An update on the performance of STI services for gay and bisexual men across 40 European cities: results from the 2017 European MSM Internet Survey

Jason Doran[1], Peter Weatherburn[3], Ulrich Marcus[2], Ford Hickson[3], David Reid[3], Axel J. Schmidt[3]
[1] London School of Hygiene and Tropical Medicine, London, United Kingdom
[2] Robert Koch Institute, Berlin, Germany
[3] Sigma Research, London School of Hygiene and Tropical Medicine, London, United Kingdom

ABSTRACT

Objectives

Rectal manifestations of sexually transmitted infections (STIs) compromise the health of gay and bisexual men. In 2010, across 40 European cities among men-who-have-sex-with-men (MSM) screened for STIs, the practice of anal swabbing showed wide variation. The highest was reported in London and Amsterdam with rates of more than 72%, but low across most other European cities. Suh In this study, we repeated the comparison of diagnostic procedures for MSM across the same 40 cities, in order to see if in 2017 improvements have been achieved and the gap between London/Amsterdam and other European cities has narrowed.

Methods

We used data from the European MSM Internet Survey (EMIS-2017), a sexual health survey that was accessible online in 33 languages from 10/2017 to 01/2018. As sexual healthcare for MSM in most countries is organised locally, we chose cities for comparison and focus on a sub-sample of 38,439 men living the same 40 European cities. We applied multivariable regression models to compare the odds of having received anal swabbing in the 12 months, controlling for age, HIV diagnosis, and the number of sexual partners.

Results

In 2017, the proportion of respondents tested for STIs in the previous 12 months in the absence of symptoms ranged from under 19% in Belgrade to over 59% in London. At individual level, compared to London, the Adjusted Odds Ratio (AOR) for having received anal swabbing ranged from 0.02 in Belgrade, Bucharest, and Istanbul to 0.80 in Oslo, whilst there is little evidence for a difference in Amsterdam and Dublin. Many Western European cities have substantially narrowed their performance gap to London, but many Eastern European cities have widened the gap even further since 2010.

Conclusions

Although comprehensive STI-screening in gay and other MSM has increased across many European cities, rectal STIs continue to be under-diagnosed, particularly in Eastern Europe.

Introduction

In the majority of European cities, anal/genital warts, syphilis and rectal gonorrhoeal/chlamydial infections were found to be profoundly underdiagnosed in gay, bisexual and other men who have sex with men (MSM) (reference 2013 EMIS STI Paper). Such underdiagnoses, perpetuated by lack of anal swabbing and inspection during STI screenings, can severely compromise the sexual health of MSM by increasing the risk of HIV infection. Routine screening of MSM with multiple sexual partners is required for early detection of asymptomatic sexually transmitted infections (STIs). Comprehensive screening should include both specimen collection as well as physical examination of the genitals and anus, in order to avoid missed infections. Diagnostic services and healthcare provisions for STIs exist differently across European countries. They can be delivered in private practices, genitourinary medicine (GUM) clinics, specialised STI services within hospitals, dermatology clinics and municipal health offices.

In 2017, we repeated the MSM internet survey across Europe to compare the performance and components of STI screening and services used by MSM across the same 40 cities we used in 2010. In this paper, we examine the data collected from each city and compare it to the results found in 2010 to observe changes in STI testing for MSM across Europe.

Methods

The detailed methods of European MSM Internet Survey (EMIS) have been reported elsewhere. In summary, EMIS-2017 was a multi-language, internet-based, self-completion survey for men-who-have-sex- with-men living in Europe and a limited number of countries outside Europe (Canada, Israel, Lebanon & The Philippines). The survey was designed to indicate the levels and distributions of sexual health outcomes, risk and precaution behaviours, health promotion needs and the coverage (or uptake) of interventions. The survey was available in 33 languages across 50 countries. Participants were recruited through trans-national dating apps (PlanetRomeo, Grindr, Hornet, etc.) and more than 230 social media or dating websites for MSM. Typical completion time was 20 min (calculated from the precise completion time for each survey and auto-captured by the survey software). No financial incentives were given. No IP addresses were collected. The survey was accessible online from 18 October 2017 to 31 January 2018. More background information, including the English version of the questionnaire, is available at www.emis-2017.eu.

Measures

All participants who identify as male were asked about their access to STI testing and the time since their last STI test. Men who had tested in the last 12 months were asked about the presence or absence of symptoms at their last STI test, and which of the six diagnostic procedures were used (blood test, urine sample, penile/vaginal examination, urethral swab, anal examination, anal swab). Questions were phrased in plain language to avoid specialist medical terms.

Disclosure of MSM status was defined as men who reported that their healthcare provider during their last STI test ‘definitely knew’ that they had sex with men.

STI screening was defined as the last STI test being in the absence of symptoms. The six procedures were collapsed into four: blood test was defined as having ‘provided a blood sample’; genital test was having had ‘provided a urine sample’ or ‘something inserted into

your penis/vagina'; inspection was defined as having had 'your penis/vagina' and 'your anus examined'; and anal swab was defined as having had 'something inserted into the anus (anal swab)'.

Statistical Analysis

To compare across cities the odds of undergoing the four procedures, we applied four individual-level multivariable logistic regression analyses (SPSS V.25., IBM Corporation, New York, USA) with stepwise inclusion of variables, controlling for age (<25; 25–39; ≥40), HIV diagnosis (diagnosed positive vs untested/last test negative) and number of sexual partners (0; 1; 2-5; 6-10; >10) to ensure that the differences in intervention performance observed between cities were not confounded by differences in numbers of sexual partners in the respective sub-samples. In recognition that STI testing in most countries is organised at a city level, we chose cities and not countries as units of comparison in the multivariable logistic regression analyses, choosing London as the reference. European cities were defined by self-reported postal code or sub-region of residence, combined with settlement size. The same forty large (500,000 inhabitants or more) European cities or country capitals as in 2010 were included in the analysis. We also provide the same measures on 65 additional cities across Europe, Canada, Lebanon, Israel, the Philippines (and Brazil?) in an annex.

Results

Respondents

Data in this paper came from 38,439 respondents who lived in the 40 European cities shown in table 1. All are: men; above the age of sexual consent in their European country of residence; having sex with men and/or sexually attracted to men; and who passed the internal data validity checks. They represent 28.0% of all EMIS qualifiers (N=137,358). A total of x(x%) lived in other large European cities (either not reaching 300 respondents per city, or residing in the German cities of Frankfurt, Stuttgart, Leipzig, Hannover, Dusseldorf, Essen, Dresden, Leipzig or Nuremberg, all excluded for the sake of balance, but which appear in the annex); 90,306(51.8%) lived in settlements with less than 500 000 inhabitants; and x (x%) declined questions on region/postal code or settlement size.

Across the groups living in different cities, there was substantial variation in age, diagnosed HIV, and numbers of sexual partners (*table 1*).

Disclosure of having sex with men

In the majority of cities, men reported high levels of disclosing having sex with men to their healthcare provider when being tested. Disclosure of same-sex sexual contacts ranged from 93.9% in London to 18.8% in Tallinn. The city median proportion of disclosure was 81% (IQR: 57%-88%). Disclosure was 88% or above in Amsterdam, Berlin, Birmingham, Copenhagen, Dublin, London, Manchester, Munich, Oslo, Stockholm and Zurich. All other cities had disclosure rates below the upper quartile.

STI Screening and diagnostic procedures

STI screening (in the last 12 months) ranged from 18.8% in Belgrade to 59.1% in London (city median 43%). As in 2010, the most common diagnostic procedure was a blood test (featured in more than 82% of screenings in all cities (median 94%).

