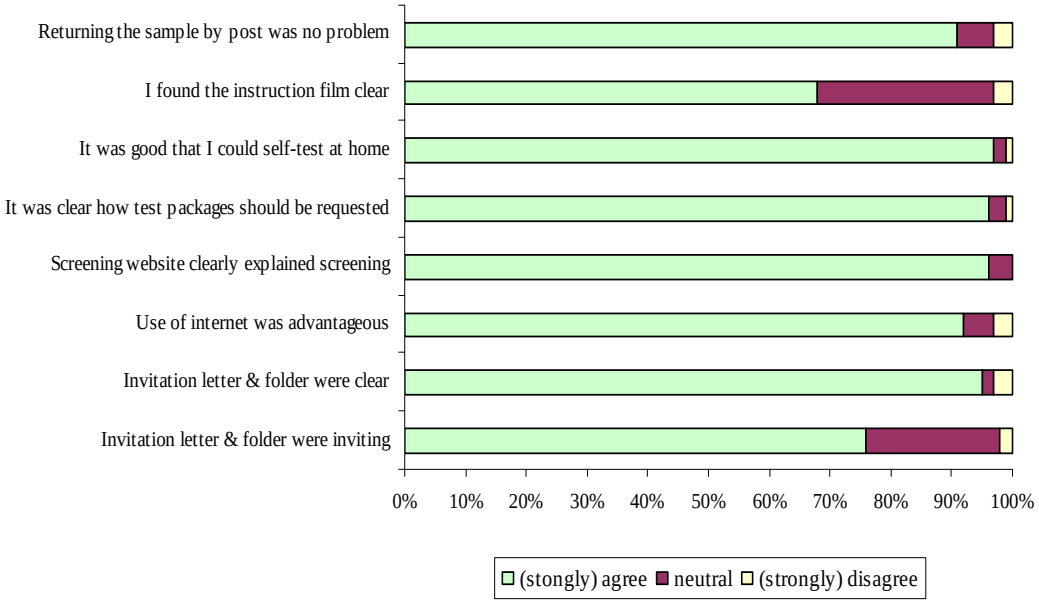

Figure 2.23. Participants' opinions on the screening design.

Nearly all women (96%) participated using the default vaginal swab kit. Turkish women more frequently (24%) opted for urine kits ($p<0.001$)

and were more likely to find vaginal swabs 'unpleasant' than other urine test kit users (73 vs 42%, p<0.001). Women using the swab kit found it easier to use than women using the urine kit (94 vs 85%, p<0.001).

Almost all participants (98%) accessed the website without a problem. The majority of participants were very satisfied with receiving results by internet, regardless of their Chlamydia status (Table 2.6). The 4% who were not satisfied with the use of internet to receive results often reported having forgotten their password or would have preferred a telephone call or letter with the results.

Table 2.3. Participants' experiences receiving results (round 1).

	% of Men (N=828)	% of Women (N=2671)	*P*-value	% of Chlamydia positives (N=261)	% of Chlamydia negatives (N=3238)	*P*-value
Receiving results by internet						
Very good	76.8	76.5	0.502	83.7	76.3	<0.001
Good	19.4	19.6	0.551	12.8	19.9	<0.001
Other	3.8	3.9	0.805	3.5	3.8	0.534
Perception of result waiting time						
Good/Acceptable	97.8	97.9	0.644	92.0	98.1	<0.001
Too Long	2.1	2.1	0.692	8.0	1.9	<0.001
Reaction to test result						
Shocked/Disbelieving	2.6	4.8	<0.001	81.2	1.2	<0.001
Relieved	55.1	61.4	<0.001	18.5	61.1	<0.001
Happy to have participated	85.8	89.3	<0.001	97.8	87.9	<0.001
Concerned about health	10.7	12.6	<0.001	75.9	9.6	<0.001

All percentages reported are weighted to account for oversampling.

Round 2 results

In round 2, 6700 persons were invited to fill in an online questionnaire for a second acceptability survey. One third (N=2533) of these were round 2 participants who also had participated in round 1 (1-1 participants) and one quarter (N=1680) had not participated the previous year (0-1 participants); a third group was 'new' to the screening (N=2475). For this report, we focus mostly on the group who was invited for the screening for the second time.

The overall response rate in this survey was 52%, higher among the 1-1 participants (59%) than the 0-1 group (46%). Persons who participated for a second time mainly gave 'for my own health' (52%) as their reason for participating. This answer was also the most frequently reported in round 1. A new option: 'important to participate in research' was the second most commonly selected response (22%), followed by 'it is easy to be tested in this way' (17%). People who had not participated in round 1 but participated this year most frequently said they 'forgot' or 'had no time' last year (38%). A further 22% participated for his/her own health (5% indicated they may have been

at risk now), and 7% said they had not been sexually active yet last year, but now they were.

Similar to round 1, Chlamydia positives were often shocked by the test result (76%), ashamed (35%) or disbelieving (23%), but nevertheless 95% of them again were happy to have participated in the screening. (Figure 2.24).

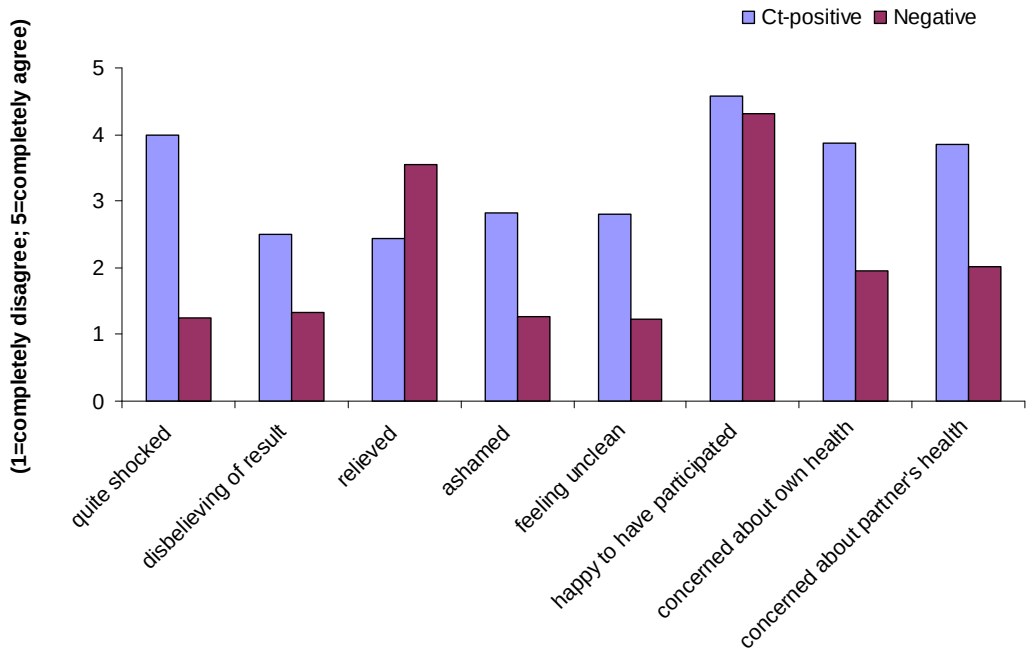

Figure 2.24. Emotional reaction to the receipt of the test result among persons testing positive and negative for Chlamydia in round 2.

2.4.2 Insight into reasons for non-response among non-participants

- Almost 70% of non-participants (of the 15% who responded to the questionnaire) had self-justified reasons for not participating: not sexually active, recently tested for Chlamydia or allegedly not at risk of infection.
- Only 2% did not participate because of no access to internet.
- The invitation and set-up of the screening were reasonably well received by non-participants in round 1 and round 2.

Round 1 findings

A random sample of individuals who did not respond to postal invitation or reminder letters after 12 weeks (non-participants) were invited to complete a postal questionnaire for the non-response survey and overall 15% (2060/13,976) of invited non-participants participated in the first year. Only 2% of non-participants stated that they were unable to participate because of their inability to read Dutch. Non-participants most commonly reported not participating in the screening because they had not been at risk of infection (Table 2.4) Open answer comments (164) most frequently described lost invites, moving, forgetfulness or pregnancy. Thirty-one percent of non-participants with low education level (none or primary school only) agreed that the information provided was not clear enough and 6% of them gave this as reason for non-participation.

Table 2.4 Non-participants' reasons for non-participation and opinion on the screening (round 1).

	% of all sexually active non-participants (n=1263)	% with non-Dutch ethnic background (n=489)	% aged 16-19 years old (n=228)	% with low education^ (n=487)	% with two or more recent* sexual partners (n=204)
Reported reasons for not participating in the screening					
No perceived risk of infection	40.5	34.3	41.6	36.4	27.7
No time or no interest	18.9	23.7	20.0	26.3	24.4
Recently had a chlamydia test (last 6 months)	15.9	13.1	11.4	8.7	18.9
No symptoms	4.3	4.4	5.2	4.7	4.1
Treated for Chlamydia previously	2.9	3.2	3.5	3.9	5.0
No/limited internet access	2.5	3.2	1.4	3.4	2.6
Didn't understand the invitation	0.7	1.3	2.2	2.1	1.0
Afraid to test/prefer not to know	0.6	1.1	0.5	1.1	0.1
Other[#]	13.8	15.7	14.2	13.5	14.9
Opinions on the screening					
The invitation letter did not clearly explain the investigation	7.5	9.9	12.1	10.1	9.5
I found it a disadvantage that I had to participate via the internet	16.4	20.2	26.1	22.8	24.4
I found it unpleasant that I needed to take the test at home	12.1	16.1	15.4	18.1	20.4
I found it unpleasant that I was supposed to post my sample	25.9	32.6	33.4	30.2	37.1

Non-participants, particularly people of non-Dutch ethnicity and those under 20 years old, were sometimes negative about the programme design, when asked whether they agreed with specific statements on the set-up of the screening (in Table 2.4 'Opinions on the screening'). In particular they disliked posting their sample to the lab (26%), using the internet (16%) and having to home-test (Table 2.4).

Round 2 findings

In round 2, we sent questionnaires by postal mail to a sample of non-participants who had not participated in either round (non-participants 0-0) or had not been on the invitation list in round 1. We also sent questionnaires by post (or e-mail if we had an e-mail address) to round 2 non-participants who had participated in round 1 (non-participants 1-0). In total, 14,923 questionnaires were sent out: 12,648 by postal mail to 0-0 non-participants (N=8304), 1-0 non-participants (N=822) and 'new' round 2 non-participants who were not invited in round 1 (N=1253). A total of 2275 questionnaires were sent to 1-0 non-participants by e-mail.

9% of non-participants who had received two invitations and not participated in either round of the screening returned the questionnaire, whereas the response was 36.6% in 1-0 non-participants and 6.3% in 'new' non-participants.

More than 40% of non-participants were surprised to have received a second CSI invitation. Reasons for non-participation given by 1-0 non-participants were mainly as follows: it was unnecessary because they had not been at risk (47%), they forgot or didn't have time (12%), they had tested recently (6%). Only 1% stated that participation last year had not been a good experience. Of the 0-0 non-participants, 17% had never had sex, 25% allegedly had not been at risk, 24% had not had time or was not interested, while 12% said they had been tested in the last six months. About 6% had no access to internet and 0.9% gave that as a reason for not being screened. 1.3% said they did not understand the information provided.

As in the first round, non-participants, despite their non-participation, were again quite appreciative about the set-up of the screening and the information provided. The 0-0 non-participants were less positive about taking a sample at home and sending it by post then 1-0 non-participants.

2.4.3 Comparison of participants and non-participants

- Participants were more positive about the screening design than non-participants, although non-participants were still quite positive.
- Over two thirds of the participants and nearly half of the non-participants were willing to be invited and tested again in the future, the majority of whom would prefer to test yearly instead of every two or three years.

Round 1 findings

Participants and non-participants (who responded to the surveys) appear to be different groups: 70% of participants and 58% of non-responders had higher (post-compulsory) education. 60% of participants and 73% of non-responders reported a steady sexual partner and participants more frequently had a history of STI (34%) than sexually active non-responders (9%).

Participants were more enthusiastic than non-participants about the screening invitation and programme design (Table 2.5). Non-participants were least accepting of having to return their sample by post. Participants were more receptive to regular Chlamydia testing than non-participants (66 vs 46%, p<0.001) and more willing to do this test via the CSI programme (Table 2.5).

Table 2.5. Overview of participants' and non-participants' opinions about the screening programme.

	Participants (N=3499)	**Non-participants**	
	% of study population	**N^**	**% of study population**
Reaction to offer of a Chlamydia test			
It is great to test in this way	89.0	1288	63.0
I didn't mind being invited	8.2		19.3
I found the offer unnecessary	0.5		10.3
Other	2.3		7.4
Consulted others about the screening			
Discussed the offer with someone	51.5	1172	64.2
Decision to participate influenced by discussion	17.5	1032	7.5
Opinion about the screening procedure*			
Use of the internet was advantageous	93.0	1216	56.0
Self-sampling at home was advantageous	96.9	1206	55.5
There was no problem with being asked to post the sample	91.7	1205	43.9
Opinion about screening in the future			
Willing to be offered a test in the future	66.3	1216	45.6
Willing to test via the screening programme in future[#]	91.6	873	42.3

^ Number of non-participants who answered the question.

** Participants who agreed/ strongly agreed with the affirmative statement; Non-participants who disagreed/strongly disagreed with the negatively phrased statement i.e. 'use of the internet was a disadvantage of the programme'.*

[#] Among those who said 'yes' or 'don't know' to the offer of a future test.

All percentages reported are weighted to account for the sampling design.

Round 2 findings

Non-participants were more often surprised when they received a second invitation for the screening than participants (41% versus 15%). Participants mostly found it useful to have received an invitation to round 2 (88%), whereas only 37% of non-participants held this opinion.

93% of participants of rounds 1 and 2 (1-1 group) said they wanted to be invited for the screening again in future, compared with 62% of the 1-0 group and 82% of the 0-1 group. Among the group who did not participate in round 1 or 2 (0-0 group), 42% said they did not want to be invited again for the screening in the future and 25% did not know yet.

When asked the circumstances in which they would participate in the future, a proportion of the 0-0 and 0-1 non-response groups said they would participate if they thought they had been at risk of STI (63% vs 43%), had entered into a new relationship (41% vs 31%) or if they have symptoms of an STI (31% vs 17%). Among participants, 22% would only participate when they had been at risk and 17% only when in a new relationship; a minority (5%) said they would only participate when they had complaints indicative of an STI.

Among those who said 'yes' or 'I don't know' to future screening, the majority of participants (82%; 77% of 0-1 and 90% of 1-1 participants) and non-participants (46% of 0-0 and 67% of 1-0) would be most likely to participate when the interval between screening rounds was 1 year (compared to two or three years).

Table 2.6. Opinions of participants and non-participants on location of Chlamydia testing (Round 2).

	Acceptability study					Non-response study						
	0-1		1-1		Total	1-0		0-0		.-0 'new'		Total
	Male	Female	Male	Female	Acc	Male	Female	Male	Female	Male	Female	NR
Through internet *	94.9	96.0	97.6	97.4	96.8	69.3	78.4	27.8	36.0	38.5	20.5	34.6
At STI clinic	2.0	1.4	1.2	0.9	1.4	8.6	2.6	11.7	11.3	44.8	27.9	18.8
At my GPs	1.3	1.9	0.7	0.9	1.1	18.5	16.6	49.9	48.3	13.4	50.2	40.9
Other	1.8	0.8	0.6	0.9	7.4	3.7	2.4	10.5	4.4	3.3	1.4	5.7

Weighted population estimates are presented. All results are percentages.

.-0 'new' refers to new invitees who were not invited to the first round.

* screening participants were asked two questions which have been combined: testing via internet via an invitation. (80.2% would prefer this method) and testing via the internet by requesting a test packet at own convenience. (16.6% prefer this method). Non-responders were asked only how they felt about testing via the internet.

2.4.4 Testing behaviour of participants and non-participants

- Participants in the CSI programme were more likely to have been tested in the previous year than non-participants and had more often experienced an episode of STI before.

In the Netherlands, testing rates for the 16-29 year old were reported to be 12% (RNG study Sexual health 2009), but the rates might be higher in big cities, i.e. in Amsterdam about 20% of young people (<35 years) indicated to have been tested in the previous year (Amsterdam 2008 report on Health-monitoring); in Rotterdam similar data indicated a 12% testing rate. In order to determine whether CSI (also) reaches a group of people who do not 'habitually' go for testing at an STI centre or their GP, we looked at data from the general questionnaire on previous testing and data from the general questionnaire and non-response survey for prior STI infections.

In the general questionnaire, 23% of participants and 20% of non-participants in the first round indicated they had been tested in the previous year. This proportion was higher for round 2 and 3 participants, although the levels were similar after participation in CSI had been corrected for (22 and 24% respectively) (Table 2.7). In all rounds, a greater proportion of women than men reported having had an STI test in the last year.

The proportion of participants and non-participants that had previously had an STI was quite comparable among general questionnaire respondents, but far fewer non-participants who completed the non-response questionnaire reported having had an STI (9.3% in round 1 and 13.3% in round 2) (Table 2.7.). After correcting for the non-response survey respondents who were not yet sexually active (27% in round 1 and 17% in round 2) the proportion with previous STIs was still lower: 12.7% and 16.0% in round 1 and 2 respectively.

Table 2.7. Tested (in previous year) and history of STIs (ever). Population in denominator: only general questionnaire respondents who answered STI-related questions.

	STI test in the last year*		**Ever had an STI**		
	participants (n, %)	non-participants (n, %)	participants (n, %)	non-participants (n, %)	non-participants (NR study: n,%)
Round 1	1544 (23,1)	245 (19,6)	1093 (30,7)	164 (28,0)	110 (9,3)
Round 2	5032 (32,0)	717 (24,6)	2934 (29,9)	396 (27,3)	274 (13,3)
Round 3	1000 (31,4)	173 (25,0)	569 (29,0)	97 (28,2)	na

^ Not all blocks are included at the time of analysis for round 3: this data is from blocks A to C for Limburg and block A only for Amsterdam and Rotterdam.

* 51% of round 2 participants and 38% of round 2 non-participants who tested in the previous year participated in round 1. 48% of round 3 participants and 35% of round 3 non-participants who tested in the previous year participated in round 2. When participants of previous screening rounds are excluded, 22% and 23.5% of round 2 and round 3 participants respectively had an STI test in the last year.

* 51% of round 2 participants and 38% of round 2 non-participants who tested in the previous year participated in round 1. 48% of round 3 participants and 35% of round 3 non-participants who tested in the previous year participated in round 2. When participants of previous screening rounds are excluded, 22% and 23.5% of round 2 and round 3 participants respectively had an STI test in the last year.

In all rounds, a greater proportion of women than men reported having had an STI test in the last year.

** 20 of the round 2 participants and 3 of the non-participants tested positive in round 1. 46 of the round 3 participants and 4 of the non-participants had tested positive in round 1 or 2.

3 Results: impact epidemiology

3.1 Determinants for participation

3.1.1 Trends in participation rates

- 22% of those invited to screening rounds 1 and 2 participated at least once; 24% of those invited three times participated at least once.
- 30% of first round participants invited to the second round participated again, of whom 44% also participated in round 3. This was only 2.2% of individuals invited three times.

In total, 204,647 individuals were invited in screening rounds 1 and 2; 45,337 persons participated at least once (22%). At the time of analysis (November 2010), 133,616 persons were invited in all three screening rounds. Of those 24% participated at least once. Of the 41,910 participants in the first round, 10,384 (25%) participated also in the second round (5% of the invited population). Counting only the 34,499 participants in round 1 who were actually invited again for round 2, this percentage was 30%. Of the persons who participated in round 1 and round 2, only 35% (n=6,789) had received an invitation to round 3 at the time of analysis; of these, 41% participated again in round 3.

Participation rates in block C (invited for the first time in round 2 or 3) were slightly lower than in block A in round 1 but higher than in block A in round 2 or 3 (Figures 3.1 and 3.2).

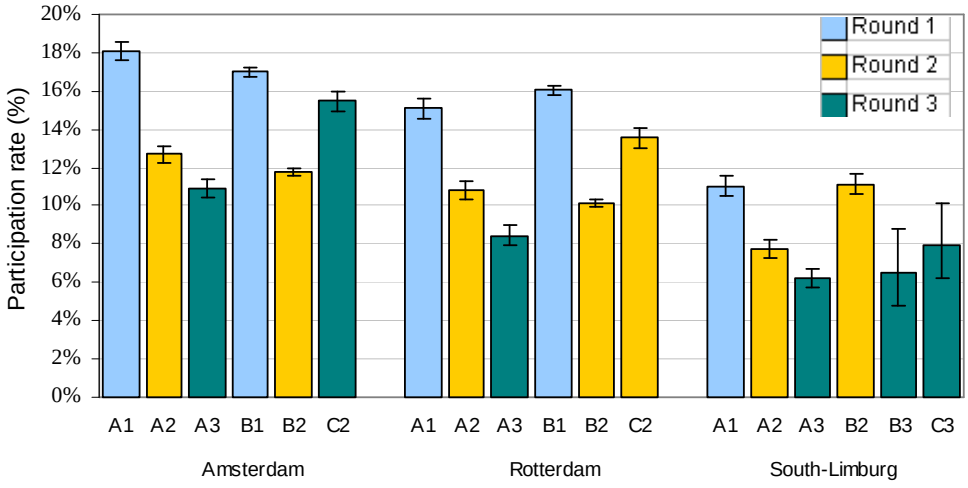

Figure 3.1. Participation per block and per region in the three rounds.

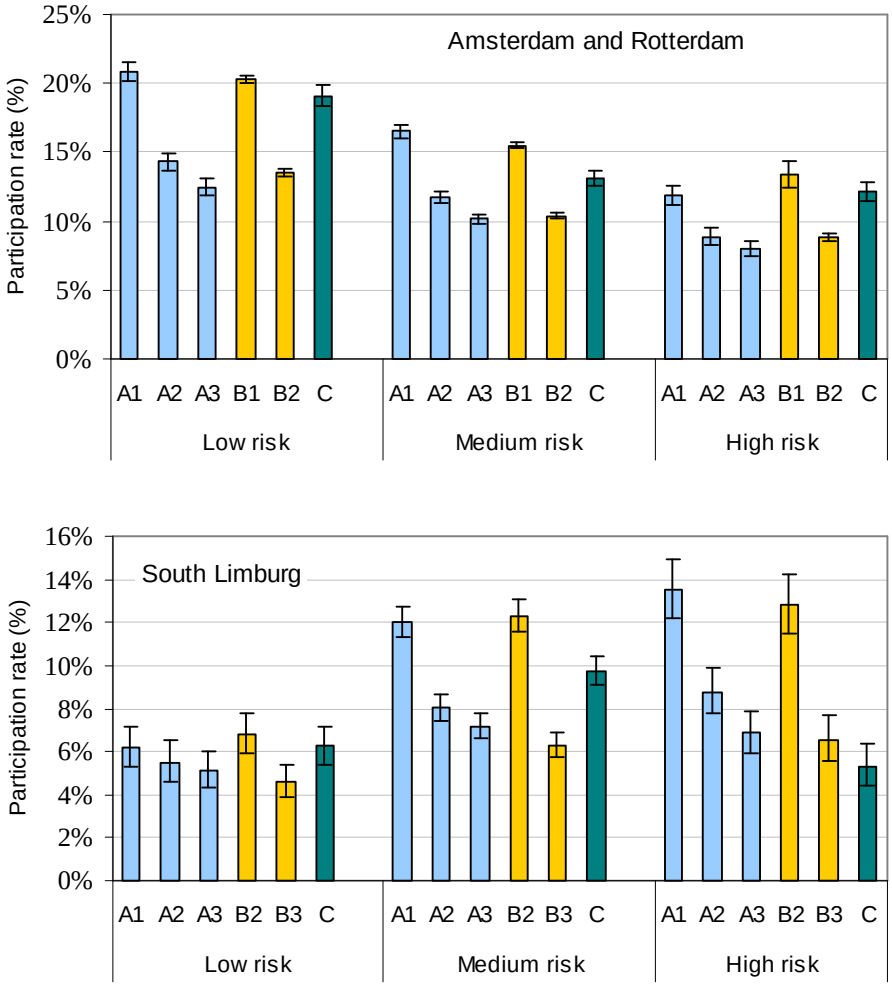

Figure 3.2. Participation per block and per risk level in the three rounds, A in Amsterdam and Rotterdam, B in South-Limburg.

3.1.2 Determinants for participation in the first screening round

- Independent individual factors associated with lower participation were male gender, non-Dutch origin, young age, and lower education.
- Independent community factors associated with lower participation were high community risk level and low SES.
- Men, Turkish/Moroccan people, and persons aged > 19 were less likely to participate repeatedly.

Sociodemographic factors associated with lower participation in the multivariate model (Amsterdam and Rotterdam data only) were male gender, non-Dutch origin, young age, high community risk level, low socioeconomic status, and lower education level.
The results reported in this section are based on analysis run in August 2010, which could give small differences with tables in the annex.

Self-selection of participants is largely driven by the duration of steady relationships, their history of STIs, and having symptoms of an STI. Also, having a non-Dutch sexual partner increased the likelihood of participation. Furthermore, MSM showed lower participation rates compared to heterosexual men (Figure 3.3). Age at first sexual intercourse and number of partners in the past six months were only associated with participation in the univariate model.

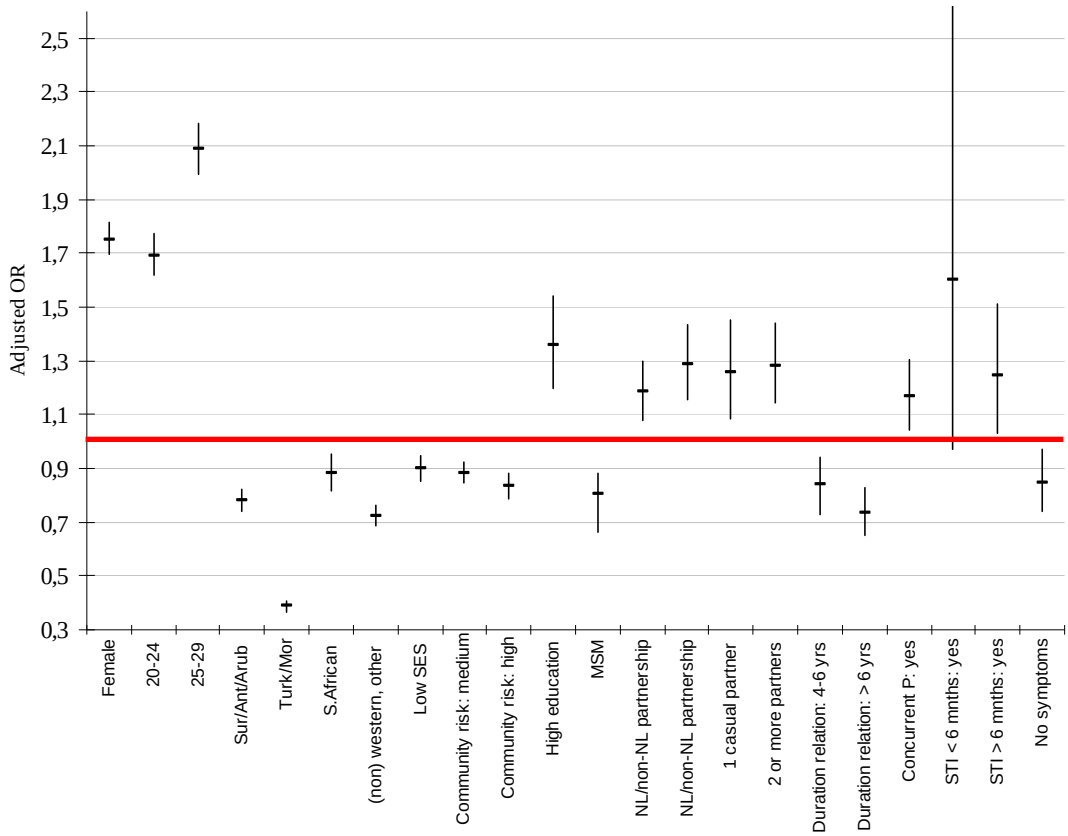

Figure 3.3. Determinants of participation in the first screening round.

3.1.3 Multilevel analysis: cluster-effect

- Participation rates differed between geographic clusters, independent from individual determinants (i.e. ethnicity or age) and community risk level.

Measure for cluster-effect (participation):

Median Odds ratio (MOR) cluster: 1.14 (1.11-1.16), p< 0.001

The screening is cluster randomised (at neighbourhood level) so that the screening can be delivered to people within social or sexual networks. The mailing of invitation letters is divided into three blocks (A, B and C) of selected clusters; 69 in Amsterdam, 52 in Rotterdam and 46 in South-Limburg. The population sizes of the clusters varied from 451 and 4538 inhabitants for Amsterdam, 375 to 4374 for Rotterdam and 398 to 2130 for South-Limburg. South-Limburg was not included in the multilevel model due to different approach and small number of invitations in the first screening round.

In the multilevel model including individual level variables, the MOR for cluster-effect was equal to 1.14. This shows that the median heterogeneity between clusters increased the individual odds of participation 1.14 times when two persons in different clusters were randomly selected. In other words, if a person moves to another cluster with a higher probability of participation, their chance of participation will (median) increase 1.14 times.
The cluster effect was independent from the effect that community risk level had on participation. In other words, participation differences in clusters could not be fully predicted from community risk level or individual determinants.
Including cluster-based invitations as a second level of analysis in the multivariate model (multilevel analysis) had no major impact on the ORs of the individual determinants (see Appendix A7).

3.1.4 Determinants for repeated participation

- Repeated participation was mainly associated with individual risk factors and to lesser extent influenced by sociodemographic factors or the community risk level.

Men and Turkish/Moroccan people were less likely to participate repeatedly. After participating once, age and education are no longer determinants for participation in the second round. Of the behavioural characteristics, having concurrent partners and having had an STI in the past increased the likelihood of repeated participation. Persons with long-term relationships were less likely to participate repeatedly (Figure 3.4). Region, community risk level and SES score had no significant effect on repeated participation.

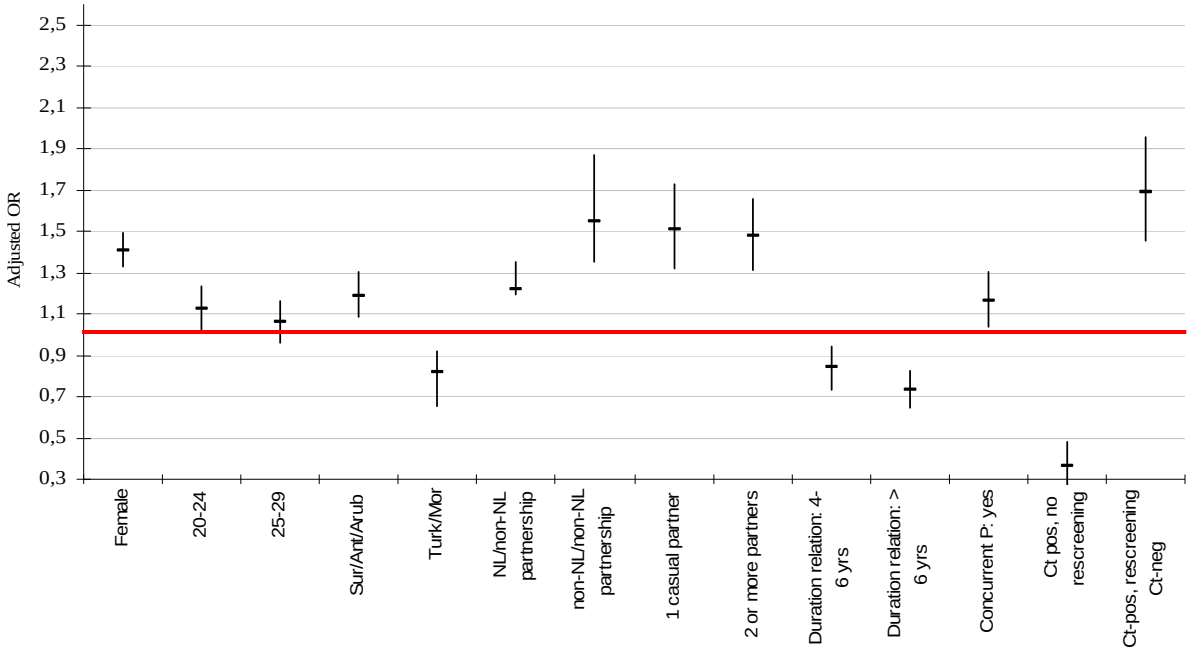

Figure 3.4. Determinants for repeated participation.

3.2 Impact evaluation

- Factors associated with lower screening uptake were also associated with higher Chlamydia prevalence (young age, non-Dutch ethnic background, low education).
- In consecutive screening rounds community factors play a smaller role compared to round 1. Self-selection for screening is mainly determined by the person's own (perception) of sexual risk.
- The level of individual sexual risk was slightly higher in CSI participants compared to the general sexually active population of the same age group.
- The level of sexual risk among participants increased between screening rounds, suggesting self-selection of groups at higher risk after repeated invitations

3.2.1 Trends in sexual risk behaviour among participants

A combined variable (including eight questions) was constructed to indicate the individual level of sexual behavioural risk based on: number of partners in the previous six months, age at first sexual intercourse, concurrent partnerships, condom use with last sexual partner, STI testing, and having symptoms of an STI. People could score a maximum of seven points on this new variable (0-2 points per category, see Figure 3.5).

The average sexual risk level was higher among participants from the second screening round than among participants in the first round. Partly, this can be explained by the fact that more people were tested for an STI in the second screening round (possibly due to the screening). In the third round, the level of sexual risk was again slightly higher, which indicates a better self-selection of participants (not an increase in risk behaviour) (Figure 3.7). Analysis for block A only, which is better comparable over three consecutive rounds, showed the same trend (not shown).

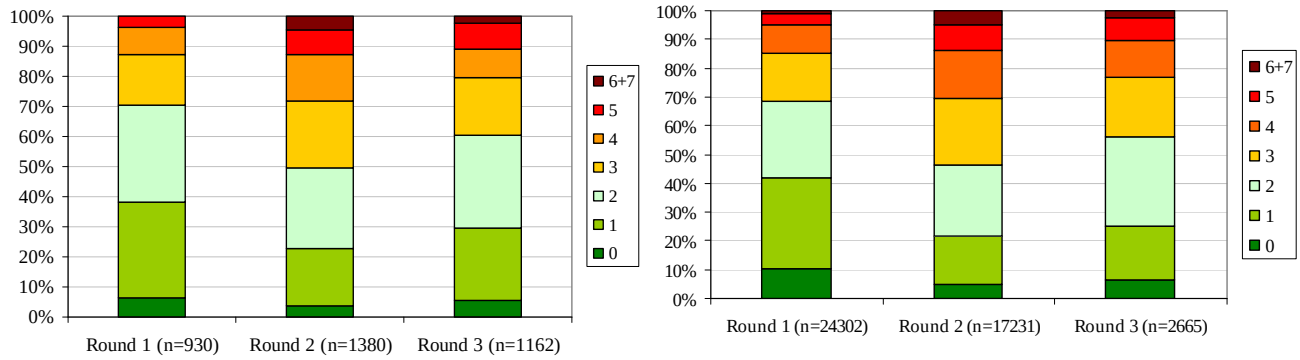

Figure 3.5. The sexual risk level* of participants, by screening round (left: Amsterdam and Rotterdam, right: South-Limburg) (source: CSI database).
* Based on eight questions (number of partners, concurrent partnerships, STI testing, age at first sexual contact, condom use at last contact, and symptoms of an STI). 0-7: low to high sexual risk.

The level of individual sexual risk was slightly higher among CSI participants than in the general sexually active population aged 16-29 years in the Netherlands (source: RNG study 2009, CSI database) (Figure 3.6).

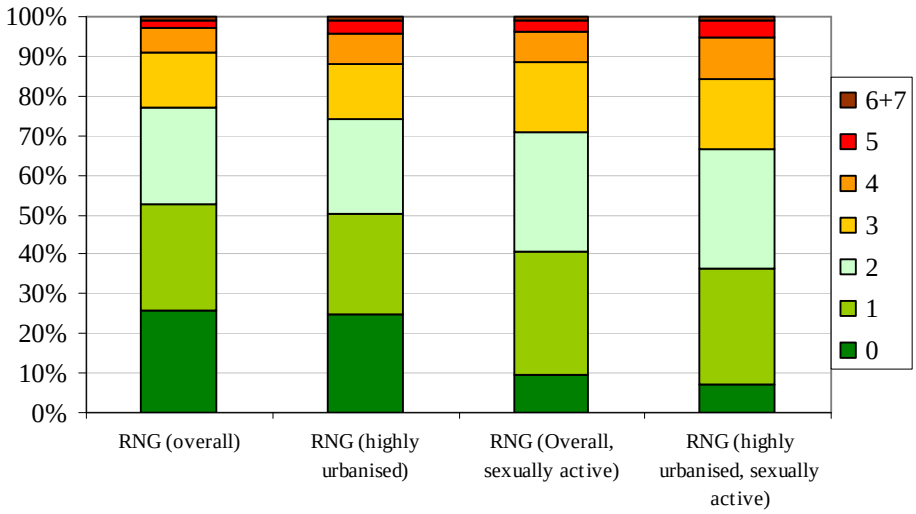

Figure 3.6. The sexual risk level* of the general population of 16-29 years (source: RNG, 2009). * Based on eight questions (see Figure 3.5).

