

Evolution de l'excès pondéral du diabète et du syndrome métabolique aux Seychelles, un pays en rapide développement

17 March 2006 David Faeh Evolution du diabète et du syndrome métabolique aux Seychelles 

1'100'000'000

Estimated global number of overweight and obese (BMI ≥ 25 kg/m²) individuals in 2004

Source: International Obesity Task Force (IOTF), <http://www.ietf.org/> 17 March 2006 David Faeh Evolution du diabète et du syndrome métabolique aux Seychelles 

including

312'000'000

Estimated global number of obese (BMI ≥ 30 kg/m²) individuals in 2004


Source: International Obesity Task Force (IOTF), <http://www.ietf.org/> 17 March 2006 David Faeh Evolution du diabète et du syndrome métabolique aux Seychelles 

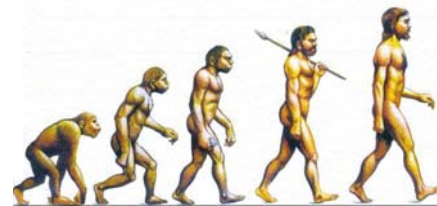
1 of 10 children is overweight or obese


(2004)

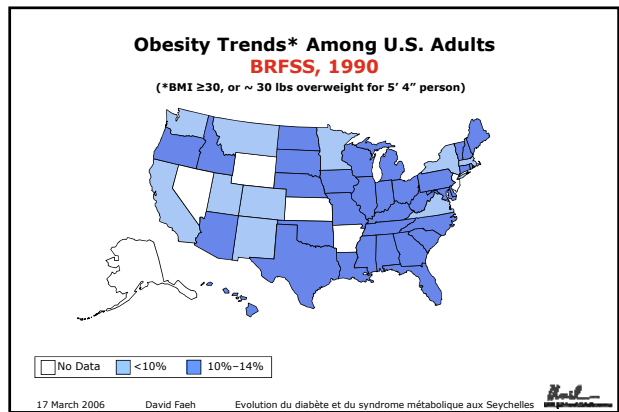
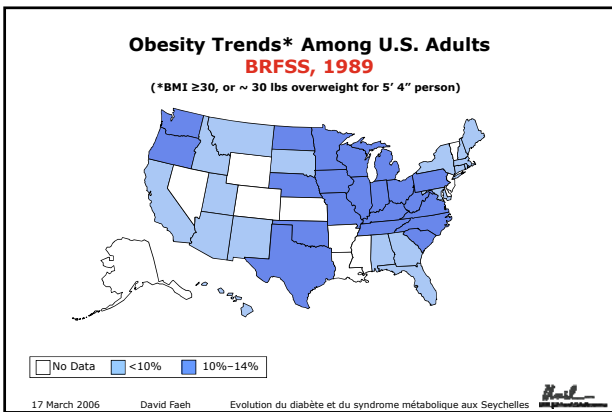
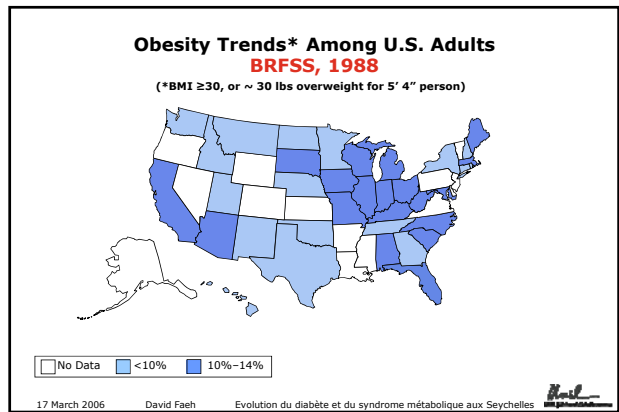
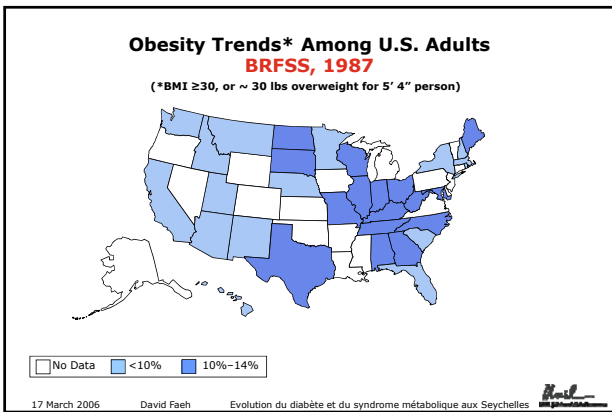
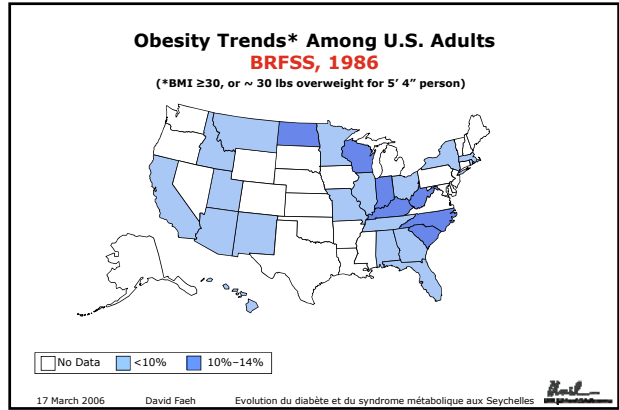
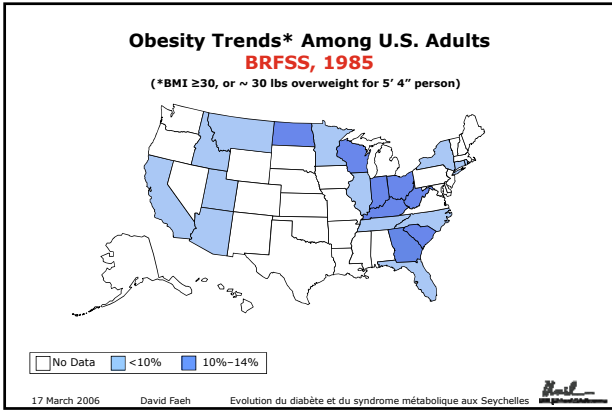
Source: International Obesity Task Force (IOTF), <http://www.ietf.org/> 17 March 2006 David Faeh Evolution du diabète et du syndrome métabolique aux Seychelles 

