

Update on Sexually Transmitted Infections in Toronto

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Epidemiology

- Epidemiology is the study of the causes, distribution and frequency of disease
- “Who gets the disease and why?”
- Useful to find out the agent responsible, how it is transmitted, contributing factors, geographic spread
- Useful in the planning and delivery of health services and programs

Three Essential Characteristics

- Person

- Age, gender, ethnicity, risk taking behaviour, diet, exercise, socioeconomic status

- Place

- Climate, population density

- Time

- Calendar time, time since an event, seasonality

The Epidemiologic Triangle

- Agent
 - Necessary for disease to occur
 - Biological, physical or chemical
- Host
 - Personal behaviours, genetic predisposition, immunologic factors
- Environment
 - External conditions, physical or social (eg. Access to condoms)

Rates

- Numerator
 - The number of people to whom something happened (ie. The number who got chlamydia)

- Denominator
 - The population at risk (all the people at risk)

Prevalence Rate

- Prevalence = the number of existing cases divided by the total population
- Prevalence describes a group at a certain point in time, it is like a snapshot of an existing situation
- For HIV, this would equal everyone ever diagnosed with HIV minus those who have died from the disease divided by the population

Incidence Rate

- Incidence = the number of new cases in a given period of time divided by the total population at risk
- Incidence describes the rate of development of a disease over a period of time
- For chlamydia, this would be the number of new cases diagnosed within a year (this is usually an underestimate of the true incidence as not everyone infected gets diagnosed)

Bias

- A deviation in the results from the truth
- Can be due to a systematic error in testing, data collection, analysis or interpretation
- Eg. A particular group of people may be tested less often for STIs leading us to underestimate the incidence of disease in that group

Interpreting Changing Rates

- Need to sort out if the change is a true change of the disease rate or an artefact
- true increase means more people are being infected
- artefactual increase means more people are being tested or we have a better test or there has been an increase in reporting, these types of increases are still important for program and service delivery planning

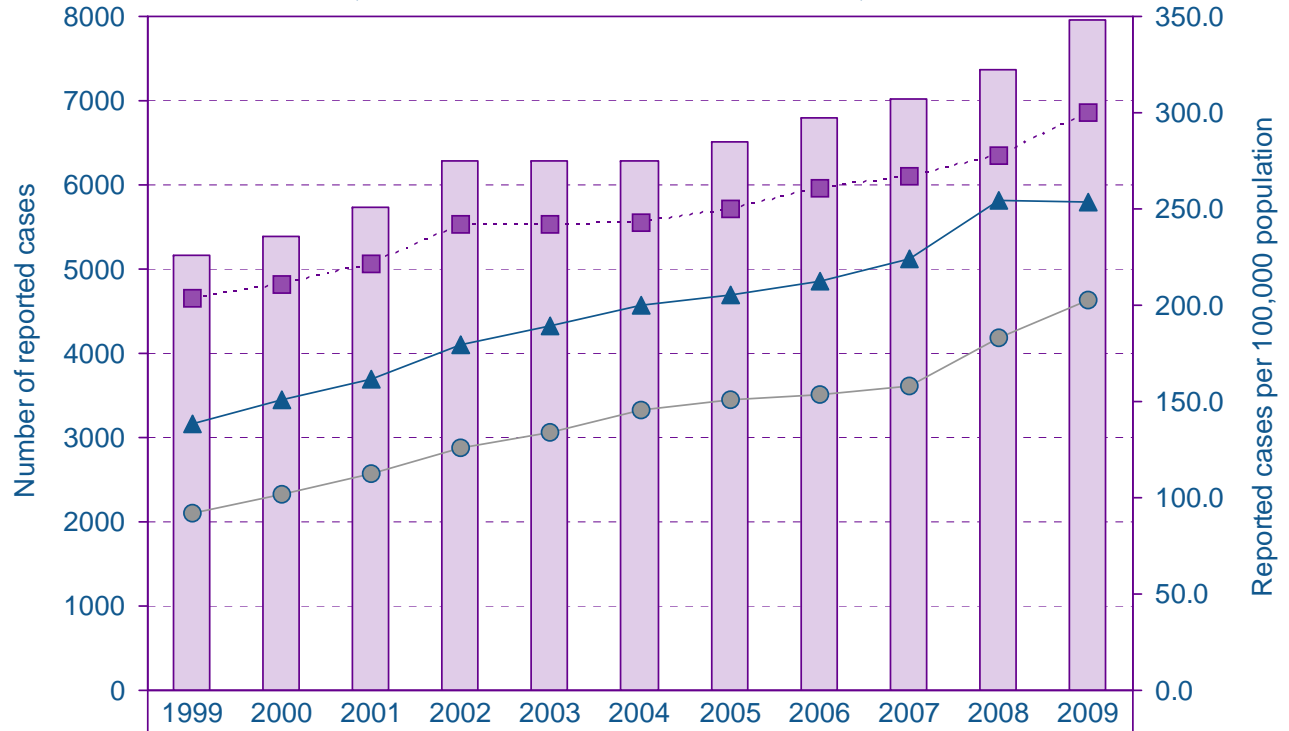
- chlamydia trachomatis
 - chancroid
 - congenital CMV
 - HIV/AIDS
 - neonatal herpes
 - ophthalmia neonatorum
 - syphilis
 - Gonorrhea
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- Please note that all data included in the presentation is preliminary and subject to change

Reportable Sexually Transmitted Infections, Toronto, 2009

Chlamydia	7950	72 %
Gonorrhea	1475	13 %
Syphilis, (infectious)	578	5 %
HIV	509	5 %
Syphilis late latent	447	4 %
AIDS	56	<1%
Congenital CMV	2	<1%
Herpes, neonatal	2	<1 %

- Chlamydia trachomatis infection manifests in males primarily as urethritis (discharge, itching or burning on urination) and may be asymptomatic in up to 50% of men
- In women, it manifests as a cervical infection (discharge) and may be asymptomatic in up to 75% of women, complications include pelvic inflammatory disease and infertility
- Newborns can develop eye infections or pneumonia