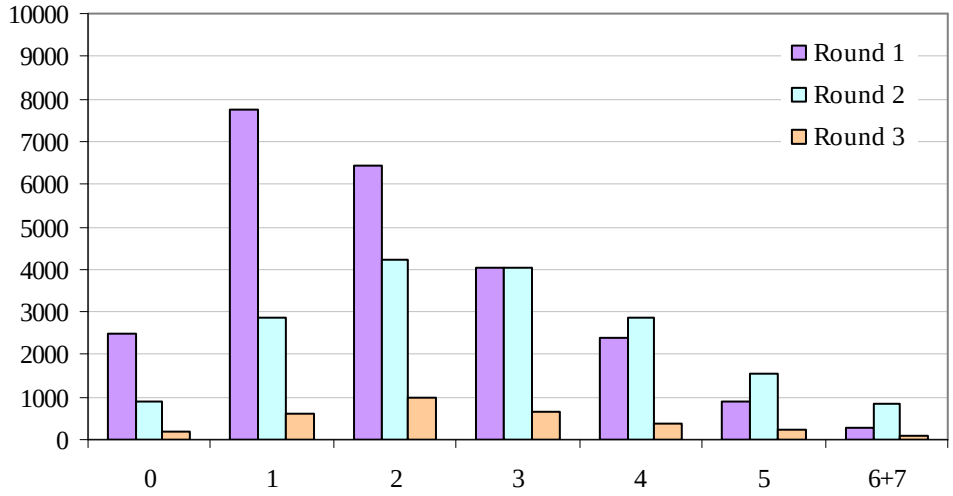

Figure 3.7. The sexual risk level of participants (absolute numbers), by screening round (Amsterdam and Rotterdam).

Table 3.1. Comparison of variables on sexual behaviour between CSI participants (Amsterdam and Rotterdam) and the general population of 16-29 years (RNG study 2009).

	Participants round 1 (%)	Participants round 2 (%)	Participants round 3 (%)	General population 16-29 years (%), highly urbanised area, sexually active	General population 16-29 years (%), highly urbanised area
Steady partner					
Yes	62.2	57.9	58.3	68.8	55.0
No	**37.7**	**42.1**	**41.7**	31.4	45.0
Number of different sexual partners < 6 months					
0	9.4	8.9	8.8	7.7	23.5
1	62.5	59.0	61.2	73.3	60.4
2	**13.9**	**15.7**	**16.1**	9.4	8.6
3-5	**11.5**	**13.2**	**12.0**	7.0	5.7
6-10	**2.0**	**2.5**	**1.5**	1.4	1.0
> 10	**0.7**	**0.8**	**0.5**	1.2	0.9
Duration of the steady relationship					
< 1 year	14.9	16.6	16.2	18.7	20.6
> 1 year	85.5	83.4	83.8	81.4	79.3
Age at first sexual contact					
≤15	26.2	27.4	28.3	26.1	19.3
≥16	73.8	72.6	71.7	73.9	80.7
Condom use last sexual contact					
Yes	46.5	44.0	41.0	27.7	45.1
No	**53.5**	**56.0**	**59.0**	72.3	54.9
Concurrent partners					
No	89.0	86.3	86.3	92.5	93.7
Yes	**11.0**	**13.7**	**13.7**	**7.5**	**6.3**
Ever tested for STI					
No	85.3	46.3	34.4	54.1	64.9
Yes	**14.7**	**53.7**	**65.6**	**45.9**	35.1
Symptoms of an STI					
No	89.9	68.2	92.5	94.6	96.0
Yes	**10.1**	**31.8**	**7.5**	**5.4**	**4.0**

Distributions calculated over persons with answered questions.

Table 3.2. Variables included in the sexual risk score, for participants in CSI (Amsterdam and Rotterdam) and the general population of 16-29 years (RNG study 2009).

	Score	Participants round 1 (%)	Participants round 2 (%)	Participants round 3 (%)	General population 16-29 years (%), highly urbanised area, sexually active	General population 16-29 years (%), highly urbanised area
Nr of sexual partners < 6 months						
No partner/partner > 1 year	0	49.9	42.3	42.1	61.9	66.7
1 casual partner	1	21.8	24.4	25.4	19.1	17.2
≥ 2 partners	2	28.3	33.3	32.5	19.0	16.2
Age at first sexual contact						
≤15	1	26.2	27.4	28.3	26.1	19.3
≥16	0	73.8	72.6	71.7	73.9	80.7
Condom use last sex contact						
Yes	0	46.5	44.0	41.0	27.7	45.1
No	1	53.5	56.0	59.0	72.3	54.9
Concurrent partners						
No	0	89.0	86.3	86.3	92.5	93.7
Yes	1	11.0	13.7	13.7	7.5	6.3
Ever tested for STI						
No	0	85.3	46.3	34.4	54.1	64.9
Yes	1	14.7	53.7	65.6	45.9	35.1
Symptoms of an STI						
No	0	89.9	68.2	92.5	94.6	96.0
Yes	1	10.1	31.8	7.5	5.4	4.0

Increasing sexual risk levels corresponded to higher Ct-positivity rates. This trend was similar in all regions and for all rounds (Figure 3.8).

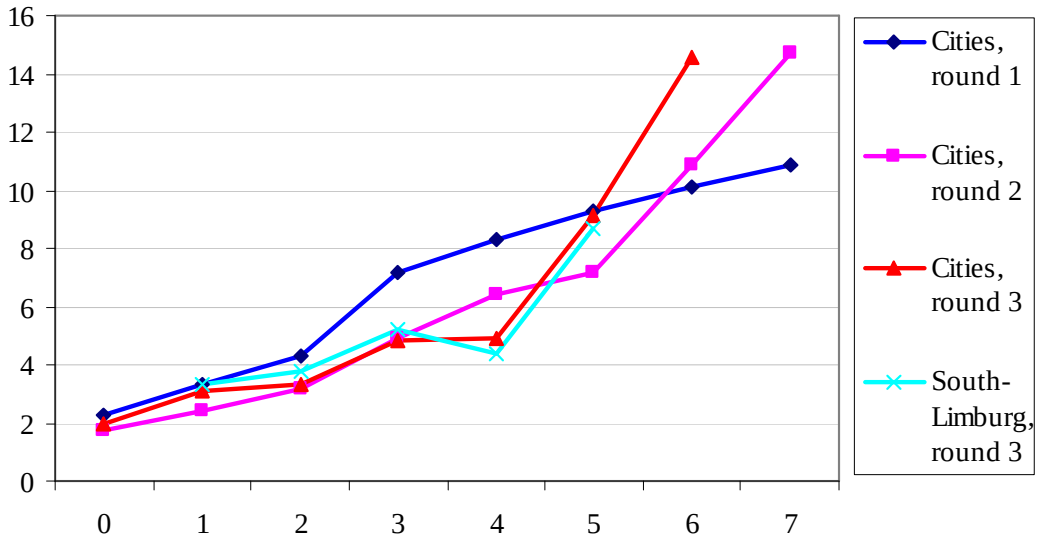

Figure 3.8. The sexual risk level (0=low, 7=high) and Ct-positivity rate (%).

3.2.2 Trends in Ct-positivity rate

- Positivity rates in block A declined gradually (although not significantly) from the first to the third screening round in Amsterdam and South-Limburg. In Rotterdam, a significant decrease was only observed from the first to the second round.
- In block B, no significant changes in Ct-positivity were observed over time.

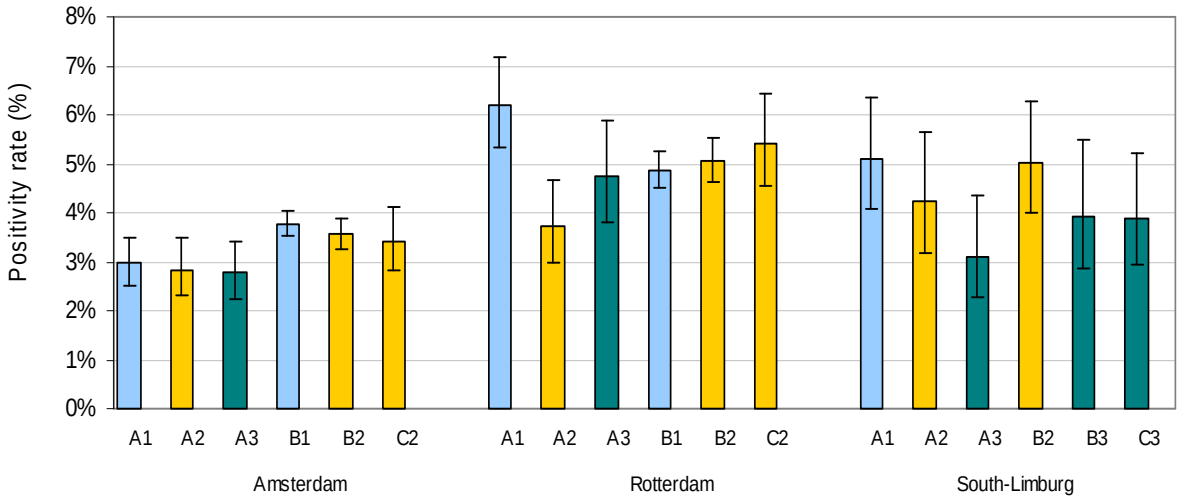

Figure 3.9. Positivity rate per block and per region in the three rounds.

In high- and medium-risk areas, larger changes in positivity were observed compared to low-risk areas in all three regions (for block A only) (Figure 3.10). These differences were however also not significant.

In the group who received invitations to all three rounds (n=133,616), the positivity rates declined from 4.7% to 4.3% to 4.1%. In the group who participated to the first two rounds (n=10,384), the positivity decreased from 4.9% to 3.1%. Participants to round 1, round 2 and round 3 (n=-2776) reduced their chance to be positive from 6.0% to 3.3% to 2.9%.

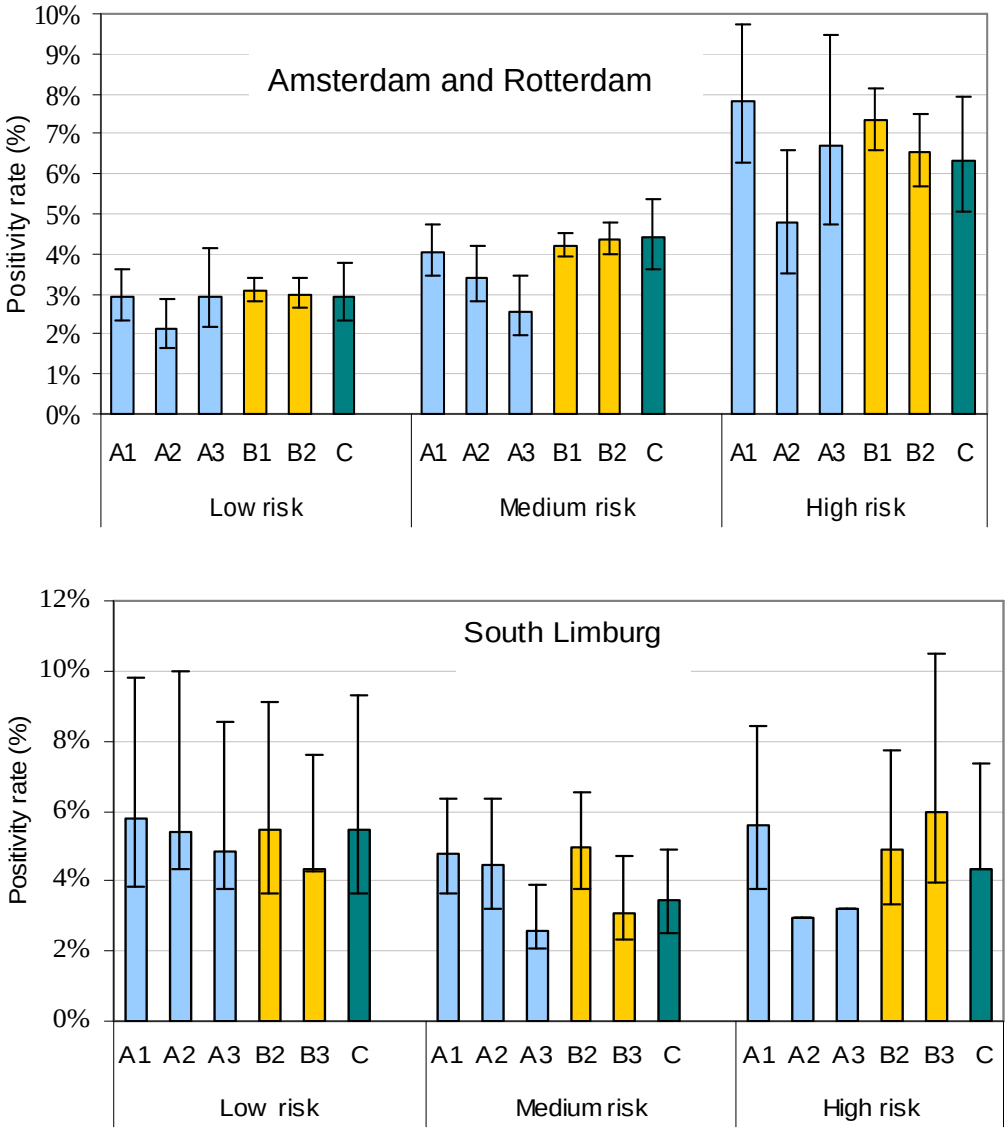

Figure 3.10. Positivity rate per block and per risk level in the three rounds, A in Amsterdam and Rotterdam, B in South Limburg.

3.2.3 Determinants for Ct-positivity

- Individual factors strongly associated with higher Ct-positivity were: younger age, non-Dutch background, non-Dutch steady partner, lower education, and symptoms of an STI (in both screening rounds).
- Chlamydia positives who were not rescreened after six months had the highest likelihood of being Chlamydia positive in the second screening round.
- An independent community factor associated with higher Chlamydia positivity was: high community risk level.
- Socioeconomic status (SES-score) had no added effect on positivity in a model with community risk level.
- Geographic clusters were not independently associated with positivity rate, i.e. differences between clusters are explained by individual risk factors rather than 'area-related' risk factors.
- In the model including repeated participants, first screening round results and history of STI were the most important predictors for Chlamydia positivity.

Individual factors strongly associated with higher Ct-positivity were: younger age, non-Dutch background, non-Dutch steady partner, lower education, and symptoms of an STI. A positive test result in the first round was an additional determinant for positivity in the second round, especially for those who did not participate in the rescreening after six months. Socioeconomic status (SES-score) had no added effect on positivity in a model with community risk level. In a multivariate model without community risk, SES-score was not an independent predictive factor (Table 3.3).

The results reported in this section are based on analysis in August 2010.

Table 3.3. Determinants of positivity, by screening round.

	Logistic regression *(positivity)*			
	Multivariate (**Round 1**)		Multivariate (**Round 2**)	
Total population	OR (95%CI)	p-value	OR (95%CI)	p-value
Gender				
Male	1.0		1.0	
Female	**1.2** (1.1-1.4)	<0.001	ns	ns
Age				
16-19	1.0		1.0	
20-24	**0.8** (0.7-0.9)	<0.001	0.9 (0.7-1.1)	0.53
25-29	**0.6** (0.5-0.7)	<0.001	**0.6** (0.5-0.8)	<0.001
Ethnicity*				
Netherlands	1.0		1.0	
Surinam/Antillean	**1.6** (1.4-1.9)	<0.001	**1.6** (1.1-1.7)	<0.001
Turkish/Moroccan	0.9 (0.7-1.1)	0.32	0.9 (0.7-1.2)	0.52
Sub Sahara African	**1.6** (1.3-2.0)	<0.001	**1.5** (1.2-1.9)	0.002
Western, other	1.0 (0.8-1.2)	0.95	0.9 (0.7-1.2)	0.88
Non-Western, other	1.1 (0.9-1.3)	0.54	1.0 (0.8-1.3)	0.93
Region				
Rotterdam	1.0		1.0	
Amsterdam	**0.8** (0.7-0.9)	0.003	**0.8** (0.7-0.9)	0.002
Community risk level				
Low	1.0		1.0	
Medium	**1.2** (1.0-1.3)	0.02	**1.2** (1.0-1.5)	0.003
High	**1.5** (1.3-1.8)	<0.001	**1.4** (1.1-1.8)	0.002
SES-score				
0	1.0		1.0	
1	ns	ns	ns	ns
2 >				
<0				
Educational level				
Low	1.0		1.0	
Medium	0.9 (0.7-1.1)	0.34	1.2 (0.9-1.6)	0.29
High	**0.4** (0.3-0.6)	<0.001	**0.6** (0.4-0.8)	0.001
Ethnicity SP				
Concordant (NL/NL)	1.0		1.0	
Discordant (NL/non-NL)	**1.8** (1.5-2.3)	<0.001	**1.7** (1.4-2.5)	<0.001
Concordant (non-NL/non-NL)	**2.3** (1.8-3.0)	<0.001	**2.3** (1.8-3.4)	<0.001
Age at first sexual contact				
≤15	1.0		1.0	
16-18	0.9 (0.8-1.0)	0.11	0.9 (0.8-1.1)	0.30
≥19	**0.7** (0.6-0.9)	<0.001	**0.6** (0.4-0.7)	<0.001
Number of sexual partners < 6 months				
1 steady partner	1.0		1.0	
1 casual partner	1.0 (0.8-1.4)	0.84	1.1 (0.8-1.6)	0.53
≥ 2 partners (steady partner included)	**1.4** (1.4-1.8)	0.02	**1.5** (1.1-2.0)	0.01
No partner(s)	0.8 (0.6-1.0)	0.05	1.0 (0.3-3.4)	0.9
Duration steady partnership				
< 1 year	1.0		1.0	
1-3 years	**0.7** (0.6-0.9)	0.001	**0.7** (0.5-0.8)	<0.001
4-6 years	**0.6** (0.4-0.7)	<0.001	**0.6** (0.4-0.7)	<0.001
≥ 6 years	**0.4** (0.3-0.5)	<0.001	**0.3** (0.2-0.5)	<0.001
Concurrent partners				
No	1.0		1.0	
Yes	ns	ns	**1.3** (1.2-1.7)	0.006

Table 3.3. Determinants of positivity, by screening round -continued.

	Logistic regression *(positivity)*			
	Multivariate (**Round 1**)		Multivariate (**Round 2**)	
Condom use last contact CP				
Yes	1.0		1.0	
No	**1.4** (1.2-1.6)	<0.001	**1.7** (1.4-2.0)	<0.001
Condom use last contact SP				
Yes	1.0		1.0	
No	**1.4** (1.1-1.8)	0.004	**1.6** (1.2-2.2)	0.004
History of STI				
No STI ever	1.0		1.0	
Yes, < 6 months	ns	ns	**1.8** (1.2-2.6)	0.002
Yes, ≥ 6 months			**1.3** (1.0-1.6)	0.04
Symptoms of an STI				
Yes	1.0		1.0	
No	**0.6** (0.5-0.8)	<0.001	**0.6** (0.5-0.7)	<0.001
Test result first screening round				
Ct-neg			1.0	
Ct-pos, no rescreening	NA	NA	**4.9** (2.4-9.9)	<0.001
Ct-pos, rescreened Ct-neg			**1.6** (1.0-2.5)	0.06
Ct-pos, rescreened Ct-pos			**3.7** (1.3-10.7)	0.01

OR, odds ratio; CI, confidence interval; MSM, men having sex with men, STI, sexual transmitted infection(s); SP, steady partner; CP, casual partner. Determinants selected for multivariate analysis based on Wald test for univariate association (p>0.20). Not significant of highly correlated variables excluded from the model: sexual preference, new relationship < 2 months, invitation by GP, SES,….. South-Limburg excluded from the model. * Classes (from high to low SES): score ≤ 0, 0-1, 1-2, ≥ 2.

Table 3.4. Determinants of positivity, repeated participants.

	Multivariate (**Round 2**)	
Total population	OR (95%CI)	p-value
Age		
16-19	1.0	
20-24	**0.7** (0.5-1.0)	0.01
25-29	**0.5** (0.3-0.7)	<0.001
Community risk level		
Low	1.0	
Medium	**1.5** (1.1-2.1)	0.02
High	**1.7** (1.2-2.5)	0.01
Educational level		
Low	1.0	
Medium	0.7 (0.4-1.2)	0.19
High	**0.4** (0.2-0.7)	<0.001
Ethnicity SP		
Concordant (NL/NL)	1.0	
Discordant (NL/non-NL)	**1.7** (1.0-2.9)	0.01
Concordant (non-NL/non-NL)	**2.2** (1.8-3.4)	<0.001
History of STI		
No STI ever	1.0	
Yes, < 6 months	**2.9** (1.7-4.9)	<0.001
Yes, ≥ 6 months	1.2 (0.8-1.8)	0.08
Symptoms of an STI		
Yes	1.0	
No	**0.6** (0.5-0.7)	<0.001
Test result first screening round		
Ct-neg	1.0	
Ct-pos, no rescreening	**5.2** (2.6-10.5)	<0.001
Ct-pos, rescreened Ct-neg	1.4 (0.9-2.3)	0.16
Ct-pos, rescreened Ct-pos	**3.1** (1.1-9.1)	0.03

OR, odds ratio; CI, confidence interval; MSM, men having sex with men, STI, sexual transmitted infection(s); SP, steady partner; CP, casual partner. Determinants selected for multivariate analysis based on Wald test for univariate association (p>0.20). Not significant variables excluded from the model: number of sexual partners < 6 months, sexual preference, new relationship < 2 months, gender, invitation by GP, duration relationship, concurrent partnerships, region. South-Limburg excluded from the model. * Classes (from high to low SES): score ≤ 0, 0-1, 1-2, ≥ 2.

Measure for cluster-effect (positivity):

Median Odds ratio (MOR) cluster: 1.03 (1-1.14), ns

In the multilevel model including individual level variables, the MOR for cluster-effect was equal to 1.03 and not significant. Therefore, geographic clusters were not independently associated with positivity rate. In other words, differences between clusters were explained by individual risk factors rather than 'area-related' risk factors. The variable community risk level was the only 'area-related' predictive factor. The individual odds of positivity were not significantly influenced by geographic cluster (see Appendix A8).

3.2.4 The effect of selection by risk score in South-Limburg

- The selection by risk score applied in South-Limburg excluded 37% of the invited population in round 1 (cut-off point at score 6), 20% in round 2 and 22% in round 3 (cut-off lowered to 5).
- The higher the risk score, the more likely an individual was to test positive.
- The number of invitations needed per Ct-positive case identified (NNI) was higher in Limburg than in the two cities, but the number needed to screen per case (NNS) was similar due to the selection criteria.
- With lower participation rates (round 3) both NNI and NNS rise. By applying a stricter selection this can be optimized, but it would also reduce the case-finding substantially.

Selective screening of higher-risk participants
Systematic screening by individually inviting all persons of the target group ensures everyone is reached, but has the disadvantage that people at no/low-risk for Chlamydia will also be tested which might make the screening programme less (cost-)effective than opportunistic screening aiming to attract people with actual risk behaviour.

Table 3.5. Questions and risk-score used for selection of participants.

Characteristic/behaviour	answer	**SCORE**	
Age	15 - 19 years	**1**	
	20 - 29 years	0	
Place of residence	Low- or non-urbanized area	0	
	Medium urbanized area	**2**	
Level of Education	Higher level	0	
	Medium/lower level	**2**	
Ethnicity	Dutch	0	
	Antillean/Surinamese	**2**	
	Other	0	
Recent blood loss after sexual intercourse	Yes	**F: 1**	**M: 0**
	No	0	
Recent increased urge to urinate	Yes	**M: 2**	**F: 0**
	No	0	
Condom used at last sexual intercourse	Yes	0	
	No	**1**	
Lifetime sex partners	1 partner	0	
	2-5 partners	**F: 3**	**M: 2**
	6 or more partners	**F: 5**	**M: 3**
New sexual partner in the last 6 months	Yes	**1**	
	No	0	

For participation in South-Limburg, an area with a lower expected prevalence than in the cities based on earlier estimates, we applied a short online questionnaire to select people with higher-risk behaviour. The questionnaire and points scored per answer were the result of a prediction rule modelled on data from the earlier pilot screening (Götz et al. 2005).
South-Limburgers who logged onto the Chlamydia test website with login codes provided in their invitation letter, first had to fill in the questionnaire and, depending on the score attained, could thereafter request for a test-package. The score was based on answers to nine questions, as shown in Table 3.5.

The cut-off point for selection was a score of 6 or more in the first round; it was decided to lower this to 5 or more for the second and third round to prevent exclusion of a large proportion of persons interested to participate (especially in men: nearly half of male respondents were rejected in the first round).

Result of selection by risk score in round 1, 2 and 3
The initial response (persons who filled in the selection questionnaire), was 22.4% in round 1, and decreased to 15.2% in round 2 and 11.0% in round 3 (Table 3.6). During the first round, 63% of respondents attained the minimum score for participation (6 points or more; M 53% F 70%), during the second and third round (5 points or more) this was 80% (M 78%, F 81%) and 78% (M 76%, F 79%). The positivity rate among the participating selected group was 5.0% in the first round, 4.8% in the second and 3.9% in the third round (see Table 3.6).

Most persons scored 6-8 points on the questionnaire. The positivity rate increased linearly with the number of points scored (Figure 3.11), both in round 1 and round 2; in round 3 the rise is not seen with scores higher than 9.

Table 3.6. Questions and risk-score used for selection of participants.

	Round 1	***Round 2***	***Round 3***
Invited	13,190	25,111	38,336
Filled in questionnaire	2.955	3,825	4,216
(% of invited)	(22.4%)	(15.2%)	(11.0%)
	[M 16.5; F28.9]	[M 10.9; F 19.8]	[M 7.6; F 14.7]
Sufficient score to request	1874	3065	3282
test package	(63.4%)	(80.1%)	(77.8%)
(% of respondents)	[M 53.0; F 69.9]	[M 78.2; F 81.3]	[M75.9; F 78.9]
Package requested	1832	2968	3222
(% of selected)	(97.7%)	(96.8%)	(98.2%)
Package returned	1466	2388	2436
(% of package requests)	(80.0%)	(80.5%)	(75.6%)
Positive test	73	115	95
(% of tested)	(5.0%)	(4.8%)	(3.9%)

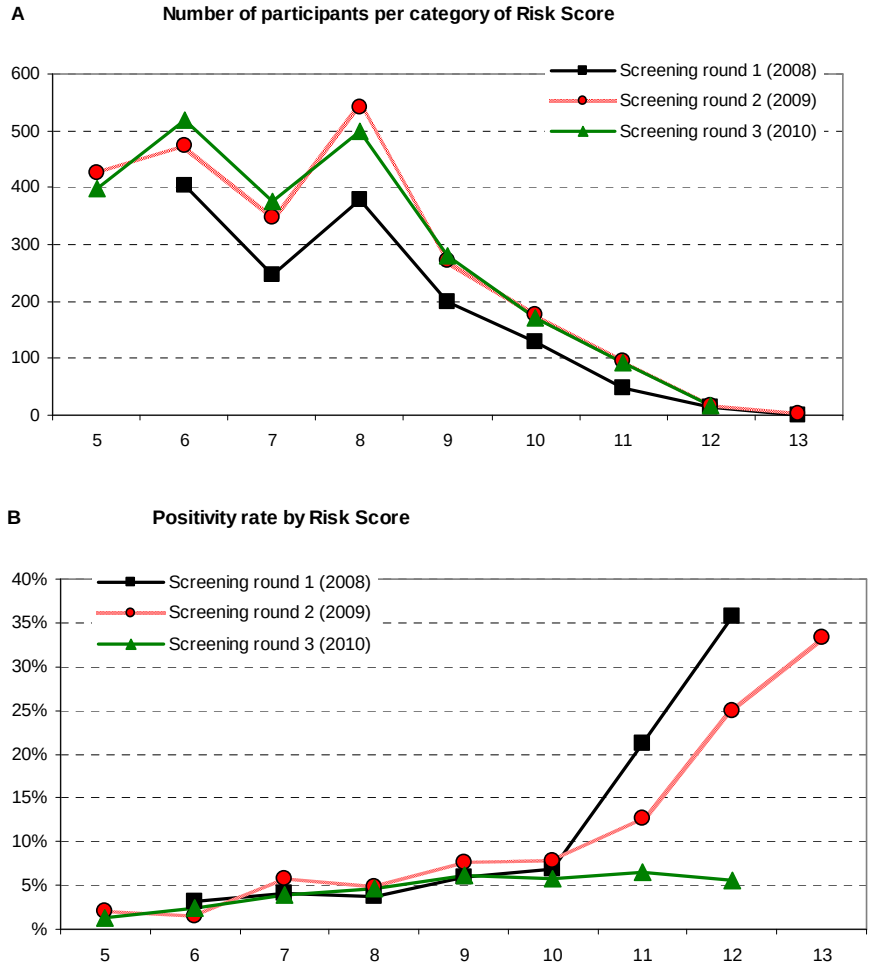

Figure 3.11. Number of participants (A) and percentage testing positive for Chlamydia (B) by risk-score in South Limburg.

The effect of the selection can be evaluated by regarding the number needed to invite and the number needed to screen expressed as the 'Number Needed to Invite' (NNI) and the 'Number Needed to Screen' (NNS) to find one case of Chlamydia (ref. Rembold 1998, Nelson and Hefland, 2001). If selection is effective, it narrows down the number of people that get tested while it does hardly or not affect the number of Chlamydia cases found. Hence, the NNI remains high, but the NNT is reduced.

In round 1, in Amsterdam and Rotterdam 164 and 130 invitations needed to be sent out, respectively, to find 1 positive case of Chlamydia (NNI). In Limburg the NNI in round 1 was somewhat higher: 178. However, the number of tests performed (NNS) in Limburg was similar to that in Rotterdam (20) and lower than in Amsterdam (28).
Due to lower participation rates, the NNI increased in round 2 and round 3 in all three regions, up to 340 in Amsterdam, 259 in Rotterdam and 403 in Limburg. The NNS however remained lower in Rotterdam and Limburg as compared to Amsterdam. We calculated that, at given participation rates in round 1 and 2, selection of participants at a higher cut-off score (e.g. 7 points), would have increased the NNI by about

20% while the NNS would be reduced by about 20%, making the testing more efficient. However, about 15% of Ct-positives would have been missed by increasing the cut-off to 6 or 7. In round 3, a cut-off score at 7 points instead of 5 would have improved NNS/NNI by 25% but would have also reduced the case-finding by 20%.

Table 3.7: Total number invitees, respondents, participants and Ct-positives per region; number needed to invite (NNI) and to screen (NNS) per Chlamydia case.

	Amsterdam			Rotterdam			South-Limburg		
	R1	**R2**	**R3 (bl A)**	**R1**	**R2**	**R3 (bl A)**	**R1 (6+)**	**R2 (5+)**	**R3 (5+)**
Nr Invited	140057	155585	24878	107806	121176	17578	13161	25158	**38336**
Nr responded*	30133 (22%)	22701 (13%)	3340 (13%)	20796 (19%)	15559 (15%)	1911 (11%)	2955 (22%)	3823 (15%)	**4216 (11%)**
Nr selected by riskscore	-	-	-	-	-	-	1871 (14%)	3063 (12%)	**3282 (9%)**
Nr tested	23827 (17%)	17988 (10%)	2736 (11%)	16361 (15%)	12321 (12%)	1561 (9%)	1450 (11%)	2388 (10%)	**2436 (8%)**
Nr Chlamydia +	856 (3.6%)	595 (3.3%)	73 (2.7%)	832 (5.1%)	590 (4.8%)	68 (4.4%)	74 (5.1%)	114 (4.8%)	**95 (3.9%)**
NNI/chlam	**164**	**261**	**340**	**130**	**205**	**259**	**178**	**221**	**403**
NNS/chlam	**28**	**30**	**37**	**20**	**21**	**23**	**20**	**21**	**26**

* Response in Amsterdam and Rotterdam was requesting a test package online; in South-Limburg response was filling-in the online risk-score questionnaire.

Additional questionnaire for people with a low (< 6) risk score in round 1

Persons who were excluded from participation in the first year because of a low-risk score had a lower response to the invitation the second round: 21.1% of the excluded versus 29.4% of the included responded by filling in the risk score questionnaire again (24.5% of previous participants). A small survey (n=200) was held among people who were excluded from participation, to assess whether the fact that people were excluded from the screening caused problems or negative opinions on the screening and their willingness to be tested in the future.

Seventy-six of the people responded (38%); 29 men (33%) and 47 women (42%). Of these respondents, 11 (15%) mentioned that they had not yet been sexually active, hence they were actually not supposed to fill in the risk score questionnaire. More than 30% mentioned that they were disappointed that they could not participate in the Chlamydia Screening. 5% reported that they may have been at

risk of Chlamydia. Six people (8%) decided to go to the GP or STI centre for a Chlamydia test.

The respondents approved of the screening set-up in general (e.g. the information was clear, and internet participation was appreciated), 58% mentioned that they would like to be able to participate in a future screening programme, and 72% would like the same procedure using internet and home-based sampling.

3.2.5 Trends in population prevalence

- The estimated population prevalence declined over the screening rounds in Amsterdam and Rotterdam (in South-Limburg only the maximum estimate). The declines, however, were not statistically significant.
- Block C (not previously screened) of the stepped wedge design showed a higher prevalence than block A3 (two previous screening rounds). Although differences were not statistically significant, a similar effect was visible in each region, suggesting at least a short-term impact of two screening rounds on prevalence.
- A decline in prevalence was only visible in the age groups 20-24 and 25-29 years.
- After one screening round, no effect was visible on population prevalence.

For evaluation purposes we implemented a 'stepped wedge approach' (sequential roll-out of invitations over blocks of neighbourhoods). This design provides insight in the effectiveness of screening (e.g. decreasing population prevalence) after one (comparison block C with A2 or B2) or two screening rounds (block C vs A3). Also trends in population prevalence (A1-A2-A3 and B1-B2) can be studied (for more details: see introduction and publications: Van den Broek et al., 2010, Van Bergen et al., 2010). For each region and block of the stepped wedge design, the population prevalence is estimated from Ct-positivity by using weight factors (see Appendix A9).

The estimated prevalence in the total population of 16-29 year olds varied between 2.2% and 3.8%. This is 0.6-1.4% lower than the positivity rates of the screening participants. The estimated population prevalence declined over the screening rounds in Amsterdam and Rotterdam (in South-Limburg only the maximum population estimate). The declines, however, were not statistically significant (Figure 3.12).

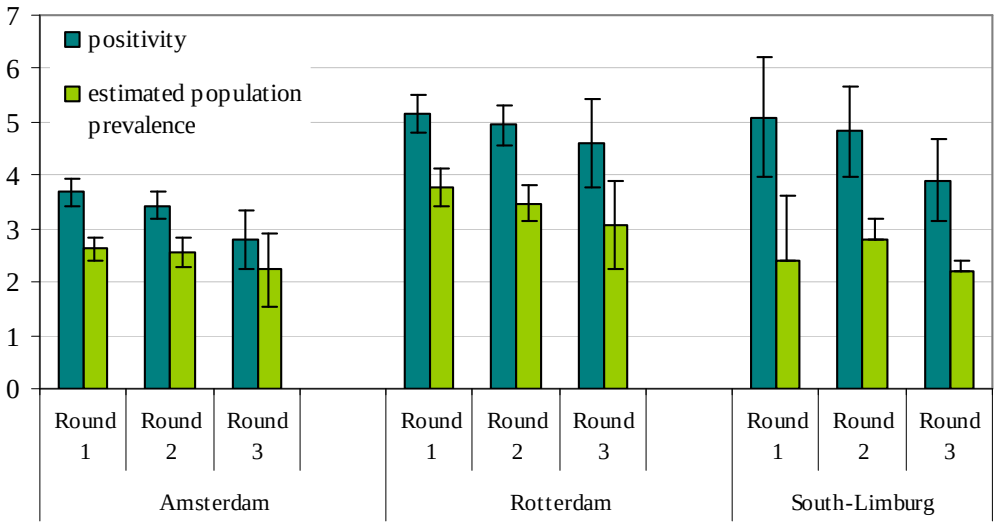

Figure 3.12. Estimated population prevalence and positivity rates, by region and screening round. Estimated prevalence rates were calculated from the Ct-positivity by a weighing method. South-Limburg: prevalence estimates are shown as the lowest and highest estimate. Amsterdam and Rotterdam: prevalence estimates with confidence intervals. Positivity rates might slightly differ from other graphs and tables since all positive cases from the third round (as available at that time) were used for the prevalence estimates.