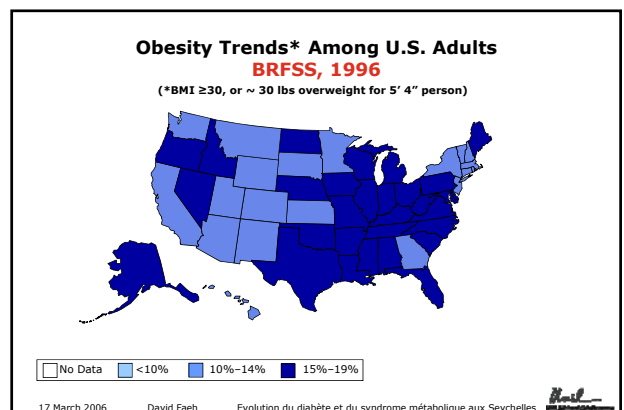
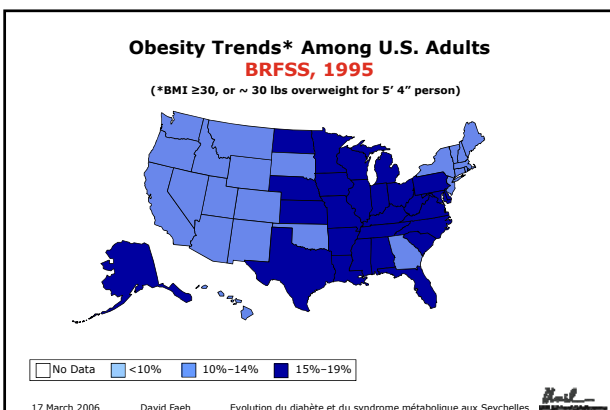
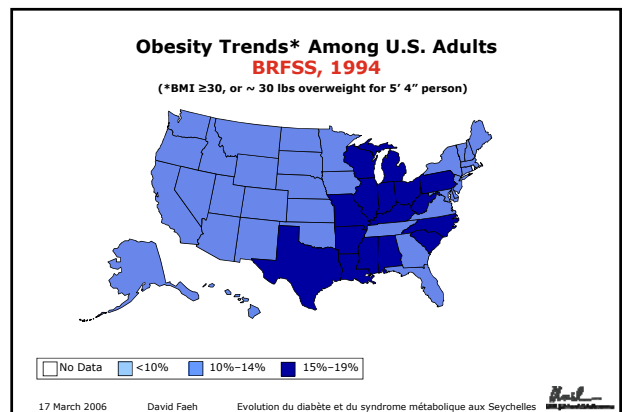
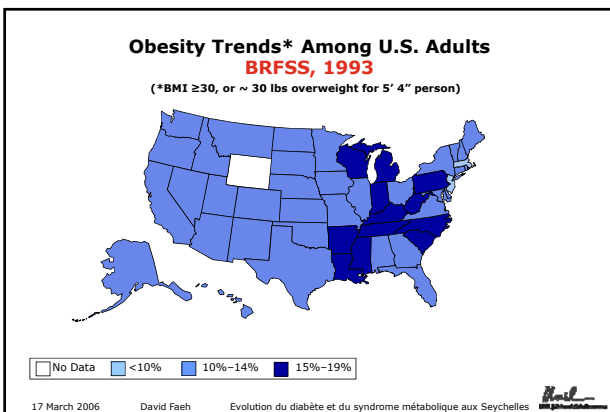
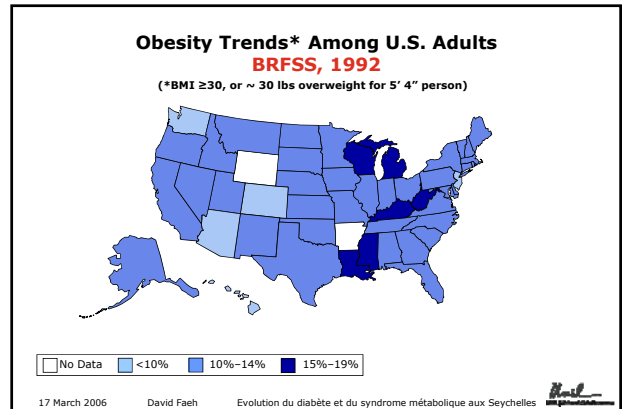
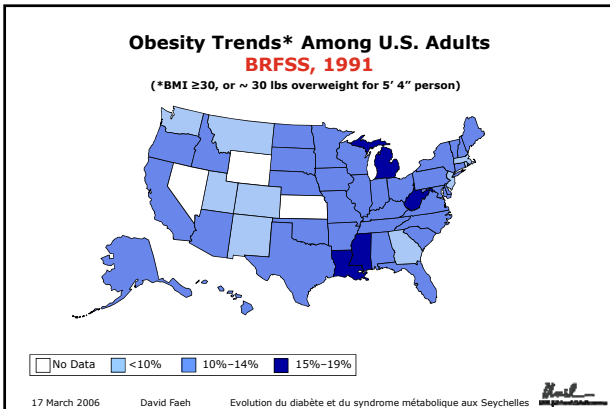
The only region where obesity is not common is sub-Saharan Africa

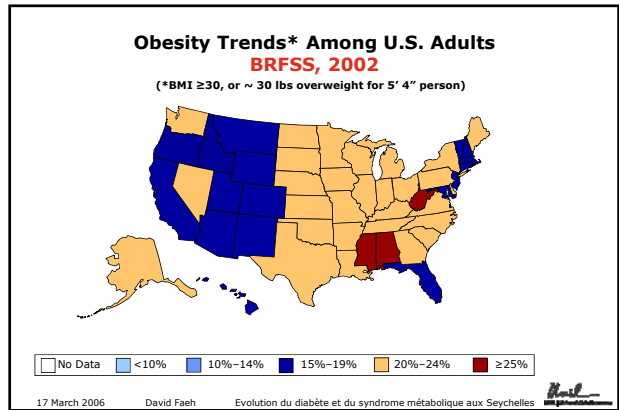
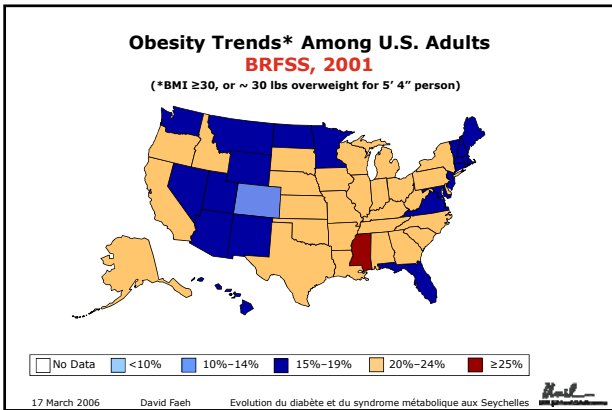
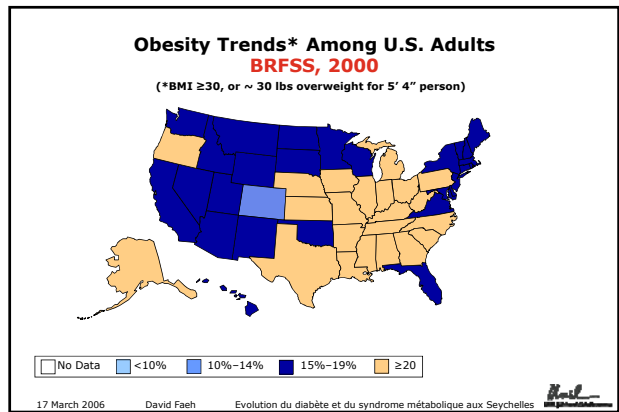
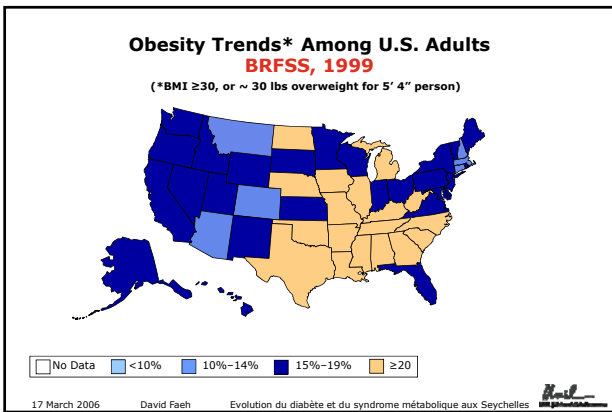
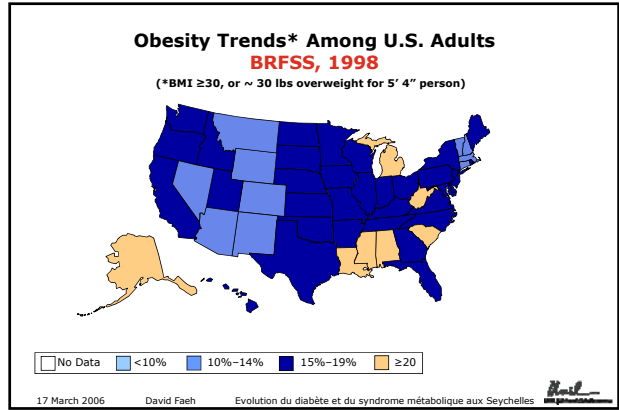
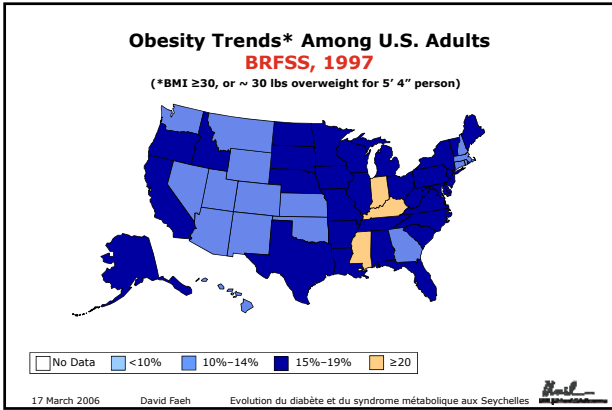
Source: International Obesity Task Force (IOTF), <http://www.ietf.org/> 17 March 2006 David Faeh Evolution du diabète et du syndrome métabolique aux Seychelles 

