

The Transition to Post-Industrial BMI Values in the US

John Komlos
University of Munich

Obesity: the Welfare Regime
Hypothesis
Oxford, 27-28. 11. 2009

Table 4. Prevalence of Overweight and Obesity by Age, Sex, and Racial/Ethnic Group: United States, 1999-2000

| Sex | Age, y† | Sample Size, No. | | | | Prevalence of Overweight (BMI ≥25), % | | | Prevalence of Obesity (BMI ≥30), % | | |
|------------|------------|-------------------------------|-----------------------|---------------------|---------------------------|--|---------------------|-------------------------------|---------------------------------------|---------------------|------|
| | | All* Non-Hispanic White | Non-Hispanic Black | Mexican American | All* Hispanic White | Black | Mexican American | All* Non-Hispanic White | Non-Hispanic Black | Mexican American | |
| Both sexes | ≥20 | 4115 | 1831 | 794 | 1105 | 64.5 | 62.3 | 69.6 | 73.4‡ | 30.5 | 28.7 |
| Men | ≥20 | 2043 | 946 | 374 | 538 | 67.2 | 67.4 | 60.7 | 74.7 | 27.5 | 27.3 |
| | 20-39 | 666 | 276 | 125 | 184 | 60.5 | 61.0 | 52.6 | 67.5 | 23.7 | 22.0 |
| | 40-59 | 595 | 262 | 127 | 157 | 70.0 | 69.9 | 63.9 | 79.1 | 28.8 | 28.5 |
| | ≥60 | 782 | 408 | 122 | 197 | 74.1 | 74.3 | 69.1 | 79.6 | 31.8 | 34.3 |
| Women | ≥20 | 2072 | 885 | 420 | 567 | 61.9 | 57.3 | 7.3‡ | 71.9 | 33.4 | 30.1 |
| | 20-39 | 640 | 249 | 140 | 180 | 54.3 | 49.0 | 70.8‡ | 61.6 | 28.4 | 24.4 |
| | 40-59 | 653 | 249 | 141 | 193 | 66.1 | 61.0 | 81.5‡ | 79.3 | 37.8 | 34.2 |
| | ≥60 | 779 | 387 | 139 | 194 | 68.1 | 65.8 | 81.7‡ | 77.5 | 35.0 | 33.3 |

*Includes racial/ethnic groups not shown separately.

†Estimated prevalences for ages ≥20 years were age-standardized.

‡Significantly different from non-Hispanic whites, $P<.05$ (with Bonferroni correction).

Highest Rate among Black Women

Table 1. Trends in the Age-Adjusted and Age-Specific Prevalence of Obesity for Adults Aged 20-74 Years, 1960-2000*

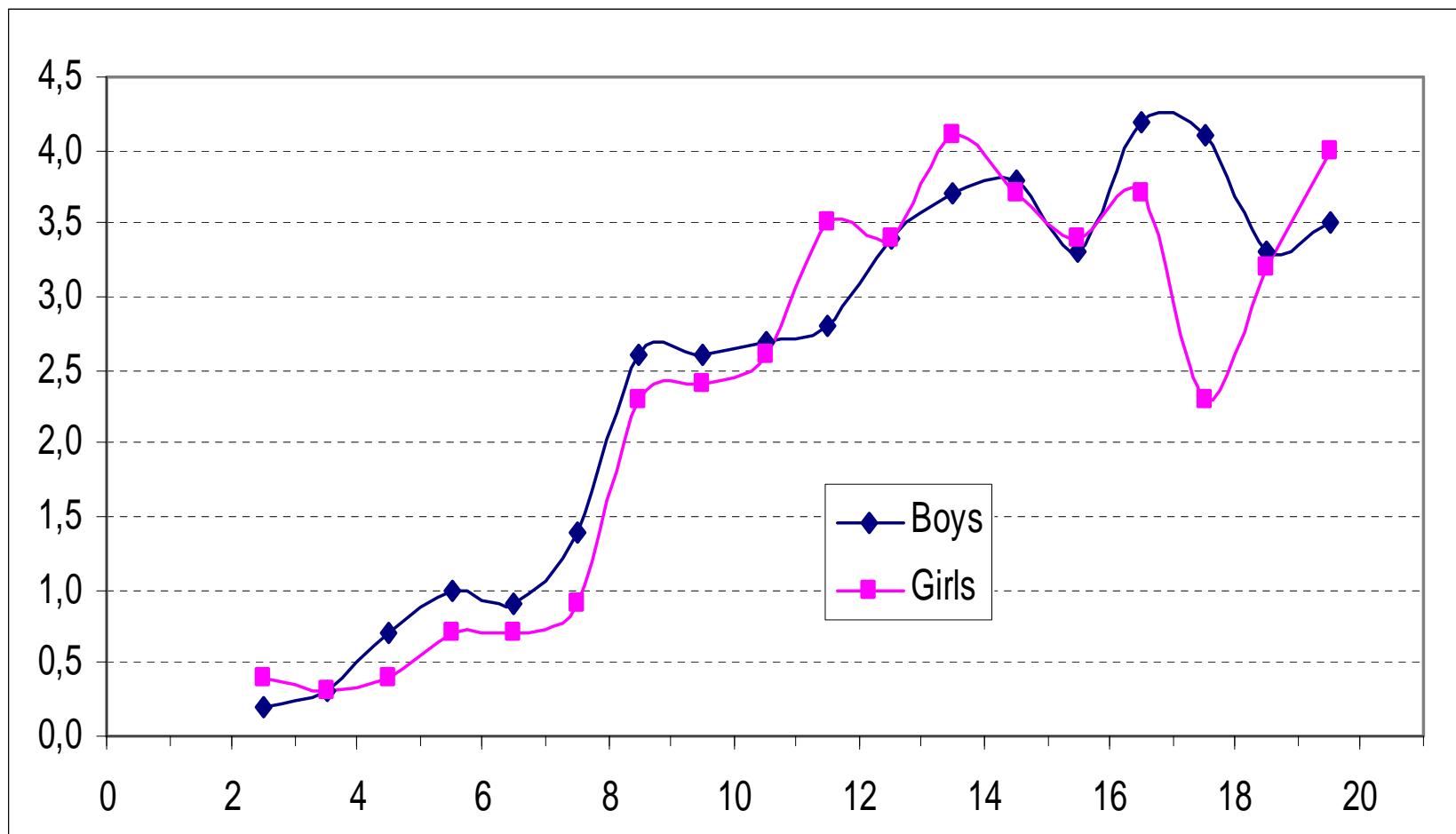
| Sex | Age, y† | Prevalence, % | | | | | Change, % (95% CI)‡ | |
|------------|---|------------------------------------|--|---|--|---|----------------------------|--------------------------------------|
| | | NHES I, 1960-1962 (n = 6126) | NHANES I, 1971-1974 (n = 12 911) | NHANES II, 1976-1980 (n = 11 765) | NHANES III, 1988-1994 (n = 14 468) | NHANES Continuous, 1999-2000 (n = 3601) | NHANES II to NHANES III | NHANES III to NHANES 1999-2000 |
| Both sexes | 20-74 | 13.4 | 14.5 | 15.0 | 23.3 | 30.9 | 8.3 (6.6-10.0) | 7.6 (4.2-11.0) |
| Men | 20-74 | 10.7 | 12.1 | 12.7 | 20.6 | 27.7 | 7.9 (6.0-9.8) | 7.1 (3.4-10.8) |
| | 20-39 | 9.8 | 10.2 | 9.8 | 14.9 | 23.7 | 5.1 (2.9-7.2) | 8.8 (4.8-12.8) |
| | 40-59 | 12.6 | 14.7 | 15.4 | 25.4 | 28.8 | 10.0 (6.9-13.0) | 3.4 (-2.8-9.6) |
| | Prevalence constant 1960-1980 and then explodes\$3 | | 13.5 | 23.8 | 35.8 | 10.3 (6.3-14.3) | 12.0 (5.0-19.0) | |
| Women | 20-74 | 10.7 | 16.6 | 17.0 | 25.9 | 34.0 | 8.9 (6.5-11.3) | 8.1 (3.7-12.5) |
| | 20-39 | 11.2 | 12.3 | 20.6 | 28.4 | 8.3 (5.2-11.4) | 7.8 (2.5-13.1) | |
| | 40-59 | 18.5 | 19.7 | 20.4 | 30.4 | 37.8 | 10.0 (6.1-13.9) | 7.4 (0.5-14.3) |
| | 60-74 | 26.2 | 23.4 | 21.3 | 28.6 | 39.6 | 7.3 (3.9-10.6) | 11.0 (4.6-17.4) |

*NHES indicates National Health Examination Survey; NHANES, National Health and Nutrition Examination Survey; and CI, confidence interval.

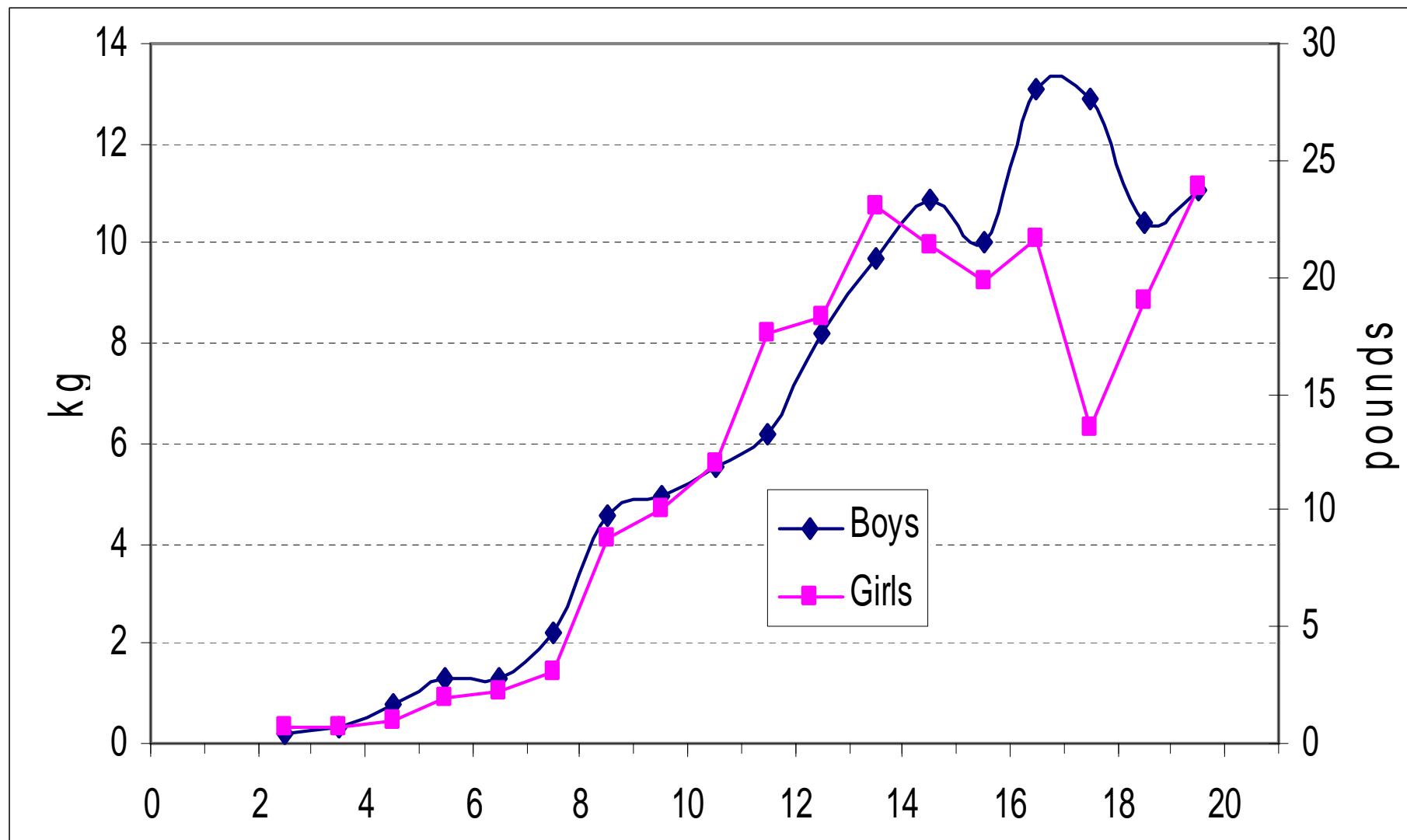
†Estimated prevalences for ages 20-74 years were age-standardized by the direct method to the 2000 Census population using age groups 20-39, 40-59, and 60-74 years.

‡Overall and within each age-sex group, the changes between 1988-1994 and 1999-2000 are not significantly different from the changes between 1976-1980 and 1988-1994.

The Amazing difference in US and Dutch BMI values: as much as 4 BMI Units!

