

Being Fat in the Cold: Are the Circumpolar Inuit Becoming More Obese?

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Issues

- Are Inuit at higher risk for obesity than other populations?
- Is obesity more common today than it was in the past?
- Is the observed obesity metabolically harmful?
- Are the obesity measures appropriate for the Inuit?
- What are the research gaps?

Historical Notes

- *The [Copper Eskimo] are of about middle stature, and sturdy and robust in build. The fur clothing in which they are habitually enveloped gives them an exaggerated appearance of corpulence, whereas in reality they incline towards slenderness, the body tapering a little below the broad shoulders*

(Diamond Jenness 1923)

- *As a rule the Eskimos are powerfully built and plump without being fat. The trunk is comparatively long and the arms and legs short in relation to the total height*

(Kaj Birket-Smith 1936:32)

- *[There is a] popular misconception of Eskimos eating lots of blubber and being jolly rotund fellows whose presumably ample subcutaneous fat padding helps them to withstand the Arctic cold ...*
(Otto Schaefer 1977)



Newman's review of Inuit anthropometric data

(Hum Biol 1960)

Year	Population	Sample Size	Mean Ht(cm)	Mean Wt(kg)	BMI
1901,1923	Copper Eskimo, NWT	20	163.5	74.0	28
no date	SW Greenland	43	157.7	64.3	26
1951	Aleut	28	161.2	65.3	25
1954	E Greenland	162	162.0	64.1	24
1949	SW Greenland	121	159.3	61.1	24
1885	Pt Barrow, Alaska	51	161.3	66.0	25
1958	E Greenland	133	162.4	63.6	24
1939	Chesterfield Inlet, NWT	30	162.7	65.3	25
1952	Alaska, various sites	17	165.7	63.3	23
1950	St.Lawrence Island	27	165.0	63.2	23

Regional anthropometric surveys of adults

- Alaska, 1958: Interdepartmental Committee on Nutrition for National Defence – 8 villages – 189 M, 129 F adults – Ht and Wt

(Mann et al *Am J Clin Nutr* 1962)

- Central/eastern NWT, 1960s: >1000 Inuit – Ht, Wt, Tri, Subs skinfolds

(Schaefer *Am J Clin Nutr* 1977)

- International Biological Program – Human Adaptability, 1960s: NW Alaska (5 villages), NWT (2 villages), W. Greenland (2 villages) – 270 M, 289 F – Ht, Wt, skinfolds

(Auger et al, 1980)

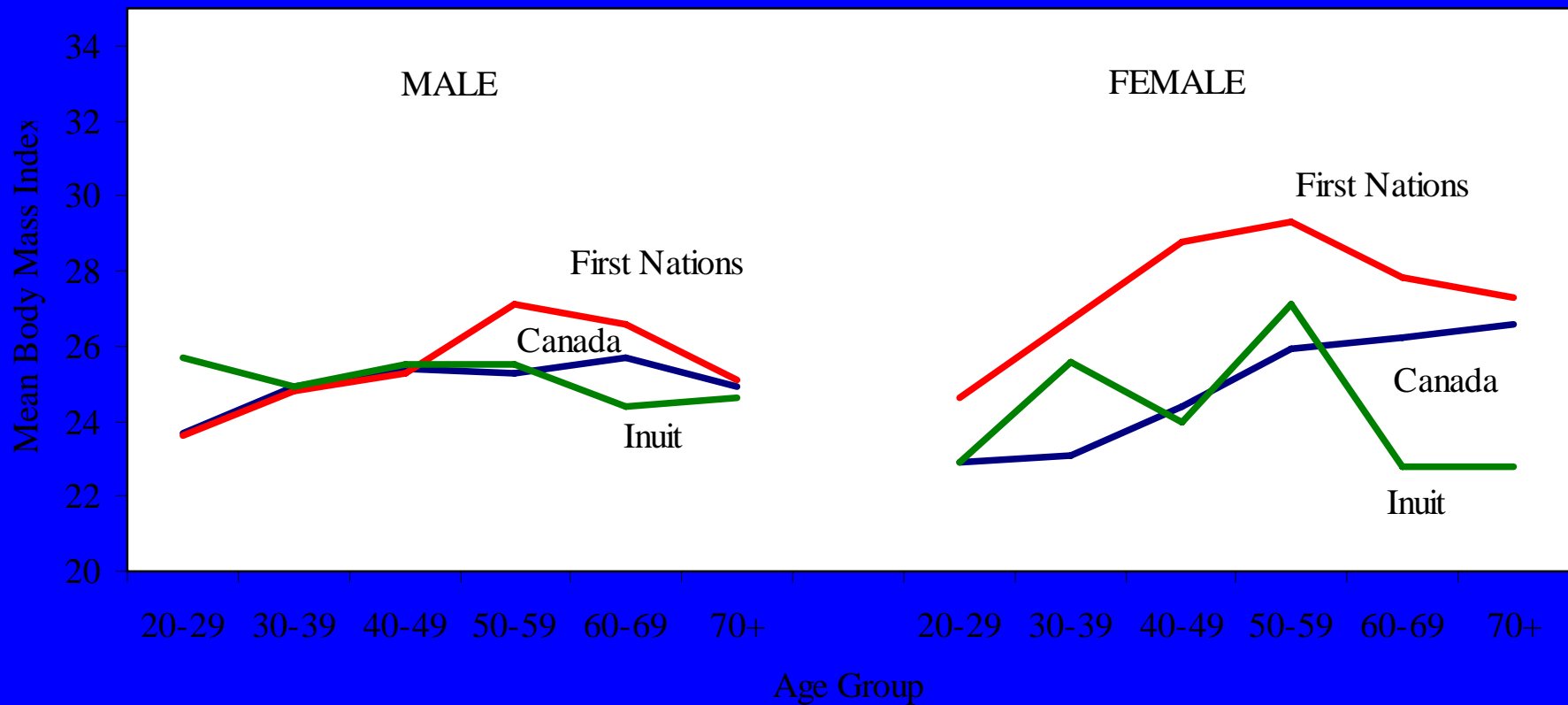
- Nutrition Canada Survey, 1970-2:
 - included 4 Inuit communities in NWT [n=221]
 - Comprehensive health interview and examination survey, including anthropometry and metabolic indices

(Nutrition Canada: *Eskimo Survey* 1975;
Anthropometry Report 1980)

