

**Armstrong B & Doll R.** Environmental factors and cancer incidence and mortality in different countries, with special reference to dietary practices.  
*Int. J. Cancer* 15:617-31, 1975.

[Department of the Regius Professor of Medicine, Radcliffe Infirmary, University of Oxford, England]

Incidence and mortality rates for up to 27 cancers in 23 countries were correlated with a wide range of dietary and other variables. Diet was strongly correlated with several cancers, particularly meat with colon cancer and fat with cancers of the breast and corpus uteri. [The *SCI*® indicates that this paper has been cited in over 430 publications.]

Bruce K. Armstrong  
NH&MRC Research Unit in  
Epidemiology and Preventive Medicine  
University of Western Australia  
Nedlands 6009  
Western Australia

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I went to Oxford in 1972 to study epidemiology with Richard Doll (my co-author). I had been interested in diet and cardiovascular disease but decided that I should pursue Richard's interest in cancer. It thus seemed logical to study diet and cancer. The possibility that diet might be important in cancer aetiology, had not, to that time, excited a lot of attention.

I decided to pursue the idea (by no means new) of correlating incidence and mortality rates of as many cancers as possible with corresponding data on as many dietary and other relevant variables as I could find. What was new was our use of incidence data, application of truncated age-standardised incidence rates (to minimise error due to underdiagnosis of cancer in the elderly in some populations), comprehensive coverage of dietary variables and types of cancer, and inclusion of socioeconomic status indicators and other alternative explanatory variables in the correlation matrix. I searched the Bodleian Library for dietary and other relevant data; I spent weeks standardising rates on an "ancient" pro-

grammable calculator; I keypunched the data myself; and, newly introduced to Statistical Package for the Social Sciences (SPSS), I discovered how easy it was to generate large numbers of correlation coefficients, partial correlation coefficients, and the like.

At last the results emerged. They were remarkable for the strength of some of the relationships: coefficients of the order of 0.8 to 0.9 for correlations between meat intake and colon cancer and between fat intake and cancers of the breast and endometrium. We were moved to write "...we are impressed by the large number of strongly positive and negative relationships between cancer rates and dietary variables. While it is possible that all these relationships might be explained by secondary associations with other environmental agents or by economic effects on the quality of the data, this seems unlikely, particularly since the economic variables are rarely as highly correlated as the dietary ones. It is possible, therefore, that diet may have an effect on many cancers...."

In the 11 years since this paper was published, interest in diet and cancer has grown enormously. The subject can now claim its own journal (*Diet and Cancer*) and a National Research Council report.<sup>1</sup> For some of the main themes, however, such as fat intake and breast cancer, the geographical evidence still stands as the strongest pointer to an aetiological role for diet. This may be one of the reasons the paper is still frequently cited. In addition, while it was not the first study of its type, it was published at a time when interest in diet and cancer was increasing rapidly. In consequence, it seems to have contributed to the development of that interest to a degree disproportionate with the substance of its findings.

1. Committee on Diet, Nutrition, and Cancer, Assembly of Life Sciences, National Research Council. *Diet, nutrition, and cancer*. Washington, DC: National Academy Press, 1982.