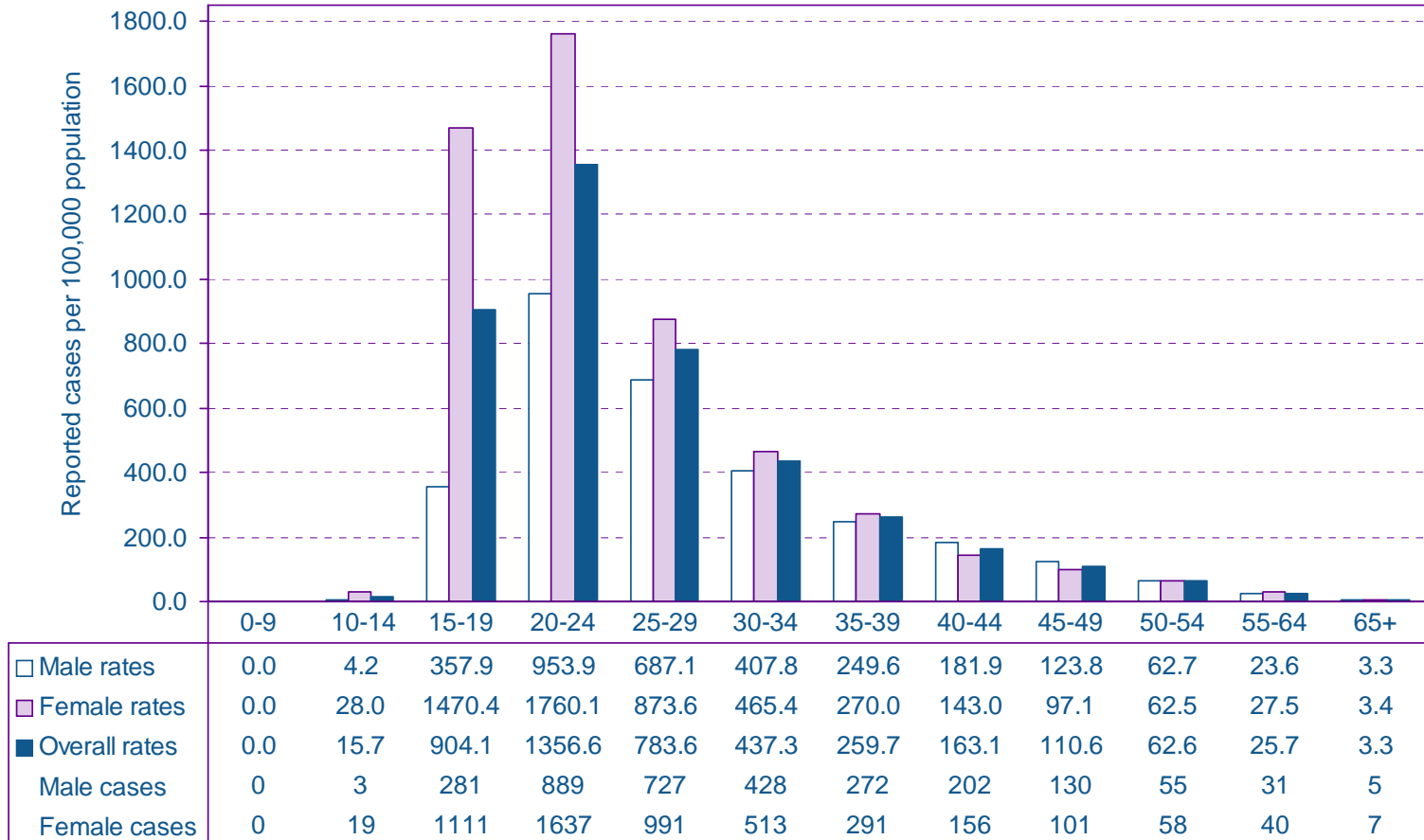
**Figure 1.1: Incidence of chlamydia by year.
Toronto, the rest of Ontario and Canada, 1999 - 2009**



 Toronto cases	5158	5380	5728	6293	6284	6293	6501	6800	7023	7372	7950
 Toronto rates	203.9	211.0	221.7	241.7	242.0	242.6	250.2	260.5	267.1	278.0	299.8
 Ontario less Toronto rates	91.7	102.0	112.9	126.0	133.6	145.5	150.9	153.8	158.3	182.6	203.0
 Canada rates	138.2	150.9	161.4	179.4	189.4	200.2	205.6	212.4	224.4	254.7	253.6

Year

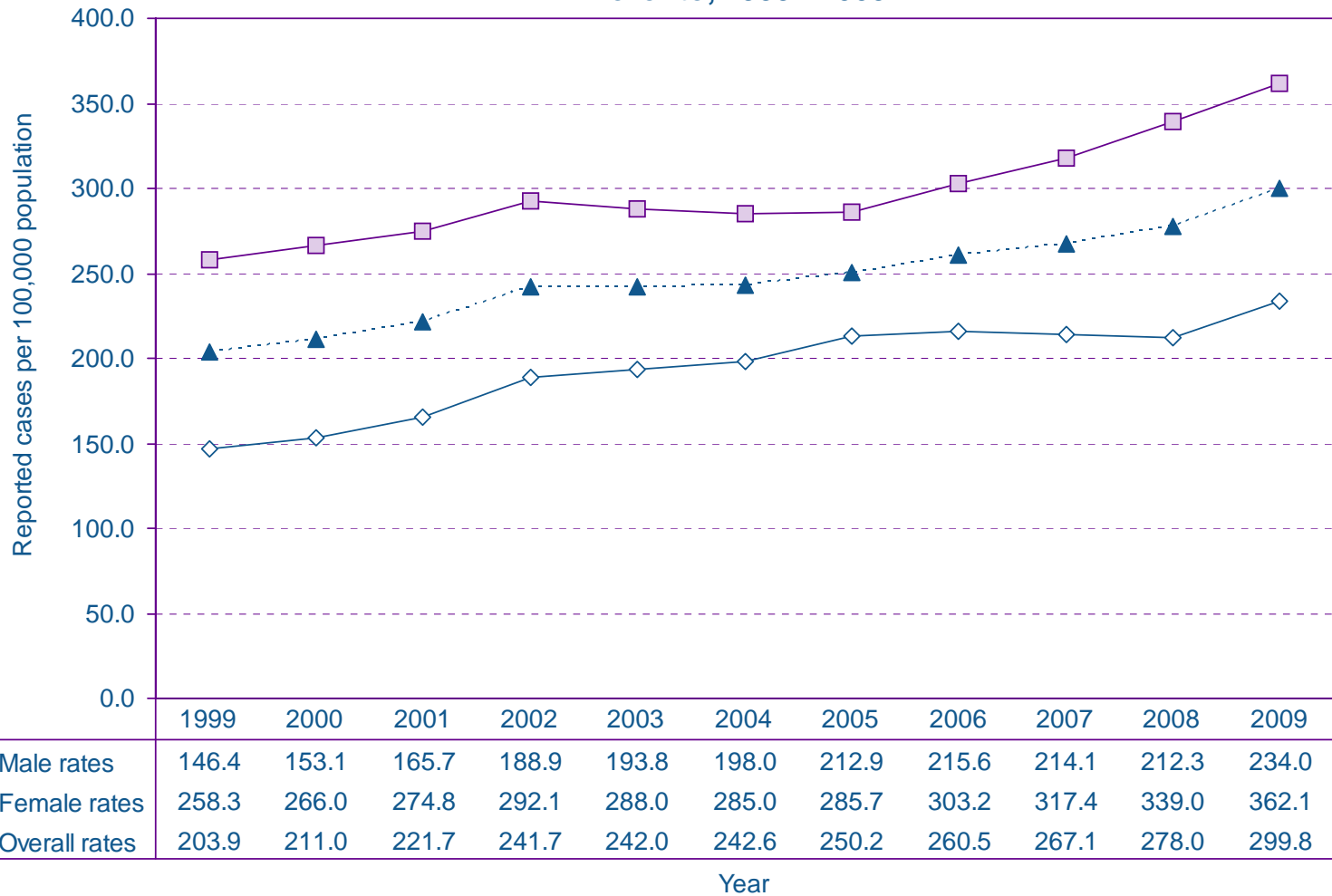
**Figure 1.2: Incidence of chlamydia by age group and sex* .
Toronto, 2009**



*For 3 cases, sex was transgender or not reported and/or age was not reported.

Age group (years)