Diagnostic approaches to detect bacterial infections of the male urethra were less common (median 60%, IQR: 43%-76%). Less than 43% of screens in Athens, Belgrade, Bucharest,

Budapest, Kiev, Ljubljana, Milan, Rome, Sofia, Valencia and Warsaw included a genital test (urethral swab or urine sample). Only in Amsterdam, Birmingham, Dublin, Helsinki, London, Manchester, Oslo, Stockholm, and Tallinn were genital tests as common as blood tests, ranging from 79.5% to 95.8%. The city median proportion reporting a physical inspection of the anus and penis/vagina was 13% and varied from 3.8% in Warsaw to 32.4% in Helsinki. The city median for the proportion of screens that included an anal swab was 29.2% and varied from 5.9% in Bucharest and less than 10% in Athens, Belgrade, Riga, Sofia, and Warsaw, to more than 70% in Birmingham, Dublin, London, Manchester, Oslo and Stockholm, and up to 86.3% in Amsterdam.

Multivariable logistic regression analyses

In multivariable logistic regression analysis, the adjusted odds for receiving the four diagnostic procedures (without the condition of being screened) increased steadily with the number of sexual partners in the past 12 months and were up to five times higher for men diagnosed with HIV. When compared with men aged 25–39 years, younger and older men were less likely to report any STI testing (*table 1*).

Blood test

When adjusting for the previously described variables, the odds of receiving a blood test in the last 12 months did not differ greatly between Amsterdam and London. In all other cities, men were less likely to have received a blood test (median AOR=0.48). Cities with AORs at or below the median were Athens, Bucharest, Budapest, Cologne/Bonn, Hamburg, Helsinki, Istanbul, Kiev, Lisbon, Milan, Munich, Porto, Prague, Rome, Sofia, St Petersburg, Tallinn, Turin, Valencia, Vienna and Warsaw, and was least common in Belgrade (AOR=0.14).

Genital test

As with blood tests, minimal differences in the adjusted odds ratio were observed between London and Amsterdam for men receiving a genital test. In all other cities, men were less likely to have received a genital test (median AOR=0.22). Cities with AORs at or below the median were Athens, Bucharest, Budapest, Cologne/Bonn, Hamburg, Istanbul, Kiev, Ljubljana, Madrid, Milan, Munich, Porto, Prague, Riga, Rome, Sofia, Turin, Valencia Vienna and Warsaw, and was least common in Belgrade (AOR=0.06).

Inspection

When compared with London, the adjusted odds ratio for receiving a genital/anal inspection were higher in Amsterdam, Birmingham, Copenhagen, Helsinki, Manchester, and Stockholm. In Dublin, men were almost twice as likely to have their genitals/anus inspected than in London (AOR=1.74). In all other cities, men were less likely to have received a penile and anal inspection (median AOR=0.54). The city where men were least likely to receive a genital/inspection in comparison to London is Warsaw (AOR=0.15).

Anal swab

The adjusted odds rate for receiving an anal swab were higher than London for men in Amsterdam. In all other cities, men were less likely to have received anal swabbing (median AOR=0.14). Cities with AORs at or below the median were Athens, Budapest, Cologne/Bonn, Kiev, Lisbon, Madrid, Milan, Moscow, Porto, Prague, Riga, Rome, Sofia, St. Petersburg, Tallinn, Valencia and Warsaw, and was least common in Belgrade, Bucharest and Istanbul (AOR=0.02).

In summary, offering anal swabs for the detection of rectal bacterial STIs and physical inspections of penis and anus were best in UK cities, Dublin, Amsterdam, Oslo and Stockholm, followed by Copenhagen, Ljubljana and Zurich. An intermediate performance was reported from Berlin, Munich and Turin.
As in 2010, poor performance could be demonstrated for a culturally and geographically diverse spectrum of cities such as Belgrade, Brussels, Istanbul, Lisbon, Paris, Sofia, Tallinn and Warsaw.

Comparison with EMIS 2010

MSM reporting STI screening has increased since 2010 in all cities except Belgrade. In comparison with 2010, the percentage of men who received a blood test increased in 29 cities, decreasing only in Athens, Belgrade, Budapest, Kiev, Lisbon, Milan, Moscow, Riga, St. Petersburg, Tallinn and Turin. There was also an increase in men receiving a genital test, with a decrease in 2017 just 13 cities; Birmingham, Bucharest, Helsinki, Kiev, Lisbon, Ljubljana, Manchester, Moscow, Riga, Rome, St. Petersburg, Stockholm and Warsaw. The percentage of men receiving an inspection decreased from 2010 to 2017 in all but 8 cities; Barcelona, Belgrade, Berlin, Brussels, Lyon, Munich, Paris and Valencia. In contrast, the percentage of men receiving an anal swab decreased only in Athens, Bucharest, Kiev, Moscow, Riga, Sofia, St. Petersburg and Tallinn, with an increase seen in all other 32 cities. A visual representation of these changes can be seen in figure 1, where cities below the grey triangle represent a decrease since 2010, while cities within the grey triangle represent an increase since 2010.

