Methods of Health Impact Assessment: 
a literature review

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### Methods of Health Impact Assessment: a literature review

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Executive summary

Background
It is now recognised that most of the influences on public health do not lie within the health sector, and that the health of the public may be influenced by many areas of public policy which have not traditionally been assessed for their health impacts. This has led to the development of Health Impact Assessment, an approach to assessing the impacts on health of policies, programs, projects with a view to minimising the negative impacts and enhancing positive impacts. Several methods of carrying out such assessments have been proposed. The methodology of HIA however is currently in development, and the relationship between methods of HIA and their results, and the most effective methods of carrying out HIA are still being widely researched. There are also few published examples of HIA in the literature, making it difficult to identify “worked examples”. This literature review was therefore carried out to identify existing examples of HIA in practice. In particular, we wished to determine whether a wide range of HIAs of policies, programs or projects had already been carried out to date, and what methods they had employed. We also wished to determine whether the results of prospective Health Impact Assessments been validated by long-term follow-up.

Methods
A systematic literature review was undertaken to identify existing examples of health impact assessments. This involved a literature search of databases of published and “grey” literature.


The review included retrospective and prospective health impact assessments of the impact on health (broadly defined) of non-health sector policies, programs and projects. Studies of the impact of such policies and projects on disease outcomes alone were not included (for example, studies of the impact of air pollution on cancer incidence). This is not to imply that these are of no relevance in health impact assessment; rather we wished to identify generic health impact assessments, which assessed the broader impacts of projects or policies on health broadly defined using a range of indicators. Search terms used to attempt to identify relevant literature, included: (apprais* or assess* or eval*) near (policy or policies);impact near assessment; as well as the phrase “health impact assessment”.
Results
Twenty studies were identified for inclusion, 9 of which were prospective and 11 retrospective. All 9 prospective studies used a formal model of HIA. The following models were used: models based on Winters and Scott-Samuel (1997) were used in 5 prospective assessments undertaken by Liverpool Public Health Observatory (Broomfield, Fleeman, 1997; Fleeman, 1999; Winters, 1997; Winters, 1998); one study used a model developed by the Public Health Departments for South Manchester and Stockport (Will et al., 1994); one study used a model being developed by the National Centre for Health Program Evaluation, Victoria, Australia (Dunt et al., 1995); one study adopted the methods of Birley (1989, 1995) and the Asian Development Bank (Konradsen et al., 1997); and one study used the Canadian Environmental Assessment Process (Spiegel & Yassi, 1997). None of the retrospective impact assessment studies used a formal model of HIA to structure the process. A variety of methods were used, including household interviews, questionnaire and telephone surveys, routine data from Official Government Sources, and literature reviews.

The most common focus of HIA to date appears to have been the transport sector. Other projects or policies which have been subject to HIA include the Common Agricultural Policy, irrigation projects, industrial development, urban regeneration, drug prevention, community safety.

Conclusions
The existing HIA evidence base is currently small though it is expected to grow rapidly in the next few years as planned HIAs are completed. This makes it difficult to come to definite conclusions about the most appropriate methodological approach to HIA. Further research in this area should consider the nature of the evidence used as inputs to the HIA process. Currently, HIA relies on a wide range of evidence from expert opinion to prospective epidemiological studies and literature reviews. All these sources of evidence may be biased. An evidence-based approach to HIA suggests that decisions (for example, decisions about mitigation) should be based on the most sound evidence available. However, this evidence may often be difficult to locate, and appraise and summarise. One possible solution to this problem may be to compile bibliographies or databases of systematic reviews and related literature (such as large good quality prospective studies) which report on the impacts of specific non-health sector developments/projects/programs on health. These resources could then be used to support evidence-based decision-making in HIA.

In the short term, whatever approach to HIA is used, it is essential that the results and conclusions of existing studies are made widely accessible. If existing HIAs remain unpublished or otherwise inaccessible, it will be difficult to learn from the experiences of others in the field, and to see what methods have been used previously, and what impacts were identified. As HIA becomes more widespread, opportunities will exist to develop the methodology and to learn more about the effects on public health of non-health sector interventions. These opportunities may be missed if the results of such studies are not widely disseminated.

This review will be updated regularly to include the results of other HIAs which became available after the report was completed.
Acknowledgements

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1. Background

1.1 Why the current interest in HIA?

There is a widespread acceptance that new health care technologies should not be introduced unless there is good evidence that their benefits outweigh their harms. It is also recognised however that most of the influences on health do not lie within the health sector, and the health of the public may be influenced by many areas of public policy which have not traditionally been assessed for their health impacts.[1, 2] For example, a range of policies of the European Community strongly impact on health, including taxation, agricultural policy, environmental protection, and socioeconomic policy relating to poverty, though such policies are often not sensitive to public health needs.[3] In addition, action taken to improve public health may be more effective when it involves relationships across many sectors, than when it involves the health sector alone.[4]

There is increasing awareness too that policies too should be evaluated to determine their potential and actual impacts on public health. This has been bolstered by recommendations from WHO that public policy should be health promoting, and more recently by statements in the EU treaty that its policies should not have adverse health impacts. The BMA has also called for all major policies to be assessed prospectively, and the green papers “Our Healthier Nation” and “Working together for a healthier Scotland” in turn highlighted a commitment that Government programs and policies will be evaluated in this way. More recently the Scottish White Paper “Towards a healthier Scotland” committed itself to encouraging the use of health impact assessment to help ensure that the health implications of policies are assessed across departments. This highlights the need to assess the impact on health of central and local government policies, and it represents a commitment to the use of HIA.[5] More generally this also reflects an increasing interest in “upstream” vs “downstream” approaches to improving health, the latter involving for example structural changes to improve health and reduce health inequalities.[6] These influences have been said to “set the stage” for health impact assessment (HIA).[7]

Several definitions of health impact assessment have been offered [Box 1], which differ slightly in the details. Some definitions emphasise the possibility of mitigation (that is, taking avoiding action to protect health, by changing the policy or project in someway) in prospective assessments, and the importance of considering the effects of developments on specific subgroups of the population is also emphasised. HIA therefore emphasises the assessment of the positive and negative effects on health and wellbeing of non-health sector interventions, with a view to accentuating the positive and minimising the negative impacts (mitigation). Mitigation can itself be “targetted” to help achieve specific objectives, such as reducing inequalities in health, or promoting social inclusion.
### Box 1: Definitions of HIA

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<td>“Any combination of procedures or methods by which a proposed policy or program may be judged as to the effects it may have on the health of a population” Ratner et al. (1996)</td>
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<td>“…a methodology which enables the identification, prediction and evaluation of the likely change in health risk, both positive and negative, (single or collective) of a policy, programme, plan or development action on a defined population…To be effective, HIA must provide a mechanism for identifying the full spectrum of potential ‘health hazards’, evaluating their potential for causing harm and assessing their risk of occurrence to any particular group / target at any particular time/ place.” (British Medical Association)</td>
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<td>“The estimation of the effects of a specified action on the health of a defined population” (Scott-Samuel, 1998)</td>
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<td>“Identification of the health impacts of policy involves establishing all the potential effects on the health of the nation, tangible and intangible, direct and indirect, that could occur at each stage of the implementation of a policy initiative” (Department of Health: “Policy Appraisal and Health” report)</td>
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<tr>
<td>“Method of evaluating the likely effects of policies, initiatives and activities on health at a population level and helping to develop recommendations to maximise health gain and minimise health risks” (Towards a Healthier Scotland)</td>
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Health impact assessment itself is not new, having developed partly out of work done in recent decades on environmental impact assessment, and tools for carrying out similar evaluations of the impact of policies programs and projects on health have been developed in the UK and elsewhere. These tools include qualitative assessments of the likely health impact at various stages of a project’s lifecycle, along with quantitative estimates of the probability of an impact occurring, and its likely magnitude. The Merseyside Guidelines for HIA for example use a checklist to aid in the systematic identification of aspects of health which may be affected, and to help in assessing the risk, measurability and size of any impact. Where it is possible to quantify the latter through previously published epidemiological and other literature, the monetary value of these health impacts may also be estimable, and they may then be compared to social and economic impacts. It has been suggested that this in principle may provide the basis for intersectoral economic evaluation. Even if this monetary valuation is impossible however it will still be necessary to note the existence and likely size of all relevant health impacts.

In practice, existing health impact assessment frameworks often tend to use a matrix approach which allows the existence and size of each impact of a project to be documented. The cells of the matrix may contain an estimate of the size of the impact on each of a range of direct measures of mortality and morbidity and general health indicators (for example, cancer incidence, injuries, mental health, dietary changes, subjective assessments of health) along with a qualitative estimate of the risk of an impact. This is a much simplified view of HIA as it may often involve other steps, such as the screening of a project for suitability and appropriateness, the use of option
appraisal, and the development of mitigation packages to limit the negative health impacts which have been identified.[12]

1.2 Methods and methodological problems in Health Impact Assessment

Although methods have been developed for carrying out HIA, there are many difficulties and there is some agreement in the literature that there is an urgent need for further development of these methods. [8, 14] There are many potential problems, chief among which is the retrospective nature of most assessments, as they are often employed after a policy has been implemented.[15] These methods are also difficult to validate, as longitudinal assessments of the health effects are lacking. Particular problems may exist where prospective assessments have been carried out and not validated by long term follow-up to validate the initial HIA, that is, to assess whether the identified health effects did indeed materialise and have the expected impact. Studies which compare experts’ predictions with actual results are rare in epidemiology, but there is some evidence that “…preconceived concepts of investigators do not always coincide with epidemiologic reality.”[16] In general, prognostic judgements are error-prone.[17]

Validations by comparing different methods of HIA within the same project or programme also appear to be uncommon[15] and added to this is the more general epidemiological problem of the attribution of causation (that is, determining whether the health impacts are really due to the policy or project, or to other confounding risk factors). This may be a particular source of uncertainty in retrospective studies.

Several problems with the economic appraisal approach have also been identified,[10, 15] and there are also likely to be more basic problems, such as how to identify and appraise relevant evidence to include in health impact assessments. In particular, local data on the size of risks to health are often unavailable, requiring the use of existing prospective studies and literature reviews instead. Problems with the identification, use, validity and applicability of existing literature are also likely to exist, and the results of any HIA may be sensitive to the quality of the evidence of impacts which is used. For example, from other areas of epidemiology it is known that retrospective studies may mis-estimate risk compared to prospective studies,[18] while reviews which do not consider the quality of the evidence they consider are likely to produce biased conclusions.[19] Meta-analyses of observational studies of risk, while common, are often invalid,[20] and in general epidemiological reviews are often methodologically flawed.[21] Even the most methodologically sound studies may not necessarily be appropriate or generalisable. The identification and incorporation of relevant evidence, its appraisal for methodological soundness and relevance and its incorporation with qualitative evidence is likely to be difficult, but crucial to the validity of HIAs.

Apart from the above methodological or epidemiological issues, more general problems with the nature of the evidence used in HIA also exist. The incorporation of evidence from experts may be another a source of potential bias, given increasing evidence of inherent biases in expert opinion and decision-making[22, 23]. These biases even extend to the way in which risk perceptions vary with affiliation (for example, chemical risks are perceived as lower by toxicologists in industry than by toxicologists in academia).[24]
Such effects may have implications for the results of health impact assessments relying heavily on expert opinion. Sociological studies of social impact assessment also demonstrate that lay perceptions of risk are variable both between and within individuals.[25] These may have important implications for the use (and weighting) of expert and lay opinion in health impact assessment.

Another layer of complexity also exists relating to perception of risk; this has implications for the effective communication of risk estimates. The way in which risk is presented has a marked impact upon decision-making, as has been illustrated for example in one study which presented the results of clinical trials and systematic reviews in four different ways: as relative risk reductions, as absolute risk reductions, as proportions of patients without a clinical event, and as numbers need to treat (NNTs) (a commonly used way of presenting information on treatment effectiveness). Presentation of exactly the same information to health authority members in different formats had a strong influence on health policy decisions.[26]

Given some of these methodological and related issues, it is worth considering how existing HIA methods can be developed and validated. One starting point is to identify existing health impact assessments, as these will show what methods are in use, and what effects the HIAs have had in practice (for example, whether they lead to changes in the policy or project to mitigate their negative and enhance their positive effects). They may also provide some methodological guidance to those planning to carry out health impact assessments themselves.

Reviewing existing literature can also extend and develop existing methods, as well as highlighting areas where current HIAs can be developed further. One of the difficulties identified by the BMA report in this respect was that there has been little dialogue between health professionals and those involved with environmental regulation and this may have resulted in the absence of human health from the environmental impact assessment process, which in turn may have limited the development of methods to assess health impacts.[8] Synthesising the results of existing research in this area will help identify more clearly what we do not know, and what areas of uncertainty in HIA remain.