**Figure 1.3: Incidence rates of chlamydia by sex and year.
Toronto, 1999 - 2009**



**Table 1.3: Risk factors* for reported cases of chlamydia by sex.
Toronto, 2009**

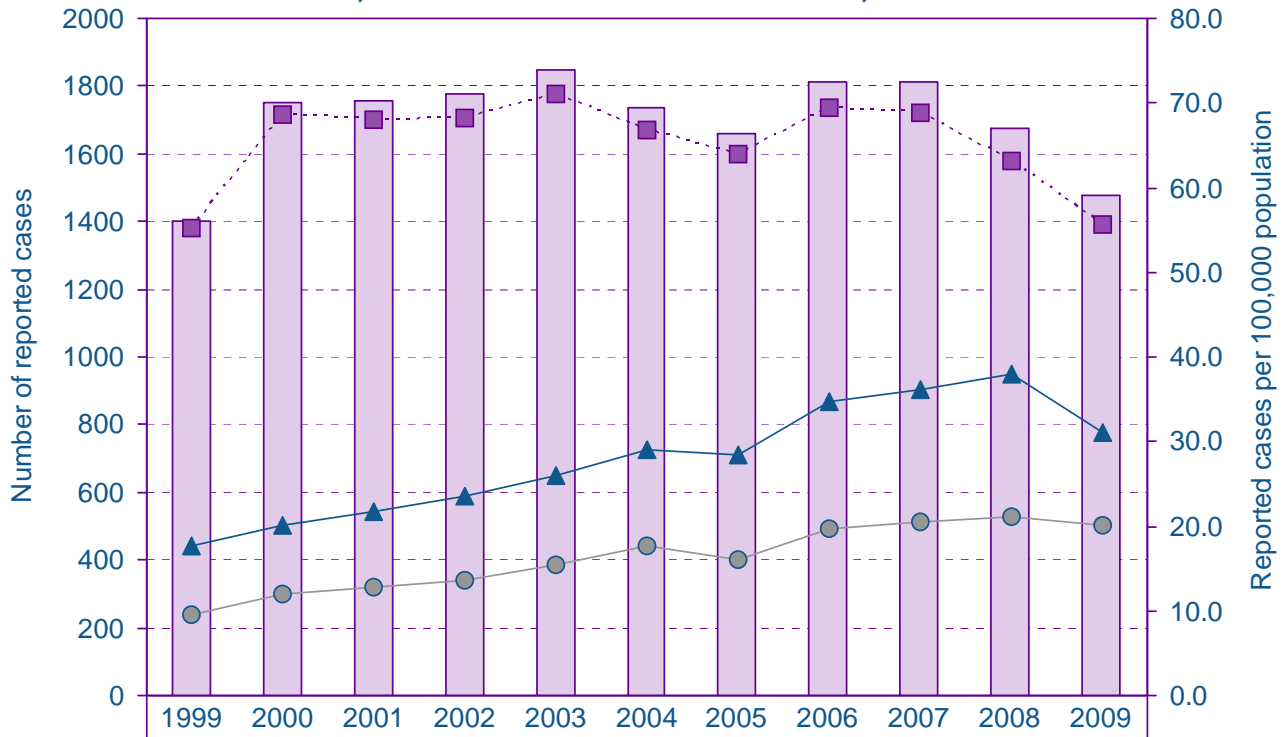
Reported risk factor*	Number of cases [†] (%)					
	Male		Female		Overall	
No condom used	1345	(87)	2304	(92)	3649	(90)
Multiple sex partners in last six months	426	(27)	254	(10)	680	(17)
New partner in past two months	211	(14)	240	(10)	451	(11)
Partner with multiple sex partners	64	(4)	323	(13)	387	(10)
Sex with same sex	255	(16)	5	(<1)	260	(6)
Condom breakage	78	(5)	71	(3)	149	(4)
Travel outside province	40	(3)	38	(2)	78	(2)
Judgement impaired by alcohol/drugs	24	(2)	28	(1)	52	(1)
Partner visiting from outside province	15	(<1)	37	(1)	52	(1)
Met partner through internet	8	(<1)	7	(<1)	15	(<1)
Bath house	13	(<1)	0	(0)	13	(<1)
Sex with sex trade worker	5	(<1)	7	(<1)	12	(<1)
Sex trade worker	4	(<1)	7	(<1)	11	(<1)
Sex for drugs	1	(<1)	5	(<1)	6	(<1)
Homeless	2	(<1)	3	(<1)	5	(<1)
Encounter following major event	2	(<1)	1	(<1)	3	(<1)
Total with a known risk factor	1551		2497		4048	
Number missing or unknown	1473		2427		3902	
Total cases	3024		4924		7950	





*Due to a systematic change in how risk factors are captured in iPHIS, risk factors for chlamydia cases with multiple STIs have been under-reported.

[†]Sex was transgender or not reported for 2 cases.

- *Neisseria gonorrhoea* causes urethritis in men (discharge, painful urination), a small percentage of men will be asymptomatic
- It causes cervicitis in women, often asymptomatic although some women will present with discharge. Complications include pelvic inflammatory disease and infertility
- In women and men who have sex with men, pharyngeal and anorectal infections can occur
- Newborns can develop eye infections
- Antibiotic resistance is increasing

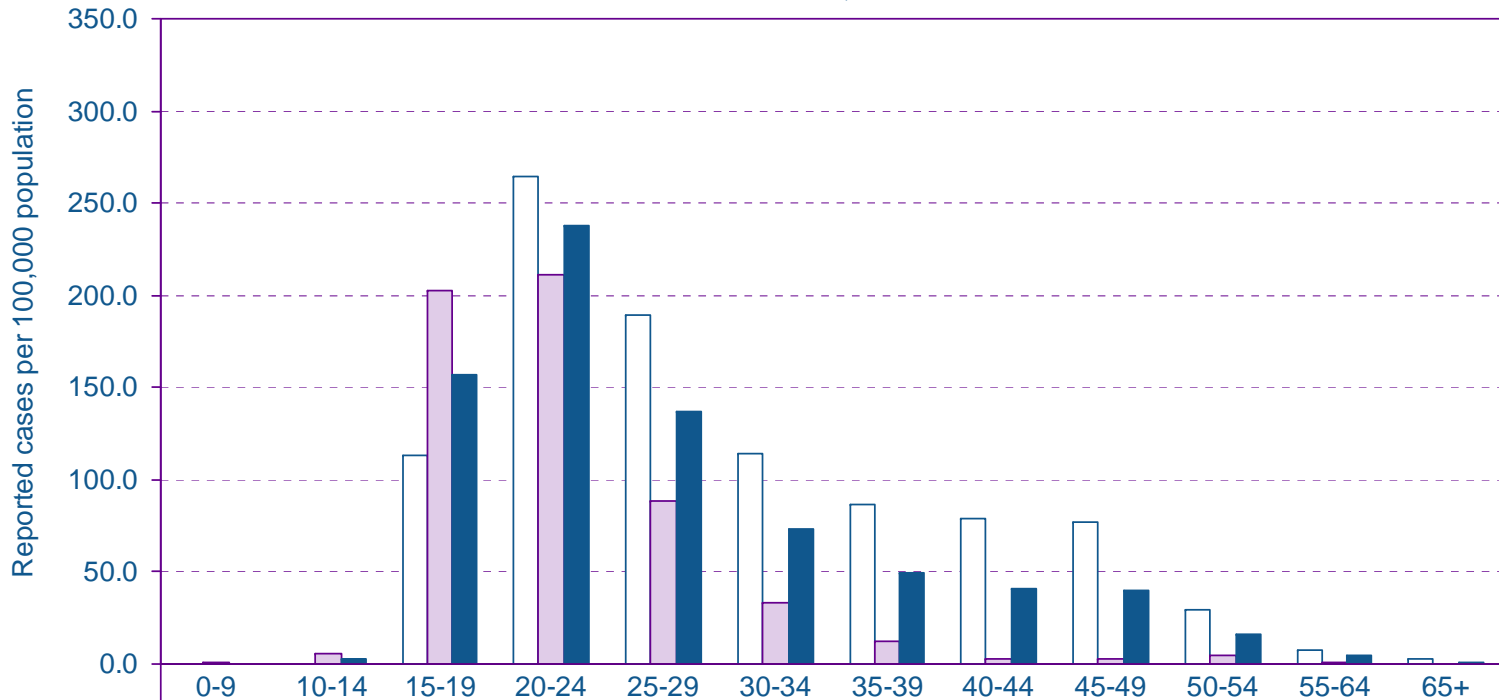
**Figure 1.4: Incidence of gonorrhoea by year.
Toronto, the rest of Ontario and Canada, 1999 - 2009**



 Toronto cases	1399	1752	1758	1779	1846	1736	1660	1812	1813	1677	1475
 Toronto rates	55.3	68.7	68.0	68.3	71.1	66.9	63.9	69.4	68.9	63.2	55.6
 Ontario less Toronto rates	9.6	12.0	12.7	13.6	15.5	17.7	16.1	19.6	20.6	21.1	20.2
 Canada rates	17.6	20.1	21.8	23.5	26.0	29.1	28.5	34.7	36.1	38.0	31.0

