Epidemiology of Tuberculosis: Global and Local

McGill Tuberculosis Course
November 26, 2010

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Objectives

Participants will be able to:

- Describe key features of current TB epidemiology, at the global and local level
- Identify major determinants of trends in TB incidence globally, and in Canada
- Identify key elements of global and Canadian TB control strategies

Case 1

- 32 y.o. male refugee claimant from DR Congo presented to RVH ER with herpes zoster involving left V1 distribution, with probable bacterial superinfection
- Wife known to be HIV-infected
- Hospitalized, confirmed HIV+ with CD4 ~70
- Minor hemoptysis; sputum induction performed
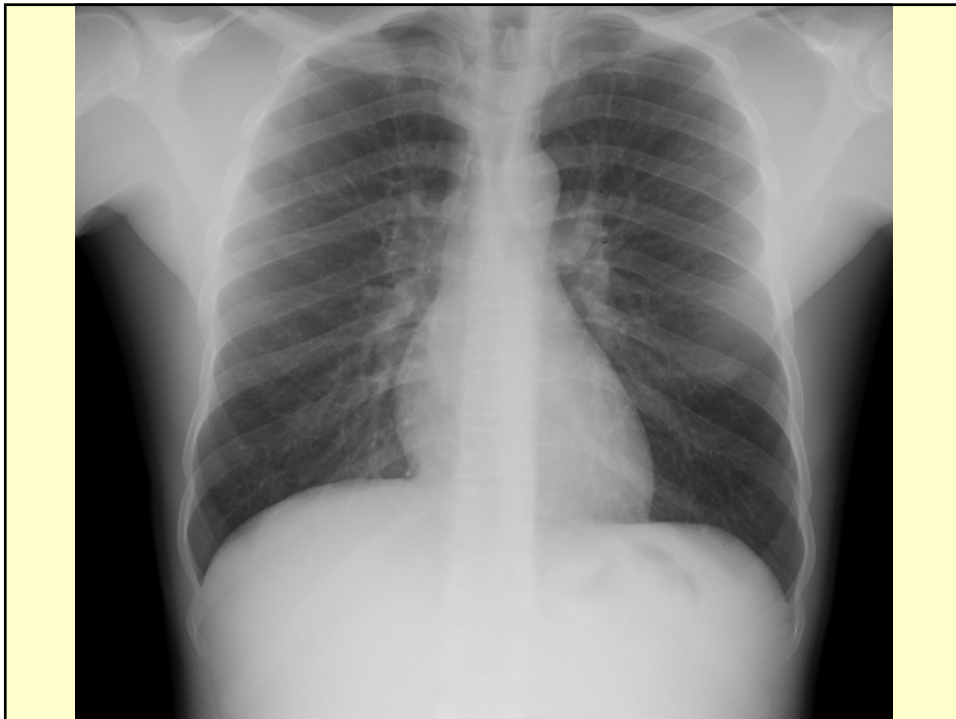
Case 1

- Found to have smear-negative, culture-positive pulmonary TB
- Sensitive to all first line anti-TB drugs
- Treated successfully with microbiologic cure
- HAART instituted with excellent response

Case 2

- 20 y.o. Peruvian-born male, in Canada for several years
- No past medical history of any kind
- Presented with sudden onset severe chest pain and dyspnea ~one week after returning from visit to Peru by airplane
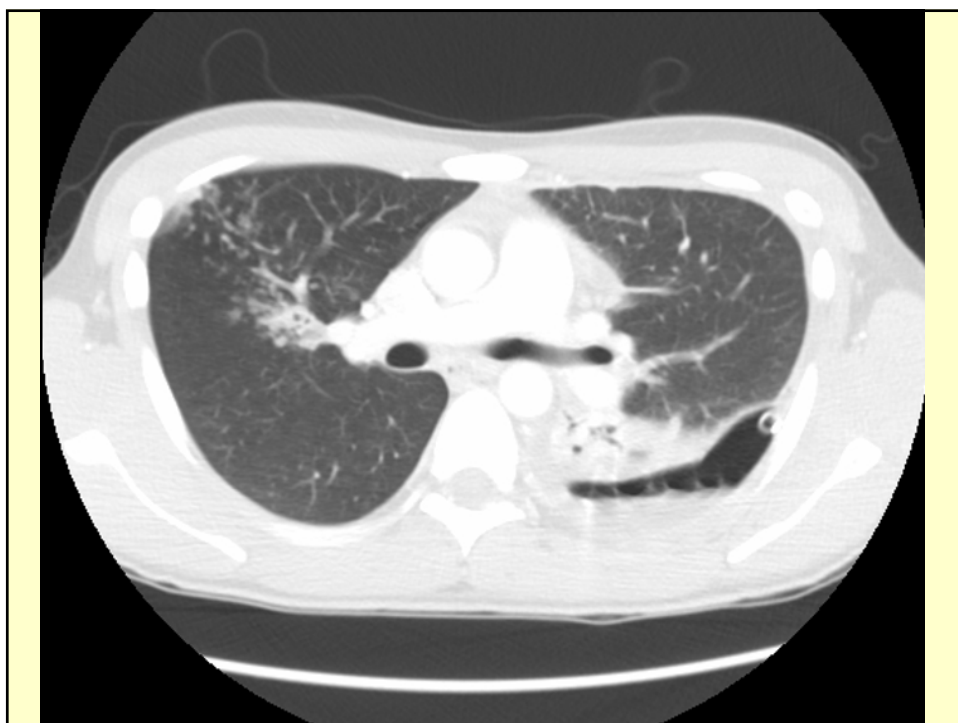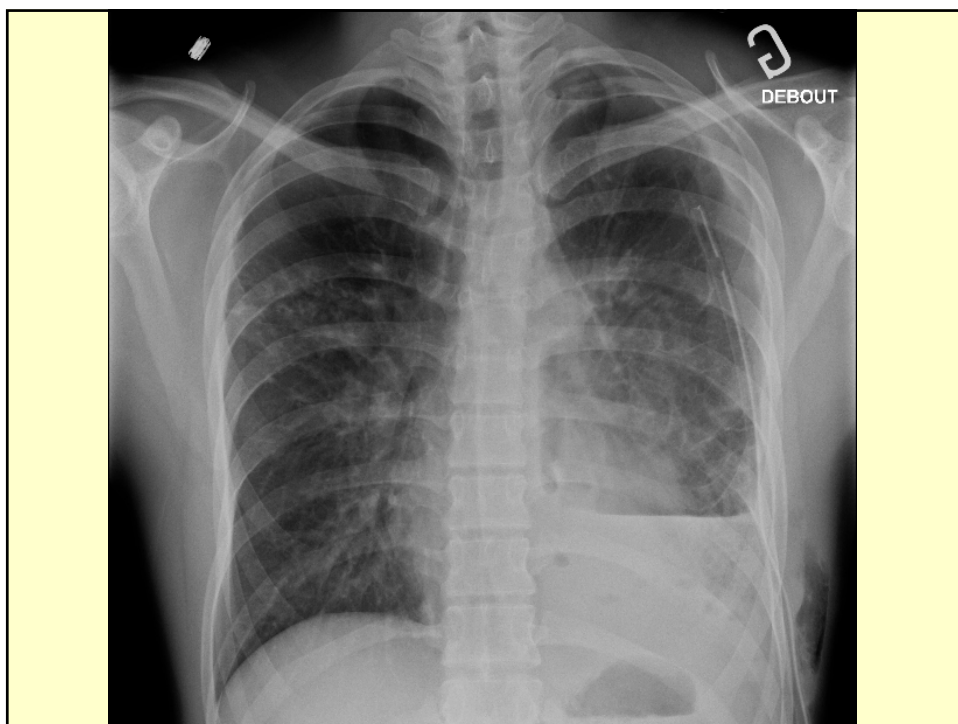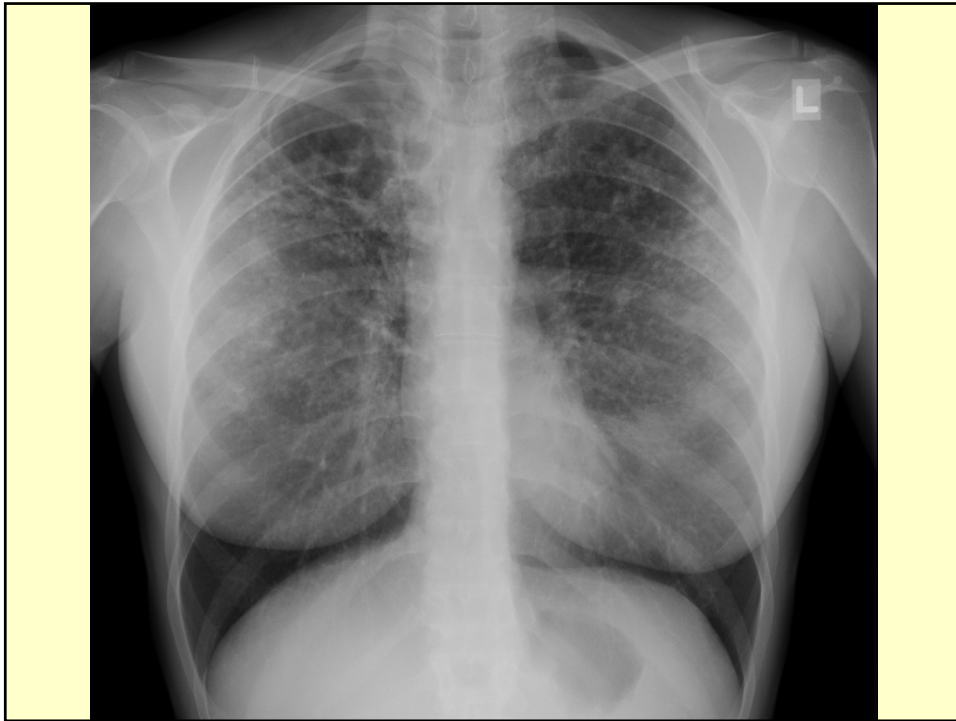
Case 2