In particular however it will be useful to identify existing HIAs to summarise their results. This would give a picture of where we are starting from, what types of policy/programme or project have been associated with what types of health impact, and what methods have been used to assess these impacts. This review therefore set out to address several research questions:

1.3 Research questions
- What HIAs have been carried out to date, of what programs/projects
- What are the methods and results?
- In particular, have the results of prospective Health Impact Assessments been validated by long-term follow-up?
• On the basis of existing research, how specifically can HIA methods be developed further to improve their validity and utility to policy-makers and others?

• Is there a relationship between the HIA methods used, and the outcomes of those HIAs?

• Can we critically appraise HIAs? What features might help identify a “good” HIA?

• What might a good “HIA tool” look like?
2. Methods

A systematic literature review was undertaken to identify existing health impact assessments, in order to identify examples of methodological approaches currently being taken. This involved a literature search of databases of published and “grey” literature to identify examples of health impact assessments.

2.1 Search strategy

The following databases were searched: MEDLINE (1966-1999), PsycLit (1974-1999), ASSIA (1987-1999), the grey literature database SIGLE (1983-1999), EMBASE (1980-1999), BIDS (Science Citation Index 1981-1999), HSEline (Health and Safety Executive database) (1968-1999), ERIC (1966-1999), Healthstar (1975-1999), HMIC database (combined databases of the Department of Health's Library and Information Service, the King's Fund and the Nuffield Institute), Geobase (1980-1997 – the most recent year available) and the National Research Register (NRR). Bibliographies of retrieved articles were also examined.

2.2 Inclusion/exclusion criteria for primary studies

The review included retrospective and prospective health impact assessments of the impact on health (broadly defined) of non-health sector policies, programs and projects. Studies of the impact of such policies and projects on disease outcomes alone were not included (for example, studies of the impact of air pollution on cancer incidence). This is not to imply that these are of no relevance in health impact assessment; rather we wished to identify generic health impact assessments, which assessed the broader impacts of projects or policies on health broadly defined using a range of indicators. Search terms used to attempt to identify relevant literature, included: (apprais* or assess* or eval*) near (policy or policies);impact near assessment; as well as the phrase “health impact assessment”.

2.3 Data extraction/summary

Methodological details of the included HIAs were extracted from the included studies by one reviewer and checked by a second reviewer. The following information was extracted from each study: details of the project, the methods used to evaluate the health impacts, the actual impacts which were assessed, any mitigation activities which had been carried out and/or recommendations which had been made as a result of the HIA, whether any validation of the results of the HIA was proposed, and whether any monitoring of the health impacts was planned. This information was then tabulated.
3. Results

The database searches resulted in the retrieval of just over 6,000 abstracts. From these 20 studies were identified for inclusion, brief details of which are included in Table 1. Fuller details of these studies are also included in Appendix 2, which gives detailed summaries of the methods used and the categories of impacts considered, the result of carrying out the HIA, and any limitations of the study which were identified or reported by the authors, and the study conclusions.

In addition, a small number of ongoing and unpublished Health Impact Assessments were identified from conference abstracts and elsewhere, but where little information was as yet available. These will be included in a subsequent update of this report.

A total of 20 published health impact assessments (HIAs) were identified for inclusion, and tabulated. Nine of these were prospective and 11 retrospective. The earliest included study was undertaken in 1984 by Derban (1984). A further 8 impact assessment studies were retrieved and considered for inclusion but were subsequently excluded on the grounds that they limited the outcome only to impacts on a particular disease condition. References for these excluded studies are included in the Appendix 3.

(i) Methods used in existing health impact assessments.

Prospective studies.
All 9 prospective studies used a formal model of HIA. The following models were used: models based on Winters and Scott-Samuel (1997) were used in 5 prospective assessments undertaken by Liverpool Public Heath Observatory (Broomfield, Fleeman, 1997; Fleeman, 1999; Winters, 1997; Winters, 1998); one study used a model developed by the Public Health Departments for South Manchester and Stockport (Will et al., 1994); one study used a model being developed by the National Centre for Health Program Evaluation, Victoria, Australia (Dunt et al., 1995); one study adopted the methods of Birley (1989, 1995) and the Asian Development Bank (Konradsen et al., 1997); and one study used the Canadian Environmental Assessment Process (Spiegel & Yassi, 1997).[11, 27-33]

Retrospective studies.
None of the retrospective impact assessment studies used a formal model of HIA to structure the process. A variety of methods were used, including the following: household interviews using free response and specific questions after implementation of project (Baldassare, 1981);[34] questionnaire survey by interview part-way through the implementation of the project (Biswas, 1988);[35] telephone survey of those living near 3 facilities that had been operating for 20 years, 10 years and newly approved (Cole & Eyles, 1997);[36] survey (before/after design) of the affected population (Derban, 1984);[37] before/after telephone survey (Dintzer & Soderstrom, 1978);[38] before/after study using data from Official Government Sources (Garfield & Santana, 1997);[39]
literature review (Wolff & Gillham, 1991);[40] and review of existing literature and Government Statistics (Andreasson & Colliander, 1997).[41]

(ii) Focus of included health impact assessments
The included HIAs were carried out across a range of sectors, the most common being the transport sector (these involved 6 HIAs, 3 prospective and 3 retrospective in design). Other sectors which were subject to HIA were as follows: Common Agricultural Policy (4 HIAs, all of which were retrospective); irrigation (3 HIAs, one prospective and 2 retrospective HIAs); industrial development (2 HIAs, one prospective and one retrospective HIA); urban regeneration (2 prospective); drug prevention (one prospective HIA); community safety (one prospective HIA); and government sanctions (one retrospective HIA).

The included studies can also be categorised according to whether they involved a HIA of a policy, programme or project, as follows:

HIA of policies
The following 6 retrospective HIAs of policies were included: the Common Agricultural Policy (4 HIAs: Andreasson, Leather, Haartman, Joosens);[42] USA Government Policy of sanctions (Garfield & Santana, 1997);[39] UK Transport Policy (Wolff & Gillham, 1991).[40] Retrospective health impact assessments of the following 5 projects are included: Transport (2 HIAs);[34, 38] Irrigation (2 HIAs) [35, 37]; Industrial Development (1 HIA).[36] (Table 1)

HIA of projects
Thirteen health impact assessments were of projects, of which 8 were prospective and 5 were retrospective. The focus of these HIAs was as follows: transport (4 HIAs, 2 prospective and 2 retrospective); irrigation (3 HIAs, one prospective and 2 retrospective); industrial development (2 HIAs, one prospective and one retrospective); urban regeneration (2 prospective); drug prevention (one prospective); and community safety (one prospective). (Table 1)

Just under half of the HIAs which were identified were prospective in design (n=8/20). These included the prospective HIAs of transport policy, urban regeneration, drug prevention strategy, and community safety project. Other HIAs were retrospective in design, including most of the HIAs of policies.

(iii) Critical Appraisal
Ideally any systematic literature review should undertake a critical appraisal of the primary studies (in this case, examples of health impact assessment in practice). This would typically involve a formal, standardised assessment of the methods used, using some sort of validated scale or checklist. This could then be used for example to weight the evidence when synthesising the results of the studies. In the current review a formal critical
appraisal was felt to be inappropriate, as health impact assessment methodology is at an early stage of development, and there has been no methodological research to help determine which factors may be most appropriate to consider when assessing the validity of the conclusions of a HIA.

Some general points relating to methodology of the included studies are however raised in the discussion (below).

(iv) Summary of formal approaches used in the included Health Impact Assessments
This section summarises briefly the main approaches used in the HIAs included in this review.

Model described by Winters and Scott-Samuel (1997)[29]
The following stages were included:
1. Application of screening criteria (to select policy, programme or project)
2. Profiling the affected areas / communities using demographic data from key informants
3. Identification of key informants which includes community participation
4. Identification of health impacts by project stage and category of health influence
5. Assessment of measurability and certainty of impacts
6. Selection of highest priority impact areas
7. Identification of further research needs and information needs
8. Consideration of alternative options
9. Recommendations for management of priority impacts

Model developed by the Public Health Departments for South Manchester and Stockport
The model assesses environmental effects linked to health effects and uses a grid where the axis are sub-divided according to the measurability and certainty of the effect. The likely effects on health of the following impacts are explored: quality of environment in which we live; physical safety; psychological well-being, social functioning; and lifestyle including income. The grid categorises environmental impacts as calculable, estimable, definite or speculative and considers these against health impacts categorised as calculable, estimable and definite not measurable. (From Winters L. Health Impact Assessment: a Literature Review. 1999. Liverpool Observatory Report Series No 36.)[15]

Model being developed by the National Centre for Health Program Evaluation, Victoria, Australia
This model aims to assess the future affects of the development on the local communities physical and mental health, and includes the following elements: public participation; multi- sectoral consultation; opinions and guidance from health professional from the earliest stages; the provision of proponents and environmental agencies with guidelines and advice in relation to known hazards, relevant databases, research and methodologies and interpretation of health risk assessment; and incorporates explicit attention to public health. (Ewan C, Young A, Bryant E, Calvert D. National Framework for environmental and health impact assessment. Canberra, National Health and Medical Research Council, 1994.[43]
The following stages are included: Project screening for possible health hazards and their implications; Scoping to determine which health concerns, health hazards and health opportunities should be further assessed; Full health impact assessment involving assessing the health risk associated with each identified health hazard according to three factors: environmental; vulnerable communities; and capabilities of health protection agencies.[11]

Canadian Environmental Assessment Process
Common procedural elements in Canadian environmental assessment process are as follows: Project proposal; Screening (if required); Preparation of Guidelines for an Environmental Impact Statement; Preparation and submission of an Environmental Impact Statement; Review of EIS / Public Hearing on the EIS; Recommendations about Project’s potential; and Decision about project.
4. Summary

It was intended to carry out a systematic review of the primary research to help guide current use of such measures, guide methodological development, and through identifying gaps in the research base will allow requirements for future research in this area to be outlined. The limited literature available to date however prevented many of these questions being addressed fully. The existing evidence base is currently small (though expected to grow rapidly in the next few years as planned HIAs are completed and their results disseminated).

Several brief comments can be made however on the basis of the limited literature. Firstly, it is notable that most of the HIAs of policies carried out to date have been retrospective in nature. This is not surprising as policies, more than most non-health sector interventions, are not easily subjected to HIA, for several reasons. Firstly, policy has not traditionally been open to challenge or change before implementation, and has not always sought evidence of its possible impacts on health before implementation. Policy-making is not always an orderly linear process integrating evidence of health impacts into decision-making. However, this is currently changing, with the growing interest in evidence-based policy-making, and an increasing acceptance that public policy should be better informed by reliable research evidence. Also, as indicated above, recent white papers on health have stated a commitment to HIA of policy. At present there are few prospective HIAs policies, though the retrospective studies provide insights into the potential negative impacts of policies for which mitigation can be carried out in future.

4.1 Using the results of Health Impact Assessments

This suggests that prospective HIAs of policies are now required, to show how the HIA methods work in this context. This may require a different range of methods (or HIA “tools”) to those now in use. For example, policy makers will often be concerned with positive and negative impacts other than health impacts, and will require methods to help them directly compare qualitatively different effects of policies. Health econometric approaches have been proposed to help with this process, but others are also available and could be developed further. For example, decision analysis (which has been used to compare different screening policies in healthcare, for example), and simple systems for weighting evidence which have been proposed for environmental impact assessment, may be worth exploration. [44-47] This approach would involve listing the negative and positive health (and other) impacts of a particular policy, scoring these, giving each a numerical weight representing its importance in the overall assessment of the policy, and then multiplying the scores by the weights to give an overall score for each option to allow them to be ranked. This can be combined with sensitivity analysis to examine the rankings under a range of different assumptions and value weights.[48]

Other economic approaches have been suggested but given the current need to consider the impacts of policies on health inequalities, not just health, these may present problems. A straightforward cost-utility analysis may be criticised on the basis that it presents a simple utilitarian approach: that is, the total sum of benefits or costs to the community is
considered rather that their distribution. However, extensions of cost-benefit and cost-effectiveness analyses such as distributional analysis can also be used to examine the distribution of benefits and costs within particular population subgroups and thus may be of use in assessing the impact of policies on health inequalities. In the case of decision analysis, evidence of the effects of different policy (or other) interventions could be incorporated to help assess the overall impact of a range of policy options. This could incorporate information on the needs and values of the population affected, and software is available to support the process.

