



### Queensland hospital costs attributable to inappropriate diet

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- Although diet-related diseases are said to account for about one-third of all deaths, these diseases have a number of different causes. Thus, dietary habits alone do not account for 100% of these diseases.
- The contribution of poor diet to hospital costs has been estimated using aetiological fractions. These describe the proportion of a condition in a population that can be attributed to a particular factor and therefore, the proportion which might be eliminated if the causal factor is removed.
- The likely range of the aetiological fraction for the dietary component of a number of diet related diseases has been estimated by Crowley *et al* (1992). Their mid-range estimates have been applied to the separation data (hospital discharges plus transfers and deaths) for public and private hospitals in Queensland for the 1992-3 financial year to estimate the direct hospital costs that can be attributed to inappropriate diet (see Appendix for methodology).

### Key Findings

- Diet-related diseases account for around 14% or \$192 million of the annual Queensland hospital budget, which was \$1.4 billion in 1992-3.
- The dietary component of the cause of these diseases has been estimated to cost 6%, or \$78 million of annual hospital costs.
- Cardiovascular disease accounts for 50% of the dietary component costs (\$39 million in 1992-3) and is made up of coronary heart disease (31% or \$24 million) and stroke (19% or \$15 million).
- Non-cancer colonic conditions (haemorrhoids, constipation and diverticular disease) contribute to 13% of the costs, or \$10 million.
- Other significant diet-related diseases in decreasing order of cost are cancer, gallstones, diabetes and osteoporosis.

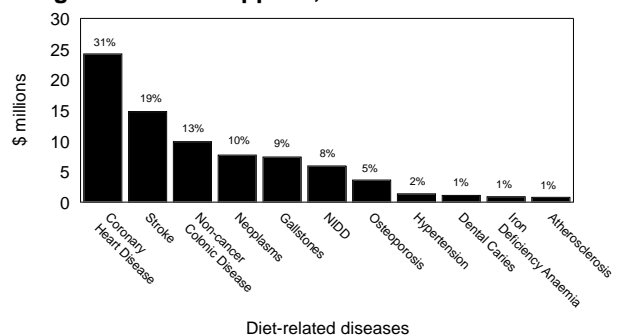
### Introduction

- Inappropriate dietary intake is a well-known risk factor for many diseases that require hospital admission.

### Annual hospital inpatient diet-related costs

- The dietary component cost of diet-related diseases accounted for around 6% or \$78 million in the annual Queensland hospital budget of \$1.4 billion in 1992-3 (see Figure 1).

**Figure 1: Annual cost to Queensland hospitals of the diet component of diet-related diseases, mid estimate of aetiological fractions applied, 1992-3**



Source: Queensland Health, Health Information Centre

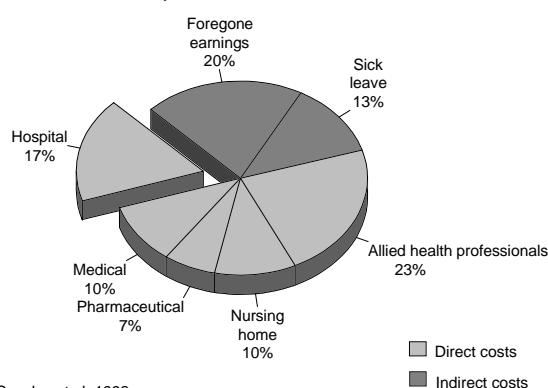
- These costs are based on the mid-estimates of the aetiological fractions. Using the low and high estimates, a range of about \$38-110 million would be predicted for the direct hospital costs attributable to inappropriate diet.

- Coronary heart disease has the highest dietary component cost of 31%, or \$24 million.
- Stroke has the next highest diet component cost of 19%, or \$15 million.
- The diet component of non-cancer colonic conditions (haemorrhoids, constipation and diverticular disease) account for 13% of the total (\$10 million).
- Diet is a causal factor in some cancers, the most important of which is colon (diet component cost of \$2.8 million in 1992-3), breast (\$1.9 million), rectum (\$1.6 million), stomach (\$1.2 million) and endometrial cancer (\$200,000). (See Figure 2).

estimated to be less than 20% of the total direct and indirect costs (Crowley *et al*, 1992). The costs from losses in quality of life and effects on family members are very difficult to estimate.

The relative contribution of the direct costs to the total direct and indirect costs of the diet component of these diet-related diseases has been estimated from the work by Crowley *et al*. This is shown in Figure 3, with hospital costs approximately 17% of the total cost of diet-related disease.

**Figure 3: Direct and indirect components of the total cost of diet-related disease, Australia 1989**



Source: Crowley et al, 1992

## Discussion

It is likely that these calculated figures underestimate the true cost of inappropriate diet for a number of reasons:

- The diet component of other important diet-related diseases in decreasing order of cost are gallstones (9% or \$7.4 million), non insulin dependent diabetes (8% or \$6 million) and osteoporosis (5% or \$3.6 million).

### Other direct and indirect costs

In addition to hospital inpatient costs, inappropriate diet also contributes to outpatient and other costs. For example, many osteoporotic fractures do not require hospital admission and are treated in Accident and Emergency outpatient departments.

The Diagnostic Related Groups (DRGs) used to calculate standard hospital costs do not include a number of other costs related to treating disease: the costs of pharmaceuticals, health personnel and transfers to nursing homes. There are also indirect costs related to losses in work productivity and sick leave payments.

