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## Economic impact of allergy prevention

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### Abstract

Estimation of the economic impact of allergy and allergy prevention must consider many qualifying factors before a single calculation should be made. Such factors include the variety of viewpoints of different stakeholders, the limitations of economic research tools, and the extension of health economics beyond money and market. Costs of illness can be analysed in a top-down approach (measuring at the crude economic sector level) or bottom-up (using cohorts of the population). At present, economic studies comparing treatments for allergies increasingly use cost-benefit, cost-effectiveness and cost-utility analyses. However, existing data often have limited reliability, comparability and reproducibility. Current estimates have been made for direct costs for asthma, contact dermatitis and allergic rhinitis (~10 billion Euro, 1997 price level), but economic costs of food allergy are harder to estimate, because of lack of knowledge about the epidemiology and social impact of food allergy. Such costs might fall into different economic sectors, such as individual household, health sector, food industry and public sector. A cost in one sector may be a benefit to another sector. Much interdisciplinary collaboration is still needed to make future cost-of-illness research and economic evaluations reliable.

**Keywords:** food; allergy economics; cost of illness

### Introduction

The economic impact of allergy prevention is a very large and complex issue, depending on viewpoints of decision makers. In this introduction to economic issues, I first consider what sort of economic questions might be important. From the viewpoint of an economist specializing in the health and social-care field, one feature of the field of research is how little is known, and how limited the tools for investigation are. I will illustrate this from work with colleagues first on asthma and, more recently, on food allergy.

### What is economics?

Economics is about resources and happiness in society. It concerns itself with how all the productive resources we have are used to optimize welfare (happiness). Perhaps a reason why economics was called the 'dismal science' by Thomas Carlyle in the 19th century (August 1971) is that there can never be enough resources to entirely satisfy every need and want. Choices have to be made. The best choices result

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in gains for everyone, but most choices necessarily result in losers as well as winners. How does this get resolved?

### **Money and markets**

One way is through valuation of goods and services for exchange using money. Societies arrive at consensus about the right values through market price systems. Economics is commonly thought of as the study of money and markets, but it is also more than this. The reason for this is that markets fail to deliver optimal social welfare in many ways.

### **Markets and market failure**

Unregulated organization and distribution of wealth and power in production can lead to unfair advantage (monopoly). Consumers and producers do not always have perfect information about goods and services, nor about their need. This is especially true in health and health care. In addition, many services are not exchanged in the market and can be undervalued or not valued at all in market transactions. One example of an undervalued resource is parents' care of their children. Finally, some goods are not marketable to individuals, but are so-called 'public goods', such as clean air or hygiene in public places. In most societies these needs are met through socially organized systems.

For all of these reasons, welfare economists and policy analysts have evolved methods for counting, valuing and weighing up costs and benefits that did not simply rely on observing market activities.

### **Viewpoints, domains and economic questions**

Different economic questions are important at different levels and for different groups. Solutions favouring one group may not favour all.

For example, individuals or households are usually most concerned with maintaining their own health and well-being, and so will be interested mainly in particular costs of living with or avoiding allergy. In countries with state-provided health care, the costs of the services that are used by people with allergies may not be perceived as costs to them. In contrast, when health-care providers consider costs and benefits, they do not necessarily take account of the effects of illnesses or treatment of illnesses on household earnings, as this is not included within the direct responsibility of health-care managers.

Firms that produce goods and services in the economy may be affected in different ways by food allergy. Apart from the health-care industry, there are food and other manufacturers of products which may either trigger allergy or which may assist sufferers in some way. Companies may become concerned, through their own corporate social responsibility or through regulation, with pursuing social objectives for maintenance of the health of the population, but in the end they have the need to maintain profitability.

Governments need to take broader viewpoints and are elected to balance the conflicts between interests in the political economy. The methods of economists advising public-sector policy have evolved to take a societal viewpoint (Drummond et al. 1997).

### **Methods used by economists**

In the field of health economics, cost (or burden)-of-illness analysis (COI) is commonly used as a descriptive tool. This can take a broad 'top-down' approach

(looking at crude sector level estimates of impact) or a much more detailed ‘bottom-up’ approach, studying a defined cohort of the population, with prospective data collection and/or analysis of routinely collected information. It is important to be aware that COI does not provide answers to economic allocation decisions, where different strategies for solving problems are being compared.