- Culture-positive on pleural fluid, BAL
- Found to have MDR-TB i.e. probable primary MDR
- Hospitalized for over 3 months with bronchopleural fistula
- Still on complex treatment regimen

Case 3

- 43 y.o. Quebec-born female
- No past medical history of any sort
- Referred to MCI clinic for persistent cough of several months duration
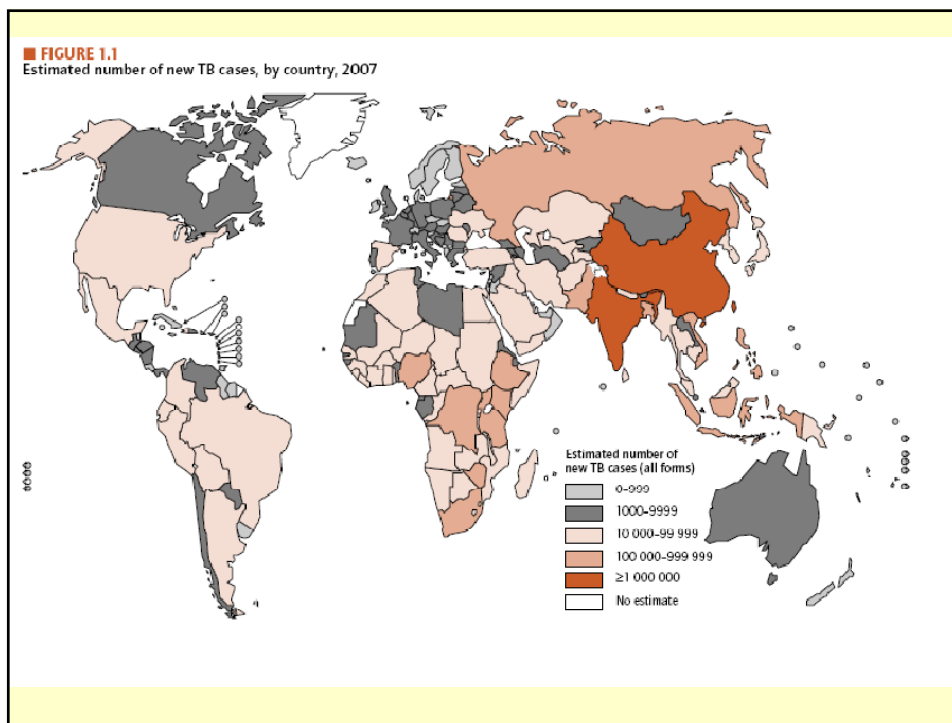- Minor fatigue, weight loss

Case 3

- Immediately admitted to hospital
- 3+ smear positive on spontaneous sputum
- TB sensitive to all
- No clear exposure history; HIV-negative
- Prolonged hospitalization (> 3 months) as slow to clear sputum
- Ultimately cured

"I thought TB had disappeared"

- 2009: WHO estimated 9.4 million new cases, vs. 8.3 million cases in 2000 and 6 million cases in 1990
- 55% in Asia, 30% in Africa
- Overall global incidence 137 per 100,000 annually, down from peak 142 in 2004
- 1.3 million deaths in HIV-negative individuals, 380,000 deaths in HIV-positive individuals (~25% of all deaths in HIV-infected persons)