4.2 HIA methodology

Other methodological points can be made. It could be assumed that prospective HIAs are in some way methodologically “better” than the retrospective HIAs, as they allow the possibility for mitigation of negative health impacts (or enhancement of positive impacts), an opportunity which may be lost if only retrospective HIAs are carried out. However, given the dearth of HIAs currently available, both retrospective and prospective HIAs are needed, as retrospective studies provide pointers to where negative impacts have occurred as a result of past developments, and thus can provide valuable input into the development of future HIAs. This is supported by the data from the retrospective HIAs in Table 1, all of which provide detailed recommendations to limit the negative impacts of future developments. For example, the retrospective HIA of the Common Agricultural Policy relating to fruit and vegetable production makes a series of specific recommendations, including improving access and availability of fruit and vegetables to low income households.

The nature of the evidence used as inputs to HIA should also be considered. One possibility is to compile a list of systematic reviews and related literature (such as large good quality, prospective studies) which identify and ideally quantify the likely impact of specific non-health sector developments/projects/programs on health. This would perhaps allow the “hazard” associated with any development, and the likely groups affected to be identified with a degree of confidence. A similar approach has been used in the ranking of chemicals in terms of their relative potential risk to human. However, even when prospective studies are available to inform HIA, they will need to be assessed with regard to their main potential sources of bias. Some of the main sources of error derive from losses to follow-up, lack of consideration of confounding variables, adequate length of follow-up, reliability of ascertainment of exposure, and others.

4.3 Bias in HIA

Increasing awareness of the main sources of bias in epidemiological studies allows us to speculate how these may affect the results of prospective HIAs. For example, losses to follow-up are one such bias: those lost to follow up may differ from those who remain in the study, and this may be the case in health impact assessments. One Australian study of the health effects of a hazardous waste site reported on the correlates of attrition, separating the psychological and social characteristics of those who had refused to respond to the survey, and those who had moved from the area. Non-responders were more worried, more stressed and felt the waste site more intrusive than did those who had
responded, suggesting that the psychological impact of the site may be greatest in those who are lost to follow-up. The authors concluded that such studies “require very high follow-up rates for confident interpretation of results, particularly in situations where the potentially exposed population is small”. While the results may be specific to an Australian hazardous waste site, they raise the possibility that the results of HIAs, as with any study, may be vulnerable to bias.

There are a range of other potential biases whose impact may also be considered. Among these are;

- the role of confounders (are there other explanations for health impacts that have been identified, other than the project, programme or policy?)
- appropriate lengths of follow-up (how long should prospective HIAs be to detect health impacts?)
- Appropriate sample sizes (does the study have sufficient power to detect small risks?)
- Ascertainment of exposure (how do we know who has actually been exposed to the health impacts?)
- The nature of evidence (how do we locate, appraise and use existing evidence of health impacts?)

The lack of guidance regarding appropriate health indicators has also been highlighted.[15]

In the latter case, HIA approaches often rely on a range of evidence from expert opinion to prospective epidemiological studies and literature reviews. All these may be biased, and evidence-based decision making (and evidence based public policy) suggests that we should be aware of these biases and base decisions (for example, decisions about mitigation) only on the most sound evidence. One possibility for the future may be to compile a list or database of systematic reviews and related literature (e.g. large good quality prospective studies) which report on the impact of specific non-health sector developments/projects/programs on health. This would perhaps allow the “hazard” associated with any development, and the likely groups affected, to be identified as part of a HIA with a degree of confidence. A similar approach has been used in the ranking of chemicals in terms of their relative potential risk to human health. [51]

It may be useful to consider in future how HIAs may be appraised, and Fleeman (1999) and Ardern (1999) suggest use of the following ‘checklist’:

1. Conditions in the Terms of Reference (including consideration of whether the terms of reference were suitable for the purpose and whether the study has met the terms of reference)
2. Biases and traps (including consideration of the timing of the assessment, the relative budget, and the impartiality of the consultant).
3. Technical adequacy and quality of format (including who was consulted, range of health impacts evaluated, whether local conditions were taken into account)

4. Recommendations - are they practical and can they be transmitted into action?

The above may provide the basis for a future “HIA appraisal checklist”. At present there are too few examples of HIA to allow such a checklist to be validated. As more examples of completed HIAs become available further development of a validated appraisal tool will be possible, and may help the development of HIA methodology in general.

On a more general level, this review provides an overview of a wide range of methods which have been used to carry out health impact assessment, ranging from straightforward before and after surveys to the more sophisticated methodological approach recommended by the Merseyside Guidelines. All of these have a place in health impact assessment, and some approaches may be more appropriate than others depending on the resources, time and expertise available. For example, before-and-after telephone or questionnaire surveys involving a sample of those exposed to the development of interest will provide valuable information on how these non-health sector developments affect public health. With more expertise, more detailed study designs may be possible, using a control group not exposed to the development, but similar (or matched) in other ways. Additional face-to-face interviews, or use work with focus groups, may also provide valuable qualitative data on impacts which are not accessed by questionnaire-based methods. With more time and resources, the more detailed approach taken by some of the Liverpool Observatory can also be considered. However, at present any of the above methods should be considered. At its simplest, giving or sending a questionnaire measure of health status to the affected population before and after the development, and reporting the results, will make a valuable contribution to the HIA evidence-base. More sophisticated study designs, and studies with longer lengths of follow-up can be developed from these types of study.

4.4 Dissemination

Whatever study is carried out it is essential that the results and conclusions are made accessible. One of the current problems in HIA appears to be that the relevant studies have often been unpublished or otherwise inaccessible, making it difficult to learn from the experiences of others in the field, or even to see what methods have been used previously. This makes it difficult for those new to the field to find how others have “done” HIA, and difficult to find out what types of development are associated with what types of health impacts. As the field grows and as HIA becomes more common, the evidence from primary studies is likely to grow, and opportunities will exist to develop the methods and learn more about the effects of non-health interventions. These opportunities may well be missed if the results of these studies were to remain inaccessible. For example, HIAs currently carried out by local authorities are likely to remain unpublished and unavailable to HIA researchers. Some formal mechanism may be needed to help ensure that the results of existing and further HIAs are not lost. One possibility is an online database presenting summary details of existing HIAs, their methods and results, and contact details. This would need to be regularly updated to be useful, perhaps by contacting researchers in the field and other groups (such as local authorities, and councils) on a regular basis to ask for detailed of planned and completed HIAs. Other models may of
course be possible. At present however, much of the relevant literature details of primary studies are likely to remain unpublished, or accessible only through the “grey literature”.

4.5 Summary

In summary, then this review set to attempt to answer some ambitious questions. Some of these proved unanswerable, in particular those relating to what the most appropriate methods of HIA may be. Some tentative answer to this question is given above: at present any study is likely to provide valuable information, as long as it incorporates a broad model of health. However, prospective HIA is required if existing methods are to be validated. More detailed guidance is not possible; for example it is not possible yet to examine the association between particular types of HIA and their conclusions. This review will be updated in 2000, when the results of further HIAs will have become available. Some of these questions will be approached again, in the light of new studies which emerge.
Table 1: summary of health impact assessment studies.  Prospective (Liverpool observatory)

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<tr>
<th>Study details</th>
<th>Project/ programme/ policy. Aim</th>
<th>Methods used to evaluate health impact</th>
<th>Impacts considered</th>
<th>Mitigation/ recommendation/ validation/ conclusion</th>
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<tr>
<td>Broomfield</td>
<td>Project: Proposed re-development of King George V playing fields, Huyton SRB area, UK</td>
<td>Methods based on those of Winters and Scott-Samuel 1997 Sources of information on impacts: Information from the following four groups of informants: staff involved in the development and implementation of the project; professionals and volunteers from health, education, community, social and youth services; community organisations; academic researchers. (Participants listed) Individual interviews and group discussions included. Reports from Marketing and Research Unit; and Pathways residents survey.</td>
<td>Health impacts considered under the following categories: biological factors; personal/ family circumstances and lifestyle; social environment; physical environment; public services; public policy. Impacts identified for different stages of the projects (development and operational) Health impacts summarised under the following headings: category of specific influence on health; impact at project development or operation stage; predicted health impact (nature, size, whether is qualitative, estimable or calculable); certainty of impact (definite, probable, or speculative)</td>
<td>Recommendations: Make maximum use of established local networks, sporting clubs, local and national associations Careful thought be given to the marketing and promotion including pricing policy Maximise co-operation between agencies to promote the health of the community Utilise innovative programmes such as Local Exchange and Trading Schemes to aid social cohesion and regenerate a sense of community Make public transport, coupled with road safety, a priority. Monitoring: monitor health status of community</td>
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### Prospective HIA (Liverpool Observatory)

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<th>Study Details</th>
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<th>Mitigation/ Recommendation/ Validation/ Conclusion</th>
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| Fleeman 1997 UK | **Project**: Drug Prevention Initiative in Southport, UK  
**Primary aim of project**: reduction in drug use; reduction in associated illegal activities; greater awareness of the issue in the community; improved facilities for young people; direct and indirect economic (employment) benefits; possible model for establishment of permanent charity | **Model of HIA**: Based on method surmised by Winters and Scott-Samuel, 1997  
**Source of information**: Interviews with key personnel (listed). Relevant literature from Sefton Health, the SRB board and the DPI development worker. | **Health impacts** considered under the following categories: biological factors, personal/family circumstances and lifestyle, social environment, physical environment, public services, public policy.  
**Information recorded**: Categories/ specific influences on health; predicted health impacts (positive or negative); certainty of impact (definite, probable, speculative)  
Certainty of impacts largely based on researchers perceptions of findings. | **Recommendations**:  
Involve young people more  
Provide widespread information for all sections of community  
Do more work around clubs  
Use peer led education to increase positive health impacts  
Communicate existence and purpose of DPI to all sections of the public  
Ensure services can cope with the increase in demand  
Ensure various agencies’ policies (including the DPI’s) are properly integrated  
**Monitoring**: Evaluate whether the predicted health impacts have indeed occurred  
**Validation**: Not stated |
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<tr>
<td>Fleeman</td>
<td>Programme: Mersey side Integrated Transport Strategy (MERITS)</td>
<td>Model of HIA: Based on method used by Broomfield 1998, Fleeman 1997, Winters and Scott-Samuel 1997, Winters 1998 combined with methods from strategic environmental assessment (D of Environment 1991) and principles from policy analysis (Burch and Wood 1986, Hogwood 1987) Source of information: Interviews with key informant groups (listed) and literature review to investigate evidence relating to impacts of transport and health (databases listed).</td>
<td>Health impacts considered under: biological; lifestyle; social and economic environment; physical environment; access to services; public policy both local and national priorities. Findings from interviews were recorded in matrices, areas of agreement, disagreement and speculation noted. Matrices consisted of broad categories of impacts considered vs predicted health impacts. Health impacts explored by tabulating policy, predicted health impacts categorised as positive or negative, and certainty of impact categorised as definite, probable, or speculative.</td>
<td>Recommendations Build data sets for the key traffic related pollutants; link air quality data to available health data sets on a geographical basis; promote low emission buses. Economic viability: consider phasing traffic demand management measures Public transport: promote accessible buses; maintain non-commercial public transport systems and avoid excessive service saturation on commercial routes; take steps to reduce real and perceived dangers of using public transport at night; promote improved public transport services at night and over holiday periods Road hierarchies: target mitigation methods for communities adjacent to priority traffic routes. Other: minimise the impacts of the construction of transport infrastructure and traffic management schemes; develop an action plan that defines the following: action required to maximise positive health impacts and minimise negative ones; who is to carry out each action; timescale; how action can be monitored and evaluated. Suggested indicators and their limitations Suggestions are made on how to monitor health impacts (based on the literature) Monitoring: air quality, bus patronage.</td>
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### PROSPECTIVE HIA (LIVERPOOL OBSERVATORY)