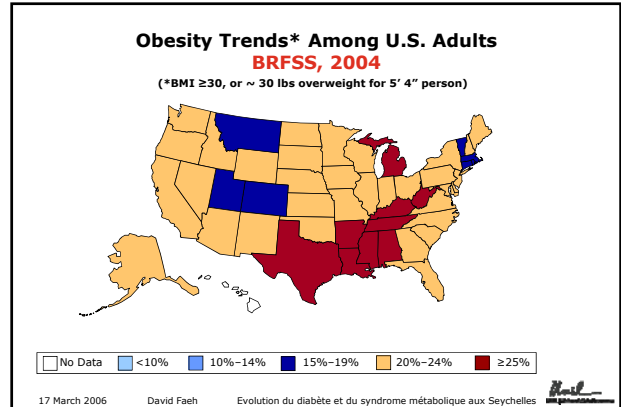
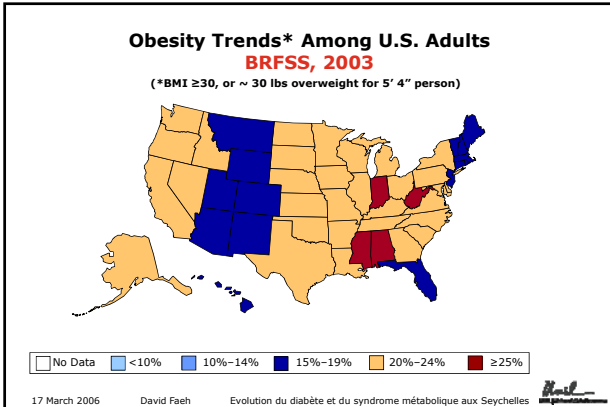


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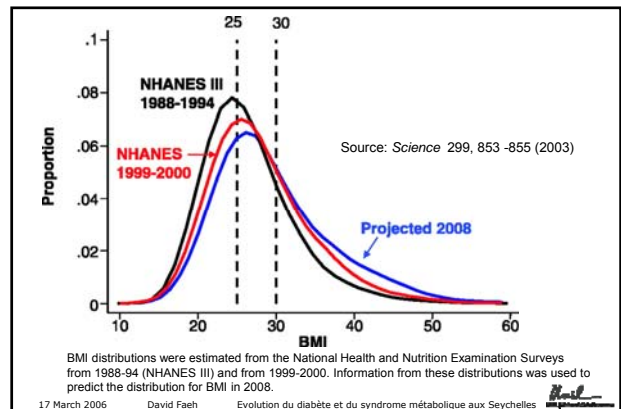
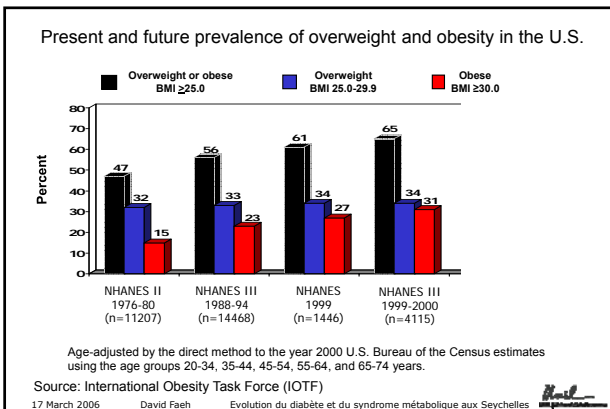
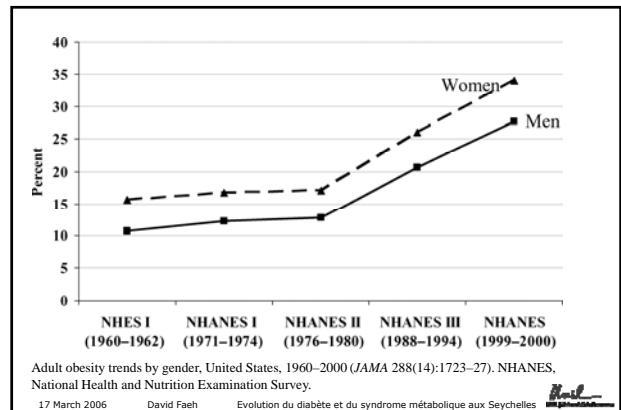




Citations

- Source: Behavioral Risk Factor Surveillance System (BRFSS), Centers for Disease Control and Prevention (CDC).
- Source: Mokdad A H, et al. JAMA 1999;282:16.
- Source: Mokdad A H, et al. JAMA 2001;286:10.
- Source: Mokdad A H, et al. JAMA 2003;289:1.