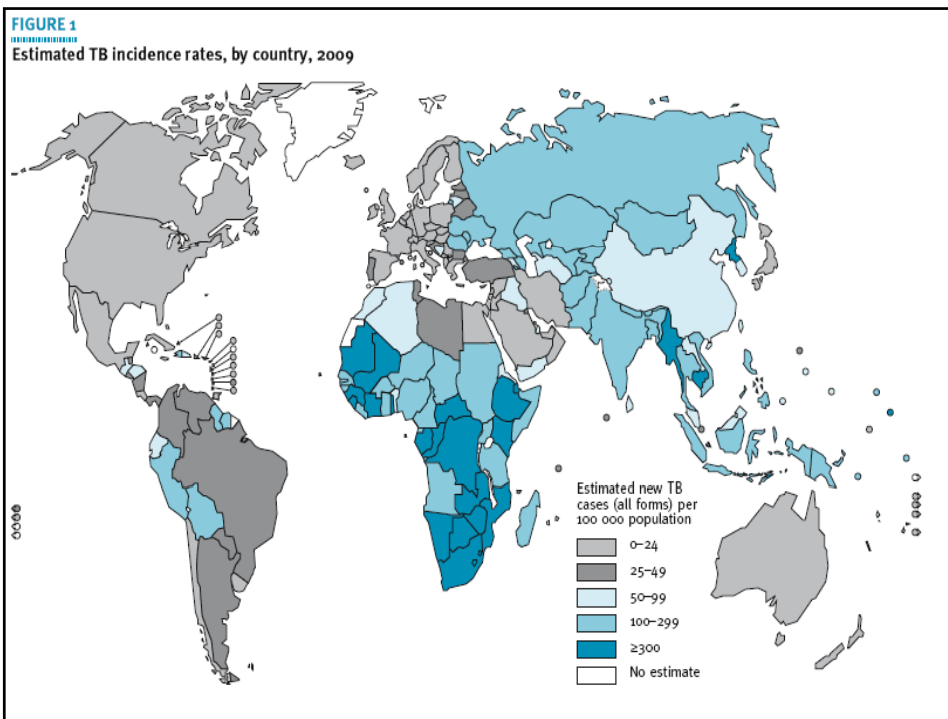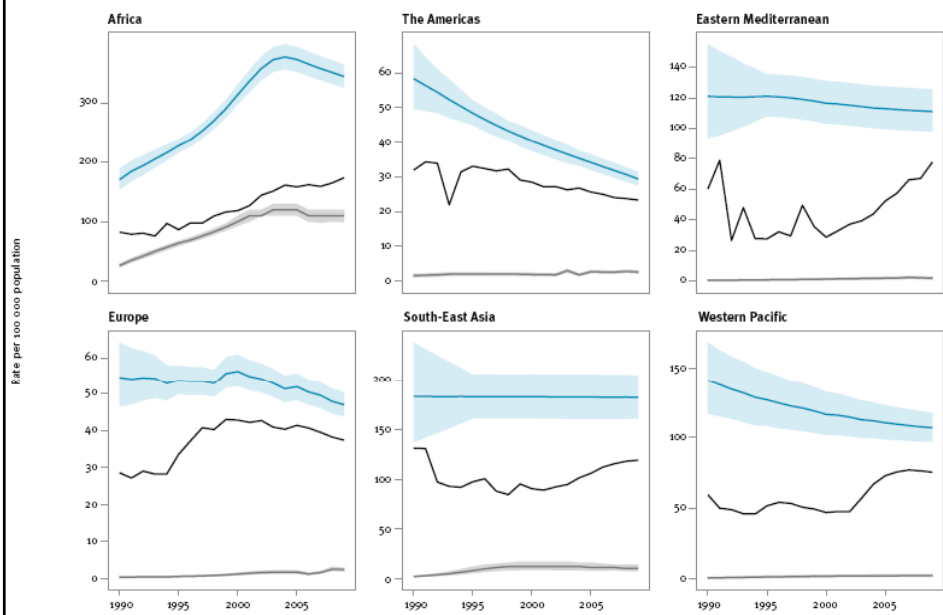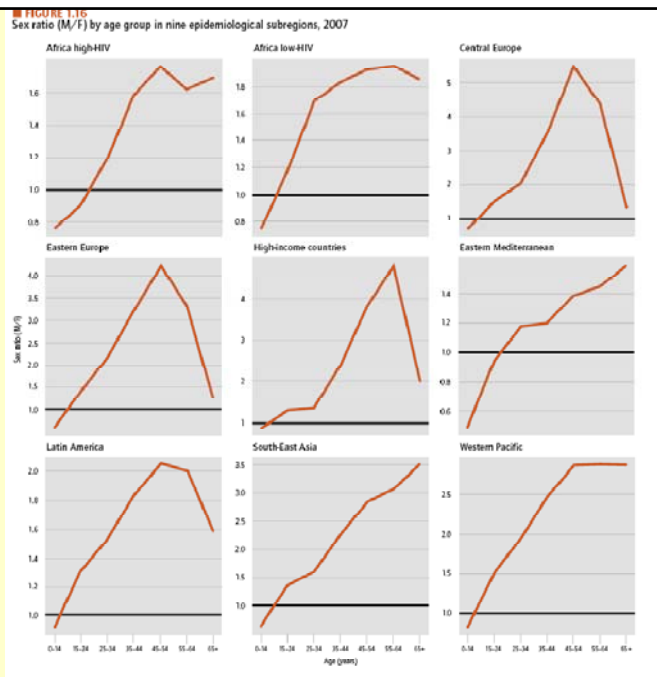http://www.who.int/tb/publications/global_report/2010/en/index.html

FIGURE 1.1
Estimated number of new TB cases, by country, 2007

Estimated number of new TB cases (all forms)
- 0–999
- 1000–9999
- 10 000–99 999
- 100 000–999 999
- ≥1 000 000
- No estimate

FIGURE 1
Estimated TB incidence rates, by country, 2009

Estimated new TB cases (all forms) per 100 000 population

- 0–24
- 25–49
- 50–99
- 100–299
- ≥300
- No estimate

■ **TABLE 1.2**
Estimated epidemiological burden of TB, 2007

	POPULATION 1000s	INCIDENCE ALL FORMS NUMBER 1000s	INCIDENCE ALL FORMS PER 100 000 POP PER YEAR	INCIDENCE SMEAR-POSITIVE NUMBER 1000s	INCIDENCE SMEAR-POSITIVE PER 100 000 POP PER YEAR	PREVALENCE ALL FORMS NUMBER 1000s	PREVALENCE ALL FORMS PER 100 000 POP PER YEAR	MORTALITY HIV-NEGATIVE NUMBER 1000s	MORTALITY HIV-NEGATIVE PER 100 000 POP PER YEAR	MORTALITY HIV-POSITIVE NUMBER 1000s	MORTALITY HIV-POSITIVE PER 100 000 POP PER YEAR	HIV PREV. IN INCIDENT TB CASES %
1 India	1 169 016	1 962	168	873	75	3 305	283	302	26	30	2.5	5.3
2 China	1 328 630	1 306	98	585	44	2 582	194	194	15	6.8	0.5	1.9
3 Indonesia	231 627	528	228	236	102	566	244	86	37	5.4	2.4	3.0
4 Nigeria	148 093	460	311	195	131	772	521	79	53	59	40	27
5 South Africa	48 577	461	948	174	358	336	692	18	38	94	193	73
6 Bangladesh	158 665	353	223	159	100	614	387	70	44	0.4	0.3	0.3
7 Ethiopia	83 099	314	378	135	163	481	579	53	64	23	28	19
8 Pakistan	163 902	297	181	133	81	365	223	46	28	1.4	0.9	2.1
9 Philippines	87 960	255	290	115	130	440	500	36	41	0.3	0.3	0.3
10 DR Congo	62 636	245	392	109	174	417	666	45	72	6.0	10	5.9
11 Russian Federation	142 499	157	110	68	48	164	115	20	14	5.1	3.6	16
12 Viet Nam	87 375	150	171	66	76	192	220	18	20	3.1	3.5	8.1
13 Kenya	37 538	132	353	53	142	120	319	10	26	15	39	48
14 Brazil	191 791	92	48	49	26	114	60	5.9	3.1	2.5	1.3	14
15 UR Tanzania	40 454	120	297	49	120	136	337	12	29	20	49	47
16 Uganda	30 884	102	330	42	136	132	426	13	41	16	52	39
17 Zimbabwe	13 349	104	782	40	298	95	714	6.9	52	28	213	69
18 Thailand	63 884	91	142	39	62	123	192	10	15	3.9	6.0	17
19 Mozambique	21 397	92	431	37	174	108	504	10	45	17	82	47
20 Myanmar	48 798	83	171	37	75	79	162	5.4	11	0.9	1.9	11
21 Cambodia	14 444	72	495	32	219	96	664	11	77	1.8	13	7.8
22 Afghanistan	27 145	46	168	21	76	65	238	8.2	30	0.0	0	0
High-burden countries	4 201 761	7 423	177	3 245	77	11 301	269	1 058	25	339	8.1	14
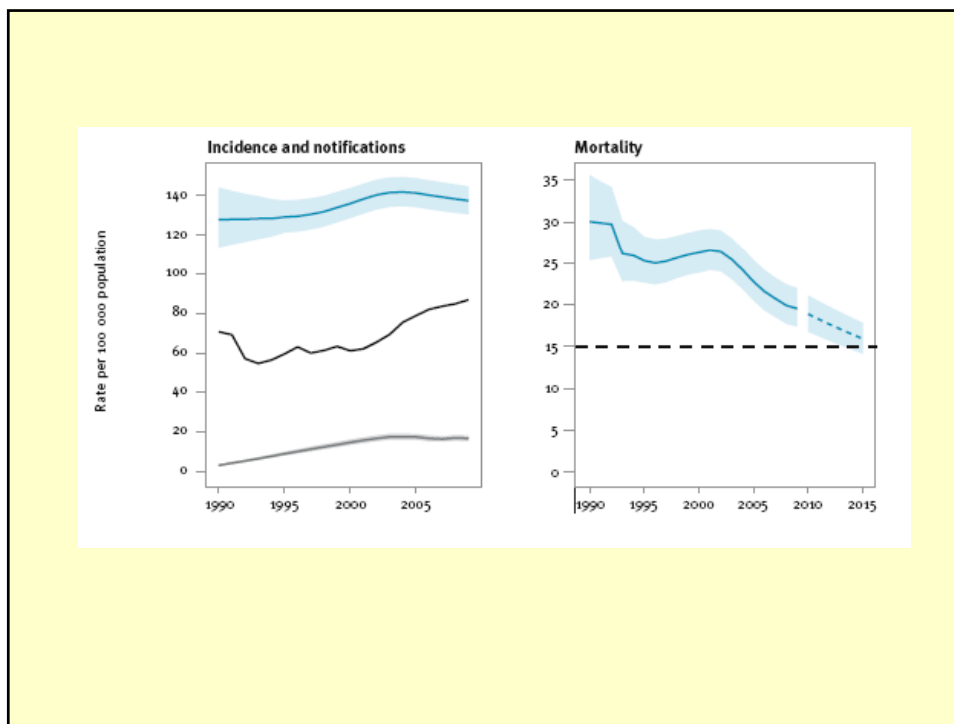
FIGURE 26

Estimated incidence and case notification rates by WHO region, 1990–2009. Regional trends in case notification rates (new and relapse cases, all forms) (black), estimated incidence rate including HIV-positive TB (blue) and estimated incidence rate of HIV-positive TB (grey). Shaded areas represent uncertainty bands.

