Descriptive studies and surveillance - Assignment solutions

1. The absolute number of cancer deaths is a function of the number of Americans and their personal characteristics, such as age and gender. During the period from 1962 to 1982, the U.S. population has increased in size, and the population age distribution has shifted so that both median age and the proportion of Americans above age 65 have increased. These changes would greatly increase the number of cancer deaths independently of any advance or retreat in the "War on Cancer". Conversely, the decline in the population sex ratio (males:females) would lower the number of cancer deaths (since the death rate for men is greater than that for women). Therefore rates and proportions, which express numbers of deaths in relation to population size, are more informative than are raw numbers. Similarly, adjustment for characteristics (e.g., age and sex) that are regarded as irrelevant to the question at hand provide a better comparison.

2. The choice of a measure(s) depends upon the study question or objective as well as on the availability of data. Mortality measures reflect both incidence and survival and are also more widely available (from vital statistics data), so mortality is the best single indicator for a "bottom line" index. On the other hand, nonfatal disease entails suffering, disability, and costs, so incidence is in some ways a better (and more demanding) measure of disease burden than is mortality, especially when the disease does not lead rapidly and inevitably to death. Of course, progress against cancer can take many forms, including reduced incidence, detection and simpler treatment of presymptomatic or precancerous lesions, improved survival, less pain and suffering, and improved quality of life among survivors. A thorough examination would involve all these dimensions.

3. Cancer mortality statistics necessarily depend upon the classification and coding of cause of death. Death may occur from or in the presence of multiple pathologic processes (e.g., cancer, heart disease, lung disease), in which case a decision must be made in selecting the "underlying cause" that determines how the death is tabulated in vital statistics reports. All of these factors can differ from place to place and can change over time, as diagnostic methods, access to care, and understanding of disease improve. So various factors besides the incidence of a disease and the effectiveness of treatment for it can complicate comparisons of mortality rates.

4. The breast cancer (and prostate cancer) mortality rates shown in Figure 2 are based on the entire population (p 1227, col 2), even though primarily (only?) women (and only men) contribute deaths to the respective numerators.

5. For overall prostate cancer mortality rates to remain stable in spite of increases among nonwhite men, prostate cancer mortality rates among white men must have declined.

6. Epidemiology would presumably most like to claim credit for the decline in stomach cancer, because of its steepness and because the decline reflects lower incidence, i.e., prevention. But the decline is probably a result of improvements in socioeconomic status, nutrition, and transport, storage, and preservation of foodstuffs, which did not come about as the result of findings or recommendations from epidemiology. In fact, the decline began before chronic disease epidemiology had really got underway.

_____

7. Incidence data are available for only a (nonrandom) portion of the U.S. population (SEER data cover only 10%) and go back only about 25 years. There are too few data to estimate stable annual rates for nonwhites. Furthermore, the clinical importance of lesions found through sensitive screening procedures is sometimes uncertain. If lesions have the microscopic appearance of cancer they will be reported, yet in some cases they may not behave as cancer or may progress so slowly that they will not influence the life or health of the patient (as appears to be the case for the majority of prostate cancers).

8. Survival rates have as their denominator cases of a disease. Any problems in defining a case and classifying individuals as cases can confound survival rates. In particular, "overdiagnosis" (classifying as cancer lesions that do not or at least do not yet exhibit malignant behavior) will spuriously inflate survival rates. Also, earlier detection of truly malignant lesions, by advancing the time of detection ("lead time") from the time when symptoms occur, will increase the time between detection and death (survival time) regardless of an effect of treatment.

9. Because such deaths account for a very small portion of total cancer mortality, their influence on total cancer mortality is minor.

10. Direct adjustment uses weighted averages obtained from a single set of weights, so the adjusted rates are comparable to one another. Indirect adjustment uses weights from each separate group to compute its adjusted rate, so technically speaking, these rates can be compared only to the standard population.

11. Direct adjustment is appropriate because the figure compares mortality rates for different years (which would be problematic unless all are adjusted using the same weights) and the numbers of deaths are adequate to satisfy direct adjustment's need for stable estimates of age-specific rates. Since the population of the U.S. is aging, declines in age-specific mortality rates will be partly offset by a greater proportion of the population in age groups with higher mortality rates. Therefore, the actual (crude) death rate for cancer will not decline as sharply as will the age-adjusted death rate (assuming we achieve the NCI goal).

12. Perhaps not lost, but certainly not won. On the other hand, people affected by cancer (their own or a loved one's) are generally much more interested in and grateful for new treatments than are people who are never affected by cancers grateful for preventive measures. This is the paradox of public health and a major challenge to shifting the allocation of resources towards prevention.

Bailar and Smith assert: "By making deliberate choices among these measures, one can convey any impression from overwhelming success against cancer to disaster." (page 1231). Or as stated in the "evolving text", the choice of a measure depends upon the objective of the measure (!).

_____