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<tr>
<td>Winters 1997 UK</td>
<td>Project: Community safety projects, Huyton SRB area, UK</td>
<td><strong>Model of HIA;</strong> Methods used by Liverpool Observatory build on methods developed in Canada, in developing countries in the HIA of Manchester's second Airport and in the Department of Health's Policy and Appraisal model. Model surmised by Winters and Scott-Samuel, 1997</td>
<td><strong>Health impacts considered under the following categories:</strong> biological factors; personal/ family circumstances and lifestyle; social environment; physical environment; public services; public policy. Impacts identified for different stages of the projects (development and operational)</td>
<td><strong>Recommendations:</strong> involve local people in designing out crime Development opportunities for employment and training Before and after surveys of residents Increased participation on Community Safety Working Group Participatory safety education for children Project timetables Recreation for local people Reduce the environmental cues associated with fear of crime Primary prevention by increased levels of pre-schooling. <strong>Validation:</strong> not stated</td>
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<tr>
<td>Prospective HIA of combined effect of four community safety projects</td>
<td><strong>Primary aim of project:</strong> Reduction of crime and fear of crime. Tackling nuisance &amp; anti-social behaviour and problems associated with youths within communities.</td>
<td><strong>Sources of information on health impacts:</strong> Interviews conducted with key informants (listed). Brainstorming sessions (participants listed). Literature searches (details given)</td>
<td>Information tabulated by listing key areas and specific influences on health, with predicted health impacts detailed (nature, size where possible, and quantitative, estimable, or calculable), and the certainty of impact (definite, probable, or speculative)</td>
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## PROSPECTIVE HIA (LIVERPOOL OBSERVATORY)

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<td>Winters 1998 UK</td>
<td><strong>Project</strong>: International astronomy and space exploration centre at Twelve Quays, Wirral, UK. Consists of three components: Telescope Technologies LTD (TTL); Liverpool John Moores University (JMU)Astrophysics Research Institute; and Visitor Centre. Primary aim of project: to regenerate Wallasey Docklands area, building on investment to date and create a vibrant and sustainable economy.</td>
<td><strong>Model of HIA</strong>: Based on method surmised by Winters and Scott-Samuel, 1997 <strong>Sources of information</strong>: Interviews with key informants (listed). Brainstorming sessions. Literature searches (details given)</td>
<td><strong>Health impacts considered under the following categories:</strong> biological factors; personal/family circumstances and lifestyle; social environment; physical environment; public services; public policy. Information tabulated by listing key areas and specific influences on health, with predicted health impacts detailed (nature, size where possible, and quantitative, estimable, or calculable), and the certainty of impact (definite, probable, or speculative). Impacts defined as positive or negative.</td>
<td><strong>Recommendations</strong>: listed under the following headings: Transport and Traffic Security and Public Safety Civic Design Employment and Training <strong>Monitoring</strong>: A traffic safety audit; access audit; asthma prevalence rates and hospital admissions with asthma; Recommended that the Docklands Steering Group ensures that the recommendations are addressed in the detailed design stage of the project. (including monitoring) <strong>Validation</strong>: not stated.</td>
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## PROSPECTIVE HIA

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| Dunt Australia 1995 Prospective HIA of project. | **Project:** Western bypass consisting of an inner city 4 km extension of the Tullamarine Freeway, Melbourne Country: Australia  
**Primary aim of project:** to divert traffic away from Melbourne Central Activity district and reduce large and small vehicular traffic on network roads in the area traversed by the bypass. | Steering group with representatives from government agencies and community groups identified matters of community concerns using. Reporting process involved public meetings.  
**Other sources of information:** Literature search on the relationship between road type and traffic injury and health effects of ambient air and noise pollution. Baseline traffic accident data, current air and noise pollution measured | **Categories of impact:** Injury associated with traffic movements; respiratory and other diseases associated with air pollution resulting from traffic emissions; insomnia, anxiety and other health effects associated with noise pollution resulting from traffic movements. Pollutant levels were used as proxies for levels of associated diseases and health states.  
Forecasts made of levels of traffic accidents, air pollution, and noise pollution: | **Recommendations:** Noise attenuation measures,  
**Conclusion**  
The effects of the freeway on the area should be favourable to health with reduction in traffic injury and noise-related health problems outweighing any risk of a small deterioration in respiratory health associated with atmospheric pollution.  
**Validation:** authors report that ‘An observational study of the health effects of the freeway, if constructed, would be required to confirm the projections’. |
# PROSPECTIVE HIA

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<td>Konradsen Denmark and UK. 1997</td>
<td><strong>Project</strong>: Mupfure Irrigation Project in northern Zimbabwe - a small scale irrigation and dam development project. <strong>Country</strong>: Zimbabwe</td>
<td><strong>Primary aim of project</strong>: To improve the living standard of the rural community through irrigation development and by increasing production of cash crops and to a lesser extent food crops.</td>
<td>Specific potential health hazards (listed) were tabulated against the following three variables: environmental factors; vulnerable communities; and capabilities of health protection agencies to detect, monitor, inform, safeguard and mitigate risk. The health risk was categorised as increasing, or reducing and an estimate of the altered risk.</td>
<td><strong>Recommendations/ mitigation</strong>: 18 items specified with estimated total cost, agency responsible for implementation and details of health hazard impacted upon. Conclusion: This study shows that adequate data are available for a sound HIA; integration of HIA into project feasibility studies is prudent; complexity and methodological problems exist but a systematic evaluation of health impacts yields valuable results; and cost-benefit analysis should be used to prioritise mitigation measures.</td>
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| **Spiegel Canada 1997** | **Projects:** Several new uranium mining projects in Northern Saskatchewan.  
Country: Canada  
**Primary aim of project:** extraction of high grade ore. | **Methods:** in order  
1. Scoping meetings held in 12 Saskatchewan communities to determine guidelines for environmental impact assessment (EIS).  
2. Circulation of draft guidelines  
3. Panel guidelines on information required by proponents (details given)  
4. Proponents submission  
5. Public meetings to discuss proponents submissions  
6. Panel issues recommendations. | Impacts included the following 4 pathways suggested to linking exposure to mining developments and health effects: environmental contamination (exposure), ecosystem mediated effects; employment and income effects; and general community impact. | **Recommendations:**  
One mine was not allowed to proceed due to health and safety concerns. Second mine was delayed for 5 years to allow further evaluation of concerns. Third mine was allowed to proceed with various caveats re mitigating and monitoring procedures. Panel commissioned study on community health and made recommendations about community health impacts including concerns on contamination of air, water, and food chain, transportation of dangerous goods, socioeconomic impacts on health, health risk communication and gathering of community health data. |
## PROSPECTIVE HIA

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| Will 1994 UK Prospective HIA of project | **Project**: Second Main Runway (part) and associated facilities: including construction of new highways at Manchester Airport.  
**Primary aim of project**: not specified. | **Model used for HIA**: aimed at providing qualitative descriptions of potential health effects and using baseline data which shows the levels of any given health effect in the community. Grid used to tabulate health impacts (calculable, estimable, definite not estimable) vs environmental impacts (calculable, estimable, definite, speculative)  
**Sources of information**: ‘Review of the evidence which suggests links between major diseases and air pollution’ Literature and Zurich Airport Study. | **Health impacts** are considered under the following categories: Air pollution; Noise and Health; Employment and Health; Other health effects including infectious disease; road accidents; social separation; scleroderma.  
Health gains and losses were identified from a multi-agency brainstorming session. (From Health Impact Assessment: the way forward, K Ardern, 1999). | **Recommendations**: The airport company to maximise use of public transport; give priority to employment of local people and disadvantaged groups.  
Develop integrated transport policy for Greater Manchester  
**Monitoring** (by Airport company): Health effects of air pollution; potential health effects of noise from increased air traffic movements; Surveillance of imported infectious disease; Promotion and implementation of traffic calming measures for roads serving both the local communities and the airport.  
**Validation**: not stated. |
### RETROSPECTIVE HIA (CAP): Discusses effect of policy on Swedish population

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<td>Andreasson and Collander Swedish National Institute of Public Health 1997 Retrospective HIA of policy</td>
<td>CAP alcohol regime Primary aim of CAP agricultural policy 1. Increasing agricultural production 2. Insuring a fair standard of living for agricultural communities 3. Stabilise markets, 4. Assure availability of supplies 5. Ensuring that supplies reach consumers at reasonable prices</td>
<td>No details of formal methods used in HIA. No details of formal strategy used to determine information needs. References given for evidence presented. Quotes cause for Swedish public health concerns as alcohol related health damage including the effect of alcohol on human behaviour and direct toxic effects of alcohol.</td>
<td>No formal classification of categories of health impacts discussed. Health impacts discussed could be classified as biological and socio-economic.</td>
<td>Conclusion Present regulation of in market by the CAP does not constitute an immediate threat to increased consumption there is a clear latent threat. Any measures which would lower the price of alcohol or actively promote consumption needs to be opposed on public health grounds.</td>
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<td>Leather Swedish National Institute for Public Health 1997 Sweden Retrospective HIA of policy</td>
<td>European Union’s common Agricultural policy for fruit and vegetables. Primary aim of CAP 1. Increasing agricultural production 2. Insuring a fair standard of living for agricultural communities 3. Stabilise markets, 4. Assure availability of supplies 5. Ensuring that supplies reach consumers at reasonable prices</td>
<td>No details of formal methods used in HIA. No details of formal strategy used to determine information needs. References given for evidence presented. Quotes cause for Swedish public health concerns as the protective role fruit and vegetables play in the development of several chronic diseases especially coronary artery disease, certain cancers, hypertension and diabetes.</td>
<td>No formal classification of categories of health impacts discussed. Health impacts discussed could be categorised as biological, economic, employment.</td>
<td>Recommendations: Improve access and availability of fruit and vegetables to low income households. Direct efforts at increasing consumption of fruit and vegetables among younger age groups. Improved marketing of fruit and vegetables form EU rules on the marketing of fruit and vegetables to give greater choice to consumers End subsidised withdrawal of fruit and vegetables. Consider implementing price incentives to encourage increased consumption of fruit and vegetables perhaps through a subsidised fruits scheme in schools.</td>
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## RETROSPECTIVE HIA. CAP

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<td>von Haartman Swedish National Institute for Public Health 1997 Retrospective HIA of policy</td>
<td>Policy evaluated: CAP regime for dairy products (milk subsidies and yellow fats). Original objectives of CAP included: 1. Increasing agricultural production 2. Insuring a fair standard of living for agricultural communities 3. Stabilise markets, 4. Assure availability of supplies 5. Ensuring that supplies reach consumers at reasonable prices</td>
<td>No details of formal methods used in HIA. No details of formal strategy used to determine information needs. References given for evidence presented. Quotes cause for Swedish public health concerns as the mounting evidence for the role of nutrition in some of the most prevalent diseases in Europe today.</td>
<td>No formal classification of categories of health impacts discussed. Health impacts discussed could be categorised as biological.</td>
<td>Recommendations: A more forceful co-ordinated approach is required to challenge current action programme to promote milk consumption from a public health perspective.</td>
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**RETROSPECTIVE HIA**

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<tr>
<td>Baldassare USA Retrospective HIA of project.</td>
<td>Project: Bay Area Rapid Transit (BART). Railway system to provide mass public transport. Began service in 1972. <em>Primary aim of project:</em> To provide a mass transit system within low-density urban environment in San Francisco.</td>
<td>Home interviews with 702 residents at 10 sites. Free-response items and specific questions included.</td>
<td>Categories of impacts: General attitudes towards BART; residential mobility; total neighbourhood environment; and specific impacts of BART including noise inside home, vibration inside home, traffic congestion, parking, barriers and accessibility, backyard privacy, neighbourhood appearance, view from backyard, lighting at night, shadows, crime nearby, and change in residents. The following mediating factors were investigated: BART attributes including trackway configuration, presence of linear parks, train frequency and station parking facilities; environmental conditions such as background activity, housing orientation, and distance of respondents house from BART; respondent characteristics including social status, stage of life cycle, time spent in locality, and respondents experience as a BART commuter.</td>
<td>Recommendations: Regions considering mass-transit systems should consider the size of the commuter population and must vigorously attempt to recruit regular users. Monitoring: A follow-up study in perhaps 10 years would determine whether the general and specific attitude found had changed in the interim.</td>
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</table>
### RETROSPECTIVE HIA

<table>
<thead>
<tr>
<th>Study details</th>
<th>Project/ programme/ policy. Aim</th>
<th>Methods used to evaluate health impact</th>
<th>Impacts considered</th>
<th>Mitigation/ recommendation/ validation/ conclusion</th>
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</table>
| Biswas UK 1988 Summary of two retrospective HIAs of project. | **Project:** Bhima Command Area Development in Maharastra province, India. Consists of storage dam and net irrigable area of 126,000 ha. Inundation required of 29,000 ha. Country: India  
**Primary aim of project:** To provide irrigation to improve provincial economy and welfare | Two questionnaire surveys of selected individuals from different villages undertaken. Interviewees represented large, medium and small farms and landless labourers. Special emphasis on determining the changing role of women. | Categories of impact: income; employment generation; livestock; energy use; education; transportation; water supply; sanitation; housing; food and nutrition; health; women; public participation and environmental impacts. | Recommendations  
Urgent need for health education; steps to control aquatic weeds to reduce potential problems with health from disease vectors; decreasing water quality and increasing water requirements.  
Monitoring  
Suggestions include: meteorological observation to assess impact on microclimate; and observation of water table. |