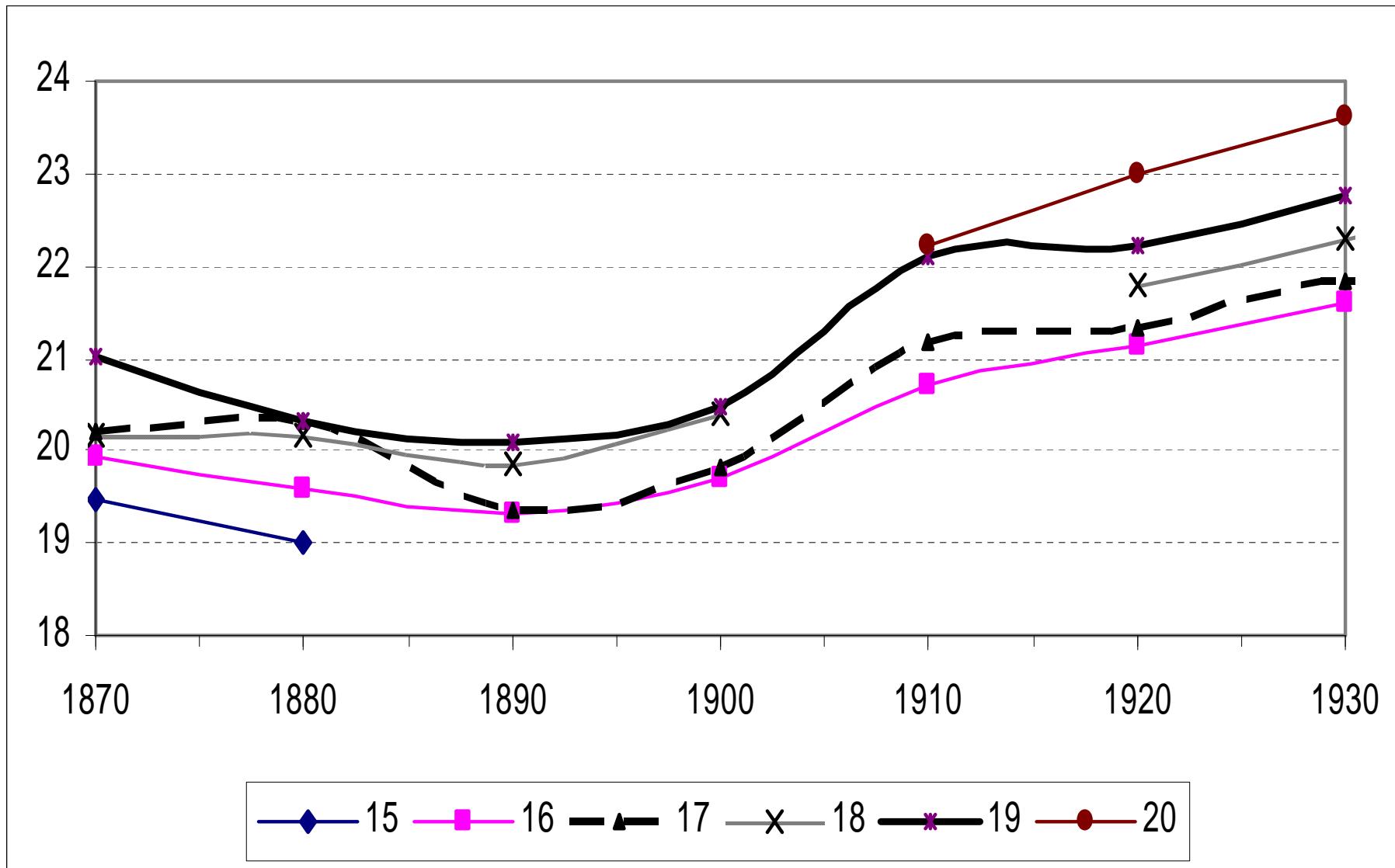


Difference in Weight Between US (1999-2003) and Dutch (1997) Children



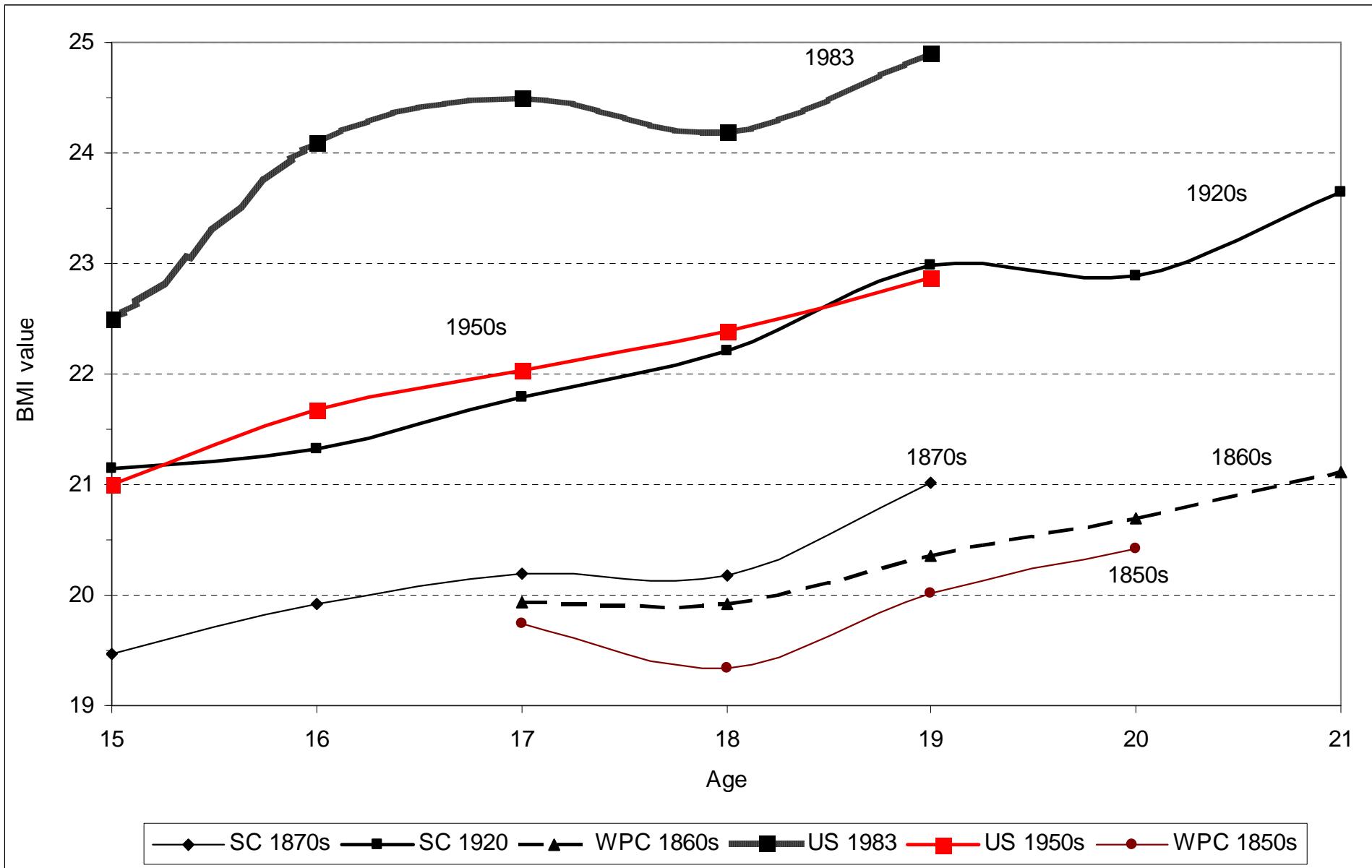
- From Opulence to Corpulence:
When did obesity epidemic begin ?

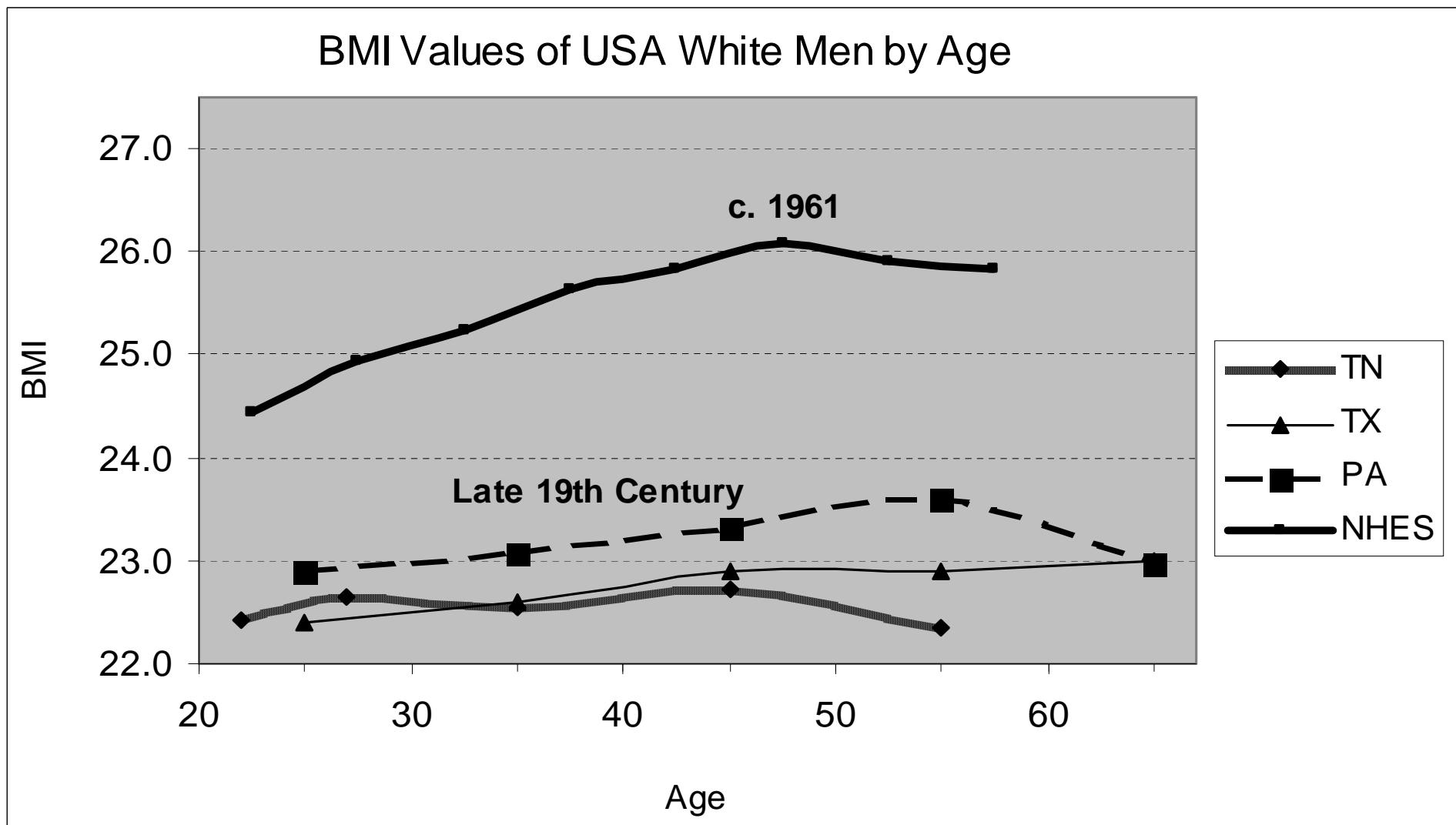
BMI values of South Carolina Students by Year of Birth



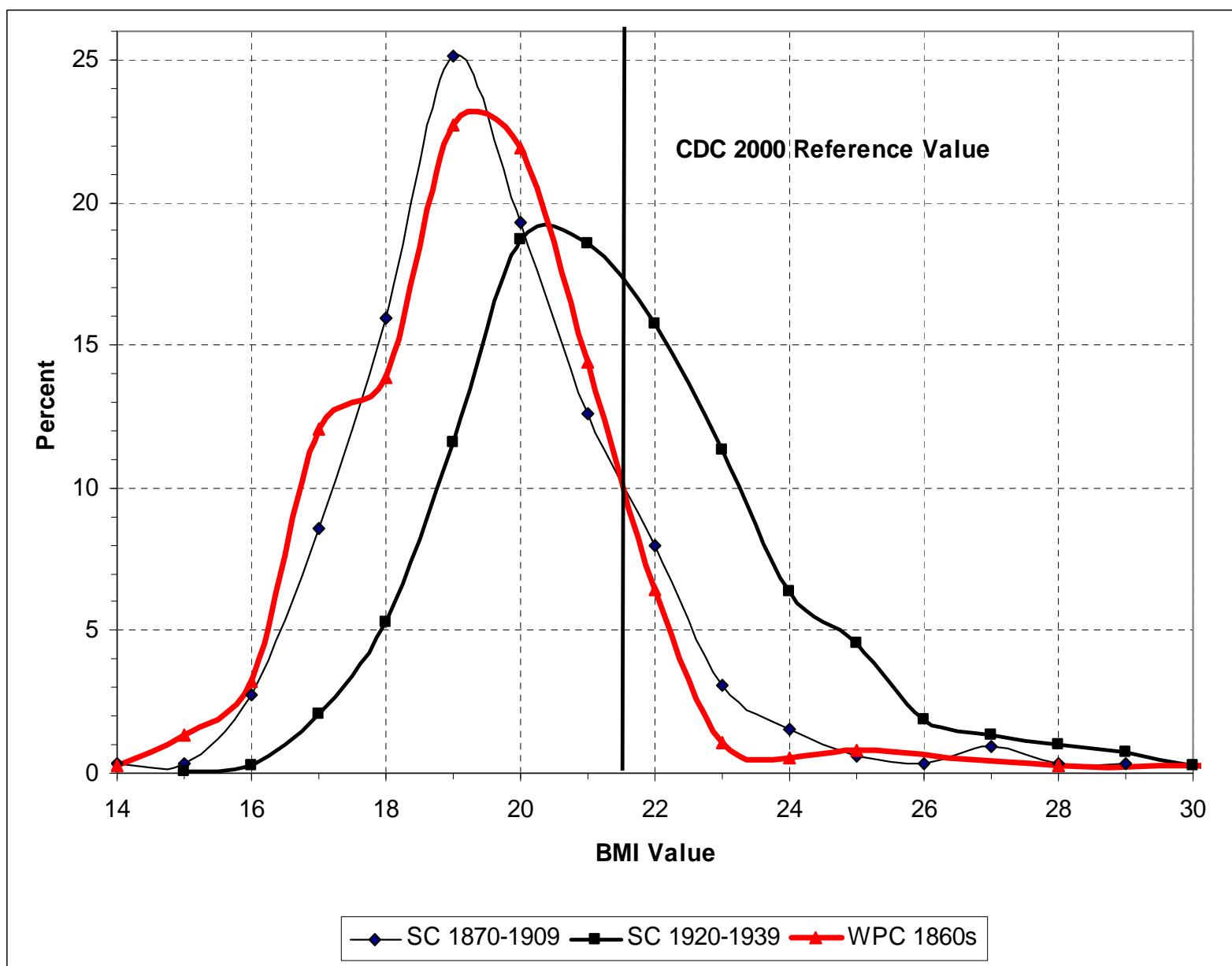
Source: Coclans, Peter and Komlos, John, "Nutrition and Economic Development in Post-Reconstruction South Carolina: an Anthropometric Approach," *Social Science History* 19 (1995): 91-116.

