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NUCLEAR DIVISION NEWS

3/23/81

THE "HEALTHY WORKER EFFECT"

Epidemiologists study the differences in disease distribution among population groups in order to better understand the various factors which influence a disease's incidence (the occurrence of new cases) or prevalence (the number of cases existing at any given time). Since it is considered unethical to conduct experiments on humans, they generally must resort to comparisons among different "natural" populations. Ideally, occupational epidemiology studies would like to compare the incidence of a disease in a population exposed to one specific factor with an identical population which had never been exposed to that factor. In this manner, it might be possible to identify the relationship between that factor and the occurrence of a disease. Unfortunately, it is almost never possible to find two large groups of humans who are identical except for one factor. Many compromises in study design are, therefore, frequently necessary.

Industrial epidemiology studies frequently compare the health experience of employed populations with the health experience of the general, or total population. However, such a comparison may not be accurate. Studies of the death rates of persons employed in industry consistently show that they have a better health experience than those in the general population. This effect has been labeled the "healthy worker effect". For example, the average death rate for male hourly workers in a large communications industry was found to be only 65% as high as the death rate in the U.S. total male population. There was an even greater difference at age 40 than at age 65. It was 53% at age 40 and 67% at age 64.

There are many reasons why employed populations are healthier than the general population. A strong selection process screens out the unhealthy in any work force. Pre-employment physical examinations tend to exclude from employment people with major health problems or, at least, to admit only those who can perform certain jobs safely and adequately. A constant weeding-out process occurs during the early years of employment. If a worker finds a job too stressful or if he develops symptoms such as chronic fatigue or vague aches and pains, he may voluntarily "drop out". He often leaves a demanding job in big industry for a less demanding job in a small service industry. He will probably never get studied in the newer job while in the former one he might become a member of a large study. Some "drop outs" never get steady employment again.

UCC 096914

Many people never work. Those with congenital defects, chronic diseases, mental deficiencies or major life style problems such as alcoholism and drug abuse may not be able to work. Employed populations also differ from chronically unemployed populations in other ways. There are differences in age, education, race, health care, diet, standard of living, life styles and many other factors which affect health experience. As a result, death rates for the unemployed populations have been found to be much higher than those who work steadily.

The mortality rate of all U.S. males or females necessarily includes the experience of the unemployed, the unemployable and those with a low standard of living. The overall national experience is, therefore, biased with a higher death rate.

Since epidemiology studies often have no alternative to using the general U.S. population as a comparison group, some critics have recommended the use of a correction factor when comparing health experience in industry, (the "observed" rate), against the total national experience (the "expected" rate). Statisticians, however, object to using vague correction factors to apply to overall mortality rates or even to specific U.S. death rates.

It should not be surprising to find that the healthy worker effect affects the death rate more from some diseases than others. The effect on deaths from cardiovascular disease is much greater than on deaths from cancer. Dr. Philip Enterline, Professor of Biostatistics at the University of Pittsburgh, believes that selective factors are not nearly as important for cancer as for cardiovascular, kidney, and respiratory disease.

If the above is confusing, then you can understand why two epidemiologists can sometimes look over the same data and come to quite different conclusions. It also suggests that when readers pick up their newspapers and read of "startling new evidence of cancer for people working with compound X", they should accept the story with great caution. In most cases, the news

story represents a preliminary report. A warning flag has been raised and detailed studies must follow. Before a clear cut association between exposure to a substance and an increased risk of cancer can be made, meticulous studies must be performed. They may take several years to finish and must be examined in great detail by many competent experts before any consensus of opinion can be expected to develop.

If basic data on age, sex, smoking habits, type and amount of principal occupational exposures and, perhaps, several other variables could be collected on a large number of people working for several large companies, then an adequate comparison population could be identified. It would enable much better studies than are now possible. The healthy worker effect is only one of many problems with which epidemiologists have to contend but having an adequate comparison population would make their work much simpler.

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