Supplementary material

Factors associated with anorectal *Chlamydia trachomatis* or *Neisseria gonorrhoeae* test positivity in women – a systematic review and meta-analysis.

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3,4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Sup2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3,5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	4
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	4,5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	4

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	4

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	5, Sup9-10
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	15
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Sup9-10
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	18,19
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	5,6, Sup4
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	5,6, Sup4-5
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	6,7
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	7
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	7,8
FUNDING			

Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	8,9

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Supplementary material 2 – PubMed search strategy

(("Chlamydia"[All Fields] OR "Chlamydia trachomatis"[All Fields]) AND (("anal"[All Fields] OR "rect*"[All Fields]) OR ("extra?genital"[All Fields] OR "multi?site"[All Fields]))) AND (("0001/01/01"[PDAT] : "2018/10/31"[PDAT]) AND "humans"[MeSH Terms] AND English[lang])

Supplementary material

Supplementary material 3 – Data items extracted

Data extracted	Example of data
Study background	
Country of study	
Study design	Cross-sectional studies
Study population and setting	Women attending STI/STD/GUM clinics
Data collection period	Start and end month/year of data collection
Age mean (range); median (IQR)	Participants must be aged 15+ years to meet eligibility criteria
Anal intercourse profile of population	Including **only** women reporting anal intercourse **or** including **both** women who did or did not report anal intercourse and if anal intercourse not specified.
Rectal sample collection method	Self-collected swab, clinician-collected swab, not reported
Diagnostic used	CT & NG: NAAT (Aptima Combo 2)
Outcome data	
Number testing positive or negative for anorectal CT and/or NG	Used to calculate summary positivity estimates
Association of urogenital positivity with rectal positivity	
Number testing urogenital CT positive and rectal CT positive Number testing urogenital CT positive and rectal CT negative Number testing urogenital CT negative and rectal CT positive Number testing urogenital CT negative and rectal CT negative	For 2x2 table, prevalence ratio
Number testing urogenital NG positive and rectal NG positive Number testing urogenital NG positive and rectal NG negative Number testing urogenital NG negative and rectal NG positive Number testing urogenital NG negative and rectal NG negative	For 2x2 table, prevalence ratio
Association of pharyngeal positivity with rectal positivity	
Number testing pharyngeal CT positive and rectal CT positive Number testing pharyngeal CT positive and rectal CT negative Number testing pharyngeal CT negative and rectal CT positive Number testing pharyngeal CT negative and rectal CT negative	For 2x2 table, prevalence ratio
Number testing pharyngeal NG positive and rectal NG positive Number testing pharyngeal NG positive and rectal NG negative Number testing pharyngeal NG negative and rectal NG positive Number testing pharyngeal NG negative and rectal NG negative	For 2x2 table, prevalence ratio
Association of anal intercourse (AI) with rectal positivity	
Number reporting AI and testing rectal CT positive Number reporting AI and testing rectal CT negative Number reporting no AI and testing rectal CT positive Number reporting no AI and testing rectal CT negative	For 2x2 table, prevalence ratio
Number reporting AI and testing rectal NG positive Number reporting AI and testing rectal NG negative Number reporting no AI and testing rectal NG positive Number reporting no AI and testing rectal NG negative	For 2x2 table, prevalence ratio

Supplementary material 4 – Anorectal positivity - sub-group analysis and meta-regression

Anorectal Chlamydia Positivity										
	Sub-group analysis					**Meta-regression[a]**				
Variable	**Number of studies, n**	**Summary prevalence estimate, %**	**95%CI**	**I^2**	**p**	**Summary PR**	**95%CI**	**p**	**Residual I^2**	**τ^2, Δ**
All	25	8.0	7.0, 9.1	88.5%	<0.01					0.1480, ref
Region									88.6%	0.1485,
N. America	12	8.2	6.4, 10.2	89.9%	<0.01	ref				+0.3
U.K.	3	8.5	5.3, 12.4	50.8%	0.13	1.0	0.5, 2.0	0.92		
The Netherlands	7	8.6	7.0, 10.3	92.1%	<0.01	0.9	0.6, 1.5	0.80		
Africa/S. America	3	5.3	3.3, 7.8	58.9%	0.09	0.6	0.3, 1.1	0.11		
Final year of data collection									88.4%	0.1695,
<2010	7	8.7	5.8, 12.0	85.2%	<0.01	ref				+14.5%
2010-2012	9	7.5	5.7, 9.5	90.5%	<0.01	0.82	0.5, 1.4	0.46		
2013+	9	7.9	6.5, 9.5	88.7%	<0.01	0.82	0.5, 1.4	0.44		
Anal intercourse reporting									87.5%	0.123,
AI only	11	9.9	8.3, 11.6	80.3%	<0.01	ref				-16.9%
Mixed/Unspecified	14	6.6	5.4, 8.0	91.2%	<0.01	0.68	0.5, 0.97	0.04		
Association of Urogenital Chlamydia with Anorectal Chlamydia										
	Sub-group analysis					**Meta-regression**				
Variable	**Number of studies, n**	**Summary PR estimate**	**95%CI**	**I^2**	**p**	**Summary ratio of PR**	**95%CI**	**p**	**Residual I^2**	**τ^2, Δ**
All	13	32.2	25.6, 40.7	70.3%	<0.01					0.1739, ref
Region									76.2%	0.1827,
N. America	7	36.3	23.3, 56.5	76.7%	<0.01	ref				+5.1%
U.K.	1	119.2	16.8, 846.0	.	.	3.4	0.3, 44.0	0.30		
The Netherlands	4	32.9	23.4, 46.3	75.8%	<0.01	1.0	0.5, 2.1	0.93		
Africa/S. America	1	15.4	8.0, 29.4	0.0%	0.52	0.4	0.1, 1.7	0.20		
Final year of data collection									92.8%	0.2318,
<2010	5	48.8	35.2, 67.6	0.0%	0.53	ref				+33.3%
2010-2012	5	28.0	18.2, 43.1	82.7%	0.01	0.4	0.2, 0.9	0.04		
2013+	3	27.3	21.2, 36.4	30.7%	0.24	0.5	0.2, 1.1	0.07		