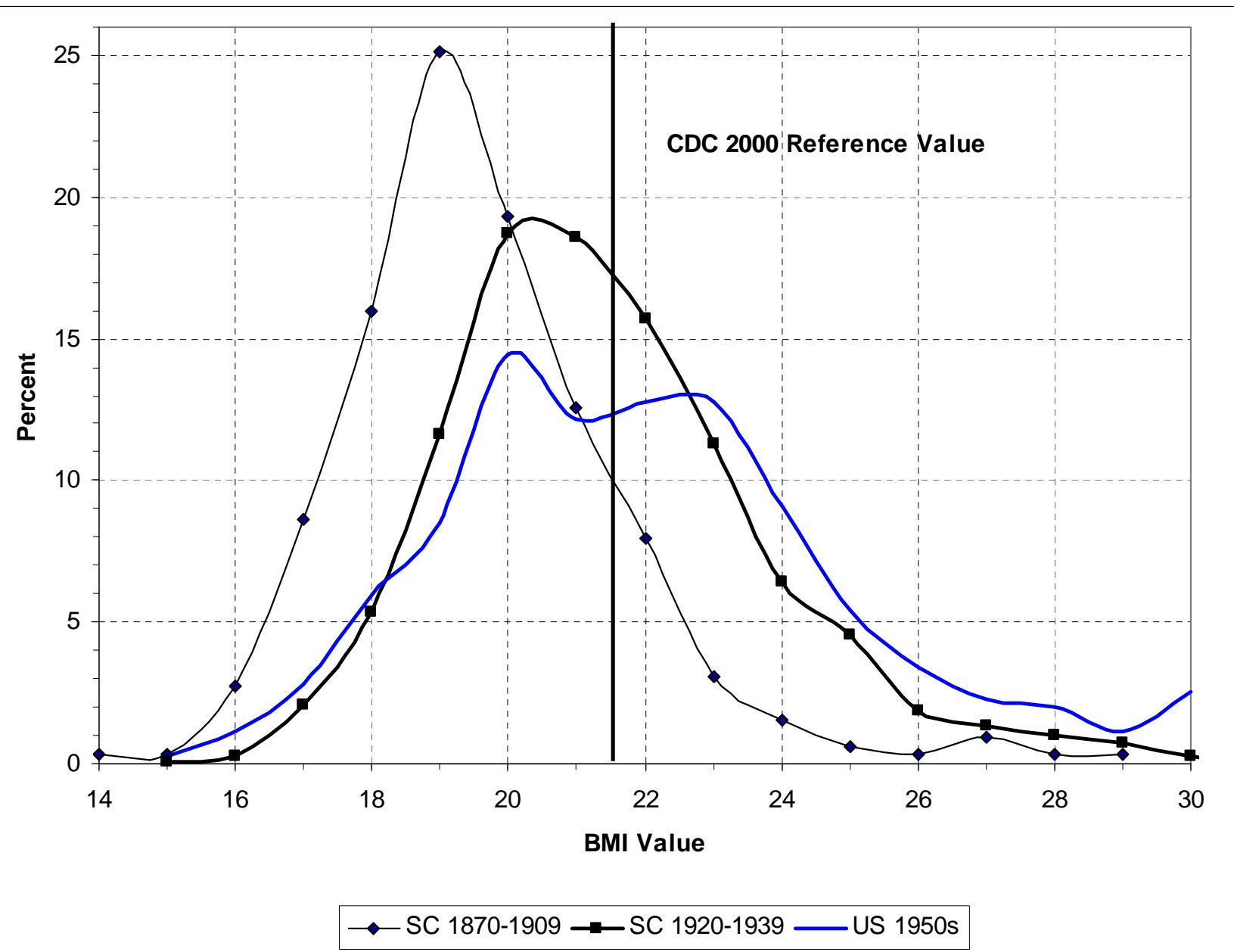
BMI Values by Age In the US, 1850-1983





Distribution of BMI values of US students in 19th and early 20th centuries by year of birth

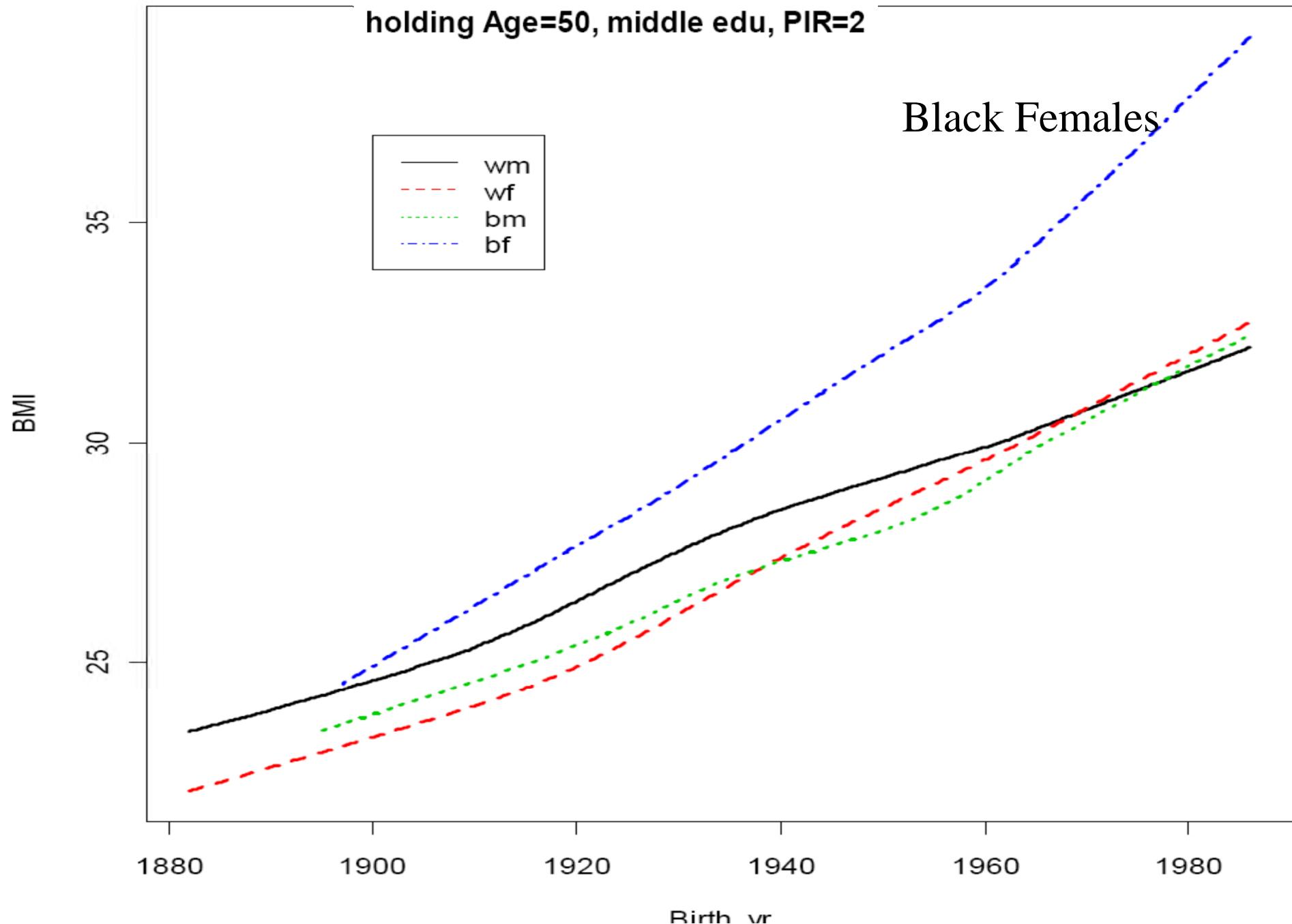




**Hence, the transition to
Post-Industrial BMI values was
already in progress by the
1920s Birth Cohorts**

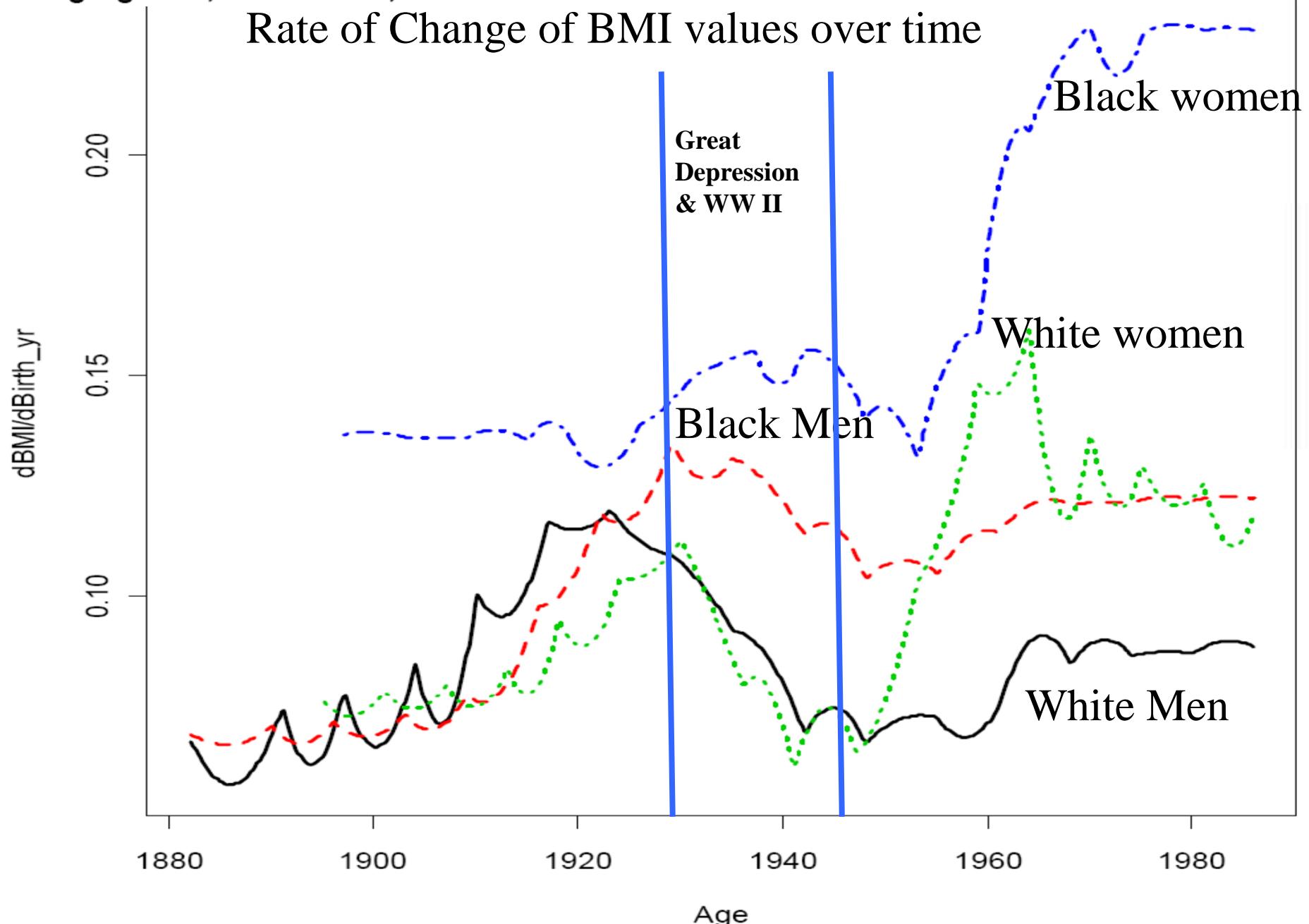
What other evidence is there?

