SECTION: 5 IMPACT OF IMPROVED NUTRITIONON HEALTH CARE COSTS

The ultimate purpose of a more nutritious diet is improved health. In this section we look at the implications of improved health from an economic viewpoint. More specifically, we look at the impact of improved nutrition on health care costs.

There are numerous reasons to exercise caution in analyzing the impact of improved nutrition on health care costs. While knowledge of the linkages that connect diet and health is expanding rapidly, there is much that remains unknown or poorly understood. And relatively few of the studies conducted to date have traced the effects of improved nutrition from childhood through adulthood. Most of the larger trials and studies cited in this section have been conducted among middle-aged or older adults, those age cohorts in which the more serious health conditions are in greatest evidence. Thus, they offer an imperfect understanding of what to expect from dietary intervention among school-age children.

Future trends in health conditions and in methods of treatment are other areas of uncertainty. We have assumed current incidence rates, outcomes, and methods of treatment. Though it is not possible to foretell their direction or magnitude, changes in each of these dimensions can be expected.

As indicated in the previous Section, we have used the purchase of a reimbursable school lunch, including school milk, as a proxy for the adoption of a healthy eating pattern. While there is evidence that school meal participants have more nutritious diets, including their away-from-school eating, there is no assurance that the new participants and the new milk drinkers will maintain these practices into the future. Neither is it appropriate to ascribe the impacts entirely to increased milk consumption. Milk is but one of several key components of a healthy diet that must be present if the outcomes described here are to be achieved.

For these and other reasons, the analysis presented in this section should be viewed not as a certainty but as a possibility, based on best available knowledge. The ever-growing body of research results and the relatively consistent direction of their findings offer support for the reasonableness of this approach. Furthermore, the magnitude of the costs involved is so large that even estimates at the lower boundary of a wide range can be staggeringly high.

5.1 Introduction

There are three major components to account for in estimating the costs of ill health: (1) direct expenditures for health care; (2) productivity losses resulting from illness; and (3) the cost of premature death. As a component of the national income and product accounts, personal consumption expenditures for medical care were $1,072 billion in

2001 (13). This was the equivalent of 15.3 percent of all personal consumption expenditures in 2001 and is up from 5.1 percent in 1959.

A gradual increase in life expectancy over the past several decades has been a major contributor to improved health. Life expectancy at birth has risen from 68 years in 1950 to 77 years at present. Nearly 5 of the 9 additional years are attributed to reduced mortality from cardiovascular disease while reduced infant mortality accounts for nearly 2 more years.

A recent study by William Nordhaus of Yale University helps put the value of improved health care in perspective (15). He concluded that as "a first approximation, the economic value of increases in longevity in the last hundred years is about as large as the value of measured growth in non-health goods and services." Given the tremendous growth in non-health goods and services that has occurred over this period from the development of such technologies as the airplane, television, atomic energy, the computer, and superhighways, this is a startling finding. It tells us that whatever is responsible for increased longevity, the economic payoff is very, very large.

5.2 Identifying Diet-Related Illnesses

For this analysis, the first step is to identify those threats to health that are diet-related. In the more distant past, these threats were more likely to arise from hunger or malnourishment and the illnesses that resulted from too little nutritious food. It was the evidence of malnourishment on the physical conditions of recruits to the Armed Forces during World War II that gave impetus to adoption of the National School Lunch Act in 1946. Viewed across the broad sweep of the past two centuries, Robert Fogel has argued that improved nutrition resulting from economic growth explains 50 to 90 percent of improved health in developed countries over this period (16). Of course, there are many other influences, particularly in more recent times. Improvements in medical technology and practices have been especially important. So too have been improvements in public information and changes in government programs and policies. David Cutler of Harvard University concludes that about two-thirds of reduced mortality over the past 50 years is due to improved health care with the remaining one-third resulting from behavior changes (8).

While establishing a direct link between the consumption of fluid milk and disease prevention would be interesting, that is well beyond the scope of this study. Furthermore, as noted earlier, diet-related health outcomes are associated with the nutrient makeup of dietary patterns rather than with the intake of particular foods. Thus, it is the combined contribution of all the foods comprising the diet that determines health effects. Our objective, therefore, is to identify the relationship between common,

chronic medical conditions and a generally healthy diet, one that includes low-fat dairy products.[1]

A wide variety of techniques have been used in studying the relationship between diet and health. Some studies are based on comparisons of the dietary practices of the individuals taking part. The Coronary Artery Risk Development in Young Adults (CARDIA) study, for example, based its analysis on a detailed 28-day dietary history of each participant (47). In other studies, participants have adopted prescribed diets of varying severity. The diet prescribed in the Dietary Approaches to Stop Hypertension (DASH) study is illustrative (17). The diet used in these trials was rich in fruits, vegetables and low-fat dairy foods and had reduced amounts of saturated fat, total fat, and cholesterol. In these trials, for example, participants on the control diet averaged 0.1 servings/day of low-fat dairy products and 0.4 servings/day of regular-fat dairy products while those on the treatment diet averaged 2.0 servings/day of low-fat dairy products and 0.7 servings/day of regular-fat dairy products.

A review of the literature reporting on results of other controlled trials and observational studies indicates that several of the most common chronic medical conditions are or can be controlled through dietary interventions similar to those prescribed by the results of these studies (9, 26, 27, 39, 40, 42, 43).