Anal intercourse reporting									74.2%	0.2017,
AI only	6	30.1	21.4, 42.3	60.8%	0.03	ref				+16.0%
Mixed/Unspecified	7	35.8	23.9, 53.7	78.1%	<0.01	1.1	0.5, 2.3	0.77		

Anorectal Gonorrhoea Positivity

	Sub-group analysis					Meta-regression[a]				
Variable	**Number of studies, n**	**Summary prevalence estimate, %**	**95%CI**	**I^2**	**p**	**Summary PR**	**95%CI**	**p**	**Residual I^2**	**τ^2, Δ**
All	25	2.1	1.6, 2.8	92.7%	<0.01					0.7662, ref
Region									85.2%	0.3998,
N. America	12	3.7	2.6, 4.9	86.3%	<0.01	ref				-47.8%
U.K.	3	1.7	0.1, 4.7	71.5%	0.03	0.4	0.1, 1.5	0.17		
The Netherlands	7	1.1	0.8, 1.3	62.5%	0.01	0.3	0.1, 0.5	<0.01		
Africa/S. America	3	1.4	0.5, 2.8	55.1%	0.11	0.3	0.1, 1.0	0.05		
Final year of data collection									94.0%	0.7689,
<2010	7	3.2	1.4, 5.5	85.5%	<0.01	ref				-0.4%
2010-2012	9	2.1	1.2, 3.3	93.9%	<0.01	0.7	0.3, 2.1	0.57		
2013+	9	1.7	1.0, 2.6	89.3%	<0.01	0.5	0.2, 1.4	0.20		
Anal intercourse reporting									94.4%	0.7776,
AI only	11	2.8	1.5, 4.3	94.0%	<0.01	ref				+1.5%
Mixed/unspecified	14	1.7	1.1, 2.4	90.9%	<0.01	0.7	0.3, 1.6	0.33		

Association of Urogenital Gonorrhoea with Anorectal Gonorrhoea

	Sub-group analysis					Meta-regression				
Variable	**Number of studies, n**	**Summary PR estimate**	**95%CI**	**I^2**	**p**	**Summary ratio of PR**	**95%CI**	**p**	**Residual I^2**	**τ^2, Δ**
All	13	89.3	53.1, 150.3	80.1%	<0.01					1.145, ref
Region									71.1%	0.6373,
N. America	7	71.4	34.2, 149.3	74.4%	<0.01	ref				-44.3%
U.K.	1	114.0	15.5, 837.4	.	.	1.7	0.1, 49.3	0.73		
The Netherlands	4	176.5	94.8, 328.8	42.9%	0.154	3.1	0.6, 14.7	0.13		
Africa/S. America	1	13.6	5.0, 36.8	.	.	0.2	0.0, 2.6	0.18		
Final year of data collection									83.5%	1.471,
<2010	5	116.5	24.4, 556.9	84.2%	<0.01	ref				+28.5%
2010-2012	5	71.2	29.9, 169.6	86.5%	<0.01	0.67	0.1, 4.9	0.66		

2013+	3	112.0	56.9, 220.6	26.0%	0.26	1.2	0.1, 14.7	0.89			
Anal intercourse reporting									78.0%	1.161,	
AI only	6	65.3	31.9, 133.6	74.9%	<0.01	ref				+1.4%	
Mixed/unspecified	7	128.7	52.0, 318.6	78.1%	<0.01	2.1	0.4, 10.5	0.34			

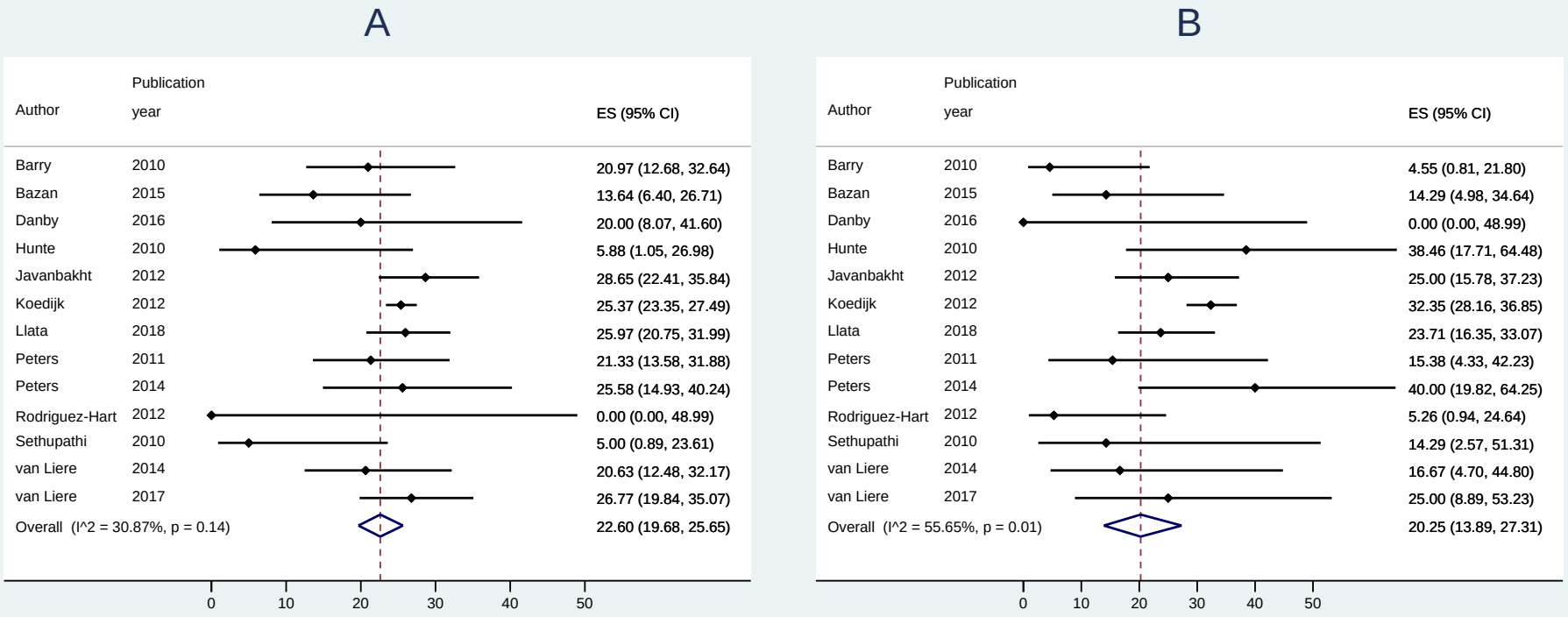
a=Stephens et al excluded from meta-regression as 0% prevalence for CT and NG. CI=confidence interval. PR=Prevalence ratio. AI=anal intercourse