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Prevalence of overweight and obesity in the U.S. in 2010

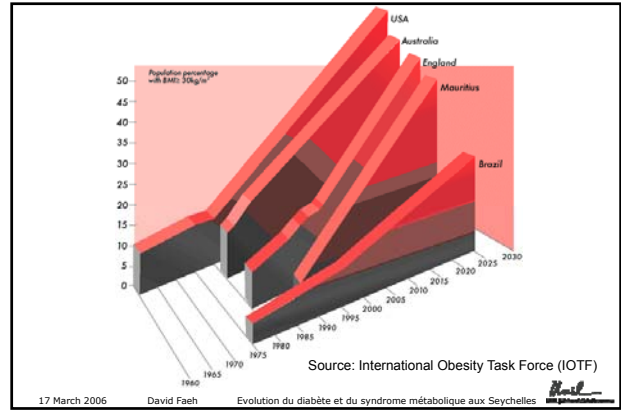
USA in 2010

- **75%** overweight (BMI $\geq 25\text{kg/m}^2$)

including

- **40%** obese (BMI $\geq 30\text{kg/m}^2$)

Source: Centers for Disease Control and Prevention (CDC), <http://www.cdc.gov/>

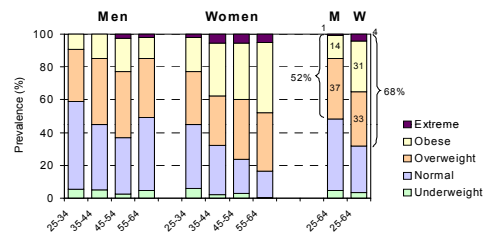


 The Republic of the Seychelles



- 80'000 inhabitants
- 90% black African decent
- 90% live on the main island (Mahé)
- 75% of workers are employed in services
- GDP per capita rose from US\$ 600 in 1976 to US\$ 8492 in 2004

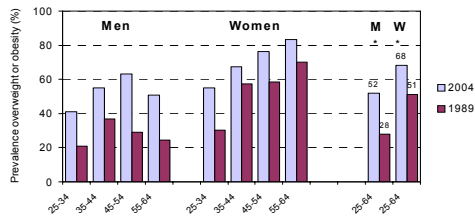
Prevalence of overweight/obesity in population aged 25-64



Prevalence of overweight/obesity: 52%M 68%W
 (~16,000 overweight, ~12,000 obese)

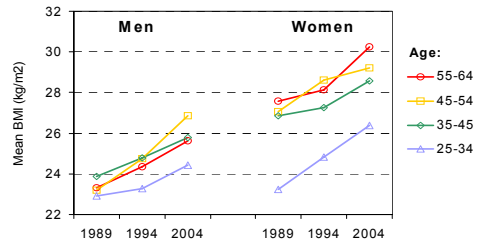
Source: Bovet, et. al. 2004

Trends in prevalence of overweight/obesity , 1989-2004



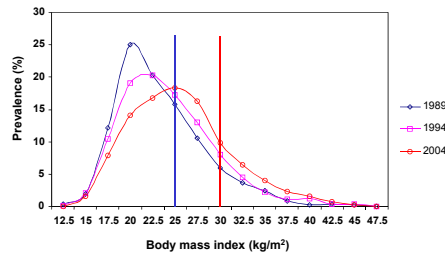
Source: Bovet, et. al. 2004

Increase in body weight (BMI) from 1989 to 2004



Source: Bovet, et. al. 2004

Distribution of BMI in the Seychellois population aged between 25 and 64 years, 1989-2004



Source: Bovet, et. al. 2004

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Country ^a	Year of Data Collection	Population	Age Category	Male % BMI 25-29.9	%BMI 25-29.9	Female % BMI 25-29.9	%BMI 25-29.9
Albania ^a	2001	1120	20+	16.5	22.8	17.2	21.3
Armenia	2000	1088	15-49	18.9	18.9	23.3	7.3
Austria	1999	841	20-64	40	10	27	14
Australia	2000	11067	20+	48.2	18.3	29.8	22.2
Argentina	1997	n/a	20-79	38.9	28.4	29.2	25.4
Bahrain	1998-99	1771	16-64	28.1	13.9	25.8	28
Bahrain	1998-9	2261	15+	36.7	23.3	23	24.1
Bangladesh	1999/2000	4496	15-49	18	10	3.7	0.7
Barbados	1991	n/a	25-74	16	10	28	21
Belgium	84-7	21556	35-59	48	14	28	13
Benin	2001	2876	15-49	18	11.2	4.8	4.8
Bolivia	1998	3057	15-49	15	15.5	11.2	11.2
Brazil	1997	n/a	20+	31	6.9	26.8	12.6
Brunei Darussalam	1997-99	n/a	Adults	44	12.9	45	13.9
Bulgaria ^a	1984	1986	25-74	16	16.3	20.8	20.8
Burkina Faso	98/99	3277	15-49	18	4.8	0.9	0.9
Cambodia	2000	2398	15-49	18	5.1	6.3	6.3
Cameroon ^a	2000	3469	15+	15	5.1	13.8	13.8
Canada ^b	2000/01	30801	20-64	40	16	25	14
Central African Republic	1994/95	2025	15-49	18	6.6	1.1	1.1
Chad	1996/7	3429	15-49	18	4.5	0.8	0.8
China ^c	1992	3120	25-64	30.2	16.7	23	23
China ^d	1998-2000	2776	20-64	30.2	2.84	28.9	6.5
Colombia	2000	3070	15-49	18	30.3	19.5	19.5
Comoros	1996	773	15-49	18	15.9	4.4	4.4
Congo ^a	1996	3529	15+	15	2.3	5.8	5.8
Cook Island	n/a	n/a	n/a	n/a	38.6	38.8	38.8
Costa Rica	2000	1332	20-64	47.9	45.4	45.4	45.4
Cote d'Ivoire	1998/9	1299	15-49	18	13.5	4.5	4.5
Croatia	1999/97	5840	18-60	48.1	31.1	34.7	15.2
Cuba	1999	4197	20-64	25.1	7.1	28.7	18.2
Cyprus	1999-2000	1019	25-64	46	26.6	34.2	23.7
Czech Republic	1997/8	3068	26+	48.6	34.7	31.4	28.2

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Denmark ^a	1992	1624	30-60	39.7	12.5	26	11.3
Dominican Rep.	1996-9	8178	18-74	18.4	16.4	18.3	18.3
Egypt	2000	8781	15-49	18	38.8	32.4	32.4
England	2003	15089	16+	43.2	22.2	32.6	23
Ethiopia	2000	6493	15-49	18	2.1	0.2	0.2
Eritrea	2002	8754	15-49	18	9	2	2
Estonia	1997	1154	19-64	32	9.9	23.9	6
Fig	1993	1189	>19	21.1	5.8	28.1	18.3
Finland	1997	4284	25-64	48	19.8	33	18.4
France ^b	2003	26770	15+	37.4	11.4	23.7	11.3
French Polynesia	1998	1773	18+	38.8	38.3	38.2	34.3
Gabon	2000	2180	15-49	18	21.3	8.2	8.2
Gambia	1996-7	6389	15+	18	0.6	4.4	4.4
Germany	2002	3827	26+	49.8	29.6	36.6	23.2
Ghana	1997	8300	25+	17.4	4.4	28.9	26.2
Greece	1994-8	28773	19-64	51.1	27.6	34.6	34.1
Guatemala	1998/9	2199	15-49	18	31.7	12.1	12.1
Guinea	1999	3142	15-49	18	8.4	2.6	2.6
Haiti	1994/5	1896	15-49	18	8.9	2.6	2.6
Honduras	1998	888	15-49	18	27.8	7.8	7.8
Hungary	1992-4	2059	18+	41.9	21	27.8	21.2
India	1991-8	6176	18+	47.3	17	35.2	18.3
India	1998	177841	18+	44	5.3	4.3	0.6
Indonesia	2001	12910	15+	7.3	11.1	14.2	3.6
Israel	2000	2020	25-64	43.6	14.7	30.3	20.8
Iran	2000	16146	20+	47	18	48	36
Ireland	1997/99	1379	15-64	48.3	28.1	32.6	15.8
Italy ^b	1992	14900	20+	41	9.5	26.7	8.8
Jamaica	1981-1995	n/a	25-74	22.4	7.2	39.2	31.4
Japan	2000	8306	20+	23.9	2.9	17.4	3.3
Jordan ^a	1994-8	2836	25+	18	32.7	39.8	39.8
Kazakhstan	1995	2038	15-49	18	21.8	16.7	16.7
Kenya	1998	3163	15-49	18	12.1	2.7	2.7
Korea (South)	1998	8816	15-79	22	1.6	23.4	3
Kuwait	1998-2000	8755	20+	38.3	27.6	32.8	29.9

