

Doc S1. Additional explanations of relative survival (net survival)

Why do we use relative survival approach for population-based cancer registry data?

Many readers are not familiar with “relative survival”. We will explain why we use this approach to estimate population-based cancer survival.

Net survival

Net survival is the gold standard for estimating cancer survival. It corresponds to the survival probability of cancer when risk of death from other causes has been eliminated.

Net survival can be defined as the probability of survival from cancer when the risk of death from other causes has been eliminated ⁽¹⁾. It is the theoretical gold standard for estimating survival from cancer, although it can be difficult to measure robustly in the population setting unless the quality and completeness of the certification and coding of the cause of death are known to have been good over a long period of time. Given the difficulty of ensuring that those conditions are met in practice ⁽²⁾, relative survival has become the preferred approach for estimating long-term trends ⁽³⁾ or for international comparisons of survival ⁽⁴⁾.

Therefore, the relative survival approach is the globally recognised approach for estimating the net survival for routine population-based cancer data.

(1) J. Estève, E. Benhamou, and L. Raymond. Statistical methods in cancer research, volume IV. Descriptive epidemiology. (IARC Scientific Publications No. 128), Lyon:International Agency for Research on Cancer, 1994.

(2) R. Laurenti, M. P. Coleman, and P. Aylin. Accuracy of statements of the cause of death on death certificates and the international comparability of mortality statistics. In: Death certification and mortality statistics: an international perspective, edited by M. P. Coleman and P. Aylin, London:Office for National Statistics, 2000,

(3) T. Hakulinen. On long-term relative survival rates. *J.Chron.Dis.* 30:431-443, 1977.

(4) F. Berrino and R. Capocaccia. Survival of European cancer patients. In: Responding to the challenge of cancer in Europe, edited by M. P. Coleman, D. M. Alexe, T. Albrecht, and C. M. McKee, Ljubljana:Institute of Public Health of the Republic of Slovenia, 2008, p. 151-176.

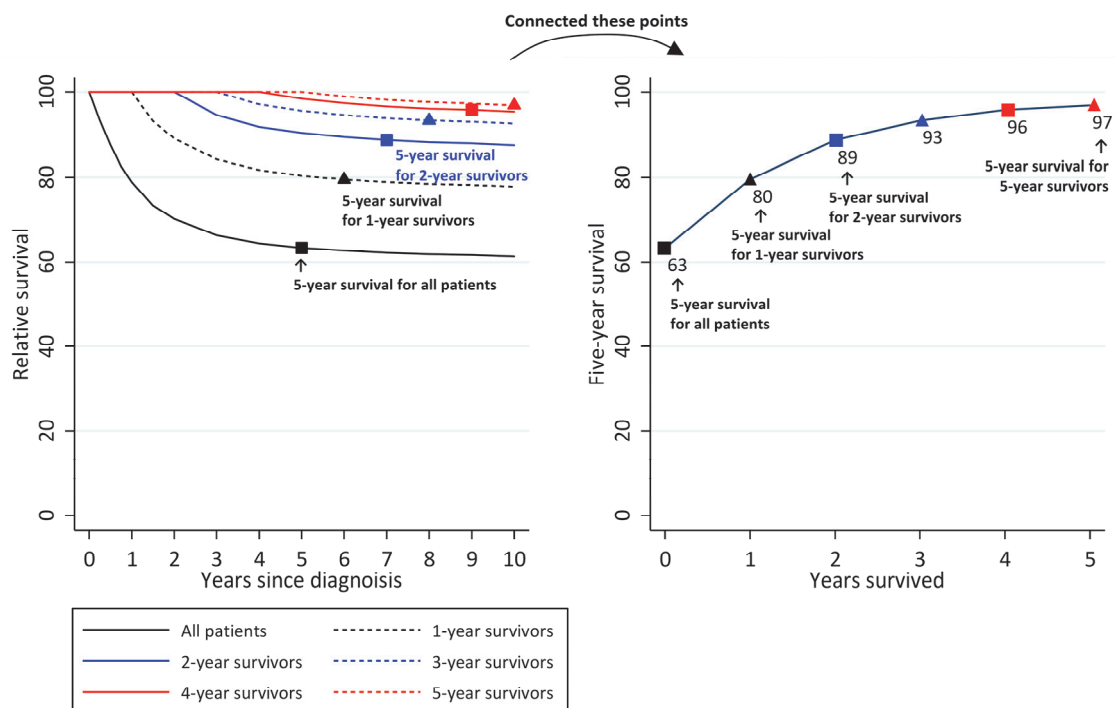
Doc. S2: Additional explanations of conditional survival

The relationship between conventional relative survival curves and conditional five-year survival curve

Conditional five-year survival is a relatively recent concept to present cancer survival for cancer survivors. We have added an explanation of how we obtained and interpreted these figures, showing three typical examples of results.