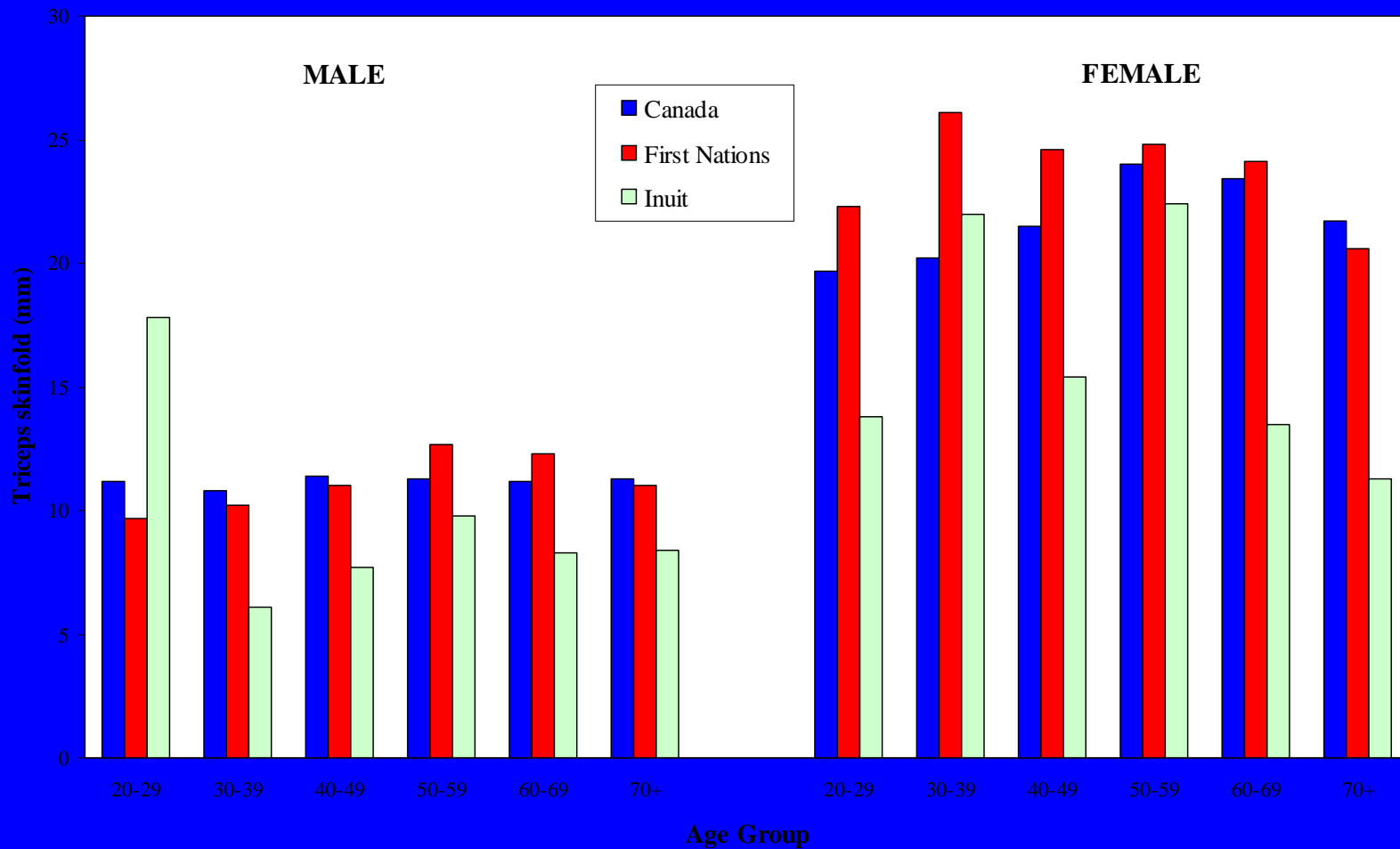
- Northern Quebec, 1982-84: 13 Inuit communities
 - 354 M, 424 F – Ht, Wt, Triceps skinfolds

(Thouez et al *Arct Med Res* 1990)

Nutrition Canada Survey (1972): Mean BMI by age-sex group



Nutrition Canada Survey (1972): Mean triceps skinfold by age-sex group

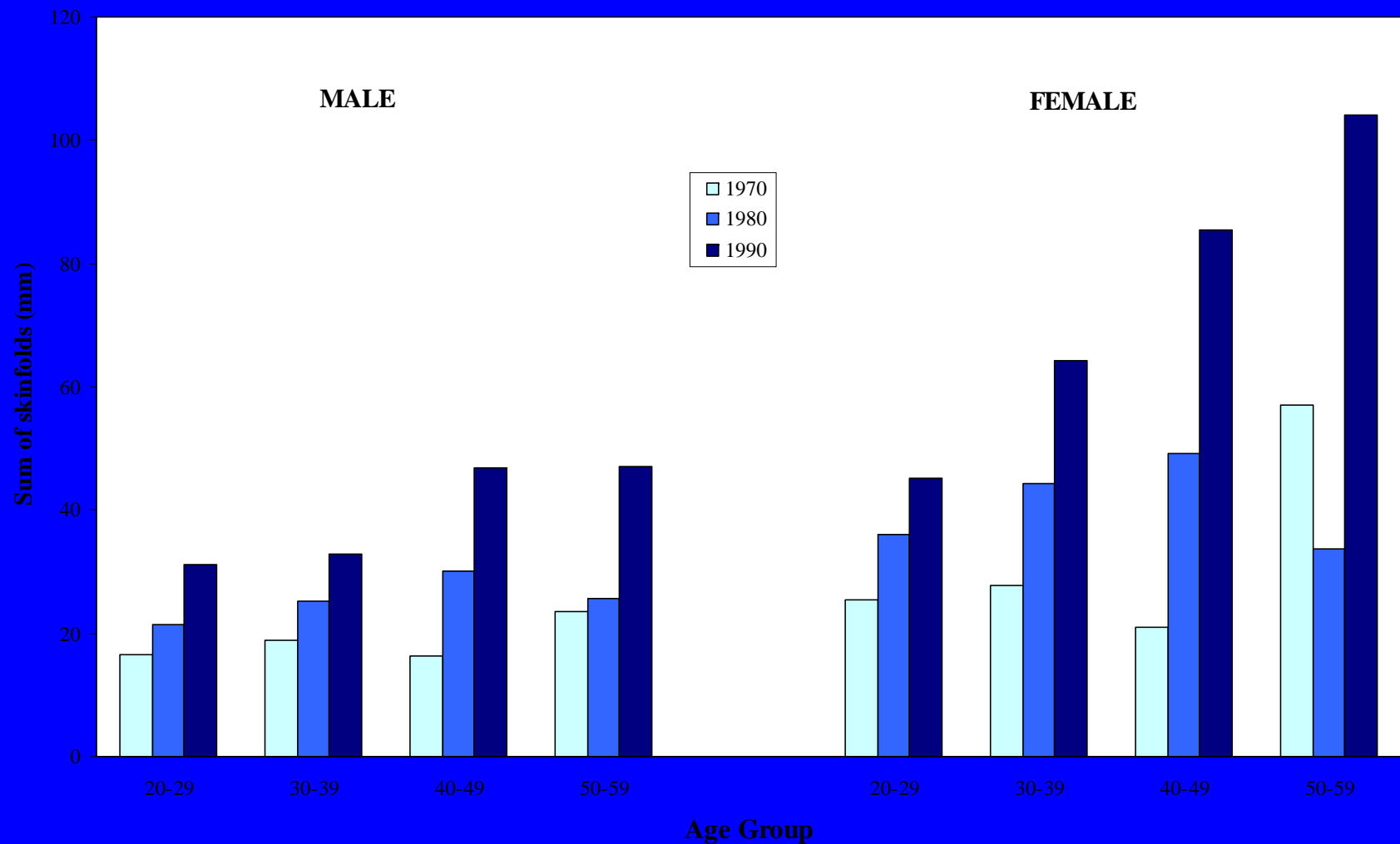


Body Composition

Only data from Igloolik: Inuit had low % body fat

- Shephard et al (*Eur J Appl Physiol* 1973) – part of IBP studies – estimated % body fat in 74 Inuit men and women using deuterium oxide dilution
- Rode and Shephard (*Am J Hum Biol* 1994) – hydrostatic weighing of 51 Inuit men
- Validity of assumptions in standard prediction equations
- Where's the fat? Subcutaneous vs intraabdominal

Increase in skinfold thickness in Igloolik, 1970-1990: [sum of triceps, subscapular and suprailiac]