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**Categories of impact:** income; employment generation; livestock; energy use; education; transportation; water supply; sanitation; housing; food and nutrition; health; women; public participation and environmental impacts.
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<tbody>
<tr>
<td>Cole DC Canada. 1997 Discusses qualitative environmental risk assessment approaches.</td>
<td>Three solid waste facilities in Canada facilities were studied. <em>Primary aim of project: not stated.</em></td>
<td>Waste facilities: Telephone survey administered to random samples of people living in four distance zones around each of the three study sites. Included in-depth interviews; discussion groups and focus groups with residents, and interviews with key informants.</td>
<td>Questionnaires consisted of the following five sections: attitudes towards the neighbourhood; social networks; health measures; combination of closed and open-ended items to determine residents levels of awareness, knowledge, concern and action regarding the site or more general environmental problems; standard sociodemographic details</td>
<td>Conclusions. It was felt that the qualitative stage confirmed the survey findings and enriched them with specific links between environment and health and provided information on residents perceptions of authorities responsible for the facilities. The authors consider that the increasing emphasis on a broader definition of health and the need to include community concerns support the use of qualitative methods but that few agencies have personnel with the skills or time for rigorous qualitative work</td>
</tr>
</tbody>
</table>

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**Note:**

This table provides a structured overview of the study details, methods used, impacts considered, and conclusions drawn from a retrospective Health Impact Assessment (HIA) conducted by Cole DC in Canada in 1997. The study focuses on waste facilities and employs qualitative assessment approaches, including telephone surveys and in-depth interviews, to gauge public perceptions and health-related concerns. The conclusions emphasize the importance of qualitative methods in understanding environmental health impacts, highlighting the need for specialized personnel and time to conduct rigorous qualitative investigations.
## RETROSPECTIVE HIA

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<tr>
<td>Derban Ghana 1984 Retrospective HIA of project.</td>
<td>Project: resettlement programme which was required to accommodate the Volta Dam, Ghana. Construction started in 1961. The aim of the Dam was to generate electric power for industrial expansions in Ghana Primary aim of resettlement programme: To provide dwelling, work and recreation places for the settlers. To offer the settlers the opportunity for productive work To improve the physical appearance of their surrounding landscape To help the settlers develop a community spirit. Some 80,000 people living in 739 villages displaced from the flooded area.</td>
<td>No methods of formal HIA described. Source of information: Social survey by Volta River Authority, Ministry of Health, Department of Fisheries. Dates of survey not stated.</td>
<td>Categories of impact: Socio-economic problems; sanitation and health problems; specific diseases (urinary schistosomiasis, onchocerciasis, trypanosomiasis</td>
<td>Recommendations 'Need for comprehensive study realised in 1962'. Action taken Volta Dam research project was formed with the aim of assessing the full potential of the scheme and the extent of problems to be solved. Volta Dam research project included activities in three sectors: fisheries and hydro biology, public health, and social agricultural and economics. The public health component involved the establishment of baseline epidemiological data on water borne diseases and the drawing up of control programmes. Results of the research project have made it possible for recommendations to be made for exploiting the benefits from the formation of the new lake and finding solutions to some of the problems encountered.</td>
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## RETROSPECTIVE HIA

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<tr>
<td>Dintzer L USA 1978</td>
<td>Project: Concorde operations at Dallas International Airport. Country: USA. Primary aim of project: not stated.</td>
<td>Methods of original study: three waves of surveys were conducted: 1. Telephone interviews conducted immediately prior to initial Concorde operations. 2. Interviews of different sample 7 months after operations started. 3. Interviews with different sample 12 months after operations started.</td>
<td>Impacts in original HIA: 1. Physical noise and vibration. 2. Community reaction to Concorde operations. (spontaneous noise-related complaints; media content analysis, and an attitudinal survey). Sample stratified by level of impact.</td>
<td>Recommendations and mitigation made in original: Concorde allowed to operate provided current noise levels do not increase. Concorde not to operate at supersonic speeds over the US; no operations between the hours of 10 pm and 7 am; airports to retain option to limit/ban operations through reasonable non-discriminatory noise rules; any second generation Concorde required to meet noise standards at least as stringent as the standard for subsonic aircraft. Authors of study report methodological limitations of original study including: Administration; sampling; and measurement. Detailed discussion and proposed revised design.</td>
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## RETROSPECTIVE HIA

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<tr>
<td>Garfield R. 1997 USA Retrospective HIA of policy.</td>
<td>Policy: US embargo against Cuba since 1961 with tightening since 1992. <strong>Primary aim of policy:</strong> to directly impact upon aid, trade and domestic economic activity of Cuba.</td>
<td>Trends in specified health indicators reported. <strong>Sources of information:</strong> Data from surveillance systems for nutrition, reportable diseases and hospital diagnosis. Cuba reported to provide high-quality data from a health system with universal access.</td>
<td>Categories of impact: health of newborns, pregnant women, mortality from specified causes, mortality rates in specified age groups Proportion of population with the following: domestic water connections, access to potable water; covered by chlorinated water system. Per capita funding of health services, number of hospital beds, physician per population ratio, laboratory investigations and ambulances in working order.</td>
<td>Conclusion This embargo has raised the cost of medical supplies and food. Rationing, universal access to primary health services, a highly educated population and preferential access to scarce goods for women and children help protect most Cubans from what might have been a health disaster.</td>
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## RETROSPECTIVE HIA

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<tr>
<td>Wolff, UK 1991</td>
<td>Policy: British urban transport policy</td>
<td>No details of formal methods used in HIA. No details of formal strategy used to determine information needs. References given for evidence presented.</td>
<td>No formal classification of categories of health impacts discussed. <em>Impacts discussed</em> under the headings: car ownership and mobility; air pollution; accidents, attitudes and inequalities; community severance and social isolation, and transport.</td>
<td>Recommendations: Universally accessible public transport facilities will have to be developed, walking and bicycling encouraged and the use of the private car, particularly in urban areas, discouraged. Universal mobility and accessibility independent of the car is required for public health protection and advancement. <em>Conclusion</em>: The current focus of the Transport Policy on accident reduction as the sole means of avoiding adverse effects of transport distracts attention from the wide health erosive effects of road traffic.</td>
</tr>
</tbody>
</table>
Appendix 1: BIBLIOGRAPHY OF HEALTH IMPACT ASSESSMENT STUDIES.


Cole DC, Eyles J. Combining qualitative and quantitative approaches to assessing impacts of environments on human health and well-being in local community studies. Toxicology and Industrial Health 1997; Vol 13, No2/3: 259-265.


Appendix 1 continued: Bibliography by type of HIA

PROSPECTIVE (LIVERPOOL)


PROSPECTIVE (OTHER)


RETROSPECTIVE (CAP)


RETROSPECTIVE (OTHER)
Baldassare M. The effects of a modern rapid-transit system on nearby residents. NO REFERENCE. IS CHAPTER IN BOOK? WHICH BOOK p 201-239.


Cole DC, Eyles J. Combining qualitative and quantitative approaches to assessing impacts of environments on human health and well-being in local community studies. Toxicology and Industrial Health 1997; Vol 13, No2/3: 259-265.


Appendix 2: Detailed summary of methods and results of included HIA studies.

PROSPECTIVE (LIVERPOOL OBSERVATORY)


AUTHOR
D Broomfield, Liverpool Public Health Observatory, 1998

PROGRAMME: prospective project. Prospective HIA on the proposed re-development of King George V playing fields, Huyton area of Liverpool. Facilities to be included in the development are: outdoor sporting facilities offering community use with casual and coaching sessions; indoor facilities including changing rooms, meeting rooms, storage facilities, catering facilities, fitness facilities; community woodland; adventure playground; increased parking.

SCREENING
Not stated.

INTENDED OUTCOMES
HIA was intended to aid development plans by considering what measures are required to maximise the positive impacts and ameliorate the negative impacts.

METHODS
Prospective HIA, with steering group (members and term of reference listed). Methods based on those of Winters and Scott-Samuel 1997

CATEGORIES OF IMPACTS CONSIDERED
Health impacts considered under the following categories: biological factors; personal/family circumstances and lifestyle; social environment; physical environment; public services; public policy. Impacts identified for different stages of the projects (development and operational)

SOURCES OF INFORMATION ON IMPACTS
Information from the following four groups of informants: staff involved in the development and implementation of the project; professionals and volunteers from health, education, community, social and youth services; community organisations including the Hillside Women's Group, Mosscroft Residents Association, and individual residents; academic researchers who are involved within the area of sociology, psychology, environmental and public health. Categories of impact and accompanying questions were used as the basis for discussions sessions with groups and as an outline for interviews conducted with individuals

INFORMATION RECORDED ON HEALTH IMPACTS
health impacts identified are summarised in tables under the following headings: category of specific influence on health; impact at project development or operation
stage; predicted health impact (nature, size, whether is qualitative, estimable or calculable); certainty of impact (definite, probable, or speculative)

INFORMATION RECORDED FOR PROFILE
Age structure; profile of children; economic position; car ownership; housing tenure; limiting long term illness; skills; qualifications; level of involvement in community issues; suggestions on improving the area from residents.

SOURCES OF BASELINE DATA
Report from Marketing and Research Unit ‘Profile of Huyton SRB Area (1997)’
Pathways resident survey

PRIORITY AREAS
Biological: which age, gender and disabled groups will benefit most. Personal and family circumstances: which aspects of people’s personal and family circumstances will be improves or changed; will the project improve material circumstances, access to education, training, real jobs, improve lifestyle and leisure opportunities, reduce stress fear, and anxiety; encourage walking or cycling.

Social environment: will the developments alter social cohesion, encourage or develop inter-generational relationships; encourage respectful attitudes and behaviour.

Physical environment: will the project protect and assist those most vulnerable; reduce the incidence of preventable injuries and deaths; be environmentally pleasing and enhance quality of life.

Public services and public policy: will the project promote access to health promoting or protecting services, influence economic, social and health trends, alter use of health relevant services, support local and national priorities, policies, programmes and projects.

METHODS USED TO PRIORITISE IMPACTS
The following criteria were used to identify priorities: a) issues which were raised by individuals or members in at least three of the four groups; and impacts which were identified by (a) and considered by the majority as important.

RECOMMENDATIONS/ MITIGATION
To maximise positive impacts and minimise or ameliorate negative impacts: Maximum use of established local networks, sporting clubs, local and national associations. Careful thought be given to the marketing and promotion including pricing policy. Maximise co-operation between agencies to promote the health of the community. Utilise innovative programmes such as Local Exchange and Trading Schemes to aid social cohesion and regenerate a sense of community. Make public transport, coupled with road safety, a priority. Continue to monitor the health status of the community to assess the impact of the new development upon all members of the community especially the vulnerable groups.

VALIDATION OF IMPACT ASSESSMENT
Not stated.

METHODS OF VALIDATION
Not stated.
MONITORING
One recommendation to monitor health status of community


AUTHOR
N Fleeman 1997. Liverpool Public Health Observatory

PROGRAMME:
Drug Prevention Initiative in Southport

INTENDED OUTCOMES
1. reduction in drug use
2. reduction in associated illegal activities
3. greater awareness of the issue in the community
4. improved facilities for young people
5. direct and indirect economic (employment) benefits
6. possible model for establishment of permanent charity

METHODS
Prospective HIA. Based on method surmised by Winters and Scott-Samuel, 1997

CATEGORIES OF IMPACTS CONSIDERED
Health impacts considered under the following categories: biological factors, personal/family circumstances and lifestyle, social environment, physical environment, public services, public policy.

SOURCES OF INFORMATION ON IMPACTS
8 one-to-one interviews and one mini-focus group with the following key informants: Director (Merseyside Safer Cities); Director (Sefton CVS and Vice -Chair of SRB Board); DPI Co-ordinator; Drug Education Project Worker, Merseyside Drug Council; HIV co-ordinator (Southport); lay / community representative on dpi steering group; practice nurse (Southport); specialist drug worker (Sefton social services); specialist drugs worker (Merseyside drugs council; youth service worker (Southport). Findings noted in table at time of interview, collated and analysed.

Relevant literature from Sefton Health, the SRB board and the DPI development worker. Certainty of impacts largely based on researchers perceptions of findings.