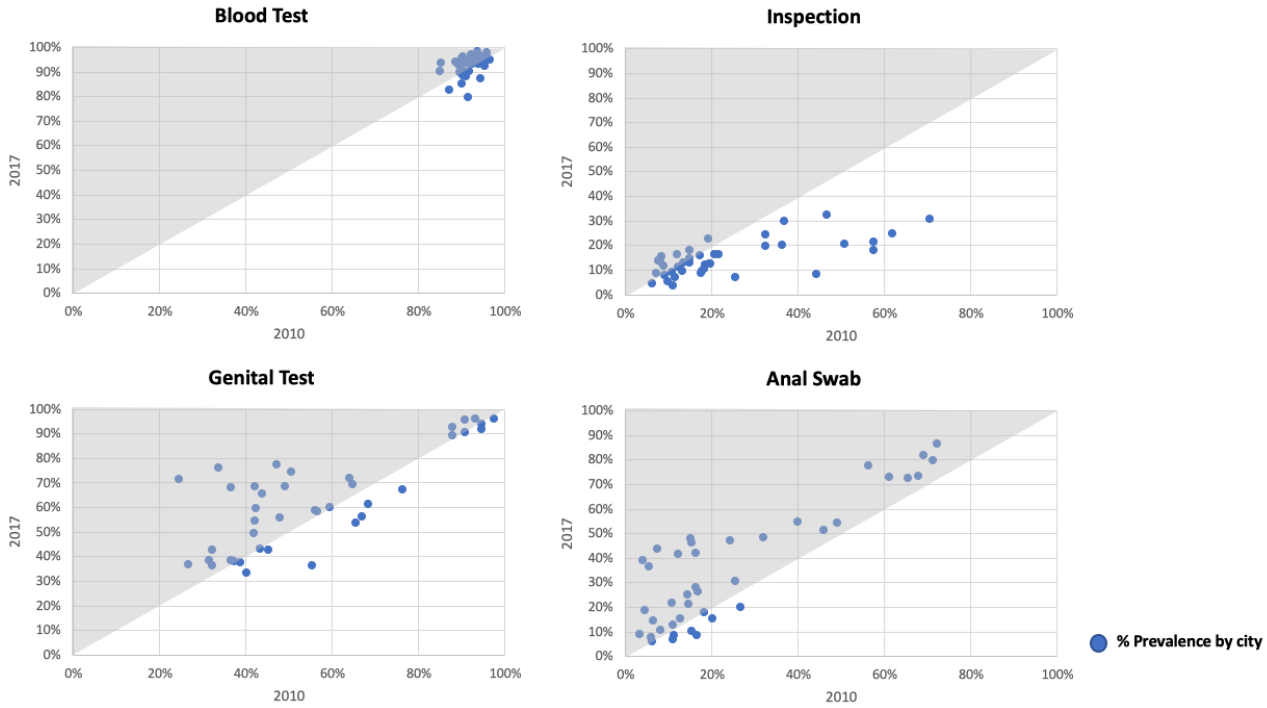

Table 1 **City Profiles and Individual-level multivariable logistic regression**

	N	Age		Diagnosed HIV	>10 Sexual Partners	Disclosure of MSM Status	Screening	Blood Test		Genital Test		Inspection		Anal Swab	
City	**N**	**%<25**	**%40+**	**%**	**%**	**%**	**%**	**%**	**AOR (95% CI)**	**%**	**AOR (95% CI)**	**%**	**AOR (95% CI)**	**%**	**AOR (95% CI)**
Amsterdam	786	5.2	63.4	19.9	45.4	91.8	58.0	97.8	0.94 (0.78-1.13)	92.8	0.81 (0.68-0.97)	21.3	1.04 (0.83-1.30)	86.3	1.13 (0.95-1.34)
Athens	1413	14.9	31.1	14.2	32.3	57.0	36.4	93.0	0.36 (0.31-0.42)	38.3	0.10 (0.08-0.12)	14.8	0.57 (0.46-0.72)	8.6	0.03 (0.03-0.04)
Barcelona	1571	13.9	34.6	18.9	44.0	79.5	50.0	94.0	0.68 (0.59-0.78)	68.2	0.36 (0.31-0.41)	16.5	0.70 (0.58-0.85)	41.4	0.24 (0.21-0.28)
Belgrade	437	19.0	22.0	8.5	21.5	47.7	18.8	87.3	0.14 (0.11-0.19)	36.7	0.06 (0.04-0.08)	13.9	0.30 (0.18-0.49)	8.9	0.02 (0.01-0.04)
Berlin	3190	8.3	45.8	19.7	40.4	90.0	45.5	95.1	0.52 (0.46-0.59)	68.4	0.29 (0.26-0.33)	22.6	0.94 (0.81-1.10)	47.0	0.26 (0.23-0.29)
Birmingham	256	20.7	37.1	10.2	27.0	89.7	49.6	93.6	0.68 (0.52-0.90)	96.0	0.69 (0.53-0.91)	20.0	1.11 (0.76-1.62)	77.6	0.71 (0.54-0.95)
Brussels	724	7.6	46.3	14.5	47.8	76.8	55.1	96.7	0.73 (0.61-0.88)	68.5	0.35 (0.29-0.42)	8.7	0.33 (0.24-0.47)	36.7	0.19 (0.16-0.23)
Bucharest	628	28.8	18.9	8.8	25.7	29.1	42.3	89.8	0.41 (0.34-0.50)	42.6	0.14 (0.11-0.17)	4.3	0.18 (0.11-0.30)	5.9	0.02 (0.01-0.04)
Budapest	1086	18.8	25.0	7.0	26.5	61.8	33.2	92.4	0.34 (0.29-0.40)	38.6	0.11 (0.09-0.14)	12.6	0.53 (0.41-0.69)	15.5	0.07 (0.05-0.09)
Cologne	848	10.4	47.8	17.6	35.7	87.2	43.7	93.6	0.48 (0.41-0.57)	55.7	0.21 (0.18-0.25)	12.9	0.46 (0.35-0.62)	24.9	0.12 (0.09-0.15)
Copenhagen	689	9.9	48.2	17.1	38.2	88.5	42.9	96.2	0.54 (0.45-0.65)	69.4	0.34 (0.28-0.41)	24.3	1.21 (0.95-1.53)	54.9	0.38 (0.31-0.46)
Dublin	910	16.9	27.8	8.4	31.2	93.2	52.9	96.6	0.83 (0.71-0.99)	95.8	0.82 (0.69-0.96)	30.7	1.74 (1.42-2.12)	81.7	0.90 (0.78-1.08)
Hamburg	969	8.5	48.3	14.4	31.8	86.5	39.3	94.8	0.39 (0.33-0.46)	65.5	0.21 (0.18-0.25)	12.6	0.43 (0.33-0.58)	46.3	0.21 (0.18-0.26)
Helsinki	498	9.2	45.0	8.3	29.5	67.5	35.0	94.1	0.35 (0.28-0.43)	90.6	0.33 (0.27-0.41)	32.4	1.26 (0.95-1.65)	54.1	0.26 (0.21-0.33)
Istanbul	858	28.2	16.1	12.8	38.4	35.6	31.3	94.6	0.21 (0.18-0.26)	49.6	0.09 (0.07-0.11)	9.7	0.23 (0.16-0.34)	10.5	0.02 (0.02-0.03)
Kiev	471	31.8	14.9	15.3	24.9	45.2	47.4	82.6	0.47 (0.38-0.59)	36.2	0.14 (0.11-0.18)	12.8	0.55 (0.38-0.80)	10.1	0.04 (0.03-0.06)
Lisbon	873	14.9	33.6	17.6	40.5	73.7	46.5	90.1	0.48 (0.41-0.57)	56.1	0.23 (0.19-0.27)	9.2	0.39 (0.29-0.52)	21.7	0.10 (0.08-0.12)
Ljubljana	269	18.2	26.4	7.5	19.7	80.3	47.5	95.2	0.67 (0.51-0.88)	33.3	0.13 (0.10-0.19)	7.1	0.41 (0.24-0.72)	48.4	0.34 (0.26-0.47)
London	2627	10.0	46.1	14.7	40.4	93.9	59.1	96.1	1.00 (Ref.)	96.0	1.00 (Ref.)	18.2	1.00 (Ref.)	79.5	1.00 (Ref)
Lyon	516	22.3	36.2	10.9	51.7	73.9	52.8	95.9	0.80 (0.65-0.99)	71.5	0.43 (0.35-0.53)	13.5	0.74 (0.55-0.98)	39.0	0.24 (0.20-0.31)
Madrid	2304	18.5	28.1	14.0	38.6	67.3	45.2	96.2	0.60 (0.53-0.68)	54.6	0.22 (0.19-0.25)	11.3	0.51 (0.42-0.62)	21.2	0.10 (0.08-0.11)
Manchester	398	18.6	34.2	12.8	34.2	91.2	50.1	92.8	0.78 (0.62-0.99)	93.8	0.81 (0.64-1.02)	20.5	1.38 (1.03-1.83)	72.3	0.77 (0.61-0.97)
Milan	1117	10.9	43.3	12.3	38.5	71.3	41.5	94.7	0.42 (0.36-0.49)	36.5	0.10 (0.09-0.12)	7.1	0.26 (0.19-0.36)	12.9	0.05 (0.04-0.06)
Moscow	2031	20.3	15.6	18.2	29.4	20.8	44.5	88.1	0.54 (0.47-0.61)	61.3	0.29 (0.25-0.33)	16.2	0.66 (0.55-0.81)	18.0	0.07 (0.06-0.08)
Munich	1005	9.1	44.2	13.0	33.3	84.5	41.9	92.6	0.40 (0.34-0.47)	59.6	0.20 (0.17-0.24)	18.1	0.64 (0.51-0.83)	42.2	0.19 (0.16-0.23)
Oslo	1044	16.2	36.7	7.0	25.5	93.1	50.6	93.2	0.82 (0.70-0.96)	89.1	0.72 (0.62-0.84)	8.1	0.50 (0.38-0.56)	73.1	0.77 (0.68-0.94)
Paris	2284	10.6	48.2	16.3	52.6	69.8	55.9	95.6	0.75 (0.66-0.85)	76.2	0.43 (0.38-0.48)	11.6	0.46 (0.38-0.56)	43.8	0.25 (0.22-0.29)
Porto	279	21.1	26.9	14.4	32.6	63.8	41.5	90.9	0.35 (0.27-0.46)	58.2	0.17 (0.13-0.23)	5.5	0.18 (0.09-0.38)	14.5	0.04 (0.02-0.07)
Prague	807	18.1	21.9	10.9	25.4	83.0	39.2	98.4	0.45 (0.38-0.54)	59.9	0.21 (0.17-0.25)	12.2	0.48 (0.36-0.66)	28.0	0.13 (0.11-0.17)
Riga	163	13.5	27.0	13.0	21.5	34.9	44.1	88.7	0.50 (0.36-0.71)	53.5	0.22 (0.15-0.32)	8.5	0.36 (0.17-0.74)	8.5	0.03 (0.02-0.07)
Rome	1020	9.3	47.5	12.8	37.6	66.4	35.3	93.7	0.31 (0.26-0.36)	43.0	0.11 (0.09-0.13)	9.7	0.28 (0.20-0.39)	26.5	0.08 (0.07-0.11)
Sofia	629	21.9	15.4	7.8	24.8	25.3	31.5	90.1	0.33 (0.27-0.40)	38.0	0.12 (0.10-0.15)	7.8	0.31 (0.20-0.46)	6.8	0.03 (0.02-0.04)
St. Petersburg	964	25.8	14.3	15.0	24.8	24.5	40.4	85.1	0.48 (0.41-0.57)	67.3	0.33 (0.28-0.39)	19.9	0.91 (0.72-1.14)	19.9	0.07 (0.06-0.10)
Stockholm	1263	6.2	59.8	9.7	23.6	88.9	43.4	94.5	0.57 (0.49-0.66)	91.9	0.53 (0.45-0.61)	24.8	1.18 (0.97-1.44)	73.3	0.61 (0.53-0.71)
Tallinn	126	16.7	29.4	4.0	19.0	18.8	32.2	79.5	0.26 (0.18-0.40)	74.4	0.23 (0.15-0.35)	10.3	0.40 (0.17-0.92)	15.4	0.05 (0.02-0.11)
Turin	340	14.4	45.0	11.9	34.4	80.9	36.8	93.4	0.32 (0.25-0.42)	71.9	0.22 (0.17-0.29)	29.8	0.96 (0.68-1.35)	51.2	0.23 (0.17-0.30)
Valencia	422	23.0	29.4	11.2	34.0	65.7	38.5	96.8	0.48 (0.38-0.60)	42.9	0.14 (0.11-0.18)	15.4	0.54 (0.37-0.79)	18.6	0.08 (0.06-0.11)
Vienna	1120	15.1	35.0	10.1	31.7	79.6	38.5	94.2	0.42 (0.36-0.49)	58.9	0.21 (0.18-0.25)	16.4	0.66 (0.52-0.83)	30.4	0.14 (0.11-0.17)
Warsaw	939	19.2	17.1	12.8	29.8	58.7	37.3	96.2	0.39 (0.33-0.46)	37.8	0.10 (0.08-0.12)	3.8	0.15 (0.10-0.23)	7.9	0.02 (0.02-0.04)
Zurich	565	5.3	49.9	14.7	42.1	89.8	48.5	93.3	0.61 (0.50-0.75)	77.5	0.40 (0.33-0.49)	16.1	0.64 (0.47-0.86)	47.9	0.31 (0.25-0.38)