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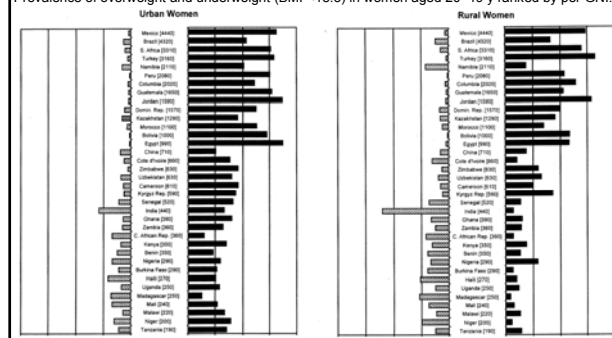
Kyrgyzstan	1993	4063	18-59	25.4	4.2	24.3	10.7
Latvia	1997/2002	2292	19-64	41	6.6	33	17.4
Lebanon	1998-2002	2848	25-64	41.3	16.3	28.3	28.3
Lithuania	1997	2096	19-64	41.8	11.4	32.7	18.3
Luxembourg	2006	5206	16+	45.6	13.9	30.7	13.9
Moldova	1997	2664	15-49	18	2.3	0.4	0.4
Malawi	2000	6489	15-49	18	9.5	1.5	1.5
Malaysia	1996	20165	18+	20.1	4	21.4	7.8
Maldives	1996	4327	15-49	18	7.2	1.2	1.2
Malta	1984	n/a	25-64	46	22	32	35
Marshall Islands	1993	1863	18+	29	21	29	21
Mauritania	2000/01	2826	15-49	18	33.6	19.2	19.2
Mauritius	1990	6261	20-74	33	6	34	20
Mexico	2000	8138	25-69	41.3	18.6	38.2	29
Morocco	1999	2449	20+	30.8	13.8	32	28.6
Morocco	2000	1797	20+	28.8	8.2	29.8	21.7
Mozambique	1997	2691	15-49	18	7.8	1.7	1.7
Namibia	1992	2226	15-49	18	13.8	1.8	1.8
Nicaragua	1994	n/a	25-49	18	60.2	3.2	0.5
Nepal	2001	4078	15-49	18	10.4	29.5	10.1
Netherlands	1998-2002	3681	20-69	43.6	10.4	29.5	10.1
New Zealand	1997	4429	15+	47.9	14.79	14.79	19.2
Nicaragua	1997/98	4793	15-49	18	28.8	11.6	11.6
Niger	1998	3224	15-49	18	6	6	6
Nigeria	1991-4	1980	20+	6.5	6	9.1	9.1
Norway	1997	740	20+	34	15	38	46
Norway (Troms)	1994-95	854	20-49	18	10	16	11
Oman	2000	5838	20+	31.8	16.2	26.6	20.5
Pakistan	1998	1471	18+	18.3	4.5	21.4	8.86
Pakistan	1994	326	20-65	30	23.8	42.6	42.6
Panama	2000	876	15-83	30.92	27.88	33.44	38.08
Paper New Guinea	1991	720	26+	74.8	79.6	79.6	79.6
Paraguay	2000	1993	16-68	29.74	41.6	32.8	36.1
Paraguay (A areas)	1996	n/a	Adults	41.8	7.2	40.9	16.4
Philippines	1993/95	9259	20+	14.9	2.1	18.9	4.4
Poland ^b	1996	28427	15+	18	10.3	12.4	12.4

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Qatar	2002	1208	20-65	34.2	34.6	32	45.2
Romania	2000	4096	15-49	18	11.8	1.4	1.4
Romania ^c	1997	7547	25+	18	10.8	22.4	22.4
Russia	2000	3096	19-55	28.7	18.3	27.4	21.8
Russia	1995	581	20+	18	32.9	45.6	63
Saudi Arabia	1995-2000	17223	30+	42.4	24.4	31.8	44
Scotland	1998	7456	16+	43	19	32	22
Senegal	1992/3	2886	15-49	18	12	3.7	3.7
Seychelles	1994	1069	25-64	28.8	8.6	31.6	28.2
Seychelles	2004	2760	25-64	36.9	15.0	33.1	35.2
Slovakia ^a	1995	4733	20+	18	18	18	18
South Africa	1998	13685	15+	21.1	10.1	25.9	27.9
Spain	1990-2000	9885	25-60	45	13.4	32.2	15.8
St Lucia	1991-94	1084	25-74	44	8.4	28.7	28.7
Sweden	1996-7	15422	18-84	41.2	10	29.8	13.9
Switzerland ^b	2000-1	2482	35-74	49.9	14.1	27.6	10.4
Tanzania ^a	1998	9313	20-64	4.6	4.6	10	10
Thailand ^a	1985	3486	35-64	23.3	3.2	18.4	3
Togo	1998	3029	15-49	18	4.8	9	2.4
Togo	n/a	n/a	n/a	n/a	46.8	70.3	70.3
Trinidad & Tobago	1999	803	20+	29.6	10.7	33.6	21.1
Tunisia	1997	2760	20-68	23.2	8.7	29.3	22.7
Turkey ^a	2001-2	9916	20+	48.6	18.6	28.6	28.6
Turkmenistan	2000	2117	15-49	18	16	7.8	7.8
UAE ^b	2000	6565	20-79	25.6	25.6	29.9	29.9
Uganda	2000/01	3222	15-49	18	8.5	1.7	1.7
Uruguay ^b	1998	800	18+	40	17	30	18
USA	1999-2000	2951	20-74	29.3	27.7	28	24
USA	1998	228	20+	18	18	18	18
Uzbekistan ^a	1997	1064	35+	14	14	33	33
Uzbekistan	1998	1614	20+	33.6	32.2	32.2	19.8
Venezuela	1981-87	7542	20-50	22.1	4.7	23	6.8
Vietnam	2003	7400	15+	44	17	36	18
Vietnam	1997	5479	15-49	18	11.1	4	4
Vietnam	2001/2	3629	15-49	18	7.9	2.4	2.4
Zimbabwe	1998	228	25-49	18	4.8	4.8	4.8

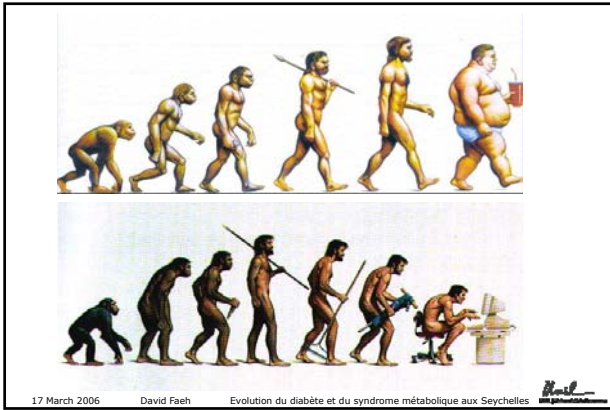
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Prevalence of overweight and underweight (BMI <18.5) in women aged 20-49 y ranked by per GNI.