INFORMATION RECORDED
Categories/ specific influences on health; predicted health impacts (positive or negative); certainty of impact (definite, probable, speculative)

INFORMATION RECORDED FOR PROFILE
SMR, crime level, vulnerable groups, concerns, unemployment, qualifications, population mobility, type of accommodation, % at risk of drug use, recent changes in area, special circumstances (club culture),

SOURCES OF BASELINE DATA
Annual report of the Director of Public Health, Sefton; Central Southport Partnership 1997a; Metropolitan Borough of Sefton;

RECOMMENDATIONS/ MITIGATION
Involve young people more
Provide widespread information for all sections of community
Do more work around clubs
Use peer led education to increase positive health impacts
Communicate existence and purpose of DPI to all sections of the public
Ensure services can cope with the increase in demand
Ensure various agencies’ policies (including the DPI’s) are properly integrated
Evaluate whether the predicted health impacts have indeed occurred; e.g. by measuring prevalence of drug use and uptake of services or by repeating Southport Youth Survey.

VALIDATION OF IMPACT ASSESSMENT: Not stated

METHODS OF VALIDATION: not stated

OTHER COMMENTS
Problem of time constraints mentioned repeatedly.

AUTHOR
N Fleeman
Liverpool Public Health Observatory 1999

PROGRAMME
Merseyside Integrated Transport Strategy. Used as pilot for HIA at strategy level.

INTENDED OUTCOMES
1. To support economic development and urban regeneration opportunities
2. To increase the relative attractiveness of public transport, cycling, and walking
3. To secure the efficient use of the existing road network
4. To improve road safety and environmental quality for all, and to improve access for people with disabilities.

METHODS
Prospective HIA. Methods piloted by Liverpool Public Health Observatory involving: interviews with a wide range of informant groups; and a literature review.

CATEGORIES OF IMPACTS CONSIDERED
Health impacts considered under the following categories: biological factors (genetic, sex, age); lifestyle (diet, physical activity, recreation, means of transport, risk taking behaviour & substance abuse); social and economic environment (employment, culture, peer pressure, social exclusion, discrimination, community & spiritual participation); physical environment (housing conditions, working conditions, water quality, air quality, noise, public safety and security); access to services (education, health, social services, housing services, transport, leisure, police, voluntary services); public policy both local and national priorities (economic, social, environmental, health).

Framework based on the above plus the following core policy elements of MERITS: assist in achieving economic growth and urban regeneration; provide a transport policy framework within which individual proposals may be evaluated and appraised, better enable Mersey side authorities to make the case for external funding for transport investment.

SOURCES OF INFORMATION ON IMPACTS
Series of interviews with the following key informant groups: Borough Engineers, Consultant in Communicable Diseases, Director of ASH, Director of Public Health (Sefton), Field Services Manager and Active Age Manager of Age Concern, Mersey side Integrated Transport Environmental Sub-Group, Principal Transport Policy Officer and Senior Transport Policy Officers, Road and Transportation Strategy Officer, Transport Access Officer, Transport Campaigners, Transport Planner, Transport Policy and Street works Team Leader.

Literature review to investigate evidence relating to impacts of transport and health. The following databases were searched: Accomplice 1950-97; Urbaline 1991 -97; Medline 1992-98; Psychlit 1974-98; Socio File 1974-98; EconLit 1969-98. The Internet was searched for relevant information. Literature recommended by people also used.
INFORMATION RECORDED
Findings from interviews were recorded in matrices, areas of agreement, disagreement and speculation noted. Matrices consisted of broad categories of impacts considered vs predicted health impacts. Health impacts explored by tabulating policy, predicted health impacts (positive and negative) and certainty of impact (definite, probable, speculative). The following broad impact areas were identified from the literature search: road traffic accidents, air quality, noise pollution, dependence on cars and lack of physical activity, community severance and health inequalities. Topics are discussed under subcategories in the Appendix. Communities likely to be affected by MERITS were determined.

INFORMATION RECORDED FOR PROFILE
Population number. Employment status.

SOURCES OF BASELINE DATA
1991 Census. 1997 MERITS technical appendices. Meetings with key informants from each of the five local authorities.

PRIORITY AREAS
Air quality, economic viability, public transport, road hierarchies.

METHODS USED TO PRIORITISE IMPACTS
Based on results of interviews and supporting evidence from the literature. Impacts selected met the following criteria: clear and important health implications; many key informants highlighted it as a priority; was a pre-cursor role to several other health impacts; clear policy implications.

TERMS OF REFERENCE
Agreed by steering group after discussion.

RECOMMENDATIONS/ MITIGATION
Air quality: continue to monitor air quality and build data sets for the key traffic related pollutants; link air quality data to available health data sets on a geographical basis; continue to promote low emission buses.

Economic viability: consider phasing traffic demand management measures.

Public transport: continue to monitor bus patronage and promote accessible buses; use all available powers and means to maintain non-commercial public transport systems and avoid excessive service saturation on commercial routes; take steps to reduce real and perceived dangers of using public transport at night; promote improved public transport services at night and over holiday periods.

Road hierarchies: target mitigation methods for communities adjacent to priority traffic routes.

Other: minimise the impacts of the construction of transport infrastructure and traffic management schemed; develop an action plan that defines the following: action required to maximise positive health impacts and minimise negative ones; who is to carry out each action; timescale; how action can be monitored and evaluated. . Suggested indicators and their limitations are presented.

VALIDATION OF IMPACT ASSESSMENT
Not done
METHODS OF VALIDATION
Not stated

OTHER COMMENTS
Authors reports on biases, traps, and limitations. Biases include the following: potential bias of person(s) undertaking a HIA especially if they are dependent upon the project for future work; limited timescale restricted talking to a more representative cross-section of the general population; inability to carry out HIA at planning stage rather than during the development and implementation phase.

Limitations: great difficulty of discovering the likelihood of health impacts and quantifying them. Impacts tend to be qualitative rather than quantitative - reasons include the following: strategies require a more general approach to impacts than do projects; health impacts are not included as explicit policy objectives of MERITS so no specific transport related health indicators are collected which can be used for quantifiable predictions; impact on health is hard to measure quantifiably (especially when there is a lack of health indicators) Traditional indicators tend to ignore social impacts. Difficulty of attributing cause and effect of policy action. Validity of indicators: available data may not be valid. Real impact of policies can only be meaningfully measured several years after the introduction of interventions. Indicators often proxies.

MONITORING
Suggestions are made on how to monitor health impacts (based on the literature)

Travel patterns: modal splits.

Specific data for specified projects: accident data, air pollution data, traffic counts/flows for specific roads.

Sustainability indicators for public transport.

Environmental indicator: engine profile of bus fleet, proportion of buses failing emission standards test; air quality at bus and rail stations; number of buses using low-polluting fuels / alternative energy sources; energy consumption per passenger per mode. Air quality indicators: current system measures trends rather than specific levels (NOx and benzene).

Economic viability indicators: % of the following: economically active people unemployed and calming benefit; unemployed age 18 to 24 years; unemployed for more than one year; households receiving housing benefits; households receiving council tax benefits; children aged 5 to 16 years receiving free school meals.

Social indicators: households within specified distance of bus stop or rail station; number and usage of park and ride schemes; proportion of buses accessible to wheelchair users; proportion of concessionary passes issued and used by those eligible; proportion of pre-paid tickets purchased and used for all public transport modes; sources for supplying information on public transport services; number of outlets for purchasing transport tickets.

Lists other transport indicators.

Others: public safety and accidents; noise pollution. Surveys of schoolchildren to determine modes of transport to school.
Quantifying health impacts associated with transport: Emphasises these are no more than estimates since are confounding factors.

Mortality and morbidity: deaths brought forward, hospital admissions brought forward or additional estimated fro PM$_{10}$, SO$_2$, ozone.

Economic cost: impacts of road transport on the environment

Unemployment: impact of unemployment on health

AUTHOR
L Winters & A Scott-Samuel. Liverpool Public Health Observatory 1997

PROGRAMME: prospective HIA. Community safety projects, Huyton SRB area
A combination of four community safety projects involving:
1. Clearance of vulnerable sites
2. Target hardening of domestic dwellings
3. Parking & access
4. Improved street lighting

TERMS OF REFERENCE
Agreed by steering group after discussion.

INTENDED OUTCOMES
Reduction of crime and fear of crime. Tackling nuisance & anti-social behaviour and problems associated with youths within communities.

METHODS
Prospective HIA. Methods used by Liverpool Observatory build on methods developed in Canada, in developing countries in the HIA of Manchester’s second Airport and in the Department of Health’s Policy and Appraisal model. Model surmised by Winters and Scott-Samuel, 1997

CATEGORIES OF IMPACTS CONSIDERED
Health impacts considered under the following categories: biological factors; personal/family circumstances and lifestyle; social environment; physical environment; public services; public policy. Impacts identified for different stages of the projects (development and operational)

SOURCES OF INFORMATION ON IMPACTS
Steering Group formed. Terms of reference agreed (included)

Exploratory interviews conducted with key information from the following: planning, community police, residents association, area housing management, youth and community workers, environmental health and housing.

The categories of influence were used as a basis for the brainstorming sessions and interviews.

Two brainstorming sessions were held, each had two researchers in attendance. One session comprised professionals including representatives from the following: planning, community development, police, drug services, Groundwork Trust, environmental health and housing. Another brainstorming session was conducted with community representatives. Individuals were identified by the Steering Group and at the exploratory interviews. Representatives from Public health departments, social services and health visiting were invited but were unable to attend. They were interviewed separately. Interviews were also held with the following agencies: community safety, general practice, and Victim Support.

Literature searches of the following: Alta Vista on the Internet; BIDS; CD-ROM Medline and Sociofile. Research sought on the following topics: increases in lighting; off-street
parking; methods of tackling youth crime; situational crime prevention and rationale; designing out crime; crime levels and fear of crime; crime and inequality. Findings discussed under health impact areas.

INFORMATION RECORDED
Information tabulated by listing key areas and specific influences on health, with predicted health impacts detailed (nature, size where possible, and quantitative, estimable, or calculable), and the certainty of impact (definite, probable, or speculative).

INFORMATION RECORDED FOR PROFILE
Age structure, children in area, age at conception, unemployment rate, crime statistics including command and control calls: all by locality.

SOURCES OF BASELINE DATA FOR PROFILE

PRIORITY AREAS
Development stage: sense of control from community involvement; quality of life; social environment - recreation; local employment; risk of accidents.
Operational stage: risk of accidents; fear of crime; crimes that are not opportunistic; community development and change of culture; root cause of crime not affected.

METHODS USED TO PRIORITISE IMPACTS
Impacts were selected if they represented one or more of the following: many interviewees considered it to be a priority; a major contributor to the chance of other impacts happening; the impact would have important health implications; where modifications or recommendations could be made to improve health outcomes.

RECOMMENDATIONS/ MITIGATION
Involve local people in designing out crime
Development opportunities for employment and training
Before and after surveys of residents
Increased participation on Community Safety Working Group
Participatory safety education for children
Project timetables
Recreation for local people
Reduce the environmental cues associated with fear of crime
Primary prevention by increased levels of preschooling.

VALIDATION OF IMPACT ASSESSMENT
Not stated.

METHODS OF VALIDATION
Not stated.

MONITORING
See text of recommendations: suggests well designed survey of a representative sample of residents or properly selected focus groups to articulate local concerns and confirm or refute the health impacts that have been predicted.
PROBLEMS ENCOUNTERED
Relevant local information, particular of a quantifiable nature was difficult to obtain. Available statistical or qualitative data may not be in an accessible form. Gathering quantifiable evidence can be time-consuming. Boundaries may not be coterminous with area under study. Completed studies will not be on identical populations. Policies, other than the one under review, may impact upon the communities being studied.

Opportunity for evaluating the certainty of occurrence of predicted health impacts from local quantitative data was disappointing. Would be improved by before and after surveys. Limitations of evidence from the use of crime statistics.

Potential positive impact from increasing job opportunities of local people in construction stage has not been achieved.

Initiatives in other areas not been in operation long enough to allow a realistic assessment of their effect. Problems with crime data. Monitoring of command and control data is underway.

AUTHOR
L Winters. Liverpool Public Health Observatory 1998

PROGRAMME
Three components of the International Astronomy and Space Exploration Centre, Twelve Quays, Wirral: Telescope Technologies LTD (TTL); Liverpool John Moores University (JMU)Astrophysics Research Institute; and Visitor Centre.

SCREENING
Choice made as to which programme of the docklands project should be subjected to HIA.
Used the Observatory screening criteria at a meeting with researcher, Director of Observatory, Consultant in Public Health and members of Special Initiatives Team. Criteria listed.