Example 1: Stomach cancer (male)

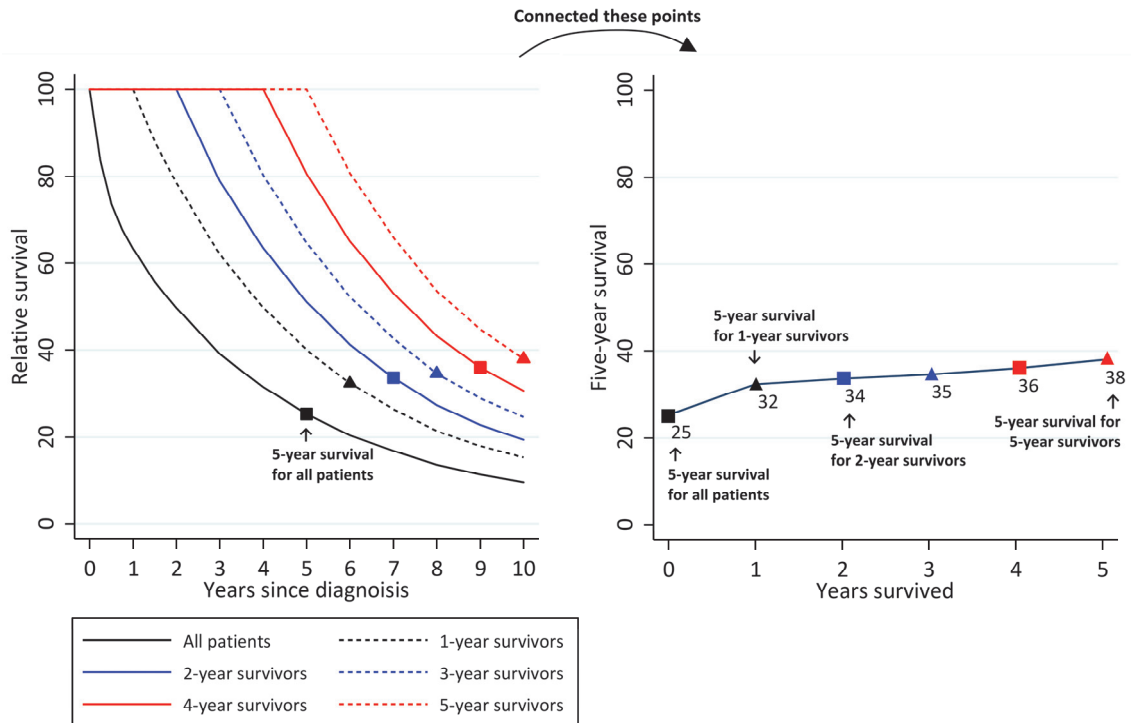
Most patients died within 1-2 years, few survivors died afterwards.



Among stomach cancer patients, many who had an unfavorable prognosis (e.g. advanced stage) died within 1 or 2 years. Conditional five-year relative survival approaches 100% some years after diagnosis, this means that long-term survivors can be considered as those who have a survival probability close to that of the general population.

Example 2: Liver cancer (male)

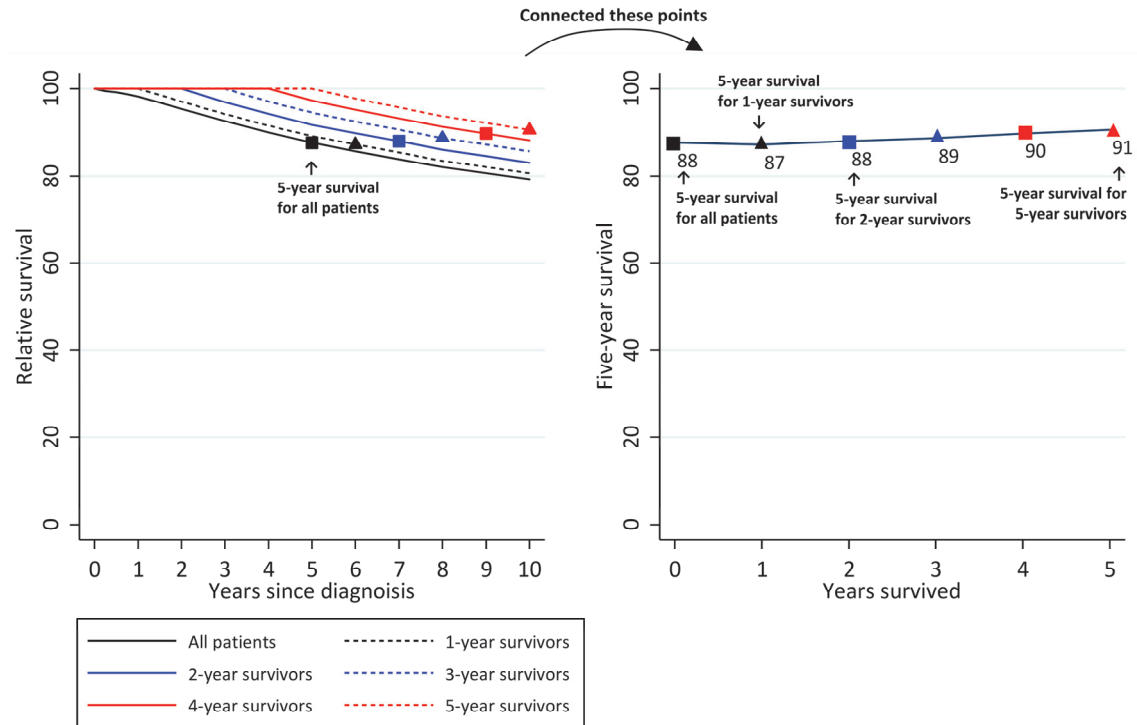
After some years post diagnosis, many patients continued to die.



Liver cancer patients continued to die after diagnosis. Conditional five-year survival for five-year survivors was lower than 40%. This is probably because liver cancer patients have a high probability of recurrence of cancer, or dying from liver cirrhosis or liver failure related to the hepatitis B or C virus.

Example 3: Breast cancer (female)

Five-year survival was high; however, a proportion of survivors continued to die.



Although five-year survival of breast cancer is relatively high, after some years post diagnosis, a proportion of survivors of breast cancer continued to die. This may be due to recurrence or progression of tumors of survivors during long-term follow-up.