Year

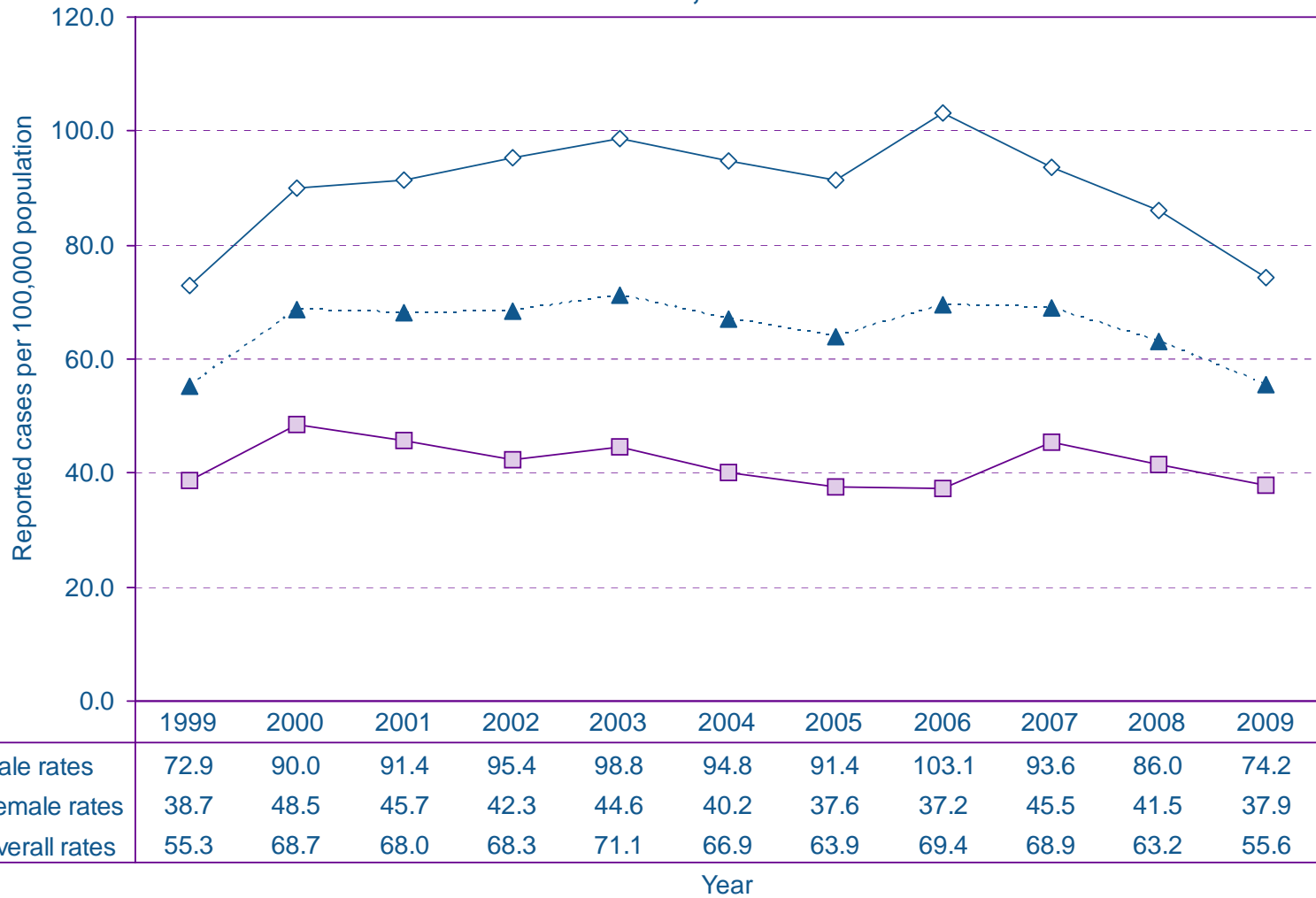
**Figure 1.5: Incidence of gonorrhoea by age group and sex.
Toronto, 2009**



Male rates	0.0	0.0	113.3	264.0	189.0	114.3	86.3	79.2	77.2	29.6	7.6	3.3
Female rates	0.8	5.9	202.5	210.7	88.2	33.6	12.1	2.8	2.9	4.3	1.4	0.0
Overall rates	0.4	2.9	157.1	237.4	136.8	73.0	49.4	41.3	40.2	16.6	4.3	1.4
Male cases	0	0	89	246	200	120	94	88	81	26	10	5
Female cases	1	4	153	196	100	37	13	3	3	4	2	0

Age group (years)

**Figure 1.6: Incidence rates of gonorrhoea by sex and year.
Toronto, 1999 - 2009**



**Table 1.5: Risk factors* for reported cases of gonorrhoea by sex.
Toronto, 2009**

Reported risk factor*	Number of cases† (%)					
	Male		Female		Overall	
No condom used	517	(84)	258	(90)	775	(86)
Sex with same sex	290	(47)	1	(<1)	291	(32)
Multiple sex partners in last six months	240	(39)	42	(15)	282	(31)
New partner in past two months	55	(9)	28	(10)	83	(9)
Partner with multiple sex partners	47	(8)	35	(12)	82	(9)
Condom breakage	34	(6)	16	(6)	50	(6)
Travel outside province	20	(3)	5	(2)	25	(3)
Bath house	15	(2)	0	(0)	15	(2)
Judgement impaired by alcohol/drugs	12	(2)	1	(<1)	13	(1)
Met partner through internet	6	(<1)	2	(<1)	8	(<1)
Sex with sex trade worker	6	(<1)	1	(<1)	7	(<1)
Partner visiting from outside province	2	(<1)	4	(1)	6	(<1)
Sex trade worker	3	(<1)	1	(<1)	4	(<1)
Sex for drugs	0	(0)	1	(<1)	1	(<1)
Total with a known risk factor	613		286		899	
Number missing or unknown	346		230		576	
Total cases	959		516		1475	

*Due to a systematic change in how risk factors are captured in iPHIS, risk factors for gonorrhoea cases with multiple STIs have been under-reported.

†Cases may report more than one risk factor.

- Caused by the spirochete, *Treponema pallidum*
- ancient disease with sexual transmission first identified in the mid 16th Century
- usually spread by oral, vaginal or anal sex, through direct contact with lesions, infected blood, and through the placenta to the fetus
- if untreated, can progress through 5 stages

- Painless ulcer or chancre at site of infection
- on average, occurs 21 days after exposure
- Resolves in 1- 4 months without treatment
- Untreated will progress to secondary syphilis

- Diffuse rash (palms and soles)
- May have other symptoms such as fever, headache, malaise, swollen lymph nodes
- Central nervous system involvement can occur, especially with HIV co-infection
- Occurs 4 to 10 weeks after the primary stage and resolves in weeks to 1 year
- Untreated will become latent

No symptoms

Early latent (first year after infection)