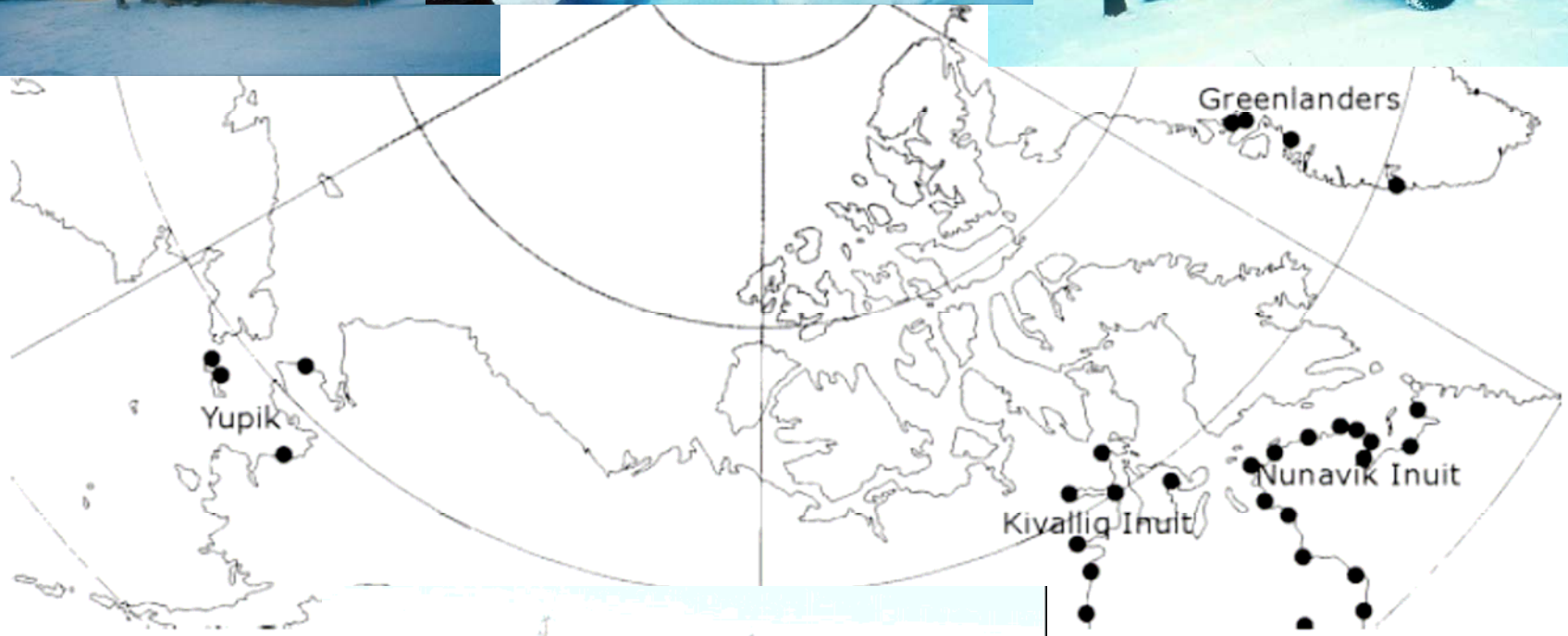


(Rode and Shephard *Eur J Appl Physiol* 1994)

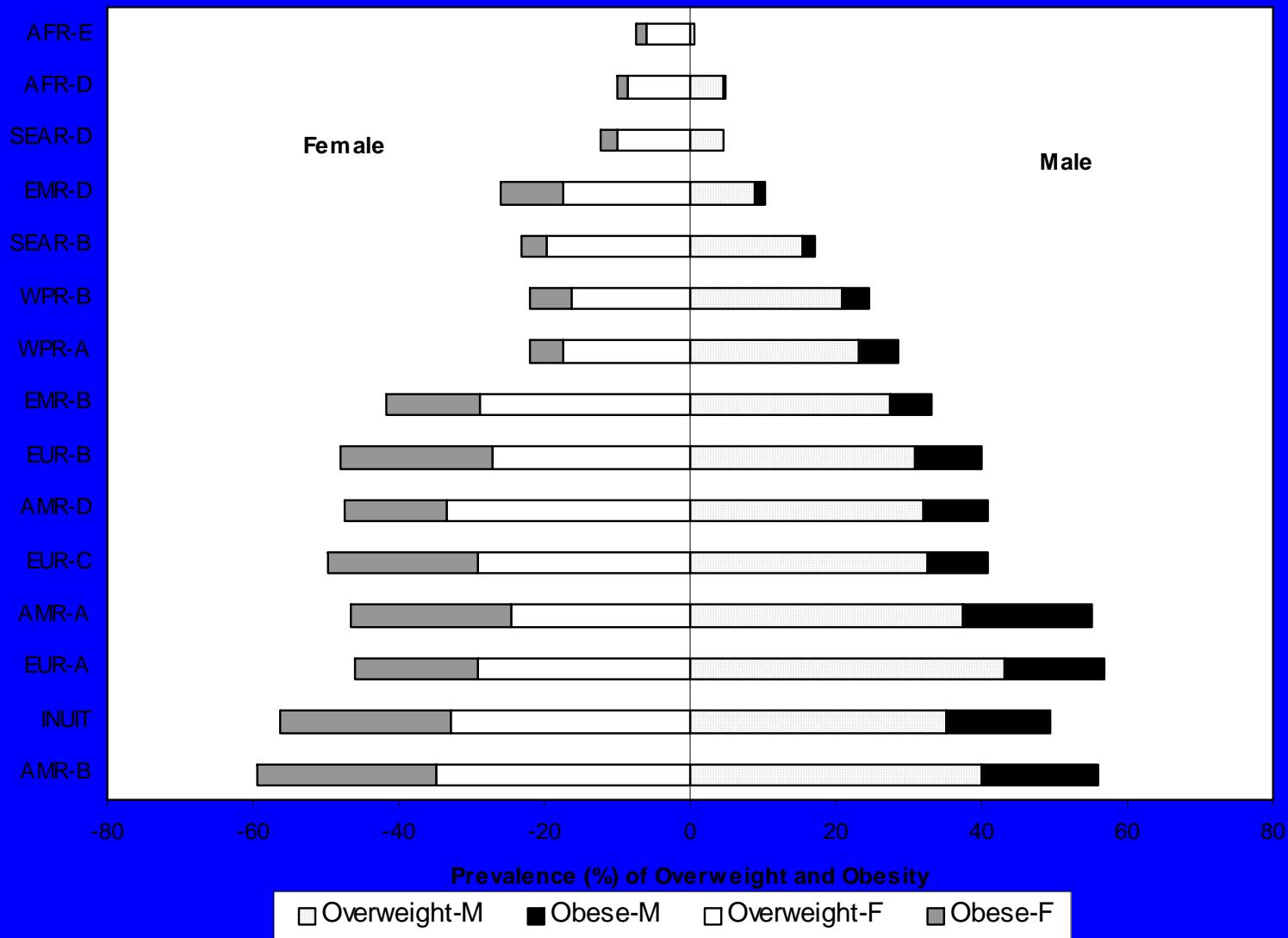
Pooled dataset from 4 surveys, 1990s

Total: 2,545 participants aged 18 and above

- Alaska: 4 communities in the Bering Strait region
[n=454] (Risica et al *Int J Obesity* 2000)
- Canada: 8 communities in the Kivalliq region,
Nunavut [n=380] (Young *Hum Biol* 1996)
- Canada: 14 communities in the Nunavik region of
northern Québec [n=400] (Dewailly et al *Am J Clin Nutr* 2001)
- Greenland: 2 towns and 4 villages on the west coast
[n=1311] (Jørgensen et al *Int J Obesity* 2003)