Economic evaluation compares the impacts of alternative policies, comparing costs of inputs and values of outcomes. Methods include cost–benefit, cost–effectiveness, and cost–utility analysis (CBA, CEA and CUA). These analytic approaches in health economics increasingly use techniques of decision analysis and modelling derived from Operational Research and other management methods. Option appraisal or investment appraisal are used for industry and public-sector planning. Econometric (statistical) modelling is used to analyse and model impacts on economic variables at all levels.

## Costs of allergy

There have been estimates of the costs of allergy in Europe. One source (Table 1) gives estimates of direct costs showing three forms of allergy, but does not include an estimate for food allergy. Asthma counts for the largest social cost of all.

Table 1. Direct costs to society of allergy in Europe (1998 euros)

Asthma	6.4bn
Contact dermatitis	2.3bn
Allergic rhinitis	1.3bn
Food allergies	[???

Source: European allergy white paper (1997)

The authors of the report recognize the shortage of good-quality data about any of the allergies at this level. Even where data exist, the methodology of cost-of-illness research is not well defined or scientifically validated, and it is often seen and used as a technique for persuading those in power to take notice of this problem. For more trust in the figures, it is important to develop methods that are replicable and useful.

## Economics of asthma treatment

I have been involved with many colleagues at University of East Anglia in several studies about asthma treatment. During 2002–2003 we conducted a systematic review to examine the impact of psycho-educational interventions on health outcomes and costs in adults and children with difficult asthma (Smith et al. in press). It was clear from the outset that asthma is a problem affecting large numbers of people and would have high costs for this reason alone. It also became clear that the worst risks of asthma were borne by a small number of people with a range of psychological and social problems. The most difficult to treat asthma also had the highest health-care costs, mainly from emergency and intensive hospital treatment.

Many interventions have been designed to break the vicious circle of living with asthma and coping with these multiple problems. Previous research on the economics of asthma care has shown that, in general asthma populations, self-management programmes may be more cost effective than routine health care. There were, however, limited quantity and quality of economic studies, with an emphasis on cost reporting and minimization, but little comparison of costs and outcomes. The main

emphasis in the economic literature in asthma was on evaluation of drug treatments. A particular difficulty identified in economics research in asthma is the difficulty in defining, measuring and valuing outcomes for cost–effectiveness comparisons. A consensus seems to be emerging that ‘symptom-free days’ are considered by most asthma sufferers to be a good measure; however, this does not provide a sensitive measure for those who even with best management continue to have daily problems from their asthma. The search continues for the best measures of outcome for economic decisions.

We sought papers only on patients with difficult to treat asthma and which were evaluating psycho-educational interventions with direct carer-to-patient contact (excluding computerized or other information giving). Out of a ‘shortlist’ of titles apparently meeting the search criteria for economic studies, we found only 16 relevant studies with some comparative economic analysis of alternative forms of care.

The findings of the review were limited by the quality of the studies we had reviewed, but confirmed the findings of previous reviews. Economic studies were not generally based on best evidence of effectiveness; health-related quality-of-life status was measured and valued in very few studies; a health providers’ viewpoint was usually adopted, and not usually explicitly, rather than the societal viewpoint. Costs to individuals or households affected by asthma were sometimes discussed but were not measured.

There were two conclusive findings from the review, both concerning care for children with asthma. In children and adults, hospitalization may be reduced, but this was a statistically significant result only in studies of children. A multifaceted intervention may improve children’s quality of life, at an increased cost, and the cost effectiveness in the USA was judged to be well within the range of currently funded health technologies.

### **Socio-economic costs of food allergy**

If we can say fairly little about the economics of asthma treatment, can we say anything about food allergy? The UCB team who prepared the European Allergy White Paper (1997) had not found enough to attempt an estimate of the European impact of food allergy. Colleagues at the Institute for Food Research have prepared a further review (Miles et al. in press). This has included searching Web of Science journals using search terms (and variations) shown in Figure 1.