Control variables for multivariable logistic regression analysis			Blood Test	Genital Test	Inspection	Anal Swab
			AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
	Age	<25	0.70 (0.65-0.74)	0.73 (0.68-0.78)	0.89 (0.79-1.00)	0.82 (0.75-0.89)
		25-39	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
		40+	0.66 (0.63-0.70)	0.71 (0.67-0.75)	0.90 (0.83-0.98)	0.64 (0.60-0.68)
	HIV Diagnosis	Yes	3.67 (3.41-3.96)	3.05 (2.85-3.26)	2.18 (2.00-2.37)	2.54 (2.36-2.74)
		No	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Number of sexual partners in the past 12 months	None	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
		1	1.07 (0.96-1.18)	0.94 (0.83-1.05)	0.83 (0.68-1.01)	0.86 (0.74-1.01)
		2-5	1.96 (1.78-2.14)	1.80 (1.62-1.99)	1.24 (1.04-1.46)	1.76 (1.54-2.01)
		6-10	3.05 (2.77-3.36)	2.61 (2.35-2.91)	1.53 (1.28-1.82)	2.82 (2.46-3.23)
		>10	5.49 (5.01-5.99)	4.56 (4.13-5.03)	2.73 (2.32-3.20)	4.99 (4.39-5.66)

Discussion

Comprehensive, accessible and non-judgmental healthcare and diagnostic services, where MSM feel comfortable disclosing their sexuality, are imperative to the battle against STIs. This study demonstrates the move towards such a MSM-focused healthcare model since 2010 across the 40 European cities but highlights the need for continued improvement.

Over ten years have passed since the Ljubljana Gay Health Meeting in 2008, where a call for more accessible, voluntary and anonymous HIV/STI testing services for MSM across Europe was made. This study found MSM disclosure to be high in the majority of cities, with a city median disclosure rate of over 80%. However, disclosure remained low across Eastern Europe, with the lowest reports being in Tallinn, Moscow, St. Petersburg, Sofia, Bucharest, Kiev and Riga. Such homophobic climates continue to exist and hinder the widespread efforts made by non-governmental lesbian, gay, bisexual and trans and HIV/AIDS organisations. Conversely and as expected, more liberal societies, such as London, Oslo, Dublin, Amsterdam and Berlin, which offer the MSM community more protections, show higher rates of disclosure. These findings highlight the need for more inclusive rights and protections for MSM which would allow them to feel more comfortable “coming out” to their healthcare provider and thus tailoring their STI test according to their sexual activities.

As found in 2010, STI screening rates reported in 2017 varied considerably by city but have significantly increased. This positive finding suggests awareness of current services may have increased. Furthermore, an increase in MSM-targeted diagnostic services (E.g. Checkpoint) has occurred in many European cities which may be responsible for increased testing in the MSM community.

To ensure the correct diagnosis and treatment of STIs in MSM occurs, screening must include a combination of blood tests, genital tests, anal swabbing and physical inspection. Similar to 2010, this study found that blood tests were performed almost universally during an STI screen. It is thus likely that STIs which are diagnosed using blood-based tests, such as syphilis, are The proportion of men who report having had their anus swabbed during their last STI test has increased since 2010 across the majority of the 40 cities. Conversely, the proportion who reported having an inspection has decreased considerable from 2010. The advent of self-testing/swabbing may provide the answer to this disparity. In the UK, more and more clinics allow men to perform their own rectal and pharyngeal swab. Whilst this increases efficiency and comfort to the users, it reduces the opportunity for a medic to inspect their anus and/or genitals. Adequate diagnosis of manifestations of viral infections such as anal or genital warts and herpes can only be achieved when both the genitals and anus are inspected. Whilst the improvement in rates of anal swabbing can potentially increase the diagnosis of rectal gonorrhoea, the decrease in inspection perpetuates the under-diagnosis of anal/genital warts, allowing them to fester and spread to others.

