Ukrainian famine of 1932-1933

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Famine in Ukraine
(1932-33, 1946)

- Estimated death tolls:

2.2-3.5 million die of starvation in 1932-1933 [1,2]

Up to 1 million starves to death in 1946 [3]

Investigation tool:

Diabetes Mellitus (DM) registers of 3 regions exposed to 1932-33 famine

- n = 64,496, aged 40-79
- Total population: n = 1,946,078 aged 40-79

DM registers for 2 Ukrainian regions unexposed to 1932-33 famine

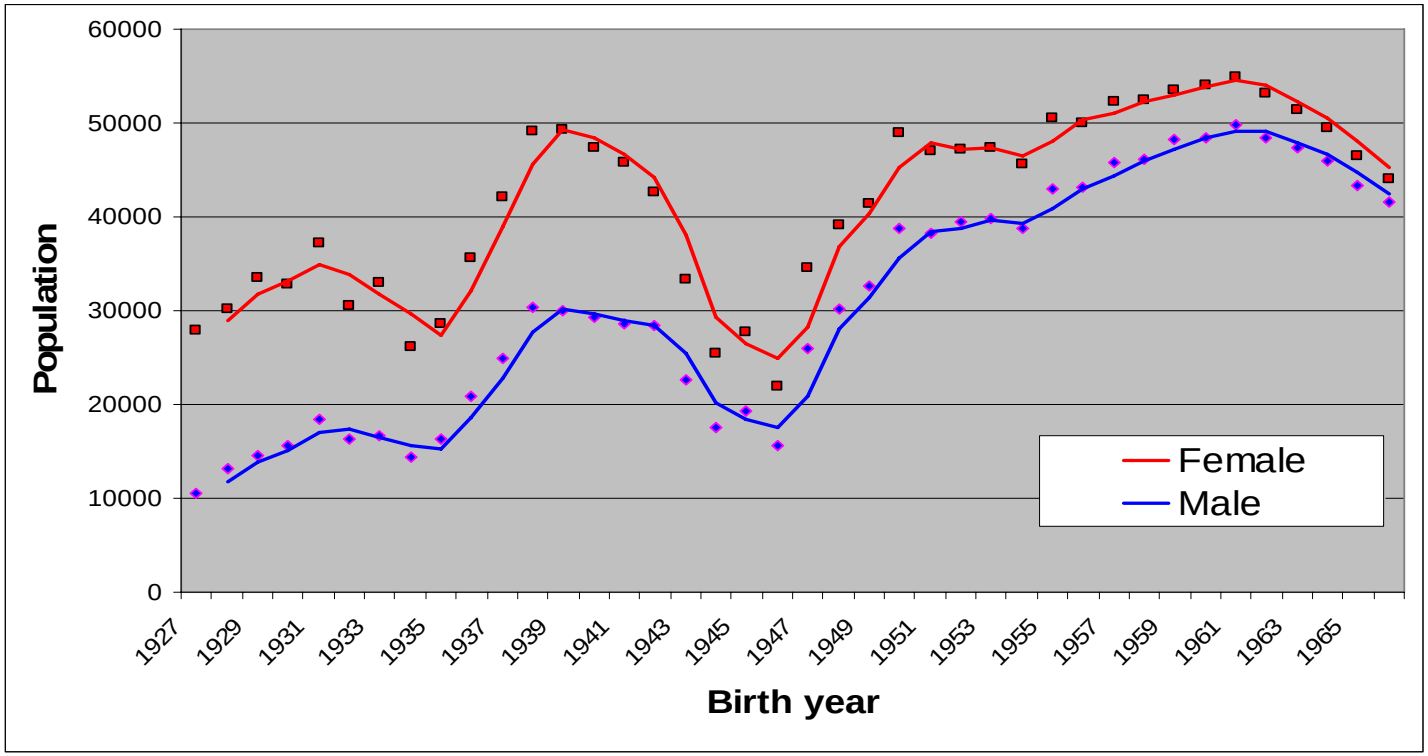
- n =27,719, aged 40-79.
- Total population: n = 864,801, aged 40-79.

