What kills middle-aged Swedes? A Prospective cohort study on NCD risk factors and mortality
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Background
We aimed to attribute changing risk factor exposures to patterns of premature (age 40 to 70 years) non-communicable disease (NCD) mortality in a defined population, and to assess the compound effect on individuals of multiple risk factors.

Methods
A prospective cohort study was conducted during 1990–2006, including 68,336 individual NCD risk factors at the age of 40, 50 or 60 in Västerbotten health intervention program, which were linked to cause-specific mortality data from the Swedish
national data. The attributable contributions of changing risk factors over the study period to various categories of reduction premature NCD mortality were estimated using the relative risks from the Cox proportional hazards regression models. Age- and sex-adjusted mortality rates for each year of the study were calculated using Poisson regression models with various categories of premature mortality as the dependent variable.

**Results**

1,799 deaths occurred over 553,921 person-years in the 40 to 70 year age group, of which 82% were due to NCDs. The proportion of NCD mortality attributable to risk factors ranged from 40.1% at baseline to 32.8% in 2006, with a higher proportion for cardiovascular causes (76.2% to 67.7%) and a lower proportion for cancers (19.3% to 15.8%). Individuals with multiple risk factors were at particularly high risk: one in three deaths occurred among the 11.6% of individuals with three or more risk factors.

**Conclusions**

Since most premature mortality was due to non-communicable diseases, and substantially attributable to relevant risk factors, managing those risks is a critical public health issue. As well as minimising population risk factor levels, individuals with multiple risk factors need to be prioritised in view of their elevated overall risk. Sweden may not achieve the WHO target of a 25% reduction in premature non-communicable mortality from 2010 to 2025 unless non-communicable disease risk factors are further reduced.

**Key messages**

- This study clearly shows that multiple non-communicable disease risk factors in the same individual, which is disadvantageous, are associated with high compounded risks for every mortality group
- Since most premature mortality was due to non-communicable diseases, and substantially attributable to relevant risk factors, managing those risks is a critical public health issue