Trend of BMI values by birth cohorts of US-born White and Black Adults



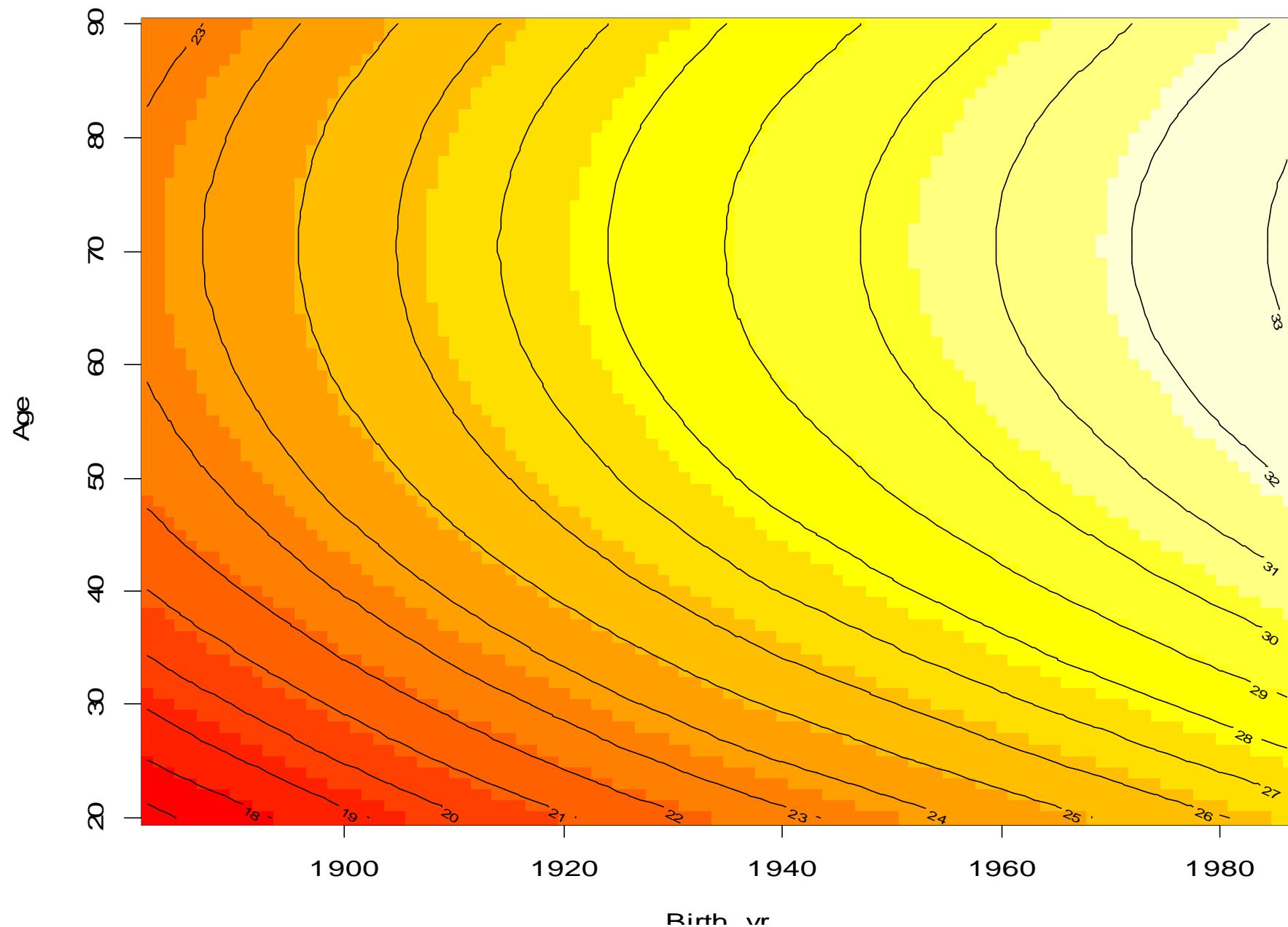
holding Age=50, middle edu, PIR=2

Rate of Change of BMI values over time

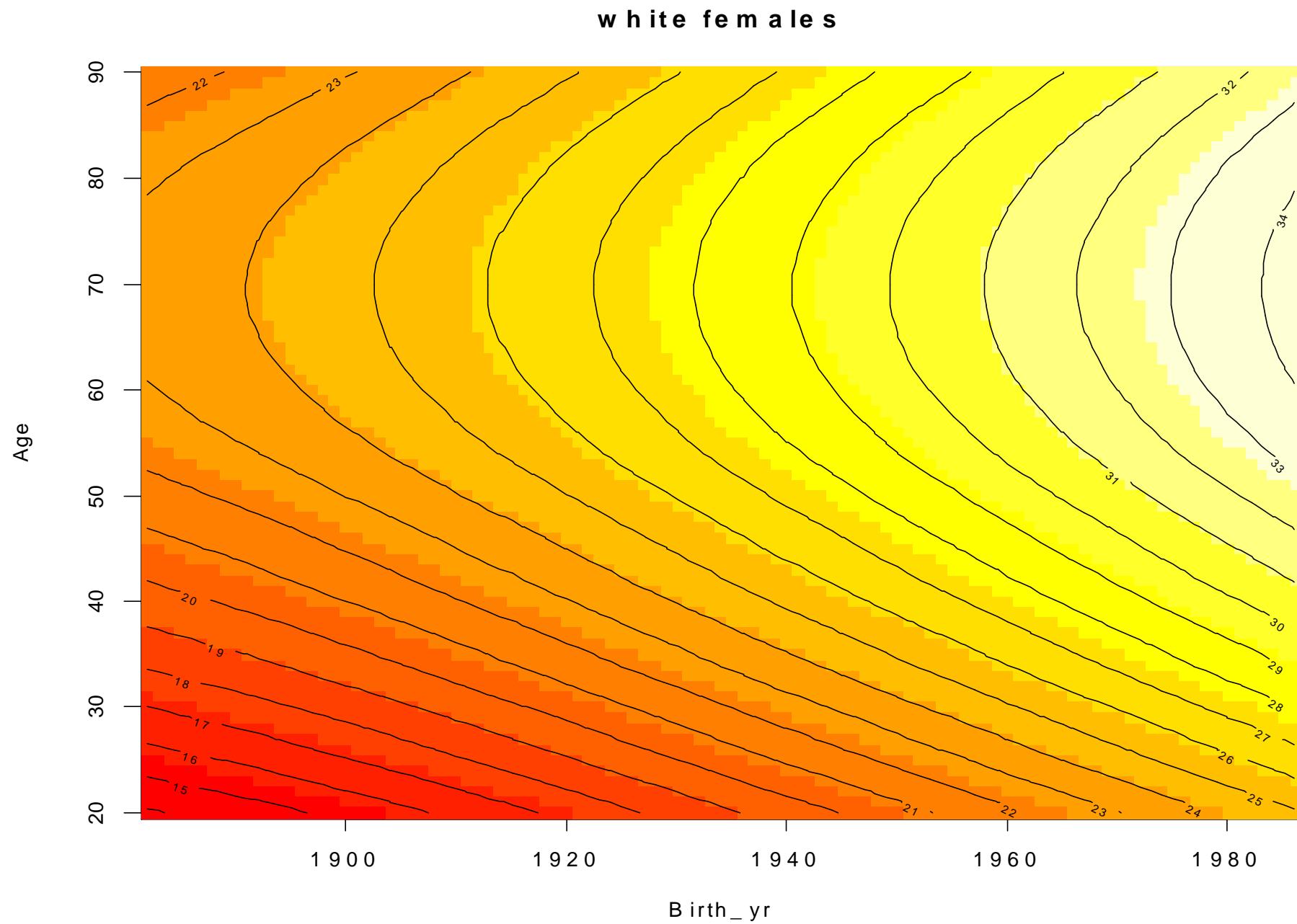


Iso-Bmi lines for age-birth cohort combinations

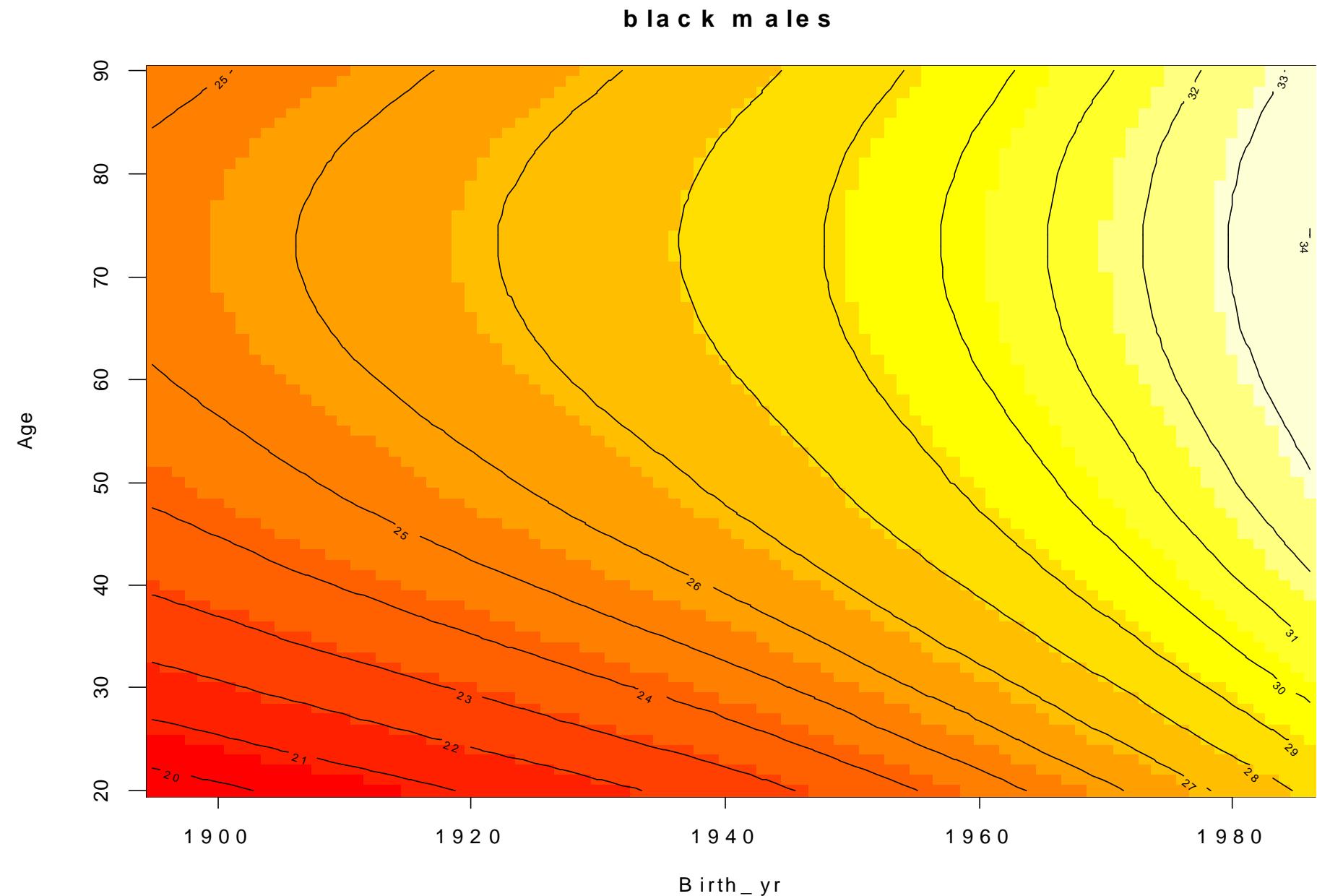
white males



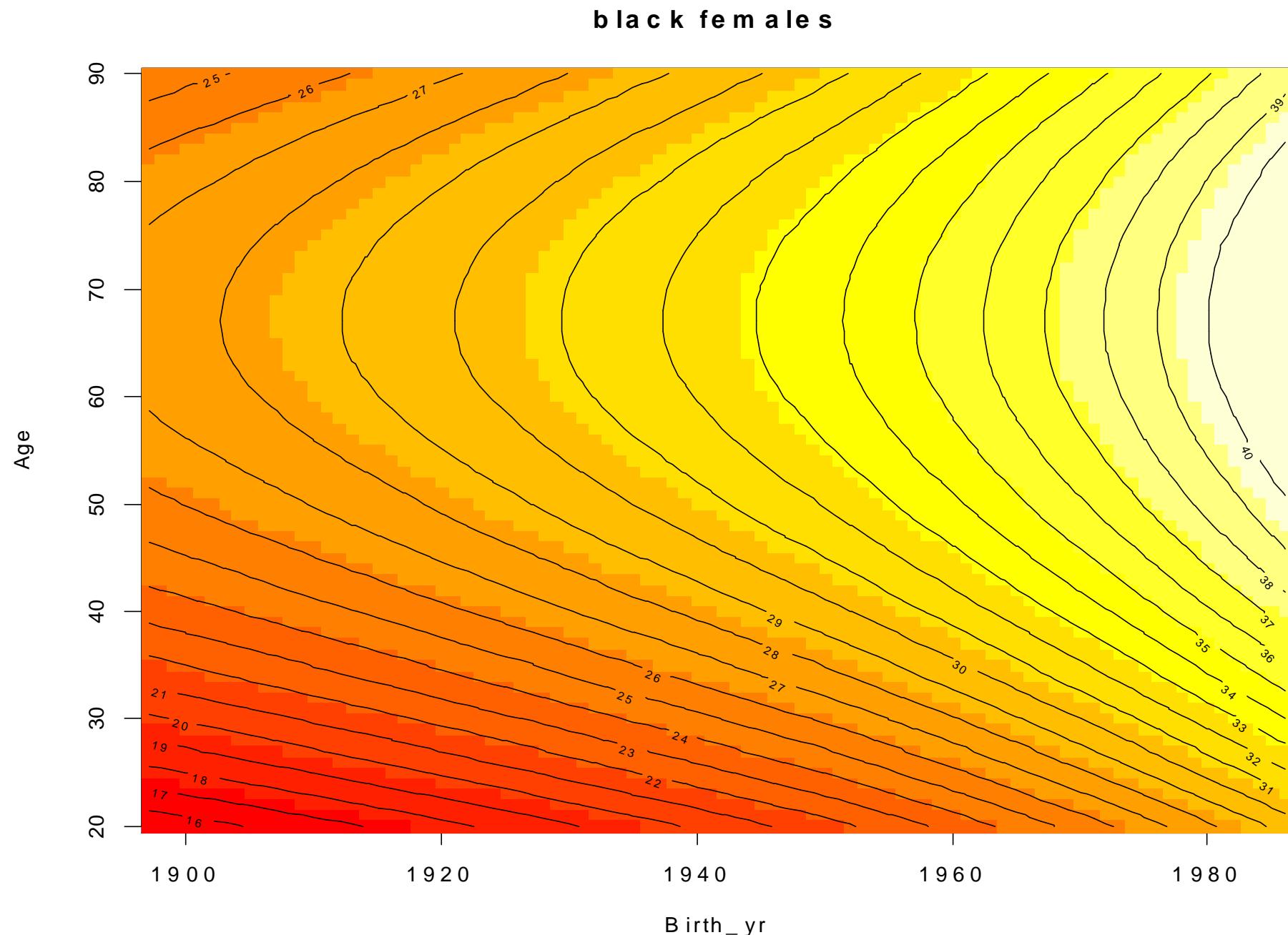
Iso-Bmi lines for age-birth cohort combinations