Supplementary material 5 – Sensitivity analysis

	Chlamydia trachomatis			Neisseria gonorrhoeae		
	Random ES	**95% CI**	**I^2 (p-value)**	**Random ES**	**95% CI**	**I^2 (p-value)**
Excluding studies with large CT/NG denominator discrepancies						
Anorectal positivity, (%)	8.0	7.0, 9.1	88.5% (<0.01)	2.1	1.6, 2.8	92.7% (<0.01)
Excluding Koedijk [13] and van Rooijen [14], (%)	7.8	6.6, 9.1	88.6% (<0.01)	2.4	1.7, 3.2	88.7% (<0.01)
Association of urogenital positivity with anorectal positivity, (PR)*	32.2	25.6, 40.7	70.3% (<0.01)	89.3	53.1, 150.3	80.1% (<0.01)
Excluding Koedijk [13], (PR)	34.5	25.1, 47.4	72.8% (<0.01)	91.0	47.7, 173.8	76.9% (<0.01)
Excluding studies using NG culture diagnostics						
Anorectal positivity, (%)	N/A			2.1	1.6, 2.8	92.7% (<0.01)
Excluding Cosentino [15], Koedijk [13], and Sethupathi [16], (%)	N/A			2.2	1.5, 3.0	92.2% (<0.01)
Association of urogenital positivity with anorectal positivity, (PR)*	N/A			89.3	53.1, 150.3	80.1% (<0.01)
Excluding Koedijk [13] and Sethupathi [16], (PR)	N/A			90.3	45.9, 177.9	78.9% (<0.01)

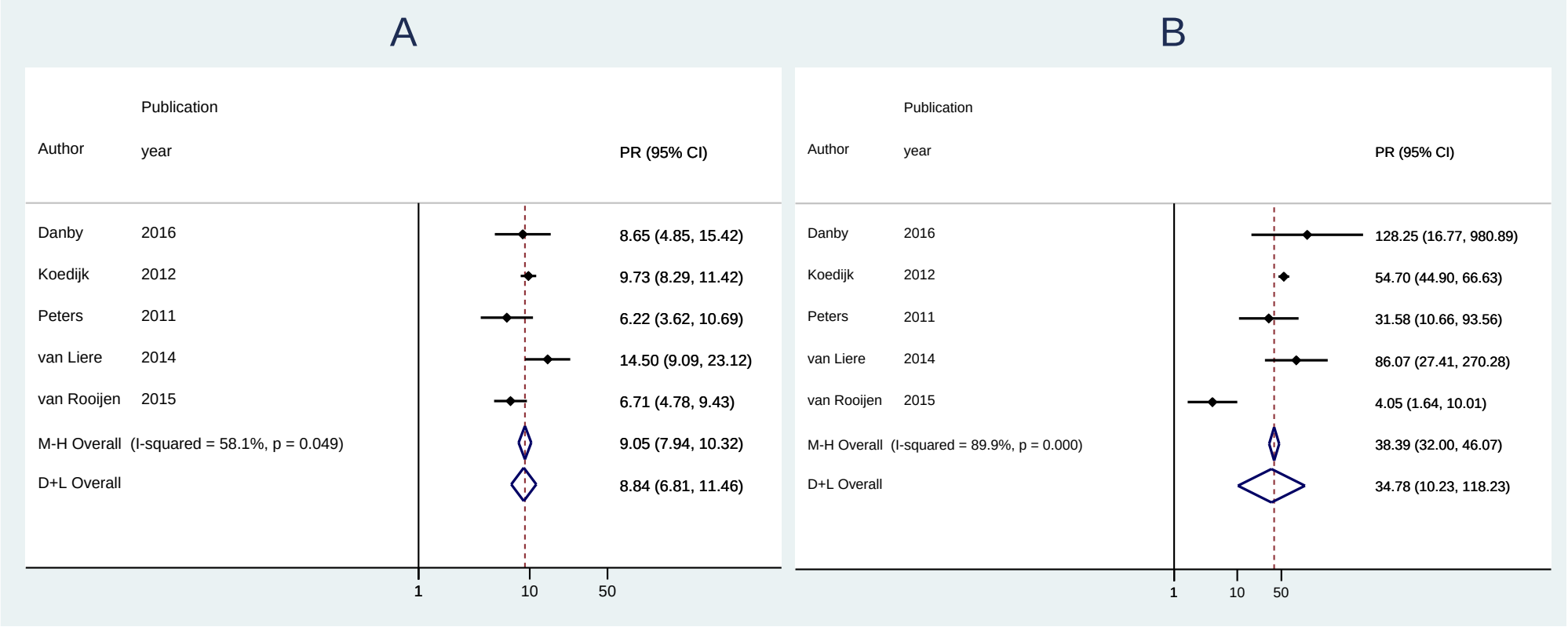
*ES=Effect size, CI=Confidence interval, PR=Prevalence ratio. *= Van Rooijen and Cosentino did not contribute data for the respective PRs. N/A= not applicable as testing for NG only*