Limitations

The self-reported data collected in EMIS-2017 is subject to recall bias (plus an element of social-desirability bias, believed to be negligible in this analysis). The four diagnostic procedures are constructs based on the questions about what was done as part of STI testing; thus, the validity of what is called, for example, a genital test may be questioned. However, our pre-testing of the survey in a variety of languages showed that the non-medical language was appropriate and understood by respondents.

Due to the absence of denominator studies and sampling frames, representative random samples of MSM are impossible, so we rely on convenience samples. However, the Law of Large Numbers suggests that for the larger city samples, the range is adequately represented. In this analysis, we compared performance of STI testing for MSM between cities, controlling only for variables likely to reflect recruitment biases (age composition, prevalence of diagnosed HIV, number of sexual partners in the past 12 months). MSM populations in different European cities also differ with respect to migration status, sexual identity, outness, gay community attachment and the degree of legal, societal and institutional homophobia. Although all these variables were substantially and significantly associated with the presented outcomes, we did not include them in the multivariable regression models, because they would mask the differences between cities. Nevertheless, they all contribute not only to the degree to which MSM are reached by targeted information, what they know about STI transmission or where and how frequently to present for STI testing, but also to the likelihood of disclosing their homosexual activity in the context of STI testing.

Conclusion

The majority of the 40 European cities have made great progress towards more acceptable MSM STI testing services. However, poor disclosure and testing procedures remain in some cities, particularly in Eastern Europe.

The data presented and the needed improvements presented in the present study suggest that the call for improved attitudes towards sexual diversity in the healthcare system is still warranted. Although the increase in anal swabbing is welcomed, this must not be accompanied by reduced inspection, allowing infections to remain undetected.

Our data suggest that there is a trend towards more inclusivity of MSM in STI diagnostic services but that anal and genital warts remain unacceptably underdiagnosed amongst MSM.

Annex 1

Annex 1

	Respondents	Age		HIV diagnosis	>10 sexual partners	Disclosure of MSM Status	Screened		Blood test		Genital Test		Inspection		Anal Swab
City (By Country)	**N**	**<25 (%)**	**>40 (%)**	**%**	**%**	**%**	**%**	**%**	**AOR (95% CI)**	**%**	**AOR (95% CI)**	**%**	**AOR (95% CI)**	**%**	**AOR (95% CI)**
Austria															
Vienna	1120	15.1	35.0	10.1	31.7	79.6	38.5	94.2	0.42 (0.36-0.49)	58.9	0.21 (0.18-0.25)	16.4	0.66 (0.52-0.83)	30.4	0.14 (0.11-0.17)
Belarus															
Minsk	244	32.4	10.7	6.2	20.9	18.7	37.2	91.0	0.51 (0.38-0.68)	68.5	0.34 (0.25-0.45)	11.2	0.47 (0.27-0.81)	19.1	0.07 (0.05-0.12)
Belgium															
Antwerp	206	3.9	55.3	26.0	44.2	91.2	59.7	99.2	1.20 (0.85-1.69)	70.8	0.46 (0.33-0.63)	11.7	0.52 (0.31-0.84)	29.2	0.15 (0.10-0.22)
Brussels	724	7.6	46.3	14.5	47.8	76.8	55.1	96.7	0.73 (0.61-0.88)	68.5	0.35 (0.29-0.42)	8.7	0.33 (0.24-0.47)	36.7	0.19 (0.16-0.23)
Bulgaria															
Sofia	629	21.9	15.4	7.8	24.8	25.3	31.5	90.1	0.33 (0.27-0.40)	38.0	0.12 (0.10-0.15)	7.8	0.31 (0.20-0.46)	6.8	0.03 (0.02-0.04)
Canada															
Calgary	288	15.3	38.9	9.5	32.3	87.0	60.0	97.1	1.21 (0.91-1.60)	95.3	1.12 (0.85-1.48)	40.9	2.77 (2.08-3.69)	62.6	0.65 (0.50-0.84)
Edmonton	251	19.9	31.5	5.2	23.9	77.0	55.6	98.6	1.21 (0.91-1.62)	94.9	1.04 (0.79-1.38)	26.1	1.90 (1.36-2.66)	42.8	0.39 (0.29-0.52)
Montreal	485	16.3	36.5	10.8	36.5	91.8	62.3	95.6	1.12 (0.90-1.40)	95.3	1.10 (0.88-1.37)	41.6	2.88 (2.28-3.62)	68.6	0.73 (0.59-0.90)
Ottawa–Gatineau	258	14.7	44.2	8.6	34.9	92.9	50.8	93.8	0.77 (0.59-1.02)	86.8	0.65 (0.49-0.85)	25.6	0.67 (0.44-1.02)	44.2	0.30 (0.22-0.41)
Toronto	849	11.7	47.8	13.0	39.0	90.2	55.4	96.3	0.90 (0.76-1.08)	90.6	0.78 (0.66-0.93)	22.2	1.15 (0.92-1.43)	39.9	0.26 (0.21-0.31)
Vancouver	876	10.5	42.9	14.0	34.1	88.9	63.8	96.7	1.33 (1.11-1.59)	94.1	1.20 (1.01-1.44)	19.2	1.06 (0.85-1.33)	57.6	0.58 (0.49-0.68)
Winnipeg	133	5.2	49.6	9.8	25.8	94.2	43.8	100.0	0.69 (0.47-1.00)	94.7	0.61 (0.42-0.88)	43.9	0.31 (0.15-0.68)	61.4	0.41 (0.27-0.61)
Croatia															
Zagreb	432	34.0	17.8	6.5	14.8	59.7	36.8	83.3	0.43 (0.34-0.54)	42.3	0.17 (0.13-0.22)	7.1	0.36 (0.22-0.59)	19.9	0.11 (0.08-0.16)
Cyprus															
Nicosia	107	13.1	34.6	17.8	35.5	46.3	42.2	93.0	0.44 (0.28-0.67)	27.9	0.08 (0.05-0.14)	14.0	0.34 (0.15-0.80)	14.0	0.06 (0.03-0.11)
Czech Republic															
Prague	807	18.1	21.9	10.9	25.4	83.0	39.2	98.4	0.45 (0.38-0.54)	59.9	0.21 (0.17-0.25)	12.2	0.48 (0.36-0.66)	28.0	0.13 (0.11-0.17)
Denmark															
Copenhagen	689	9.9	48.2	17.1	38.2	88.5	42.9	96.2	0.54 (0.45-0.65)	69.4	0.34 (0.28-0.41)	24.3	1.21 (0.95-1.53)	54.9	0.38 (0.31-0.46)
Estonia															
Tallinn	126	16.7	29.4	4.0	19.0	18.8	32.2	79.5	0.26 (0.18-0.40)	74.4	0.23 (0.15-0.35)	10.3	0.40 (0.17-0.92)	15.4	0.05 (0.02-0.11)
France															
Bordeaux	311	21.5	36.3	9.0	40.2	63.0	47.2	93.8	0.62 (0.48-0.80)	58.3	0.26 (0.20-0.34)	5.6	0.28 (0.16-0.49)	31.9	0.15 (0.11-0.20)
Lille	236	23.3	34.3	13.7	47.9	72.5	50.4	94.8	0.69 (0.52-0.93)	72.4	0.38 (0.28-0.50)	20.7	0.53 (0.26-1.08)	37.9	0.22 (0.16-0.30)
Lyon	516	22.3	36.2	10.9	51.7	73.9	52.8	95.9	0.80 (0.65-0.99)	71.5	0.43 (0.35-0.53)	13.5	0.74 (0.55-0.98)	39.0	0.24 (0.20-0.31)
Marseille	221	19.0	47.5	15.9	46.2	71.2	52.6	96.5	0.73 (0.54-0.99)	73.5	0.40 (0.30-0.54)	17.7	0.36 (0.22-0.59)	56.6	0.40 (0.30-0.54)
Montpellier	202	20.3	37.6	9.5	41.1	68.5	54.4	97.2	0.76 (0.55-1.04)	74.5	0.43 (0.31-0.58)	6.6	0.88 (0.55-1.41)	27.4	0.15 (0.10-0.21)
Nantes	189	25.9	32.8	7.0	47.6	63.9	54.3	91.0	0.69 (0.50-0.96)	62.0	0.31 (0.23-0.43)	10.0	0.07 (0.03-0.20)	28.0	0.15 (0.10-0.22)
Nice	193	8.8	53.9	17.8	45.6	68.1	55.0	95.2	0.64 (0.46-0.89)	55.8	0.23 (0.17-0.32)	17.3	0.43 (0.27-0.69)	32.7	0.18 (0.12-0.26)
Paris	2284	10.6	48.2	16.3	52.6	69.8	55.9	95.6	0.75 (0.66-0.85)	76.2	0.43 (0.38-0.48)	11.6	0.46 (0.38-0.56)	43.8	0.25 (0.22-0.29)
Strasbourg	179	21.2	39.1	14.0	36.5	68.4	56.5	91.6	0.79 (0.56-1.12)	68.4	0.43 (0.31-0.60)	4.2	1.15 (0.92-1.43)	12.6	0.07 (0.04-0.11)
Toulouse	285	17.9	41.4	11.1	41.8	60.8	54.8	93.5	0.75 (0.57-0.98)	66.7	0.36 (0.27-0.46)	9.2	1.06 (0.85-1.33)	30.7	0.18 (0.13-0.24)
Finland															