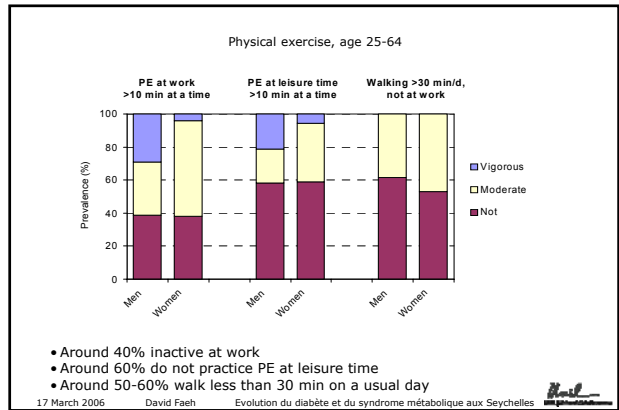
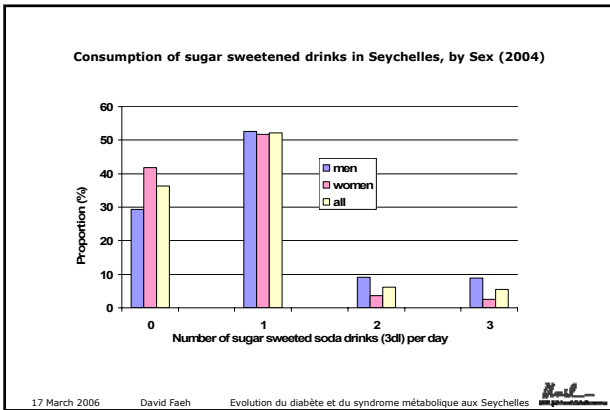
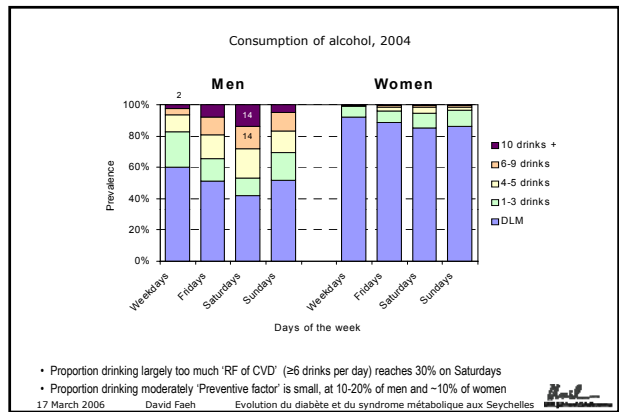
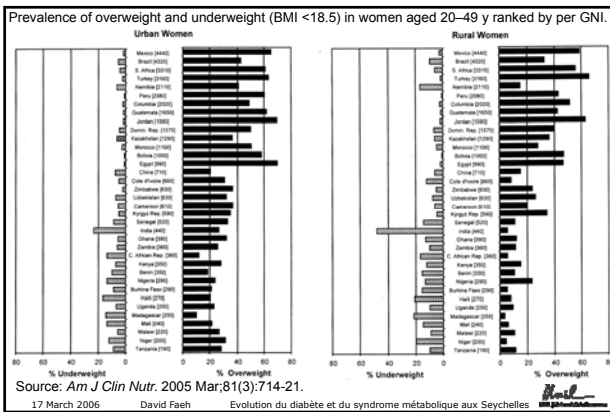


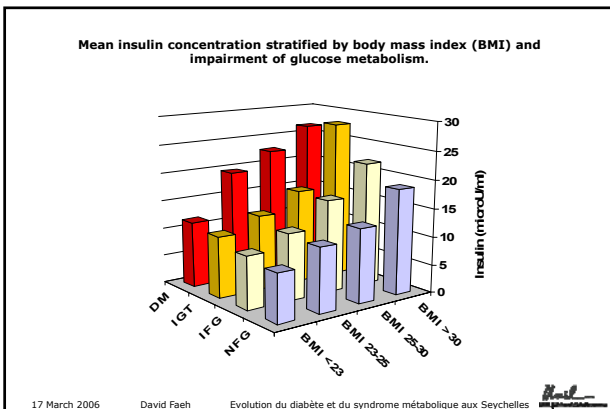
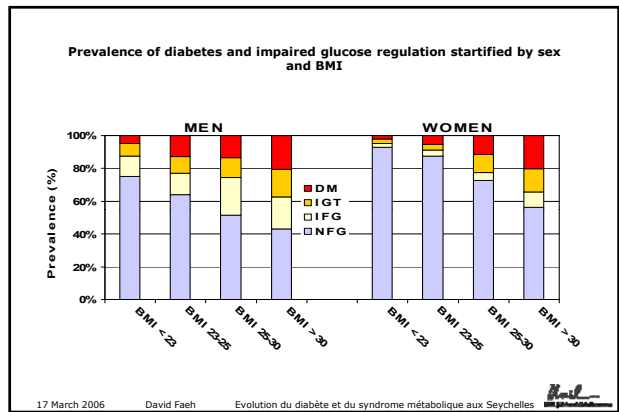
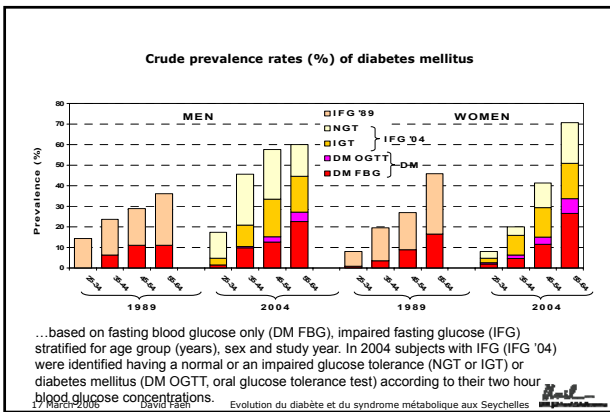
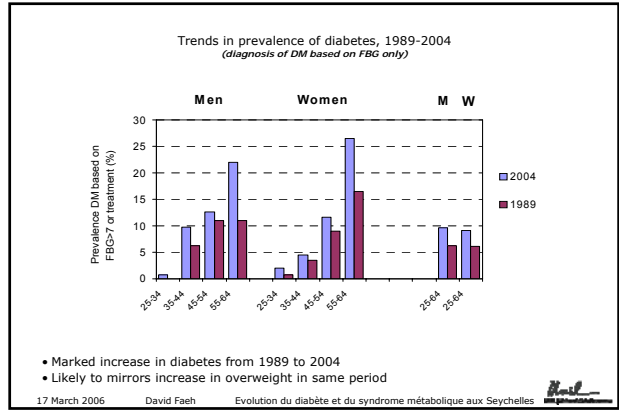
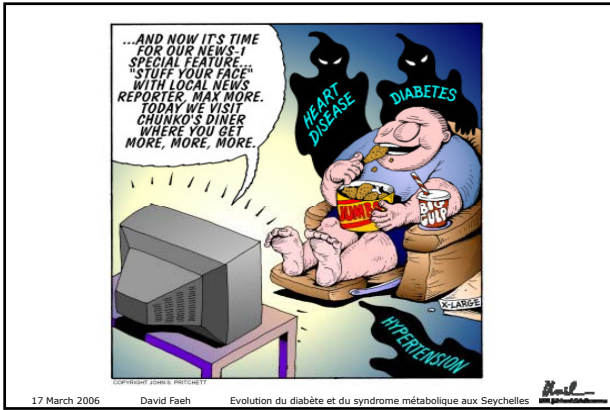
Source: Am J Clin Nutr. 2005 Mar;81(3):714-21.