The population prevalence rate in Rotterdam was higher in block A1 (4.8%) compared to A3 (3.1%). In South-Limburg a similar effect was visible: A1: 2.4% versus A3: 1.7% (minimum estimates); A1: 3.6% versus A3: 1.9% (maximum estimates). The differences, however, were not statistically significant. In Amsterdam prevalence rates were much lower compared to Rotterdam. In Amsterdam no trend was observed (not shown). Also, the prevalence in block B remained relatively stable in each region (Figure 3.13).

The prevalence in block A3 (populations who received two previous screening offers) was lower compared to block C (no prior screening). These differences were not statistically significant but since each region showed a similar trend, this may suggest a short-term impact of two screening rounds. There was no visible impact of one screening round; the prevalence rate in block B remained stable and no differences were observed between block C and A2 and B2.

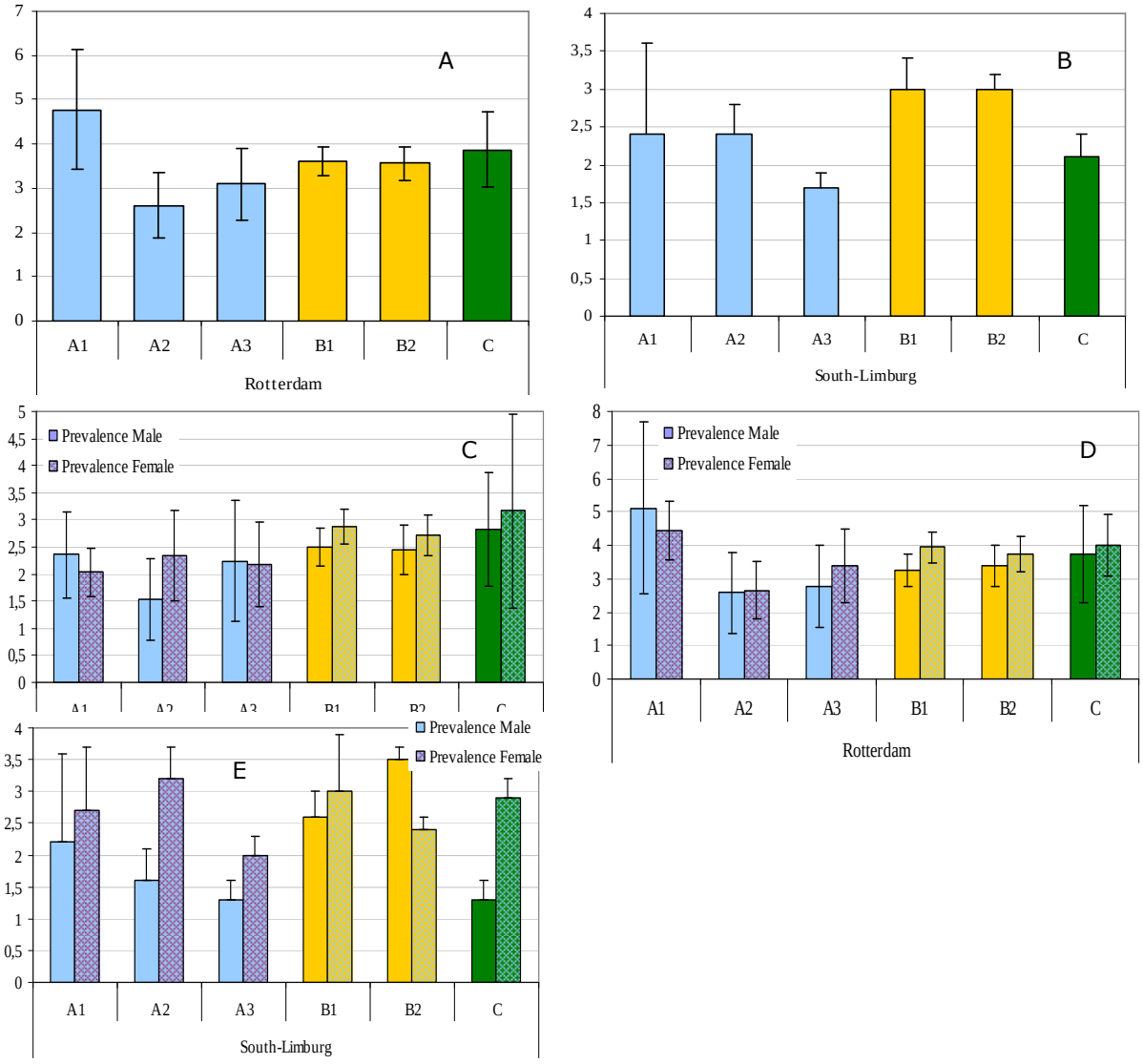

Figure 3.13. (A-E). Estimated population prevalence, by region, block and gender.

In most blocks, the estimated prevalence rates were higher in women than in men (Figure 3.13).

A decline in prevalence was visible in the group of women aged 20-24 and 25-29 years old in Rotterdam and South-Limburg and in the age group 25-29 in Amsterdam (see Figure 3.14). In women, the screening showed no impact on the estimated prevalence in the youngest group. In Rotterdam, a small (but also not significant effect) of screening was shown in the oldest age group. In the other regions and age groups, the screening had no effect on estimated population prevalence in men (possibly due to smaller numbers of participants).

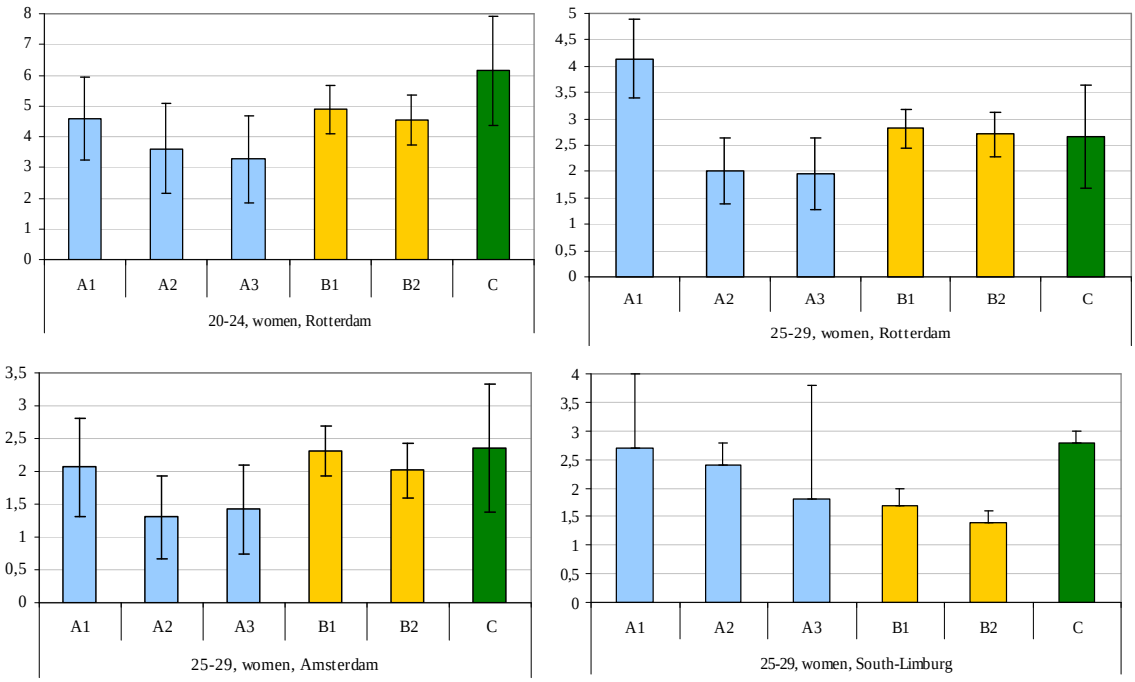

Figure 3.14. Estimated population prevalence in women, by region, block, and age group.

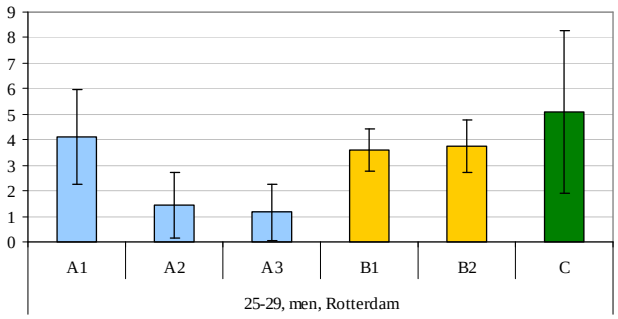

Figure 3.15. Estimated population prevalence in men, by region, block, and age group.

3.2.6 Trends in national surveillance databases

- STI centres in the Netherlands see about 9,500 Chlamydia cases per year and GPs an estimated 32,000 (in 2009).
- The baseline testing rates (testing at STI centres and by GPs) are estimated at about 12% in Amsterdam/Rotterdam and 7% in Limburg. CSI increased testing rates to 27-30% in the cities and 18% in Limburg in the first round; in round 3 this decreased to 20-24% and 13%.
- The proportion of Chlamydia cases found in CSI was about 23-36% of all cases found in the CSI-areas (CSI, STI centres and GPs together) in the first screening round. This proportion decreased to 20-30% in round 2 and 13-20% in round 3.
- Hence, testing rates increased considerably with the introduction of CSI, while the number of cases found also increased, albeit less substantially due to the lower positivity in CSI (4%) than at STI centres (12%) and GPs (17%). The added effect of CSI decreased with the reduced case finding in round 2 and round 3.

Recent trends in Chlamydia reported cases at STI centres in The Netherlands show a gradual increase in numbers, in line with the increase of numbers of visitors (see Figure 3.16). The positivity rates have stayed on the same level during the past years (11-12%). The annual number of cases found in all STI centres together amounted to about 9,500 in 2009.

The role of GPs in STI-diagnosis and treatment is very important, national estimates indicate GPs see 70-75% of all STIs. The recent trends until 2008 show a quite stable estimate of case reports until 2007 (about 20-25,000 per year), while in 2008 higher numbers were reported (32,000), especially in men (Figure 3.17). The increase was more obvious from the practices located in highly urbanized areas, and might have been related to the extra case numbers in Amsterdam and Rotterdam. It needs to be seen whether this trend continues into 2009. These estimates for Chlamydia cases also indicate that about 25% of cases is seen by STI centres and 75% by GPs.

In the national survey on sexual health in 2009 (RNG), 12% of respondents in the age category 16-29 years indicated they had been tested for STI/HIV in the previous year. A general health survey in Amsterdam (Amsterdam 2008 Health monitor) indicated a higher percentage, 20% was tested, while in Rotterdam similar 'monitor' data indicated a 12% testing rate.

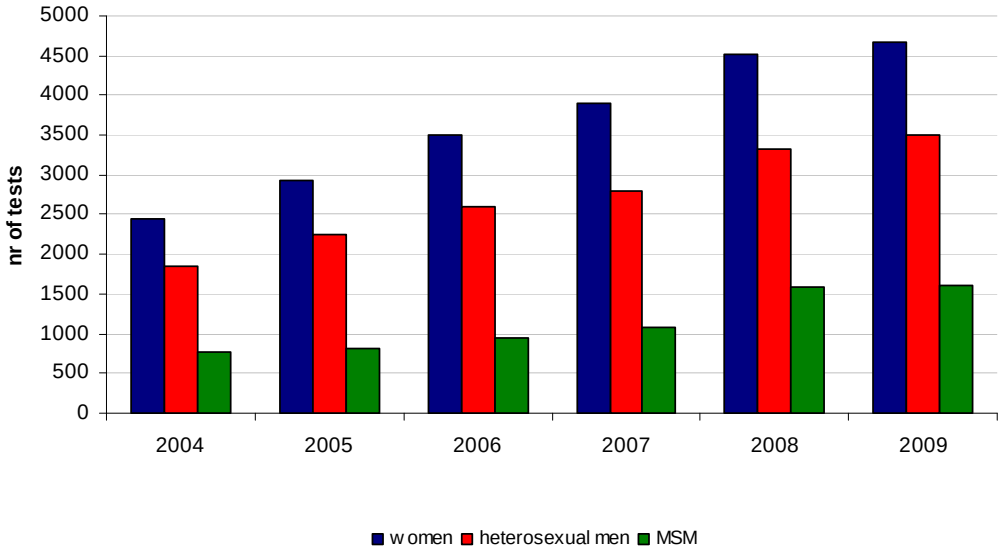

Figure 3.16. Total number of Chlamydia cases by gender and sexual preference, STI centres, the Netherlands, 2004–2009.

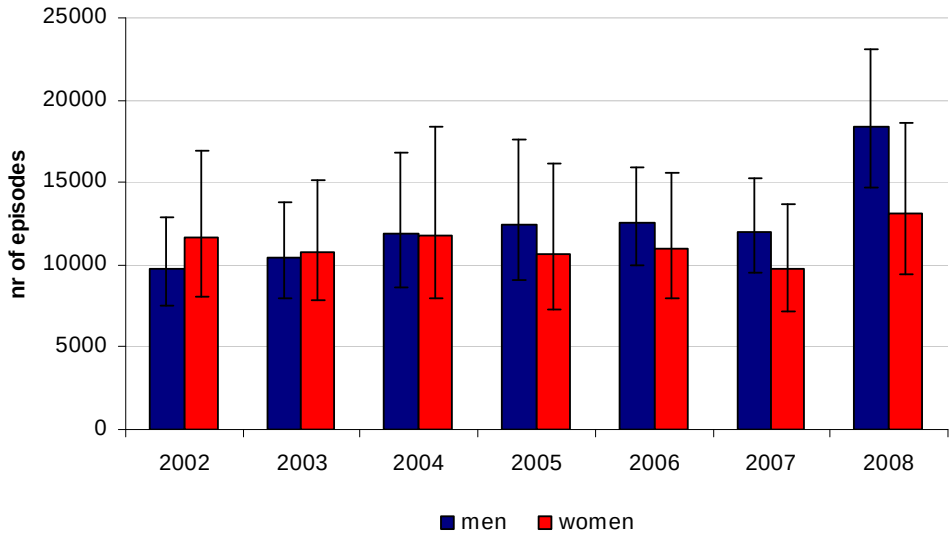

Figure 3.17. Estimated number (and 95% CI) of episodes of chlamydia at GPs by gender, based on extrapolation from 80 practices in the surveillance network of GPs in the Netherlands, 2002–2008. (Source: LINH)

Table 3.8. Chlamydia cases seen by GPs by degree of urbanization; estimates of incidence per 100,000 (95% CI) from two GP networks compared (LINH and IPCI).

Degree of urbanization	Men all ages		Women all ages		men 15-29		women 15-29	
	IPCI	LINH	IPCI	LINH	IPCI	LINH	IPCI	LINH
Level 1: highly urban	**132.5**	**340.8**	**156.2**	**371.7**	**427.4**	**634.1**	**650.3**	**881.1**
95%CI	93- 184	277-419	112 -212	307-450	276- 635	471-853	453- 906	703-1105
Level 2	**96.6**	**197.7**	**144.4**	**248.5**	**341.5**	**364.2**	**616.1**	**682.1**
95%CI	61- 146	141-278	99- 203	185-333	196- 558	217-611	405-901	472.-984
Level 3	**54.9**	**181.2**	**67.8**	**166.3**	**140.7**	**255.4**	**330.8**	**331.9**
95%CI	33-87	130-253	43-103	118-235	63-276	243-622	197-524	201-547
Level 4	**52.1**	**138.9**	**146.7**	**97.1**	**201.8**	**210.3**	**686.8**	**261.5**
95%CI	22-107	103-187	89-230	68-139	68-480	125.-353	385-1141	163-418
Level 5: rural	**75.6**	**108.3**	**101.8**	**173.6**	**282.3**	**83.1**	**498.1**	**441.0**
95%CI	21-202	73-161	34-242	126-239	56-905	32-214	138-1329	286-680
Overall	**87.3**	**189.7**	**119.1**	**207.9**	**296.3**	**325.3**	**535.9**	**525.1**
95%CI	70-108	167-216	98-143	184-235	225-389	265-399	435-660	450-613

[From: submitted manuscript Anita Suijkerbuijk *et.al.*: Usefulness of primary care electronic networks to assess the incidence of genital chlamydia in general practice in the Netherlands]

Incidence rates from GP-reports are generally higher in highly urbanized areas (see Table 3. 8). Data from two academic GP-networks in Amsterdam (VUMC and AMC) show higher estimated incidence rates than national estimates, i.e. 275-600 per 100.000 in these two networks versus 100-200 per 100.000 for the countrywide networks. In the age group of 15-29 years, incidence rates are obviously higher (See Table 3.8).

In order to make an estimate of the cases seen at GPs in the three screening regions, we used the incidence rates as given in Table 3.8 and applied these to the CSI population in Amsterdam and Rotterdam (extremely urbanized, 15-29 years), and South Limburg (moderately to hardly urbanized, 15-19 years).

We compared the data from the regional STI centres (Amsterdam, Rotterdam, South-Limburg) with those from CSI and from the GP in Table 3.9. Unfortunately, no information on double-reporting is available, therefore, we made the following calculations on the assumption that people do not test twice within one year.

Testing rate and case-finding

Rotterdam

In Rotterdam, the number of tests in 16-29 year old persons at the STI centre was 5,337 in 2009, whereas the number of tests requested by GPs for this age group in the three main local laboratories was 9,498. The proportion of people tested at the MHS and the GPs together, i.e. the 'baseline testing' amounted to 12.2% of the 16-29 year olds in Rotterdam. The CSI programme had a participation rate of 15.2% in Rotterdam, hence more than doubling the proportion tested in that year

(27%). In the second and third round, CSI-participation was 10.7% and 8.9% in Rotterdam, hence an estimated 23% and 20% of the population was tested at either of these facilities.

In Rotterdam, CSI identified a relatively large number of cases in the 16-29 years old as compared to those of the STI centre and the GPs (832 in CSI versus 750 at the STI centre and 1348 at GPs): in the first screening round about 28% of all Chlamydia cases found were in the CSI programme. This proportion decreased in subsequent rounds, assuming similar number for STI centres and GPs. In round 2, about 23% of estimated cases from CSI, GPs and STI centres together; in round 3 the number of CSI cases (extrapolation from block A only) would relate to about 16% of all cases expected.

Amsterdam
The proportion of people in the age range 16-29 years old tested at STI centres and at GPs in Amsterdam was 12.5% in 2009 (with two third going to the STI centres). The GP-data were based on the NIVEL-GP-network estimates from high-urban areas and cases from the main laboratory in Amsterdam, but might be an underestimate (Health Monitor reported 20% tested in one year). Assuming 12.5% baseline testing, the testing rate in Amsterdam would reach nearly 30% together with 17.2% CSI-participation rate. In round 2 and 3 this proportion decreased to about 25% and 24%. In Amsterdam the numbers identified by CSI in the first round (856) were lower than in the STI centre (1805) and estimated for GPs (984), and indicate that 23% of Chlamydia cases would be identified by CSI. In round 2 this would be about 20% and in round 3 (based on block A) it would be 13%.

South-Limburg
In South-Limburg only block A, one third of the CSI population was invited in round 1, so when comparing found positive of the number tested and in CSI (74/1450) with those identified in the STI centre (167/1495) and in GPs (178/1047), we should take that into account. The baseline testing rate (STI centre and GPs) was about 6.6% in 2009; CSI would add 11% in round 1, i.e. 18% tested overall in 16-29 year olds, which decreased to 16% in round 2 and 13% in round 3. If the whole target group would have been invited, 216 cases may have been found in block A, B and C in round 1, about 38.5% of all cases from CSI, GPs and STI centres together. In round 2 this would have been 33% (115 cases found in block A and B) and in round 3 22% (97 cases found in block A, B and C).

Overall
The testing rates are increased a lot by introduction of CSI, but the number of cases found does not increase in a similar way due to lower positivity in CSI. The added effect of CSI decreases with the reduced case-finding in round 2 and round 3. The estimates also indicate that in Amsterdam, where the STI centre sees a relatively large proportion of Chlamydia cases, the added effect of CSI is lower than in Rotterdam and South-Limburg.

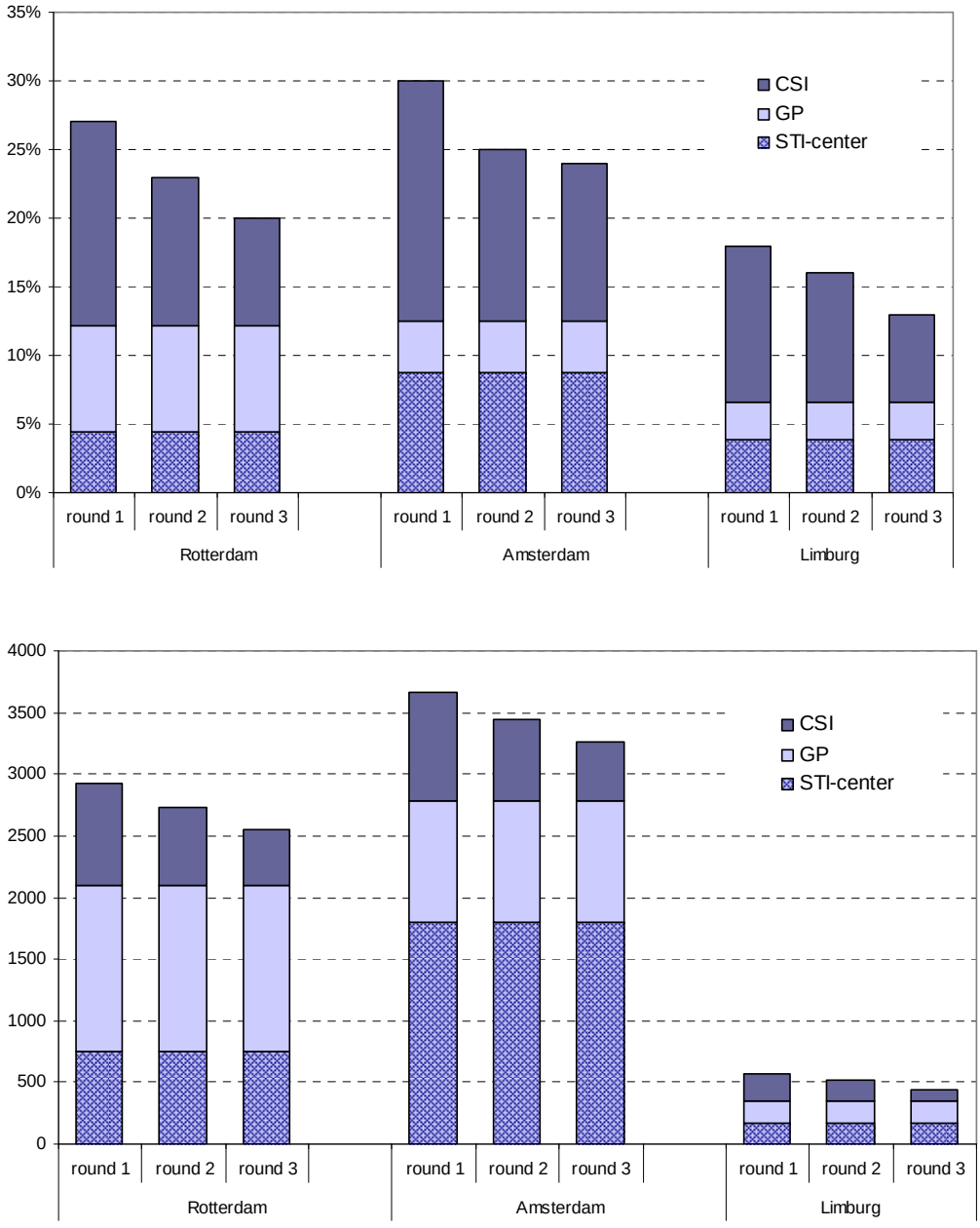

Figure 3.18. A: Number of Chlamydia tests performed in the CSI regions during the screening and B: number of Ct-positives found. CSI= tests in CSI per round, GP=tests done at general practitioners, estimates based on laboratory and GP-surveillance data, STI-centre=number of tests done at MHS STI centre, average of 2008 and 2009.

Table 3.9. Number of Chlamydia cases identified in the first screening round (2008-2009) compared with numbers reported from the regional STI centres in the same age group (16-29 years) in 2009.

Chlamydia Screening first round 2008/2009				**STI centres age group 16-29 years (reported 2009)**				**Chlamydia cases seen at GPs in CSI population (15-29 yrs) – Estimates of tests and Ct-positives, 2008-9**			
	Men	Women	Total		Men	Women	Total		Men	Women	Total
South-Limburg (CSI-area)*				**PHS South-Limburg (Heerlen)**				**South-Limburg (Parkstad, GP-tests from regional laboratory)**			
Invited	6848	6315	13163					Population	20,000	18,500	38,500
Participated	428	1026	1454	Tested	739	756	1495				
Positive	**23**	**51**	**74**	Positive	**78**	**89**	**167**	Chlamydia cases	**51**	**127**	**178**
% positive	5.4%	5.0%	5.1%	% positive	10.6%	11.8%	11.1%	*Estimated nr tested***	*300*	*747*	*1047*
Amsterdam*				**PHS Amsterdam**				**Amsterdam (GP estimates high urban area, see Table 3.10)**			
Invited	65182	74737	139919					Population	73,000	82,500	155,500
Participated	7109	16939	24048	Tested	6096	7550	13659	Incidence/100.000	500	750	625
Positive	**241**	**629**	**870**	Positive	**868**	**935**	**1805**	Chlamydia cases	**365**	**619**	**984#**
% positive	3.4%	3.7%	3.6%	% positive	14.2%	12.4%	13.2%	*Estimated nr tested***	*2147*	*3641*	*5788*
Rotterdam*				**PHS Rotterdam Rijnmond**				**Rotterdam (GP tests from regional laboratories)**			
Invited	50723	52612	103335					Population	60,000	61,500	121,500
Participated	5572	10836	16408	Tested	2415	2922	5337	Number of tests	2732	6766	9498
Positive	**236**	**600**	**836**	Positive	**326**	**424**	**750**	Chlamydia cases	**480**	**868**	**1348**
% positive	4.2%	5.5%	5.1%	% positive	13.5%	14.5%	14.1%	% positive	17.6%	12.8%	14.2%

* South-Limburg CSI area 'Parkstad' around Heerlen; first screening round only invited one third of the population of the targeted age group; in Amsterdam and Rotterdam this was 5/6th of the target population.

** based on the assumption of 17% Ct-positive of those tested at GPs – from survey GP sentinel surveillance (CMR Peilstations, NIVEL, 2008-2009).

984 Ct-cases estimated from GPs, matches with 800 cases reported in the main GP-laboratory, Atal, in Amsterdam.

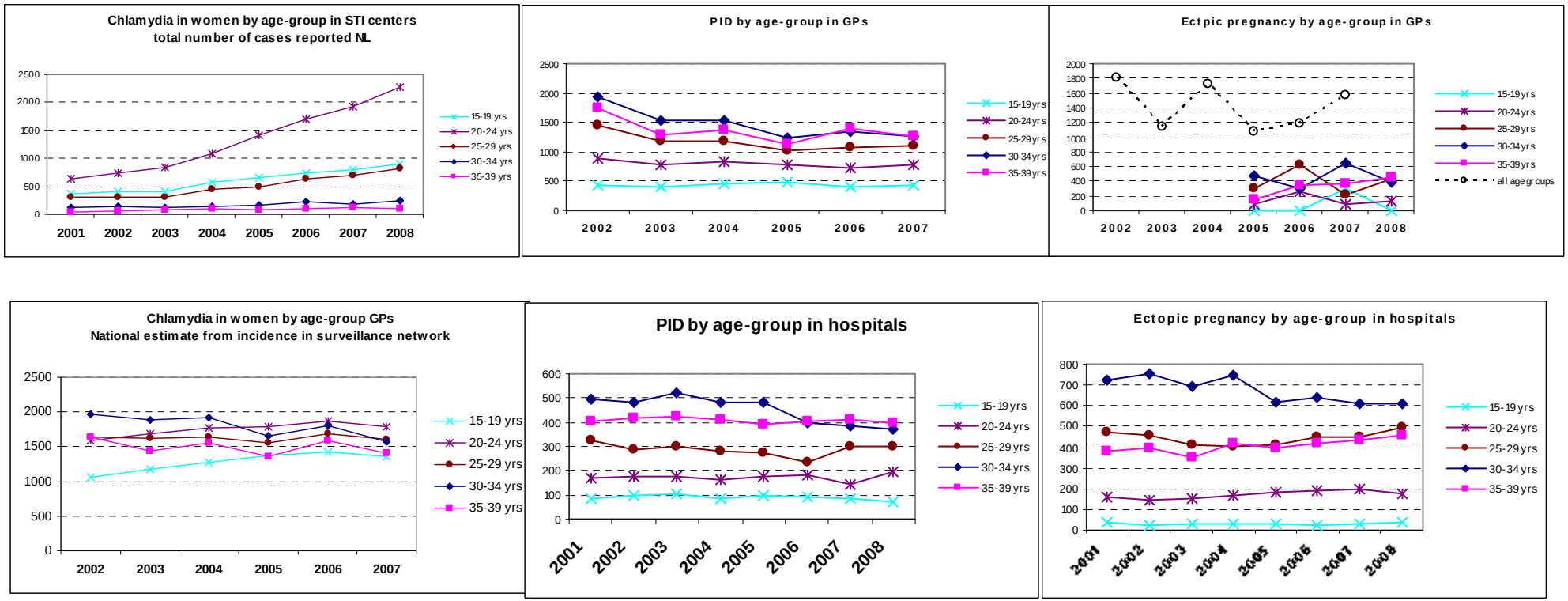

Figure 3.19. Trends in (estimates of) reported cases of Chlamydia (STI centres and GPs) and reported cases of PID and EUG (GPs and hospitals) from national surveillance data (SOAP, LINH, LMR) are shown in the graphs below. Trends are shown in total (estimated) cases per year in the Netherlands; The number of Ct-cases detected has increased, whereas PID seems to decrease (EUG shows a different pattern in specific age groups). Future trend-monitoring and comparison to regional data from CSI areas is needed to determine whether or not CSI has had an impact.

4 Results: simulation model of effect CSI on Chlamydia prevalence

In addition to the direct interpretation of the effectiveness of the CSI programme, data collected during CSI can be used to parametrize an agent-based simulation model. This type of model can simulate the spread of Ct over sexual contact networks and the effect of screening on Ct prevalence. The simulated population can be directly queried in terms of prevalence, yearly incidence and other epidemiological outcomes, which can subsequently be used to provide input for the cost-effectiveness analysis study. Furthermore, with the model it is possible to predict the long-term effectiveness of CSI and the effect that different implementation decisions of CSI would have had on its outcome.

4.1.1 Model description

The agent-based model consists of a virtual population of individuals who are connected to each other through sexual relationships, which form and break up over time. As such, the individuals form a dynamic sexual contact network, over which sexually transmitted diseases can spread. The characteristics of this network are based on a national survey on sexual behaviour (RNG Study 2009), and where lacking detail, supplemented with data from a United Kingdom based survey. Diagnosis and treatment of Ct in the model occurs at a 'baseline' level of treatment that is tailored to reflect regional differences and time-trends in opportunistic screening through GPs and STI clinics in the CSI pilot regions. In addition, the model describes population based screening as defined by the CSI.

Compared to the work of Kretzschmar et al, 1996, the main improvements of the model are its good fit to a more detailed source of information on sexual behaviour than was used in the original model, and a more accurate implementation of the baseline Ct treatment and CSI programme.

4.1.2 Limitations of the model

Agent-based models are most commonly used to gain insight in the mechanisms that drive a particular system. They are -by definition-, a simplified description of reality, omitting many of the minor factors that influence the behaviour of the system, but hopefully capture the most influential ones. It is important to understand some of the limitations of the current Chlamydia transmission model, as to be able to accurately interpret its results.

The current limitations of the model fall in two categories. First, some of the parameters for the natural history of Ct (e.g. duration of asymptomatic infection, transmission rates per sexual contact), and for the sexual contact network (e.g. variation in the number of recent partners by age and gender) display large uncertainty in the available data,, but have a substantial impact on the Ct prevalence that the model predicts. Currently, the parameters have been chosen such that they match the available data relatively well (Table 4.1), and that the prevalence of Ct in the model matches the Ct prevalence as reported for the Netherlands in van Bergen et al, 2005. However, there are sufficiently many

degrees of freedom in the model that multiple combinations of parameters will result in a similar Ct prevalence, but will give somewhat different results as to the effectiveness of the CSI programme.

Table 4.1. Main parameters of the model described, by category.
Estimates are based on literature and expert opinion.

Category	Parameter	Estimates
Sexual contact network	Frequency distribution of the number of relationships per individual in the last 6 months (for age, gender, urban/non-urban)	see Appendix A11, figure1
	Average duration of short-term, casual and long-term relationships	13 days, 250 days, 18 years
	Average gaps and overlaps between relationships	214 days , 176 days
Ct transmission	Transmission chance per day (fitted to match *Ct* prevalence, compensates for over- or under-promiscuous fits to the urban / non-urban sexual contact networks)	1.15% in urban, 3% days in non-urban
	Ct duration	370 days
	Ct symptomatic/asymptomatic	50/50 males, 30/70 females
	Incubation time	14 days
Healthcare-seeking behaviour	Treatment seeking when symptomatic. Treatment delay is a personal trait of individuals, and the same delay will apply to every *Ct* episode for an individual.	90% seeks treatment. Average delay from onset symptoms to testing is 22 days.
	Partner notification	Baseline: 40%, CSI: 75%
	Delay between testing and (if positive) treatment	14 days
	Treatment 'tiredness' (days past since last treatment during which a person declines treatment)	60 days

Secondly, some of the mechanisms that could play an important role in Ct prevalence are not included in the model. Either knowingly, as we lack the detailed information required to model a particular mechanism (e.g. differences in sexual behaviour of sub-groups of the population, and the interaction between them), or unknowingly, as we are simply not aware that they play an important role in Ct prevalence.

Despite these cautionary words, the qualitative behaviour of the model is quite robust. During development of the model, and in comparison with other types of models of Ct transmission through a population (Kretzschmar et al, 2001; Kretzschmar et al, 2009; Althaus et al, in preparation), the consistent result is that increased screening efforts will result in a lower endemic level of Ct prevalence (although there is substantial variation on the size of the estimated effect), and that unless participation of the population in these efforts is unrealistically high, screening will not eliminate the disease.

4.1.3 Effectiveness of screening

To estimate the effect that 3 years of the CSI programme had on the Ct prevalence in the Netherlands, we compared the Ct prevalence in 2010 in simulations with and without CSI. In doing so, changes in Ct prevalence due to changes in the baseline health care were taken into account; a necessity, as the health care provided by general practitioners and the STI clinics have been going through a phase of growth between 2002 and 2009 (van den Broek et al, BMC 2010), but are expected to reach their capacity limits 2010.

The Ct prevalence at the end of 2010 in the baseline scenario (without CSI) is predicted for the age-group 16-29 to be at 2.8% in large cities (urbanization degree of >2500 addresses/km2, such as Rotterdam and Amsterdam), and 1.9% in Limburg, a region with an average urbanization degree in the Netherlands (Figure 4.1A & B). This prevalence is the result of fitting the transmission probability of Ct such that the Ct prevalence in 2002 in the model matched the Ct prevalence observed in 2002 in the Netherlands (van Bergen et al, 2005).

Subsequently, we simulated the additional effect of a population based screening programme, such as CSI. The Ct prevalence at the end of 2010 in the CSI programme is predicted to be 1.7% in the cities, and 1.2% for Limburg in the age range 16-29 (Figure 4.1A & B). However, these Ct prevalence levels are not stable, and are expected to increase after 2010 (see next section). Expressed in age-brackets of 1 year, the largest drop in Ct prevalence occurred in 20 year old women and 24 year old men within cities, and in 22 year old women and 24 year old men in Limburg. Due to the stochastic variations in the sexual contact network and in the Ct prevalence in the model population, there is considerable variation in the model results, even after averaging over 20 simulations with 50,000 individuals each.