INTENDED OUTCOMES
The aim of the Docklands programme is to ‘regenerate Wallasey Docklands area, building on investment to date and create a vibrant and sustainable economy’ There are three key components: continued revitalisation of the Dock Estate; creation of a Green Technology park; support the development of important commercial research and leisure facilities on the prime waterfront site of Twelve Quays.

Lists following ‘problems to be addressed: large moribund areas of land; large areas which have a poor environmental quality; local concerns regarding rising levels of crime, vandalism, and drug and alcohol abuse; New Wallasey has poorer health than the National and Wirrel average as measured by a range of indicators; low quality and paucity of visitor attractions and amenities in New Brighton; Council’s local Agenda 21 strategy is only at an early stage.

METHODS
Prospective HIA. Based on method surmised by Winters and Scott-Samuel, 1997

CATEGORIES OF IMPACTS CONSIDERED
Health impacts considered under the following categories: biological factors; personal/family circumstances and lifestyle; social environment; physical environment; public services; public policy. Impacts identified for different stages of the projects (development and operational)

SOURCES OF INFORMATION ON IMPACTS
Key informants identified by members of the Steering Group and by asking interviewees for further contacts. Impacts determined using interviews with key informants and brainstorming sessions. Details of key informants are included in the Appendix as are other sources of information.

INFORMATION RECORDED
Information tabulated by listing key areas and specific influences on health, with predicted health impacts detailed (nature, size where possible, and quantitative, estimable, or calculable), and the certainty of impact (definite, probable, or speculative). Summary of health impacts mentioned during development phase and operational stage are included.
INFORMATION RECORDED FOR PROFILE

SOURCES OF BASELINE DATA
Interviews of key informants from Planning and Public Health. Profile undertaken of Wallasey locality in 1996. Survey conducted in 1995 to explore concerns of community . Data also from Merseyside Information Service.

PRIORITY AREAS

METHODS USED TO PRIORITISE IMPACTS
Determined by the number of times key area was mentioned as a priority at interview sessions.

RECOMMENDATIONS/ MITIGATION
Transport and Traffic
Ensure that good quality transport is available to the Twelve Quays from both Birkenhead and Wallasey; When planning permission is being sought it is recommended that Environment and Traffic Impact Assessments bear the proposals in this HIA in mind; Heavy goods vehicles should use routes away from residential areas; Encourage exercise through walking and cycling; Continue to monitor asthma prevalence rates and hospital admissions with asthma

Civic Design
Local children could make suggestions to what they would like to see in centre; Building design should take account of sustainable development through the prudent use of natural resources in an energy efficient building; To commission expert advice to carry out an access audit

Security and Public Safety
As far as possible local people, especially the young should be involved in the design of publicity
Dangerous area, which might be vulnerable to criminal activity and accidents should be eliminated
A traffic safety audit should be completed at the preliminary and detailed design stage of IASEC and maintained once in place

Employment and Training
That the feasibility study investigate the provision of affordable access to local people, particularly the unemployed and others on a low income; The centre to work closely with the training agencies so that local people will have the right skills to be employed and use their skills in publicity

Recommended that the Docklands Steering Group ensures that these recommendations are addresses in the detailed design stage of the project.
VALIDATION OF IMPACT ASSESSMENT
Not stated.

METHODS OF VALIDATION
Not stated

MONITORING
Included in the recommendations are the following suggestions for monitoring:
- monitor asthma prevalence rates and hospital admissions with asthma
- access audit
- traffic safety audit at preliminary stage and ongoing

COMMENTS FROM AUTHORS
Report includes progress on the following priority areas: transport and traffic; public safety (contaminated land and water); issues of safety in the design of site; civic design; adult education; employment and training. Some concerns were not covered by the recommendations since further investigations will have to be undertaken before specific recommendations can be made. Issues include afford ability. Progress has been made on planning of adult education.

PROSPECTIVE (OTHER THAN LIVERPOOL OBSERVATORY)


Aim: to estimate the effect on health of traffic injury and air and noise pollution from a proposed inner-suburban freeway in Melbourne.

AUTHOR
Dunt DR, Abramson MJ, Andreassen DC. Department of Public Health and Community Medicine, University of Melbourne; Department of Social and Preventative Medicine, Monash University, Melbourne, Australian Road Research Board, Melbourne.

PROJECT
Western bypass consisting of an inner city 4 km extension of the Tullamarine Freeway.

INTENDED OUTCOMES OF PROJECT
The bypass would connect the Tullamarine Freeway with Docklands and other Melbourne freeways. Would divert traffic away from Melbourne Central Activity district and reduce large and small vehicular traffic on network roads in the area traversed by the bypass.

METHODS
Steering committee consisted of representatives from VicRoads, government agencies, and community groups including a group opposed to the freeway. The reporting process involved public meetings.

The above allowed the identification of matters of community concern.
CATEGORIES OF IMPACTS CONSIDERED
Injury associated with traffic movements; respiratory and other diseases associated with air pollution resulting from traffic emissions; insomnia, anxiety and other health effects associated with noise pollution resulting from traffic movements. Pollutant levels were used as proxies for levels of associated diseases and health states.
Articles does not include an economic evaluation, studies the effects on the local area alone and compares the freeway development with the present road system.

SOURCES OF INFORMATION ON IMPACTS
Traffic accidents: search conducted for literature on the relationship between road type and traffic injury.

Air pollution and respiratory disease: a literature review on ambient air pollution (SO₂, NOₓ, O₃, acid aerosols, and polycyclic aromatic hydrocarbons) and respiratory disease is referenced. Sources quoted of information on the health-related effects of O₃, airborne particulates, benzene, and lead.

Noise pollution: literature refs given.

INFORMATION RECORDED FOR BASELINE PROFILE
Area reported to have a large proportion of socially disadvantaged and to have distinctive terrains and microclimate.

Baseline traffic accident data for 1984 to 1988 used to determine average number of reported accidents per year at all intersections.

Air pollution and respiratory disease: current air quality in the vicinity of the freeway development. A new monitoring station was set up on a nearby housing estate to measure meteorological conditions and environmental pollutants. Results are summarised.

Noise pollution: average and maximum noise levels were measured at several locations in the affected area.

FORECASTING METHODS
Traffic accidents: Assumptions made when predicting number of future accidents are stated. Sensitivity analysis conducted on the basis of different traffic flows.

Air pollution: Models were used to predict future levels of CO and NOₓ in the vicinity of the proposed freeway.

Noise pollution: estimated from traffic projections. Further study at sensitive spots is required.

Factors other than traffic flow also influence noise levels. Sensitivity analysis discussed.

PRIORITY IMPACTS
Air pollution: O₃, airborne particulates.

METHODS USED TO PRIORITISE IMPACTS
Air pollution: baseline and monitoring data. Health effects from estimated pollutants from relevant literature.

RECOMMENDATIONS/ MITIGATION
Noise attenuation measures, including consideration of noise reduction methods such as restrictions or prohibitions in trucks (particularly during sleeping hours).

VALIDATION OF IMPACT ASSESSMENT
‘An observational study of the health effects of the freeway, if constructed, would be required to confirm the projections’.

CONCLUSIONS
The effects of the freeway on the area should be favourable to health with reduction in traffic injury and noise-related health problems outweighing any risk of a small deterioration in respiratory health associated with atmospheric pollution.

PROBLEMS ENCOUNTERED WITH HIA
Accidents in the future cannot be predicted with a high degree of accuracy because of the many unknown variables.

Difficult to arrive at an overall assessment of the effect of the freeway on health.

Variable effects at different locations in the affected area.
It is possible that on the basis of the data presented that others may arrive at a different conclusion.

The authors consider that the strengths of this HIA include: the incorporation of community participation; the identification of vulnerable population groups; provision of public information via public meetings and newsletters; multi sectoral consultation; the provision of guidance and opinions from health professionals from the earliest stage; the provision to proponents of guidelines and advice in relation to known health hazards, relevant databases, research and methodologies, interpretation of health risk assessments; and the incorporation of explicit attention to public health.

Aim: to present the framework that is being developed by the WHO for addressing environmental health indicators, findings of a series of 5 regional workshops held to examine the role of health professionals in environmental assessment in Canada, and present a case study of an EA conducted in Northern Saskatchewan.

AUTHOR
Spiegel J, Yassi A. University Department of Community Health services and Department of Occupational and Environmental Medicine.

PROGRAMME
Several new uranium mining projects in Northern Saskatchewan.

METHODS
Concern over potential health effects led to human health being included in terms of reference. Methods: in order
1. Scoping meetings held in 12 Saskatchewan communities to determine guidelines for environmental impact assessment (EIS) for 2 of the proposed mining developments.
2. Circulation of draft guidelines
3. Panel guidelines on information required by proponents
4. Proponents submission
5. Public meetings to discuss proponents submissions
6. Panel issues recommendations to provincial and federal governments.
Review panel included a health professional

CATEGORIES OF IMPACT
Impacts included the following 4 pathways suggested to linking exposure to mining developments and health effects: environmental contamination (exposure), ecosystem mediated effects; employment and income effects; and general community impact.

TERMS OF REFERENCE FOR PROPONENTS.
Following the circulation of draft guidelines, Panel guidelines specified that proponents were to address both radiation and conventional hazards with respect to worker health and safety and public health. Proponents required to provide baseline assessment, outline monitoring procedure, predict impacts, quantify impacts on biophysical environment and health of workers, address community vitality issues, economic development and employment opportunities. Public hearings were conducted in nine communities. Oral presentations and written briefs were submitted.

PANEL RECOMMENDATIONS
Followed public meetings.

One mine was not allowed to proceed due to health and safety concerns. Second mine was delayed for 5 years to allow further evaluation of concerns. Third mine was allowed to proceed with various caveats re mitigating and monitoring procedures.

Panel commissioned study on community health and made recommendations about community health impacts including concerns on contamination of air, water, and food chain, transportation of dangerous goods, socioeconomic impacts on health, health risk communication and gathering of community health data.
METHODS OF VALIDATION
Not stated.

MONITORING
Not specified.

COMMENTS FROM AUTHORS
Consider health as having several domains each with its own data sources and indicators. Domains include physical, mental/ emotional, social and cultural/ spiritual. Health and demographic indicators can be constructed from the variety of existing health databases.

Types of indicator may be defined according to casual pathways that have been suggested linking the exposure of interest and health effects.

For mining suggests the following:
1. Environmental contamination: data for assessment from data linkage with medical care / hospitalisation databases, cancer registries and workers compensation board data.
2. Ecosystem mediated effects: prospective cohort studies or repeated cross-sectional surveys.
3. Employment and income effects: as social and mental health databases are poorly developed, repeated cross-sectional surveys may be necessary.
4. General community impact: effects include increased employment and overall income, improved infra-structure, potential for disruption of community cohesion resulting in increased psychological stress and interpersonal violence, influx of young male workers leading to increased criminal offences, substance abuse, increased STDs, ecosystem changes resulting in altered patterns of infectious disease, changes in availability of game, and influence on tourism.

OTHER COMMENTS
An environmental health indicator (EHI) provides ‘an expression of the link between environment and health, targeted at an issue of specific policy or management concern and presented in a form which facilitates interpretation for effective decision making’.

EHI can be exposure based (peoples whose exposure exceeds a guideline value); health based outcomes : or linkage based (obtained from time series analysis). Good quality medical data are essential.

Information to support indicators may come from existing databases of disease, health care utilisation data, or environmental. In most cases there are limitations in the baseline data for considering the local impacts of concerns.

EIA in Canada: Government ministry issues a set of ‘scoping criteria’ to be addressed by proponents. Proponents prepare an EIS. If is level of concern, public hearing process is held prior to the making of a decision.

ISSUES IN HEALTH AND ENVIRONMENTAL ASSESSMENT. Results from workshops held across Canada in 1995/1996.

Need for baseline community health information to encompass sociocultural well-being and physical health.

Need to develop common agreed-on methods and indicators
Determinants of health and WHO definition of health should be used as a basis for identifying indicators of health and well-being and used in EA.

Need to develop methods to study health and well-being in small populations.

Psychosocial impacts considered to be poorly understood and in need of further development.

AUTHOR
Public Health Medicine, Manchester Health authority and Public Health Department, Stockport

Aim: to review the evidence which suggests links between major diseases and air pollution; to examine sources and types of air pollution associated with the airport; to determine potential health effects and suggest ways of monitoring them; summarise key points.

PROGRAMME
Second Main Runway (part) and associated facilities: construction of new highways at Manchester Airport.