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Topic	Seychelles	Canada
Official name:	Republic of Seychelles	Canada
Capital:	Victoria	Ottawa
Area (Thousands of km²):	0.455	9,985
Population (millions):	0.081 (2004)	32.0 (2004)
Population density (per km²):	178 (2004)	3 (2004)
Urban population (%-2003):	87	80
GNI purchasing power parity (per capita):	US\$7,480 (2003)	US\$23,930 (2003)
GNI purchasing power parity (per capita):	US\$15,960 (2003)	US\$29,740 (2003)
Structure of (%-2003):		
□ Agriculture	3	2
□ Industry	35	32
□ Services	62	66
Ecological footprint (global hectares per person-2002):	N/A	6.4
Human development index () ranking:	35 th of 177 countries (2002)	4 th (2002)
Gender-related development index () ranking:	N/A of 144 countries (2002)	4 th (2002)
Life expectancy at birth:	N/A (1960), 73 (2003)	71 (1960), 79 (2003)
Mortality rate under 5 years old (per 1,000):	N/A (1960), 15 (2003)	33 (1960), 6 (2003)
Adult literacy rate (% 2000-2004):		
□ Total	92	99
□ Men	91	99
□ Women	92	99
Population using improved drinking water sources (%-2002):		
□ Total	87	100
□ Urban	100	100
□ Rural	75	99



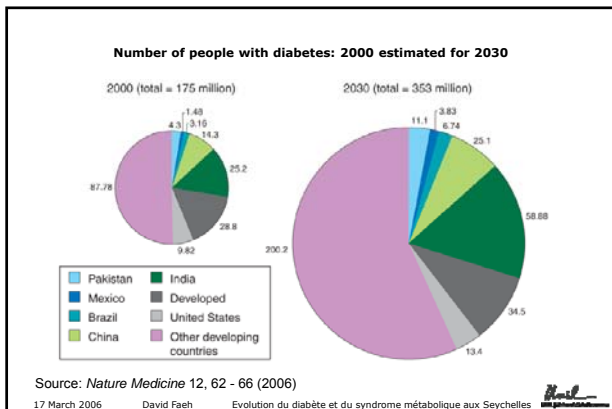
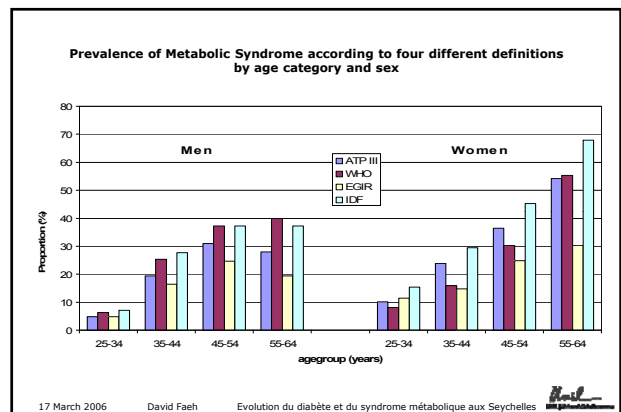
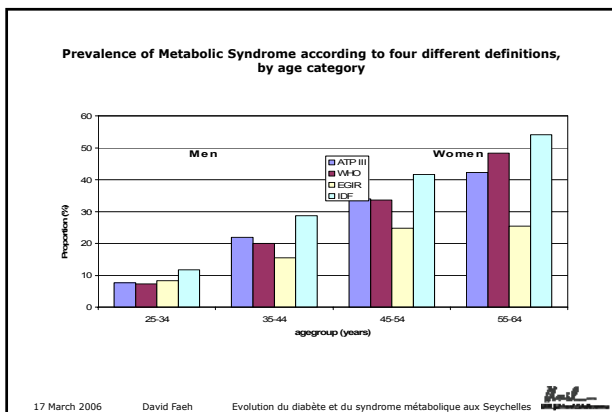
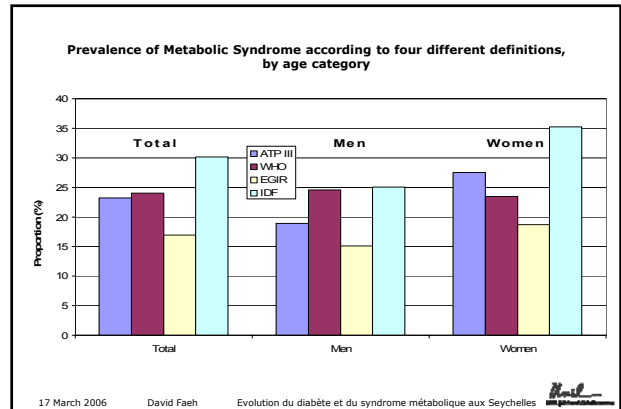
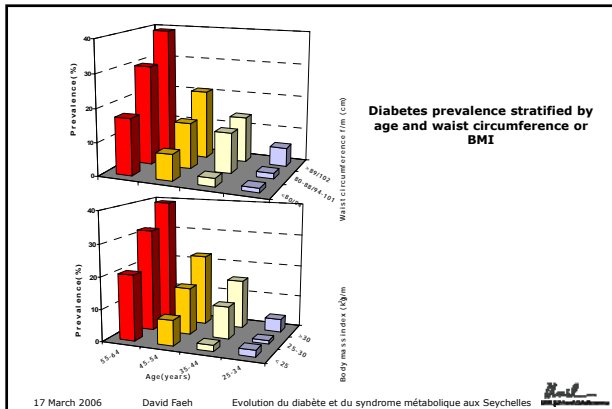


Population attributable fraction (PAF) of diabetes related to overweight and obesity in 2004 adjusted for age and family history of diabetes

	Men		Women		All	
	PAF* (%)	AFE** (%)	PAF* (%)	AFE** (%)	PAF* (%)	AFE** (%)
Overweight (BMI 25-29 kg/m ²)	15	16	18	25	16	20
Obesity (BMI ≥ 30 kg/m ²)	14	28	41	39	27	33
Total excess weight (BMI ≥ 25 kg/m ²)	28	44	60	64	43	53

*In exposed (BMI > 25 kg/m²) and unexposed (BMI < 25 kg/m²) individuals
 **In exposed (BMI > 25 kg/m²) individuals

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- Evidence from randomized controlled trials on three continents show, that maintenance of modest weight loss through diet and physical activity **reduces the incidence of DM in high-risk individuals by $\geq 40-60\%$ over 3-4 years.**

Source: *Diabetes Care* 2005, 28:1599-1603

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- Reserve

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Diabetes prevalence in people over 20 years of age in 2000 and predicted for 2030 in countries with more than 100 million inhabitants.