Supplementary material 6 – Summary estimate of anorectal positivity only among those tested at both anorectal and urogenital sites



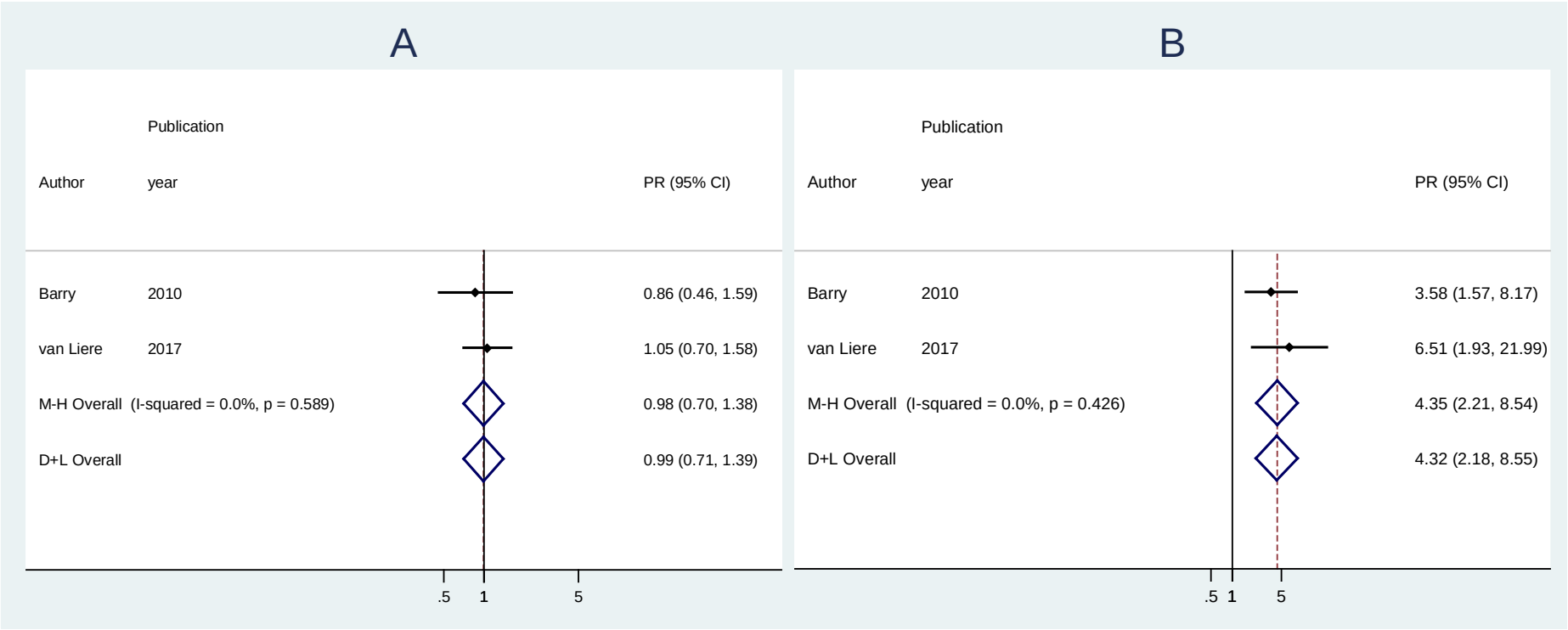
A=Chlamydia trachomatis. *B*=Neisseria gonorrhoeae. *ES=proportion (%) of those testing anorectal positive who are urogenital negative*

Supplementary material 7 – Association of oropharyngeal positivity with anorectal positivity



A=Chlamydia trachomatis. B=Neisseria gonorrhoeae. PR=prevalence ratio (proportion of those who are oropharyngeal positive who are also anorectal positive relative to the proportion of those who are oropharyngeal negative who are also anorectal positive)

Supplementary material 8 – Association of anal intercourse with anorectal positivity



A=Chlamydia trachomatis. B=Neisseria gonorrhoeae, PR=prevalence ratio (proportion of those reporting anal intercourse who are anorectal positive relative to the proportion of those not reporting anal intercourse who are anorectal positive)