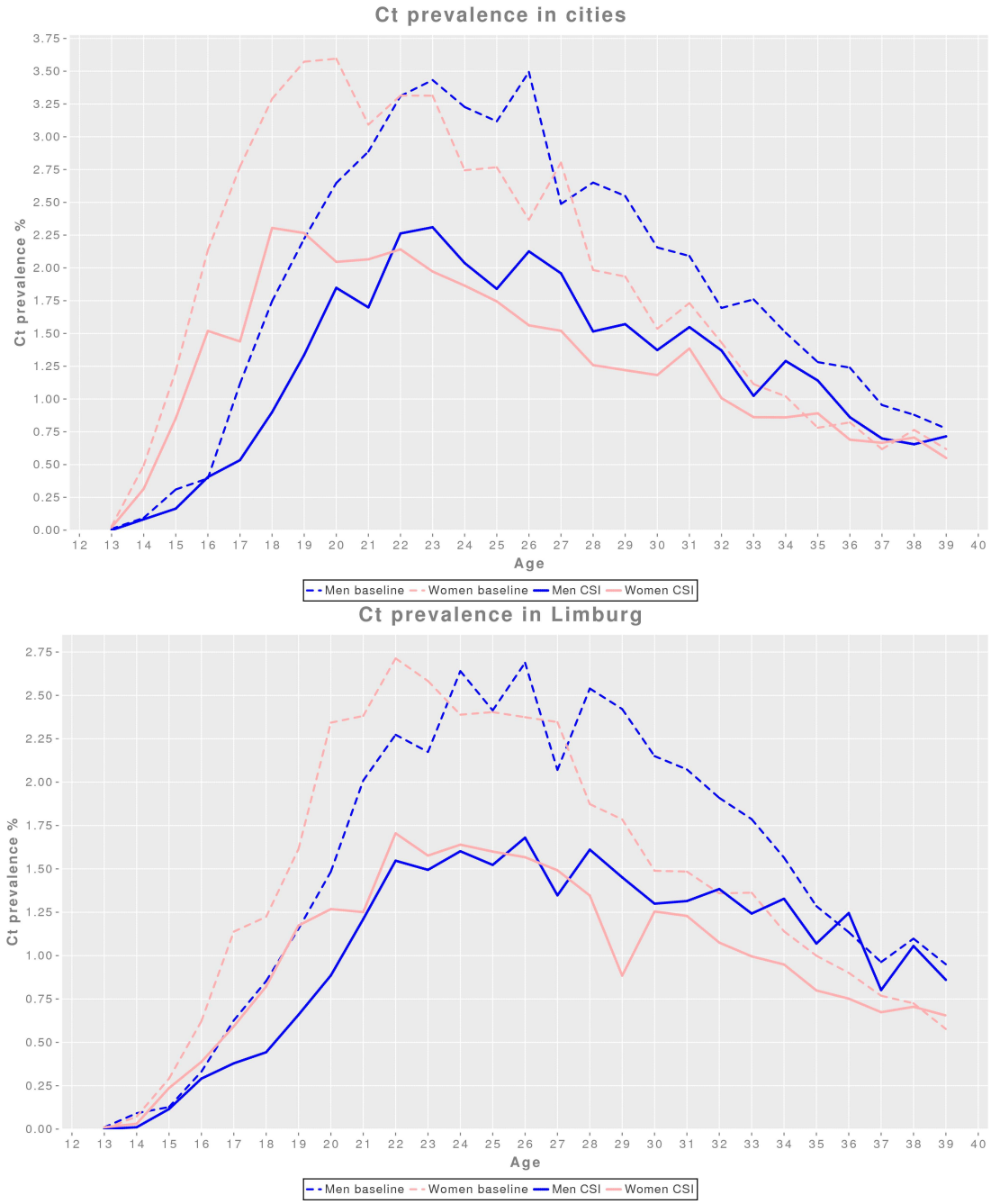

Figure 4.1. Ct prevalence per age, at the end of 2010. Splitting the population into age-groups gives a detailed view on the effect of CSI screening as a supplement to the baseline treatment (GPs and STD clinics). The effect on the *Ct* prevalence is most visible in the age-groups 17-23 (women cities), 21-26 (men cities), 20-27 (women Limburg) and 24-29 (men Limburg), where it lowers the *Ct* prevalence by up to 1.75 percent-points.

4.1.4 Modelling CSI participation rates

One of the determining parameters of the model in terms of effectiveness of the CSI programme is the degree of participation of the population. For 2008-2010 we have accurate information on the proportion of individuals that will accept the invitation to participate, based on his/her previous decisions to participate in the CSI programme. For 2011 and further, we have to extrapolate two trends in the data: the decline in the participation rate amongst the newcomers to CSI (who did not participate previously because they were too young, not yet sexually active, or not eligible based on their risk-score), and the likelihood to participate, given an individuals' past decisions on participating in the programme. We chose to explore two future scenarios of participation (a 'high' and a 'low' one), which gives some degree of insight in the sensitivity of the Ct prevalence to participation rates of the populations. Both scenarios follow the observed decline in participation rate between 2008 and 2010, but the `high' scenario assumes that the yearly fraction of individuals that participate at first invite will remain constant at +-13% of newly invited sexually active, and that those invited by the CSI programme for the 4th or more time will have the same chance of participating as they had the 3rd time they were invited (Figure 4.2, Top). The 'low' scenario assumes that the yearly fraction of individuals that participate at first invite drops for two more years to +-4% of newly invited sexually active individuals before becoming constant, and has a more pessimistic view on the chance that individuals will participate when invited for a 4th or more time (Figure 4.2, Bottom). For the simulations modeled after the Limburg region, the risk-score requirements for CSI participation lowered the overall participation in the programme by 25%.

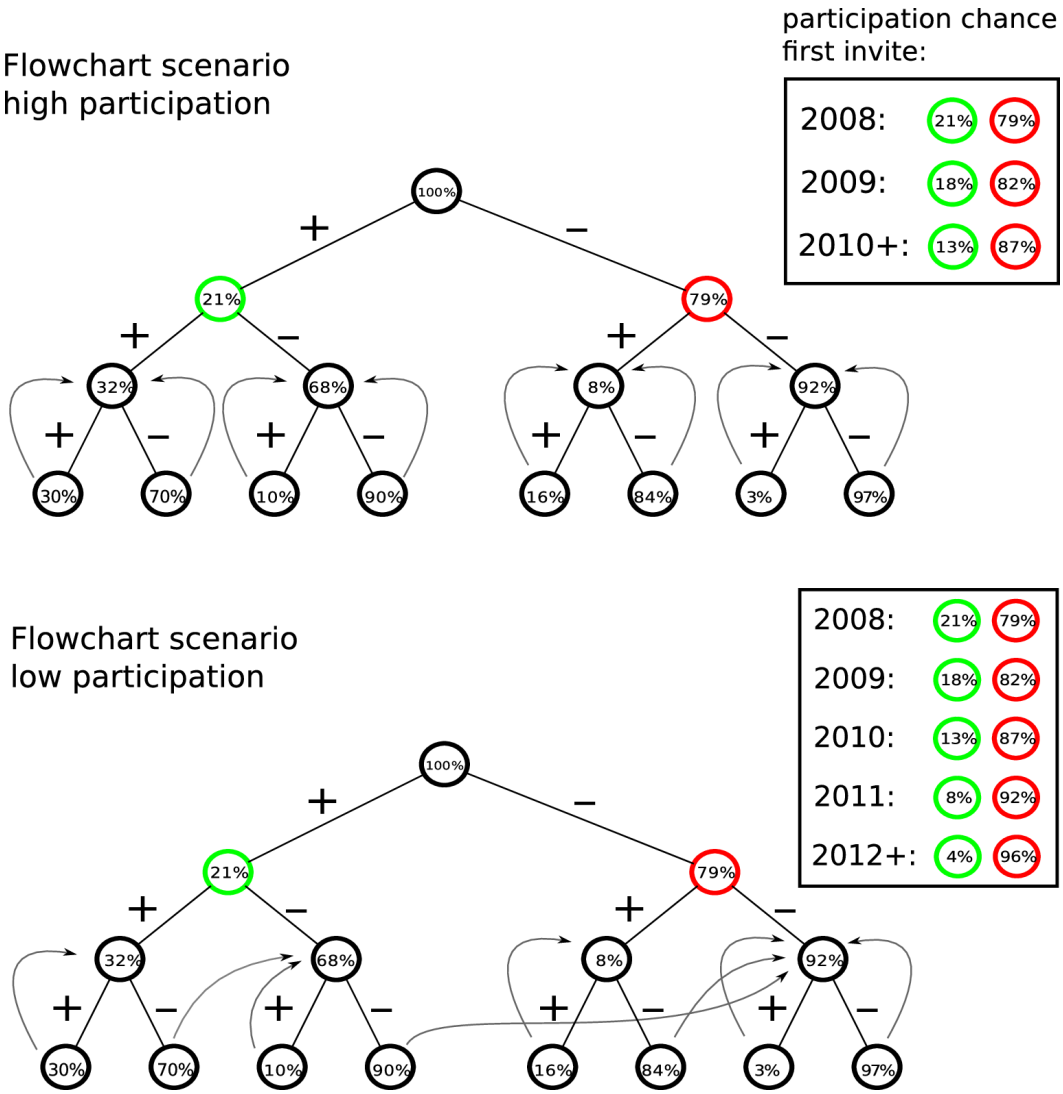

Figure 4.2. CSI participation tree, for the high and low participation scenario. The trees and the percentages within the tree are based on the CSI participation data of men and women. (future versions of the model will have gender-specific participation trees). After receiving the first invitation to the CSI programme, 21% of the individuals would decide to participate in 2008 (green circle, trees), and based on their first decision (to participate or not) have a 32% and 8% chance to participate in CSI on their second invite, respectively, and a 30%, 10%, 16% and 3% chance to participate on their third invite. The boxed areas on the right-hand side of the panel show the observed decline in subsequent years in the chance to respond positively upon first invite. In the high participation scenario, the participation chance upon first invites drops no further than the 2010 level, whereas in the low participation scenario, the participation chance drops for two more years before stabilizing. We assumed that the other chances in the participation tree (black circles) only depend on the previous choice(s) of the women, and not on the screening year. The arrows leading upwards in the two panels show the second difference between the high and low participation scenarios: in the high participation scenario, the 4th and subsequent choice that an individual makes whether to participate in CSI is similar to the 3rd choice, while in the low scenario, negative choices in the 3rd round redirect the individual to more negative parts of the decision tree.

For both scenarios, there is an initial steep decline in CSI testing uptake (Figure 4.3), which is largely an effect of inviting everyone in the age-range 16-29 for the first time in the initial year of CSI. In later years, those aged 17 or higher had already been invited in previous years and thus had a lower propensity to participate than the 17-29 year-olds had in 2008. The proportion of individuals in the model that participated the first time was 21% , while the proportion that participated a second and third time in subsequent years was 13% (21% * 32% + 79% * 8%), and 6.6% (21% * 32% * 30% + 21% * 68% * 10% + 79% * 8% * 16% + 79% * 92% * 3%), respectively (Figure 4.2). After the initial 3 to 4 years of CSI, a more stable age distribution of participation formed in the simulations, in which the number of tests used is almost stable (Figure 4.3).

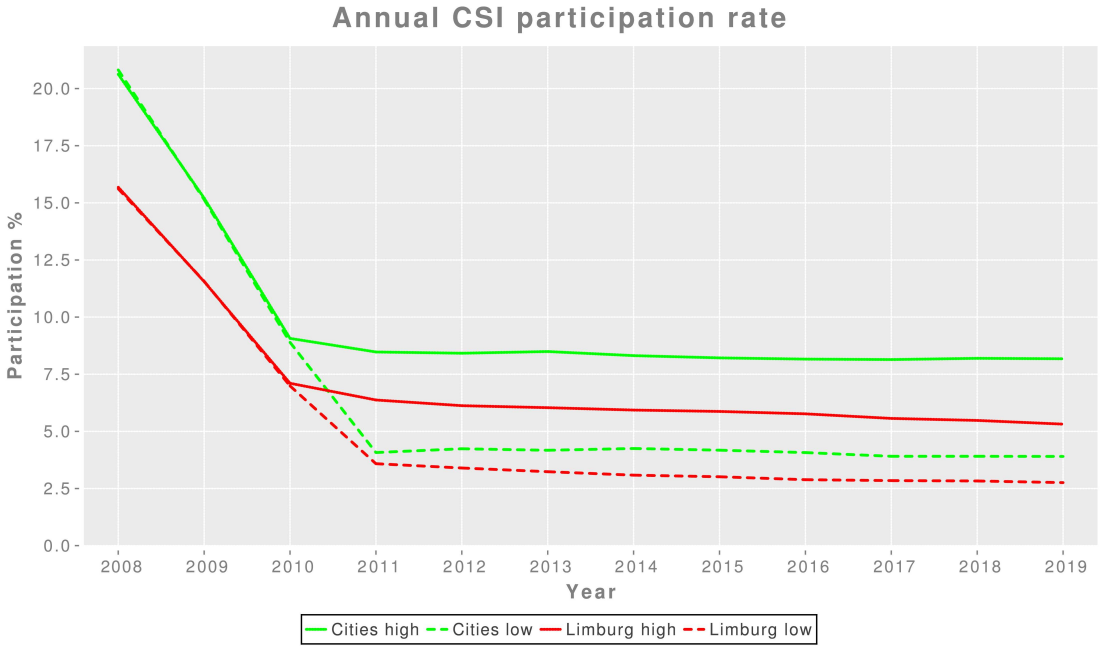

Figure 4.3. Annual CSI participation rate amongst sexually active individuals in the age-group 16-29, for 2 different extrapolations of future CSI participation rates. The modeled Limburg population has to pass a risk-score assessment similar to the one applied in the actual CSI programme, and thus has a lower participation rate than the cities.

4.1.5 Long-term effectiveness of screening

Having established a method to extrapolate the participation rates of the CSI programme in the previous section, we can estimate the long-term impact of the CSI programme on Ct prevalence. In accordance with the number of CSI tests used (Figure 4.3), the effect of the CSI programme is largest in its first year, in which about 2/3rd of the decrease in Ct prevalence is achieved (Figure 4.4 A & B). By the end of the third year of the programme the CSI has reached most of its cumulative effects, and the prevalence in the age-group 16-29 is predicted to decrease by 1.1 percent-points in the cities (Figure 4.4A) and by 0.7 percent-points in Limburg (Figure 4.4B). However, in both the high and low participation scenario, continuation of the CSI programme past 2010 did not lead to a further drop in Ct prevalence, but at most maintained the percent-point decrease compared to a baseline scenario of not implementing the CSI programme (Figure 4.4 A & B). In both scenarios, the CSI programme resulted in a lower endemic Ct prevalence compared to the baseline expectation: the high participation scenario

resulted in an estimated 0.7 and 0.6 percent-point drop in Ct prevalence by 2019, for the cities and Limburg respectively, and the low participation scenario resulted in a 0.5 and 0.4 percent-point drop in Ct prevalence. Note that the low participation scenario does have an impact on the Ct prevalence: halting the CSI programme in 2010 would lead to a return to the baseline Ct prevalence by 2017 (not shown).

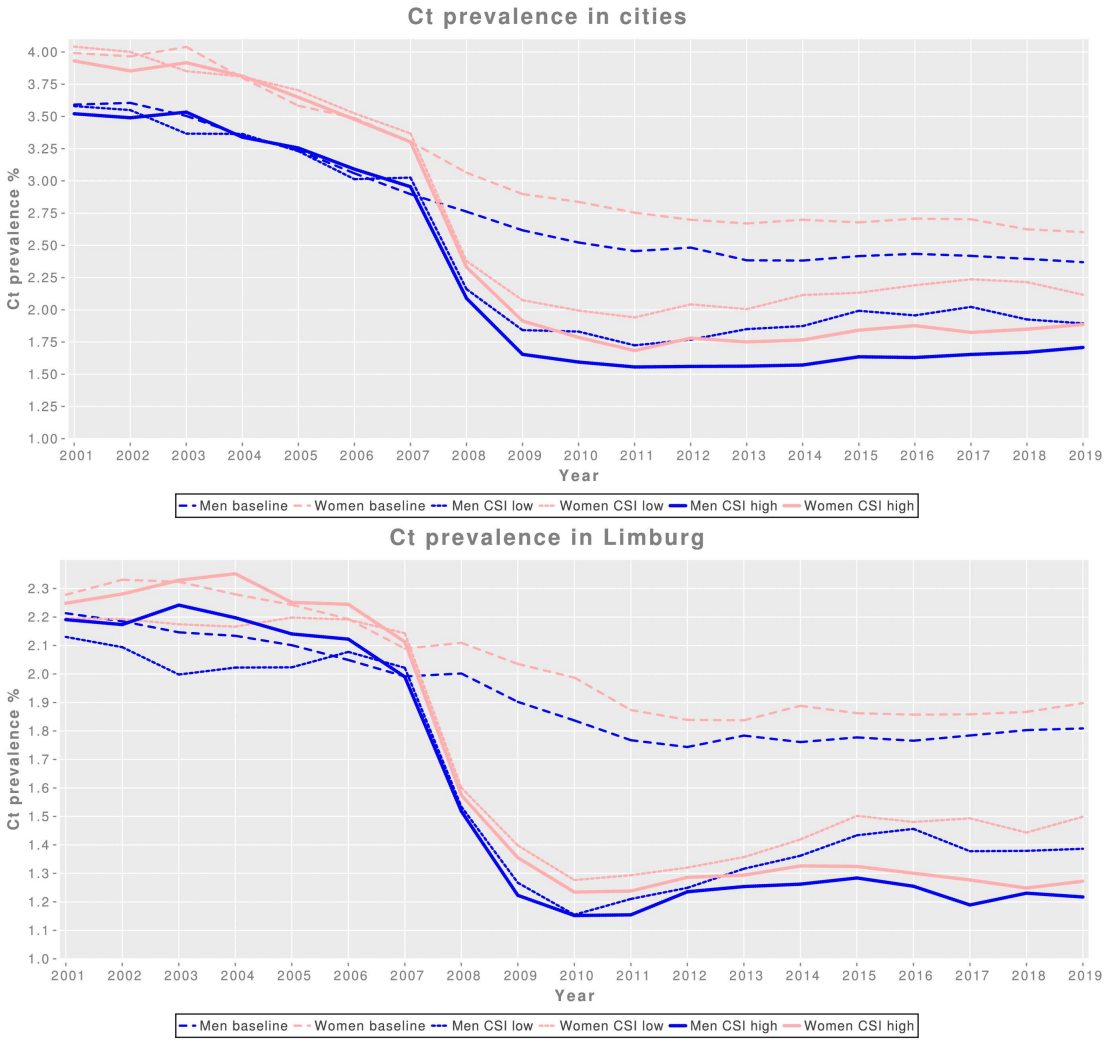

Figure 4.4 *Ct* prevalence in the age-group 16-29, plotted over time and by gender for populations in highly urbanized regions (Amsterdam, Rotterdam: top panel) and for generic regions (Limburg: bottom panel). Two CSI scenarios are plotted, based on different assumptions on future CSI participation rates: the 'high participation' and 'low participation' scenario (see previous section).

4.1.6 Alternative CSI screening scenarios

One of the possibilities of modelling is to study how different implementations of CSI would have affected the results. This kind of study has been done prior to the CSI (Kretzschmar et al, 2001), but not with the current insights into realistic participation rates, partner notification rates, nor with the current model (with its progressive advantages compared to older models). In this section we will shortly touch upon three alternative CSI screening scenarios. As all three scenarios reduce the size of the target population of the CSI programme, the effect of these scenarios on Ct prevalence will inevitably be less than that of the current CSI implementation. However, the cost effectiveness (see next chapter) could be higher. For all screening scenarios, we assume the earlier discussed high participation scenario.

Screening women only

Motivation: as the long-term harmful effects of Ct are almost exclusively affecting women, screening women only (and their partners) could be a more economical CSI scenario.
Results: Despite the high success rate of current partner notification (80%) in the CSI programme, screening women only is the least effective alternative scenario, reaching only 50% of the percent-point decrease in endemic Ct prevalence that screening both men and women does.
Comments: this result is in contrast with an earlier analysis of Kretzschmar et al, 2001 in which screening of men and women had little additional value above screening women only. A key difference between Kretzschmar et al, 2001 and this study is that the former had a 65% yearly participation rate in the age-range 15-24, with an effective treatment of 45% of the current partners (based on an Amsterdam pilot study on opportunistic screening (van den Hoek et al, 1999). We speculate that the almost 10-fold higher participation rate in the 2001 model means that even when men are not directly targeted for screening, they would frequently be invited for screening by partner notification. In such a scenario, directly screening men and women might not have much additional value above screening only women. The result warrants additional attention in order to understand the differences in model outcome. One important remark is that the CSI programme also attempted to notify and treat ex-partners of Ct positive individuals, but at a far lower success rate (28%), whereas in the model only current partners were notified. Therefore the efficiency of screening women only might be underestimated by the model.

Screening the age group 16-24

Motivation: as Ct prevalence is generally thought to be highest in the age range of 16-24, targeting the CSI programme on that age-group would be the most economical choice. Other screening programmes (LaMontagne et al, 2004) indeed use the age range 16-24.
Results: The initial decrease in Ct prevalence would be smaller in the 16-24 scenario than in the current CSI implementation, because those of age 25-29 were not invited to participate, while the decrease in Ct prevalence is still measured over the age range 16-29. However, in the cities the difference in the Ct prevalence reduction when screening until 24 or until 29 becomes indistinguishable after 12 years of screening (Figure 4.5A). In Limburg, the 16-24 scenario appears to be permanently less effective than the default CSI scenario (Figure 4.5B).

Comments: although the peak of Ct prevalence in women in cities falls between the ages of 16 and 24, for men living in an urban environment, and for both men and women in a non-urban environment, the peak prevalence is at age 26-29 (Figure 4.1). Therefore, the current CSI age range would appear to be a good target age range for a nationwide screening programme in the Netherlands. Furthermore, decreasing the age range will also decrease the effect that the CSI programme has through partner notification on the population outside of the age-range (see Ct prevalence decrease outside screening range in Figure 4.1).

That in the cities the difference between screening until age 24 or age 29 becomes smaller over time (fig 4.5A) is a consequence of the way the model extrapolates CSI participation in 2012-2019: the chance to participate decreases with the number of CSI invitations that an individual has received (see section 4.1.4). In 2019, most people age 25-29 enrolled in the programme will have been invited >10 times to participate in the CSI programme and the majority of them will decline to participate, thus making the difference between screening until 24 or until 29 very small. The Ct prevalence peaks later than in the urban environment in Limburg, and people are invited less frequently to participate with the CSI programme (due to the risk-score requirement). Thus, sufficient people of age 25-29 still participate to make a permanent difference in the effectiveness of screening until age 24 or age 29.

Screening biennial

Motivation: screening individuals biennially (once every two year) rather than annually may prevent participation exhaustion by inviting people less frequently.
Results: this scenario causes the largest decrease in Ct prevalence of the tested alternative scenarios, but does not lead to a lower endemic Ct prevalence than the default scenario (Figure 4.5).
Comments: One important assumption in the biennial scenario is that the participation behaviour is not affected by the time interval between CSI invites, but only by the number of invitations that an individual gets. As such, it takes longer for individuals to become exhausted with CSI participation, and the average number years after which individuals permanently stop participating in the CSI programme doubles from 4.5 years to 9 years (in the cities). Shifting the age at which individuals participate in the screening such that their participation corresponds better with the peak in Ct prevalence increases the effectiveness of the CSI programme. In the cities, the effect of screening biennially (slower participation exhaustion) is initially not sufficient to compensate for the lower annual participation rate inherent to inviting people every two years, but by 2019 the Ct prevalence reaches a similar level as that of the default CSI programme. For the non-urban environment (Figure 4.5B), the biennial scenario does not decrease the Ct prevalence as much as the default CSI programme, as the Ct prevalence peaks late in Limburg, and risk-score requirement lowers the rate with which individuals become tired of participating with CSI.

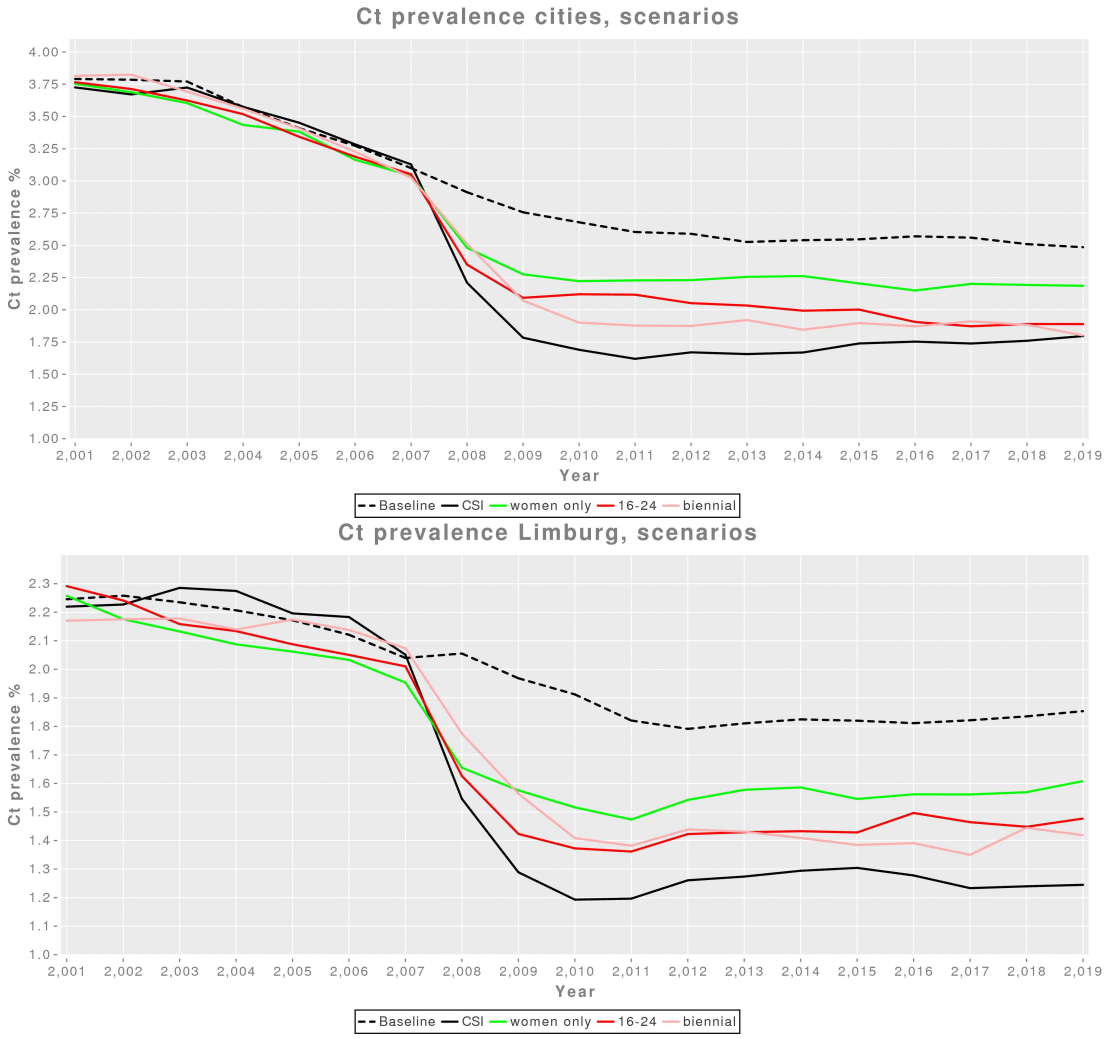

Figure 4.5. Comparison of effectiveness of alternative CSI scenarios (top panel: Cities, bottom panel Limburg). Using the high participation scenario, three alternative screening scenarios were compared to the baseline and default CSI programme in their effect on the Ct prevalence.

4.1.7 Conclusions

The two main conclusions to be drawn from modelling the impact of CSI on Ct prevalence is that a continuous CSI screening effort will have a limited but stable effect on the endemic Ct prevalence, and that the eventual size of this effect depends heavily on the sustained participation rate of a screening programme. This modelling study shows that given the observed participation rate and its optimistic and pessimistic extrapolations, impact on Ct prevalence is limited and will not succeed in eliminating Chlamydia trachomatis from the population. The estimated size of the effect of CSI on Ct prevalence is a decrease within a range of 0.4 to 0.7 percent-points.

4.1.8 Discussion and future steps in Ct transmission modelling

The current model, with its detailed description of many of the mechanisms that play a role in Ct transmission, is a large step forward towards an accurate description of Ct transmission compared to the original model of Kretzschmar et al, 1996. The increase in detail in the current model makes it possible to more accurately predict the effects of CSI on the Ct prevalence in the Netherlands than was possible in earlier models. However a more detailed model also adds complexity in terms of fitting the model to available data, and in analysing and understanding its results. In the latter aspect, the current model is still a work in progress.

For a correct interpretation of the model results it is of importance to understand the robustness of the model. Although a formal sensitivity analysis of the model is not yet available, during model development it has become clear that two factors in particular determine the model results. Firstly, and already emphasized throughout this chapter is the effect that CSI participation levels, and the extrapolation of CSI participation levels for 2012-2019 have on the model outcome (Figure 4.2-4.4). Secondly, the structure of the sexual contact network used by the model affects the predicted effectiveness of CSI: the sexual contact network implementation determines how promiscuous behaviour of individuals is distributed over the population. This distribution in turn affects the age range in which Ct prevalence peaks (Figure 4.1) and the speed with which Ct can spread through the network and reach susceptible individuals (data not shown). We have modelled the sexual contact network of highly urbanized environments, and of more rural environments such as that of Limburg, based on RNG survey data. The RNG survey data also indicates that there are substantial differences between the sexual contact networks of highly urbanized environments (e.g. Rotterdam and Amsterdam), but the sample size of the survey is not large enough to model cities individually. Therefore, some care should be taken when applying the model results to a specific city or region in the Netherlands. In general, accurately simulating social and/or sexual contact network is an ongoing challenge in the network analysis field (Robins et al, 2007, Keeling & Eames, 2005). Thirdly, the model is quite sensitive to chance events in the network: all results shown here are averages over 20 simulations with 50,000 individuals each (1 million people in total), and +- 260,000 people in the CSI age range. Despite these large samples, the estimated average Ct prevalence for the CSI age range showed +- 0.1 percent-point variation over time in a population with a Ct prevalence of 1% and 2%, respectively (Figure 4.4A & B). The differences in Ct prevalence between adjacent age classes (Figure 4.1) ranged up to 0.5 percent-point. If the stochasticity in the model reflects the stochasticity occurring in real populations, then some care needs to be taken when interpreting changes over time in Ct prevalence even in relatively large populations.

A direction in which to further develop the model analysis is to explore what happens when individuals in the model can assess the chance that they are infected by Ct, and to some degree base their healthcare-seeking behavior on that assessment. The Rutgers Nisso Groep survey and the CSI surveys indicate that many people indeed make such an assessment. The accuracy with which individuals can assess their personal risk of Ct infection plays an important role but unexplored role in the effect that a particular level of CSI participation has on Ct prevalence. Modelling can be used to translate empirical observations and hypotheses about health care seeking behavior into assumptions on participation rates and ensuing effects of screening on Ct prevalence.

5 Results: economic evaluation of screening

5.1.1 General description of modelling approach

In a context of scarce health care resources, any new screening programme should be evaluated for its relative efficiency, compared to doing nothing (no screening/usual care), or compared to the current health care approach towards the disease screening is targeted at. We performed an economic evaluation of Chlamydia screening to determine the relative efficiency of different implementation scenarios. The cost-effectiveness of Chlamydia screening has been subject of RIVM research before (Welte et al., 2000; Welte et al, 2005). The RIVM modelling approach elaborated on Danish research on the cost-effectiveness of home-based Chlamydia screening versus opportunistic screening in general practice (Andersen et al., 2006). In turn, we built on the Danish model of Andersen and colleagues for the current economic evaluation. The model will be described briefly below, more details can be found in the publications mentioned before.

Figure 5.1 represents the general approach to cost-effectiveness modelling. The mathematical modelling work described in the previous chapter resulted in estimates of annual prevalence and incidence of Chlamydia in the population. To perform a cost-effectiveness analysis, the output of the transmission dynamics model, in terms of incidence (translated into annual number of incident cases/persons) served as input into our model describing the natural history of Chlamydia infection and its sequelae.

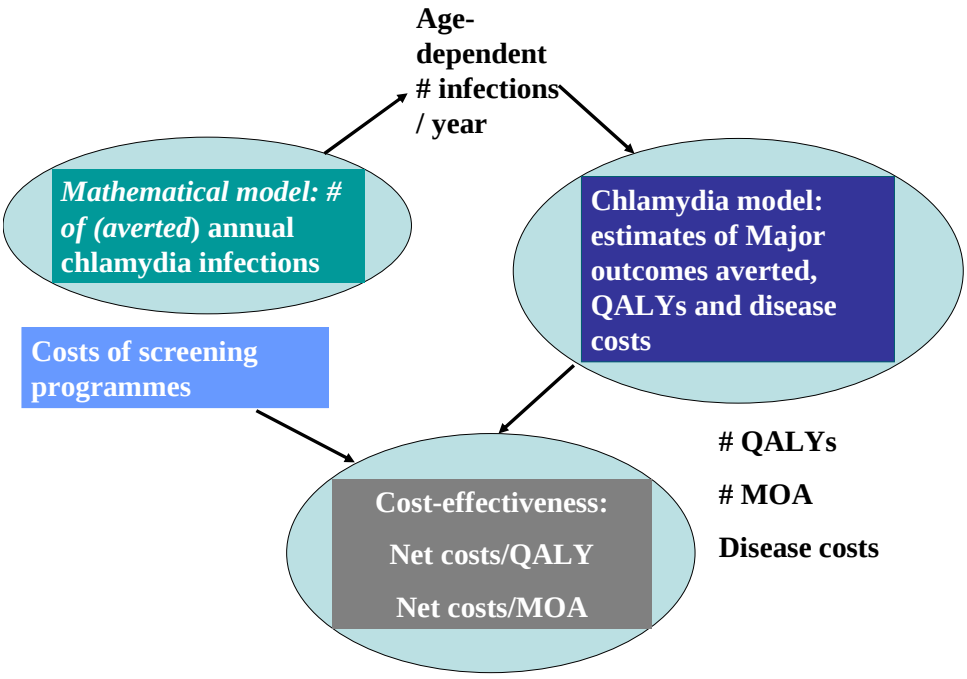

Figure 5.1. General approach to modelling the cost-effectiveness of Chlamydia screening.

Persons with an asymptomatic Chlamydia infection may either clear the infection naturally or progress to longer-term sequelae of infection. Sequelae themselves may be symptomatic or asymptomatic. A model for the natural history of infection was constructed, using published estimates for progression rates (see Andersen et al., 2006) and expert opinion (CSI study group).

Starting with the endemic steady state in year 0 (no screening policies implemented yet), the incidence under different screening scenarios is modelled dynamically over a period of ten years. The population in year 0 represents the Dutch population by age (five-year age classes: 16-19, 20-24, 25-29, etc.) and gender as in the year 2010. Screening adds to the detection of asymptomatic Chlamydia infections in the population, on top of Chlamydia care as implemented at present (i.e. treatment of symptomatic cases at GP practice or STI clinics, detection and treatment of asymptomatic cases and treatment of symptomatic cases at genitourinary clinics).

Introduction of Chlamydia screening will result in the detection and treatment of a number of asymptomatic infections, and successful treatment of asymptomatically infected persons will subsequently avert a number of new infections in the population. By comparing the numbers of incident cases in the different scenarios for the implementation of Chlamydia screening, we were able to estimate the number of averted infections when one scenario for implementation is chosen, compared to a situation with a different implementation scenario. Four different scenarios are modelled at present:

1) Default: invite all 16-29 year old men and women annually (the strategy as implemented in the Amsterdam, Rotterdam and South-Limburg regions during the period 2008-2010);
2) Women only: invite all women 16-29 for annual screening;
3) Younger persons only: invite all men and women aged 16-24 for annual screening;
4) Biennial: as default scenario, but only sending invitations every two years.