FIGURE 1.16
Sex ratio (M/F) by age group in nine epidemiological subregions, 2007

Overall 1.8 male:1 female

Limitations

- Reported TB cases (notifications) account for a variable proportion of all TB cases depending on the country
- Notifications will increase with improvements in diagnosis and reporting, regardless of underlying true incidence
- Notifications will decrease when national TB control programs worsen
- Total TB cases (reported + unreported) must therefore be estimated indirectly from other data e.g. prevalence surveys, annual risk of infection surveys, mortality data, extrapolation from "DOTS areas" etc.
- Substantial implications for program quality indicators

Major Determinants

- Basic elements of TB control e.g. diagnosis, consistent and appropriate treatment
- Health system infrastructure e.g. national control programs, public vs. private providers etc.
- General socioeconomic and health status, tobacco, alcohol
- HIV
- Drug resistance
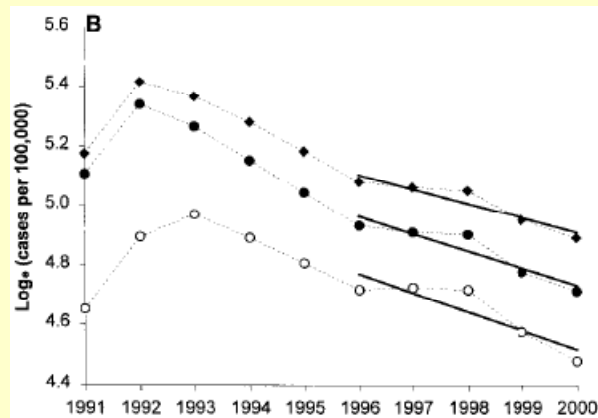- Obviously all these are interrelated

Figure 3. A, Case report rates of new sputum smear (ss)–positive tuberculosis (TB) cases per 100,000 population in 25 departments of Peru, plotted on a log$_e$ scale. B, National case report rates of all new TB cases (♦), new pulmonary cases (●), and new smear-positive cases (○). Lines were fitted by regressions for the years 1996–2000.

Suarez et al, *JID* 2001

Eastern Europe / Latin America — Cases (all forms) per 100 000 population/year, 1990–2005
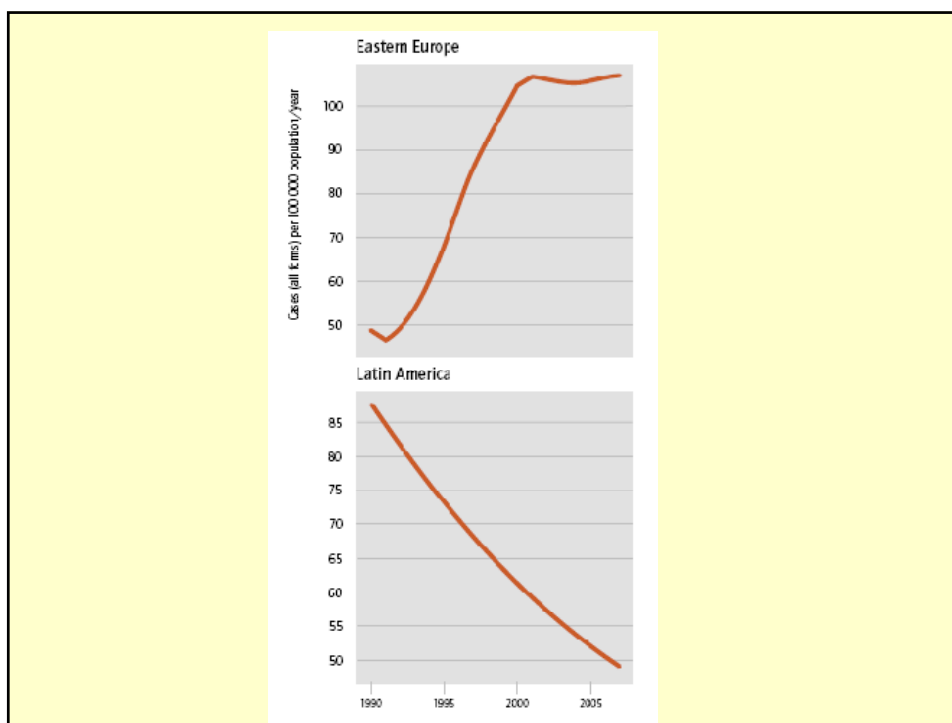
Table 3   Results of multivariate linear regression analysis of Models 1–3: adjusted estimated effect (95%CI) of the specific parameter in the specific model on the change in TB incidence rate/100 000, between 1990 and 2005

Parameter	Change in TB incidence rate/100 000		
	Model 1* (adjusted R^2 = 0.78)	Model 2* (adjusted R^2 = 0.78)	Model 3* (adjusted R^2 = 0.79)
Change in life expectancy (per 1 year increase in life expectancy between 1990 and 2005)	−7.8 (−11.3−−4.3)[†]		
Change in mortality in children aged <5 years (per 1/1000 increase in mortality among children aged <5 years between 1990 and 2005)		+1.0 (+0.5−+1.4)[†]	
Change in measles vaccination coverage (per 1% increase in measles immunization coverage over period 1990–2005)			−1.3 (−2.4−−0.8)[†]
Change in GDP per capita (per 1% increase in GDP between 1990 and 2005)	+0.003 (−0.1−+0.1)	−0.05 (−0.2−+0.09)	−0.06 (−0.2−+0.08)
HIV prevalence in 2005[‡] (per 1% higher HIV prevalence)	+16.7 (+13.1−+20.3)[†]	+20.9 (+18.4−+23.4)[†]	+22.8 (+20.3−+25.4)[†]
Change in treatment success for smear-positive cases on DOTS (per 1% increase in success between 1990 and 2005)	−0.9 (−1.8−+0.02)	−0.9 (−1.8−+0.07)	−0.9 (−2.0−+0.1)

Oxlade et al, *IJTLD* 2009
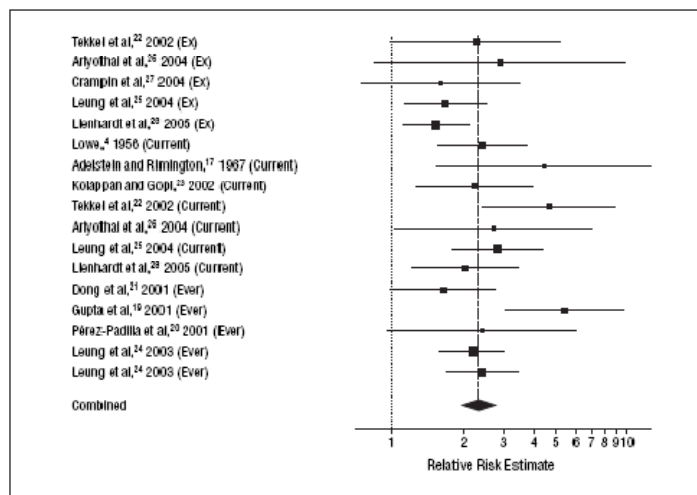
Figure 3. Forest plot of results for men only and for men and women combined in studies[4,17,19-28] that examined smoking and tuberculosis disease. The smoking type (ex-smokers [Ex], current smokers [Current], and ever smokers [Ever]) of the study population is shown on the y-axis.