Supplementary material 9 – Assessment of study quality and bias - summary

Author, publication year	Selection	Measurement	Confounding and Bias	Statistical methods	Conflict of interests and ethics
Barry, 2010 [19]	++	+	+	+	++
Bazan, 2015 [20]	++	++	+	+	+
Cosentino, 2012 [15]	+++	+/++	+	+	+/++
Danby, 2016 [21]	++	+/++	++	+	++
Dukers-Muijrers, 2015 [30]	++	+	+	+	+
Garner, 2015 [35]	++	++	++	++	+
Hunte, 2010 [22]	++	+	+	++	++
Javanbakht, 2012 [23]	++	+	+	+	+
Koedijk, 2012 [13]	++	+++	++	+	+++
Llata, 2018 [24]	++	+++	+	+	+
Mayer, 2012 [25]	+++	++	+	+	+
Nelson, 2007 [38]	++	+++	+	+	+
Peters, 2011 [31]	++	+	+	+	++
Peters, 2014 [39]	++	+	+	+	+
Rodriguez-Hart, 2012 [26]	+++	+	++	+	+
Sethupathi, 2010 [16]	++	++	++	+	+++
Shaw, 2013 [36]	+++	++	+++	+	+
Stephens, 2014 [27]	++	+	+	+++	+
Tao, 2018 [28]	+	+++	+	+	+
Travassos, 2016 [37]	+++	++	++	+	+
Trebach, 2015 [29]	++	+	++	+	+
van der Helm, 2009 [34]	++	++	+	+	+
van Liere, 2014 [32]	++	++	+	+	+
van Liere, 2017 [33]	++	+	+	+	+
van Rooijen, 2015 [14]	++	+	+	+	+

Abbreviations: + low risk of bias, ++ moderate risk of bias, +++ high risk of bias

Supplementary material

Supplementary material 10 – Assessment of study quality and bias

Author, Year		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) Setting and source population appropriate/defined? *External validity. STI/GUM considered as high-risk population and moderate risk of selection bias* b) Inclusion/exclusion criteria reported or not reported (NR)? c) Representative sample of source population. Consecutive recruitment? d) Characterisation of non-responders (NR, poor, good with difference/no difference)?	Low/Moderate/High
Methods for measuring exposure and outcome variables	a) Appropriate measure of outcome b) and exposure variables? *Diagnostic used, timeframe for RAI*	Low/Moderate/High
Methods to control confounding or bias	a) Appropriate design and/or analytical methods for aim? b) Appropriate methods to address recall/interviewer bias? *Risk factors measurement methodology and potential for measurement error or misclassification*	Low/Moderate/High
Statistical methods	a) Baseline data adequately described? b) Appropriate use of statistics for primary analysis of effect? *Software used, appropriate investigation of risk factors* c) Clear what was used to determine statistical significance/precision? *Confidence intervals and p-values reported where appropriate* d) Sample size calculation reported? e) Statistical methods adequately described for reproducibility?	Low/Moderate/High
Conflict of interest or other	a) Declaration of COI or identification of funding sources? b) Ethical approval and consent of participants attained?	

Supplementary material

Barry, 2010		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion/exclusion NR c) Consecutive "All" d) Non-responders NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 3 months	Low/Moderate
Methods to control confounding or bias	a) Aim to investigate *"whether rectal testing was an effective way to increase case-finding among women and whether reported receptive anal intercourse was a risk factor for rectal infection"* b) *"Providers conduct a standardised interview with the patient"*	Low
Statistical methods	a) Baseline data described b) *"Statistical comparisons used X^2 test and Student t test to assess for statistical significance".* Sensitivity analysis NR c) CIs and p-values reported d) Sample size calculation NR, n=8182 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval NR, consent NR	Moderate

Supplementary material

Bazan, 2015		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion *"all"/"No exclusion criteria applied"* c) Consecutive, all with no exclusions applied d) Non-responders N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 12 months	Moderate
Methods to control confounding or bias	a) Aim to *"determine the prevalence of rectal GC and rectal CT infection among females.."* b) *"..all clinic patients self-administer a paper Sexual Health Assessment that capture demographic and sexual behaviour information.."*	Low
Statistical methods	a) Baseline data described b) Software STATA13, prevalences and log-binomial regression models to compute prevalence ratios. Sensitivity analysis reported. c) CIs and p-values reported d) Sample size calculation NR, n=331 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI reported, funding sources NR b) Ethical approval reported, consent not provided but waiver was granted per U.S. Department of Health and Human services guidelines.	Low

Supplementary material

Cosentino, 2012		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) Health Department, Outpatient or AIDS center *b)* Inclusion *"who reported having had at least one lifetime episode of receptive anal intercourse"*/exclusion *"oral antibiotics in the past 7 days or used a rectal douche or other rectal product in the previous 24 h"* c) Consecutive NR d) Non-responders NR	High
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay)(BD ProbeTec)(Aptima CT/GC), culture b) Receptive anal intercourse – *"at least one lifetime episode"*.	Low/Moderate
Methods to control confounding or bias	a) Aim to *"compare the performance of strand displacement amplification (SDA) to that of transcription mediated amplification for the detection of C. trachomatis from rectal swab samples"* b) *"Participants were asked a series of questions about their age, ethnicity, and sexual activity."*	Low
Statistical methods	a) Baseline data described b) Software: SPSS 17.0.1, Risk factors: Age; Race; Clinic; collection (self vs clinician); current partner gender; rectal symptoms. Sensitivity analysis N/A c) CIs NR, p-values reported d) Sample size calculation NR, n=272 e) Statistical methods reproducible *"P values calculated using chi-square or Fisher's exact test analyses"*	Low
Conflict of interest or other	a) COI NR, funding sources reported b) Ethical approval *"Written informed consent approved by each institutional review board"*, consent attained	Low/Moderate