These conditions include:

- Obesity
- Hypertension
- Stroke
- Coronary heart disease
- Type II diabetes
- Osteoporosis
- Colorectal cancer

5.3 Estimating the Impact of Health Care Costs

Several steps are required to estimate how an improvement in the diets of 2.6 million school-age children would affect health care costs. In making these estimates, we have reviewed recent studies published in prominent medical and economic journals and by Federal agencies, including the U.S. Department of Agriculture and the Centers for Disease Control and Prevention.

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[1] Although we have not attempted to isolate the effects of milk consumption, it is noted that past research has found that milk consumed at lunch appears to serve as a "marker" for overall diets higher in the essential micronutrients of vitamin A, vitamin E, calcium and zinc (21). Furthermore, those children who drink skim milk at lunch have been found to have the lowest overall intakes of energy, percent of calories from total saturated fat, cholesterol, and sodium.

A first step is to determine the relationship between diet and health. More specifically, it is to determine the reduction in incidence of the disease that could be expected from the adoption of a healthy diet. For each of the conditions described in the proceeding section, there is a reasonably firm established connection between its incidence and diet. The magnitude of risk reduction varies among conditions and among studies. With osteoporosis, for example, there is convincing evidence that a healthy diet, one that is rich in calcium, plays an important role in reducing risk of the disease. For other conditions, such as coronary heart disease or stroke, the magnitude of risk reduction is somewhat less, though still important.

Although obesity is a growing national problem that is, in the words of the Surgeon General, of "epidemic proportions," we have not included it in the estimates that appear below. Much of its estimated $117 billion (2000) cost is associated with other conditions, including type 2 diabetes, coronary heart disease, and hypertension (25). In the absence of more detailed information that would have made it possible to avoid double-counting, we have excluded it from our estimates of health care cost-savings. Likewise, in the absence of more detailed information on the relationship of dietary interventions and expenditures for dental care, we have excluded it from the analysis as well.

A review of the literature indicates that estimates of the degree to which the risk of these conditions can be reduced through dietary intervention falls between 20 percent and 50 percent, again depending on the condition (6, 9, 10, 17). For this study, we have used risk reduction rates drawn from federally conducted research. The rates used appear in Table 8 below. They range from a 20 percent risk reduction for coronary heart disease and stroke to a 50 percent reduction in osteoporosis. Whenever choices were required, we have adopted the more conservative option.

A second step in the impact analysis is to identify the prevalence of each condition and the profile of its occurrence by age. Since we will be linking prevalence to health care expenditures, we have defined "prevalence" to include only those cases that have been diagnosed with the condition and are receiving medical care for the condition. It will be recognized that the conditions included in this analyses are typically most prevalent among older people. There are exceptions, of course. Type II diabetes, for example, is increasingly found among young adults. Still, only about 1.7 percent of individuals aged 20-39 are diagnosed with this disease compared to more than 19 percent of those aged 60 and above, according to the latest information from the CDC. And with most of these conditions, occurrence at a younger age is more likely to be associated with non-dietary factors.[1] For example, a high proportion of individuals who die from heart disease before age 55 have been found to suffer from genetic defects (9).
Two slightly different techniques have been used in making these estimates. The more conservative approach has been to limit the estimates to those ages at which

[1] This is not universally true. Type II diabetes, for example, is directly associated with childhood obesity.

prevalence of the condition is at its peak. These ages and their associated prevalence rates appear in Table 8. The rates of prevalence range from a low of 2 percent for osteoporosis to a high of 50 percent for hypertension. In the case of osteoporosis, it will be noted that prevalence rates of 13 percent or higher are frequently cited. However, most of these individuals are not receiving medical attention for the condition and therefore are not represented in the cost estimates on which our calculations are based.

Since the dietary intervention occurring among school-aged children will be separated by a number of years from major health care expenditures for these conditions, it is necessary to convert these future expenditures to present value. To do this, we must identify the age at which we would expect these expenditures to occur. On the basis of a review of the age profiles of each condition, we have identified peak prevalence ages ranging from 50 to 65 (Table 8).

The per patient cost estimates that appear in Table 8 represent a combination of the three elements described earlier. That is, they represent a combination of direct medical costs and indirect costs associated with lost productivity and premature death. They are drawn from several different sources including the American Heart Association, the National Cancer Institute, and research conducted by Barefield and by Javitt and Chiang. The per-patient estimates are on an annualized basis. They range form a low of $944 for hypertension (largely for medication) to a high of $18,534 for osteoporosis (dominated by the cost of hip fractures).

Since the medical expenditures for these conditions will not occur for many years, it is necessary to discount the estimates, converting future expenditures to present value. For children now in elementary school, these expenditures are 4 or 5 decades into the future and nearly that far for secondary students. Using a discount rate of 3 percent, we estimate the present value of the health care savings that would be realized through this intervention at about $784.5 million. This is the lower end of the range appearing in Table 8.

For those conditions having more detailed information on prevalence by age cohort, we have made separate estimates for each of five age cohorts and summed the results. These estimates provide the upper limit of the ranges that appear in Table 8. Thus, the adoption and maintenance of healthy diets by 2.6 million school children is estimated to result in savings in health care costs of approximately $0.8 billion to $1.1 billion annually, present value.