- up to 25 % can relapse to secondary disease, therefore considered infectious

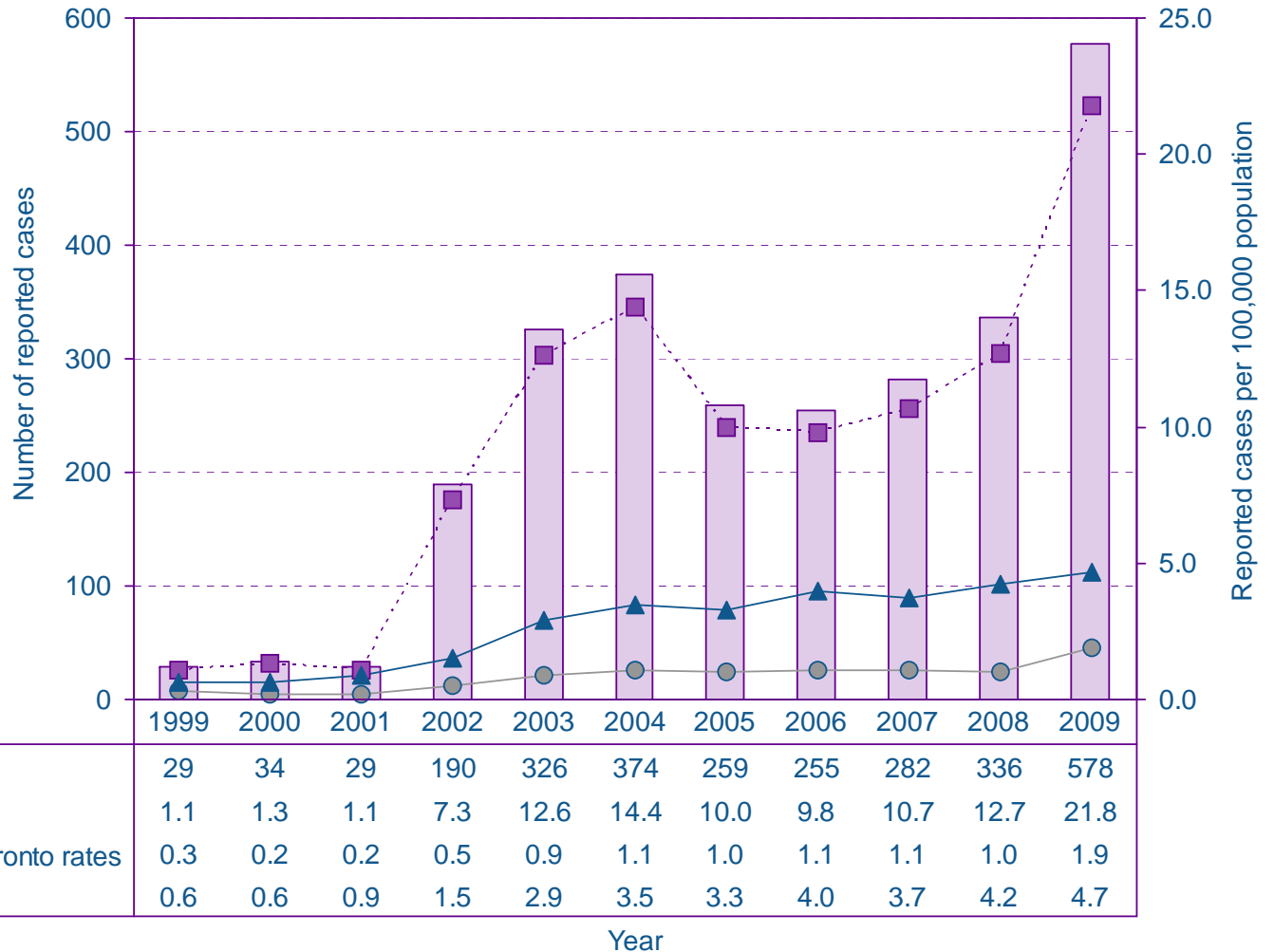
Late latent (after 1 year)

- relapses very unlikely, therefore considered non-infectious
- approximately 10 - 40 % will progress to tertiary syphilis

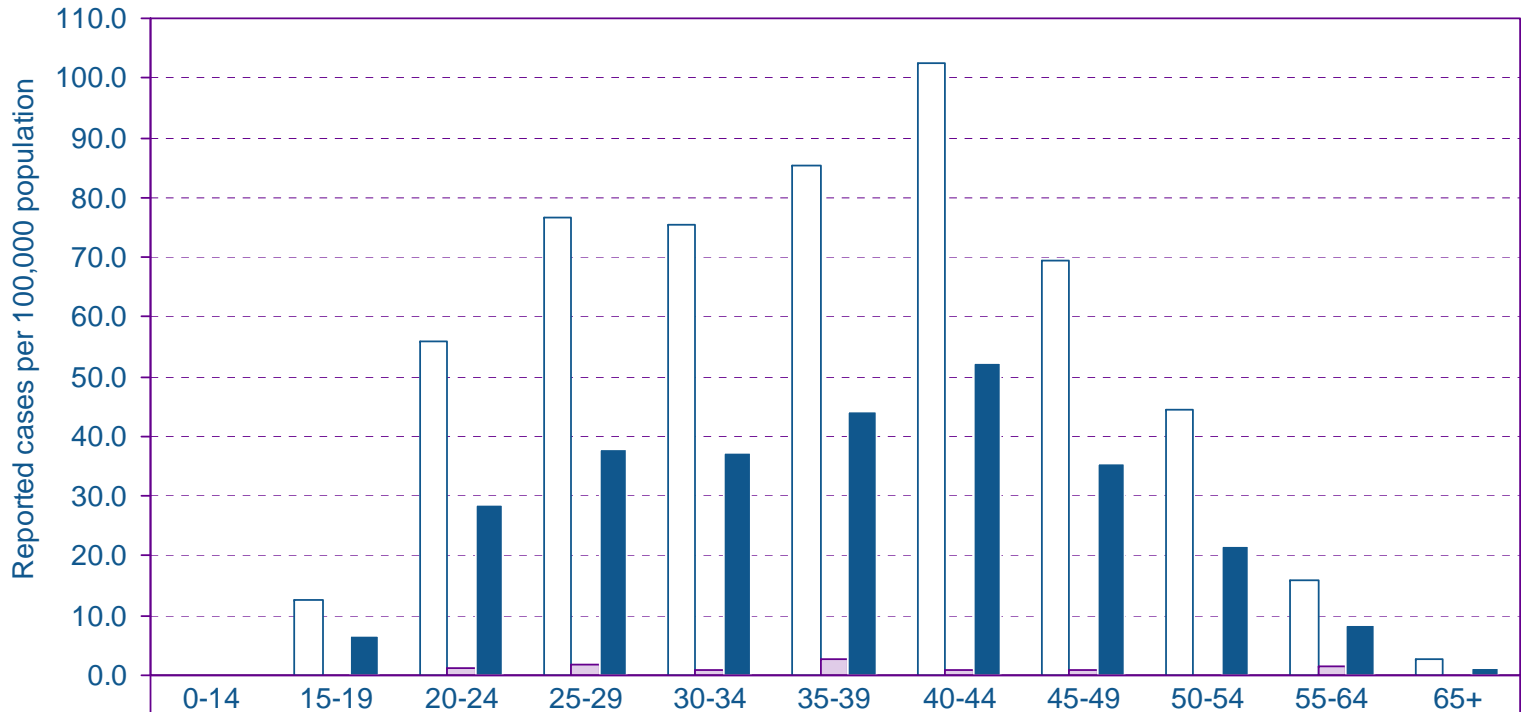
- Lesions affect many organ systems (gumma)
- Skin, bones, cardiovascular system, central nervous system (brain, spinal cord), eyes
- Usually occurs 10 to 30 years after infection

- Syphilis infection can facilitate HIV transmission
- HIV co-infection can hasten the progression of syphilis, particularly involvement of the central nervous system and eye disease
- May have atypical serology, especially false negative tests

**Figure 1.17: Incidence of infectious syphilis by year.
Toronto, the rest of Ontario and Canada, 1999 - 2009**



**Figure 1.18: Incidence of infectious syphilis by age group* and sex.
Toronto, 2009**



	0-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-64	65+
Male rates	0.0	12.7	55.8	76.6	75.3	85.3	102.6	69.5	44.4	16.0	2.6
Female rates	0.0	0.0	1.1	1.8	0.9	2.8	0.9	1.0	0.0	1.4	0.0
Overall rates	0.0	6.5	28.5	37.9	37.2	44.3	52.2	35.4	21.6	8.3	1.1
Male cases	0	10	52	81	79	93	114	73	39	21	4
Female cases	0	0	1	2	1	3	1	1	0	2	0

*For one male case, age was not reported.