We derived the number of infections and sequelae from the natural history model (see below, estimates in Table 5.1). In order to define the total burden of Chlamydia infections detected in different scenarios, we multiplied the number of infections and sequelae by their estimated costs. From the number of sequelae, we retrieved the number of major outcomes (major infection sequelae), and computed the number of quality adjusted life years (QALYs) lost due to infection. For each screening strategy, this resulted in ten year estimates of the total number of infections, the total cost of disease, the total number of major outcomes and QALYs lost due to Chlamydia infection, and the total programme (investment) costs. The comparison of the different screening scenarios to a situation without screening permitted to calculate gains (i.e. in terms of QALYs and number of major outcomes), and to calculate differences in net cost (investments minus savings) between the different strategies. All future (i.e. from year 2 on) costs and effects were discounted at 4% and 1.5%, respectively, following Dutch guidelines for pharmacoeconomic research. The base year for the analysis was 2010. The perspective for the analysis was the societal perspective, including all health care costs and productivity losses.

5.2 Methods for economic evaluation

5.2.1 Estimation of Major Outcomes Averted

Screening aims at detection and treatment of previously unnoticed cases of Chlamydia, to prevent further spread of the infection and to prevent longer-term consequences of infection, such as infertility. Most previous economic evaluations have reported effectiveness of screening in terms of Major Outcomes Averted (MOA). Different disease consequences of Chlamydia infection are added to estimate the total number of MOA, without weighing the relative severity of these outcomes. Most previous models have incorporated the following disease sequelae in their estimate of MOA: symptomatic pelvic inflammatory disease (PID), chronic pelvic pain (CPP) following PID, ectopic pregnancy, infertility, and neonatal pneumonia. Following previous work of Welte et al. (2000, 2005) and Andersen et al. (2006) we have constructed a disease progression model using probabilities that an asymptomatic case of Chlamydia will develop each of the disease sequelae. To do so, we studied the literature on disease consequences of Chlamydia. Previous Chlamydia disease models have been criticized by van Valkengoed et al. (2004) for their far too optimistic progression rates to future disease stages, thereby overestimating the burden of Chlamydia and the cost-effectiveness of policies directed at early detection and treatment of Chlamydia. Recently, Land et al (2010) summarized the available literature on Chlamydia consequences and found large discrepancies in different estimates of those probabilities. Therefore, the disease burden attributable to Chlamydia will stay uncertain to a large extent. We by and large adopted the disease model following Andersen et al. (2006). We discussed all parameter values in the CSI project group and made some downward adaptations for the progression rates to PID, CPP after PID, and epididymitis. Key parameter values for disease progression are given in Table 5.1. As disease progression rates have important consequences for the absolute levels of cost-effectiveness ratios, we used ranges for the estimates of the probabilities in the uncertainty analysis (see later).

Table 5.1. Risk of complications for untreated, asymptomatic Chlamydia infections.

Complication	Probability estimate (95% confidence interval used for uncertainty analysis)
Men	
Epididymitis (hospitalized)	2% (expert) (0.5-4.4)
Women	
Pelvic Inflammatory Disease (PID)	10% (expert) (4.7-17)
Chronic Pelvic Pain after (CPP) after PID	17% (expert) (11-24)
Probability of infertility after PID	12% (6.5-19)
Probability of infertility investigation if infertile	90% (lifetime) (83-95)
Probability of In Vitro Fertilization (IVF) if infertility investigation	70% (64-76)
Probability of ectopic pregnancy after PID	7.7% (2.7-15)
Years to diagnose infertility after PID	2 (0.24-5.6)
Newborns	
Probability of neonatal conjunctivitis transmitted at birth	18% (12-25)
Probability of neonatal pneumonia transmitted at birth	16% (10-23)

Source: probabilities from Andersen et al. (2006) or expert opinion (if indicated).

As specified in section 5.1.1 and 5.1.2., the number of MOA in a certain screening scenario is calculated and compared to baseline, i.e. not introducing Chlamydia screening, implying continuation of current Chlamydia care (i.e. through general

practices and genitourinary clinics). In this approach, MOA are solely the result of effectiveness of screening through reduction in prevalence and incidence over time (indirect effects of screening). However, it is likely that direct benefits of screening and treatment occur as well, because asymptomatic Chlamydia that is treated after detection may also have direct benefits for the person treated, depending on the timing of detection (duration of infection at detection). One study found that the second year PID rate in women who were treated for asymptomatic Chlamydia was half of the rate in women with untreated asymptomatic infection (Gottlieb et al, 2010). We have therefore included a direct benefit of screening and treatment by halving the probability estimates of complications for cases detected through screening. The total effectiveness of screening in terms of MOA is the sum of the direct and indirect effects.

5.2.2 Estimation of QALYs associated with Chlamydia sequelae

An obvious problem of using the outcome measure Major Outcomes Averted for the cost-effectiveness analysis is the fact that the acceptable level of cost per Major Outcomes Averted is unknown and that all outcomes contribute equally, while obviously differences exist in severity and duration of the different Chlamydia disease outcomes. The criterion cost per MOA cannot be compared against an independent threshold value, in order to classify Chlamydia screening as cost-effective or not. Health economists use the outcome measure of quality adjusted life years (QALY) to compare the cost-effectiveness of interventions directed at different health problems. The QALY is a measure that expresses both outcomes in terms of length of life (life years/months/days added to life through an intervention) and quality of life. Quality of life is expressed in a number between 0 (death) and 1 (best imaginable health state). The relative distance to 0 and 1 expresses the severity of the health state. A full year in a health state valued at 0.5 contributes 0.5 QALY, exactly the same as six months in a health state valued at 1.0. Chlamydia screening targets the detection and treatment of previously unnoticed Chlamydia cases. Effective Chlamydia screening programs will in general not impact on length of life but they may have an impact on quality of life, through the prevention of health problems associated with decreased quality of life, such as ectopic pregnancy and infertility.

To estimate QALYs associated with Chlamydia infection and its sequelae, we need utility values for the Chlamydia disease outcomes, such as pelvic inflammatory disease and infertility. We also need reliable estimates on the average duration of diseases associated with Chlamydia, as QALYs are the product of length of time in a certain health state and quality of life during that time. No proper utility values for all Chlamydia complications are available at present. Substantial research efforts would be necessary to elicit utility values from patients and/or society. This was outside the scope of the present research project. Only one attempt was found in the literature to elicit utility values for Chlamydia disease outcomes (Stratton et al., 1999). This was a study that was performed in the context of an Institute of Medicine (IOM) report on Vaccines for the 21st Century. The Committee to Study Priorities for Vaccine Development of the IOM valued the health states of possible complications using the Health Utilities Index – an instrument to elicit preferences (utilities) for health states. Table 5.2. presents the resulting utility values and disease durations.

Table 5.2. Utility values associated with Chlamydia related health states.

Health state		Utility value	Duration (years)	Duration (days)
Urethritis/Symptomatic infection (men)		0,84	0,0192	7 days
Epididymitis (men) (100% inpatient)		0,30	0,0082	3 days
Cervicitis/Symptomatic infection (women)		0,90	0,0767	4 weeks
PID (women)		0,63	0,0274	10 days
CPP (women) until the age of 50		0,60	22,73	lifetime
Infertility investigation (women)		(not valued)		
IVF (women)		(not valued)		
Infertility (women)		0,82	22,73	lifetime
Ectopic pregnancy (women)	first	0,23	0,0082	3 days
	then	0,66	0,0767	4 weeks
Neon. conjunctivitis (newborns)		0,97	0,5	6 months
Neon. pneumonia (newborns)		0,55	0,0137	5 days

Source: Stratton *et al.,* 1999.

Many details about the elicitation of utilities as given in Table 5.1. lack from the IOM report and have not been published elsewhere. It is therefore difficult to assess whether these values can be used for QALY calculations. However, in the absence of other data, we have used these utility values for QALY calculations, as was done by at least two other authors evaluating Chlamydia screening (Hu et al., 2004; de Vries et al., 2008).

5.2.3 Programme costs and costs of disease associated with Chlamdyia infection

The costs of screening were estimated, based on the actual programme budgets of SOA Aids Nederland (SAN - central coordination of screening program) and the three regional Public Health Services involved (Amsterdam, Rotterdam, South-Limburg) for the period 2008-2010, during which the Chlamydia screening programme was organized. During the three years that the screening programme was executed, SAN provided with staff for coordination, communication, and ICT infrastructure. Local public health authorities provided with staff for local project management and some costs for local communication and local ICT were made. Members of the CSI project group estimated that in a more permanent situation (after implementation of Chlamydia screening) 60 % of staff costs, compared to the pilot situation, would be sufficient to organize the programme. Therefore, it was estimated that annual programme costs (independent of the uptake of Chlamydia screening) would be € 500,000 for the three regions. About one third of this annual budget is needed for ICT costs and communication, and two thirds are related to (staff costs for) local and national project management. All cost estimates were made for the three regions, as estimation of effects was also based on actual experience in those three regions.

Besides programme costs, Chlamydia screening is associated with variable screening costs, depending on the uptake of the screening offer. For the screening currently under evaluation, all men and women aged 16-29 received a postal invitation to have themselves screened. After positive reply, screening kits

were sent from a central location. Non-responders received a reply invitation by e-mail. Screening kits could be returned by stamp-free reply mail. Persons who did not return the test kit received were reminded. Results from screening were communicated by SMS or e-mail. Based on the actual programme budgets, total costs for an invitation (including repeat invitation) were € 2.25. For those who responded and had themselves tested, total testing costs were € 15. This includes test kit, return service by mail, reminder for non-responders, laboratory costs, and communication of test results.

Costs for Chlamydia treatment (antibiotics and GP visit) and disease consequences were adapted from cost estimates by Andersen et al. In general, volumes of health care use (like number of days in hospital) were taken from the Danish study (Andersen et al., 2006). Costs of units of health care use were taken from Dutch guidelines, or adapted from estimates made in the Danish study. Some Danish cost estimates were adapted to changes in health care standards for treatment of certain diseases. For instance, for ectopic pregnancy it was estimated by the Danish researchers that 95 % would be treated in hospital. Based on recent Prismant data, we used estimates of 50 % hospital and 50 % outpatient treatment. Also, for PID more inpatient treatments were incorporated than in the Danish study. Based on Prismant data, it was estimated that 27 % of PID patients was hospitalized, while Danish data suggested that only 10 % of PID patients were hospitalized. All adaptations from the Danish data were discussed in the CSI project group.

Indirect costs, representing productivity losses associated with treatment of asymptomatic infections found and partner notification thereafter and associated with the disease sequelae of Chlamydia infection were included as well in the cost-effectiveness analysis. We applied Danish estimates of the number of days and hours of production lost for each disease state, and used Dutch data on the average earnings in relevant age groups, corrected for work force participation and average number of working hours in a normal working week (data from Statistics Netherlands).

5.2.4 Calculation of cost-effectiveness ratios

For each scenario, total costs and total number of effects for a 10 year implementation scheme of Chlamydia screening were calculated. Total costs were calculated by adding 10 year programme costs, variable costs for invitations and screening (depending on actual uptake of programme in three years of CSI project and assumptions on uptake in years 4-10 as in mathematical modelling), total direct health care costs associated with treatment of Chlamydia and its sequelae and indirect costs (productivity losses) associated with Chlamydia and its sequelae.

Total effects of screening were estimated by calculating the number of expected MOAs or expected QALYs associated with the total number of Chlamydia cases identified through screening. As we found that the total number of QALYs depends for nearly 90% on our assumptions with regard to Chronic Pelvic Pain (both the assumption that 17% of PID proceeds to CPP, the assumption that CPP lasts until the age of 50, and the utility value of 0.6 as reported in the IOM study) we calculated the number of QALYs both with and without CPP. We discussed the status of CPP as disease outcome in the CSI project group. A utility decrement of 0.4 is comparable to that of cancer or severe COPD, and given the fact that CPP lasts until the age of 50, this implies that total QALY outcomes depend heavily on

CPP assumptions. It was decided that the evidence-base for this disease outcome of Chlamydia infection was very weak and that we produce both QALY estimates with and without CPP outcomes.

Cost-effectiveness of different implementation scenarios of Chlamydia screening compared to the usual care scenario was calculated as total discounted costs for a ten year implementation scheme divided by total discounted number of MOAs/QALYs (with and without CPP).

As cost-effectiveness of screening depends heavily on baseline prevalence, it is important to take baseline prevalence into account. In a situation with high baseline prevalence (as in urban regions like the Amsterdam/Rotterdam region), it is feasible to detect more cases than in regions with lower prevalence, resulting in a more favourable cost-effectiveness ratio. As in the mathematical modelling, two different situations were modelled, representing either the situation in urban regions or the average prevalence for the Netherlands (represented by the South-Limburg region).

5.2.5 Probabilistic sensitivity analysis

To explore the influence of the main uncertainties in our economic model, we employed a probabilistic sensitivity analysis. In the literature, major uncertainties remain with regard to probabilities for disease progression after Chlamydia infection. We used Beta distributions for the range in probabilities that was given in Table 5.1. We ran our model 1000 times with different draws from the distributions as specified. Results are plotted on the cost-effectiveness plane. For each scenario and for ten years of implementation of Chlamydia screening, the plot shows the range in the cumulative number of Major Outcomes Averted, at the corresponding level of cumulative total costs.

5.3 Results of economic evaluation

5.3.1 Cost-effectiveness of screening in different scenarios

Averting 1000 Chlamydia infections resulted in the following number of MOAs: 100 PIDs, 17 CPPs, 6 infertilities, 2 ectopic pregnancies, and 12 neonatal pneumonias. These numbers are a reflection of the probabilities given in Table 5.1.

Tables 5.3. and 5.4. show all outcomes for the four different scenarios and two different regions (prevalence levels).

Table 5.3. Sexual network South-Limburg (NL), both direct and indirect effects of screening included.

Scenario:	Total costs (M EUR)	MOAs	QALYs	QALYs (w/o CPP)	costs/ MOA (k EUR)	Costs/ QALY (k EUR)	costs/ QALY [w/o CPP] (k EUR)	costs/ invitation (EUR)	costs/ test (EUR)	costs/ Ct (EUR)
Default[1]	6.9	1200	1600	210	5.6	4.3	32	9	140	930
Women only	6.2	670	900	130	9.2	6.9	49	15	460	1400
16-24	6.6	660	860	92	10	7.6	72	13	220	1500
Biennial	6.4	820	1100	140	7.9	6.0	47	16	180	1200

[1] *The default scenario is based on high participation rates: participation rates do not decline further after the third year of screening (see also Chapter 4).*

Table 5.4. Sexual network city (A'dam/R'dam), both direct and indirect effects of screening included.

Scenario:	Total costs (M EUR)	MOAs	QALYs	QALYs (w/o CPP)	costs/ MOA (k EUR)	costs/ QALY (k EUR)	costs/ QALY [w/o CPP] (k EUR)	costs/ invitation (EUR)	costs/ test (EUR)	costs/Ct (EUR)
Default	7.7	2100	2800	320	3.7	2.8	24	9	130	630
Women only	7.5	890	1200	140	8.4	6.4	52	15	480	1300
16-24	7.5	1300	1700	160	6.0	4.5	47	13	220	910
Biennial	6.9	1600	2100	240	4.3	3.3	28	15	170	730

Comparing Tables 5.3. and 5.4., we see that the number of MOA is much higher in the urban context than in the 'average' Dutch context. Consequently, the cost per MOA is lower in an urban environment than in a situation with lower prevalence. If we compare the four different scenarios, the default scenario, implying the annual invitation of all men and women aged 16-29, has the most favourable cost-effectiveness ratio in terms of cost per MOA and cost per QALY. This is probably due to the fact that the total number of invitations per year is the largest in the default scenario, which means that the number of people tested is also higher than in the other scenarios. A larger number of tests implies that the fixed annual programme costs is spread over more tests (and most likely over more outcomes), which improves the cost-effectiveness ratio.

In the current study, the absolute level of cost per MOA is much higher than in previous research, showing ratios below € 1000 per MOA, or even cost-savings alongside better health outcomes. Ratios as high as € 5,000 – 10,000 per MOA have not been reported before. The relatively high levels of cost per MOA are a reflection of the low participation rates as seen in the three consecutive screening rounds of the CSI project. The largest part of our total cost estimate is the annual programme costs. Those costs have to be made irrespective of the uptake of the program, implying that the total cost per invitation, the total cost per test and the total cost per case of Chlamydia found is relatively high.

The cost per QALY of all four scenarios seems acceptable if we include the CPP outcome in our QALY estimate. However, the evidence base for CPP forming the vast majority (nearly 90%) of all QALYs lost after Chlamydia infection is extremely weak. Therefore, we prefer the QALY estimate without inclusion of CPP. Depending on the sexual network, cost per QALY would be € 25,000 – 50,000 (urban prevalence) or € 30,000 – 70,000 (average Dutch prevalence).Considering previous decisions on population screening programs, this ratio is relatively high for Chlamydia screening to be regarded as cost-effective. However, due to the weak evidence base for the disease progression model, these results should be interpreted with caution.

Figure 5.2. shows the uncertainty around our estimates of cost per MOA, based on the Limburg prevalence data. For four scenarios and ten consecutive years of implementation of screening, the plots show the range in the number of MOAs reached after 1-10 years of screening, at the corresponding cumulative total costs. Depending on the scenario, the range in MOA differs up to 50% after ten years of screening.

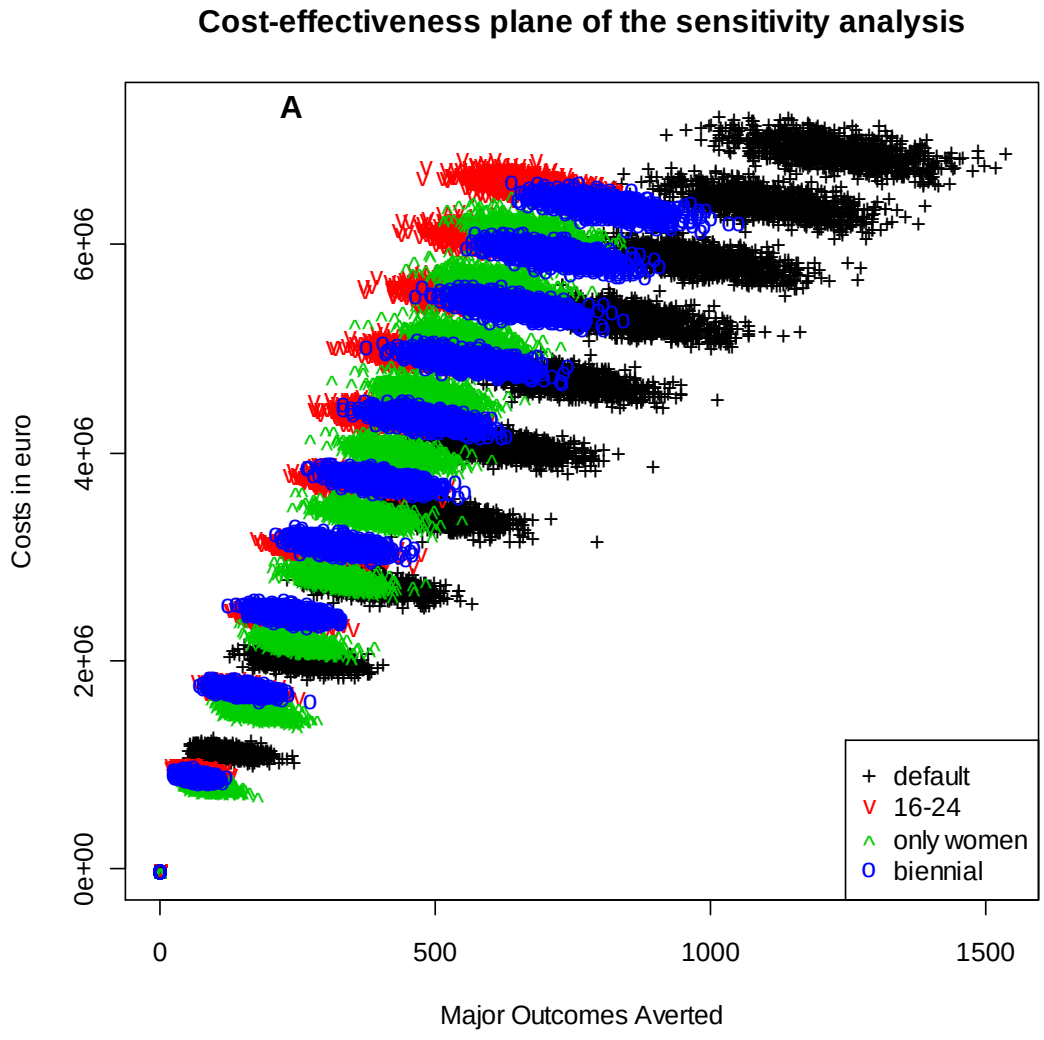

Figure 5.2. Cost-effectiveness plane for the four different scenarios of Chlamydia screening implementation. A) Effects measured in MOAs.

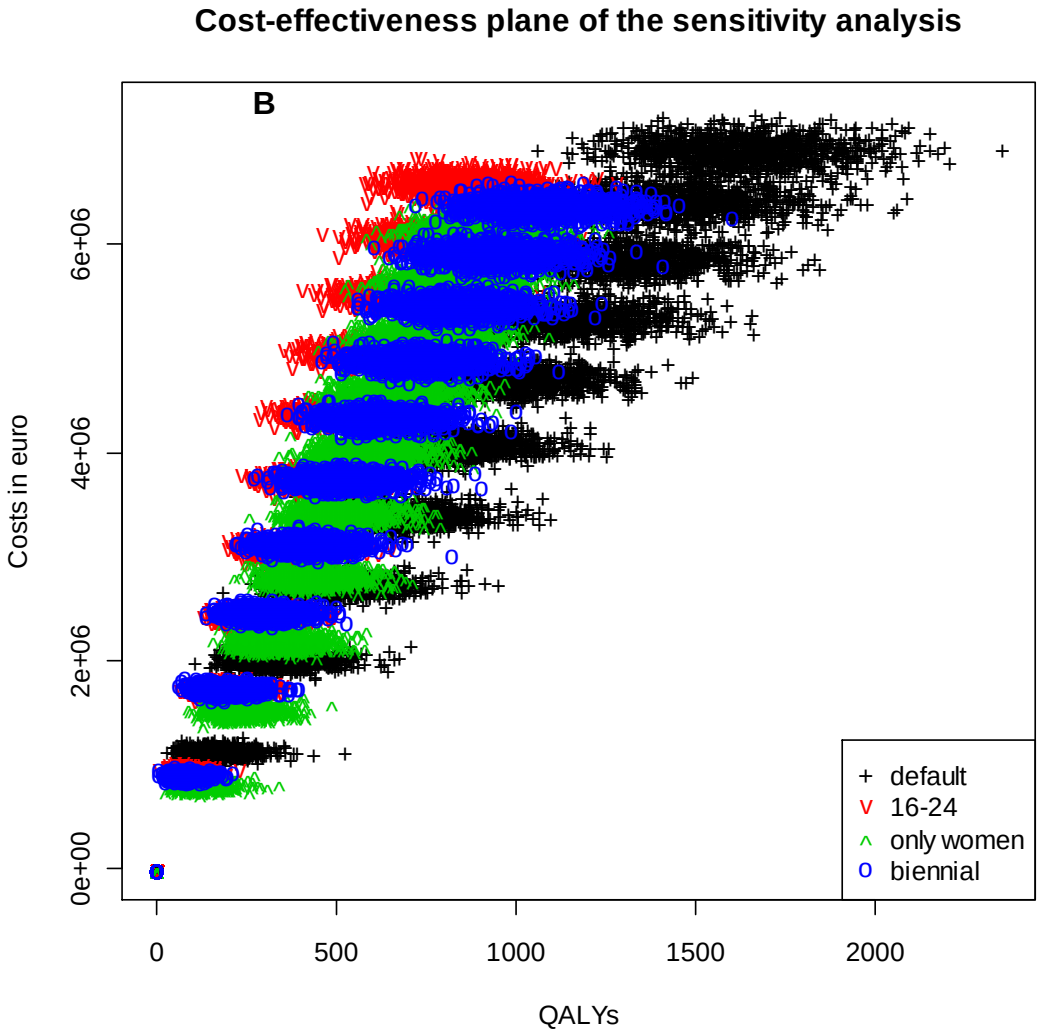

Figure 5.2. B) effects measured in QALYs (with CPP).

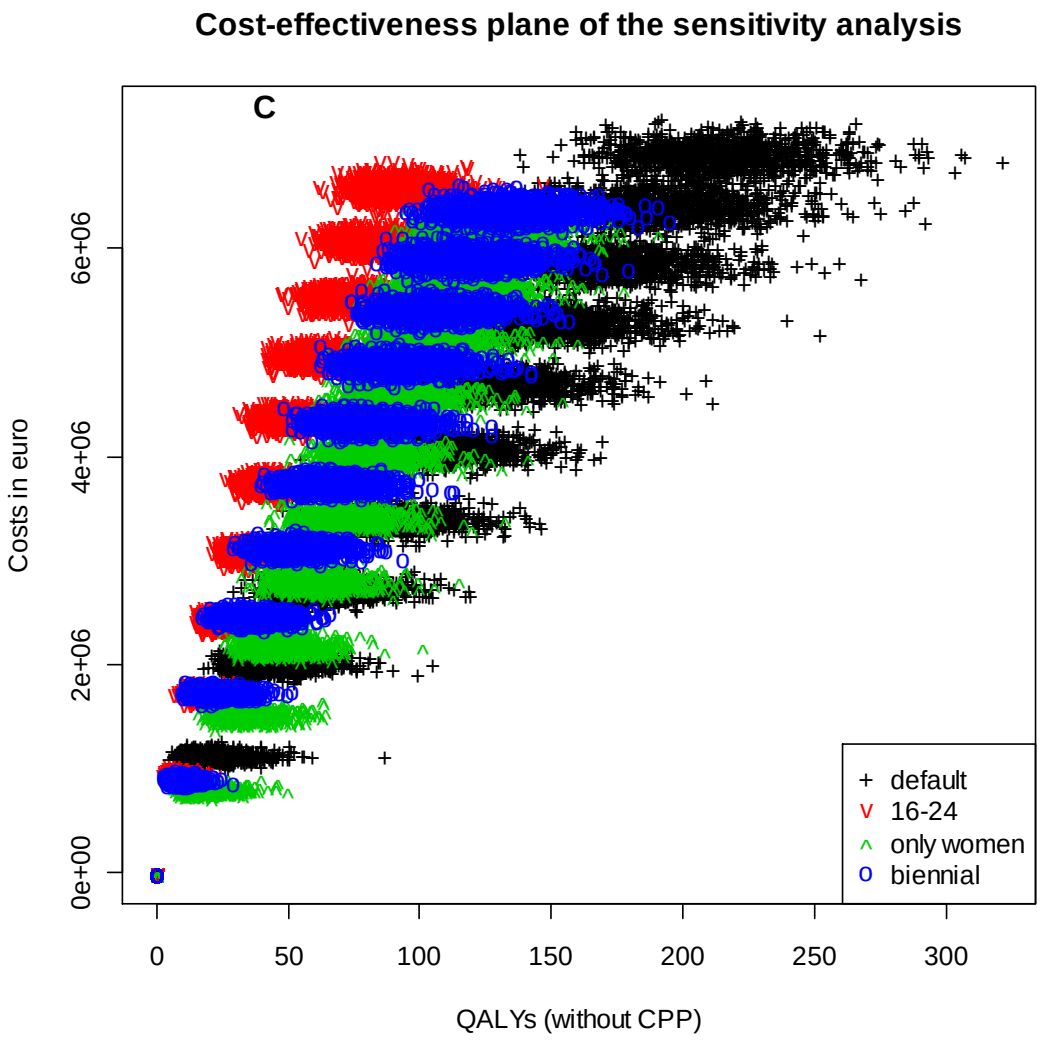

Figure 5.2. C) effects measured in QALYs (without CPP).

5.3.2 Conclusions

Based on the present estimates, which still need some refinement, the first conclusion would be that Chlamydia screening, if unsuccessful in attaining high uptake in consecutive screening rounds, is unlikely to be cost-effective. Screening in an urban prevalence context is more cost-effective than screening in a lower prevalence context. Our estimates are based on actual experiences from the CSI project, were possible. The costs per MOA are much higher than shown in previous research. Compared to previous research, we are somewhat more conservative in our estimate of the probability of Chlamydia developing into PID (10% vs 20% in previous research). As future disease sequelae largely depend on the probability to develop PID, this conservative estimate has consequences for the total number of MOA. Large uncertainties remain with regard to occurrence of disease sequelae of Chlamydia and these uncertainties will not be resolved in the near future. Based on actual experiences from the three-year CSI project, we conclude that the evidence base for cost-effectiveness of Chlamydia screening is less strong than appeared from previous Dutch and foreign research.

6 General conclusions and recommendations for screening

6.1.1 Low participation rates

- The participation rate in the first screening round (16%) was lower than the aimed 30% (based on results CT pilot study 2003). Participation rates decreased significantly in the second (12%) and third round (9%) in all screening regions.
- The low participation might be partially explained by differences in offering the testing kit. In the pilot CT study, test kits were sent directly with the invitation instead of the need to request test kits through the internet. A factor also contributing to the lower participation is the selective nature of CSI: only sexually active people are eligible for screening, and in the lower prevalence area of South-Limburg only people with a risk score of a predefined value could participate.
- The initial response of requests for test kits was higher than the final participation rate: one in five persons who requested a test kit did not return a sample.
- Participation not only decreased in the group invited for a second or third time but also among new invitees in rounds 2 (14%) and round 3 (10%).
- Sending invitation letters via family practitioners did not improve the response rate significantly in the area's in Amsterdam South were this set-up was tried. Centralised invitation through GPs, was more complicated logistically.

6.1.2 Population reached

- Although participation was lower in 'high-risk' demographic groups such as the younger age group, non-Dutch ethnic groups, high community risk areas, and persons with low education, we also observed self-selection for screening based on sexual risk: the level of sexual risk was slightly higher in screening participants compared to the general sexually-active population of the same age group.
- Positivity rates were higher among known high-risk groups, such as people < 20 years, non-Dutch ethnic groups and those living in high-community risk areas.
- Repeated participation in the screening was more likely among a selection of persons at higher (behavioural) risk. The first screening round may have motivated relatively more 'worried well' to participate or participants 'out of curiosity'. For example, fewer people with long term relationships participated in the second and third round than in the first round.
- Individuals who participated in the first screening round were more likely to participate again in the subsequent screening rounds than persons who had not participated before.
- Only 2.1% of people invited thrice participated in all three rounds. The positivity in this group declined from 6% to 3%.

6.1.3 Acceptability

- Participants were enthusiastic about the set-up of the screening (home-sampling, posting samples, receiving the results via the internet). According to them, the information provided was clear, the test kits were regarded as easy to use and access to the website was good.
- Both new and repeated participants gave as main reason to participate for their own health, but frequently curiosity, participating for the research and also the easiness to be tested in this way were mentioned.
- Although Chlamydia-positive persons were often shocked or ashamed by the result, 95% of them were happy to have participated.

6.1.4 Reasons for non-response

- Of the non-participants who responded to the non-response questionnaire (15%), 70% reported 'legitimate' reasons not to participate (no perceived risk, not yet sexually active or recently tested for STIs). A history (or symptoms) of STIs was related with higher participation, suggesting that persons make valid 'informed' decisions.
- Only 2% did not participate because they had no access to the internet.
- More frequently than among participants, non-responders were negative about the programme design: posting their sample, using the internet and home-sampling were aspects more often negatively perceived especially by younger persons (<20 yrs) and non-Dutch.
- Nevertheless, nearly half of them were interested in future invitation and screening.
- Non-responders had not picked-up that the screening was a yearly event: this was a surprise for 40% of non-responders who received a second invitation.
- Of non-responders in the second round who had participated in the first round only 1% stated participation had not been a good experience.

6.1.5 Direct impact

- The positivity rate was 4.2% among participants in round 1 and declined to 4.1% in round 2 and 3.5% in round 3.
- The decline in positivity was significant overall, in three regions together, but was not or marginally significant in the regions and sub-groups.
- Block A of the stepped wedge design, the areas submitted to screening three time, showed a significant decline from round 1 (A1) to round 3 (A3); the positivity in block A3 was lower than in C, areas which were only submitted to screening once (overall figures for three regions).
- The estimated population prevalence declined over the screening rounds in Amsterdam and Rotterdam, in South-Limburg only the maximum estimate showed a decline. The declines, however, were not statistically significant.
- Block C (not screened prior to round 2) of the stepped wedge design showed a higher prevalence than block A3 (two previous screening rounds). Although differences were not statistically significant, a similar

effect was visible in each region, suggesting at least a short-term impact of two screening rounds on population prevalence.
- There was no visible impact of one screening round; the prevalence rate in block B remained stable and no differences were observed between block C and A2 and B2.
- A decline in prevalence was only visible in the age groups 20-24 and 25-29 years.
- The selection of participants in South-Limburg using an online risk score questionnaire worked well: the percentage of positive participants in South-Limburg was similar to that of Rotterdam (5%), and higher than the low prevalence in urban areas estimated in the pilot-Ct (0.2 -2%).
- An important finding is the high participation of Ct-positives after six months (68%). In 9%, another Ct-infection was diagnosed. In the subgroup aged 16-19, this proportion was 17%.
- Of the Ct-positives, 91% visited a medical doctor (GP or STI centre) and 86% reported to be treated. Of those with a positive retest 80% visited a doctor.
- Not only Ct-positives in the screening were treated, but in 50% of cases current partners were also treated (in 80% of the 60% with a current relationship) and in 60% of cases ex-partners were notified. For the latter, 12% of participants made use of anonymous notification via the CSI website.
- We were unable to demonstrate a direct impact in self-reported PID (online questionnaire).
- In the first round, the CSI programme tested more people for Chlamydia than the usual STI care facilities in the regions (STI centres and GPs); this proportion decreased in round 2 and round 3. The screening programme contributed substantially to the detection of Chlamydia infections in the population of 16-29 year olds. Overall, more than 3700 Ct infections were detected, an extra 20-30% detected infections on top of the total number of infections found by regular screening at the STI clinics and GPs in the three CSI-regions.

6.1.6 Future impact and cost-effectiveness

- The two main conclusions to be drawn from modelling the impact of ten years CSI on Ct prevalence is that any continuous screening effort will have a small long-term effect on the endemic Ct prevalence. The eventual size of this effect depends heavily on the sustained participation rate of the screening programme.
- The modelling study suggests that, given the observed participation rate and its optimistic and pessimistic extrapolations, impact on Ct prevalence would be limited and that there is no chance of eliminating Ct from the population. The estimated size of effect of CSI on the Ct prevalence after ten years is a decrease within a range of 0.4 to 0.7 percentage points compared to baseline STI care (with a starting prevalence of 3.3% in the cities and 2.1% in South-Limburg in 2007). Within the first three years of CSI a larger drop in prevalence was seen in the model (decrease of -1.1% in the cities and -0.7% in South-Limburg).

- The costs per MOA are much higher than shown in previous research, partly due to a more conservative estimate of the probability of Chlamydia developing into PID (10% vs 20% in previous research). Large uncertainties remain with regard to occurrence of disease sequelae of Chlamydia and these uncertainties will not be resolved in the near future.
- The current results indicate a cost of € 3700 per MOA in the cities and € 5600 in South-Limburg.
- Based on the present estimates, which still need some refinement, we conclude that CSI, if unsuccessful in attaining higher uptake in consecutive screening rounds, is unlikely to be cost-effective. Screening in an urban prevalence context is more cost-effective than screening in a lower prevalence context.
- Alternative scenarios, i.e. screening women only, screening 16-24 years or biennial screening, were less cost-effective than the default CSI set-up.

6.1.7 Recommendations for practice and future research

- The screening programme was extended with one year pending this evaluation, and to facilitate a potential future (adjusted) screening programme. At the same time, the extra year will provide more insight in participation rates of following screening rounds needed to model the sustainability of a small long-term impact of annual screening.
- Individuals who had already participated in earlier screening round(s) were more likely to participate in subsequent screening rounds. It is necessary to find ways to convince persons who refused to participate in previous rounds of the importance to participate in a subsequent screening round.
- Only small proportions of participants were motivated enough to participate every year; a relatively large drop (50%) in positivity rate was achieved in this group. Repeated screening should be promoted as 'common practice' for individuals with higher sexual risk behaviour and self-selection through improved risk-perception.
- Future research is needed to identify and address determinants of non-participation in STI-screening, especially in high-risk groups such as young people, high-risk areas and people of non-Dutch ethnic groups (in particular of Turkish and Moroccan origin). Participation of high-risk groups in screening should be compared with their use of existing STI care facilities (GP's and STI centres).
- Further investigations into the potential impact of screening on the prevalence of complications from Chlamydia, such as PID and ectopic pregnancy, are needed.
- Strengthening the care of Ct-infected individuals (including notification of and care-seeking by the partner, as well as prompt treatment of index and partner) is needed in order to reduce the high rate of reinfections.
- Future research is needed to address uncertainties in the QALY analysis as described in Chapter 5, so that it is possible to compare QALYs between health interventions.
- More research is needed on the effectiveness of modified screening scenarios in the intervention areas or on mixed models of opportunistic

and internet-based Chlamydia screening. Alternative screening efforts should be developed and investigated.
- We also recommend to safeguard the successful elements of the programme, such as the CSI-website with connections to IT-processes, input from laboratories and build-up of an automatic database; relatively good reach of the youngest group (as compared to other STI programmes) and high uptake of re-testing of Ct-positives, facilitated (ex-)partner notification via the website.
- There remains a need for additional screening on top of the existing infrastructure (GPs and STI clinics) for the following groups: persons with previous infections, people under 20 years of age and those living in high risk areas, who do not easily come into regular STI-care.