Supplementary material

Danby, 2016		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STI clinic, outpatient women's health clinic b) Inclusion: lifetime RAI/exclusion: "*oral antibiotics past 7 days, rectal douche or other rectal products in the past 24 hours"* c) Consecutive NR d) Non-responders NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay), Xpert CT/NG assay b) Sexual behaviour - lifetime	Low/Moderate
Methods to control confounding or bias	a) Aim to "determine prevalence of CT and GC in men and women using the same inclusion criteria, namely reporting a lifetime history of RAI" b) *"after written informed consent was obtained, a questionnaire was administered to determine..."*	Moderate
Statistical methods	a) Baseline data described b) *Software: SPSS 22.0, "P-values calculated using Fisher's exact or Mann-Whitney U tests". Venn euler APE* c) CIs NR, p-values reported d) Sample size calculation NR, n=175 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources NR b) Ethical approval attained, consent attained	Moderate

Supplementary material

Dukers-Muijrers, 2015		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STI clinic b) Inclusion "..all patients 18 years and over who visited our STI clinic between August 2010 and October 2013. Exclusion: NR c) Consecutive d) Non-responders: NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (SDA, ProbeTec ET system, Becton Dickinson, MD, USA), PCR (Cobas Amplicor or Cobas 4800; Roche, CA, USA). Positive gonorrhoea confirmed by in-house PCR. b) Sexual behaviour past 3 months	Low
Methods to control confounding or bias	a) Aim to assess the proportion of systemic antibiotic use before screening. Adjustment for age and HIV status b) Antibiotic use by self-report	Low
Statistical methods	a) Baseline data described b) "SPSS package version 20", sensitivity analysis NR c) CIs and p-values reported d) Sample size calculation NR – n= 14775 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI (none) and funding sources (self-funded) reported b) Ethical approval reported (Maastricht University 11-4-108), consent NR	Low

Supplementary material

Garner, 2015		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion "All if reported history of receiving oral or anal sex"/exclusion- NR c) Consecutive d) Non-responders NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour time NR	Moderate
Methods to control confounding or bias	a) Aim to review evidence for change in testing practice. Analytical methods are prevalences. b) Method of collecting demographic/sexual history NR	Moderate
Statistical methods	a) Baseline data described b) Statistical program NR. c) CIs and p-values NR d) Sample size calculation NR – n=649 women, 365 MSM, 553 MSW e) Statistical methods reproducible	Moderate
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval NR, consent NR	Low

Supplementary material

Hunte, 2010		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion all women reporting RAI/exclusion- NR c) Consecutive "All" d) Non-responders - NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 3 months	Low
Methods to control confounding or bias	a) Aim to determine prevalence of rectal CT an NG in women reporting RAI b) Standard DOH STD form	Low
Statistical methods	a) Baseline data described b) SPSS used for analysis. Pearson chi-square test used. Sensitivity analysis NR c) CIs NR. p-values reported. d) Sample size calculation NR – n=97 e) Statistical methods reproducible	Moderate
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval NR, consent NR	Moderate

Supplementary material

Javanbakht, 2012		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion "All women reporting AI in the past 90 days"/exclusion – women not reporting AI c) Consecutive "Retrospective cohort" d) Non-responders	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 90 days	Low
Methods to control confounding or bias	a) Aim "to investigate the prevalence and correlates of rectal STIs among women attending public STD clinics" b) T tests and Mantel-Haenszel chi-squared methods. Hierarchical regression to account for within subject correlation.	Low
Statistical methods	a) Baseline data adequately described b) Software NR. Sensitivity analysis NR c) CIs and p-values reported d) Sample size calculation NR – n= 2084 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI (none) and funding sources reported b) Ethical approval reported, consent NR	Low

Supplementary material

Koedijk, 2012		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinics b) Inclusion: National surveillance data/exclusion – N/A c) Consecutive "All" d) Non-responders – N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (unspecified), culture for NG b) Sexual behaviour past 6 months	High
Methods to control confounding or bias	a) Aim to "analyse prevalence rates based on available surveillance data" b) Recall/interview bias N/A	Moderate
Statistical methods	a) Baseline data described b) Software SAS v9.2. Sensitivity analysis N/A c) CIs and p-values reported – N/A d) Sample size calculation NR – n=206,753 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources NR b) Ethical approval NR, consent NR	High

Supplementary material

Llata, 2018		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD surveillance data b) Inclusion: Visit at which rectal intercourse in the previous 3 months is first reported/exclusion NR c) Consecutive N/A d) Non-responders N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (unspecified) b) Sexual behaviour past 3 months	High
Methods to control confounding or bias	a) Aim "to examine the prevalence and treatment of rectal C trachomatis, N gonorrhoeae among women reporting receptive anal intercourse….and estimate the proportion of missed infections if women were tested at the genital site only." b) Interview methodology NR	Low
Statistical methods	a) Baseline data described b) SAS 9.3 c) CIs and p-values reported N/A - proportions d) Sample size calculation N/A – n=3743 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: "The STD Surveillance Network project was reviewed by the Centers for Disease project and was reviewed by the Centers for Disease Control and Prevention and was determined not to be research, so institutional review board review was not required", consent NR	Low

Supplementary material

Mayer, 2012		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) HIV specialty clinics b) Inclusion reported /exclusion reported in SUN Study Am J Epidemiol. 2009 Mar 1; 169(5):642–652. c) Consecutive d) Non-responders - reported	High
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 6 months	Moderate
Methods to control confounding or bias	a) Aim to "estimate the STD prevalence and incidence and associated risk factors among a diverse sample of HIV-infected patients" b) Computer-assisted self-interview.	Low
Statistical methods	a) Baseline data described b) SAS v9.1. Sensitivity analysis - c) CIs and p-values reported d) Sample size calculation NR – n=119 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval [approved by CDC and each site's review board], consent reported	Low