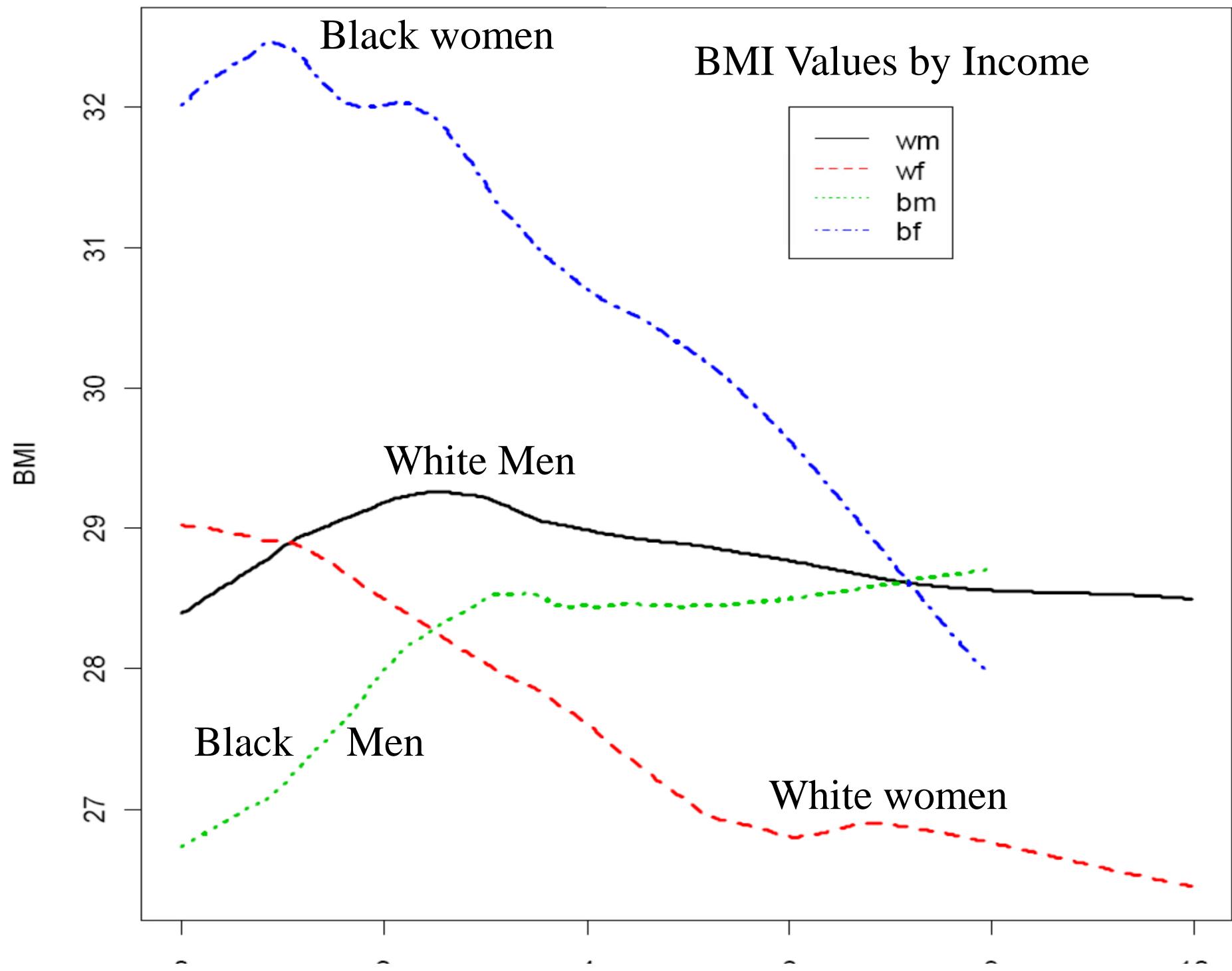


Iso-Bmi lines for age-birth cohort combinations



Iso-Bmi lines for age-birth cohort combinations





The Adult BMI values

National Sample also supports an early start

Two periods of rapid acceleration:

1920s

1950s

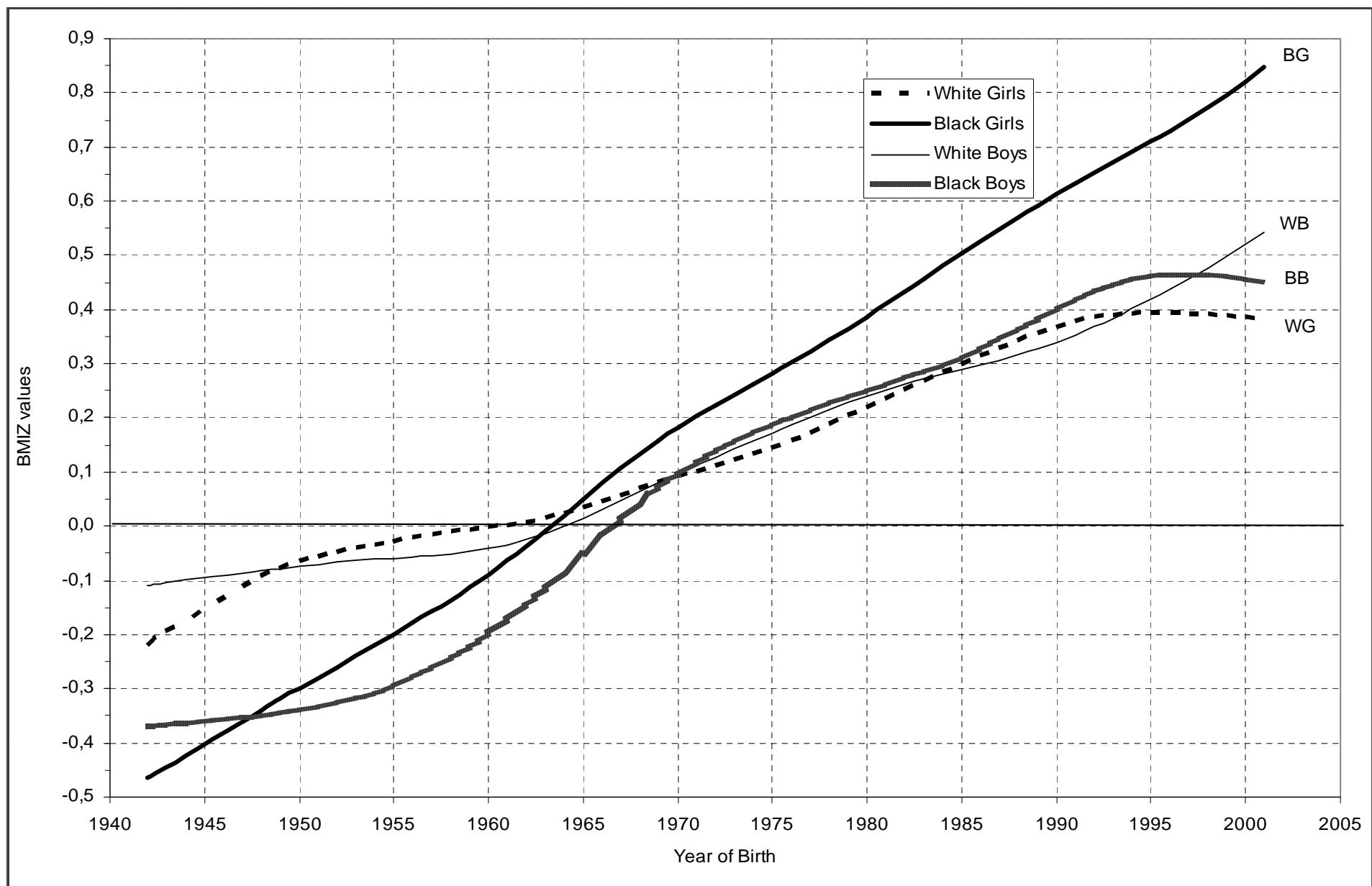
Slowdown during Great Depression and
World War II

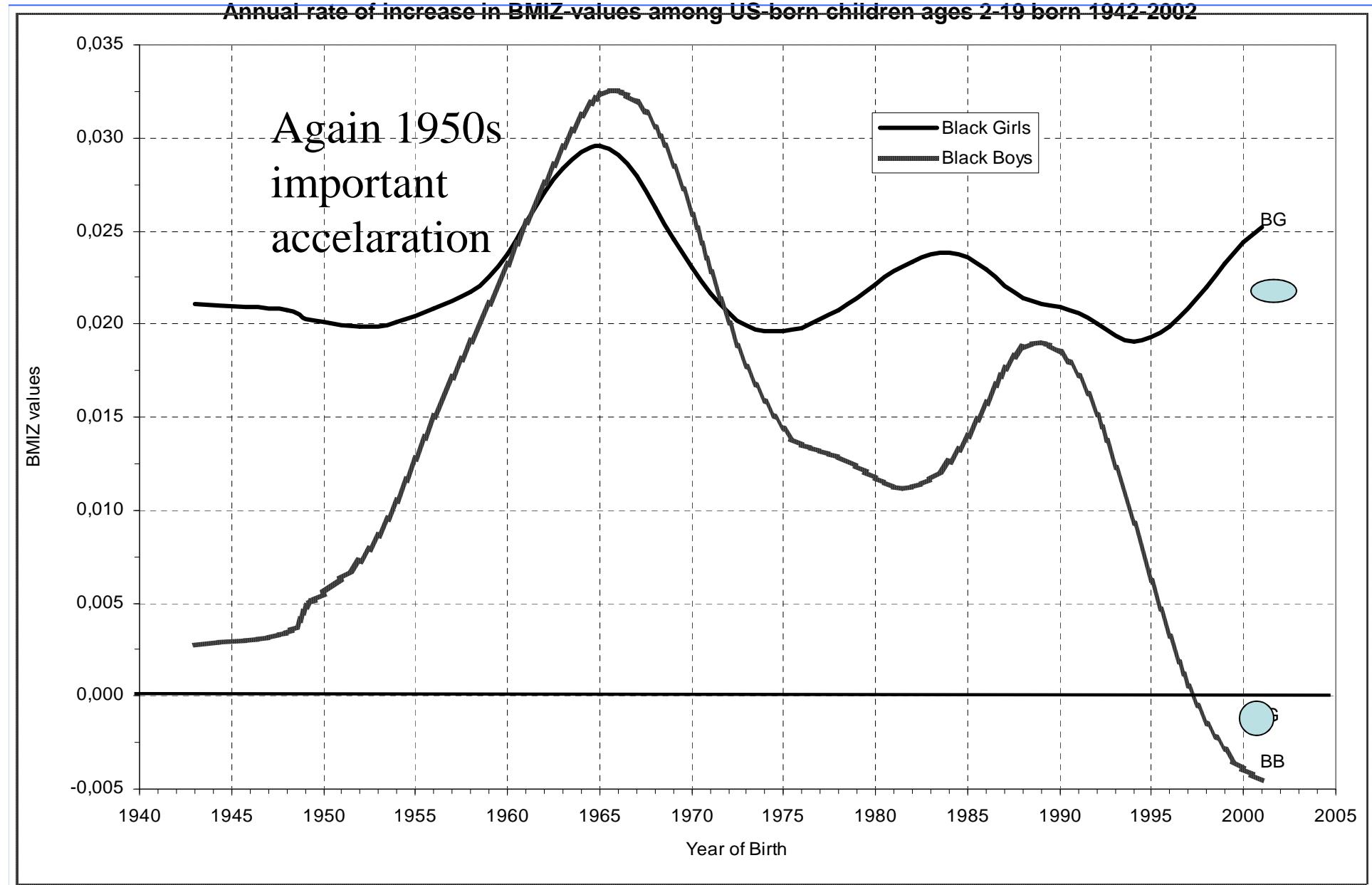
What about Children?

BMI_Z-values among US-born children ages 2-19

Birth Cohorts 1942-2002

Estimated values of the function f2: Trend in the BMIZ values of US-born black and white children compared to CDC 2000 reference values

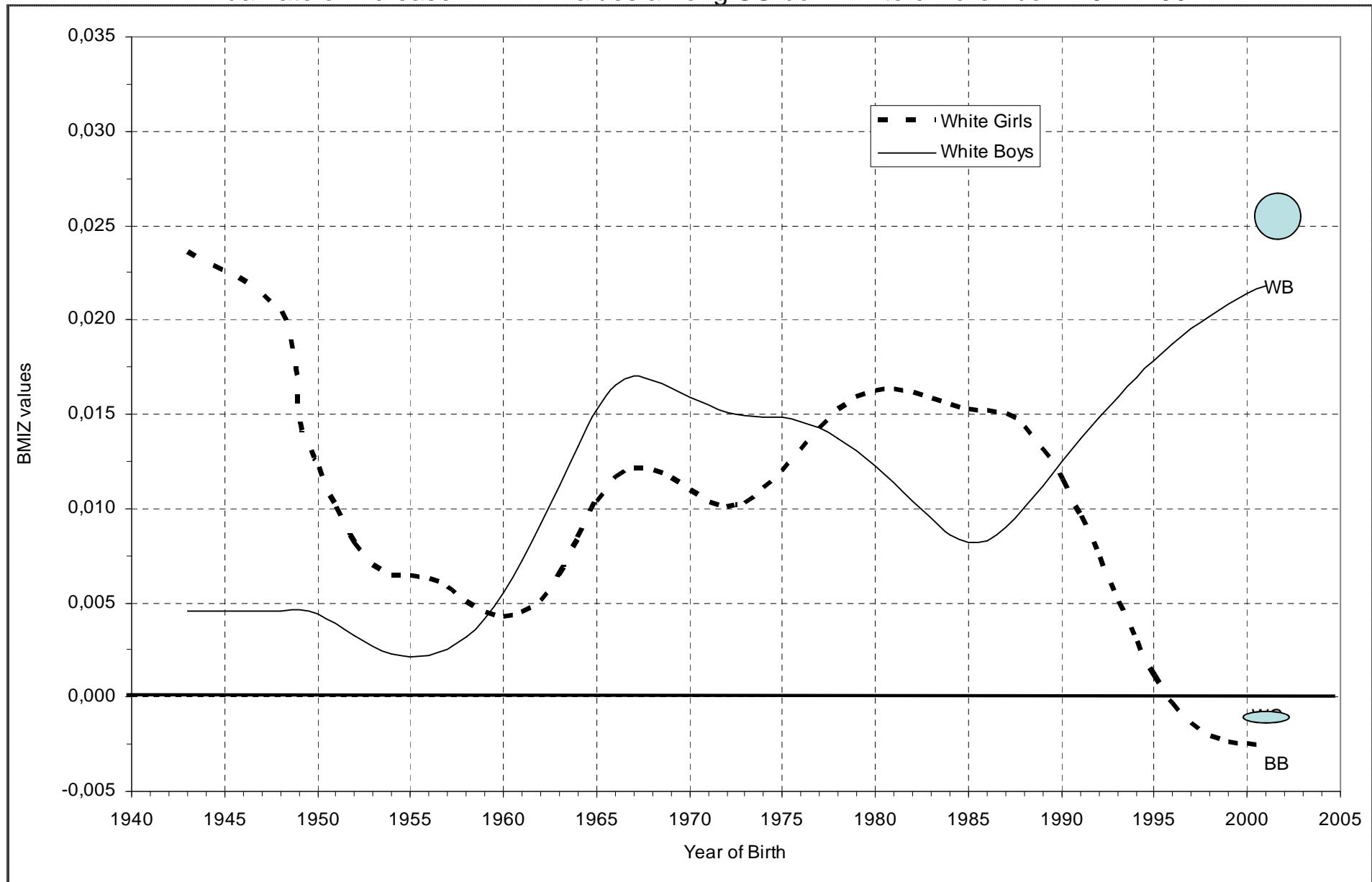




Note: Zero value implies that rate of change is constant.