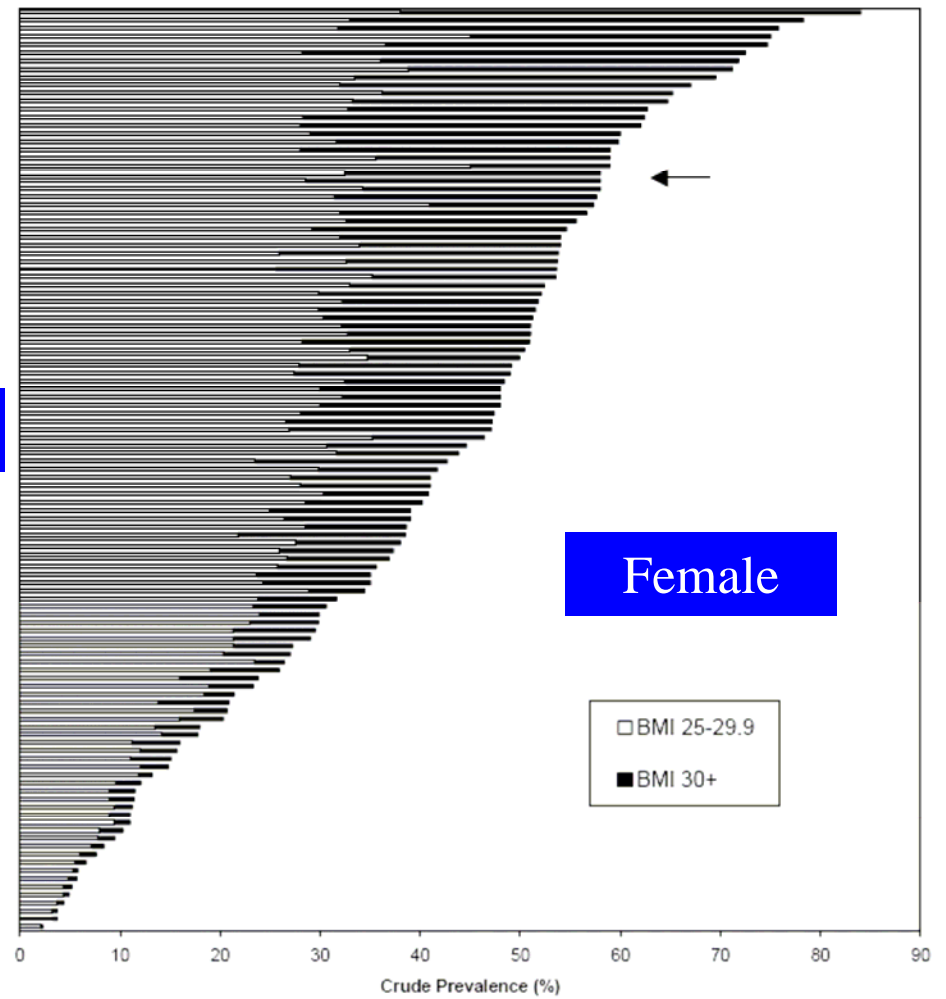
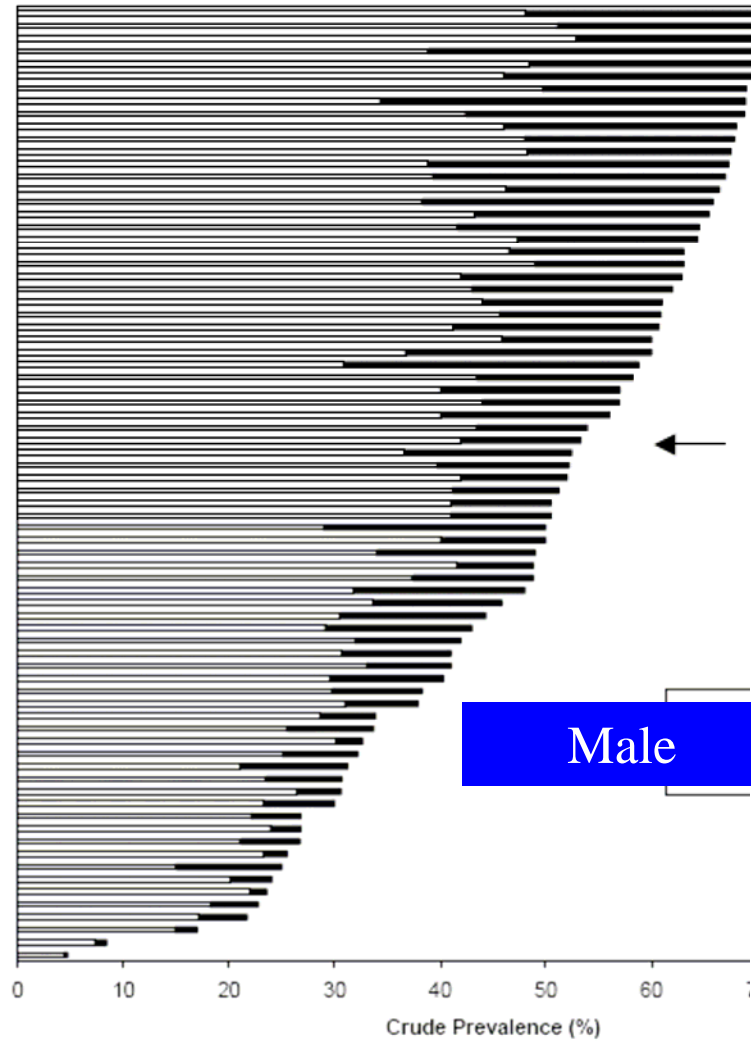


Inuit BMI in global perspective: WHO Regions



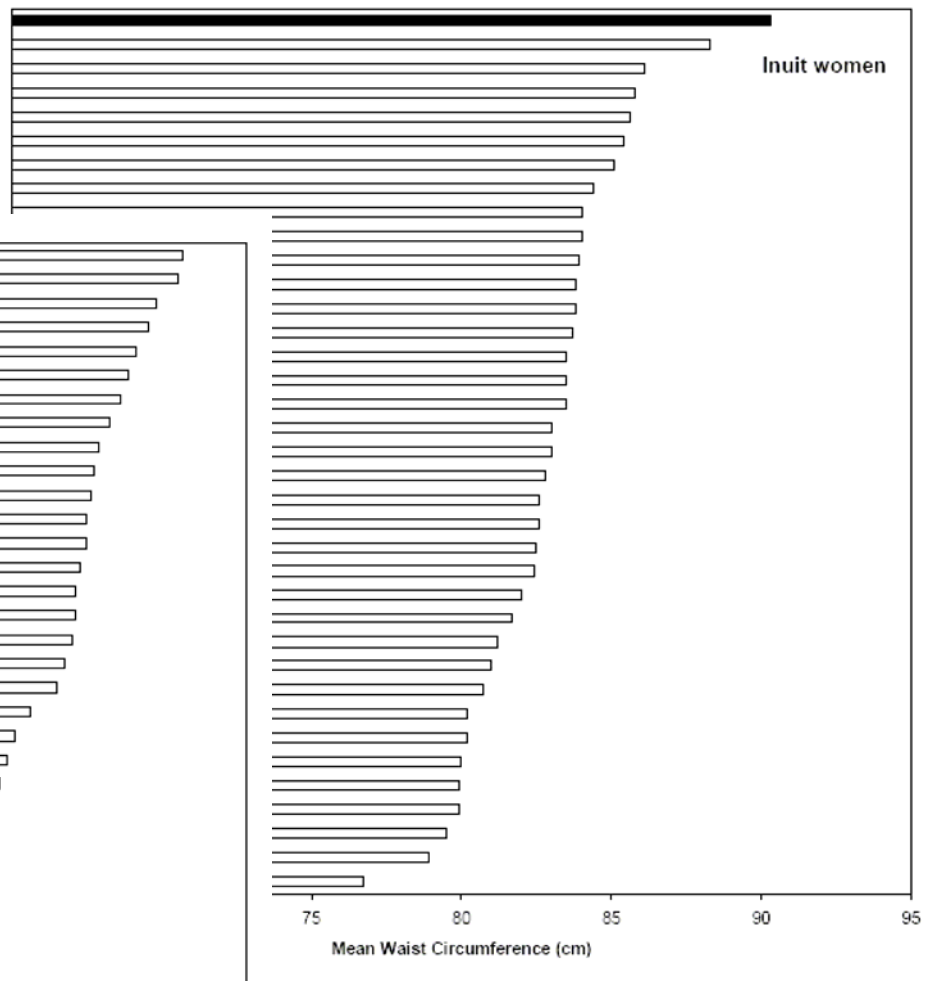
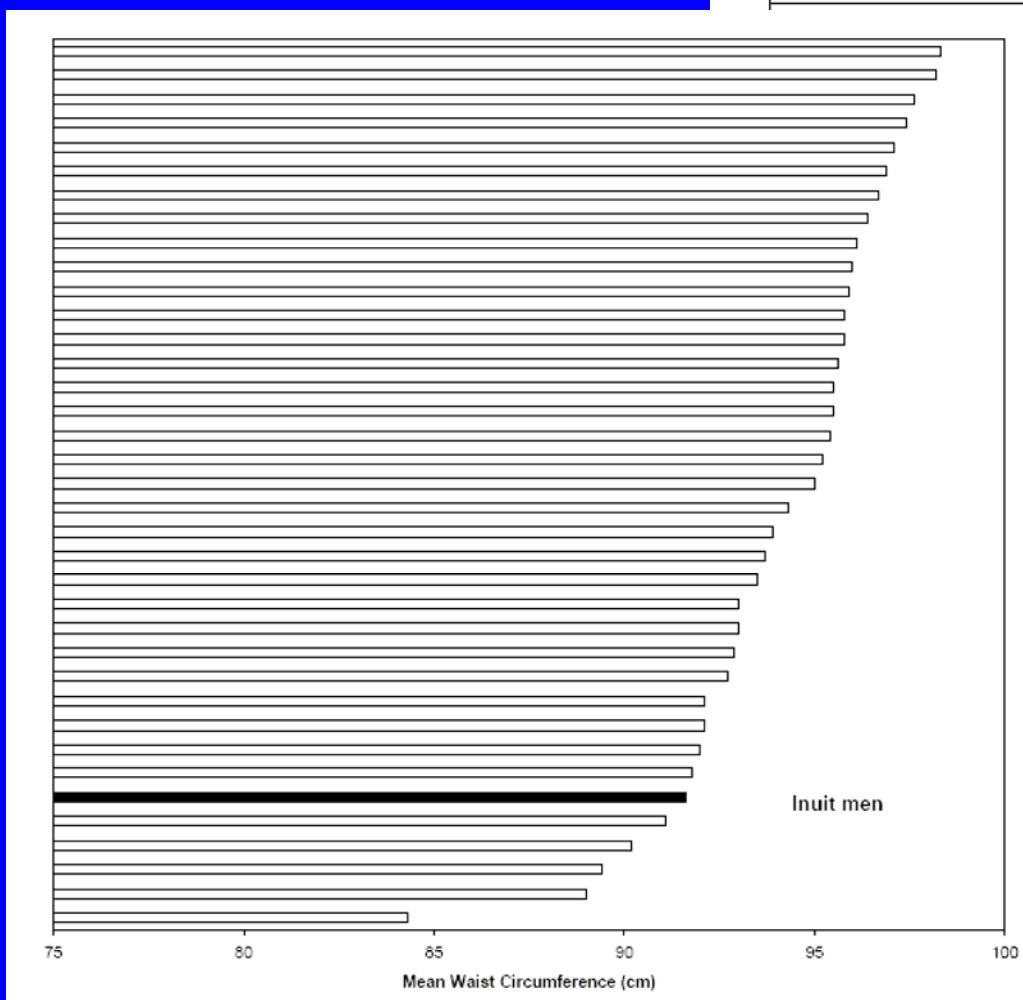
(Young et al *Am J PH* 2006)