Age group (years)

**Figure 1.19: Incidence rates of infectious syphilis by sex and year.
Toronto, 1999 - 2009**

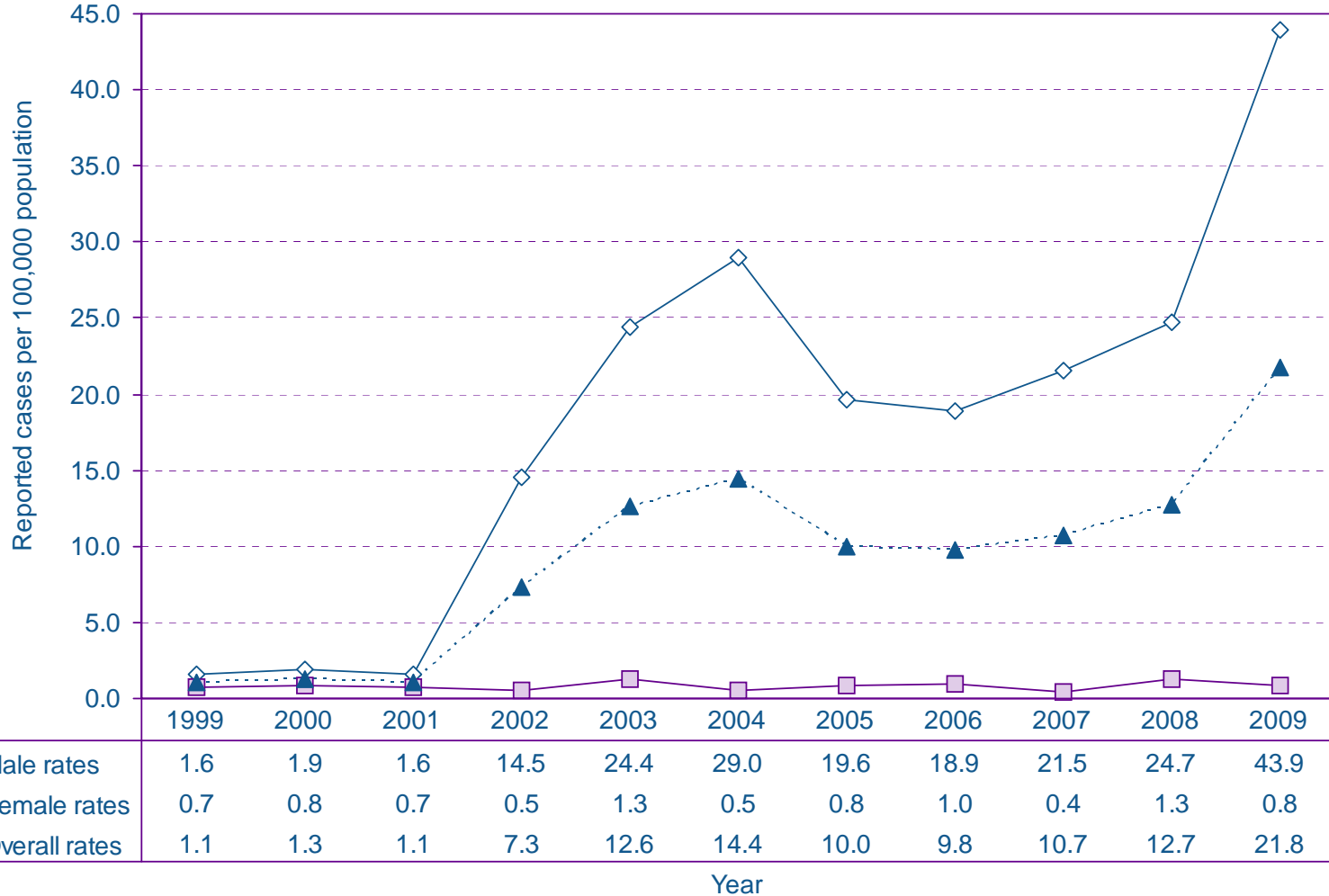
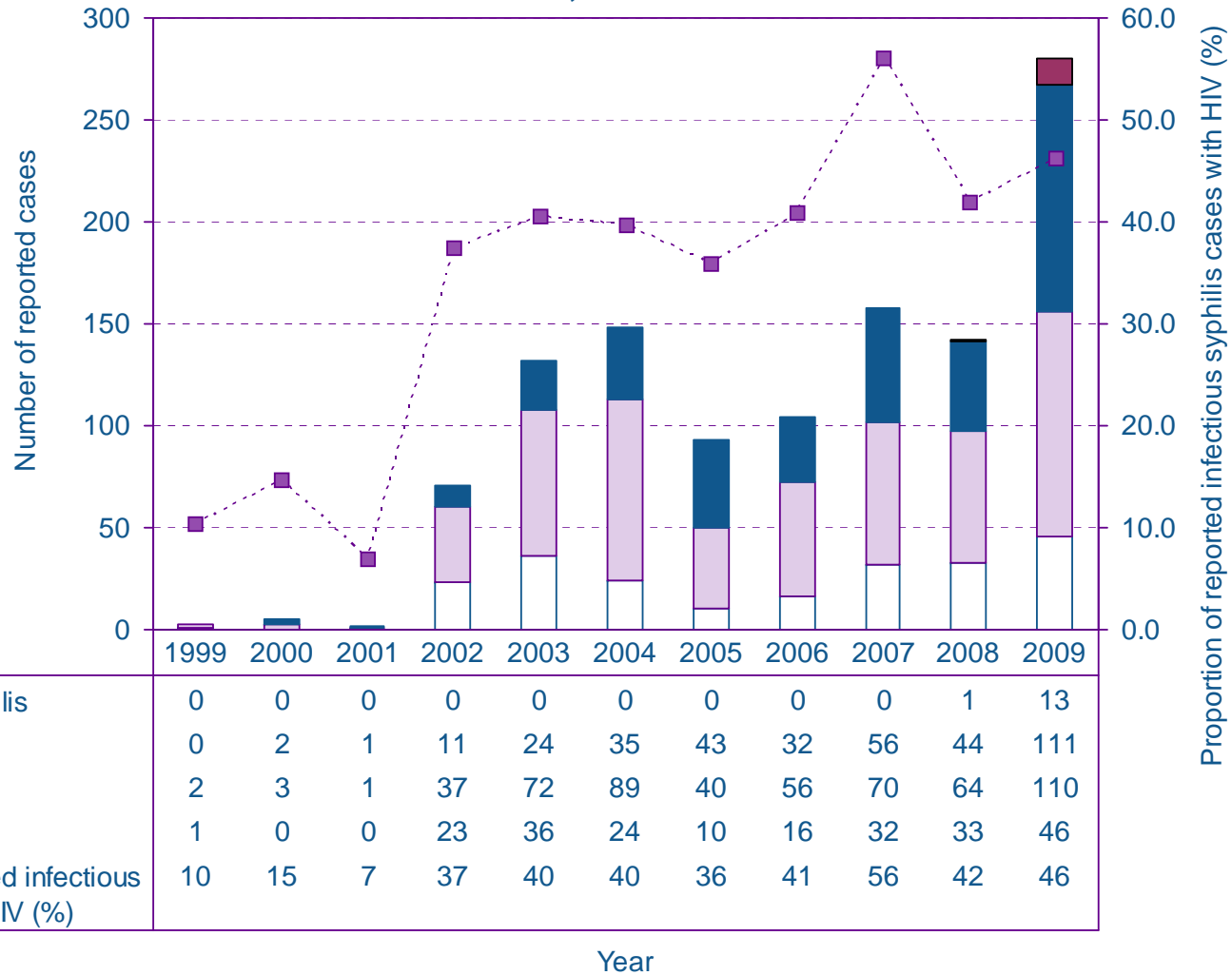


Figure 1.21: Incidence of HIV and infectious syphilis co-infections by year. Toronto, 1999 - 2009