We have gathered and analyzed Ukrainian Diabetes Mellitus (DM) data

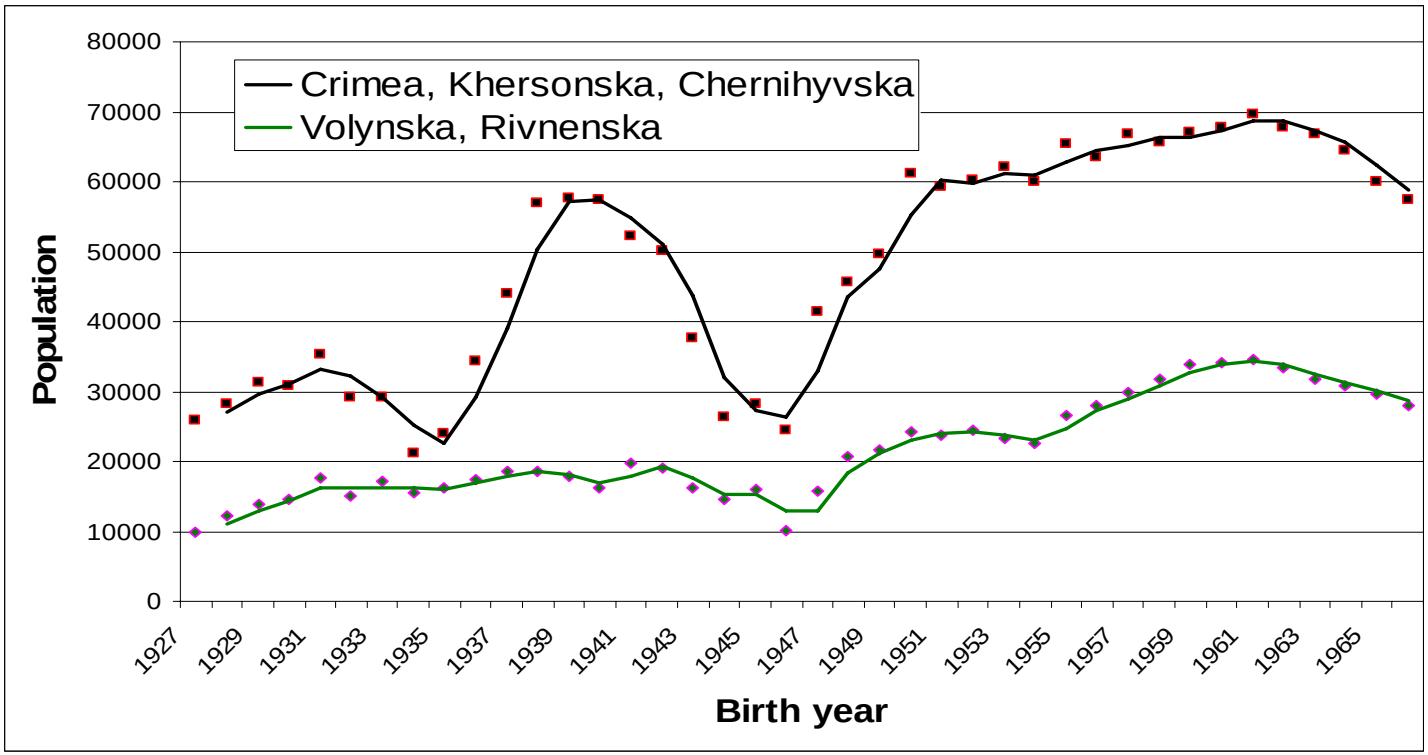
- According to the year of birth
- According to gender
- According to being part of USSR before/after 1939

A comparison to national diabetic register in Denmark had also been made (Dr. Bendix Carstensen, Copenhagen)