- With the exception of non insulin dependent diabetes and osteoporosis (see Appendix), only principal diet-related conditions were considered and secondary diagnoses were not taken into account. In addition, only the major diagnoses for the groups were included and less frequent events were not counted. For example, hip fractures were included for osteoporosis calculations, but pelvic fractures were not. Hip fractures accounted for only 19% of all fractures occurring in elderly people in a population based osteoporosis study in Dubbo (Jones et al, 1994).
- The role of obesity in increasing the morbidity associated with surgery and the possible role that nutritional support during admission might play in reducing the length of stay and subsequent hospital cost has not been considered.

The direct costs to hospitals of treating the consequences of inappropriate dietary habits is

- Since Crowley and co-workers calculated the aetiological fractions used for this report, some new information regarding diet-related conditions has evolved. For example, it is now thought that around one third of neural tube defects can be attributed to low folic acid intake during peri-conception and early pregnancy.
- The contributions of alcohol have not been considered in this information circular.
- Some conditions that may be more important in Queensland than nationally, have not been accounted for:
  - Non insulin dependent diabetes is more common among indigenous Australians. Using the national averages probably underestimates the role of this condition in contributing to hospital admissions in Queensland, due to the higher proportion of Aborigines and Torres Strait Islanders living in this state.
  - The contribution of maternal malnutrition to low birth weight and its associated hospital costs in the indigenous population is currently not clear. Pilot studies in the Northern Territory have shown that the low birth weight rate can be substantially reduced with a community-based antenatal care and nutrition awareness program.
  - The role of under-nutrition among indigenous children in contributing to admissions for infectious disease has not been considered. This may be substantial in some areas. Twenty per cent of children admitted to the Royal Darwin Hospital with diarrhoea had a post-rehydration weight-for-height that fell below the 3rd centile of the National Centre for Health Statistics growth chart (Reuben & Walker, 1995).

Furthermore, the particular components of the diet which may confer benefit or harm have not been elucidated here. Although it is often thought that nutritional scientists are continually changing their advice, the general messages regarding the *types* of foods to be recommended are clear even though there is considerable ongoing debate as to exactly which sub component within the food is the active moiety. For example, there is some discussion at present over whether it is the low fibre content or the high fat content of a dietary pattern that increases

colon cancer risk. From the point of view of giving advice to the public, identifying exactly which mechanism is operating is irrelevant because diets rich in fibre containing foods - cereals, fruits, vegetables, legumes - are generally lower in total fat content. Likewise, although recent randomised controlled trials have shown that very high doses of beta-carotene taken as a supplement do not reduce the overall risk of death and may increase lung cancer incidence in smokers (Alpha-Tocopherol, Betacarotene Cancer Prevention Study Group, 1994), the stronger findings in observational studies indicate that high fruit and vegetable consumption, rather than high consumption of any individual nutrient, confers protection (LeMarchand et al, 1993, Steinmetz & Potter, 1991, Mackerras, 1995).

### Policy Implications

These data indicate the magnitude of the savings that might be achieved over time with improvements in dietary practices. The exact magnitude of the savings will depend on the effectiveness of nutrition interventions which can only be developed, tested and refined if adequate personnel are available.

While some nutrition-related programs have been evaluated and found to have useful results (Bruggemann & Harvey, 1994; Egger *et al*, 1991), ongoing work is needed to develop and evaluate more programs directed at altering both the food related environment and the individual's choices. Queensland has fewer public health and community nutritionists per population than all other Australian states to implement successful programs and develop and test new strategies (Steele, 1996).

For further information, please contact the Health Information Centre on (07) 3234 0929.

### Appendix.

#### Methodology for Calculating Diet Related Costs of Disease

Aetiological fractions can be used to estimate the contribution of poor diet to hospital costs. These describe the proportion of a condition in a population that can be attributed to a particular factor, which is diet in this case and therefore the proportion which might be eliminated if the causal factor is removed.

Aetiological fractions are based on the *relative risks* for an exposure observed in studies and the *prevalence* of that exposure in a population. Thus,

the aetiological fraction for a dietary factor will vary between countries because of the differing prevalence of exposure (dietary habits) although the relative risk of disease associated with that exposure is the same.

The likely range of the aetiological fraction for the dietary component of a number of diet-related diseases has been estimated by Crowley, et al (1992). The mid-range estimates have been applied to the separation data (hospital discharges plus transfers and deaths) for public and private hospitals in Queensland for the 1992-3 financial year to estimate the direct hospital costs that can be attributed to inappropriate diet.

The principal conditions thought to be diet-related diseases (Crowley et al, 1992) were extracted from the hospital separation data for public and private hospitals in Queensland for the 1992-3 financial year using Diagnostic Related Groups (DRGs) and the cost for each condition was calculated. The aetiological fractions were then applied to derive the diet related component of direct hospital costs for each of the DRG's.

To estimate the hospital costs associated with osteoporosis and diabetes, a fraction was applied to the relevant separations to determine diet-related costs due to these conditions. For diabetes, separations due to diabetic complications included hypertension, cardiovascular disease, cerebrovascular disease, peripheral vascular disease, glaucoma, cataract, blindness, nephropathy, chronic skin ulcer and absence of extremities. The total of these costs was added to the cost calculated for non insulin dependent diabetes, as a principal condition. For osteoporosis, the separations for osteoporosis, distal forearm fracture, hip fracture and vertebral fracture were included.

The aetiological fractions used in this work were 0.5 for non-cancer colonic conditions, dental caries, gallstones, stomach cancer, diabetes mellitus, atherosclerosis; 0.4 for coronary heart disease and stroke; 0.35 for colon and rectal cancer; 0.3 for breast cancer; 0.25 for endometrial cancer; 0.2 for osteoporosis and related fractures.

An alternative, simpler approach would have been to apply the average cost of an occupied bed day to the total bed days for each condition. This yielded an estimate of \$91 million, instead of \$78 million, as the cost that could be attributed to inappropriate diet for the 1992/3 financial year.

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