- Sex with same sex partner - 86 %
- No condom - 56 %
- Multiple sex partners - 39 %
- Partner with multiple sex partners – 9 %

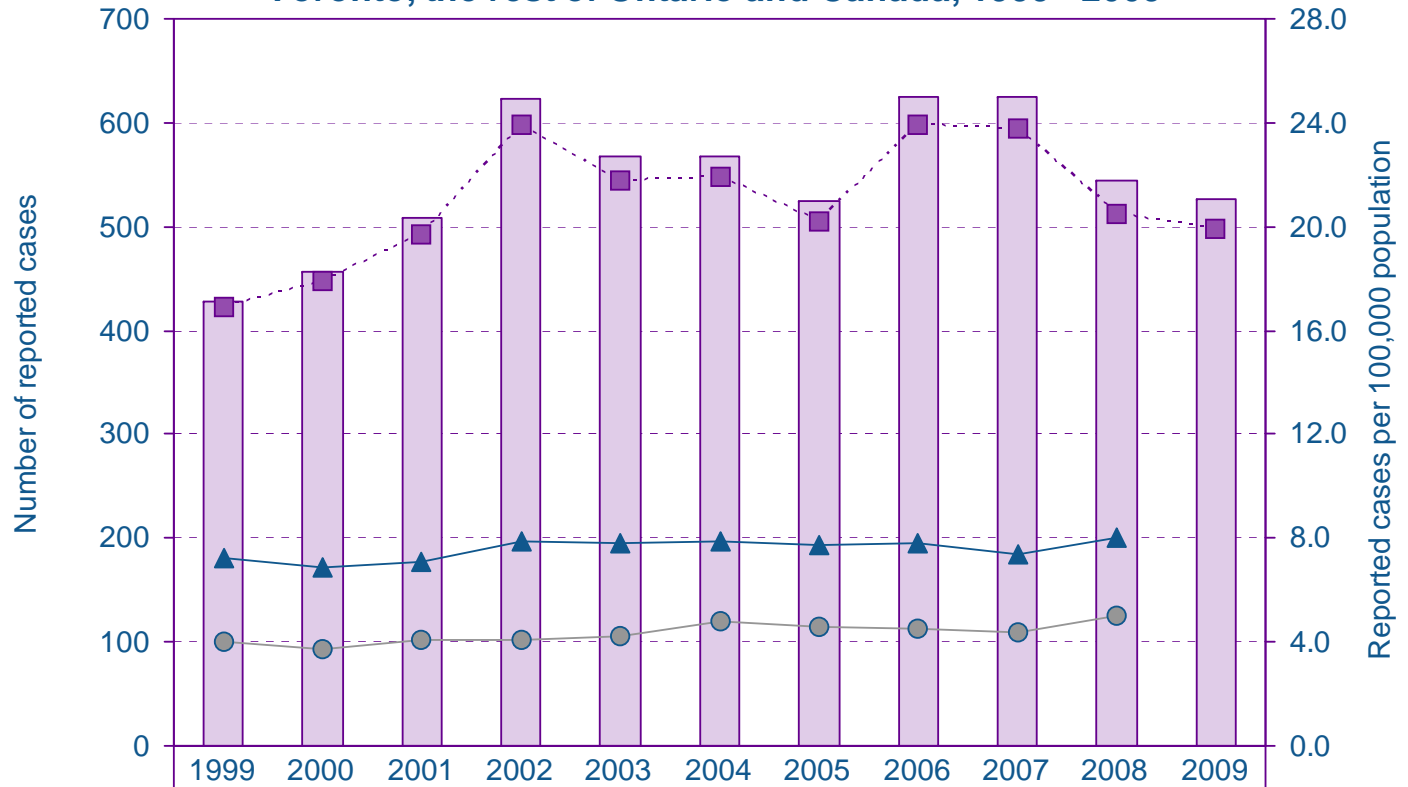
Table 2. Clients reported with infectious syphilis in 2009, counts of clients by year of first infection, Toronto (reinfection as early as 2000 and as late as 2010)





Year of first infection		2000 to 2008	2009	All
Number of clients by repeat infections	1 (only one infection)	-	388	388
	2	88	30	118
	3	26	3	29
	4	18	0	18
	5	5	0	5
Total number of clients with infections in 2009 by year of first infection (% of all clients)		137 (25%)	421 (75%)	558

Data Source: Ministry of Health and Long Term Care, iPHIS, extracted on August 11, 2010.

- Initial infection with HIV results in a self-limited flu-like illness
- The severity of subsequent HIV related infections or cancers depends on the degree of immune system dysfunction
- AIDS is defined as HIV infection plus indicator diseases (eg. TB)
- Modes of transmission include sexual transmission, sharing of drug use equipment, blood products, mother to child transmission

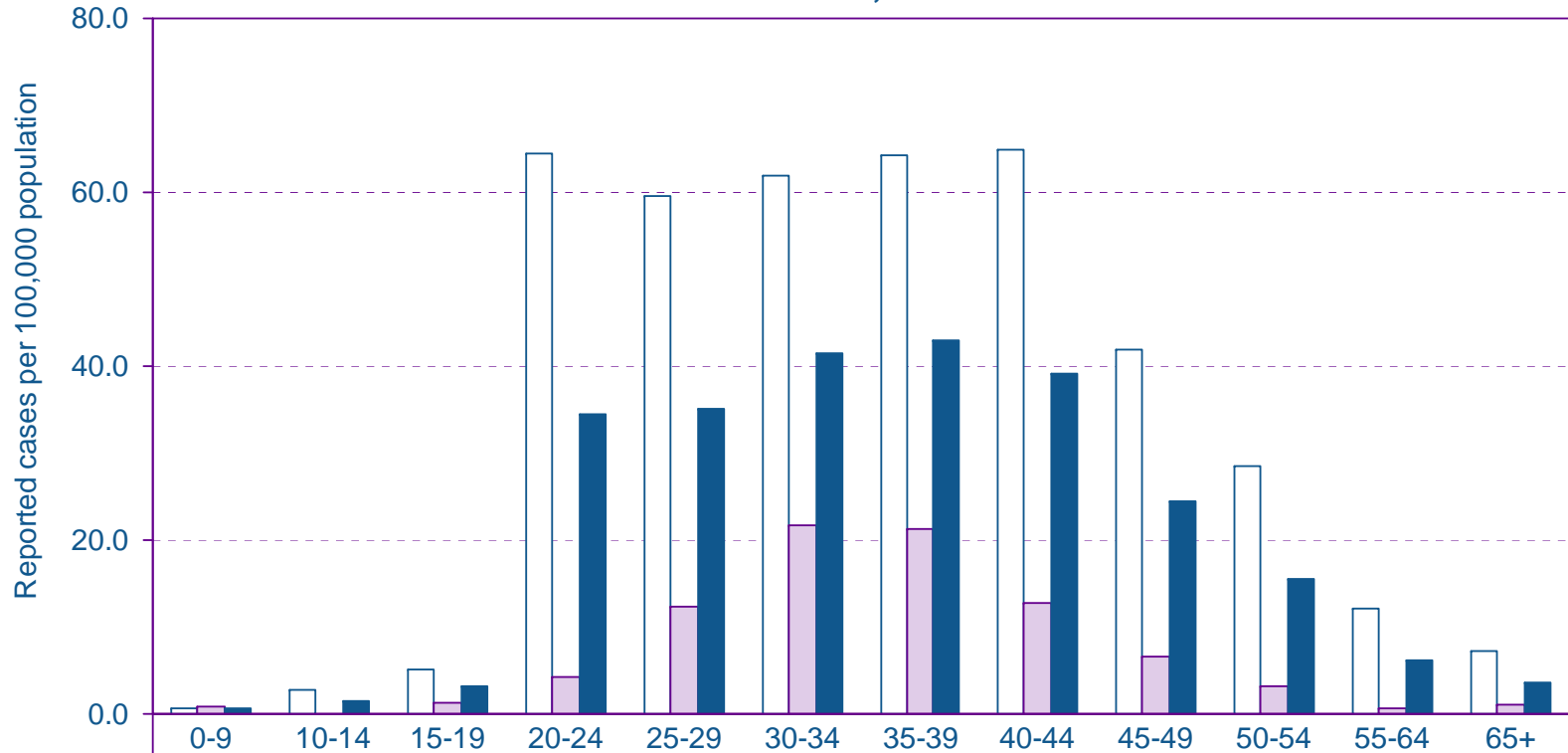
**Figure 1.14: Incidence of HIV* infection by year.
Toronto, the rest of Ontario and Canada, 1999 - 2009**