Bates et al, *Arch Int Med* 2007

HIV

- Strongest known risk factor for TB disease
- Increases risk of progression/reactivation of latent TB infection by 100-fold or more
- To date, impact on global epidemiology most evident in sub-Saharan Africa, but concern re unknown magnitude of HIV-TB coinfection notably in India

FIGURE 2

Estimated HIV prevalence in new TB cases, 2009

HIV prevalence in new TB cases, all ages (%)

- 0–4
- 5–19
- 20–49
- ≥50
- No estimate
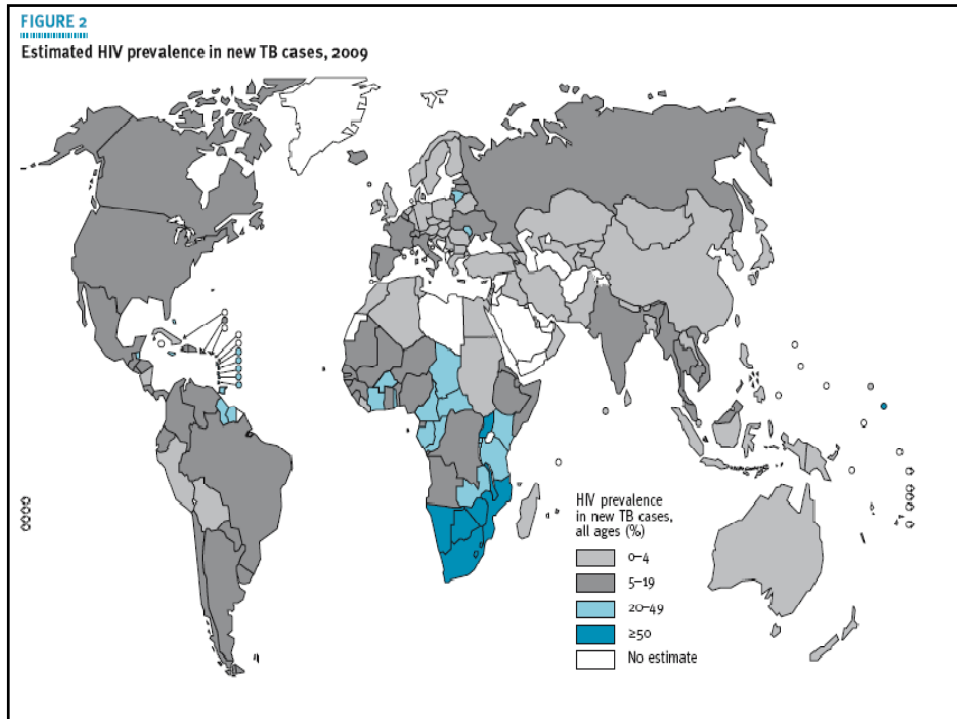
Drug Resistance

- In 2008, the estimated number of cases of multi-drug resistant TB was 440,000
- An estimated 3.1% of all new TB cases and 21% of retreatment cases were multi-drug resistant
  - Defined as resistance to isoniazid AND rifampin, with or without resistance to other antibiotics
- A marker of treatment program quality
- Poor prognosis, treatment complexity and expense

■ FIGURE 1.6
Countries with the highest numbers of estimated MDR-TB cases, 2007. Horizontal lines denote 95% confidence intervals. The source of estimates is drug resistance surveillance or surveys (DRS, in red) or modelling (in grey).
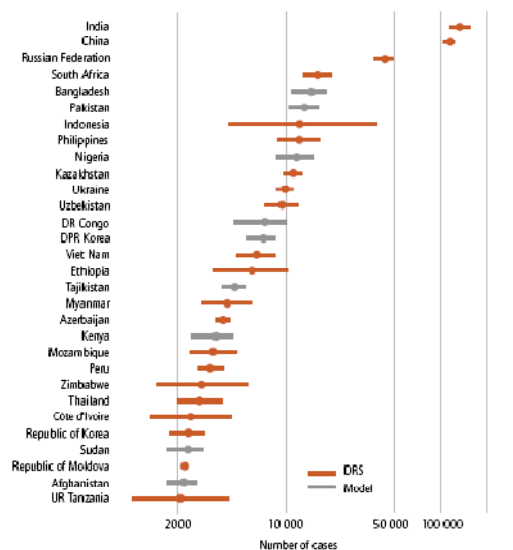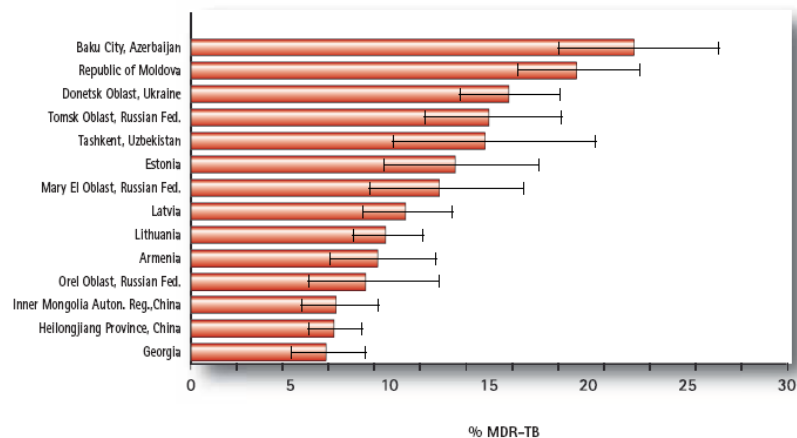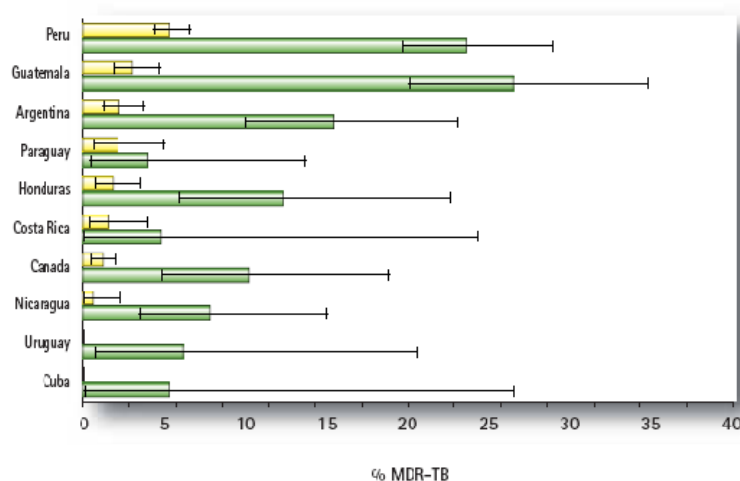

Figure 2: Countries or settings with multidrug-resistant TB prevalence higher than 6.0% among new cases, 2002–2007.

WHO, Anti-Tuberculosis Drug Resistance in the World, 2008

Figure 8: Prevalence of multidrug-resistant TB among new and previously treated cases in the WHO Region of the Americas, 2002–2007.

WHO, Anti-Tuberculosis Drug Resistance in the World, 2008

TB Control: DOTS

■ TABLE 2.2
Technical elements of the DOTS strategy

Case detection through quality-assured bacteriology
Case detection among symptomatic patients self-reporting to health services, using sputum smear microscopy. Sputum culture is also used for diagnosis in some countries, but direct sputum smear microscopy should still be performed for all suspected cases.

Standardized treatment with supervision and patient support
Standardized short course chemotherapy using regimens of 6-8 months for at least all confirmed smear-positive cases. Good case management includes directly observed treatment (DOT) during the intensive phase for all new smear-positive cases, during the continuation phase of regimens containing rifampicin and during the entirety of a re-treatment regimen. In countries that have consistently documented high rates of treatment success, DOT may be reserved for a subset of patients, as long as cohort analysis of treatment results is provided to document the outcome of all cases.