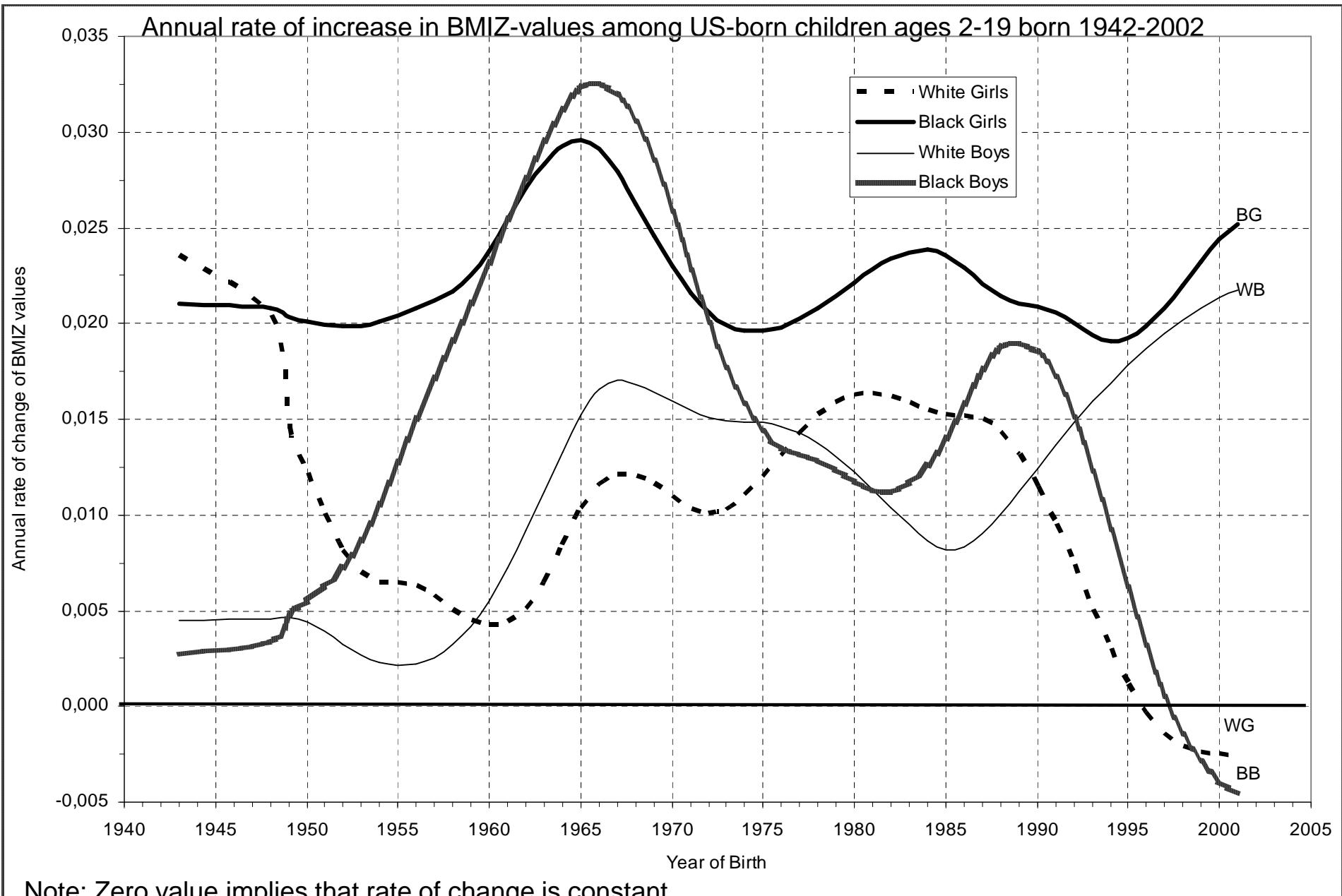
Positive values imply that BMI is increasing, (-) values that BMI is decreasing

Annual rate of increase in BMIZ-values among US-born white children born 1942-2002



Note: Zero value implies that rate of change is constant.

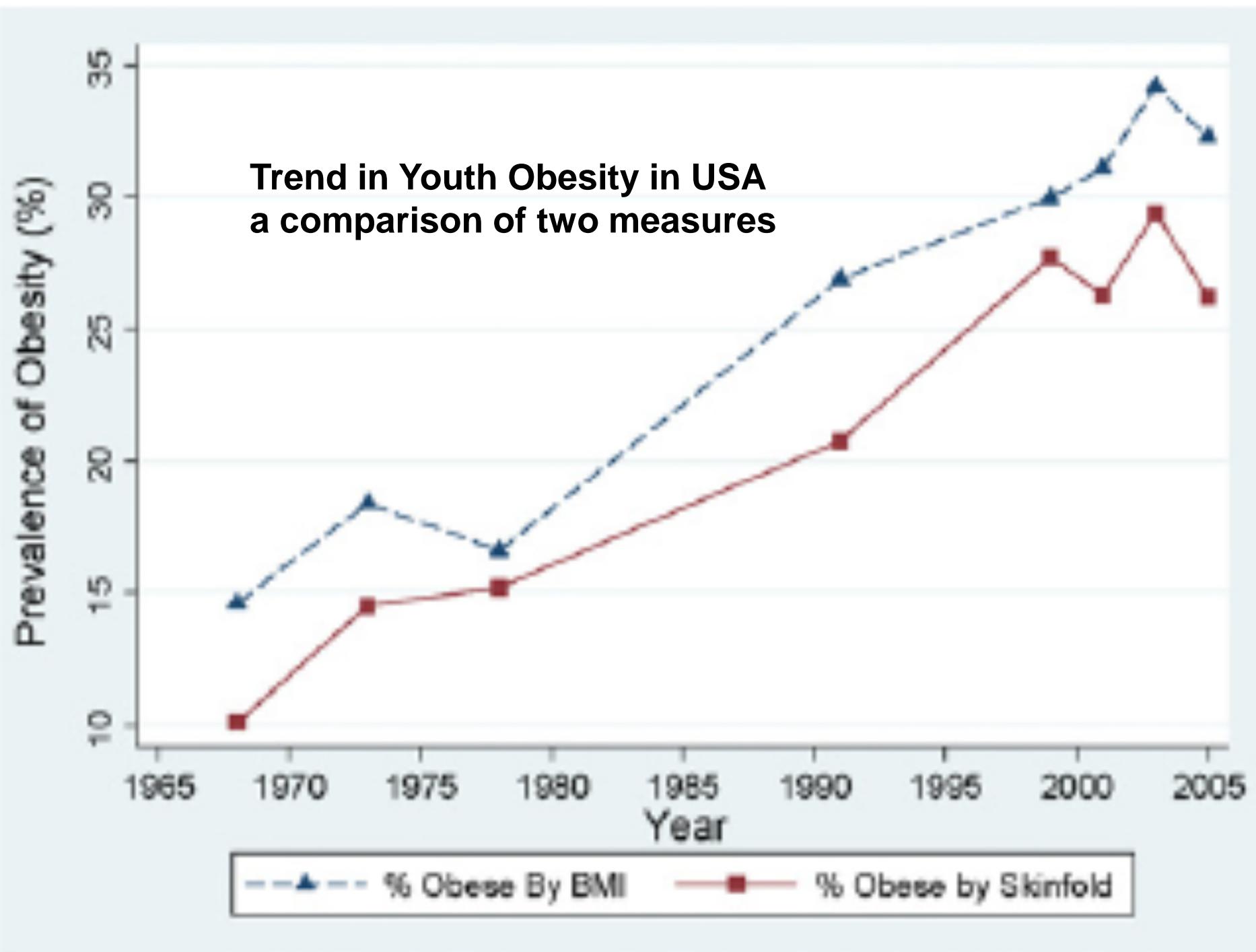
Positive values imply that BMI is increasing, (-) values that BMI is decreasing