International Obesity
Task Force database



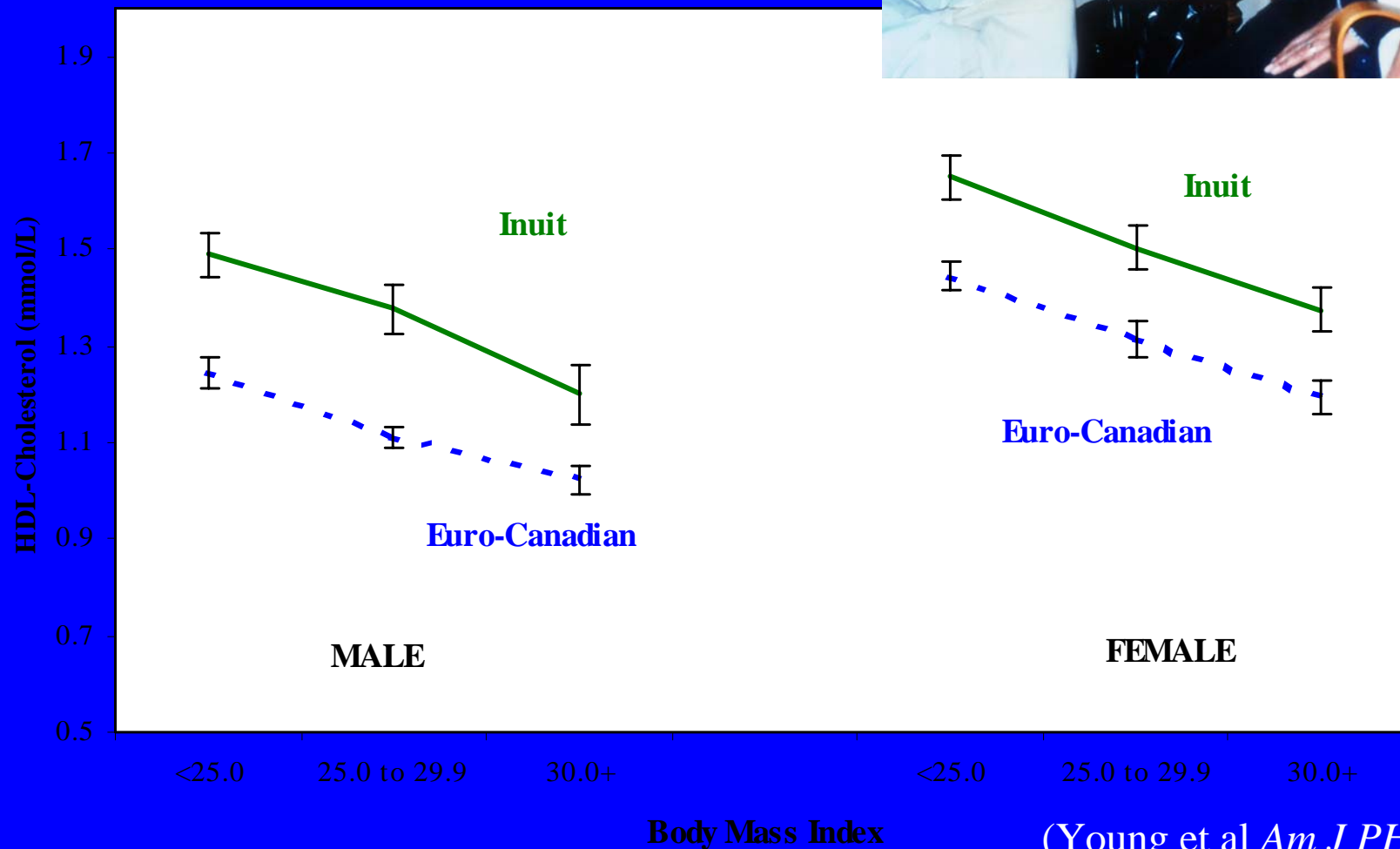
BMI categories

Mean waist circumference (cm)