Supplementary material

Nelson, 2007		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinics b) Inclusion criteria reported/exclusion reported c) Consecutive NR d) Non-responders NR. 122 (25%) refused to participate.	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (PCR, unspecified) b) Sexual behaviour past 3 months	High
Methods to control confounding or bias	a) Aim to "determine the prevalence of STIs in heterosexual couples" b) Participants interviewed privately without partner present.	Low
Statistical methods	a) Baseline data described b) Stata 8.0. Sensitivity analysis? c) CIs and p-values reported d) Sample size calculation NR – n=390 e) Statistical methods reproducible.	Low
Conflict of interest or other	a) COI NR, funding sources reported b) Ethical approval reported, consent reported	Low

Supplementary material

Peters, 2011		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion/exclusion criteria – N/A. All clinic data included c) Consecutive N/A d) Non-responders N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 6 months	Low
Methods to control confounding or bias	a) Aim to "evaluate the contribution of oropharyngeal and anorectal tests to routine endocervical tests for the detection of *C. trachomatis* and *N. gonorrhea* infection..." b) Recall bias N/A. Electronic questionnaire administered at time of consult.	Low
Statistical methods	a) Baseline data described b) SPSS v15.0. Mann-Whitney U test or Chi-square or Fisher exact test. c) CIs reported, and p-values reported NR d) Sample size calculation NR – n=4299 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI NR, funding sources reported b) Ethical approval NR, consent NR	Moderate

Supplementary material

Peters, 2014		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) Primary health care facilities b) Inclusion: all women aged 18-49 who reported being sexually active in the last 6 months/exclusion: refusal to have tests taken at all 3 anatomical sites, or menses on day of recruitment. c) Consecutive NR d) Non-responders NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Presto-PluS CT-NG-TV assay) b) Sexual behaviour past 3 months	Low
Methods to control confounding or bias	a) Aim to "obtain insight into burden of disease of vaginal, rectal and oral, chlamydial and gonococcal infection in women visiting primary health care (PHC) clinics for any indication in South Africa" b) Questionnaire administered	Low
Statistical methods	a) Baseline data described b) SPSS v13.0. Chi-square of Fisher exact test, Mann-Whity U test c) CIs and p-values reported d) Sample size calculation NR – n=604 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: HREC of University of Witwatersrand Ref. M110726, consent reported	Low

Supplementary material

Rodriguez-Hart, 2012		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) Adult film performers in a PHC setting b) Inclusion: employed in adult film production in last 12 months/exclusion c) Consecutive reported d) Non-responders NR	High
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 3 months	Low
Methods to control confounding or bias	a) Aim to estimate the amount of extragenital CT/NG missed by urinary testing alone and assess the prevalence if symptomatic and asymptomatic CT and NG among a sample of adult film performers. b) Interviewer-administered questionnaire	Moderate
Statistical methods	a) Baseline data described b) STATA 9.0. c) CIs and p-values N/A d) Sample size calculation NR – n=112 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: LAC Department of Public Health institutional review board, consent reported	Low

Supplementary material

Sethupathi, 2010		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) GUM clinic b) Inclusion/exclusion N/A. Included "all women who underwent rectal CT testing" c) Consecutive d) Non-responders N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (BD Probe Tec FT SDA and Abbott RealTime CT/NG PCR and culture for rectal NG) b) Sexual behaviour history NR	Moderate
Methods to control confounding or bias	a) Aim to "determine the prevalence of rectal chlamydia in women and to assess the degree of discordance between cervical and rectal results" b) Interview methodology NR	Moderate
Statistical methods	a) Baseline data described b) Statistical software used NR, however, analysis is simple proportions. c) CIs and p-values reported N/A d) Sample size calculation NR – n=154 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources NR b) Ethical approval NR, consent NR	High

Supplementary material

Shaw, 2013		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) GUM clinic b) Inclusion: "offered pharyngeal/rectal NAAT, in addition to endocervical testing, to women as directed by sexual history"/exclusion: NR c) Consecutive NR d) Non-responders NR	High
Methods for measuring exposure and outcome variables	a) NAAT (BD ProbeTec CT/GC Qx Amplified DNA assay) b) Sexual behaviour time NR	Moderate
Methods to control confounding or bias	a) Aim to assess missed oral and rectal infections by not testing these sites despite sexual history b) Interview methodology NR	High
Statistical methods	a) Baseline data reported b) Statistical software NR c) CIs and p-values reported N/A. Analysis was proportions. d) Sample size calculation NR – n=2808 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: Study based on clinic audit data collected as part of service evaluation, consent N/A	Low

Supplementary material

Stephens, 2014		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion" All San Francisco City Clinic patients with at least 1 city between August 2011 and December 31, 2012"/exclusion NR c) Consecutive d) Non-responders: N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 3 months	Low
Methods to control confounding or bias	a) Aim to compare demographics, testing, and risk factors for STD patients with and without self-reported health insurance" b) Data on demographics and risk behaviour collected and maintained on electronic medical record system.	Low
Statistical methods	a) Baseline data described b) *SAS v9.3. Chi-squared and Fisher exact test, Wilcoxon rank sum test.* c) CIs and p-values reported d) Sample size calculation NR – n=24 e) Statistical methods reproducible	High
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval N/A, consent N/A "Because these were de-identified surveillance data used for public health improvement purposes, this study was exempt from human-subjects considerations in accordance with the Code of Federal Regulations, Title 45".	Low

