An overview ...

- International context
- Main cross-national trends
- Some macro-level correlates
- Sex differentials in mortality
- Changes by age
- Some speculations about the future
Data sources

- Human Mortality Database (HMD) (http://www.mortality.org/)

Life expectancy at birth 1950-2050 international comparison countries

Source: UN 2010 Revision. Values are 5-year averages.
Life expectancy at birth by major area, 1950–2050 (years)

Geographic trends in Mortality, Males 1910-85

A. Scandinavia good, S & E Europe bad
B. Central improves
C. East improves
D. More recently
   • Mediterranean improves
   • Eastern Europe deteriorates

Life expectancy at birth 1950-2050 “Big 8” countries

Change in life expectancy (in years) at birth 1950-2050 major European regions
Macro-level relationships …

• Does what matters at individual/national-level also matter cross-nationally?

“Social Determinants of Health” (Marmot)

• Social gradient
• Stress
• Early life influences
• Social exclusion
• Unemployment and job insecurity
• Social support
• Addictions
• Inappropriate food
• Transport
Medical/Public health “risk factors”

• Occupation
• High blood cholesterol
• Hypertension
• Lack of fruit & vegetables
• Overweight and obesity
• Physical inactivity
• Abuse alcohol & illicit drugs
• Tobacco
• Unsafe sex

BASMRG (2008)

• Age
• Gender
• Medical history
• Genetics
• Smoking
• Diet
• Obesity
• Occupation/socio-economic class
• Alcohol consumption
• Regular exercise
• Exposure to stress
• Wealth
• Marital status
• Education
Life expectancy at 15 and macro-level mortality-related indicators, Europe (Source: HFA-DB)

![Graphs showing life expectancy at 15 and mortality-related indicators for various causes in Europe.](image)

Life expectancy at 15 and macro-level health-related indicators, Europe (Source: HFA-DB)

![Graphs showing life expectancy at 15 and health-related indicators for various factors in Europe.](image)
Life expectancy and macro-level socio-political indicators, Europe

Sex differentials in mortality

• Trends & differentials
Change in sex differential in life expectancy (in years) at birth 1950-2050 “Big 8” countries

Male-female relationship in:

Source: UN 2010 Revision. Values are 6-year average.
 Changes by age …

- Who wins?
- Cohort patterns?
- Derivative-based smoothed mortality surface
- Decomposition of changes in $e_0$
Annual age-specific percentage rate mortality improvement, England and Wales, 1965-2009

Annual age-specific percentage rate mortality improvement, France, 1965-2009
Annual age-specific percentage rate mortality improvement, Italy, 1965-2009

Annual age-specific percentage rate mortality improvement, Spain, 1965-2009
Annual age-specific percentage rate mortality improvement, Poland, 1965-2009

Annual age-specific percentage rate mortality improvement, Russia, 1965-2009
Arriaga (1984) decomposition

- Arriaga’s formula decomposes the differences in the expectation of life at birth \((e_0^b - e_0^a)\) for populations \(a\) and \(b\) due to differences in age-specific death rates.
- The total effect of age interval \((x, x + n)\) consists of a direct effect and an indirect effect.
- The direct effect of age interval \((x, x + n)\) is
  \[
  dDE_x = t_x \left( \frac{l_x}{l_x} - \frac{l_x}{l_x} \right) \]
- And the indirect effect is
  \[
  dIE_x = \left( \frac{l_x^{x+n}}{l_x^{x+n}} - \frac{l_x}{l_x} \right) \]

Annual age-specific percentage rate mortality improvement, Ukraine, 1965-2006

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Components of period life expectancy change by decade (HMD-based)
Components of period life expectancy change by decade (HMD-based)

Some speculations about the future …

• Britain (uniquely good data)
• Impact on different age groups
Decadal change in cohort life expectancy (in years) by age group, England and Wales

Years of life expectancy gained in cohorts by age in decade: Males, England and Wales

Source: Calculated from E&W 2008–based Official projections

Using 2008–based official projections
Years of life expectancy gained in cohorts by age in decade: Females, England and Wales

Annual cumulative number of deaths from age 65 in following 5 years, EU

Values are 5-year averages. Source: UN 2010 Revision
Thank you - Questions or comments?