Total population of 5 Ukrainian regions

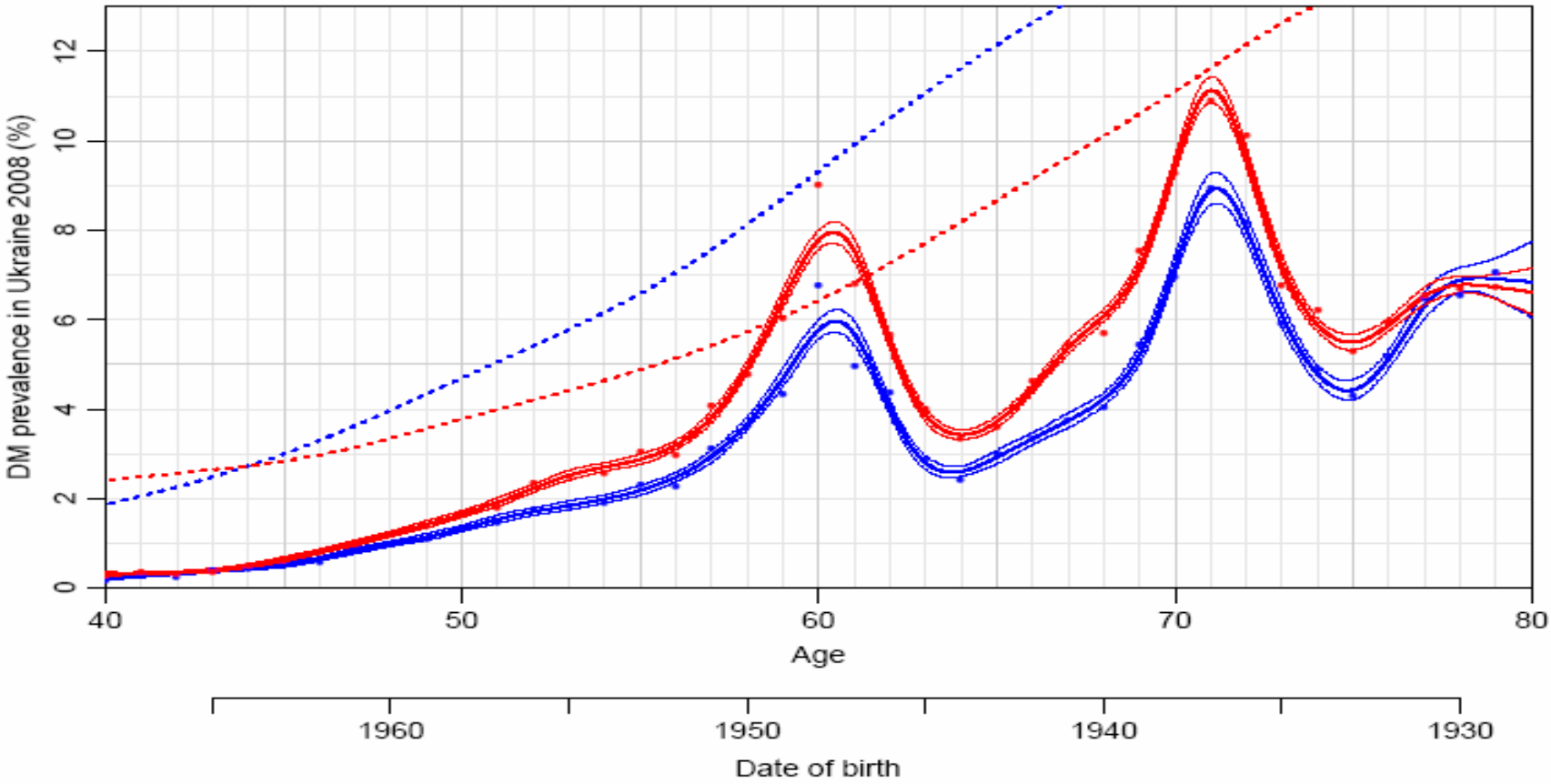


Population in 3 Ukrainian regions included into USSR before (black) and 2 regions included after (green) 1939