An effective drug supply and management system
Establishment and maintenance of a system to supply all essential anti-TB drugs and to ensure no interruption in their availability.

Monitoring and evaluation system, and impact measurement
Establishment and maintenance of a standardized recording and reporting system, allowing assessment of treatment results (see TABLE 2.7).

BOX 4

The Stop TB Strategy at a glance

THE STOP TB STRATEGY	
VISION	A TB-free world
GOAL	To dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals and the Stop TB Partnership targets
OBJECTIVES	• Achieve universal access to high-quality care for all people with TB • Reduce the human suffering and socioeconomic burden associated with TB • Protect vulnerable populations from TB, TB/HIV and drug-resistant TB • Support development of new tools and enable their timely and effective use • Protect and promote human rights in TB prevention, care and control

TARGETS	• MDG 6, Target 6.c: Halt and begin to reverse the incidence of TB by 2015
	• Targets linked to the MDGs and endorsed by the Stop TB Partnership:
	  — 2015: reduce prevalence of and deaths due to TB by 50% compared with a baseline of 1990
	  — 2050: eliminate TB as a public health problem

COMPONENTS

1. **Pursue high-quality DOTS expansion and enhancement**
   a. Secure political commitment, with adequate and sustained financing
   b. Ensure early case detection, and diagnosis through quality-assured bacteriology
   c. Provide standardized treatment with supervision, and patient support
   d. Ensure effective drug supply and management
   e. Monitor and evaluate performance and impact

2. **Address TB/HIV, MDR-TB, and the needs of poor and vulnerable populations**
   a. Scale-up collaborative TB/HIV activities
   b. Scale-up prevention and management of multidrug-resistant TB (MDR-TB)
   c. Address the needs of TB contacts, and of poor and vulnerable populations

3. **Contribute to health system strengthening based on primary health care**
   a. Help improve health policies, human resource development, financing, supplies, service delivery, and information
   b. Strengthen infection control in health services, other congregate settings and households
   c. Upgrade laboratory networks, and implement the Practical Approach to Lung Health (PAL)
   d. Adapt successful approaches from other fields and sectors, and foster action on the social determinants of health

4. **Engage all care providers**
   a. Involve all public, voluntary, corporate and private providers through Public-Private Mix (PPM) approaches
   b. Promote use of the International Standards for Tuberculosis Care (ISTC)

5. **Empower people with TB, and communities through partnership**
   a. Pursue advocacy, communication and social mobilization
   b. Foster community participation in TB care, prevention and health promotion
   c. Promote use of the Patients' Charter for Tuberculosis Care

6. **Enable and promote research**
   a. Conduct programme-based operational research
   b. Advocate for and participate in research to develop new diagnostics, drugs and vaccines

TB Control

- Continued implementation and expansion of the basic DOTS strategy
  - Target 70% case detection, 85% treatment success
- Strengthen basic TB control programs
- TB/HIV
- Drug resistance
- Public-private mix

■ FIGURE 2.2
DOTS coverage by WHO region, 2007. The red portion of each bar shows DOTS coverage as a percent of the population. The numbers in each bar show the population (in millions) within (red portion) or outside (grey portion) DOTS areas.
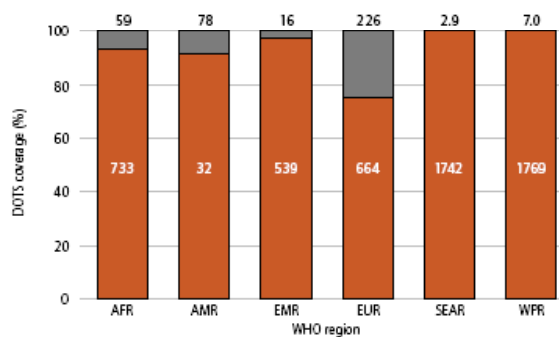
Estimates of the case detection rate for all cases (%), 1995–2009[a]

	1995			2000			2005			2009		
	BEST[b]	LOW	HIGH	BEST	LOW	HIGH	BEST	LOW	HIGH	BEST	LOW	HIGH
Afghanistan	–	–	–	18	15	23	47	39	59	49	41	60
Bangladesh	20	16	25	24	20	30	36	30	45	44	37	54
Brazil	79	66	99	74	62	93	84	70	100	86	72	100
Cambodia	24	19	32	30	25	36	56	48	65	60	52	70
China	37	30	46	34	28	41	69	59	81	75	66	86
DR Congo	40	33	50	35	29	43	40	33	50	46	38	56
Ethiopia	20	17	25	42	35	52	42	35	52	50	42	61
India	76	63	95	64	53	80	61	51	76	67	56	83
Indonesia	9.8	8.2	12	22	18	27	61	51	77	67	56	83
Kenya	46	38	57	50	42	63	71	59	88	85	70	100
Mozambique	43	36	54	31	26	38	35	29	44	46	38	57
Myanmar	10	8.6	13	16	14	20	55	46	69	64	53	78
Nigeria	6.4	5.4	8.1	7.6	6.3	9.5	14	11	17	19	16	24
Pakistan	4.4	3.6	5.4	3.2	2.7	4.0	37	31	46	76	63	93
Philippines	47	39	59	47	39	59	53	44	67	56	47	69
Russian Federation	53	44	67	77	64	97	82	68	100	84	71	100
South Africa	56	47	70	59	49	73	61	51	76	83	69	100
Thailand	55	46	69	40	33	50	64	54	80	69	57	85
Uganda	38	32	47	37	30	46	39	32	48	44	36	54
UR Tanzania	59	50	68	67	59	76	74	68	79	90	84	96
Viet Nam	37	27	45	56	41	68	56	41	68	54	42	72
Zimbabwe	55	46	69	60	50	75	49	41	61	46	38	56
High-burden countries	44	41	47	42	39	45	55	52	59	64	60	68
AFR	38	36	40	38	36	40	42	40	45	50	48	53
AMR	68	63	74	70	66	76	75	70	80	79	74	85
EMR	22	20	26	25	22	28	46	41	53	70	62	79
EUR	62	58	67	76	70	82	80	74	86	80	74	85
SEAR	53	47	60	49	44	56	58	51	66	65	58	74
WPR	41	35	48	40	35	46	66	59	74	70	64	78
Global	46	43	49	45	43	48	56	53	59	63	60	67

a. Treatment success (%)

|	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Afghanistan	–	–	45	33	86	85	84	87	86	89	90	84	87	88
Bangladesh	71	63	73	77	79	81	83	84	85	90	91	92	92	93
Brazil	17	20	27	40	78	71	55	80	77	76	76	73	72	71
Cambodia	91	94	91	95	93	91	92	92	93	91	93	93	94	95
China	93	94	95	95	95	93	95	92	93	94	94	94	94	94
DR Congo	74	48	64	70	69	78	77	78	83	85	85	86	87	87
Ethiopia	61	71	72	74	74	80	76	76	70	79	78	84	84	84
India	25	21	18	27	21	34	54	60	76	82	86	86	87	87
Indonesia	91	81	54	58	50	87	86	86	87	90	91	91	91	91
Kenya	75	77	65	77	79	80	80	79	80	80	82	85	85	85
Mozambique	39	55	65	–	71	75	78	78	76	77	79	83	79	84
Myanmar	67	79	82	82	81	82	81	81	81	84	84	84	85	85
Nigeria	49	32	73	73	75	79	79	79	78	73	75	76	82	78
Pakistan	70	–	67	23	70	74	77	78	79	82	83	88	91	90
Philippines	60	35	78	71	87	88	88	88	88	87	89	88	89	88
Russian Federation	65	57	67	68	65	68	67	67	61	60	58	58	58	57
South Africa	58	61	68	72	57	63	61	68	67	69	71	74	74	76
Thailand	64	78	58	68	77	69	75	74	73	74	75	77	83	82
Uganda	44	33	40	62	61	63	56	60	68	70	73	70	75	70
UR Tanzania	73	76	77	76	78	78	81	80	81	81	82	85	88	89
Viet Nam	89	89	85	92	92	92	93	92	92	93	92	93	92	92
Zimbabwe	53	32	69	70	73	69	71	67	66	54	68	60	78	74
High-burden countries	53	50	56	62	60	67	72	75	81	84	86	87	87	87
AFR	60	56	64	70	68	71	70	73	73	74	76	75	80	80
AMR	50	51	58	67	79	76	69	81	80	79	78	75	79	77
EMR	79	66	73	57	79	81	82	84	82	83	83	86	88	88
EUR	67	58	72	63	75	75	74	74	75	70	72	70	71	66
SEAR	33	31	29	40	34	50	63	68	79	84	87	87	88	88
WPR	80	72	91	92	91	90	91	90	91	91	92	92	92	93
Global	57	54	60	64	64	69	73	76	80	83	85	84	86	86