 Toronto cases	428	456	509	623	567	567	524	624	625	544	527
 Toronto rates	16.9	17.9	19.7	23.9	21.8	21.9	20.2	23.9	23.8	20.5	19.9
 Ontario less Toronto rates	4.0	3.7	4.1	4.1	4.2	4.8	4.6	4.5	4.4	5.0	NA
 Canada rates	7.2	6.9	7.1	7.9	7.8	7.9	7.7	7.8	7.4	8.0	NA

*HIV reports have been counted by year of test for Ontario less Toronto and Canada rate calculations. Year

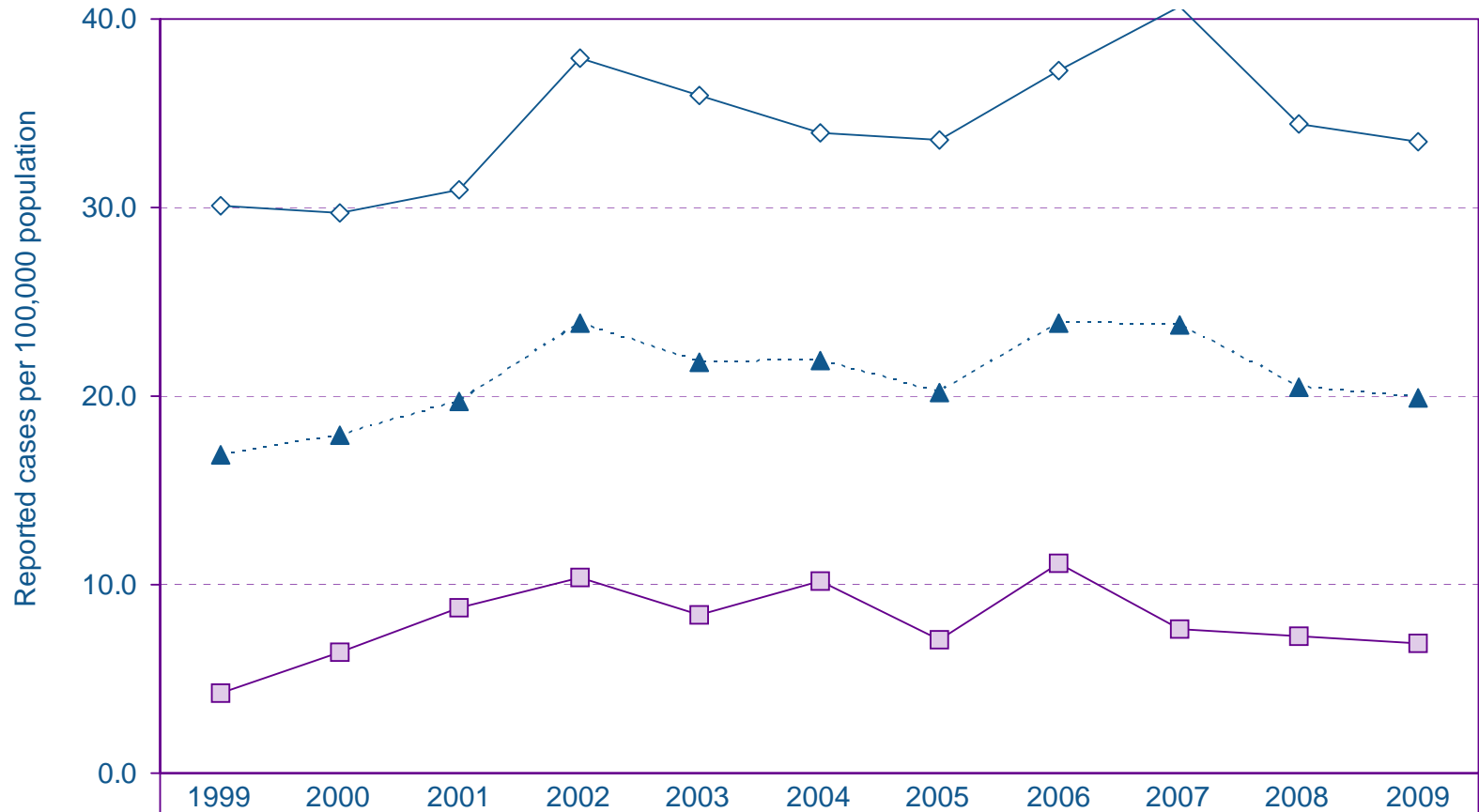
**Figure 1.15: Incidence rates of HIV infection by age group and sex.
Toronto, 2009**



Male rates	0.7	2.8	5.1	64.4	59.5	61.9	64.2	64.8	41.9	28.5	12.2	7.2
Female rates	0.8	0.0	1.3	4.3	12.3	21.8	21.3	12.8	6.7	3.2	0.7	1.0
Overall rates	0.7	1.4	3.2	34.4	35.1	41.4	42.9	39.1	24.4	15.5	6.1	3.6
Male cases	1	2	4	60	63	65	70	72	44	25	16	11
Female cases	1	0	1	4	14	24	23	14	7	3	1	2

Age group (years)

**Figure 1.16: Incidence rates of HIV infection by sex and year.
Toronto, 1999 - 2009**



—◇— Male rates	30.1	29.7	30.9	37.9	35.9	34.0	33.6	37.3	40.7	34.4	33.5
—□— Female rates	4.2	6.4	8.8	10.4	8.4	10.2	7.1	11.1	7.6	7.3	6.9
---▲--- Overall rates	16.9	17.9	19.7	23.9	21.8	21.9	20.2	23.9	23.8	20.5	19.9

Year

Table 1.11: Number and proportion of HIV-positive diagnoses by exposure category* and sex. Toronto, 2009

Exposure category*	Number of cases [†] (%)					
	Male		Female		Overall	
MSM	320	(74)	0	(0)	320	(61)
MSM/IDU	18	(4)	0	(0)	18	(3)
IDU	9	(2)	6	(6)	15	(3)
Perinatal	1	(<1)	1	(1)	2	(<1)
Received blood or blood products‡	3	(<1)	5	(5)	8	(2)
HIV-Endemic	29	(7)	45	(48)	74	(14)
HET-Partner	6	(1)	11	(12)	17	(3)
NIR-HET	18	(4)	15	(16)	33	(6)
Other	5	(1)	0	(0)	5	(<1)
No identifiable risk§/ Unknown	24	(6)	11	(12)	35	(7)
Total	433	(100)	94	(100)	527	(100)

*See the glossary for definitions of each exposure category.

[†]Cases may report one or more risks but are counted in the category considered the highest risk according to an exposure category hierarchy. The categories are listed in descending order from those that are considered to carry the highest risk of HIV infection to those considered to carry the lowest risk.

[‡]Seven of the eight cases whose exposure to HIV occurred via the receipt of blood products had also lived in or visited an HIV-endemic country.

[§]The exposure category 'No identifiable risk' has been revised to include all clients that have missing or unknown risk factors.

HIV Country of Birth, 2009 cases

Country of Birth	# Cases	
Unknown	319	
Canada	63	
Mexico	11	
Ethiopia	10	
Philippines	9	
Columbia	6	
Jamaica	6	
USA	6	
Vietnam	6	

THANK YOU