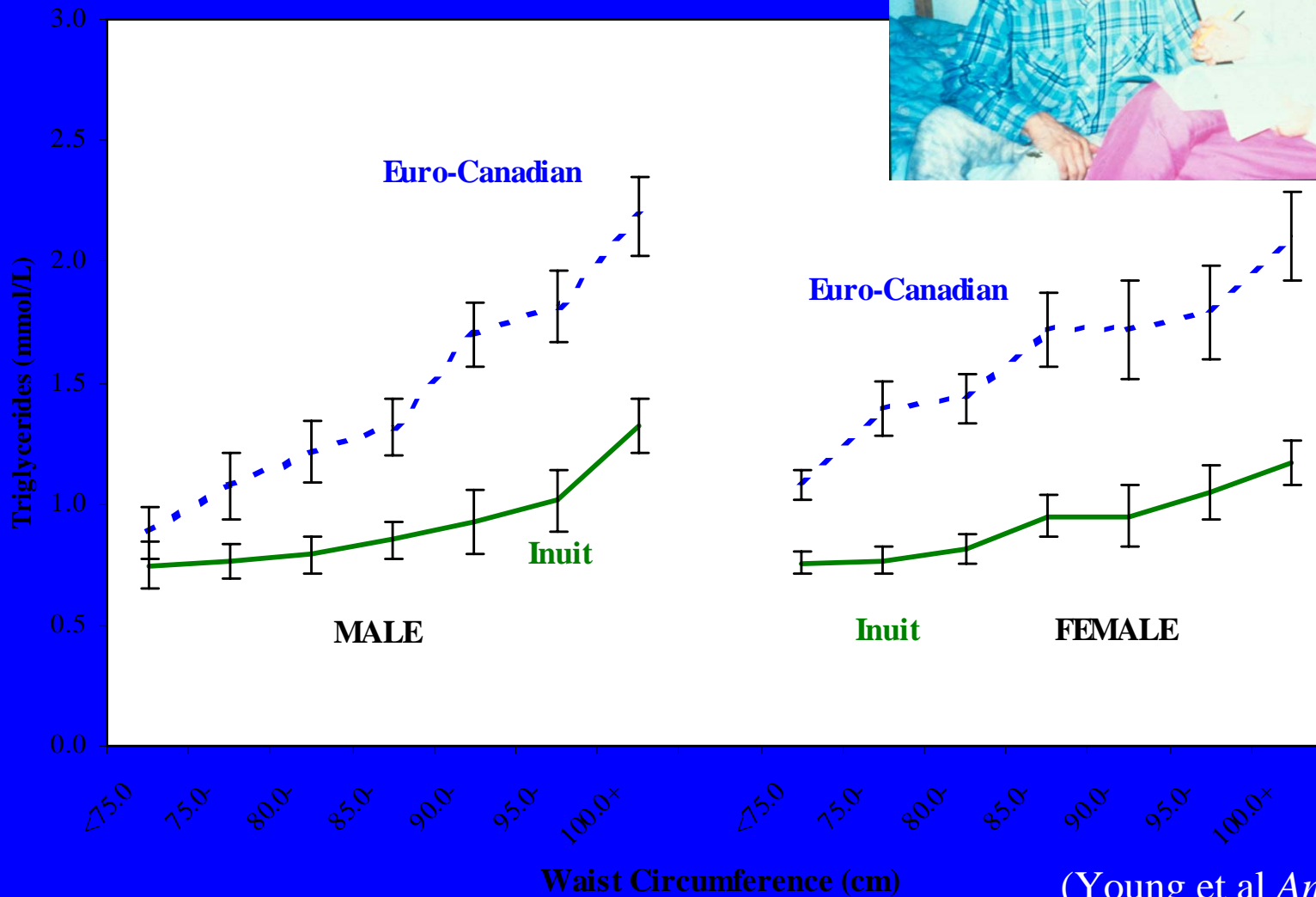
MONICA surveys database

Relationship between plasma lipids and obesity: HDL-cholesterol



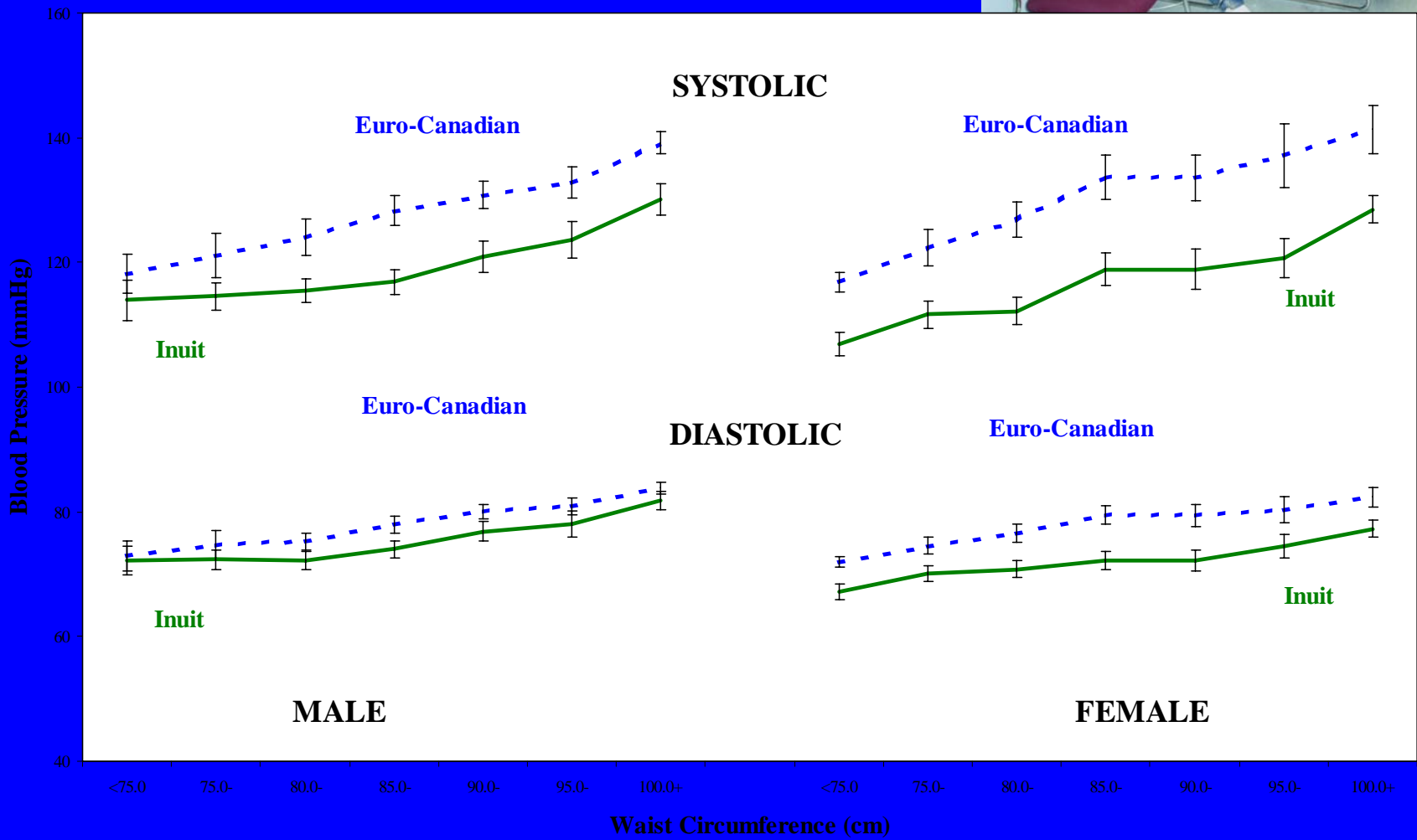
(Young et al Am J PH 2006)