Given the low and declining participation rates, only a small impact on population prevalence was predicted, which does not support nationwide roll-out of the CSI project in its present form. Although a substantial number of Chlamydia infections were detected, the evidence for effectiveness of this screening programme (as measured as a lasting decline in population prevalence) is limited and systematic, internet-based screening in 16-29 year old persons, which was implemented, is unlikely to be cost-effective. None of the alternative scenarios (only women, only people below 25 years of age, biennial screening) performed any better.

References

Althaus CL, Turner KME, Schmid BV, et al. Transmission of Chlamydia trachomatis through sexual partnerships : a comparative study between models and data. Preventive Medicine. (In preparation).

Andersen B, Gundgaard J, Kretzschmar M, Olsen J, Welte R, Ostergaard L. Prediction of costs, effectiveness, and disease control of a population-based programme using home sampling for diagnosis of urogenital Chlamydia trachomatis infections. Sex Transm Dis 2006; 33: 407-15.

Bakker F, I Vanwesenbeeck (eds). Sexual health in the Netherlands 2006 [in Dutch]. Publisher Eburon Delft, Rutgers Nisso Groep 2006.

Bergen JE van, (2006) Subsidieaanvraagformulier Chlamydia Screening Implementation Project (CSI-project).

Bergen JE van, Götz HM, Richardus JH, *et al.* Prevalence of urogenital Chlamydia trachomatis increases significantly with level of urbanisation and suggests targeted screening approaches: results from the first national population based study in the Netherlands. Sexually transmitted infections. 2005; 81(1): 17-24. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1763744&tool=pmcentrez&rendertype=abstract.

Bergen JEAM van, Fennema JS, van den Broek IVF, et al. Rationale, design, and results of the first screening round of a comprehensive, register-based, Chlamydia screening implementation programme in the Netherlands. BMC Infect Dis. 2010 Oct 7;10:293.

Broek IVF van den, Hoebe CJPA, Bergen JEAM van, et al. Evaluation design of a systematic, selective, Internet-based Chlamydia Screening Implementation in the Netherlands, 2008-2010: implications of first results for the analysis. BMC infect dis 2010; 10:89.

van den Broek IVF, Verheij RA, van Dijk CE, Koedijk FD, van der Sande MA, van Bergen JEAM. Trends in sexually transmitted infections in the Netherlands, combining surveillance data from general practices and sexually transmitted infection centres. BMC Fam Pract. 2010;11:39.

Gezondheidsraad. Screenen op Chlamydia. Den Haag: Gezondheidsraad, 2004; publicatie nr 2004/07. ISBN 9055495212.

Gottlieb SC, Berman SM, Low N. Screening and treatment to prevent sequelae in women with Chlamydia Trachomatis genital infections: how much do we know? J Infect Dis 2010; 201: S156-67.

Götz HM, Veldhuijzen IK, van Bergen JE, et al. Acceptability and consequences of screening for *Chlamydia trachomatis* by home-based urine testing. Sex Transm Dis 2005; 32: 557–562.

Götz HM, van Bergen JE, Veldhuijzen IK, et al. A prediction rule for selective screening of Chlamydia trachomatis infection. Sex Transm Infect. 2005 Feb; 81(1): 24-30.

Graaf de H, S Meijer, J Poelman, Ine Vanwesenbeeck. Sex under 25 [in Dutch]. Publisher Eburon Delft, Rutgers Nisso Groep 2005.

Greenland KE, Op de Coul ELM, Bergen JEAM van, et al. Acceptability of the internet-based Chlamydia Screening Implementation in the Netherlands and insights into non-response (in press STD).

Hu D, Hook EW, Goldie SJ. Screening for Chlamydia trachomatis in women 15 to 29 years of age: a cost-effectiveness analysis. Ann Int Med 2004; 141: 501-13.

Keeling MJ, Eames KTD. Networks and epidemic models. Journal of the Royal Society, Interface / the Royal Society. 2005;2(4):295-307.

Kretzschmar M, Duynhoven YT, Severijnen AJ. Modeling prevention strategies for gonorrhea and chlamydia using stochastic network simulations. American Journal of Epidemiology. 1996; 144(3): 306-317. Available at: http://aje.oxfordjournals.org/cgi/content/abstract/144/3/306.

Kretzschmar M, Welte R, Hoek A van den, Postma MJ. Comparative model-based analysis of screening programs for Chlamydia trachomatis infections. American journal of epidemiology. 2001; 153(1): 90-101. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11159151.

Kretzschmar M, Turner KME, Barton PM, Edmunds WJ, Low N. Predicting the population impact of chlamydia screening programmes: comparative mathematical modelling study. Sexually transmitted infections. 2009; 85(5): 359-66. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19454407.

LaMontagne DS, Fenton KA, Randall S, Anderson S, Carter P. Establishing the National Chlamydia Screening Programme in England: results from the first full year of screening. Sexually transmitted infections. 2004; 80(5): 335-41. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1744892&tool=pmcentrez&rendertype=abstract.

Land JA, van Bergen JEAM, Morré SA, Postma MJ. Epidemiology of chlamydia trachomatis in women and the cost-effectiveness of screening. Human Reproduction Update 2010; 16: 189-204.

Nelson HD, Helfand M. Screening for chlamydial infection. Am J Prev Med. 2001 Apr; 20 (3 Suppl):95-107. Review.

Op de Coul ELM, Weenen TC, Sande MAB van der, Broek IVF van den. Process evaluation of the Chlamydia Screening Implementation in the Netherlands: phase 1. Report 210261006, Bilthoven, 2009.

Rembold CM. Number needed to screen: development of a statistic for disease screening. BMJ. 1998 Aug 1; 317 (7154): 307-12. Review.

RNG study 2009. Bakker F, Graaf H de, Haas S de, Kedde H, Kruijer K, Wijsen C. Rapport Seksuele gezondheid in Nederland 2009. Available at: www.rutgersnissogroep.nl.

Robins G, Snijders T, Wang P, Handcock M, Pattison P. Recent developments in exponential random graph (p) models for social networks. Social Networks. 2007;29(2):192-215.

Stratton KR, Durch JS, Lawrence RS. Vaccines for the 21st Century – A tool for decisionmaking. Washington: Institute of Medicine, 1999.

Valkengoed IGM van, Morré SA, Brule van den JC, Meijer CJLM, Devillé W, Bouter LM, Boeke AJP. Low diagnostic accuracy of selective screening criteria for asymptomatic Chlamydia trachomatis infections in the general population. Sex Trans, Infect 2000 76: 375-380.

Valkengoed IGM van, Morré SA, Brule AJC van den, Meijer CJLM, Bouter LM, Boeke AJP. Overestimation of complication rates in evaluations of Chlamydia trachomatis screening programmes – implications for cost-effectiveness analyses. Int J Epidemiol 2004; 33: 416-25.

Vriend HJ, Koedijk FDH, Broek IVF van den, Veen MG van, et al. Sexually transmitted infections, including HIV, in the Netherlands in 2009. RIVM report 210261007. Bilthoven 2010.

Vries R de, van Bergen JEAM, Jong-van den Berg LTW de, Postma MJ, for the PILOT-CT study group. Cost-utility of repeated screening for Chlamydia trachomatis. Value Health 2008; 11: 272-4.

Welte R, Kretzschmar M, Leidl R, Hoek A van den, Jager JC, Postma MJ. Cost-effectiveness of screening programs for Chlamydia trachomatis. A population-based dynamic approach. Sex transm Dis 2000; 27: 518-29.

Welte R, Postma M, Leidl R, Kretzschmar M. Costs and effects of Chlamydial screening: dynamic versus static modeling. Sex Transm Dis 2005; 32: 474-83.

Appendices (tables and figures)

A1 Participation rates (data updated November 2010)

Round 1. Participation rate (Overall)

round 1	M #uitgenodigd					V #uitgenodigd					M&V				
	Pakket ontvangen		Total	Pakket ontvangen		Pakket ontvangen		Total	Pakket ontvangen		Pakket ontvangen		Total	Pakket ontvangen	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	109644	13109	122753	89.32	10.68	104863	28801	133664	78.45	21.55	214507	41910	256417	83.66	16.34
Ethnicity	51825	7967	59792	86.68	13.32	46342	18604	64946	71.35	28.65	98167	26571	124738	78.7	21.3
A. Nederland															
B. Turkije	8539	557	9096	93.88	6.12	8552	601	9153	93.43	6.57	17091	1158	18249	93.65	6.35
C. Marokko/Noord Afrika	10892	572	11464	95.01	4.99	12116	651	12767	94.9	5.1	23008	1223	24231	94.95	5.05
E. Suriname	9039	963	10002	90.37	9.63	8739	2118	10857	80.49	19.51	17778	3081	20859	85.23	14.77
F. Ned Ant/Aruba	3119	401	3520	88.61	11.39	2927	933	3860	75.83	24.17	6046	1334	7380	81.92	18.08
G. Oost Europa	1107	94	1201	92.17	7.83	1699	310	2009	84.57	15.43	2806	404	3210	87.41	12.59
H. Overig Afrika	4177	479	4656	89.71	10.29	3948	855	4803	82.2	17.8	8125	1334	9459	85.9	14.1
I. M-Z Amerika	1716	178	1894	90.6	9.4	1710	443	2153	79.42	20.58	3426	621	4047	84.66	15.34
J. EurOverig	7882	792	8674	90.87	9.13	7659	1883	9542	80.27	19.73	15541	2675	18216	85.32	14.68
K. Azië	10094	1018	11112	90.84	9.16	9843	2118	11961	82.29	17.71	19937	3136	23073	86.41	13.59
L. Rest	1236	88	1324	93.35	6.65	1304	285	1589	82.06	17.94	2540	373	2913	87.2	12.8
M. Onbekend of missing	18	.	18	100	.	24	.	24	100	.	42	.	42	100	.
Age	12353	682	13035	94.77	5.23	11285	1332	12617	89.44	10.56	23638	2014	25652	92.15	7.85
16-17															
18-19	13310	981	14291	93.14	6.86	12404	2554	14958	82.93	17.07	25714	3535	29249	87.91	12.09
20-24	39098	4663	43761	89.34	10.66	38251	11183	49434	77.38	22.62	77349	15846	93195	83	17
25-29	44805	6775	51580	86.87	13.13	42872	13719	56591	75.76	24.24	87677	20494	108171	81.05	18.95
Other	78	8	86	90.7	9.3	51	13	64	79.69	20.31	129	21	150	86	14
CT Risk level	20273	1995	22268	91.04	8.96	18771	3883	22654	82.86	17.14	39044	5878	44922	86.92	13.08
High															
Low	30648	4365	35013	87.53	12.47	29835	10642	40477	73.71	26.29	60483	15007	75490	80.12	19.88
Medium	58723	6749	65472	89.69	10.31	56257	14276	70533	79.76	20.24	114980	21025	136005	84.54	15.46
Blok	24270	2658	26928	90.13	9.87	22868	5980	28848	79.27	20.73	47138	8638	55776	84.51	15.49
A															
B	85374	10451	95825	89.09	10.91	81993	22821	104814	78.23	21.77	167367	33272	200639	83.42	16.58
C															

Round 1. Participation rate (Rotterdam)

round 1 by region	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	45151	5572	50723	89.01	10.99	41776	10836	52612	79.4	20.6	86927	16408	103335	84.12	15.88
Ethnicity	20361	3264	23625	86.18	13.82	17030	6549	23579	72.23	27.77	37391	9813	47204	79.21	20.79
A. Nederland															
B. Turkije	4425	313	4738	93.39	6.61	4554	322	4876	93.4	6.6	8979	635	9614	93.4	6.6
C. Marokko/Noord Afrika	3511	184	3695	95.02	4.98	4030	223	4253	94.76	5.24	7541	407	7948	94.88	5.12
E. Suriname	3968	444	4412	89.94	10.06	3958	869	4827	82	18	7926	1313	9239	85.79	14.21
F. Ned Ant/Aruba	1944	260	2204	88.2	11.8	1886	591	2477	76.14	23.86	3830	851	4681	81.82	18.18
G. Oost Europa	437	39	476	91.81	8.19	607	108	715	84.9	15.1	1044	147	1191	87.66	12.34
H. Overig Afrika	2596	305	2901	89.49	10.51	2292	550	2842	80.65	19.35	4888	855	5743	85.11	14.89
I. M-Z Amerika	648	67	715	90.63	9.37	613	166	779	78.69	21.31	1261	233	1494	84.4	15.6
J. EurOverig	2833	246	3079	92.01	7.99	2586	630	3216	80.41	19.59	5419	876	6295	86.08	13.92
K. Azië	4120	429	4549	90.57	9.43	3948	761	4709	83.84	16.16	8068	1190	9258	87.15	12.85
L. Rest	291	21	312	93.27	6.73	254	67	321	79.13	20.87	545	88	633	86.1	13.9
M. Onbekend of missing	17	.	17	100	.	18	.	18	100	.	35	.	35	100	.
Age	5440	313	5753	94.56	5.44	4945	561	5506	89.81	10.19	10385	874	11259	92.24	7.76
16-17															
18-19	5808	475	6283	92.44	7.56	5188	1054	6242	83.11	16.89	10996	1529	12525	87.79	12.21
20-24	16275	2087	18362	88.63	11.37	15179	4293	19472	77.95	22.05	31454	6380	37834	83.14	16.86
25-29	17605	2693	20298	86.73	13.27	16445	4923	21368	76.96	23.04	34050	7616	41666	81.72	18.28
Other	23	4	27	85.19	14.81	19	5	24	79.17	20.83	42	9	51	82.35	17.65
CT Risk level	14346	1424	15770	90.97	9.03	13517	2595	16112	83.89	16.11	27863	4019	31882	87.39	12.61
High															
Low	9445	1469	10914	86.54	13.46	8553	3007	11560	73.99	26.01	17998	4476	22474	80.08	19.92
Medium	21360	2679	24039	88.86	11.14	19706	5234	24940	79.01	20.99	41066	7913	48979	83.84	16.16
Blok	7565	898	8463	89.39	10.61	7329	1751	9080	80.72	19.28	14894	2649	17543	84.9	15.1
A															
B	37586	4674	42260	88.94	11.06	34447	9085	43532	79.13	20.87	72033	13759	85792	83.96	16.04

Round 1. Participation rate (Amsterdam)

round 1 by region	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	58073	7109	65182	89.09	10.91	57798	16939	74737	77.34	22.66	115871	24048	139919	82.81	17.19
Ethnicity	26403	4339	30742	85.89	14.11	25155	11185	36340	69.22	30.78	51558	15524	67082	76.86	23.14
A. Nederland															
B. Turkije	4078	242	4320	94.4	5.6	3981	278	4259	93.47	6.53	8059	520	8579	93.94	6.06
C. Marokko/Noord	7290	383	7673	95.01	4.99	8022	425	8447	94.97	5.03	15312	808	16120	94.99	5.01
E. Suriname	5050	519	5569	90.68	9.32	4767	1242	6009	79.33	20.67	9817	1761	11578	84.79	15.21
F. Ned Ant/Aruba	1138	136	1274	89.32	10.68	1014	338	1352	75	25	2152	474	2626	81.95	18.05
G. Oost Europa	615	55	670	91.79	8.21	1034	194	1228	84.2	15.8	1649	249	1898	86.88	13.12
H. Overig Afrika	1508	170	1678	89.87	10.13	1613	304	1917	84.14	15.86	3121	474	3595	86.82	13.18
I. M-Z Amerika	1041	107	1148	90.68	9.32	1077	273	1350	79.78	20.22	2118	380	2498	84.79	15.21
J. EurOverig	4299	514	4813	89.32	10.68	4431	1165	5596	79.18	20.82	8730	1679	10409	83.87	16.13
K. Azië	5738	579	6317	90.83	9.17	5681	1321	7002	81.13	18.87	11419	1900	13319	85.73	14.27
L. Rest	912	65	977	93.35	6.65	1018	214	1232	82.63	17.37	1930	279	2209	87.37	12.63
M. Onbekend of	1	.	1	100	.	5	.	5	100	.	6	.	6	100	.
Age	5958	338	6296	94.63	5.37	5522	656	6178	89.38	10.62	11480	994	12474	92.03	7.97
16-17															
18-19	6571	459	7030	93.47	6.53	6437	1343	7780	82.74	17.26	13008	1802	14810	87.83	12.17
20-24	20503	2413	22916	89.47	10.53	21242	6484	27726	76.61	23.39	41745	8897	50642	82.43	17.57
25-29	24987	3895	28882	86.51	13.49	24568	8448	33016	74.41	25.59	49555	12343	61898	80.06	19.94
Other	54	4	58	93.1	6.9	29	8	37	78.38	21.62	83	12	95	87.37	12.63
CT Risk level	4664	460	5124	91.02	8.98	4338	1059	5397	80.38	19.62	9002	1519	10521	85.56	14.44
High															
Low	19787	2868	22655	87.34	12.66	20053	7489	27542	72.81	27.19	39840	10357	50197	79.37	20.63
Medium	33622	3781	37403	89.89	10.11	33407	8391	41798	79.92	20.08	67029	12172	79201	84.63	15.37
Blok	10285	1332	11617	88.53	11.47	10252	3203	13455	76.19	23.81	20537	4535	25072	81.91	18.09
A															
B	47788	5777	53565	89.21	10.79	47546	13736	61282	77.59	22.41	95334	19513	114847	83.01	16.99

Round 1. Participation rate (South-Limburg)

round 1 by region	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	6420	428	6848	93.75	6.25	5289	1026	6315	83.75	16.25	11709	1454	13163	88.95	11.05
Ethnicity	5061	364	5425	93.29	6.71	4157	870	5027	82.69	17.31	9218	1234	10452	88.19	11.81
A. Nederland															
B. Turkije	36	2	38	94.74	5.26	17	1	18	94.44	5.56	53	3	56	94.64	5.36
C. Marokko/Noord	91	5	96	94.79	5.21	64	3	67	95.52	4.48	155	8	163	95.09	4.91
E. Suriname	21	.	21	100	.	14	7	21	66.67	33.33	35	7	42	83.33	16.67
F. Ned Ant/Aruba	37	5	42	88.1	11.9	27	4	31	87.1	12.9	64	9	73	87.67	12.33
G. Oost Europa	55	.	55	100	.	58	8	66	87.88	12.12	113	8	121	93.39	6.61
H. Overig Afrika	73	4	77	94.81	5.19	43	1	44	97.73	2.27	116	5	121	95.87	4.13
I. M-Z Amerika	27	4	31	87.1	12.9	20	4	24	83.33	16.67	47	8	55	85.45	14.55
J. EurOverig	750	32	782	95.91	4.09	642	88	730	87.95	12.05	1392	120	1512	92.06	7.94
K. Azië	236	10	246	95.93	4.07	214	36	250	85.6	14.4	450	46	496	90.73	9.27
L. Rest	33	2	35	94.29	5.71	32	4	36	88.89	11.11	65	6	71	91.55	8.45
M. Onbekend of	.	.	.	.	.	1	.	1	100	.	1	.	1	100	.
Age	955	31	986	96.86	3.14	818	115	933	87.67	12.33	1773	146	1919	92.39	7.61
16-17															
18-19	931	47	978	95.19	4.81	779	157	936	83.23	16.77	1710	204	1914	89.34	10.66
20-24	2320	163	2483	93.44	6.56	1830	406	2236	81.84	18.16	4150	569	4719	87.94	12.06
25-29	2213	187	2400	92.21	7.79	1859	348	2207	84.23	15.77	4072	535	4607	88.39	11.61
Other	1	.	1	100	.	3	.	3	100	.	4	.	4	100	.
CT Risk level	1263	111	1374	91.92	8.08	916	229	1145	80	20	2179	340	2519	86.5	13.5
High															
Low	1416	28	1444	98.06	1.94	1229	146	1375	89.38	10.62	2645	174	2819	93.83	6.17
Medium	3741	289	4030	92.83	7.17	3144	651	3795	82.85	17.15	6885	940	7825	87.99	12.01
Blok	6420	428	6848	93.75	6.25	5287	1026	6313	83.75	16.25	11707	1454	13161	88.95	11.05
A															
C															

Round 2. Participation rate (Overall)

round 2	M #uitgenodigd					V #uitgenodigd					M&V				
	Pakket ontvangen		Total	Pakket ontvangen		Pakket ontvangen		Total	Pakket ontvangen		Pakket ontvangen		Total	Pakket ontvangen	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	135331	10512	145843	92.79	7.21	131738	24042	155780	84.57	15.43	267069	34554	301623	88.54	11.46
Ethnicity	64574	6217	70791	91.22	8.78	60116	15206	75322	79.81	20.19	124690	21423	146113	85.34	14.66
A. Nederland															
B. Turkije	10489	474	10963	95.68	4.32	10463	513	10976	95.33	4.67	20952	987	21939	95.5	4.5
C. Marokko/Noord Afrika	12979	455	13434	96.61	3.39	14075	553	14628	96.22	3.78	27054	1008	28062	96.41	3.59
E. Suriname	10584	740	11324	93.47	6.53	10319	1727	12046	85.66	14.34	20903	2467	23370	89.44	10.56
F. Ned Ant/Aruba	3860	354	4214	91.6	8.4	3739	810	4549	82.19	17.81	7599	1164	8763	86.72	13.28
G. Oost Europa	1576	76	1652	95.4	4.6	2312	329	2641	87.54	12.46	3888	405	4293	90.57	9.43
H. Overig Afrika	5292	458	5750	92.03	7.97	4952	832	5784	85.62	14.38	10244	1290	11534	88.82	11.18
I. M-Z Amerika	2081	180	2261	92.04	7.96	2157	392	2549	84.62	15.38	4238	572	4810	88.11	11.89
J. EurOverig	10068	694	10762	93.55	6.45	9874	1711	11585	85.23	14.77	19942	2405	22347	89.24	10.76
K. Azië	12222	784	13006	93.97	6.03	12039	1743	13782	87.35	12.65	24261	2527	26788	90.57	9.43
L. Rest	1549	79	1628	95.15	4.85	1655	226	1881	87.99	12.01	3204	305	3509	91.31	8.69
M. Onbekend of missing	57	1	58	98.28	1.72	37	.	37	100	.	94	1	95	98.95	1.05
Age	13986	592	14578	95.94	4.06	12766	1098	13864	92.08	7.92	26752	1690	28442	94.06	5.94
16-17															
18-19	16423	787	17210	95.43	4.57	15678	2172	17850	87.83	12.17	32101	2959	35060	91.56	8.44
20-24	48650	3839	52489	92.69	7.31	48227	9680	57907	83.28	16.72	96877	13519	110396	87.75	12.25
25-29	56230	5294	61524	91.4	8.6	55025	11086	66111	83.23	16.77	111255	16380	127635	87.17	12.83
Other	42	.	42	100	.	42	6	48	87.5	12.5	84	6	90	93.33	6.67
CT Risk level	26601	1757	28358	93.8	6.2	24759	3651	28410	87.15	12.85	51360	5408	56768	90.47	9.53
High															
Low	37568	3373	40941	91.76	8.24	37693	8734	46427	81.19	18.81	75261	12107	87368	86.14	13.86
Medium	71162	5382	76544	92.97	7.03	69286	11657	80943	85.6	14.4	140448	17039	157487	89.18	10.82
r2_Blok	24300	1809	26109	93.07	6.93	23760	4104	27864	85.27	14.73	48060	5913	53973	89.04	10.96
A															
B	95436	7040	102476	93.13	6.87	93543	16472	110015	85.03	14.97	188979	23512	212491	88.94	11.06
C	15595	1663	17258	90.36	9.64	14435	3466	17901	80.64	19.36	30030	5129	35159	85.41	14.59

Round 2. Participation rate (Rotterdam)

round 2 by region	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	55601	4293	59894	92.83	7.17	52642	8689	61331	85.83	14.17	108243	12982	121225	89.29	10.71
Ethnicity	24661	2319	26980	91.4	8.6	21682	4912	26594	81.53	18.47	46343	7231	53574	86.5	13.5
A. Nederland															
B. Turkije	5542	259	5801	95.54	4.46	5596	293	5889	95.02	4.98	11138	552	11690	95.28	4.72
C. Marokko/Noord Afrika	4343	149	4492	96.68	3.32	4852	192	5044	96.19	3.81	9195	341	9536	96.42	3.58
E. Suriname	4842	327	5169	93.67	6.33	4881	750	5631	86.68	13.32	9723	1077	10800	90.03	9.97
F. Ned Ant/Aruba	2502	239	2741	91.28	8.72	2461	523	2984	82.47	17.53	4963	762	5725	86.69	13.31
G. Oost Europa	717	27	744	96.37	3.63	840	117	957	87.77	12.23	1557	144	1701	91.53	8.47
H. Overig Afrika	3264	299	3563	91.61	8.39	2913	543	3456	84.29	15.71	6177	842	7019	88	12
I. M-Z Amerika	784	68	852	92.02	7.98	816	157	973	83.86	16.14	1600	225	1825	87.67	12.33
J. EurOverig	3494	250	3744	93.32	6.68	3326	539	3865	86.05	13.95	6820	789	7609	89.63	10.37
K. Azië	5039	332	5371	93.82	6.18	4887	620	5507	88.74	11.26	9926	952	10878	91.25	8.75
L. Rest	366	24	390	93.85	6.15	361	43	404	89.36	10.64	727	67	794	91.56	8.44
M. Onbekend of missing	47	.	47	100	.	27	.	27	100	.	74	.	74	100	.
Age	6319	271	6590	95.89	4.11	5751	464	6215	92.53	7.47	12070	735	12805	94.26	5.74
16-17															
18-19	7085	336	7421	95.47	4.53	6478	845	7323	88.46	11.54	13563	1181	14744	91.99	8.01
20-24	20163	1679	21842	92.31	7.69	19341	3526	22867	84.58	15.42	39504	5205	44709	88.36	11.64
25-29	22012	2007	24019	91.64	8.36	21054	3853	24907	84.53	15.47	43066	5860	48926	88.02	11.98
Other	22	.	22	100	.	18	1	19	94.74	5.26	40	1	41	97.56	2.44
CT Risk level	18565	1211	19776	93.88	6.12	17475	2437	19912	87.76	12.24	36040	3648	39688	90.81	9.19
High															
Low	11252	985	12237	91.95	8.05	10754	2150	12904	83.34	16.66	22006	3135	25141	87.53	12.47
Medium	25784	2097	27881	92.48	7.52	24413	4102	28515	85.61	14.39	50197	6199	56396	89.01	10.99
r2_Blok	7861	609	8470	92.81	7.19	7864	1291	9155	85.9	14.1	15725	1900	17625	89.22	10.78
A															
B	40132	2862	42994	93.34	6.66	38096	5977	44073	86.44	13.56	78228	8839	87067	89.85	10.15
C	7608	822	8430	90.25	9.75	6682	1421	8103	82.46	17.54	14290	2243	16533	86.43	13.57

Round 2. Participation rate (Amsterdam)

round 2 by region	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	67543	5393	72936	92.61	7.39	68576	13800	82376	83.25	16.75	136119	19193	155312	87.64	12.36
Ethnicity	30520	3232	33752	90.42	9.58	30300	9022	39322	77.06	22.94	60820	12254	73074	83.23	16.77
A. Nederland															
B. Turkije	4857	212	5069	95.82	4.18	4798	217	5015	95.67	4.33	9655	429	10084	95.75	4.25
C. Marokko/Noord Afrika	8408	290	8698	96.67	3.33	9011	348	9359	96.28	3.72	17419	638	18057	96.47	3.53
E. Suriname	5696	410	6106	93.29	6.71	5407	968	6375	84.82	15.18	11103	1378	12481	88.96	11.04
F. Ned Ant/Aruba	1269	110	1379	92.02	7.98	1207	277	1484	81.33	18.67	2476	387	2863	86.48	13.52
G. Oost Europa	753	44	797	94.48	5.52	1363	195	1558	87.48	12.52	2116	239	2355	89.85	10.15
H. Overig Afrika	1867	154	2021	92.38	7.62	1939	285	2224	87.19	12.81	3806	439	4245	89.66	10.34
I. M-Z Amerika	1262	107	1369	92.18	7.82	1305	230	1535	85.02	14.98	2567	337	2904	88.4	11.6
J. EurOverig	5268	364	5632	93.54	6.46	5380	1039	6419	83.81	16.19	10648	1403	12051	88.36	11.64
K. Azië	6551	419	6970	93.99	6.01	6643	1055	7698	86.3	13.7	13194	1474	14668	89.95	10.05
L. Rest	1085	51	1136	95.51	4.49	1215	164	1379	88.11	11.89	2300	215	2515	91.45	8.55
M. Onbekend of missing	7	.	7	100	.	8	.	8	100	.	15	.	15	100	.
Age	6720	290	7010	95.86	4.14	6212	543	6755	91.96	8.04	12932	833	13765	93.95	6.05
16-17															
18-19	7302	342	7644	95.53	4.47	7409	1081	8490	87.27	12.73	14711	1423	16134	91.18	8.82
20-24	23814	1826	25640	92.88	7.12	24848	5516	30364	81.83	18.17	48662	7342	56004	86.89	13.11
25-29	29689	2935	32624	91	9	30085	6655	36740	81.89	18.11	59774	9590	69364	86.17	13.83
Other	18	.	18	100	.	22	5	27	81.48	18.52	40	5	45	88.89	11.11
CT Risk level	5542	371	5913	93.73	6.27	5267	851	6118	86.09	13.91	10809	1222	12031	89.84	10.16
High															
Low	23782	2275	26057	91.27	8.73	24811	6385	31196	79.53	20.47	48593	8660	57253	84.87	15.13
Medium	38219	2747	40966	93.29	6.71	38498	6564	45062	85.43	14.57	76717	9311	86028	89.18	10.82
r2_Blok	10459	875	11334	92.28	7.72	10596	2190	12786	82.87	17.13	21055	3065	24120	87.29	12.71
A															
B	49097	3677	52774	93.03	6.97	50227	9565	59792	84	16	99324	13242	112566	88.24	11.76
C	7987	841	8828	90.47	9.53	7753	2045	9798	79.13	20.87	15740	2886	18626	84.51	15.49

Round 2. Participation rate (South-Limburg)

round 2 by region	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	12187	826	13013	93.65	6.35	10520	1553	12073	87.14	12.86	22707	2379	25086	90.52	9.48
Ethnicity	9393	666	10059	93.38	6.62	8134	1272	9406	86.48	13.52	17527	1938	19465	90.04	9.96
A. Nederland															
B. Turkije	90	3	93	96.77	3.23	69	3	72	95.83	4.17	159	6	165	96.36	3.64
C. Marokko/Noord Afrika	228	16	244	93.44	6.56	212	13	225	94.22	5.78	440	29	469	93.82	6.18
E. Suriname	46	3	49	93.88	6.12	31	9	40	77.5	22.5	77	12	89	86.52	13.48
F. Ned Ant/Aruba	89	5	94	94.68	5.32	71	10	81	87.65	12.35	160	15	175	91.43	8.57
G. Oost Europa	106	5	111	95.5	4.5	109	17	126	86.51	13.49	215	22	237	90.72	9.28
H. Overig Afrika	161	5	166	96.99	3.01	100	4	104	96.15	3.85	261	9	270	96.67	3.33
I. M-Z Amerika	35	5	40	87.5	12.5	36	5	41	87.8	12.2	71	10	81	87.65	12.35
J. EurOverig	1306	80	1386	94.23	5.77	1168	133	1301	89.78	10.22	2474	213	2687	92.07	7.93
K. Azië	632	33	665	95.04	4.96	509	68	577	88.21	11.79	1141	101	1242	91.87	8.13
L. Rest	98	4	102	96.08	3.92	79	19	98	80.61	19.39	177	23	200	88.5	11.5
M. Onbekend of missing	3	1	4	75	25	2	.	2	100	.	5	1	6	83.33	16.67
Age	947	31	978	96.83	3.17	803	91	894	89.82	10.18	1750	122	1872	93.48	6.52
16-17															
18-19	2036	109	2145	94.92	5.08	1791	246	2037	87.92	12.08	3827	355	4182	91.51	8.49
20-24	4673	334	5007	93.33	6.67	4038	638	4676	86.36	13.64	8711	972	9683	89.96	10.04
25-29	4529	352	4881	92.79	7.21	3886	578	4464	87.05	12.95	8415	930	9345	90.05	9.95
Other	2	.	2	100	.	2	.	2	100	.	4	.	4	100	.
CT Risk level	2494	175	2669	93.44	6.56	2017	363	2380	84.75	15.25	4511	538	5049	89.34	10.66
High															
Low	2534	113	2647	95.73	4.27	2128	199	2327	91.45	8.55	4662	312	4974	93.73	6.27
Medium	7159	538	7697	93.01	6.99	6375	991	7366	86.55	13.45	13534	1529	15063	89.85	10.15
r2_Blok	5980	325	6305	94.85	5.15	5300	623	5923	89.48	10.52	11280	948	12228	92.25	7.75
A															
B	6207	501	6708	92.53	7.47	5220	930	6150	84.88	15.12	11427	1431	12858	88.87	11.13

Round 3. Participation rate (Overall)

round 3	M #uitgenodigd					V #uitgenodigd					M&V				
	Pakket ontvangen		Total	Pakket ontvangen		Pakket ontvangen		Total	Pakket ontvangen		Pakket ontvangen		Total	Pakket ontvangen	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	37977	2171	40148	94.59	5.41	35710	4905	40615	87.92	12.08	73687	7076	80763	91.24	8.76
Ethnicity	22762	1428	24190	94.1	5.9	20670	3404	24074	85.86	14.14	43432	4832	48264	89.99	10.01
A. Nederland															
B. Turkije	2057	93	2150	95.67	4.33	2066	67	2133	96.86	3.14	4123	160	4283	96.26	3.74
C. Marokko/Noord Afrika	2669	74	2743	97.3	2.7	2833	80	2913	97.25	2.75	5502	154	5656	97.28	2.72
E. Suriname	1415	83	1498	94.46	5.54	1362	238	1600	85.13	14.88	2777	321	3098	89.64	10.36
F. Ned Ant/Aruba	610	44	654	93.27	6.73	576	105	681	84.58	15.42	1186	149	1335	88.84	11.16
G. Oost Europa	433	20	453	95.58	4.42	565	61	626	90.26	9.74	998	81	1079	92.49	7.51
H. Overig Afrika	1056	68	1124	93.95	6.05	904	116	1020	88.63	11.37	1960	184	2144	91.42	8.58
I. M-Z Amerika	357	23	380	93.95	6.05	381	67	448	85.04	14.96	738	90	828	89.13	10.87
J. EurOverig	3464	187	3651	94.88	5.12	3347	416	3763	88.94	11.06	6811	603	7414	91.87	8.13
K. Azië	2728	135	2863	95.28	4.72	2552	307	2859	89.26	10.74	5280	442	5722	92.28	7.72
L. Rest	411	16	427	96.25	3.75	447	44	491	91.04	8.96	858	60	918	93.46	6.54
M. Onbekend of missing	15	.	15	100	.	7	.	7	100	.	22	.	22	100	.
Age	2416	84	2500	96.64	3.36	2140	164	2304	92.88	7.12	4556	248	4804	94.84	5.16
16-17															
18-19	5333	212	5545	96.18	3.82	4926	565	5491	89.71	10.29	10259	777	11036	92.96	7.04
20-24	14663	849	15512	94.53	5.47	14034	2068	16102	87.16	12.84	28697	2917	31614	90.77	9.23
25-29	15549	1025	16574	93.82	6.18	14600	2107	16707	87.39	12.61	30149	3132	33281	90.59	9.41
Other	16	1	17	94.12	5.88	10	1	11	90.91	9.09	26	2	28	92.86	7.14
CT Risk level	7321	372	7693	95.16	4.84	6766	719	7485	90.39	9.61	14087	1091	15178	92.81	7.19
High															
Low	9790	549	10339	94.69	5.31	9083	1424	10507	86.45	13.55	18873	1973	20846	90.54	9.46
Medium	20866	1250	22116	94.35	5.65	19861	2762	22623	87.79	12.21	40727	4012	44739	91.03	8.97
r3_Blok	25514	1587	27101	94.14	5.86	24718	3702	28420	86.97	13.03	50232	5289	55521	90.47	9.53
A															
B	6180	241	6421	96.25	3.75	5456	493	5949	91.71	8.29	11636	734	12370	94.07	5.93
C	6283	343	6626	94.82	5.18	5536	710	6246	88.63	11.37	11819	1053	12872	91.82	8.18