Other Aspects of TB Control

- Improved diagnostics
- Better selection of drug treatment regimens
- Treatment of MDR-TB: Green Light Committee
- New drugs, vaccines

TB in Canada

Figure 2

Tuberculosis cases and incidence rates – Canada: 1987-2007
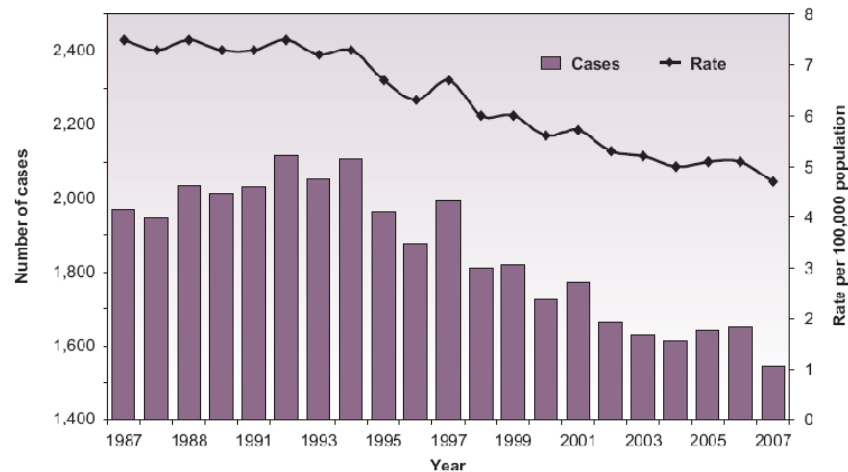
Ellis et al, Public Health Agency of Canada

Ranked tuberculosis incidence in Canada – provinces/territories: 2007

Reporting province or territory	Abbreviation	Incidence rate per 100,000
Nunavut	Nvt.	99.2
Northwest Territories	N.W.T.	34.5
Saskatchewan	Sask.	10.6
Yukon	Y.T.	9.2
Manitoba	Man.	8.6
British Columbia	B.C.	6.4
Ontario	Ont.	5.1
Alberta	Alta.	3.2
Quebec	Que.	3.0
Newfoundland and Labrador	N.L.	1.4
Nova Scotia	N.S.	0.7
New Brunswick	N.B.	0.7
Prince Edward Island	P.E.I.	0.0
CANADA		4.7

Quebec rate was 3.1/100,000 in 2008

Figure 6

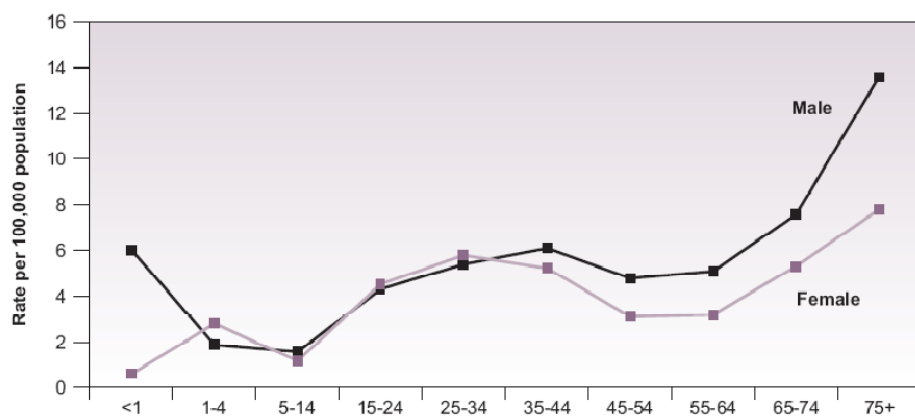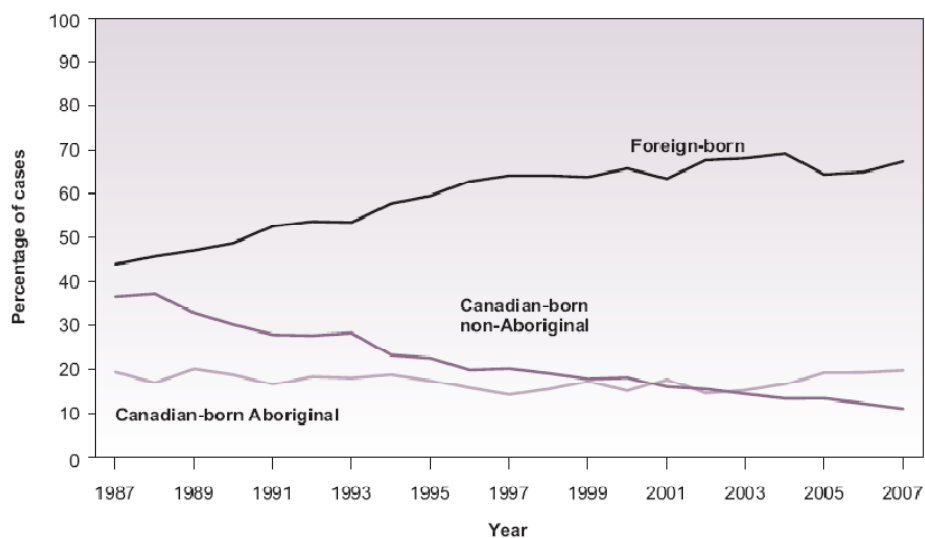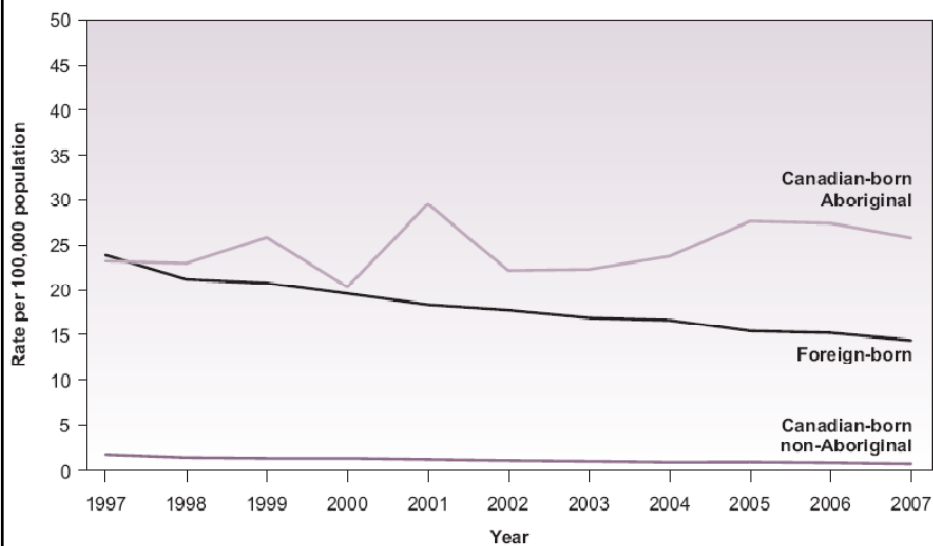Tuberculosis incidence rate by age group and sex – Canada: 2007

Figure 7

Percentage of tuberculosis cases by origin – Canada: 1987-2007

Figure 9

Tuberculosis incidence rate by origin – Canada: 1997-2007

Table 3

Reported new active and re-treatment tuberculosis cases by origin – Canada and provinces/territories: 2008