Helsinki	498	9.2	45.0	8.3	29.5	67.5	35.0	94.1	0.35 (0.28-0.43)	90.6	0.33 (0.27-0.41)	32.4	1.26 (0.95-1.65)	54.1	0.26 (0.21-0.33)
Germany															
Berlin	3190	8.3	45.8	19.7	40.4	90.0	45.5	95.1	0.52 (0.46-0.59)	68.4	0.29 (0.26-0.33)	22.6	0.94 (0.81-1.10)	47.0	0.26 (0.23-0.29)
Bremen	154	13.6	46.1	10.0	26.1	83.3	32.9	95.7	0.28 (0.19-0.41)	48.9	0.11 (0.07-0.18)	17.0	0.46 (0.23-0.91)	42.6	0.15 (0.09-0.24)
Cologne	848	10.4	47.8	17.6	35.7	87.2	43.7	93.6	0.48 (0.41-0.57)	55.7	0.21 (0.18-0.25)	12.9	0.46 (0.35-0.62)	24.9	0.12 (0.09-0.15)
Dresden	234	17.5	31.2	6.9	25.6	85.1	30.9	97.2	0.36 (0.26-0.48)	69.0	0.21 (0.15-0.28)	16.9	0.52 (0.31-0.88)	53.5	0.23 (0.16-0.32)
Düsseldorf	278	12.2	48.2	11.6	33.1	89.7	36.8	93.9	0.33 (0.25-0.43)	52.5	0.13 (0.09-0.18)	15.2	0.49 (0.31-0.79)	31.3	0.13 (0.09-0.18)
Frankfurt	491	6.5	48.7	17.8	36.9	82.1	39.2	92.8	0.33 (0.26-0.41)	67.8	0.21 (0.17-0.26)	13.9	0.41 (0.28-0.60)	16.1	0.06 (0.04-0.08)
Hanover	232	10.8	46.6	6.1	20.7	86.4	29.9	90.9	0.32 (0.23-0.43)	53.0	0.15 (0.11-0.21)	16.7	0.65 (0.39-1.08)	30.3	0.14 (0.09-0.21)
Leipzig	308	17.2	30.8	10.8	21.1	86.0	30.8	95.7	0.33 (0.25-0.43)	77.2	0.25 (0.19-0.32)	15.2	0.67 (0.44-1.02)	51.1	0.23 (0.17-0.31)
Munich	1005	9.1	44.2	13.0	33.3	84.5	41.9	92.6	0.40 (0.34-0.47)	59.6	0.20 (0.17-0.24)	18.1	0.64 (0.51-0.83)	42.2	0.19 (0.16-0.23)
Nuremberg	164	15.2	40.2	12.3	39.0	82.5	30.1	97.9	0.25 (0.17-0.36)	70.2	0.17 (0.12-0.25)	19.1	0.55 (0.36-0.86)	51.1	0.13 (0.09-0.21)
Ruhr Region	412	14.6	39.8	8.0	25.0	83.6	29.3	94.0	0.28 (0.22-0.36)	53.8	0.14 (0.11-0.19)	15.4	0.34 (0.15-0.80)	25.6	0.09 (0.07-0.13)
Stuttgart	287	9.4	44.9	13.4	33.8	87.7	36.6	95.0	0.37 (0.28-0.48)	72.0	0.22 (0.17-0.29)	19.0	1.44 (0.88-2.34)	39.0	0.16 (0.12-0.22)
Greece															
Athens	1413	14.9	31.1	14.2	32.3	57.0	36.4	93.0	0.36 (0.31-0.42)	38.3	0.10 (0.08-0.12)	14.8	0.57 (0.46-0.72)	8.6	0.03 (0.03-0.04)
Thessaloniki	422	23.2	22.5	10.7	28.2	51.9	32.0	88.5	0.29 (0.23-0.37)	40.5	0.09 (0.07-0.12)	15.3	0.58 (0.39-0.84)	7.6	0.03 (0.02-0.05)
Hungary															
Budapest	1086	18.8	25.0	7.0	26.5	61.8	33.2	92.4	0.34 (0.29-0.40)	38.6	0.11 (0.09-0.14)	12.6	0.53 (0.41-0.69)	15.5	0.07 (0.05-0.09)
Ireland															
Dublin	910	16.9	27.8	8.4	31.2	93.2	52.9	96.6	0.83 (0.71-0.99)	95.8	0.82 (0.69-0.96)	30.7	1.74 (1.42-2.12)	81.7	0.90 (0.78-1.08)
Israel															
Tel Aviv	687	16.7	24.3	8.2	50.4	75.9	50.9	97.3	0.63 (0.52-0.76)	86.4	0.48 (0.40-0.57)	3.3	0.13 (0.07-0.21)	5.9	0.02 (0.02-0.04)
Italy															
Bologna	404	9.7	49.5	15.8	40.1	58.4	43.8	93.1	0.43 (0.34-0.54)	53.4	0.17 (0.13-0.21)	10.3	0.33 (0.21-0.52)	17.8	0.08 (0.05-0.11)
Florence	218	10.1	55.0	10.6	38.5	51.2	32.2	95.6	0.29 (0.21-0.40)	42.6	0.10 (0.07-0.15)	13.2	0.37 (0.20-0.67)	22.1	0.06 (0.04-0.10)
Genoa	172	14.0	46.5	7.1	37.4	29.2	30.3	94.0	0.28 (0.20-0.40)	40.0	0.08 (0.05-0.13)	4.0	0.20 (0.08-0.48)	4.0	0.02 (0.01-0.05)
Milan	1117	10.9	43.3	12.3	38.5	71.3	41.5	94.7	0.42 (0.36-0.49)	36.5	0.10 (0.09-0.12)	7.1	0.26 (0.19-0.36)	12.9	0.05 (0.04-0.06)
Naples	205	19.5	37.6	5.4	34.8	47.6	24.6	89.4	0.19 (0.14-0.29)	31.9	0.07 (0.04-0.10)	12.8	0.41 (0.28-0.60)	17.0	0.04 (0.02-0.07)
Palermo	114	17.5	42.1	5.4	23.7	42.1	30.9	100.0	0.31 (0.20-0.48)	29.4	0.06 (0.03-0.12)	2.9	0.32 (0.24-0.42)	2.9	0.01 (0.00-0.05)
Rome	1020	9.3	47.5	12.8	37.6	66.4	35.3	93.7	0.31 (0.26-0.36)	43.0	0.11 (0.09-0.13)	9.7	0.28 (0.20-0.39)	26.5	0.08 (0.07-0.11)
Turin	340	14.4	45.0	11.9	34.4	80.9	36.8	93.4	0.32 (0.25-0.42)	71.9	0.22 (0.17-0.29)	29.8	0.96 (0.68-1.35)	51.2	0.23 (0.17-0.30)
Latvia															
Riga	163	13.5	27.0	13.0	21.5	34.9	44.1	88.7	0.50 (0.36-0.71)	53.5	0.22 (0.15-0.32)	8.5	0.36 (0.17-0.74)	8.5	0.03 (0.02-0.07)
Lebanon															
Beirut	111	20.7	9.9	12.7	35.1	60.0	40.0	90.5	0.29 (0.19-0.45)	45.2	0.10 (0.06-0.17)	19.0	0.53 (0.26-1.08)	9.5	0.04 (0.02-0.09)
Lithuania															
Vilnius	190	26.8	20.5	9.0	16.4	23.8	21.2	89.5	0.14 (0.09-0.21)	50.0	0.07 (0.05-0.12)	18.4	0.31 (0.15-0.68)	10.5	0.02 (0.01-0.05)
Malta															
Valetta	122	8.2	32.8	11.6	34.4	95.5	48.7	94.8	0.54 (0.36-0.80)	89.7	0.50 (0.34-0.74)	31.0	1.44 (0.88-2.34)	72.4	0.52 (0.35-0.78)
Moldova															
Chisinau	373	44.0	9.9	7.5	38.2	76.7	46.2	97.6	0.46 (0.36-0.59)	10.9	0.03 (0.02-0.04)	2.4	0.07 (0.03-0.20)	2.4	0.01 (0.00-0.02)
Netherlands															
Amsterdam	786	5.2	63.4	19.9	45.4	91.8	58.0	97.8	0.94 (0.78-1.13)	92.8	0.81 (0.68-0.97)	21.3	1.04 (0.83-1.30)	86.3	1.13 (0.95-1.34)
Den Haag	124	8.9	55.6	18.5	48.4	88.9	54.8	95.6	0.69 (0.47-1.04)	97.1	0.70 (0.47-1.04)	8.8	0.30 (0.14-0.65)	86.8	0.88 (0.60-1.29)
Rotterdam	216	5.1	56.0	22.3	44.4	92.4	57.3	99.2	1.24 (0.88-1.73)	95.1	1.05 (0.76-1.46)	11.5	2.88 (2.28-3.62)	84.4	1.20 (0.88-1.64)