Round 3. Participation rate (Amsterdam)

round 3	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	10967	763	11730	93.5	6.5	11088	2057	13145	84.35	15.65	22055	2820	24875	88.66	11.34
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	5068	470	5538	91.51	8.49	5034	1400	6434	78.24	21.76	10102	1870	11972	84.38	15.62
A. Nederland															
B. Turkije	705	23	728	96.84	3.16	713	26	739	96.48	3.52	1418	49	1467	96.66	3.34
C. Marokko/Noord Afrika	1351	38	1389	97.26	2.74	1407	45	1452	96.9	3.1	2758	83	2841	97.08	2.92
E. Suriname	730	49	779	93.71	6.29	648	125	773	83.83	16.17	1378	174	1552	88.79	11.21
F. Ned Ant/Aruba	174	6	180	96.67	3.33	163	39	202	80.69	19.31	337	45	382	88.22	11.78
G. Oost Europa	151	7	158	95.57	4.43	249	26	275	90.55	9.45	400	33	433	92.38	7.62
H. Overig Afrika	264	18	282	93.62	6.38	246	30	276	89.13	10.87	510	48	558	91.4	8.6
I. M-Z Amerika	181	10	191	94.76	5.24	197	33	230	85.65	14.35	378	43	421	89.79	10.21
J. EurOverig	1025	67	1092	93.86	6.14	1076	153	1229	87.55	12.45	2101	220	2321	90.52	9.48
K. Azië	1107	68	1175	94.21	5.79	1084	159	1243	87.21	12.79	2191	227	2418	90.61	9.39
L. Rest	211	7	218	96.79	3.21	271	21	292	92.81	7.19	482	28	510	94.51	5.49
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	1004	40	1044	96.17	3.83	907	80	987	91.89	8.11	1911	120	2031	94.09	5.91
16-17															
18-19	1145	56	1201	95.34	4.66	1189	167	1356	87.68	12.32	2334	223	2557	91.28	8.72
20-24	3975	275	4250	93.53	6.47	4185	850	5035	83.12	16.88	8160	1125	9285	87.88	12.12
25-29	4833	391	5224	92.52	7.48	4801	959	5760	83.35	16.65	9634	1350	10984	87.71	12.29
Other	10	1	11	90.91	9.09	6	1	7	85.71	14.29	16	2	18	88.89	11.11
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	557	36	593	93.93	6.07	540	90	630	85.71	14.29	1097	126	1223	89.7	10.3
High															
Low	4383	354	4737	92.53	7.47	4388	977	5365	81.79	18.21	8771	1331	10102	86.82	13.18
Medium	6027	373	6400	94.17	5.83	6160	990	7150	86.15	13.85	12187	1363	13550	89.94	10.06
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
r3_Blok	10967	763	11730	93.5	6.5	11088	2057	13145	84.35	15.65	22055	2820	24875	88.66	11.34
A															

Round 3. Participation rate (Rotterdam)

round 3	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	8064	531	8595	93.82	6.18	7915	1068	8983	88.11	11.89	15979	1599	17578	90.9	9.1
Ethnicity	3065	247	3312	92.54	7.46	2727	575	3302	82.59	17.41	5792	822	6614	87.57	12.43
A. Nederland															
B. Turkije	1214	64	1278	94.99	5.01	1245	36	1281	97.19	2.81	2459	100	2559	96.09	3.91
C. Marokko/Noord Afrika	941	22	963	97.72	2.28	1066	21	1087	98.07	1.93	2007	43	2050	97.9	2.1
E. Suriname	617	33	650	94.92	5.08	668	101	769	86.87	13.13	1285	134	1419	90.56	9.44
F. Ned Ant/Aruba	287	32	319	89.97	10.03	295	50	345	85.51	14.49	582	82	664	87.65	12.35
G. Oost Europa	100	6	106	94.34	5.66	119	15	134	88.81	11.19	219	21	240	91.25	8.75
H. Overig Afrika	496	38	534	92.88	7.12	454	79	533	85.18	14.82	950	117	1067	89.03	10.97
I. M-Z Amerika	112	9	121	92.56	7.44	126	25	151	83.44	16.56	238	34	272	87.5	12.5
J. EurOverig	496	38	534	92.88	7.12	505	81	586	86.18	13.82	1001	119	1120	89.38	10.63
K. Azië	688	38	726	94.77	5.23	658	84	742	88.68	11.32	1346	122	1468	91.69	8.31
L. Rest	39	4	43	90.7	9.3	48	1	49	97.96	2.04	87	5	92	94.57	5.43
M. Onbekend of missing	9	.	9	100	.	4	.	4	100	.	13	.	13	100	.
Age	854	27	881	96.94	3.06	759	52	811	93.59	6.41	1613	79	1692	95.33	4.67
16-17															
18-19	993	52	1045	95.02	4.98	946	91	1037	91.22	8.78	1939	143	2082	93.13	6.87
20-24	2926	192	3118	93.84	6.16	2939	428	3367	87.29	12.71	5865	620	6485	90.44	9.56
25-29	3288	260	3548	92.67	7.33	3270	497	3767	86.81	13.19	6558	757	7315	89.65	10.35
Other	3	.	3	100	.	1	.	1	100	.	4	.	4	100	.
CT Risk level	3167	191	3358	94.31	5.69	3105	322	3427	90.6	9.4	6272	513	6785	92.44	7.56
High															
Low	919	51	970	94.74	5.26	876	125	1001	87.51	12.49	1795	176	1971	91.07	8.93
Medium	3978	289	4267	93.23	6.77	3934	621	4555	86.37	13.63	7912	910	8822	89.68	10.32
r3_Blok	8064	531	8595	93.82	6.18	7915	1068	8983	88.11	11.89	15979	1599	17578	90.9	9.1
A															

Round 3. Participation rate (South-Limburg)

round 3	M					V					M&V				
	Pakket		Total	Pakket		Pakket		Total	Pakket		Pakket		Total	Pakket	
	0	1		0	1	0	1		0	1	0	1		0	1
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	18946	877	19823	95.58	4.42	16707	1780	18487	90.37	9.63	35653	2657	38310	93.06	6.94
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	14629	711	15340	95.37	4.63	12909	1429	14338	90.03	9.97	27538	2140	29678	92.79	7.21
A. Nederland															
B. Turkije	138	6	144	95.83	4.17	108	5	113	95.58	4.42	246	11	257	95.72	4.28
C. Marokko/Noord Afrika	377	14	391	96.42	3.58	360	14	374	96.26	3.74	737	28	765	96.34	3.66
E. Suriname	68	1	69	98.55	1.45	46	12	58	79.31	20.69	114	13	127	89.76	10.24
F. Ned Ant/Aruba	149	6	155	96.13	3.87	118	16	134	88.06	11.94	267	22	289	92.39	7.61
G. Oost Europa	182	7	189	96.3	3.7	197	20	217	90.78	9.22	379	27	406	93.35	6.65
H. Overig Afrika	296	12	308	96.1	3.9	204	7	211	96.68	3.32	500	19	519	96.34	3.66
I. M-Z Amerika	64	4	68	94.12	5.88	58	9	67	86.57	13.43	122	13	135	90.37	9.63
J. EurOverig	1943	82	2025	95.95	4.05	1766	182	1948	90.66	9.34	3709	264	3973	93.36	6.64
K. Azië	933	29	962	96.99	3.01	810	64	874	92.68	7.32	1743	93	1836	94.93	5.07
L. Rest	161	5	166	96.99	3.01	128	22	150	85.33	14.67	289	27	316	91.46	8.54
M. Onbekend of missing	6	.	6	100	.	3	.	3	100	.	9	.	9	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	558	17	575	97.04	2.96	474	32	506	93.68	6.32	1032	49	1081	95.47	4.53
16-17															
18-19	3195	104	3299	96.85	3.15	2791	307	3098	90.09	9.91	5986	411	6397	93.58	6.42
20-24	7762	382	8144	95.31	4.69	6910	790	7700	89.74	10.26	14672	1172	15844	92.6	7.4
25-29	7428	374	7802	95.21	4.79	6529	651	7180	90.93	9.07	13957	1025	14982	93.16	6.84
Other	3	.	3	100	.	3	.	3	100	.	6	.	6	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	3597	145	3742	96.13	3.87	3121	307	3428	91.04	8.96	6718	452	7170	93.7	6.3
High															
Low	4488	144	4632	96.89	3.11	3819	322	4141	92.22	7.78	8307	466	8773	94.69	5.31
Medium	10861	588	11449	94.86	5.14	9767	1151	10918	89.46	10.54	20628	1739	22367	92.23	7.77
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
r3_Blok	6483	293	6776	95.68	4.32	5715	577	6292	90.83	9.17	12198	870	13068	93.34	6.66
A															
B	6180	241	6421	96.25	3.75	5456	493	5949	91.71	8.29	11636	734	12370	94.07	5.93
C	6283	343	6626	94.82	5.18	5536	710	6246	88.63	11.37	11819	1053	12872	91.82	8.18

A2 Positivity rates (data updated November 2010)

Round 1. Positivity rate (% Ct, Overall)

round 1	M #uitgenodigd					V #uitgenodigd					M&V				
	Uitslag sample		Total	Uitslag sample		Uitslag sample		Total	Uitslag sample		Uitslag sample		Total	Uitslag sample	
	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	12632	500	13132	96.19	3.81	27572	1280	28852	95.56	4.44	40204	1780	41984	95.76	4.24
Ethnicity	7760	217	7977	97.28	2.72	17955	683	18638	96.34	3.66	25715	900	26615	96.62	3.38
A. Nederland															
B. Turkije	547	14	561	97.5	2.5	583	19	602	96.84	3.16	1130	33	1163	97.16	2.84
C. Marokko/Noord Afrika	542	32	574	94.43	5.57	625	26	651	96.01	3.99	1167	58	1225	95.27	4.73
E. Suriname	879	86	965	91.09	8.91	1949	171	2120	91.93	8.07	2828	257	3085	91.67	8.33
F. Ned Ant/Aruba	359	42	401	89.53	10.47	847	91	938	90.3	9.7	1206	133	1339	90.07	9.93
G. Oost Europa	89	5	94	94.68	5.32	295	15	310	95.16	4.84	384	20	404	95.05	4.95
H. Overig Afrika	447	32	479	93.32	6.68	777	81	858	90.56	9.44	1224	113	1337	91.55	8.45
I. M-Z Amerika	165	13	178	92.7	7.3	424	19	443	95.71	4.29	589	32	621	94.85	5.15
J. EurOverig	769	24	793	96.97	3.03	1809	75	1884	96.02	3.98	2578	99	2677	96.3	3.7
K. Azië	988	34	1022	96.67	3.33	2034	89	2123	95.81	4.19	3022	123	3145	96.09	3.91
L. Rest	87	1	88	98.86	1.14	274	11	285	96.14	3.86	361	12	373	96.78	3.22
Age	657	28	685	95.91	4.09	1218	115	1333	91.37	8.63	1875	143	2018	92.91	7.09
16-17															
18-19	920	66	986	93.31	6.69	2359	197	2556	92.29	7.71	3279	263	3542	92.57	7.43
20-24	4476	195	4671	95.83	4.17	10641	561	11202	94.99	5.01	15117	756	15873	95.24	4.76
25-29	6572	210	6782	96.9	3.1	13341	407	13748	97.04	2.96	19913	617	20530	96.99	3.01
Other	7	1	8	87.5	12.5	13	.	13	100	.	20	1	21	95.24	4.76
CT Risk level	1866	137	2003	93.16	6.84	3603	293	3896	92.48	7.52	5469	430	5899	92.71	7.29
High															
Low	4255	116	4371	97.35	2.65	10314	348	10662	96.74	3.26	14569	464	15033	96.91	3.09
Medium	6511	247	6758	96.35	3.65	13655	639	14294	95.53	4.47	20166	886	21052	95.79	4.21
Blok	2550	112	2662	95.79	4.21	5732	261	5993	95.64	4.36	8282	373	8655	95.69	4.31
A															
B	10082	388	10470	96.29	3.71	21840	1019	22859	95.54	4.46	31922	1407	33329	95.78	4.22

Round 1. Positivity rate (% Ct, Rotterdam)

round 1 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	5358	236	5594	95.78	4.22	10287	600	10887	94.49	5.51	15645	836	16481	94.93	5.07
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	3186	88	3274	97.31	2.69	6276	307	6583	95.34	4.66	9462	395	9857	95.99	4.01
A. Nederland															
B. Turkije	310	7	317	97.79	2.21	311	12	323	96.28	3.72	621	19	640	97.03	2.97
C. Marokko/Noord Afrika	164	21	185	88.65	11.35	213	10	223	95.52	4.48	377	31	408	92.4	7.6
E. Suriname	412	34	446	92.38	7.62	800	71	871	91.85	8.15	1212	105	1317	92.03	7.97
F. Ned Ant/Aruba	227	33	260	87.31	12.69	532	64	596	89.26	10.74	759	97	856	88.67	11.33
G. Oost Europa	36	3	39	92.31	7.69	103	5	108	95.37	4.63	139	8	147	94.56	5.44
H. Overig Afrika	282	23	305	92.46	7.54	489	64	553	88.43	11.57	771	87	858	89.86	10.14
I. M-Z Amerika	62	5	67	92.54	7.46	159	7	166	95.78	4.22	221	12	233	94.85	5.15
J. EurOverig	240	7	247	97.17	2.83	605	26	631	95.88	4.12	845	33	878	96.24	3.76
K. Azië	419	14	433	96.77	3.23	738	28	766	96.34	3.66	1157	42	1199	96.5	3.5
L. Rest	20	1	21	95.24	4.76	61	6	67	91.04	8.96	81	7	88	92.05	7.95
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	305	11	316	96.52	3.48	502	60	562	89.32	10.68	807	71	878	91.91	8.09
16-17															
18-19	441	38	479	92.07	7.93	955	101	1056	90.44	9.56	1396	139	1535	90.94	9.06
20-24	2003	91	2094	95.65	4.35	4051	260	4311	93.97	6.03	6054	351	6405	94.52	5.48
25-29	2605	96	2701	96.45	3.55	4774	179	4953	96.39	3.61	7379	275	7654	96.41	3.59
Other	4	.	4	100	.	5	.	5	100	.	9	.	9	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	1335	96	1431	93.29	6.71	2417	191	2608	92.68	7.32	3752	287	4039	92.89	7.11
High															
Low	1435	40	1475	97.29	2.71	2900	127	3027	95.8	4.2	4335	167	4502	96.29	3.71
Medium	2588	100	2688	96.28	3.72	4970	282	5252	94.63	5.37	7558	382	7940	95.19	4.81
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Blok	852	49	901	94.56	5.44	1648	116	1764	93.42	6.58	2500	165	2665	93.81	6.19
A															
B	4506	187	4693	96.02	3.98	8639	484	9123	94.69	5.31	13145	671	13816	95.14	4.86

Round 1. Positivity rate (% Ct, Amsterdam)

round 1 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	6868	241	7109	96.61	3.39	16310	629	16939	96.29	3.71	23178	870	24048	96.38	3.62
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	4229	110	4339	97.46	2.54	10849	336	11185	97	3	15078	446	15524	97.13	2.87
A. Nederland															
B. Turkije	235	7	242	97.11	2.89	271	7	278	97.48	2.52	506	14	520	97.31	2.69
C. Marokko/Noord Afrika	373	10	383	97.39	2.61	410	15	425	96.47	3.53	783	25	808	96.91	3.09
E. Suriname	467	52	519	89.98	10.02	1143	99	1242	92.03	7.97	1610	151	1761	91.43	8.57
F. Ned Ant/Aruba	128	8	136	94.12	5.88	311	27	338	92.01	7.99	439	35	474	92.62	7.38
G. Oost Europa	53	2	55	96.36	3.64	184	10	194	94.85	5.15	237	12	249	95.18	4.82
H. Overig Afrika	161	9	170	94.71	5.29	287	17	304	94.41	5.59	448	26	474	94.51	5.49
I. M-Z Amerika	99	8	107	92.52	7.48	261	12	273	95.6	4.4	360	20	380	94.74	5.26
J. EurOverig	499	15	514	97.08	2.92	1120	45	1165	96.14	3.86	1619	60	1679	96.43	3.57
K. Azië	559	20	579	96.55	3.45	1265	56	1321	95.76	4.24	1824	76	1900	96	4
L. Rest	65	.	65	100	.	209	5	214	97.66	2.34	274	5	279	98.21	1.79
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	322	16	338	95.27	4.73	608	48	656	92.68	7.32	930	64	994	93.56	6.44
16-17															
18-19	434	25	459	94.55	5.45	1252	91	1343	93.22	6.78	1686	116	1802	93.56	6.44
20-24	2318	95	2413	96.06	3.94	6207	277	6484	95.73	4.27	8525	372	8897	95.82	4.18
25-29	3791	104	3895	97.33	2.67	8235	213	8448	97.48	2.52	12026	317	12343	97.43	2.57
Other	3	1	4	75	25	8	.	8	100	.	11	1	12	91.67	8.33
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	427	33	460	92.83	7.17	968	91	1059	91.41	8.59	1395	124	1519	91.84	8.16
High															
Low	2794	74	2868	97.42	2.58	7276	213	7489	97.16	2.84	10070	287	10357	97.23	2.77
Medium	3647	134	3781	96.46	3.54	8066	325	8391	96.13	3.87	11713	459	12172	96.23	3.77
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Blok	1292	40	1332	97	3	3109	94	3203	97.07	2.93	4401	134	4535	97.05	2.95
A															
B	5576	201	5777	96.52	3.48	13201	535	13736	96.11	3.89	18777	736	19513	96.23	3.77

Round 1. Positivity rate (% Ct, South-Limburg)

round 1 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	406	23	429	94.64	5.36	975	51	1026	95.03	4.97	1381	74	1455	94.91	5.09
Ethnicity	345	19	364	94.78	5.22	830	40	870	95.4	4.6	1175	59	1234	95.22	4.78
A. Nederland															
B. Turkije	2	.	2	100	.	1	.	1	100	.	3	.	3	100	.
C. Marokko/Noord Afrika	5	1	6	83.33	16.67	2	1	3	66.67	33.33	7	2	9	77.78	22.22
E. Suriname	.	.	.	.	.	6	1	7	85.71	14.29	6	1	7	85.71	14.29
F. Ned Ant/Aruba	4	1	5	80	20	4	.	4	100	.	8	1	9	88.89	11.11
G. Oost Europa	.	.	.	.	.	8	.	8	100	.	8	.	8	100	.
H. Overig Afrika	4	.	4	100	.	1	.	1	100	.	5	.	5	100	.
I. M-Z Amerika	4	.	4	100	.	4	.	4	100	.	8	.	8	100	.
J. EurOverig	30	2	32	93.75	6.25	84	4	88	95.45	4.55	114	6	120	95	5
K. Azië	10	.	10	100	.	31	5	36	86.11	13.89	41	5	46	89.13	10.87
L. Rest	2	.	2	100	.	4	.	4	100	.	6	.	6	100	.
Age	30	1	31	96.77	3.23	108	7	115	93.91	6.09	138	8	146	94.52	5.48
16-17															
18-19	45	3	48	93.75	6.25	152	5	157	96.82	3.18	197	8	205	96.1	3.9
20-24	155	9	164	94.51	5.49	383	24	407	94.1	5.9	538	33	571	94.22	5.78
25-29	176	10	186	94.62	5.38	332	15	347	95.68	4.32	508	25	533	95.31	4.69
CT Risk level	104	8	112	92.86	7.14	218	11	229	95.2	4.8	322	19	341	94.43	5.57
High															
Low	26	2	28	92.86	7.14	138	8	146	94.52	5.48	164	10	174	94.25	5.75
Medium	276	13	289	95.5	4.5	619	32	651	95.08	4.92	895	45	940	95.21	4.79
Blok	406	23	429	94.64	5.36	975	51	1026	95.03	4.97	1381	74	1455	94.91	5.09
A															

Round 2. Positivity rate (% Ct, Overall)

round 2	M #uitgenodigd					V #uitgenodigd					M&V				
	Uitslag sample		Total	Uitslag sample		Uitslag sample		Total	Uitslag sample		Uitslag sample		Total	Uitslag sample	
	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	10120	397	10517	96.23	3.77	23056	1008	24064	95.81	4.19	33176	1405	34581	95.94	4.06
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	6039	180	6219	97.11	2.89	14682	536	15218	96.48	3.52	20721	716	21437	96.66	3.34
A. Nederland															
B. Turkije	461	13	474	97.26	2.74	496	17	513	96.69	3.31	957	30	987	96.96	3.04
C. Marokko/Noord Afrika	432	25	457	94.53	5.47	531	22	553	96.02	3.98	963	47	1010	95.35	4.65
E. Suriname	689	51	740	93.11	6.89	1595	133	1728	92.3	7.7	2284	184	2468	92.54	7.46
F. Ned Ant/Aruba	308	46	354	87.01	12.99	745	67	812	91.75	8.25	1053	113	1166	90.31	9.69
G. Oost Europa	76	.	76	100	.	317	13	330	96.06	3.94	393	13	406	96.8	3.2
H. Overig Afrika	427	31	458	93.23	6.77	774	58	832	93.03	6.97	1201	89	1290	93.1	6.9
I. M-Z Amerika	171	9	180	95	5	371	23	394	94.16	5.84	542	32	574	94.43	5.57
J. EurOverig	672	22	694	96.83	3.17	1645	68	1713	96.03	3.97	2317	90	2407	96.26	3.74
K. Azië	768	17	785	97.83	2.17	1679	66	1745	96.22	3.78	2447	83	2530	96.72	3.28
L. Rest	76	3	79	96.2	3.8	221	5	226	97.79	2.21	297	8	305	97.38	2.62
M. Onbekend of missing	1	.	1	100	.	.	.	.	.	.	1	.	1	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	570	23	593	96.12	3.88	1016	84	1100	92.36	7.64	1586	107	1693	93.68	6.32
16-17															
18-19	741	45	786	94.27	5.73	2018	156	2174	92.82	7.18	2759	201	2960	93.21	6.79
20-24	3666	175	3841	95.44	4.56	9202	487	9689	94.97	5.03	12868	662	13530	95.11	4.89
25-29	5143	154	5297	97.09	2.91	10815	280	11095	97.48	2.52	15958	434	16392	97.35	2.65
Other	.	.	.	.	.	5	1	6	83.33	16.67	5	1	6	83.33	16.67
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	1663	95	1758	94.6	5.4	3430	231	3661	93.69	6.31	5093	326	5419	93.98	6.02
High															
Low	3281	91	3372	97.3	2.7	8473	263	8736	96.99	3.01	11754	354	12108	97.08	2.92
Medium	5176	211	5387	96.08	3.92	11153	514	11667	95.59	4.41	16329	725	17054	95.75	4.25
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
r2_Blok	1762	48	1810	97.35	2.65	3955	150	4105	96.35	3.65	5717	198	5915	96.65	3.35
A															
B	6766	278	7044	96.05	3.95	15777	709	16486	95.7	4.3	22543	987	23530	95.81	4.19
C	1592	71	1663	95.73	4.27	3324	149	3473	95.71	4.29	4916	220	5136	95.72	4.28

Round 2. Positivity rate (% Ct, Rotterdam)

round 2 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	4106	191	4297	95.56	4.44	8260	448	8708	94.86	5.14	12366	639	13005	95.09	4.91
Ethnicity	2256	65	2321	97.2	2.8	4708	215	4923	95.63	4.37	6964	280	7244	96.13	3.87
A. Nederland															
B. Turkije	255	4	259	98.46	1.54	281	12	293	95.9	4.1	536	16	552	97.1	2.9
C. Marokko/Noord Afrika	138	13	151	91.39	8.61	185	7	192	96.35	3.65	323	20	343	94.17	5.83
E. Suriname	305	22	327	93.27	6.73	699	52	751	93.08	6.92	1004	74	1078	93.14	6.86
F. Ned Ant/Aruba	203	36	239	84.94	15.06	475	50	525	90.48	9.52	678	86	764	88.74	11.26
G. Oost Europa	27	.	27	100	.	116	2	118	98.31	1.69	143	2	145	98.62	1.38
H. Overig Afrika	274	25	299	91.64	8.36	496	47	543	91.34	8.66	770	72	842	91.45	8.55
I. M-Z Amerika	64	4	68	94.12	5.88	148	11	159	93.08	6.92	212	15	227	93.39	6.61
J. EurOverig	240	10	250	96	4	513	26	539	95.18	4.82	753	36	789	95.44	4.56
K. Azië	320	12	332	96.39	3.61	597	25	622	95.98	4.02	917	37	954	96.12	3.88
L. Rest	24	.	24	100	.	42	1	43	97.67	2.33	66	1	67	98.51	1.49
Age	258	13	271	95.2	4.8	423	42	465	90.97	9.03	681	55	736	92.53	7.47
16-17															
18-19	313	23	336	93.15	6.85	782	66	848	92.22	7.78	1095	89	1184	92.48	7.52
20-24	1597	83	1680	95.06	4.94	3308	224	3532	93.66	6.34	4905	307	5212	94.11	5.89
25-29	1938	72	2010	96.42	3.58	3746	116	3862	97	3	5684	188	5872	96.8	3.2
Other	.	.	.	.	.	1	.	1	100	.	1	.	1	100	.
CT Risk level	1143	69	1212	94.31	5.69	2296	150	2446	93.87	6.13	3439	219	3658	94.01	5.99
High															
Low	953	32	985	96.75	3.25	2070	82	2152	96.19	3.81	3023	114	3137	96.37	3.63
Medium	2010	90	2100	95.71	4.29	3894	216	4110	94.74	5.26	5904	306	6210	95.07	4.93
r2_Blok	590	21	611	96.56	3.44	1242	50	1292	96.13	3.87	1832	71	1903	96.27	3.73
A															
B	2731	133	2864	95.36	4.64	5675	313	5988	94.77	5.23	8406	446	8852	94.96	5.04
C	785	37	822	95.5	4.5	1343	85	1428	94.05	5.95	2128	122	2250	94.58	5.42

Round 2. Positivity rate (% Ct, Amsterdam)

round 2 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	5215	177	5392	96.72	3.28	13322	477	13799	96.54	3.46	18537	654	19191	96.59	3.41
Ethnicity	3137	94	3231	97.09	2.91	8769	252	9021	97.21	2.79	11906	346	12252	97.18	2.82
A. Nederland															
B. Turkije	203	9	212	95.75	4.25	212	5	217	97.7	2.3	415	14	429	96.74	3.26
C. Marokko/Noord Afrika	281	9	290	96.9	3.1	334	14	348	95.98	4.02	615	23	638	96.39	3.61
E. Suriname	381	29	410	92.93	7.07	887	81	968	91.63	8.37	1268	110	1378	92.02	7.98
F. Ned Ant/Aruba	102	8	110	92.73	7.27	260	17	277	93.86	6.14	362	25	387	93.54	6.46
G. Oost Europa	44	.	44	100	.	187	8	195	95.9	4.1	231	8	239	96.65	3.35
H. Overig Afrika	148	6	154	96.1	3.9	274	11	285	96.14	3.86	422	17	439	96.13	3.87
I. M-Z Amerika	102	5	107	95.33	4.67	218	12	230	94.78	5.22	320	17	337	94.96	5.04
J. EurOverig	354	10	364	97.25	2.75	1003	36	1039	96.54	3.46	1357	46	1403	96.72	3.28
K. Azië	414	5	419	98.81	1.19	1016	39	1055	96.3	3.7	1430	44	1474	97.01	2.99
L. Rest	49	2	51	96.08	3.92	162	2	164	98.78	1.22	211	4	215	98.14	1.86
Age	280	10	290	96.55	3.45	504	39	543	92.82	7.18	784	49	833	94.12	5.88
16-17															
18-19	326	15	341	95.6	4.4	1011	69	1080	93.61	6.39	1337	84	1421	94.09	5.91
20-24	1750	76	1826	95.84	4.16	5297	219	5516	96.03	3.97	7047	295	7342	95.98	4.02
25-29	2859	76	2935	97.41	2.59	6506	149	6655	97.76	2.24	9365	225	9590	97.65	2.35
Other	.	.	.	.	.	4	1	5	80	20	4	1	5	80	20
CT Risk level	353	18	371	95.15	4.85	784	67	851	92.13	7.87	1137	85	1222	93.04	6.96
High															
Low	2219	55	2274	97.58	2.42	6217	168	6385	97.37	2.63	8436	223	8659	97.42	2.58
Medium	2643	104	2747	96.21	3.79	6321	242	6563	96.31	3.69	8964	346	9310	96.28	3.72
r2_Blok	855	19	874	97.83	2.17	2121	68	2189	96.89	3.11	2976	87	3063	97.16	2.84
A															
B	3553	124	3677	96.63	3.37	9220	345	9565	96.39	3.61	12773	469	13242	96.46	3.54
C	807	34	841	95.96	4.04	1981	64	2045	96.87	3.13	2788	98	2886	96.6	3.4

Round 2. Positivity rate (% Ct, South-Limburg)

round 2 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief	Negatief	Positief		Negatief	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	799	29	828	96.5	3.5	1474	83	1557	94.67	5.33	2273	112	2385	95.3	4.7
Ethnicity	646	21	667	96.85	3.15	1205	69	1274	94.58	5.42	1851	90	1941	95.36	4.64
A. Nederland															
B. Turkije	3	.	3	100	.	3	.	3	100	.	6	.	6	100	.
C. Marokko/Noord Afrika	13	3	16	81.25	18.75	12	1	13	92.31	7.69	25	4	29	86.21	13.79
E. Suriname	3	.	3	100	.	9	.	9	100	.	12	.	12	100	.
F. Ned Ant/Aruba	3	2	5	60	40	10	.	10	100	.	13	2	15	86.67	13.33
G. Oost Europa	5	.	5	100	.	14	3	17	82.35	17.65	19	3	22	86.36	13.64
H. Overig Afrika	5	.	5	100	.	4	.	4	100	.	9	.	9	100	.
I. M-Z Amerika	5	.	5	100	.	5	.	5	100	.	10	.	10	100	.
J. EurOverig	78	2	80	97.5	2.5	129	6	135	95.56	4.44	207	8	215	96.28	3.72
K. Azië	34	.	34	100	.	66	2	68	97.06	2.94	100	2	102	98.04	1.96
L. Rest	3	1	4	75	25	17	2	19	89.47	10.53	20	3	23	86.96	13.04
M. Onbekend of missing	1	.	1	100	.	.	.	.	.	.	1	.	1	100	.
Age	32	.	32	100	.	89	3	92	96.74	3.26	121	3	124	97.58	2.42
16-17															
18-19	102	7	109	93.58	6.42	225	21	246	91.46	8.54	327	28	355	92.11	7.89
20-24	319	16	335	95.22	4.78	597	44	641	93.14	6.86	916	60	976	93.85	6.15
25-29	346	6	352	98.3	1.7	563	15	578	97.4	2.6	909	21	930	97.74	2.26
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	167	8	175	95.43	4.57	350	14	364	96.15	3.85	517	22	539	95.92	4.08
High															
Low	109	4	113	96.46	3.54	186	13	199	93.47	6.53	295	17	312	94.55	5.45
Medium	523	17	540	96.85	3.15	938	56	994	94.37	5.63	1461	73	1534	95.24	4.76
r2_Blok	317	8	325	97.54	2.46	592	32	624	94.87	5.13	909	40	949	95.79	4.21
A															
B	482	21	503	95.83	4.17	882	51	933	94.53	5.47	1364	72	1436	94.99	5.01

Round 3. Positivity rate (% Ct, Overall)

round 3	M #uitgenodigd					V #uitgenodigd					M&V				
	Uitslag sample		Total	Uitslag sample		Uitslag sample		Total	Uitslag sample		Uitslag sample		Total	Uitslag sample	
	Negatief of onduidelijk	Positief		Negatief of onduidelijk	Positief	Negatief of onduidelijk	Positief		Negatief of onduidelijk	Positief	Negatief of onduidelijk	Positief		Negatief of onduidelijk	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	2110	67	2177	96.92	3.08	4725	184	4909	96.25	3.75	6835	251	7086	96.46	3.54
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	1392	38	1430	97.34	2.66	3278	128	3406	96.24	3.76	4670	166	4836	96.57	3.43
A. Nederland															
B. Turkije	92	1	93	98.92	1.08	66	1	67	98.51	1.49	158	2	160	98.75	1.25
C. Marokko/Noord Afrika	71	3	74	95.95	4.05	78	2	80	97.5	2.5	149	5	154	96.75	3.25
E. Suriname	78	7	85	91.76	8.24	217	21	238	91.18	8.82	295	28	323	91.33	8.67
F. Ned Ant/Aruba	40	5	45	88.89	11.11	103	2	105	98.1	1.9	143	7	150	95.33	4.67
G. Oost Europa	20	.	20	100	.	60	1	61	98.36	1.64	80	1	81	98.77	1.23
H. Overig Afrika	61	7	68	89.71	10.29	113	3	116	97.41	2.59	174	10	184	94.57	5.43
I. M-Z Amerika	23	.	23	100	.	62	5	67	92.54	7.46	85	5	90	94.44	5.56
J. EurOverig	183	5	188	97.34	2.66	406	10	416	97.6	2.4	589	15	604	97.52	2.48
K. Azië	134	1	135	99.26	0.74	300	9	309	97.09	2.91	434	10	444	97.75	2.25
L. Rest	16	.	16	100	.	42	2	44	95.45	4.55	58	2	60	96.67	3.33
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	84	.	84	100	.	156	9	165	94.55	5.45	240	9	249	96.39	3.61
16-17															
18-19	197	15	212	92.92	7.08	525	39	564	93.09	6.91	722	54	776	93.04	6.96
20-24	823	29	852	96.6	3.4	1983	88	2071	95.75	4.25	2806	117	2923	96	4
25-29	1005	23	1028	97.76	2.24	2060	48	2108	97.72	2.28	3065	71	3136	97.74	2.26
Other	1	.	1	100	.	1	.	1	100	.	2	.	2	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	356	18	374	95.19	4.81	678	42	720	94.17	5.83	1034	60	1094	94.52	5.48
High															
Low	538	12	550	97.82	2.18	1367	57	1424	96	4	1905	69	1974	96.5	3.5
Medium	1216	37	1253	97.05	2.95	2680	85	2765	96.93	3.07	3896	122	4018	96.96	3.04
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
r3_Blok	1541	49	1590	96.92	3.08	3571	132	3703	96.44	3.56	5112	181	5293	96.58	3.42
A															
B	232	10	242	95.87	4.13	479	19	498	96.18	3.82	711	29	740	96.08	3.92
C	337	8	345	97.68	2.32	675	33	708	95.34	4.66	1012	41	1053	96.11	3.89

Round 3. Positivity rate (% Ct, Rotterdam)

round 3 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	512	22	534	95.88	4.12	1015	54	1069	94.95	5.05	1527	76	1603	95.26	4.74
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	241	6	247	97.57	2.43	546	29	575	94.96	5.04	787	35	822	95.74	4.26
A. Nederland															
B. Turkije	64	.	64	100	.	36	.	36	100	.	100	.	100	100	.
C. Marokko/Noord Afrika	21	1	22	95.45	4.55	20	1	21	95.24	4.76	41	2	43	95.35	4.65
E. Suriname	31	4	35	88.57	11.43	92	9	101	91.09	8.91	123	13	136	90.44	9.56
F. Ned Ant/Aruba	28	5	33	84.85	15.15	50	1	51	98.04	1.96	78	6	84	92.86	7.14
G. Oost Europa	6	.	6	100	.	14	1	15	93.33	6.67	20	1	21	95.24	4.76
H. Overig Afrika	33	5	38	86.84	13.16	76	3	79	96.2	3.8	109	8	117	93.16	6.84
I. M-Z Amerika	9	.	9	100	.	23	2	25	92	8	32	2	34	94.12	5.88
J. EurOverig	38	.	38	100	.	75	6	81	92.59	7.41	113	6	119	94.96	5.04
K. Azië	37	1	38	97.37	2.63	82	2	84	97.62	2.38	119	3	122	97.54	2.46
L. Rest	4	.	4	100	.	1	.	1	100	.	5	.	5	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	27	.	27	100	.	46	6	52	88.46	11.54	73	6	79	92.41	7.59
16-17															
18-19	46	6	52	88.46	11.54	77	14	91	84.62	15.38	123	20	143	86.01	13.99
20-24	181	12	193	93.78	6.22	406	22	428	94.86	5.14	587	34	621	94.52	5.48
25-29	258	4	262	98.47	1.53	486	12	498	97.59	2.41	744	16	760	97.89	2.11
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	178	15	193	92.23	7.77	307	16	323	95.05	4.95	485	31	516	93.99	6.01
High															
Low	50	1	51	98.04	1.96	114	11	125	91.2	8.8	164	12	176	93.18	6.82
Medium	284	6	290	97.93	2.07	594	27	621	95.65	4.35	878	33	911	96.38	3.62
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
r3_Blok	512	22	534	95.88	4.12	1015	54	1069	94.95	5.05	1527	76	1603	95.26	4.74
A															