This search found no specific studies of costs or economics of food allergy, but several papers referring to how this might be researched.

From this review, we suggest costs might fall to one or more of these economic sectors: individual or household, health sector, industry and public sector. Society covers all the sectors. It is not a simple case of adding up. What may be a cost to one sector may be a benefit to another (household costs of medications over the counter are a benefit to the pharmaceutical industry).

- Web of Science 2002
- allerg\* AND (cost OR econ) AND food\*
- No specific primary research on costs of food allergy
- Discussions of possible costs in several papers

Figure 1. Literature review for economics of food allergy

## Possible costs of food allergy

Costs can be directly incurred in managing allergy, or they can be an indirect effect of the allergy, or they can be an intangible effect of the allergy that is not simple to measure but which affects people's decisions (see Table 2).

Table 2. Possible costs of food allergy

	Individual or household	Health sector	Industry	Public sector	Society
Direct costs	Out-of-pocket expenses	Hospital primary care	Loss (or gain) of sales revenue	Outreach and social care	All
Indirect costs	Informal care Loss of education or income	Public-health campaigns	Costs of regulation Lost work from sick employees	Regulation	All
Intangible costs	Quality of life				Public opinion

For example, households have direct out of pocket costs, indirect costs of loss of working time, or intangible costs of effects on quality of life. Similarly the health sector experiences direct and indirect costs, such as the direct costs of providing hospital primary care, public-health campaigns may be an indirect consequence (or cost). Both industry and other public-sector agencies will experience effects of food allergy.

Societal costs and benefits are the result of all of these different factors. In economic policy decisions, the effects of public opinion are as important as the benefits to affected individuals in the final decision, especially where tax payers' money is used for services.

The literature we have reviewed so far suggests that in food allergy, as for asthma:

- Health-care costs may be low for many and high for a few;
- Effective self-management may result in lower health-care and indirect costs;
- Productivity (and education) may be affected not only by absence, but by restricted activity and efficacy at work; and
- Existing quality-of-life measures may not be sensitive to specific outcomes of food allergy.

In none of these cases do we have good evidence however.

## Research agenda on economics of food allergy

Figure 2 lays out the broad headings of what research steps are needed on the economics of food allergy. We need better knowledge about the nature and costs of food allergy before we can consider how to evaluate interventions to cope better with the problem.

- High-quality epidemiology
- Valid measurement tools for cost of illness and quality of life
- Collaboration for cost-of-illness research at the individual and household level
- Development of protocols for evaluation of interventions
- Further review on industry, market sector and policy questions

Figure 2: Research agenda in economics of food allergy

There are already many interventions, which alter the way food allergy can be managed in society. These include:

- Diagnosis and screening
- Health and food education and promotion
- Food labelling
- Self-management training and support
- Food preparation methods (in industry and at home)
- Pharmaceutical, nutrigenomic or other ‘novel food’ options
- Immunotherapy

All of these carry a cost in at least one economic sector, and may or may not be effective. Economic evaluation of different approaches could help in prioritizing policy.

A priority is to complete our preliminary review with updated searches, and through informal contacts, to take account of the fast changing literature and technology in this field.

Another urgent need is to have data on baseline costs to measure the costs of food allergy against. This would provide data to understand better the nature of the problem and from which evidence economic changes can be predicted. But for this we have to develop and validate tools for ‘bottom-up’ estimation of costs and outcomes at the level of individual allergy sufferers and stakeholders. If this is done, there is the potential for good descriptive data from which preliminary modelled evaluations can be built. There will be an ongoing need to consider policy questions as they emerge.

Good interpretation of economics data in allergy is dependent on good clinical and epidemiological research evidence on definition and severity of illness, use of health-care services, effectiveness of treatments, and quality-of-life information. So interdisciplinary collaboration is essential for both cost-of-illness research and for economic evaluation.

Since food allergy also concerns producers of food, the effects on the industry of approaches to reducing food allergy are part of overall social costs. Public policy usually involves trade-off between best solutions for consumers and producers in the short and long term. One aim of economic analysis is to inform this debate. But there is a great deal of work ahead to make this reliable.

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