Norway															
Oslo	1044	16.2	36.7	7.0	25.5	93.1	50.6	93.2	0.82 (0.70-0.96)	89.1	0.72 (0.62-0.84)	8.1	0.50 (0.38-0.56)	73.1	0.77 (0.68-0.94)
Philippines															
Manila	1430	30.4	12.2	9.7	16.3	73.4	17.2	90.3	0.12 (0.10-0.15)	52.3	0.07 (0.06-0.08)	19.8	0.32 (0.24-0.42)	15.6	0.03 (0.02-0.04)
Poland															
Gdańsk	201	30.3	16.9	6.0	17.9	42.6	30.1	86.2	0.25 (0.18-0.35)	24.1	0.06 (0.04-0.09)	0.0	0.04 (0.01-0.28)	1.7	0.01 (0.00-0.03)
Kraków	341	28.7	10.3	8.8	26.4	29.3	29.1	95.8	0.29 (0.23-0.38)	28.1	0.07 (0.05-0.10)	6.3	0.23 (0.12-0.42)	5.2	0.02 (0.01-0.04)
Łódź	132	36.4	13.6	3.8	18.2	33.3	22.9	96.7	0.26 (0.17-0.38)	20.0	0.05 (0.03-0.09)	6.7	0.28 (0.16-0.49)	16.7	0.03 (0.01-0.08)
Poznań	225	28.0	13.8	6.7	22.9	30.0	27.6	91.7	0.28 (0.20-0.38)	26.7	0.06 (0.04-0.09)	1.7	0.47 (0.27-0.81)	6.7	0.02 (0.01-0.04)
Warsaw	939	19.2	17.1	12.8	29.8	58.7	37.3	96.2	0.39 (0.33-0.46)	37.8	0.10 (0.08-0.12)	3.8	0.15 (0.10-0.23)	7.9	0.02 (0.02-0.04)
Wrocław	282	14.9	11.3	7.8	20.6	54.0	35.8	95.9	0.419 (0.32-0.55)	24.5	0.08 (0.06-0.12)	5.1	0.36 (0.22-0.59)	6.1	0.02 (0.01-0.05)
Portugal															
Lisbon	873	14.9	33.6	17.6	40.5	73.7	46.5	90.1	0.48 (0.41-0.57)	56.1	0.23 (0.19-0.27)	9.2	0.39 (0.29-0.52)	21.7	0.10 (0.08-0.12)
Porto	279	21.1	26.9	14.4	32.6	63.8	41.5	90.9	0.35 (0.27-0.46)	58.2	0.17 (0.13-0.23)	5.5	0.18 (0.09-0.38)	14.5	0.04 (0.02-0.07)
Romania															
Bucharest	628	28.8	18.9	8.8	25.7	29.1	42.3	89.8	0.41 (0.34-0.50)	42.6	0.14 (0.11-0.17)	4.3	0.18 (0.11-0.30)	5.9	0.02 (0.01-0.04)
Russia															
Krasnodar	122	34.4	12.3	9.0	29.5	14.3	40.8	77.6	0.34 (0.23-0.51)	73.5	0.28 (0.19-0.42)	18.4	0.66 (0.35-1.25)	20.4	0.07 (0.03-0.12)
Moscow	2031	20.3	15.6	18.2	29.4	20.8	44.5	88.1	0.54 (0.47-0.61)	61.3	0.29 (0.25-0.33)	16.2	0.66 (0.55-0.81)	18.0	0.07 (0.06-0.08)
Novosibirsk	109	32.1	13.8	10.2	19.3	16.7	34.3	97.3	0.34 (0.23-0.52)	83.8	0.31 (0.20-0.47)	21.6	0.23 (0.12-0.42)	21.6	0.06 (0.03-0.12)
Samara	123	26.0	15.4	14.6	20.3	7.4	34.2	85.4	0.34 (0.23-0.51)	63.4	0.22 (0.14-0.33)	17.1	0.58 (0.39-0.84)	9.8	0.03 (0.01-0.07)
St. Petersburg	964	25.8	14.3	15.0	24.8	24.5	40.4	85.1	0.48 (0.41-0.57)	67.3	0.33 (0.28-0.39)	19.9	0.91 (0.72-1.14)	19.9	0.07 (0.06-0.10)
Yekaterinburg	173	13.9	15.6	13.0	18.5	18.0	40.2	88.2	0.47 (0.33-0.66)	69.1	0.33 (0.24-0.48)	17.6	0.11 (0.04-0.30)	19.1	0.08 (0.05-0.13)
Serbia															
Belgrade	437	19.0	22.0	8.5	21.5	47.7	18.8	87.3	0.14 (0.11-0.19)	36.7	0.06 (0.04-0.08)	13.9	0.30 (0.18-0.49)	8.9	0.02 (0.01-0.04)
Slovakia															
Bratislava	410	17.1	13.9	4.6	15.9	47.2	26.2	94.1	0.23 (0.18-0.30)	44.1	0.11 (0.08-0.14)	14.7	0.36 (0.22-0.59)	16.7	0.05 (0.03-0.08)
Slovenia															
Ljubljana	269	18.2	26.4	7.5	19.7	80.3	47.5	95.2	0.67 (0.51-0.88)	33.3	0.13 (0.10-0.19)	7.1	0.41 (0.24-0.72)	48.4	0.34 (0.26-0.47)
Spain															
Barcelona	1571	13.9	34.6	18.9	44.0	79.5	50.0	94.0	0.68 (0.59-0.78)	68.2	0.36 (0.31-0.41)	16.5	0.70 (0.58-0.85)	41.4	0.24 (0.21-0.28)
Madrid	2304	18.5	28.1	14.0	38.6	67.3	45.2	96.2	0.60 (0.53-0.68)	54.6	0.22 (0.19-0.25)	11.3	0.51 (0.42-0.62)	21.2	0.10 (0.08-0.11)
Sevilla & Málaga	400	25.5	27.8	14.1	31.3	65.6	39.9	96.8	0.54 (0.42-0.68)	56.5	0.24 (0.19-0.30)	12.3	0.13 (0.07-0.21)	23.4	0.11 (0.08-0.15)
Valencia	422	23.0	29.4	11.2	34.0	65.7	38.5	96.8	0.48 (0.38-0.60)	42.9	0.14 (0.11-0.18)	15.4	0.54 (0.37-0.79)	18.6	0.08 (0.06-0.11)
Zaragoza	134	20.7	34.3	5.2	30.6	50.0	26.7	97.1	0.313 (0.21-0.46)	54.3	0.17 (0.11-0.26)	2.9	0.52 (0.31-0.84)	5.7	0.02 (0.01-0.07)
Sweden															
Gothenburg	362	9.1	50.0	2.8	21.3	79.7	33.2	86.3	0.33 (0.25-0.42)	85.5	0.32 (0.25-0.42)	16.2	0.55 (0.36-0.86)	55.6	0.28 (0.21-0.36)
Stockholm	1263	6.2	59.8	9.7	23.6	88.9	43.4	94.5	0.57 (0.49-0.66)	91.9	0.53 (0.45-0.61)	24.8	1.18 (0.97-1.44)	73.3	0.61 (0.53-0.71)
Switzerland															
Geneva	304	14.8	43.8	11.2	36.8	87.4	51.8	95.5	0.73 (0.56-0.94)	75.5	0.45 (0.35-0.58)	9.7	0.43 (0.27-0.69)	46.5	0.28 (0.22-0.37)
Zurich	565	5.3	49.9	14.7	42.1	89.8	48.5	93.3	0.61 (0.50-0.75)	77.5	0.40 (0.33-0.49)	16.1	0.64 (0.47-0.86)	47.9	0.31 (0.25-0.38)
Turkey															
Ankara	243	39.5	8.2	9.1	32.4	19.8	30.6	95.8	0.25 (0.18-0.33)	39.4	0.07 (0.05-0.11)	4.2	0.11 (0.04-0.30)	5.6	0.01 (0.01-0.03)
Istanbul	858	28.2	16.1	12.8	38.4	35.6	31.3	94.6	0.21 (0.18-0.26)	49.6	0.09 (0.07-0.11)	9.7	0.23 (0.16-0.34)	10.5	0.02 (0.02-0.03)
Izmir	162	38.3	12.3	8.7	31.1	28.0	27.1	88.1	0.17 (0.12-0.25)	38.1	0.07 (0.04-0.11)	9.5	0.17 (0.06-0.46)	4.8	0.01 (0.00-0.04)
United Kingdom															