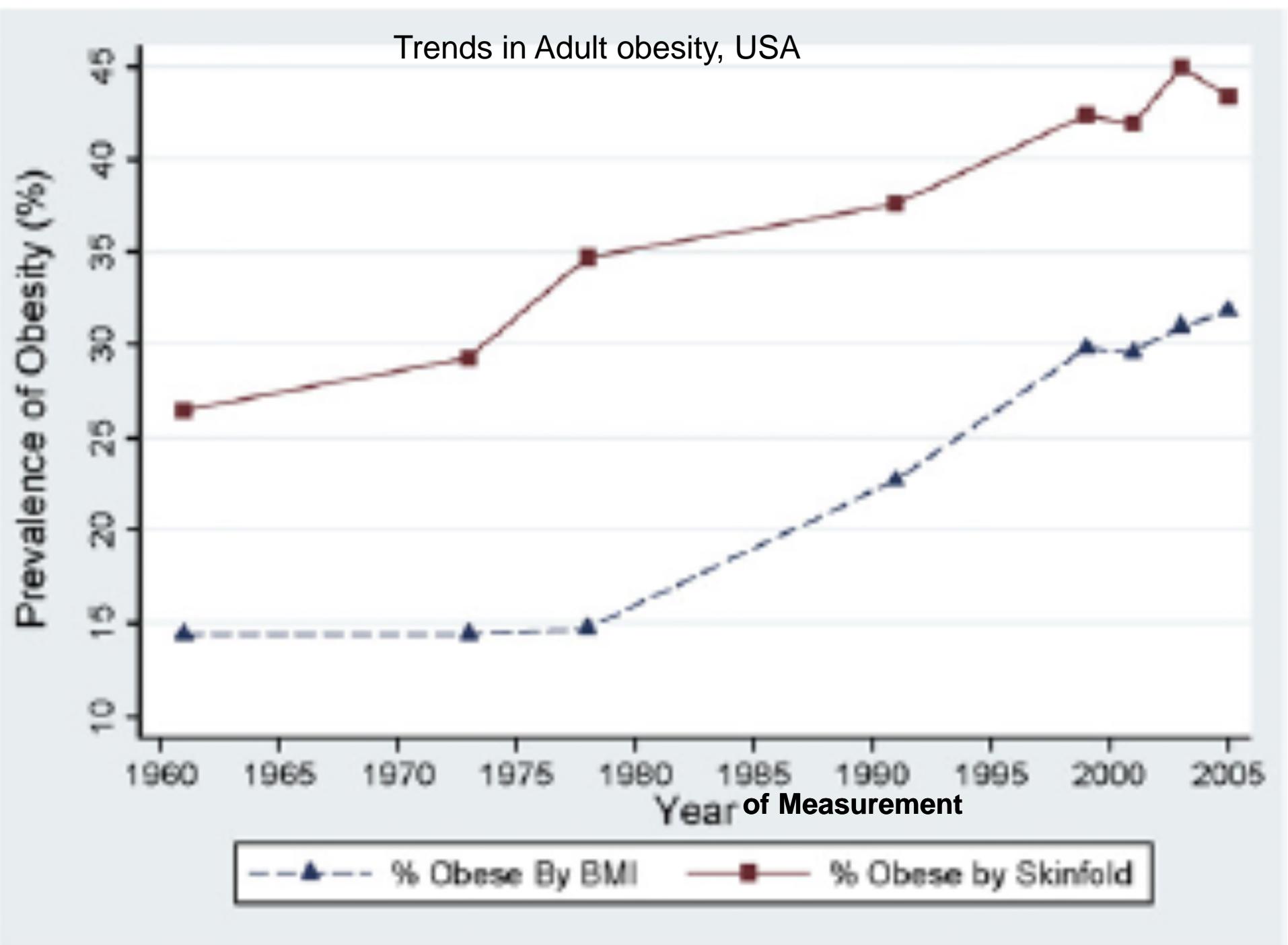


Hence, Children's BMI values also confirm the 1950s upswing

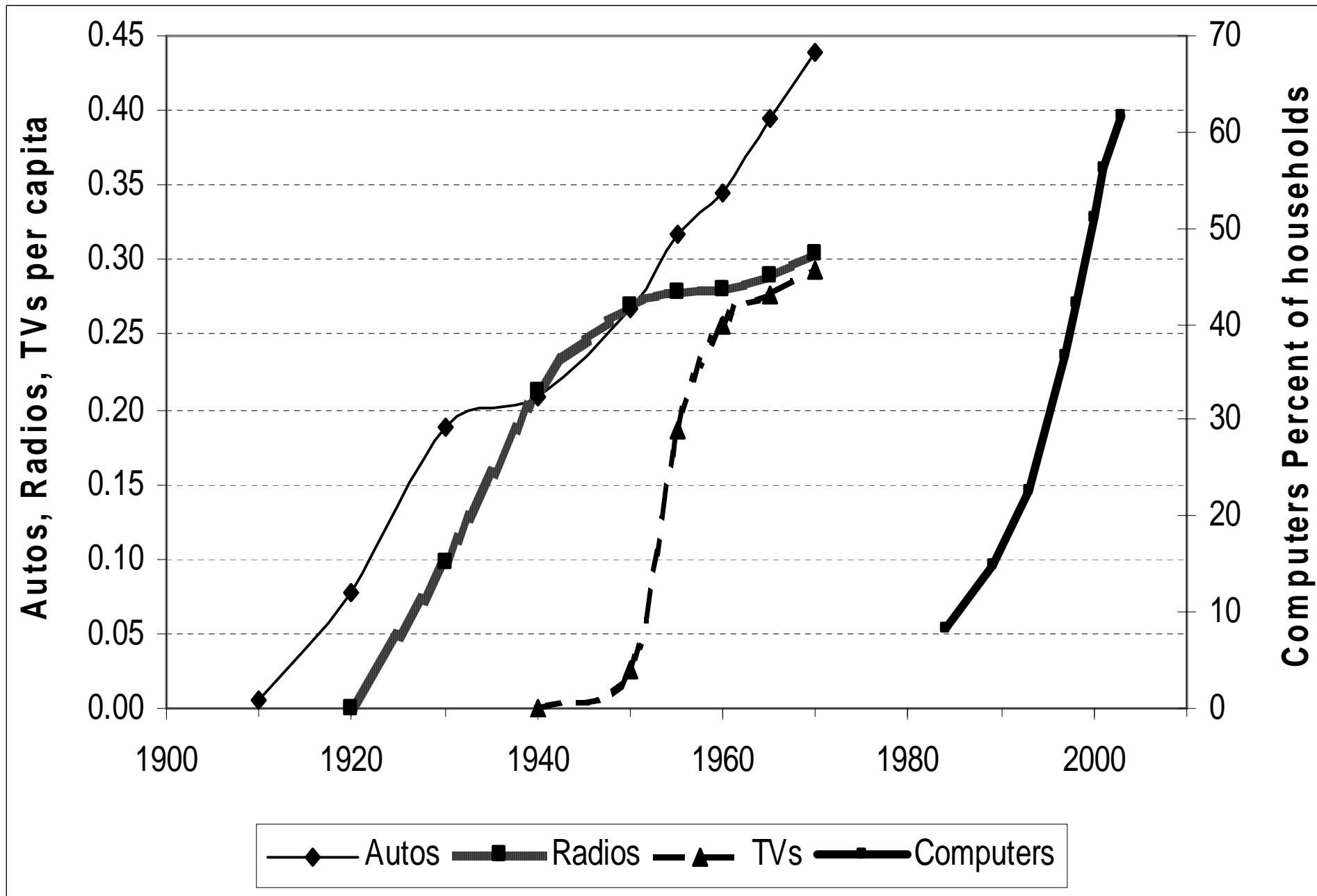
Innovation: Birth cohort trends enable us to calculate rate of change on an annual basis which in turn enables us to see periods in which the rate of change intensified.

„Creeping“ nature of transition

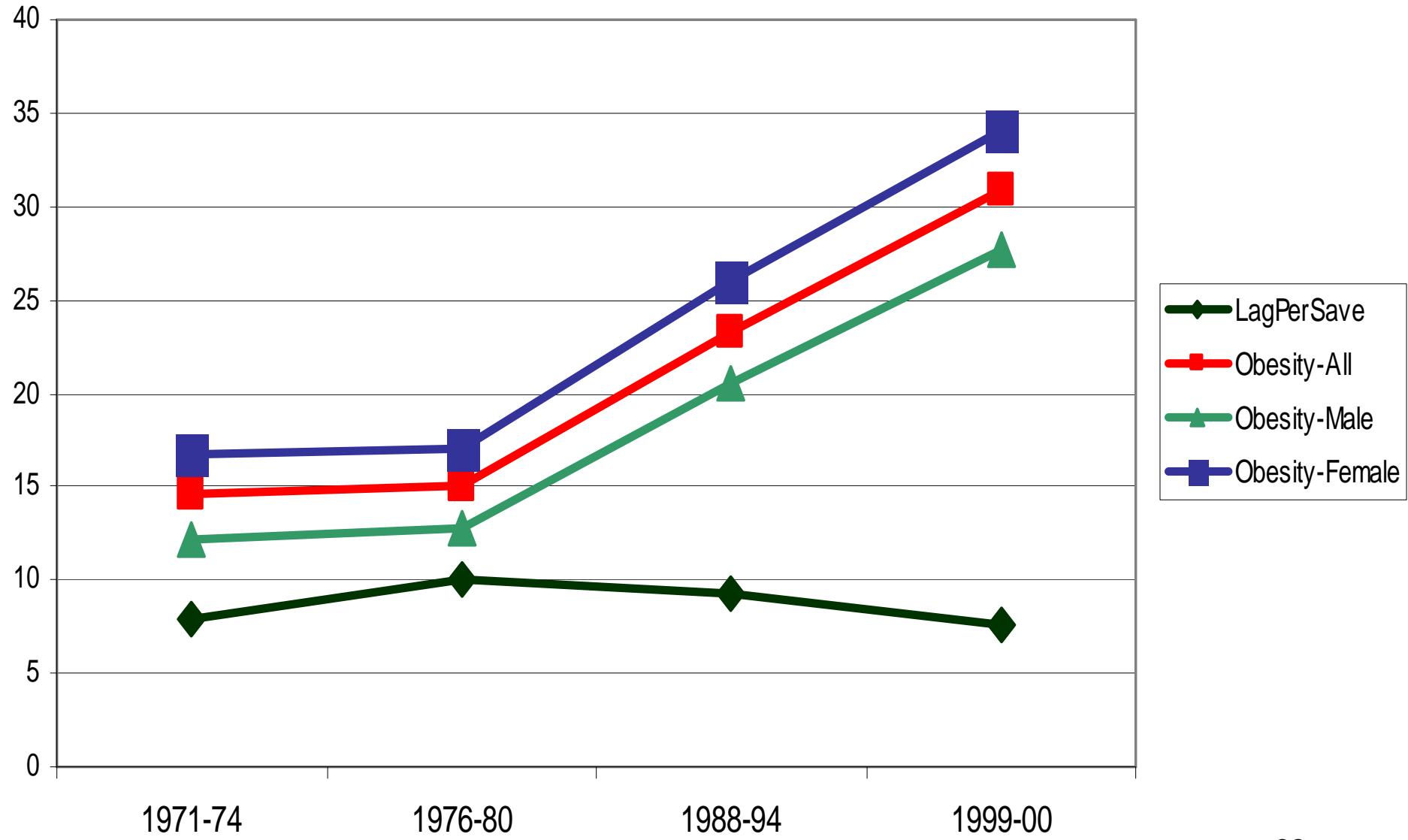




The spread of some major new technologies in the USA



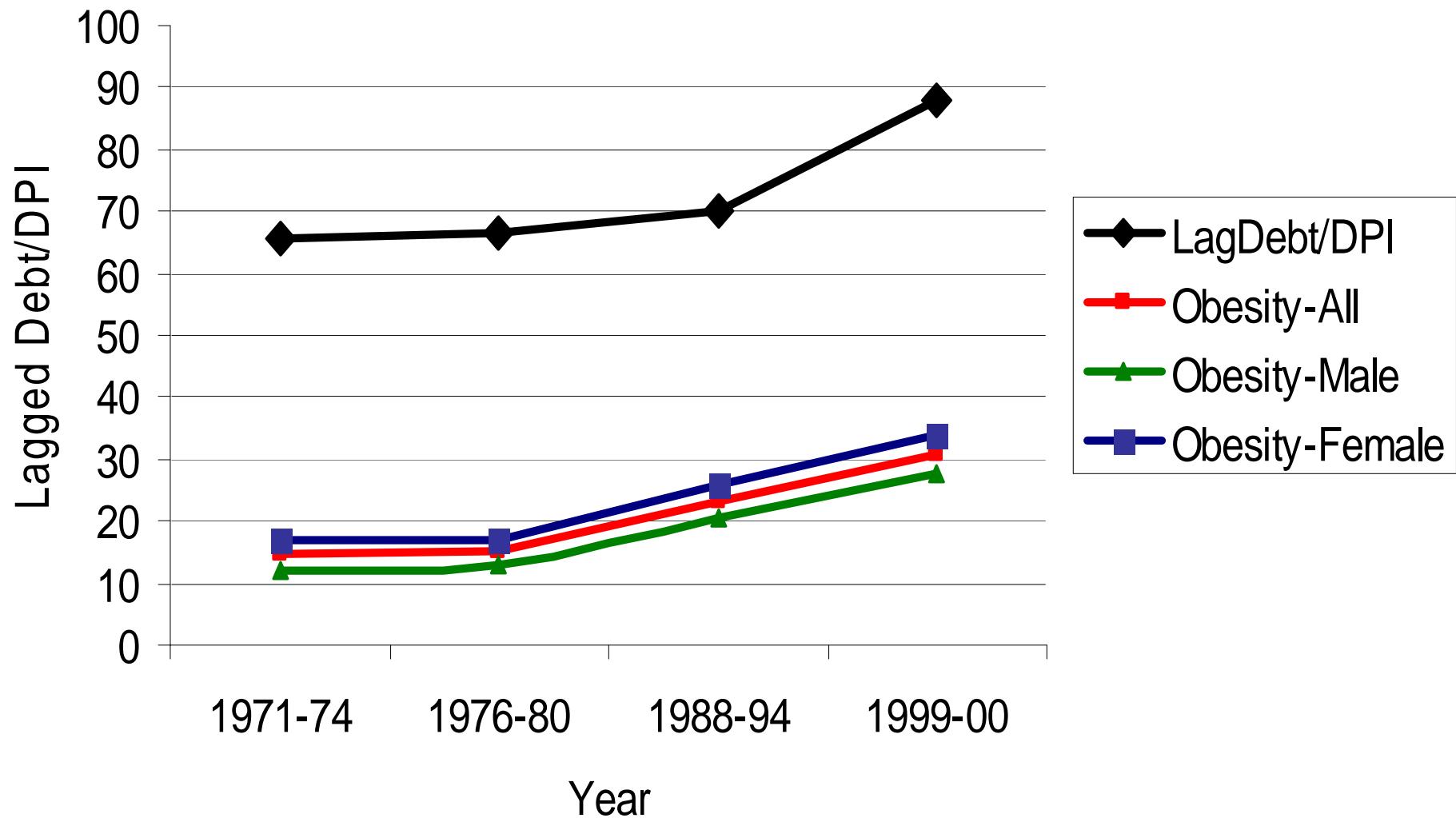
Trends in Obesity Prevalence & Lagged Personal Savings



32

Sources: NHES I (1960-62); NHANES I (1971-74); NHANES II (1976-80); NHANES III (1988-94); NHANES 99/00(1999-00).

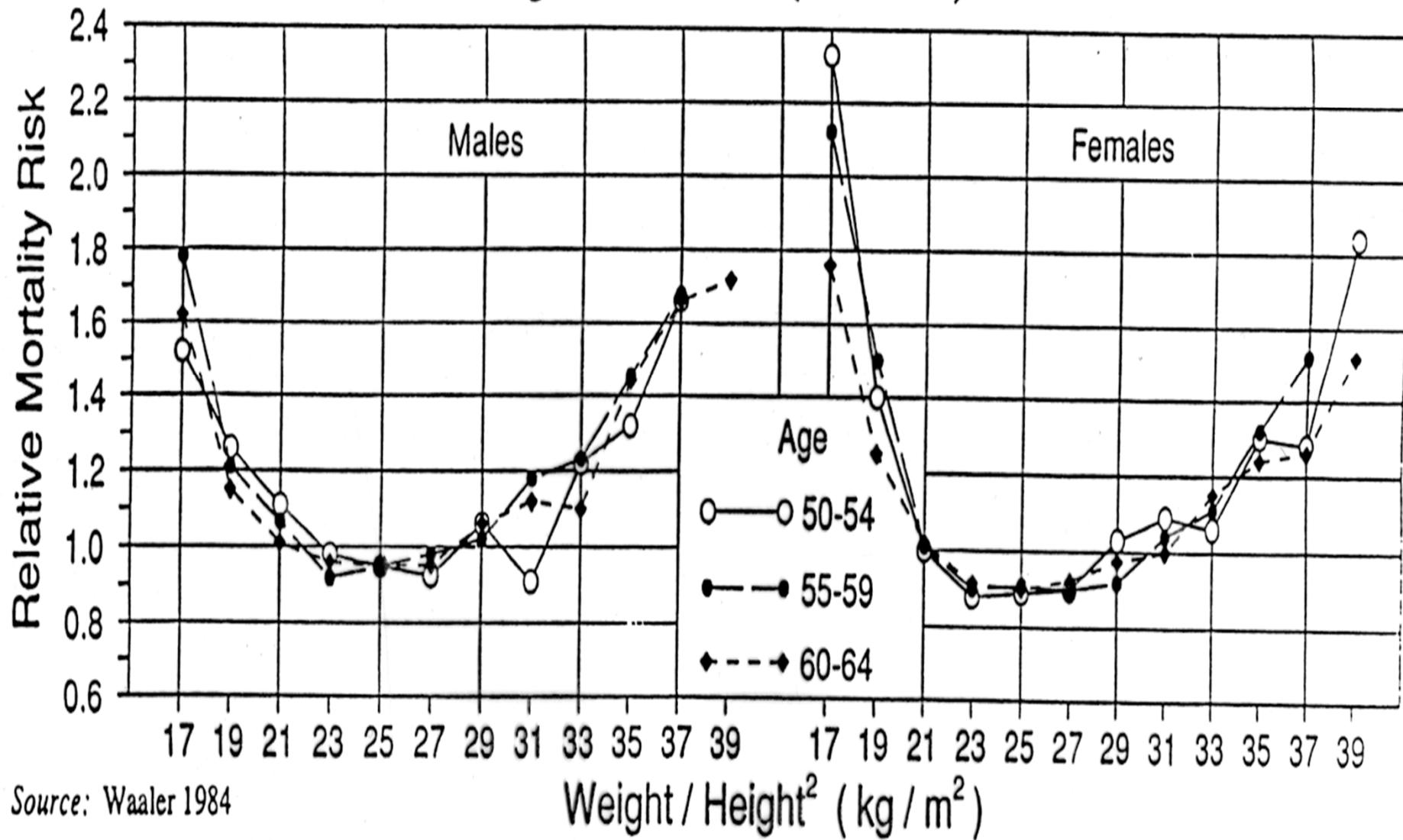
Trends in Obesity Prevalence & Lagged Debt-to-Income Ratio



Sources: NHES I (1960-62); NHANES I (1971-74); NHANES II (1976-80); NHANES III (1988-94); NHANES 99/00(1999-00).