Supplementary material

Tao, 2018		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) Laboratory testing data b) Inclusion/exclusion N/A: "All CT and GC detection tests performed from 1 November 2012 through 20 September 2015" c) Consecutive d) Non-responders N/A – lab data	Low
Methods for measuring exposure and outcome variables	a) NAAT (unspecified) b) Sexual behaviour NR	High
Methods to control confounding or bias	a) Aim to "estimate the frequency and positivity of genital, rectal, and pharyngeal CT and GC tests performed in women" b) No sexual behaviour data analysed.	Low
Statistical methods	a) Baseline data described b) SAS v9.3 c) CIs reported. p-values N/A d) Sample size calculation NR – n=5499 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI reported, and funding sources reported b) Ethical approval: "The study protocol was reviewed and approved by the Institutional Review Board at the CDC", consent NR	Low

Supplementary material

Travassos, 2016		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STI reference centre b) Inclusion: "confirmed HIV-infected patients undergoing treatment...sexually active patients"/exclusion: "Patients who had used antibiotics 30 days before from the appointment, and women with genital bleeding c) Consecutive NR d) Non-responders NR	High
Methods for measuring exposure and outcome variables	a) NAAT (In vitro Diagnostic (IVD), COBAS 4800) b) Sexual behaviour time NR	Moderate
Methods to control confounding or bias	a) Aim to "estimate the prevalence of Chlamydia trachomatis and Neisseria gonorrhoea anal and genital infection in people living with HIV/AIDS" b) Standardised medical interview	Moderate
Statistical methods	a) Baseline data described b) SPSS v20.0. Chi-square twin test, Student's t test for continuous variables. c) CIs and p-values reported d) Sample size calculation NR – n=305 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI reported and funding sources: "Brazilian Department of STD, HIV and Viral Hepatitis, Brazilian Ministry of Health (Project BRA/K57)" b) Ethical approval: "This study was approved by the Ethics Committee of the Meternidade Climério deOliveira/Universidade Federal da Bahia (process 292,413)", consent reported	Low

Supplementary material

Trebach, 2015		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion- "All patients who reported extragenital exposures in the preceding 3 months"/exclusion NR c) Consecutive d) Non-responders – N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 3 months	Low
Methods to control confounding or bias	a) Aim to "examine the prevalence of extragenital GC and CT in women reporting extragenital exposures and to compare these rates to those observed in MSM and MSW" b) "Structured interview"	Moderate
Statistical methods	a) Baseline data described b) STATA 12.1. c) CIs and p-values reported d) Sample size calculation NR – n=602 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: "This analysis was granted approval by the institutional review board of the John Hopkins Medical Institutions", consent NR	Low

Supplementary material

van der Helm, 2009		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion "reported receptive anal intercourse in the past 6 months/exclusion NR c) Consecutive NR d) Non-responders NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Cobas Amplicor, or SDA BD diagnostics) b) Sexual behaviour past 6 months	Moderate
Methods to control confounding or bias	a) Aim to evaluate the validity, feasibility, acceptability of self-collected rectal swabs compared with health care provider-collected rectal swabs" b) Self-questionnaire	Low
Statistical methods	a) Baseline data described b) SPSS 15.0. c) CIs reported, and p-values N/A d) Sample size calculation NR – n=936 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: "The study was permitted by the Medical Ethical Committees of the University of Maastricht and of Academic Medical Center", consent reported "written or verbal"	Low

Supplementary material

van Liere, 2014		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion: "all men who have sex with men…defined as men who had engaged in sex with one or more men in the post 6 months", High-risk womendefined as prostitutes or swingers /exclusion NR c) Consecutive NR d) Non-responders: MSM 5-12%; Swingers 5-9%; Prostitutes 54-75%	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (BD ProbeTec ET, Cobas Amplicor, Cobas 4800) b) Sexual behaviour past 6 months	Moderate
Methods to control confounding or bias	a) Aim to "evaluate the anatomical site distribution of chlamydia and gonorrhoea by performing universal testing at urogenital, anorectal and oropharyngeal site in men who have sex with men and high-risk women". b) Self-questionnaire	Low
Statistical methods	a) Baseline data described b) SPSS v17.0.0 c) CIs NR, p-value <0.05 indicated d) Sample size calculation NR – n=1321 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: "The Medical Ethics Committee of University of Maastricht (METC 11-04-108) approved the study, consent reported	Low

Supplementary material

van Liere, 2017		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic b) Inclusion: all women /exclusion: <16, tested for CT but not NG. c) Consecutive NR d) Non-responders NR	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 3 months	Low
Methods to control confounding or bias	a) Aim to "assess whether current testing guidelines contribute to appropriate chlamydia and gonorrhea" b) Computer-assisted self-interview	Low
Statistical methods	a) Baseline data described b) SPSS v21.0.0. c) CIs and p-values N/A - prevalences d) Sample size calculation NR – n= 950 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: The Medical Ethics Committee of Maastricht University, consent reported	Low

Supplementary material

van Rooijen, 2015		
Domain	**Criteria**	Assessment on risk of bias
Methods for selection of participants	a) STD clinic, data analysis b) Inclusion: high risk women reporting anal intercourse/exclusion NR c) Consecutive NR d) Non-responders N/A	Moderate
Methods for measuring exposure and outcome variables	a) NAAT (Aptima Combo 2 assay) b) Sexual behaviour past 6 months	Low
Methods to control confounding or bias	a) Aim to "investigate pharyngeal *C.trachomatis* RNA prevalence, spontaneous clearance and bacterial DNA load" b) Computer-assisted self-interview	Low
Statistical methods	a) Baseline data described b) SPSS v19, STATA Intercooled V11 c) CIs and p-values reported d) Sample size calculation NR – n=1656 e) Statistical methods reproducible	Low
Conflict of interest or other	a) COI and funding sources reported b) Ethical approval: Medical Ethical Committee of the Academic Medical Centre, consent reported	Low