Birmingham	256	20.7	37.1	10.2	27.0	89.7	49.6	93.6	0.68 (0.52-0.90)	96.0	0.69 (0.53-0.91)	20.0	1.11 (0.76-1.62)	77.6	0.71 (0.54-0.95)
Brighton	179	14.5	55.9	19.8	35.8	98.2	53.4	89.4	0.78 (0.55-1.09)	97.9	0.99 (0.71-1.40)	17.0	0.88 (0.55-1.41)	83.0	1.12 (0.80-1.56)
Bristol	172	20.3	32.6	7.6	26.2	89.0	55.6	91.6	0.82 (0.59-1.15)	94.7	0.90 (0.64-1.25)	16.8	0.93 (0.57-1.52)	76.8	0.87 (0.62-1.21)
Cardiff	111	21.6	35.1	8.1	36.9	93.8	48.6	92.5	0.59 (0.39-0.90)	96.2	0.70 (0.46-1.05)	18.9	0.79 (0.42-1.46)	84.9	0.81 (0.54-1.23)
Edinburgh	213	21.1	33.3	9.4	36.2	95.8	49.8	99.0	0.71 (0.52-0.96)	95.1	0.61 (0.45-0.83)	11.8	0.54 (0.32-0.92)	91.2	0.92 (0.68-1.25)
Glasgow	230	17.4	28.3	4.8	28.7	93.8	49.8	98.2	0.75 (0.56-1.00)	95.5	0.70 (0.53-0.94)	11.6	0.57 (0.34-0.95)	75.0	0.67 (0.50-0.90)
Leeds	182	18.1	35.2	8.3	22.0	88.1	46.1	93.9	0.73 (0.53-1.02)	92.7	0.72 (0.52-0.99)	28.0	1.85 (1.25-2.75)	74.4	0.77 (0.56-1.07)
Liverpool	119	26.1	31.9	6.7	24.4	90.2	45.7	92.5	0.57 (0.38-0.85)	98.1	0.63 (0.43-0.94)	43.4	0.33 (0.21-0.52)	75.5	0.69 (0.46-1.03)
London	2627	10.0	46.1	14.7	40.4	93.9	59.1	96.1	1.00 (Ref.)	96.0	1.00 (Ref.)	18.2	1.00 (Ref.)	79.5	1.00 (Ref)
Manchester	398	18.6	34.2	12.8	34.2	91.2	50.1	92.8	0.78 (0.62-0.99)	93.8	0.81 (0.64-1.02)	20.5	1.38 (1.03-1.83)	72.3	0.77 (0.61-0.97)
Ukraine															
Kiev	471	31.8	14.9	15.3	24.9	45.2	47.4	82.6	0.47 (0.38-0.59)	36.2	0.14 (0.11-0.18)	12.8	0.55 (0.38-0.80)	10.1	0.04 (0.03-0.06)