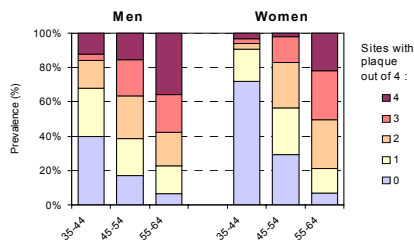
Countries (population >100 million)	Diabetes prevalence in 2000 (>20 years of age as a percentage)	Estimated prevalence in 2030 (>20 years of age as a percentage)
Bangladesh	4.6	7.7
Brazil	4.3	7.0
China	2.4	3.7
India	5.5	8.0
Indonesia	6.7	10.6
Japan	5.3	7.3
Malaysia	7.6	10.8
Mexico	3.9	6.4
Nigeria	3.4	4.0
Pakistan	7.7	8.7
Russia	4.2	5.3
United States	8.8	11.2
World	4.6	6.4
All developed	6.3	6.4
All developing	4.1	6.0

Source: *Nature Medicine* 12, 62 - 66 (2006)

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Proportion with atherosclerosis in carotid arteries (Subclinical cardiovascular disease investigated in 4 arteries)



- Atherosclerosis ('narrowed arteries', risk of major CVD) increases sharply with age.
- Less than 10% of persons aged 55-64 have no plaque on the considered 4 arteries.
- Before 55 men > women; after age 55, women ~men

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Age adjusted population attributable risk fraction (%) of diabetes related to excess weight

	Men		Women		All	
	1989	2004	1989	2004	1989	2004
Overweight (BMI 25-29 kg/m ²)	32.5	18.4	17.1	20.1	25.3	17.7
Obesity (BMI ≥ 30 kg/m ²)	10.1	12.2	21.5	44.4	17.0	25.7
Total excess weight (BMI ≥ 25 kg/m ²)	42.7	30.6	38.5	64.5	42.3	43.4

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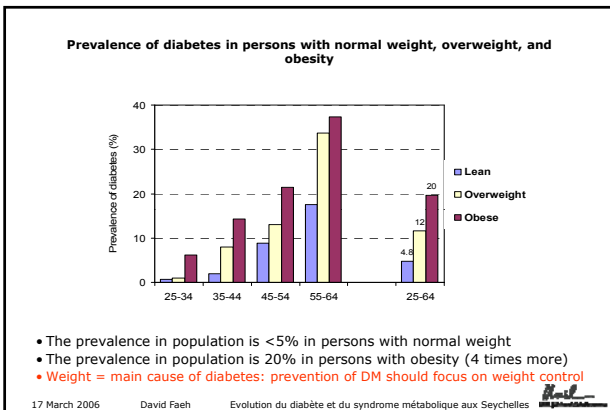
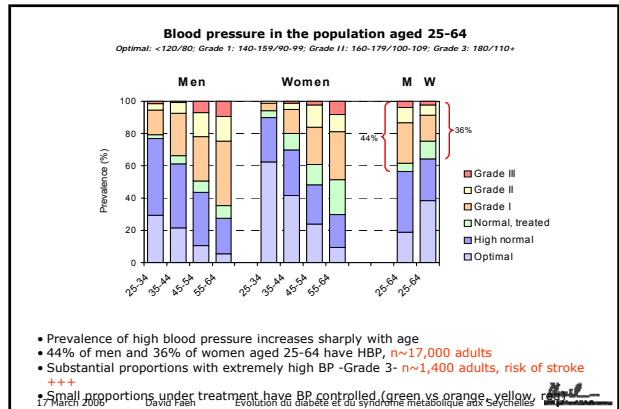


WHO	NCEP ATP III	ESR	IDF
Impaired glucose regulation, diabetes or insulin resistance and 2 any two of the other four criteria	Three or more of the following:	Insulin resistance (upper quartile of fasting insulin values) and any two of the following	Central obesity and 2 any two of the other four criteria
Central obesity	Waist circumference > 102 cm (M) or > 88 cm (F)	Waist circumference > 94cm (M) > 88cm (F)	Waist circumference > 94 cm (M) or > 88 cm (F)
Triglycerides	≥ 1.7 mmol/l (150 mg/dl) and/or HDL < 0.9 mmol/l (55 mg/dl) (M) or < 1.0 mmol/l (50 mg/dl) (F)	≥ 2.0 mmol/l or ...	≥ 1.7 mmol/l (150 mg/dl)
High density lipoprotein (HDL) cholesterol	< 1.03 (40 mg/dl) (M) or < 1.29 (50 mg/dl) (F)	< 1.00 mmol/l	< 1.03 mmol/l (40 mg/dl) (M) or < 1.29 mmol/l (50 mg/dl) (F)
Blood pressure	≥ 140/90 mmHg	≥ 140/90 mmHg	≥ 130/85 mmHg or Treatment
Fasting blood glucose	≥ 6.1 mmol/l (110 mg/dl) or known diabetes	≥ 6.1 (110 mg/dl) - 7.0 mmol/l (126 mg/dl)	≥ 6 mmol/l (100 mg/dl) or known diabetes
Two hour blood glucose	≥ 7.8 mmol/l (140 mg/dl)	7.8 mmol/l (140 mg/dl) - 11.1 mmol/l (200 mg/dl)	
Insulin	Insulin resistance (upper quartile of HOMA index)	Insulin resistance (upper quartile of HOMA index)	
Microalbuminuria	Microalbuminuria ≥ 20 µg/min or albumin: creatinine ratio (ACR) ≥ 30 mg/g		

In bold: index factor
M: male; F: female

WHO: Waist-to-Hip-Ratio

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Adult obesity in 2002 and estimated level in 2010, expressed as percent of people ≥ 15 years of age with a BMI ≥ 30

Country	2002		2010	
	Males	Females	Males	Females
Bangladesh	0.1	0.1	0.2	0.2
Brazil	6.9	15	12.4	24.5
China	1	1.5	4.1	3.6
India	0.9	1.1	1.7	2
Indonesia	0.2	2	0.2	3.9
Japan	1.5	1.5	2.3	1.1
Malaysia	1.6	6.8	1.7	41
Mexico	20.3	31.6	30.1	41
Nigeria	1.6	4.9	3	8.1
Pakistan	0.8	2.9	1.4	5
United States	32	37.8	44.2	48.3
World	5.7	9.4	8.0	12.3
High income*	18.1	20.4	24.3	25.9
Upper middle income	14.0	21.1	19.7	29.0
Lower middle income	4.1	9.9	6.6	12.6
Low income	1.1	2.8	1.7	4.2

*World Bank Income Groups (Figures in US dollars): high income, >9,206; upper middle income, 2,976-9,205; lower middle income, 746-2,975; low income, <745. Data source: World Development Indicators, World Bank, Washington DC, 2003.

Source: Nature Medicine 12, 62 - 66 (2006)

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