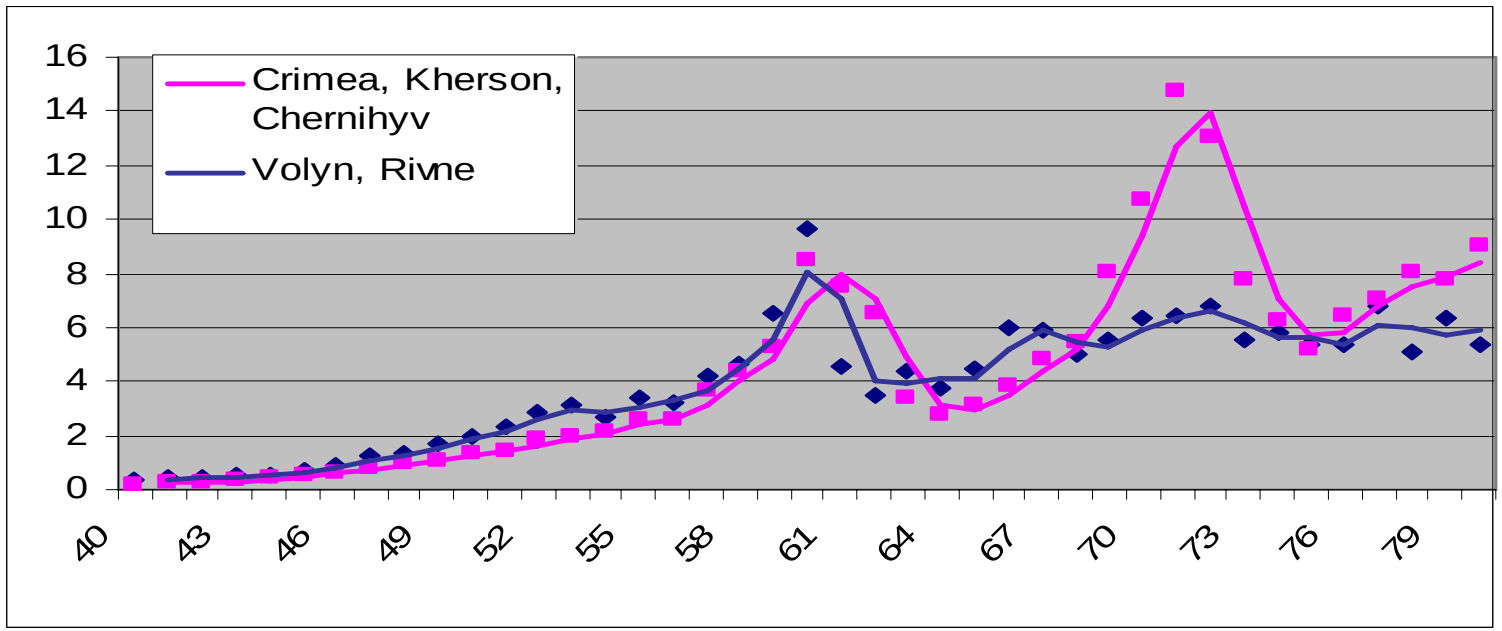
Age/Gender-Related DM Prevalence in 5 Ukrainian regions in relation to Denmark

(in cooperation with Dr. Bendix Carstensen, Copenhagen)



DM prevalence in Ukrainian regions included into USSR before (red) and after (blue) 1939

- No age-related prevalence peak for patients born between 1933-1937



Thrifty Genotype

- Thrifty alleles – ancient evolutionary adjustment to feast/famine conditions
- Diabetics may carry thrifty alleles that make them extremely efficient in food intake/utilization
- Not advantageous in modern food-abundant environment (4)
- Non-thrifty genotypes carriers dyed in 1932-1933?

Thrifty Phenotype

- Results from nutritional deficiency in gestational and early postnatal period
- Maintained for life
- Cause of type 2 DM if food-abundant lifestyle is encountered later in life [5]

Thrifty Epigenotype

- DM 2 susceptibility is predominantly determined by epigenetic variations
- Such epigenotypes are inherited
- Leptin is a candidate gene for thrifty epigenotype aquisition (6)

References

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2. Stephen G. Wheatcroft, On demographic evidence of the tragedy of the Soviet village in 1931-1933), V.P. Danilov et al, eds. [The Tragedy of the Soviet Village: Collectivization and Dekulakization: Documents and Materials, 1927-39, vol. 3, Konets 1930-1933, Moscow, 2001, pp. 866-886.
3. Veselova, O. et al (eds). *Holod v Ukraïni, 1946–1947: Dokumenty i materialy* (Kyiv–New York 1996)
4. Neel JV. 1962. Diabetes mellitus: a ‘‘thrifty’’ genotype rendered detrimental by ‘‘progress’’? Am J Hum Genet 14:353–362.
5. Hales CN, Barker DJ. 1992. Type 2 (non-insulin-dependent) diabetes mellitus: the thrifty phenotype hypothesis. Diabetologia 35:595–601.
6. Stöger R.. The thrifty epigenotype: an acquired and heritable predisposition for obesity and diabetes? Bioessays. 2008 Feb;30(2):156-66

Age/Gender-Related DM Prevalence in Ukraine

Two peaks of DM prevalence among Ukrainians from regions which were a part of USSR before 1939

- Patients born between 1933-1937
- Patients born between 1946-1947

Female domination in all age groups

Age/Gender-Related DM Prevalence in Denmark

- Linear increase of age-related DM prevalence
- Male domination in all age groups