Relationship between plasma lipids and obesity: Triglycerides

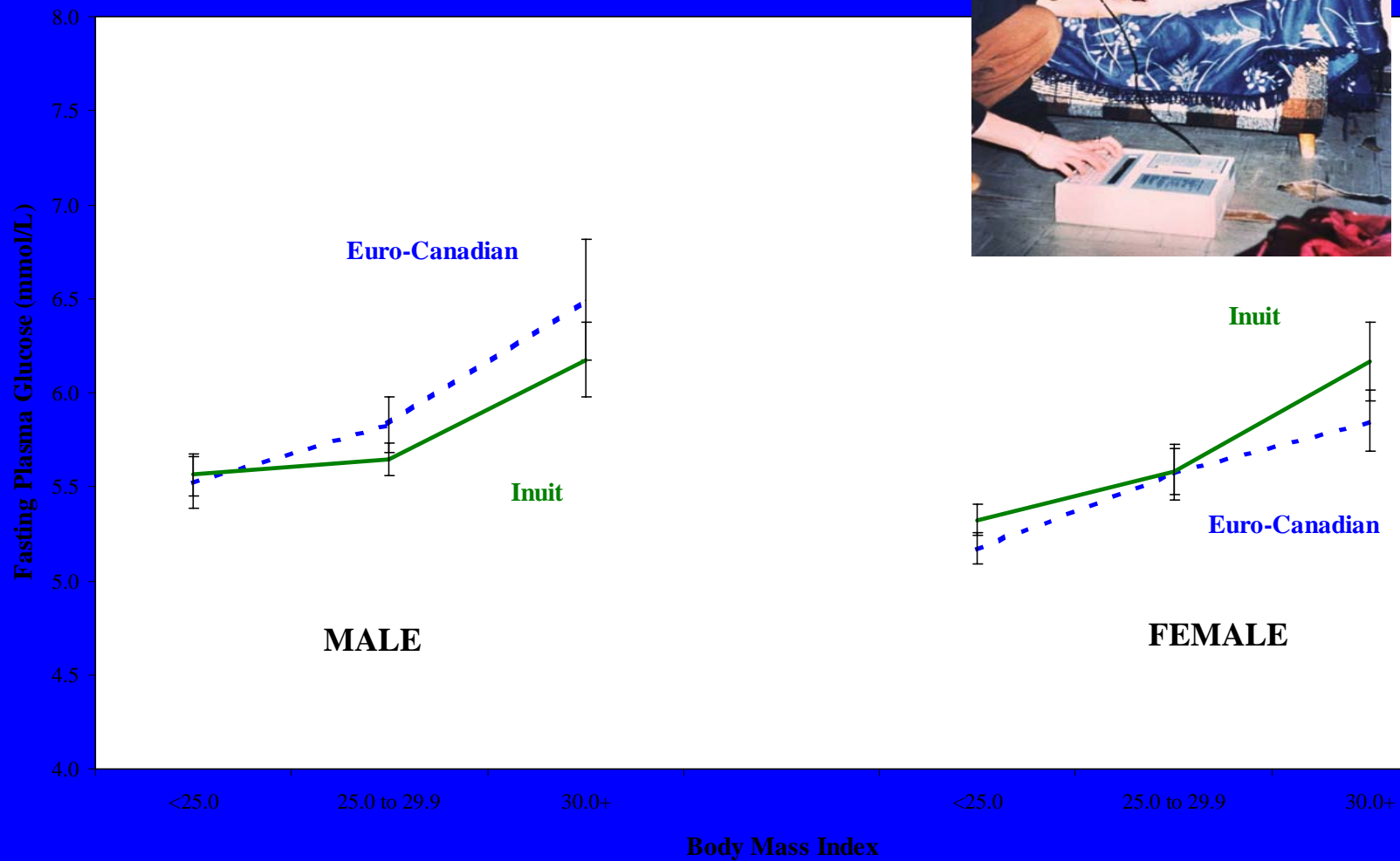


(Young et al Am J PH 2006)

Relationship between blood pressure and obesity



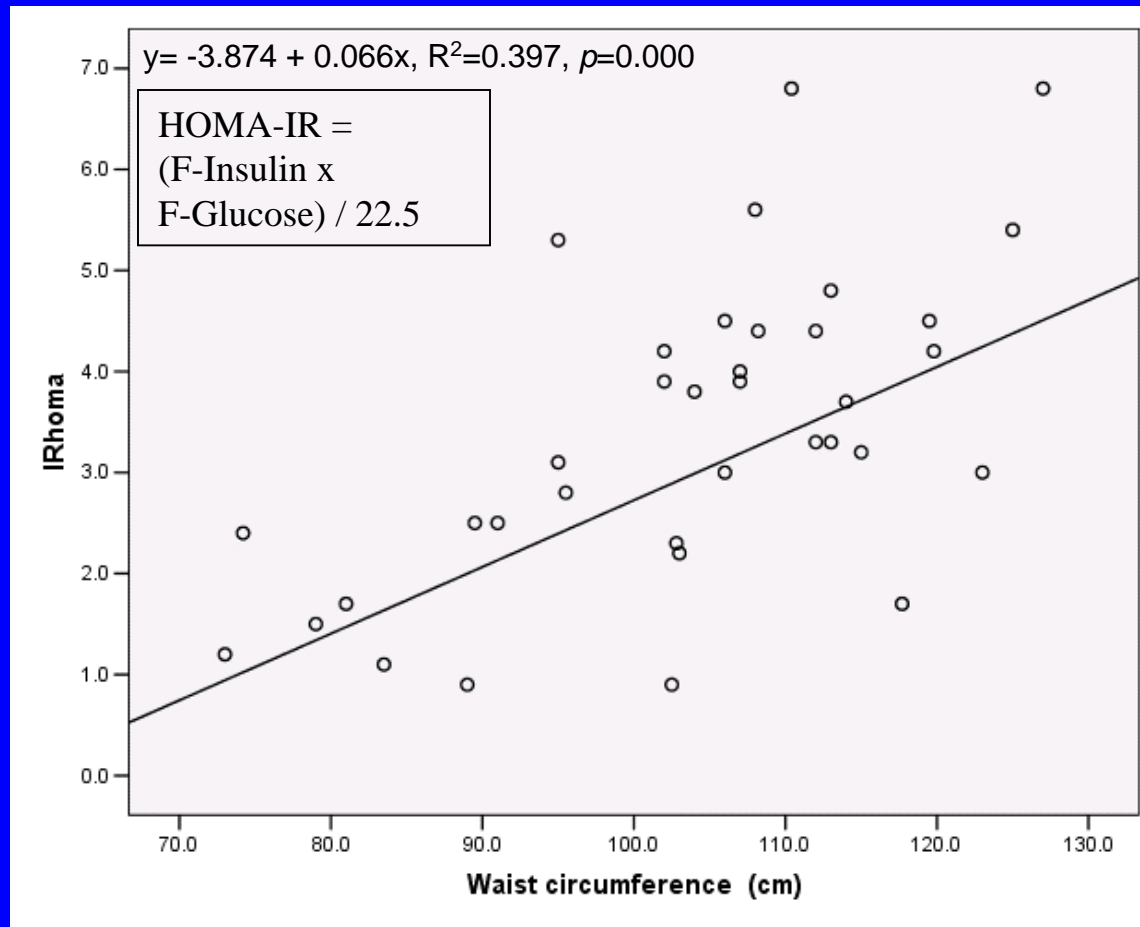
Relationship between glucose and obesity



Relationship between obesity and insulin resistance

Small pilot study in Pangsirtung, n=46

[G. Charbonneau, MSc thesis, McGill University 2005]



Among F:

Obese > non

- fasting insulin
- 2-hr insulin
- IR_{HOMA}

Among M:

Obese > non

- 2-hr insulin

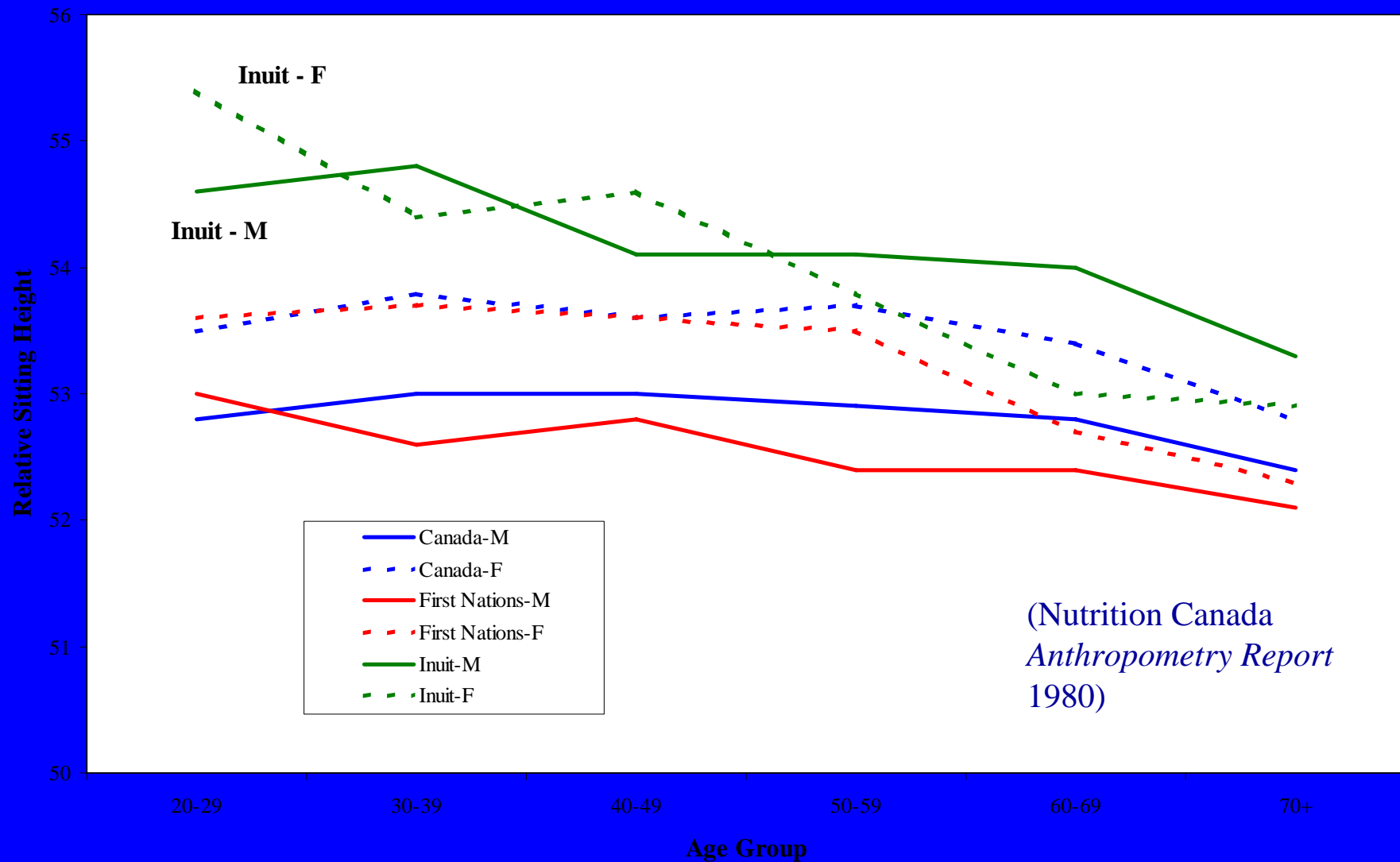
(Charbonneau et al 2006)

Do body dimensions matter?

- Inuit have high relative sitting height [SH/Ht ratio] – old data from 1970s, little secular change?
- When adjusted for SH [method of Norgan], Inuit BMI generally reduced, resulting in a lower prevalence of overweight/obesity [Nunavik re-survey of 2004]

G. Charbonneau, MSc thesis, McGill University, 2005

Nutrition Canada Survey (1972): Mean relative sitting height by age-sex group

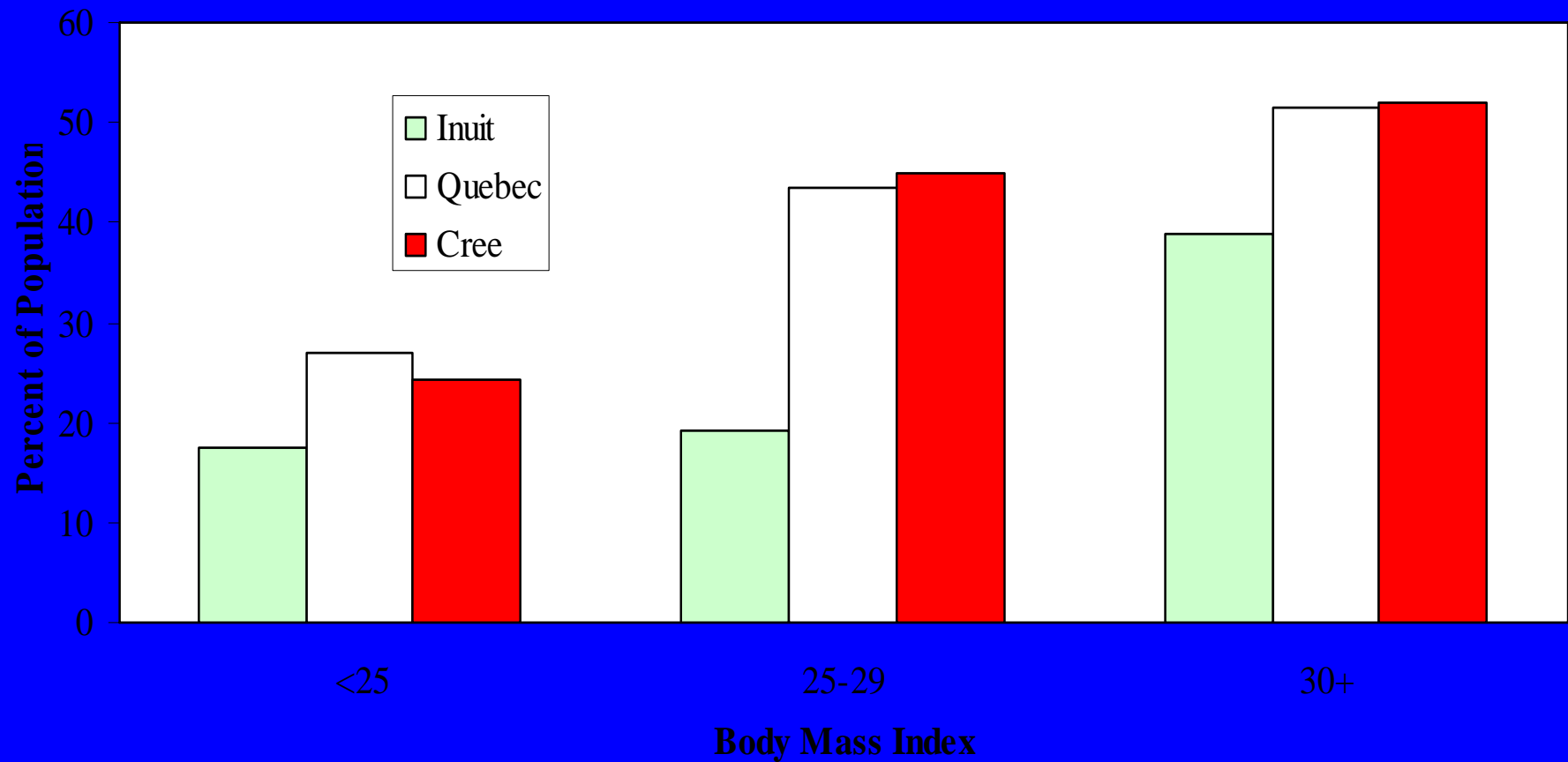


Cultural and Social Aspects

- Obesity a “culture-bound” syndrome? Connected to concept of self-worth, sexuality, ideal body image?
- Not too distant past: on brink of starvation – positive attitude towards overweight may still persist?
- Santé Québec survey (Jetté 1994): 55% Inuit [cf. 94% in Québec] believed association of obesity with increased risk of health problems. BUT: 37% Inuit believe fat layers increase protection from cold [the proportion declines with years of education]
- Gender differences: high SES associated with obesity in Inuit men but reverse in women (*Young Soc Sci Med* 1996)

Attempt to lose weight

Santé Québec Survey 1992



So, what are the answers?

- Are Inuit at higher risk for obesity than other populations?

Yes, if we use “universal” measures

- Is obesity more common today than it was in the past?

Yes, but trend data limited



- Are the obesity measures appropriate for the Inuit?

No – needs adjustment for body dimension – but little data on secular change

- Is the observed obesity metabolically harmful?

Yes, but not to the same degree



Research Gaps

- Where's the fat? Need body composition studies, imaging studies [CT, ultrasound]
- Long-term follow-up to determine health risks associated with levels of obesity
- Action needed:
Design and evaluating community-based interventions



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