Consequences: increased Mortality

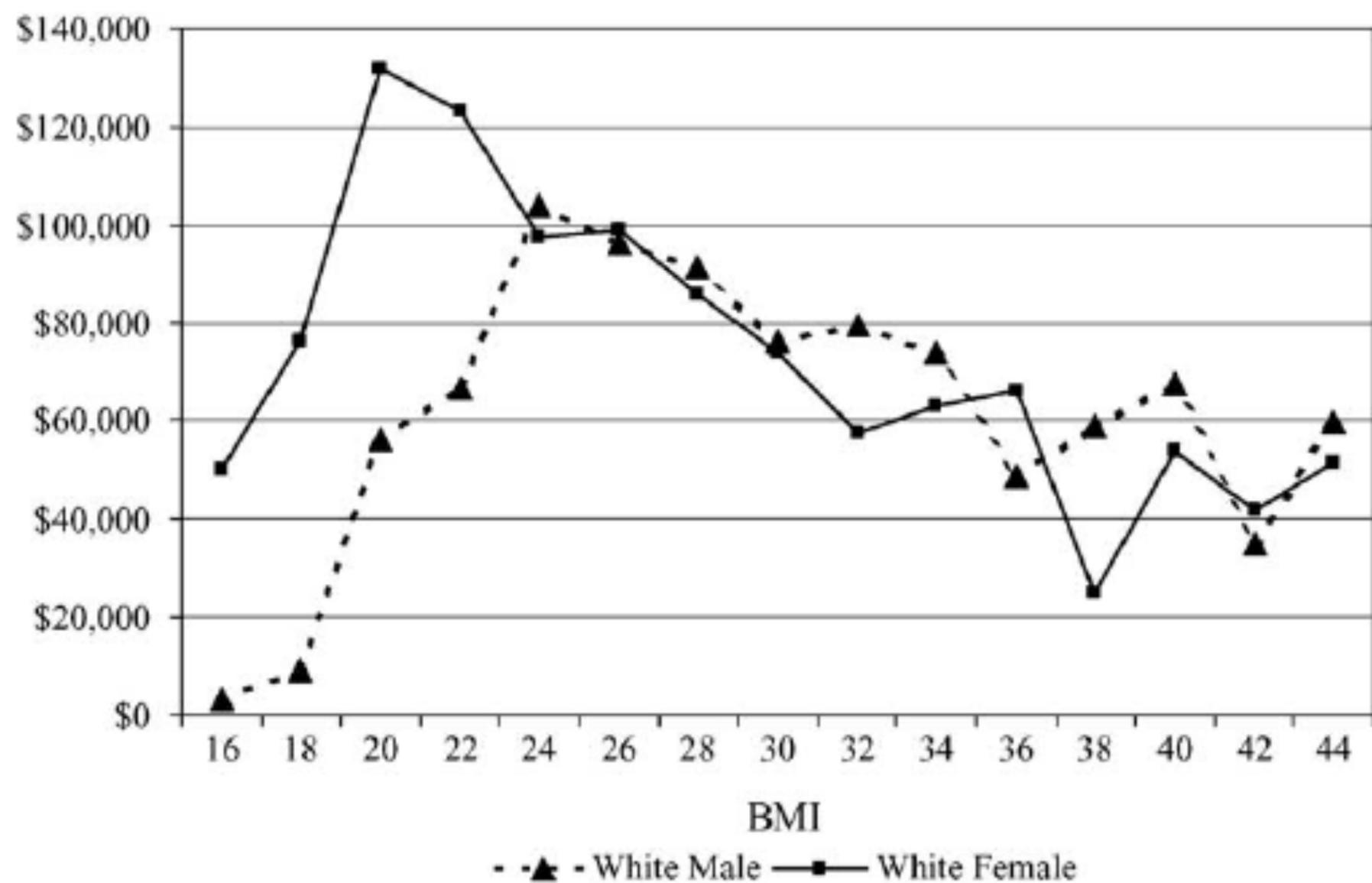
Relationship between BMI and Prospective Risk among Norwegian Adults
Aged 50-64 at Risk (1963-1979)



Source: Waaler 1984

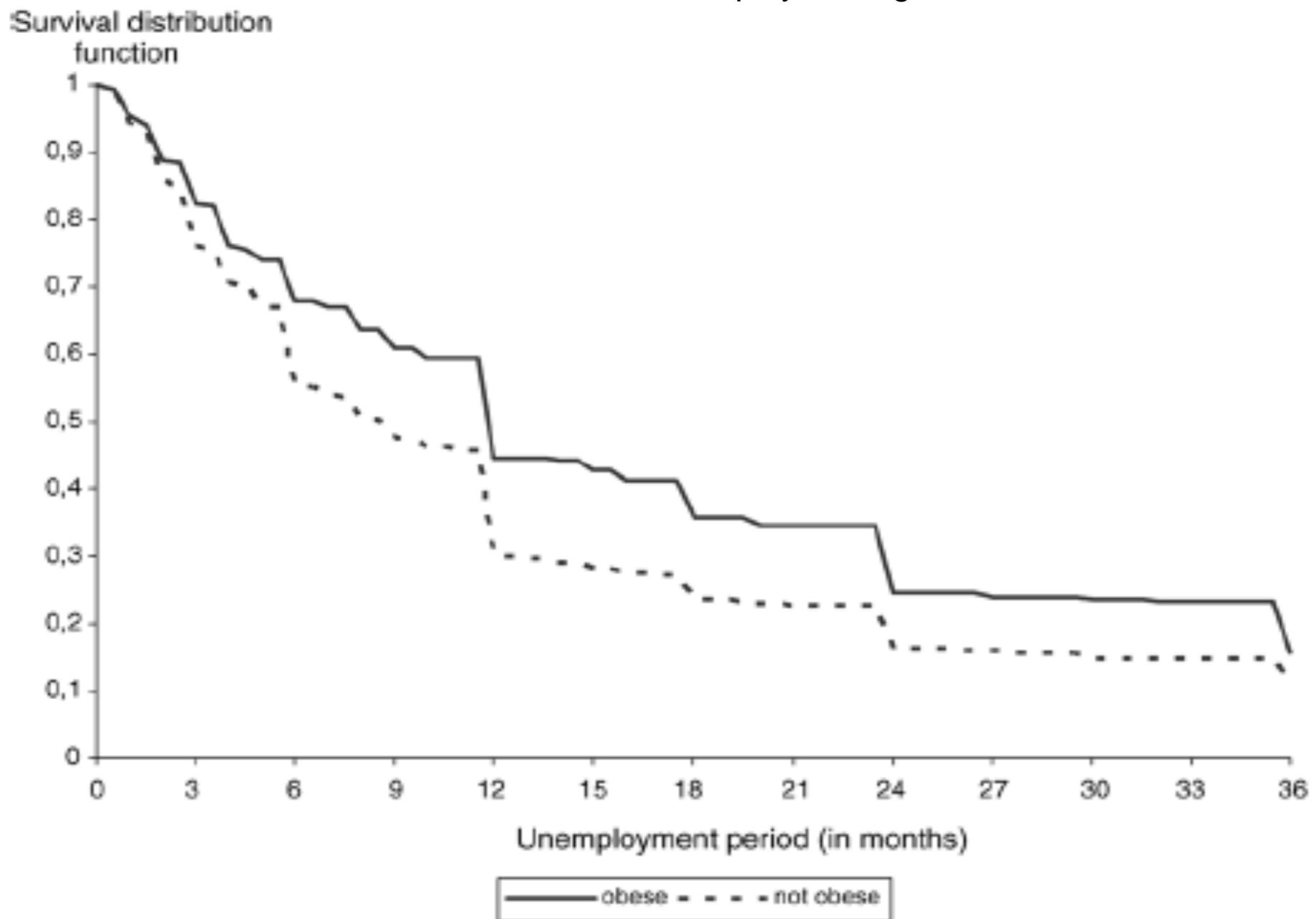
Wealth  **BMI**

Net worth of Whites in 2000 by BMI and gender.



Unemployment  **BMI**

Obese remain unemployed longer in France

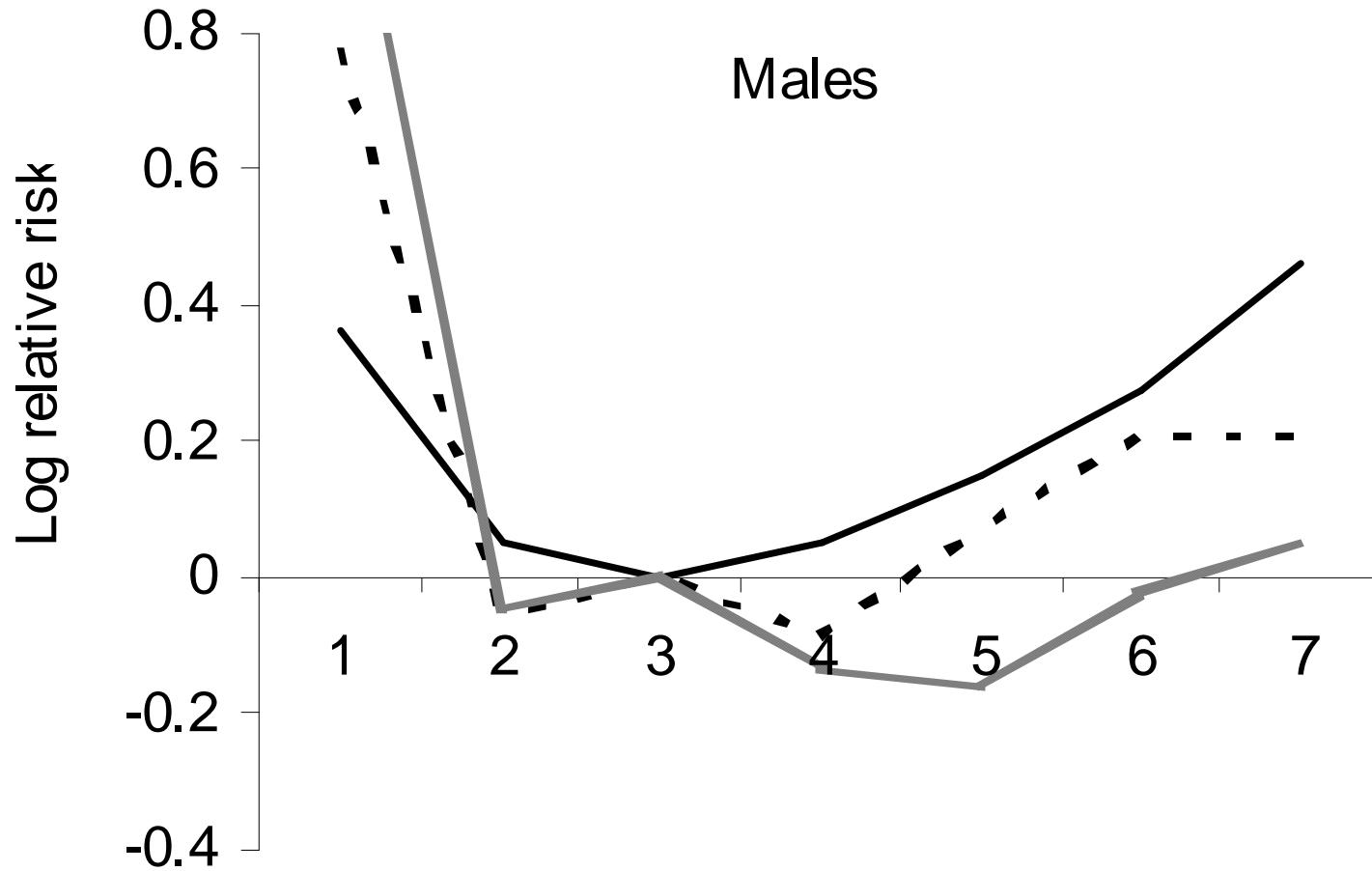


The End
Thank you for your attention

You can read all
about
these issues in:



Afterthought: why square height?



log relative risk of dying for adults at least 20 years of age at the time of measurement. X-coordinate represents the standard BMI groups. Bold line shows conventional definition of BMI Dashed line shows **results with BMI defined as $\text{kg}/\text{m}^{2.5}$** and grey line shows **results with BMI defined as $\text{kg}/\text{m}^{1.5}$** estimates are controlled for age at measurement and for birth cohort. Measurement took place between 1963 and 1975. Follow-up ended on December 31, 2006.