Round 3. Positivity rate (% Ct, Amsterdam)

round 3 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	742	21	763	97.25	2.75	1999	57	2056	97.23	2.77	2741	78	2819	97.23	2.77
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	457	13	470	97.23	2.77	1364	35	1399	97.5	2.5	1821	48	1869	97.43	2.57
A. Nederland															
B. Turkije	23	.	23	100	.	25	1	26	96.15	3.85	48	1	49	97.96	2.04
C. Marokko/Noord Afrika	36	2	38	94.74	5.26	44	1	45	97.78	2.22	80	3	83	96.39	3.61
E. Suriname	46	3	49	93.88	6.12	115	10	125	92	8	161	13	174	92.53	7.47
F. Ned Ant/Aruba	6	.	6	100	.	38	1	39	97.44	2.56	44	1	45	97.78	2.22
G. Oost Europa	7	.	7	100	.	26	.	26	100	.	33	.	33	100	.
H. Overig Afrika	17	1	18	94.44	5.56	30	.	30	100	.	47	1	48	97.92	2.08
I. M-Z Amerika	10	.	10	100	.	31	2	33	93.94	6.06	41	2	43	95.35	4.65
J. EurOverig	65	2	67	97.01	2.99	151	2	153	98.69	1.31	216	4	220	98.18	1.82
K. Azië	68	.	68	100	.	156	3	159	98.11	1.89	224	3	227	98.68	1.32
L. Rest	7	.	7	100	.	19	2	21	90.48	9.52	26	2	28	92.86	7.14
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	40	.	40	100	.	77	3	80	96.25	3.75	117	3	120	97.5	2.5
16-17															
18-19	52	4	56	92.86	7.14	158	9	167	94.61	5.39	210	13	223	94.17	5.83
20-24	266	9	275	96.73	3.27	822	28	850	96.71	3.29	1088	37	1125	96.71	3.29
25-29	383	8	391	97.95	2.05	941	17	958	98.23	1.77	1324	25	1349	98.15	1.85
Other	1	.	1	100	.	1	.	1	100	.	2	.	2	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	35	1	36	97.22	2.78	82	8	90	91.11	8.89	117	9	126	92.86	7.14
High															
Low	345	9	354	97.46	2.54	952	25	977	97.44	2.56	1297	34	1331	97.45	2.55
Medium	362	11	373	97.05	2.95	965	24	989	97.57	2.43	1327	35	1362	97.43	2.57
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
r3_Blok	742	21	763	97.25	2.75	1999	57	2056	97.23	2.77	2741	78	2819	97.23	2.77
A															

Round 3. Positivity rate (% Ct, South Limburg)

round 3 by region	M					V					M&V				
	Uitslag		Total	Uitslag		Uitslag		Total	Uitslag		Uitslag		Total	Uitslag	
	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief	Negatief of	Positief		Negatief of	Positief
	#	#	#	%	%	#	#	#	%	%	#	#	#	%	%
Gender (total)	856	24	880	97.27	2.73	1711	73	1784	95.91	4.09	2567	97	2664	96.36	3.64
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Ethnicity	694	19	713	97.34	2.66	1368	64	1432	95.53	4.47	2062	83	2145	96.13	3.87
A. Nederland															
B. Turkije	5	1	6	83.33	16.67	5	.	5	100	.	10	1	11	90.91	9.09
C. Marokko/Noord Afrika	14	.	14	100	.	14	.	14	100	.	28	.	28	100	.
E. Suriname	1	.	1	100	.	10	2	12	83.33	16.67	11	2	13	84.62	15.38
F. Ned Ant/Aruba	6	.	6	100	.	15	.	15	100	.	21	.	21	100	.
G. Oost Europa	7	.	7	100	.	20	.	20	100	.	27	.	27	100	.
H. Overig Afrika	11	1	12	91.67	8.33	7	.	7	100	.	18	1	19	94.74	5.26
I. M-Z Amerika	4	.	4	100	.	8	1	9	88.89	11.11	12	1	13	92.31	7.69
J. EurOverig	80	3	83	96.39	3.61	180	2	182	98.9	1.1	260	5	265	98.11	1.89
K. Azië	29	.	29	100	.	62	4	66	93.94	6.06	91	4	95	95.79	4.21
L. Rest	5	.	5	100	.	22	.	22	100	.	27	.	27	100	.
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
Age	17	.	17	100	.	33	.	33	100	.	50	.	50	100	.
16-17															
18-19	99	5	104	95.19	4.81	290	16	306	94.77	5.23	389	21	410	94.88	5.12
20-24	376	8	384	97.92	2.08	755	38	793	95.21	4.79	1131	46	1177	96.09	3.91
25-29	364	11	375	97.07	2.93	633	19	652	97.09	2.91	997	30	1027	97.08	2.92
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
CT Risk level	143	2	145	98.62	1.38	289	18	307	94.14	5.86	432	20	452	95.58	4.42
High															
Low	143	2	145	98.62	1.38	301	21	322	93.48	6.52	444	23	467	95.07	4.93
Medium	570	20	590	96.61	3.39	1121	34	1155	97.06	2.94	1691	54	1745	96.91	3.09
	0	0	0	.	.	0	0	0	.	.	0	0	0	.	.
r3_Blok	287	6	293	97.95	2.05	557	21	578	96.37	3.63	844	27	871	96.9	3.1
A															
B	232	10	242	95.87	4.13	479	19	498	96.18	3.82	711	29	740	96.08	3.92
C	337	8	345	97.68	2.32	675	33	708	95.34	4.66	1012	41	1053	96.11	3.89

A3 Overview of Chlamydia reinfections in round 1 and 2 (data November 2010)

		Number at risk of reinfection*	No. reinfected	% reinfected ^
Overall		1991	178	8.9
Gender	Male	499	44	8.8
	Female	1373	128	9.3
Age	16-19	310	52	16.8
	20-24	864	83	9.6
	25-29	698	37	5.3
Ethnicity	Netherlands	1064	74	7.0
	Turkey	35	6	17.1
	Morocco/N.Africa	67	6	9.0
	Suriname	244	30	12.3
	Netherlands Antilles	132	21	15.9
	Eastern Europe	23	2	8.7
	Sub Saharan Africa	118	22	18.6
	Central/South America	36	3	8.3
	Europe other	125	7	5.6
	Asia	132	5	3.8
	Other	15	2	13.3
Region	Rotterdam	892	101	11.3
	Amsterdam	866	66	7.6
	Limburg	114	5	4.4
Community risk level	Low	467	31	6.6
	Medium	967	82	8.5
	High	438	59	13.5
Blok	A	333	35	10.5
	B	1404	130	9.3
	C	135	7	5.2
SES	High SES	264	19	7.2
	High average SES	384	40	10.4
	Average SES	672	54	8.0
	Low SES	671	65	9.7

*Chlamydia positives in round 1 or round 2 who took the retest six months after their positive test.
^Calculated from no. positive at round 1 or 2 retest/no. round 1 or 2 positives who did the retest.

A4 Characteristics of participants and non-participants in round 1 and 2 (based on data August 2010)

Table 1

	Participants round 1		*Non-participants round 1*		*Participants round 2*		*Non-participants round 2*	
	N	%	N	%	N	%	N	%
Total population	41976		214832		33424		268434	
Gender								
Male	13157	10.7	109868	89.3	10113	6.9	135885	93.1
Female	28819	21.5	104964	78.5	23311	15.0	132549	85.0
Age*								
16-19	5543	10.1	49358	89.9	4488	7.1	59013	92.9
20-24	15939	17.0	77647	83.0	13124	11.9	97497	88.1
25-29	20493	18.9	87827	81.1	15806	12.4	111831	87.6
Ethnicity**								
Netherlands	26554	21.3	98305	78.7	20776	14.2	125471	85.8
Turkey	1156	6.3	17086	93.7	940	4.3	20991	95.7
Morocco/N. Africa	1223	5.1	22997	95.0	948	3.4	27111	96.6
Surinam	3077	14.8	17761	85.2	2359	10.1	21003	89.9
Netherlands Antilles	1332	18.1	6048	82.0	1117	12.8	7643	87.2
Eastern Europe	403	12.1	2801	87.4	391	9.1	3895	90.9
Sub Sahara African	1332	14.1	8127	85.9	1235	10.7	10290	89.3
Central/South America	618	15.3	3421	84.7	558	11.6	4241	88.4
Europe other	2666	14.7	15486	85.3	2310	10.4	19952	89.6
Asia	3133	13.6	19936	86.4	2426	9.1	24361	90.9
Else	374	12.8	2539	87.2	295	8.4	3212	91.6
Region								
Rotterdam	16396	15.9	86831	84.1	12622	10.4	108698	89.6
Amsterdam	24120	17.2	116283	82.8	18414	11.9	137013	88.1
South Limburg	1460	11.1	11718	88.9	2388	9.5	22723	90.5
Community risk level								
Low	14991	19.9	60499	80.1	11578	13.3	75793	86.7
Medium	21003	15.4	115002	84.6	16558	10.5	140930	89.5
High	5874	13.1	39048	86.9	5220	9.2	51547	90.8

Round 3: only part of the population; not presented.

A5 Characteristics of persons participating in both rounds

(based on data August 2010)

	Participation in round 1		*Participation in two rounds*	
	N	%	N	%
Total population	41868		10166	
Gender#				
Male	13095	31.3	2523	24.8
Female	28773	68.7	7643	75.2
Age*				
16-19	5543	13.2	1453	14.3
20-24	15831	37.8	4367	43.0
25-29	20493	49.0	4346	43.0
Ethnicity**				
Netherlands	26554	63.4	6408	63.0
Turkey	1156	2.8	214	2.1
Morocco/N. Africa	1223	2.9	213	2.1
Surinam	3077	7.4	867	8.5
Netherlands Antilles	1332	3.2	379	3.7
Eastern Europe	403	1.0	98	1.0
Sub Sahara African	1332	3.2	394	3.9
Central/South America	618	1.5	154	1.5
Europe other	2666	6.4	634	6.2
Asia	3133	7.5	726	7.1
Else	374	0.9	79	0.8
Region				
Rotterdam	16344	39.0	4084	40.2
Amsterdam	24067	57.5	5758	56.6
South Limburg	1457	3.5	324	3.2
Community risk level				
Low	14991	35.8	3679	36.2
Medium	21003	50.2	4999	49.2
High	5874	14.0	1488	14.6
Educational level				
Low	1122	2.7	155	1.5
Medium	6901	16.5	1450	14.3
High	18716	44.7	3972	39.1
Unknown	15129	36.1	4589	45.1
Sexual preference				
Heterosexual men	6074	14.5	987	9.7
MSM	445	1.1	115	1.1
Women	17225	41.1	3951	38.9
Unknown	18124	43.3	5113	50.3
Ethnicity SP				
Concordant (NL/NL)	9386	22.4	1684	16.6
Discordant (NL/non-NL)	4262	10.2	823	8.1
Concordant (non-NL/non-NL)	2598	6.2	519	5.1
Unknown	25622	61.2	7140	70.2
Age at first sexual contact				
≤15	7026	16.8	1574	15.5
16-18	13920	33.3	2927	28.8
≥19	5223	12.5	999	9.8
Unknown	15699	37.5	4666	45.9
New relationship < 3 months				
No	18554	44.3	3659	36.0
Yes	5190	12.4	1394	13.7
Unknown	18124	43.3	5113	50.3

Nr of sexual partners < 6 months				
1 steady partner	733	1.8	124	1.2
1 casual partner	1932	4.6	559	5.5
≥ 2 partners (steady partner included)	20462	48.9	4276	42.1
No partner	2755	6.6	470	4.6
Unknown	15986	38.2	4737	46.6
Duration steady partnership				
< 1 year	4005	9.6	991	9.8
1-3 years	5375	12.8	1019	10.0
4-6 years	4186	10.0	599	5.9
≥ 6 years	2563	6.1	400	3.9
No steady partner	10080	24.1	2487	24.5
Unknown	15659	7.4	4670	45.9
Concurrent partners				
No	20934	50.0	4216	41.5
Yes	2810	6.7	837	8.2
Unknown	18124	43.3	5113	50.3
History of STI *				
No STI ever	2461	5.9	2880	28.3
Yes, < 6 months	136	0.3	143	1.4
Yes, ≥ 6 months	956	2.3	1021	10.0
Unknown	38315	91.5	6122	60.2
Symptoms of an STI *				
Yes	2435	5.8	1810	17.8
No	4040	10.0	2775	27.3
Unknown	35393	84.5	5581	54.9
Condom use last SP				
Yes	2664	6.4	472	4.6
No	13428	32.1	2520	24.8
Unknown	25776	61.6	7174	70.6
Condom use last CP				
Yes	4302	10.3	1077	10.6
No	4605	11.0	1375	13.5
Unknown	32961	78.7	7714	75.9

* The two questions were optional in round 1 and non-optional in round 2; this might have influenced comparability between rounds. # Percentages calculated over non-missing answers.

A6 Determinants of participation in the first screening round

(based on data August 2010)

	Logistic regression (*participation*), model with individual level variables			
	Univariate		Multivariate	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Total population participants				
Gender (n=40188)				
Male	1.0		1.0	
Female	2.3 (2.2-2.3)	<0.001	**1.8** (1.7-1.8)	<0.001
Age (n=40187)				
16-19	1.0		1.0	
20-24	1.8 (1.8-1.9)	<0.001	**1.7** (1.6 -1.8)	<0.001
25-29	2.1 (2.0-2.2)	<0.001	**2.1** (2.0-2.2)	<0.001
Ethnicity (n=40188)				
Netherlands	1.0		1.0	
Surinam/Antillean/Aruban	0.7 (0.6-0.7)	<0.001	**0.8** (0.7-0.8)	<0.001
Turkish/Moroccan/ N. African	0.2 (0.2-0.2)	<0.001	**0.4** (0.4-0.4)	<0.001
Sub Sahara African	0.6 (0.6-0.6)	<0.001	**0.9** (0.8-0.9)	0.001
Western, other	0.6 (0.5-0.6)	<0.001	**0.7** (0.7-0.8)	<0.001
Non-Western, other	0.6 (0.6-0.6)	<0.001	**0.7** (0.7-0.8)	<0.001
Region (n=40188)				
Rotterdam	1.0		1.0	
Amsterdam	1.1 (1.1-1.2)	<0.001	**1.1** (1.0-1.1)	0.001
Socioeconomic status (SES)*				
High SES	1.0		1.0	
High average SES	0.9 (0.8-0.9)	<0.001	1.0 (0.9-1.0)	0.02
Average SES	0.8 (0.8-0.8)	<0.001	1.0 (0.9-1.0)	0.10
Low SES	0.7 (0.6-0.7)	<0.001	**0.9** (0.9-0.9)	<0.001
Community risk level (n=40188)				
Low	1.0		1.0	
Medium	0.7 (0.7-0.7)	<0.001	**0.9** (0.8-0.9)	<0.001
High	0.6 (0.6-0.6)	<0.001	**0.8** (0.8-0.9)	<0.001
Educational level (n=25635)				
Low	1.0		1.0	
Medium	1.2 (1.0-1.3)	0.009	1.1 (0.9-1.2)	0.26
High	1.9 (1.7-2.2)	<0.001	**1.4** (1.2-1.6)	<0.001
Sexual preference (n=22718)				
Heterosexual men	1.0		1.0	
MSM	0.9 (0.7-1.0)	0.12	**0.8** (0.6-0.9)	0.03
Ethnicity SP (n=15530)				
Concordant (NL/NL)	1.0		1.0	
Discordant (NL/non-NL)	0.9 (0.8-0.9)	0.002	**1.2** (1.1-1.3)	<0.001
Concordant (non-NL/non-NL)	0.7 (0.6-0.8)	<0.001	**1.2** (1.1-1.4)	<0.001
Age at first sexual contact (n=25079)				
≤15	1.0		1.0	
16-18	1.1 (1.0-1.1)	0.04	1.0 (0.9-1.0)	0.40
≥19	1.1 (1.0-1.2)	0.009	1.1 (0.9-1.1)	0.98
Number of sexual partners < 6 months				
1 steady partner	1.0		1.0	
1 casual partner	1.6 (1.3-1.9)	<0.001	**1.4** (1.3-1.6)	0.003

≥ 2 partners (steady partner included)	1.3 (1.1-1.5)	0.002	**1.4** (1.3-1.6)	<0.001
No partner(s)	1.1 (0.9-1.3)	0.48	1.3 (1.0-1.7)	0.04
Duration steady partnership (n=25119)				
< 1 year	1.0		1.0	
1-3 years	1.0 (0.9-1.1)	0.87	1.0 (0.9-1.0)	0.05
4-6 years	1.0 (0.9-1.1)	0.75	**0.8** (0.8-0.9)	<0.001
> 6 years	0.9 (0.8-1.0)	0.05	**0.7** (0.6-0.8)	<0.001
Concurrent partners (n=22716)				
No	1.0		1.0	
Yes	0.9 (0.8-0.9)	0.002	**1.2** (1.0-1.3)	0.01
History of STI (n=3488)				
No STI ever	1.0		1.0	
Yes, < 6 months	2.1 (1.44-3.17)	<0.001	**1.6** (1.0-2.6)	0.05
Yes, ≥ 6 months	2.0 (1.7-2.3)	<0.001	**1.3** (1.0-1.5)	0.03
Symptoms of an STI (n=6353)				
Yes	1.0		1.0	
No	0.7 (0.6-0.8)	<0.001	**0.8** (0.7-0.9)	<0.001

OR, odds ratio; CI, confidence interval; MSM, men having sex with men, STI, sexual transmitted infection(s); SP, steady partner; CP, casual partner. Determinants selected for multivariate analysis based on Wald test for univariate association (p>0.20). Not significant or highly correlated variables excluded from the model: invitation by GP, condom use with steady or casual partner, and new partner last two months. South-Limburg excluded from the model. * Classes (from high to low SES): score ≤ 0, 0-1, 1-2, ≥ 2.

A7 Determinants of participation 1st round.

Effect of cluster-based invitations
(based on data August 2010)

	Multilevel analysis: model with area (cluster) level variable	
	Adjusted OR (95%CI)	p-value
Total population participants		
Gender (n=40188)		
Male	1.0	
Female	**1.7** (1.7-1.8)	<0.001
Age (n=40187)		
16-19	1.0	
20-24	**1.7** (1.6-1.7)	<0.001
25-29	**2.0** (1.9-2.1)	<0.001
Ethnicity (n=40188)		
Netherlands	1.0	
Surinam/Antillean/Aruban	**0.8** (0.7-0.8)	<0.001
Turkish/Moroccan/ N. African	**0.4** (0.4-0.4)	<0.001
Sub Sahara African	**0.9** (0.8-0.9)	0.002
Western, other	**0.7** (0.7-0.8)	<0.001
Non-Western, other	**0.7** (0.7-0.8)	<0.001
Region (n=40188)		
Rotterdam	1.0	
Amsterdam	1.0 (0.9-1.0)	0.22
Socioeconomic status (SES)*		
High SES	1.0	
High average SES	1.0 (1.0-1.1)	0.12
Average SES	1.0 (0.9-1.1)	0.88
Low SES	1.0 (1.0-1.1)	0.14
Community risk level (n=40188)		
Low	1.0	
Medium	**0.9** (0.8-0.9)	<0.001
High	**0.8** (0.8-0.9)	<0.001
Educational level (n=25635)		
Low	1.0	
Medium	1.1 (1.0-1.2)	0.22
High	**1.4** (1.2-1.6)	<0.001
Sexual preference (n=22718)		
Heterosexual men	1.0	
MSM	**0.8** (0.6-0.9)	<0.001
Women	1.0 (0.9-1.0)	0.01
Ethnicity SP (n=15530)		
Concordant (NL/NL)	1.0	
Discordant (NL/non-NL)	**1.2** (1.1-1.3)	<0.001
Concordant (non-NL/non-NL)	**1.3** (1.2-1.5)	<0.001
Age at first sexual contact (n=25079)		
≤15	1.0	
16-18	1.0 (0.9-1.0)	0.50
≥19	1.0 (0.9-1.1)	0.90
Number of sexual partners < 6 months		
1 steady partner	1.0	

1 casual partner	1.0 (0.8-1.3)	0.99
≥ 2 partners (steady partner included)	1.0 (0.8-1.2)	0.74
No partner(s)	0.8 (0.7-1.0)	0.07
Duration steady partnership (n=25119)		
< 1 year	1.0	
1-3 years	0.9 (0.9-1.0)	0.08
4-6 years	**0.8** (0.7-0.9)	<0.001
≥ 6 years	**0.7** (0.6-0.8)	<0.001
Concurrent partners (n=22716)		
No	1.0	
Yes	0.9 (0.8-1.0)	0.10
History of STI (n=3488)		
No STI ever	1.0	
Yes, < 6 months	1.6 (1.0-2.7)	0.05
Yes, ≥ 6 months	**1.3** (1.0-1.5)	0.03
Symptoms of an STI (n=6353)		
Yes	1.0	
No	**0.8** (0.8-0.9)	0.002

OR, odds ratio; CI, confidence interval; MSM, men having sex with men, STI, sexual transmitted infection(s); SP, steady partner; CP, casual partner. Determinants selected for multivariate analysis based on Wald test for univariate association (p>0.20). Not significant variables excluded from the model: condom use with steady or casual partner, and invitation by GP.
Variable highly correlated with other variables: new partner last two months (excluded).
South-Limburg excluded from the model. * Classes (from high to low SES): score ≤ 0, 0-1, 1-2, ≥ 2.

A8 Determinants of positivity in the 1st round.

Effect of cluster-based invitations
(based on data August 2010)

	Multilevel analysis: model with area (cluster) level variable	
	Adjusted OR (95%CI)	p-value
Total population participants		
Gender		
Male	1.0	
Female	1.1 (0.9-1.3)	0.3
Age		
16-19	1.0	
20-24	**0.8** (0.7-0.9)	0.006
25-29	**0.6** (0.5-0.7)	<0.001
Ethnicity		
Netherlands	1.0	
Surinam/Antillean/Aruban	**1.6** (1.4-1.8)	<0.001
Turkish/Moroccan/ N. African	0.9 (0.7-1.1)	0.20
Sub Sahara African	**1.5** (1.2-1.9)	<0.001
Western, other	1.0 (0.8-1.3)	1.0
Non-Western, other	1.0 (0.9-1.2)	0.8
Region		
Amsterdam	1.0	
Rotterdam	**1.2** (1.1-1.3)	0.003
Socioeconomic status (SES)*		
High SES	1.0	
High average SES	1.0 (1.0-1.1)	0.54
Average SES	1.1 (0.9-1.1)	0.75
Low SES	1.0 (1.0-1.1)	0.20
Community risk level		
Low	1.0	
Medium	**1.1** (0.9-1.3)	0.31
High	**1.4** (1.2-1.7)	<0.001
Educational level		
Low	1.0	
Medium	0.9 (0.7-1.1)	0.31
High	**0.4** (0.3-0.5)	<0.001
Sexual preference		
Heterosexual men	1.0	
MSM	0.7 (0.4-1.2)	0.15
Women	1.1 (0.9-1.4)	0.24
Ethnicity SP		
Concordant (NL/NL)	1.0	
Discordant (NL/non-NL)	**1.9** (1.5-2.3)	<0.001
Concordant (non-NL/non-NL)	**2.5** (2.0-3.2)	<0.001
Age at first sexual contact		
≤15	1.0	
16-18	0.9 (0.8-1.0)	0.07
≥19	**0.7** (0.6-0.8)	<0.001
Duration steady partnership		
< 1 year	1.0	
1-3 years	**0.7** (0.5-0.8)	<0.001

4-6 years	**0.5** (0.4-0.6)	<0.001
≥ 6 years	**0.4** (0.3-0.5)	<0.001
Concurrent partners		
No	1.0	
Yes	**1.3** (1.1-1.5)	0.01
History of STI		
No STI ever	1.0	
Yes, < 6 months	1.7 (0.9-3.1)	0.12
Yes, ≥ 6 months	1.4 (1.0-1.9)	0.07
Symptoms of an STI		
Yes	1.0	
No	**0.6** (0.6-0.9)	<0.001

OR, odds ratio; CI, confidence interval; MSM, men having sex with men, STI, sexual transmitted infection(s); SP, steady partner; CP, casual partner. Determinants selected for multivariate analysis based on Wald test for univariate association (p>0.20). Not significant variables excluded from the model: condom use with steady or casual partner, and invitation by GP.
Variable highly correlated with other variables: new partner last two months (excluded). South-Limburg excluded from the model. * Classes (from high to low SES): score ≤ 0, 0-1, 1-2, ≥ 2.

A9 Estimation of Chlamydia prevalence from positivity

Goal: To estimate Chlamydia population prevalence for the total 16-19 years population from Ct-positivity, by using survey weights.

Principle: Survey weights are used to make statistics computed from the sample more representative of the population. A survey weight is a value assigned to each subject in the sample. The survey sample may cover segments of the target population in proportions that do not match the proportions of those segments in the population itself. The differences may arise, for example, from sampling fluctuations, from non-response, or because the sample design was not able to cover the entire target population.

Method: Since the participant population only includes persons who are sexually active, we used estimates from the RNG study for % being sexually active to derive for the control population numbers for sexually active persons. The gender, age, ethnicity, community risk level cross-classification in the control population and in the participant population is used to calculate the survey weights. In fact, we calculated three sets of weights for each study round. Gender, age, ethnicity and community risk level were chosen because of their association with the key survey outcome and their relation to the non-response. The weighted prevalence in the sexually active population calculated using the survey weights was adjusted to the total population by the estimates from the RNG study for % being sexually active.
For South-Limburg the estimation method was further extended to take into account that the lower sexual risk behavioural categories were not included in the sample. A range with a lowest and highest value for the prevalence was calculated by assuming that the missing lower sexual risk behavioural categories had either zero positivity or the positivity value of the lowest included sexual risk factor behavioural level. All calculations were done with statistical software programme SAS.

Practical considerations, decisions and assumptions:
- Ideally, one should include variables that exhibit an association with the key survey outcome variables and that are related to the non-response. This strategy will reduce bias in the key outcome variables. In practice, other considerations may enter. A variable such as gender may not be strongly related to key outcome variables or to non-response, but including it in the weighting method may be desirable to preserve the 'face validity' of the sample.
- Variables with small numbers (<2%) or empty cells were avoided or combined. We did not include variables with too many categories, or too many missing values.
- We assumed that persons that are not sexually active yet have a Ct-positivity of 0%.
- We considered Ct-prevalence as a point prevalence per year, counting each individual once (reinfections not included).

Variables used as weighting and correction factors:
- Age (16-19, 20-24, 25-29);
- Gender (Male, Female);
- Ethnicity (Dutch, Turkish-Moroccan-Northern African, Surinam-NL Antilles-Aruban, Other);
- Community risk level (High, Medium, Low);
- Risk score variable for sexual risk behavioural (South-Limburg only);

- Estimates for % being sexually active, by age year (source: Rutgers Nisso Group, RNG).

Weight factors were calculated separately for each region, by round and the blocks from the stepped wedge design.

The prevalence was estimated by block in the stepped wedge design:

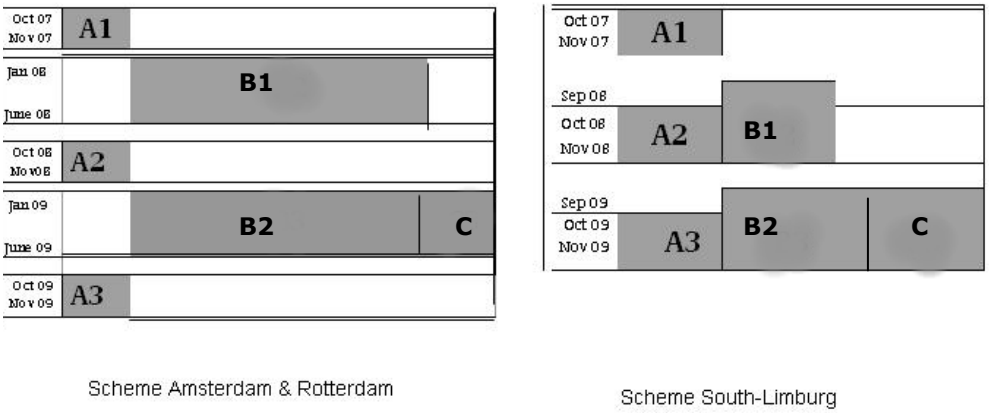

Figure A9.1. Stepped wedge design: cities left and South-Limburg right. Block A is submitted to screening thrice in consecutive rounds, block B twice and block C once.

A10 Process monitoring

For more details on the process monitoring: see report: Process evaluation of the Chlamydia Screening Implementation in the Netherlands: phase 1. Challenges and opportunities during preparation and first operational phase. Op de Coul ELM, Weenen TC, Sande MAB van der, Broek IVF van den. RIVM report 210261006, Bilthoven 2009.
For the complete first and second screening round additional were made for the effect of reminder invitations and providing of e-mail addresses and cell phone numbers.

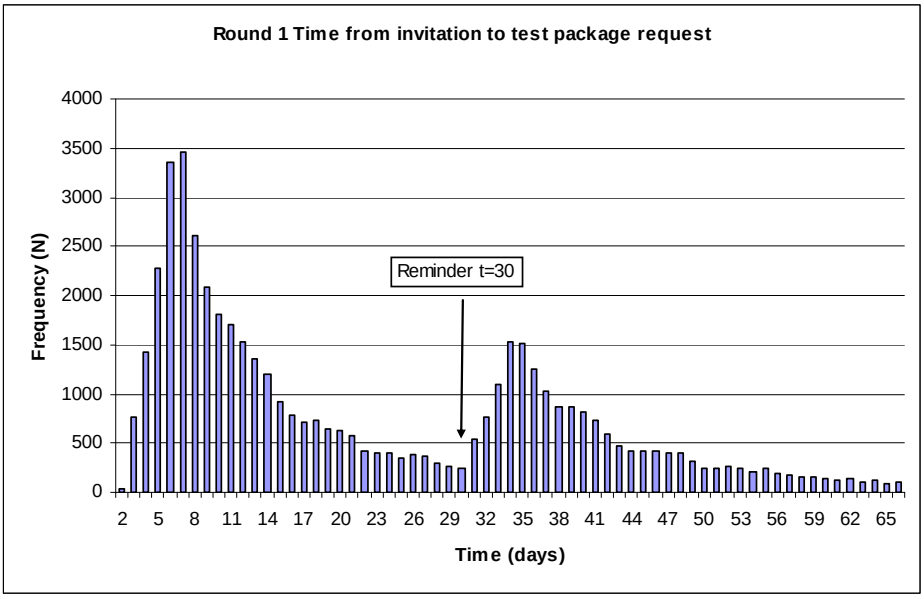

Figure A10.1. Time (days) from invitation to test package request in first and second screening round.

Table A10.1. Number of respondents providing e-mail address and cell phone number, by region and screening round.

	Provision of e-mail address				Provision of cell phone number			
	*Response round 1**		*Response round 2***		*Response round 1**		*Response round 2***	
	N	%	N	%	N	%	N	%
Total population	51922		41172		37375		30510	
Region								
Rotterdam	20329	98.5	15493	98.5	14691	71.2	11684	74.3
Amsterdam	29818	98.8	22784	98.8	21442	71.1	16775	72.7
South Limburg	1775	98.5	2895	98.7	1242	68.9	2051	69.9

* Total number of package requests in round 1: N=52628
** Total number of package requests in round 2: N=41729 (in both rounds ex partners are excluded)

Reminders contributed significantly to the response rate in both screening rounds (Figure 1).
In both screening rounds, respondents are very willing to provide their e-mail address and/or cell phone number, even when it is not obligatory. Provision of e-mail addresses is done by 98.7% of all respondents in both screening rounds. Cell phone numbers are given by 71% of the respondents in the first round, whereas 73.1% of second round responders provided their phone number (Table 2). In the urban areas percentages of cell phone number provision were slightly higher (average 71.2% in first round; 73.5% in second round) than in South-Limburg (68.9% in first and 69.9% in second round respectively).
For more information on process monitoring: see RIVM report 210261006/2009. E.L.M. Op de Coul, TC Weenen et al. Process evaluation of the Chlamydia Screening Implementation in the Netherlands: phase 1. http://www.rivm.nl/bibliotheek/rapporten/210261006.html

A11 Simulation model: parameters of sexual contact network

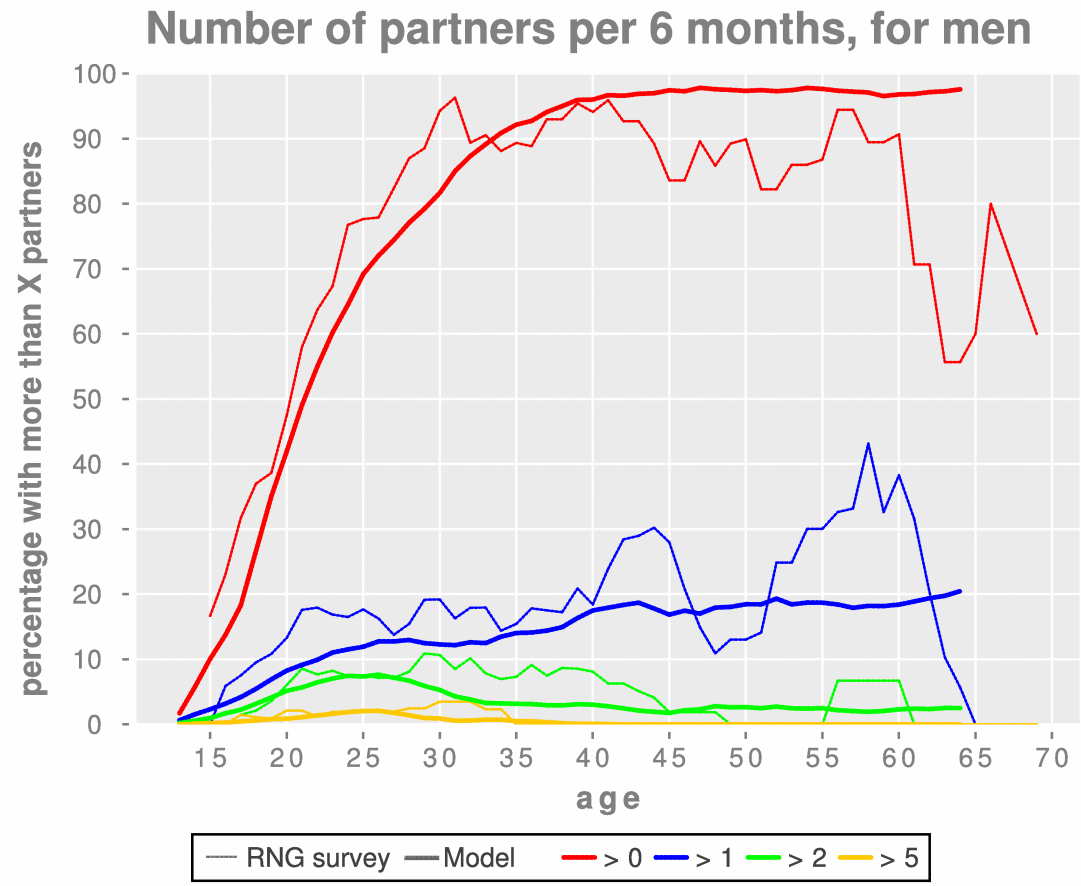

Figure A11.1. Example of RNG survey sexual contact network data (thin lines), and the model fit (thick lines). The number of partners that men of a particular age have had sexual contact with in the last 6 months can be expressed as 'more than 0, more than 1, more than 2', and results in the distribution shown here. For example, at age 40, 95% of the men had a relationship with more than 0 partners in the last 6 months (red lines). A subset of them (about 20% of all men) had a relationship with more than 1 partner in the last 6 months (blue lines), and again a subset of them had more than 2 relationships in the last 6 months (green lines)

National Insitute for Public Health and the Environment
P.O. Box 1 | 3720 BA Bilthoven
www.rivm.com