Birthplace			CANADA	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	North*
Canadian-born	Aboriginal													
	North American Indian		227	0	0	0	0	4	8	93	53	11	38	20
	Status Indian		218	0	0	0	0	4	7	89	53	9	36	20
	Non-Status	Cases	9	0	0	0	0	0	1	4	0	2	2	0
	Métis		27	0	0	0	0	0	0	1	19	3	3	1
	Inuit		87	2	0	0	0	22	3	0	0	1	1	58
	Total Aboriginal	Cases	341	2	0	0	0	26	11	94	72	15	42	79
		Rate	28.2	8.7	0.0	0.0	0.0	24.2	4.6	51.2	44.3	7.7	21.3	130.2
	Non-Aboriginal	Cases	209	6	0	0	3	77	42	10	9	20	42	0
		Rate	0.8	1.3	0.0	0.0	0.4	1.2	0.5	1.2	1.1	0.7	1.5	0.0
	Total Canadian-born	Cases	550	8	0	0	3	103	53	104	81	35	84	79
		Rate	2.1	1.6	0.0	0.0	0.4	1.5	0.6	10.1	8.5	1.2	2.8	78.6
Foreign-born (WHO regions)	Africa, high HIV prevalence		86	0	0	1	0	16	26	6	1	23	13	0
	Africa, low HIV prevalence		22	0	0	0	0	8	6	0	1	5	2	0
	American region – Latin American and Caribbean countries		59	0	0	0	1	28	24	1	0	3	2	0
	Established market economies and Central Europe	Cases	57	0	0	0	0	7	29	0	1	7	13	0
	Eastern Europe		16	0	0	0	0	4	5	1	0	2	4	0
	Eastern Mediterranean		103	0	0	0	0	21	54	4	2	18	4	0
	South-East Asia		222	0	0	1	0	9	132	3	1	28	48	0
	Western Pacific		406	0	0	0	0	37	182	19	5	46	117	0
	Unknown		14	0	0	0	0	2	9	3	0	0	0	0
	Total Foreign-born	Cases	985	0	0	2	1	132	467	37	11	132	203	0
		Rate	13.3	0.0	0.0	3.1	2.8	12.7	11.6	20.4	16.8	21.4	15.3	0.0
Unknown birthplace		Cases	65	0	0	2	0	6	48	0	0	0	0	0
TOTAL†		Cases	1,600	8	0	4	4	241	568	141	92	167	296	79
		Rate	4.8	1.6	0.0	0.4	0.5	3.1	4.4	11.7	9.1	4.7	6.8	73.2

Table C

Comparison of the reported foreign-born tuberculosis incidence rate in Canada by STOP-TB Partnership/WHO TB epidemiological regions of birth (per 100,000 population) with WHO estimated tuberculosis incidence rate in the respective region
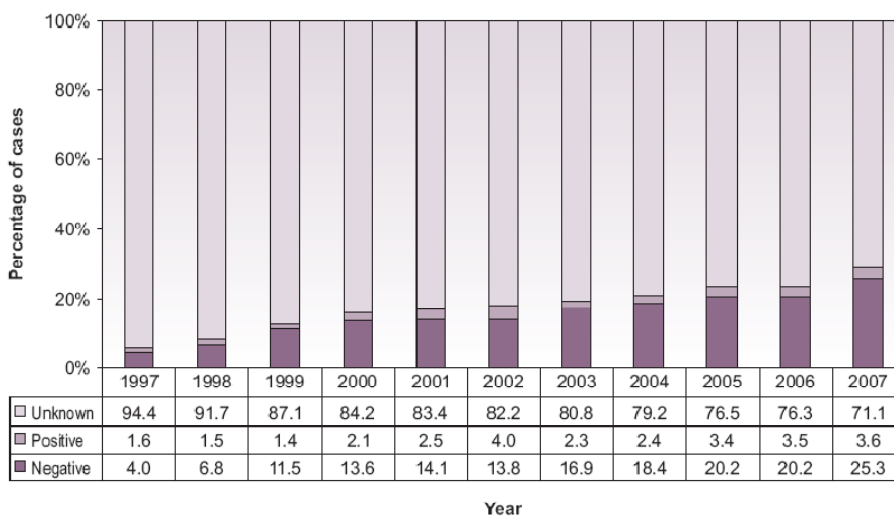
WHO regions*	Reported rate in Canada, 2007	WHO estimated TB incidence rate in regions, 2007**
Africa, High HIV Prevalence, (AFR High)	43.9	414
Africa, Low HIV Prevalence, (AFR Low)	29.7	217
American Region (AMR) – Latin American Countries (LAC)	9.4	56
Eastern Europe (EEUR)	7.2	91
Eastern Mediterranean (EMR)	15.7	104
Established Market Economies (EME) and Central Europe (CEUR)	2.3	12
South-East Asia (SEAR)	31.7	180
Western Pacific (WPR)	24.1	117
Overall	14.4	139

TB in the Foreign-Born

- Data consistently demonstrate parallel between incidence rates in countries of origin and incidence rates following arrival in destination country
- Incidence highest during the first years after arrival
  - Recently acquired infection
  - "Stressors" associated with migration?
- Disproportionately affects young adults

Figure 15

Percentage of tuberculosis cases by HIV status – Canada: 1997-2007

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
☐ Unknown	94.4	91.7	87.1	84.2	83.4	82.2	80.8	79.2	76.5	76.3	71.1
☐ Positive	1.6	1.5	1.4	2.1	2.5	4.0	2.3	2.4	3.4	3.5	3.6
☐ Negative	4.0	6.8	11.5	13.6	14.1	13.8	16.9	18.4	20.2	20.2	25.3

Year

Drug Resistance in 2009

Of 1,321 Canadian cases with drug resistance data:

- 125 (9.5%) resistant to one or more first-line drugs
- 96 (7.3%) mono-resistance to first line drugs (83 INH)
- 18 (1.4%) MDR-TB
- 0 XDR-TB

Montreal

- 123 reported active TB cases in 2007; maximum was 209 in 1994
- Corresponding decrease in incidence from 11.6 to 6.4 per 100,000
- Consistently ~80% of cases involve foreign-born persons

DSP Montréal-Centre, Bureau de surveillance épidémiologique

http://www.santepub-mtl.qc.ca/Mi/surveillance/mado/archives/90-2005/incidence90-2007.pdf

Elements of Canadian TB Control

- Successful completion of appropriate treatment for active TB
- Contact investigation, with suitable treatment of latent TB infection
- Screening of new immigrants and refugees for 1) active TB; 2) "high-risk" latent TB i.e. "inactive TB"
- Improved diagnosis and contact investigation among Aboriginals and other high-risk subgroups

Key Messages

- TB remains a global epidemic and public health emergency
- There are a number of reasons for this:
  - Basic TB control infrastructure
  - Limitations of current diagnostic tools and treatment
  - HIV
  - Drug resistance
  - General health and socioeconomic conditions
- Successful control will clearly require more than "basic DOTS"

Key Messages

- Relative to global incidence, TB in Canada is extremely rare
  - Incidence in Canada is clearly decreasing
  - TB is concentrated in several population subgroups including foreign-born, Aboriginals, those with "inner city risks"
  - We see the impact of global phenomena locally

IUATLD-NAR Meeting
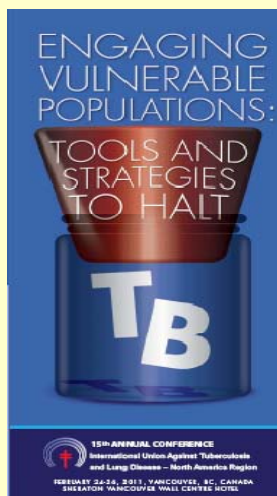
- TB in indigenous populations
- Impact of immigration and migration
- TB diagnostics
- TB, diabetes and tobacco

- Vancouver, February 24-26, 2011

http://www.bc.lung.ca/association_and_services/union.html