INTENDED OUTCOMES
Maximise the potential for health gain
Minimise possible health loss

METHODS
Prospective HIA. Some information on methods is given in Health Impact Assessment: the way forward, K Ardern, 1999. Time taken 18 months. SR and Registrar from Public Health Department undertook project on a part-time basis. Health gains and losses were identified from a multi-agency brainstorming session.

Report consists of 4 chapters with the following headings:
Air pollution; review of evidence which suggests links between major diseases and air pollution; individual pollutants and possible health effects and importance in the following: asthma and chronic bronchitis, allergic disease, respiratory infections, ischaemic heart disease, cancers.

Noise and Health: effect of noise; special effects including hearing damage and speech interference; non-specific effects including blood pressure increase, chronic stress syndrome, psychiatric disorders, psychosomatic disorders, behavioural disorders, performance disorders and accident risk.

Employment and Health: unemployment and effect on health; Scott-Samuel method and Brenner method for calculation of health impact of job creation

Other health effects: infectious disease including influenza, food borne/ waterborne disease; person to person; insect borne; road accidents; social separation; scleroderma.

CATEGORIES OF IMPACTS CONSIDERED
Air pollution, noise, employment, infectious disease including influenza, food borne/ waterborne disease, person to person, insect borne; road accidents; social separation; scleroderma.

SOURCES OF INFORMATION ON IMPACTS
Literature, Zurich study
SOURCES OF BASELINE DATA
Manchester air pollution advisory council, Public Health Common Data Set.

INFORMATION RECORDED FOR PROFILE
Number of vehicles registered, estimated emissions from road transport, national and local traffic growth, hospitalisation rates for asthma, hypertension, respiratory illness, injuries by wards in Manchester area, all causes SMR for Manchester, Ischaemic heart disease and lung cancer rates for Manchester.

PRIORITY AREAS
Positive impact resulting form creation of employment.

Negative impact of the road traffic created by the airport. Results in deterioration in air quality with particular reference to increased emissions of Nitrogen Dioxide, Nitrogen Oxide, Carbon Monoxide, Ozone, particulates and Hydrocarbons.

Other health impacts likely to affect the local population include: noise pollution; road accidents; social separation; infectious disease; and impact of road traffic.

METHODS USED TO PRIORITISE IMPACTS
Not stated

RECOMMENDATIONS/ MITIGATION
The airport company to: Actively pursue policies which will maximise the percentage of passenger journeys using public transport; Limit the number of on-site parking spaces; Plan and control the number of off-site parking spaces; Protect land for the future development of the airport station and western rail link.

Be actively committed to maintaining and expanding the air quality monitoring system
Contribute to monitoring of health effects of air pollution and contribute to research and development aimed at minimising adverse health effects.

Action by those responsible for the increase in noise to ameliorate the effects by sponsorship of local schools

Develop integrated transport policy for Greater Manchester
Enforce noise legislation

Protect those exposed to significant levels of noise and plan to minimise the added burden of noise resulting from airport development

Monitor the potential health effects of noise from increased air traffic movements

Structure job package to include part-time work in hours suitable for single parents and a stated minimum number to be filled by disable people

Advertise jobs in media accessible to single parents, disabled people, unemployed and people from deprived areas. Give priority to local people.

Provide affordable creche facilities with the appropriate number to cater for likely demand
Make every effort to provide transport between the airport and local centres of population at times related to staff working hours
The airport should take an active role in the surveillance of imported infectious disease. The airport should take an active role in the promotion and implementation of traffic calming measures for roads serving both the local communities and the airport.

VALIDATION OF IMPACT ASSESSMENT
Not stated.

METHODS OF VALIDATION
Not stated.

MONITORING
The following are included in the recommendations:
Maintain and expand the air quality monitoring system; Monitor health effects of air pollution.
Monitor the potential health effects of noise from increased air traffic movements;
Surveillance of imported infectious disease; Promotion and implementation of traffic calming measures for roads serving both the local communities and the airport.
RETROSPECTIVE (CAP)

1. THE CAP REGIME FOR FRUIT AND VEGETABLES

AUTHOR
Suzi Leather, Swedish National Institute for Public Health

POLICY
European Union’s common Agricultural policy for fruit and vegetables. Covers all fruit and vegetables grown in the EU except potatoes, bananas, wine grapes, and beans and peas for animal fodder.

METHOD
Retrospective HIA.

PRIMARY AIM OF POLICY (EU objectives)
Original objectives of CAP included:
1. Increasing agricultural production
2. Insuring a fair standard of living for agricultural communities
3. Stabilise markets,
4. Assure availability of supplies
5. Ensuring that supplies reach consumers at reasonable prices

SPECIFIC MECHANISMS BY WHICH POLICY WAS IMPLEMENTED
Guaranteed minimum prices for agricultural products within EU. CAP mechanisms are: intervention; export refunds and minimum import prices and tariffs; quality requirements.

POPULATION TARGETED BY POLICY
Population of European Union

STATED EFFECT OF CAP POLICY ON FRUIT & VEGETABLES
Raise prices to consumers, restrict supplies of certain qualities and reduce access to third world imports. Greatest impact on low income consumers. Considerable quantities of fruit and vegetables are bought up and destroyed.

PROJECT EVALUATION (to determine if aims of project are achieved)
Not stated

PUBLIC HEALTH COMPONENT OF original POLICY OBJECTIVE
No

METHODS USED FOR HIA
Not stated.

SOURCE OF INFORMATION
Includes WHO reports (link between consumption of vegetables and fruit and development of cancers ), CEC, European Commission, Court of Auditors, Swedish Action Plan on Nutrition. Other refs given. No details of strategy used to determine information needs.
OBJECTIVES OF SWEDISH PUBLIC HEALTH DEPARTMENT
The consumption of fibres in food should increase to 25-30 grams per capita through increased intake of fibre rich foods such as fruit, vegetables, potatoes, root vegetables and cereals..(Swedish National Plan for Nutrition, 1995)

PUBLIC HEALTH CONCERNS
Fruit and vegetables play protective role in development of cancer at many sites. High intake plant food is associated with a reduced risk of several chronic diseases especially coronary artery disease, certain cancers, hypertension and diabetes. References given.

PROFILE OF POPULATION ABOUT WHICH CONCERNS ARE EXPRESSED
Consumption of fruit and vegetables is comparatively low in Sweden.

ANY ACTION ON HEALTH CONCERNS RAISED, BY WHOM,
‘Consistent criticism of regime, not least, by the Court of Auditors’

RECOMMENDATIONS
Improve access and availability of fruit and vegetables to low income households.
Direct efforts at increasing consumption of fruit and vegetables among younger age groups.

Improved marketing of fruit and vegetables.
form EU rules on the marketing of fruit and vegetables to give greater choice to consumers.
End subsidised withdrawal of fruit and vegetables.
Consider implementing price incentives to encourage increased consumption of fruit and vegetables perhaps through a subsidised fruits scheme in schools.

CONCLUSION (AUTHORS)
Fruit and vegetables need to be given more prominence in agricultural support strategies but not at the expense of consumers and public health as at present. Better targeted support for growers in the poorer Mediterranean areas could be given through direct income aid
2. THE CAP REGIME FOR DAIRY PRODUCTS

AUTHOR

POLICY
CAP regime for dairy products. Impact of the following were assessed: milk subsidies and yellow fats.

PRIMARY AIM OF POLICY (EU OBJECTIVES)
Original objectives of CAP included:
1. Increasing agricultural production
2. Insuring a fair standard of living for agricultural communities
3. Stabilise markets,
4. Assure availability of supplies
5. Ensuring that supplies reach consumers at reasonable prices

SPECIFIC MECHANISMS BY WHICH POLICY WAS IMPLEMENTED
Price support provided for milk, milk powder, butter and some cheeses by the following mechanisms: taxing imports, subsidising exports (mainly for butter and milk powder); intervention buying and storage of surplus. Quotas used to regulate milk produced.

Subsidies provided to schools, daycare centres, and other organisations to promote sale of milk with high fat content with more subsidy being given for whole milk than skimmed milk.

CAP applies a variable and highly protective import levy system on butter.

POPULATION TARGETED BY POLICY
Milk subsidies: Children attending day care centres and schools in Sweden.
Yellow fats: population of EU

METHODS USED FOR HIA
Not stated.

SOURCE OF INFORMATION
No details of strategy used to determine information needs.

STATED EFFECT OF CAP ON DAIRY PRODUCTS
Effect of milk subsidies in Sweden assessed using the following information: Amounts of subsidised milk and milk products purchased since Sweden joined EU. No prior records available for comparison. Survey conducted of day care centres and schools to assess impact of subsidies on purchasing. Response rate approx 30%. Trends in milk consumption reported from 1993/94 and 1994/95. Concluded was a trend to change from skimmed to semi-skimmed milk before subsidies and that this trend had continued as a result of subsidies.

Yellow fats: consider that prices kept high by CAP leads to reduced consumption but that if the price of butter falls, this would lead to increased consumption and increased heart risk for population. Based on the following information: price of yellow fats over time and
after entry to EU and in relation to market. References given supporting effect of factors on consumption.

PUBLIC HEALTH COMPONENT OF POLICY OBJECTIVE (YES/ NO)
No.

OBJECTIVES OF PUBLIC HEALTH DEPARTMENTS
To encourage people to choose low fat alternatives. Recommend that consumption of total fat shall decrease to 30% of total energy intake from present 36-37% and that the percentage of food energy derived from saturated fat shall decrease to 10% from the present 16%. through decreased consumption of fats from spreads and cooking fat, fatty meats, pastries and dairy products (Nordic Dietary Recommendations, 1993)

PUBLIC HEALTH CONCERNS
Mounting evidence for the role of nutrition in some of the most prevalent diseases in Europe today. Consumption of fat need to be reduced to 30% of the energy intake, through decreased consumption of fat from spreads, cooking fats and dairy products. Report recommends that children from aged 1 to 3 get into the habit of consuming semi-skimmed and thereafter skimmed milk. References given.

ANY ACTION ON HEALTH CONCERNS RAISED, BY WHOM,
Written questions to the EU Commission expressing concern 1994.

RECOMMENDATIONS
A more forceful co-ordinated approach is required to challenge current action programme to promote milk consumption from a public health perspective.

CONCLUSION (AUTHORS)
The EU has so far given more weight to agricultural interests than to nutritional need.
3. THE HEALTH IMPACT OF THE CAP TOBACCO REGIME

AUTHOR

POLICY
CAP tobacco regime

PRIMARY AIM OF POLICY (EU OBJECTIVES)
Original objectives of CAP included:
1. Increasing agricultural production
2. Insuring a fair standard of living for agricultural communities
3. Stabilise markets,
4. Assure availability of supplies
5. Ensuring that supplies reach consumers at reasonable prices

SPECIFIC MECHANISMS BY WHICH POLICY WAS IMPLEMENTED
To encourage farmers to grow commercially valued varieties of tobacco
Expand tobacco production to disadvantaged farming areas, maintain a reasonable income for farmers.

Norm prices, premiums, export refunds, intervention prices and maximum guaranteed quantities.

METHODS USED FOR HIA
Not stated.

SOURCE OF INFORMATION
Refs given. No details of strategy used to determine information needs.

STATED EFFECT OF CAP TOBACCO POLICY
Concludes that CAP tobacco subsidies have failed in key goals, resulting in over production, continued imports, and the wastage of huge sums of money providing employment for farmers.

Tobacco subsidies considered to have minimal effect on tobacco consumption though the impact on health is ‘considerable and important’. Dumping of cheap high tar tobacco onto markets of neighbouring poorer countries.

Information given on: Increasing cost of subsidies over time. Production over time. Exporting of ‘unwanted’ tobacco by country and countries importing such tobacco. Economic efficiency of tobacco subsidies.

PUBLIC HEALTH COMPONENT OF POLICY OBJECTIVE (YES/NO)
No

BASIS FOR PUBLIC HEALTH CONCERNS
Smoking causes three main types of disease: coronary heart disease, lung cancer, and chronic obstructive airways disease. Passive smoking can cause low birth weight, acute respiratory illness in early childhood, chronic cough, phlegm, wheeze and reduced lung
function in children, reduced lung function in adults, increased symptoms in asthmatics, and lung cancer.

Quantitative estimate of premature deaths per specified population and trends in smoking worldwide quoted.

SWEDISH PUBLIC HEALTH POLICY
Reduce death and disease caused by tobacco by reducing tobacco use as much as possible and as quickly as possible.

ANY ACTION ON HEALTH CONCERNS RAISED
None stated.

RECOMMENDATIONS
Tobacco subsidies are in conflict with EU health policy and should be abolished.

CONCLUSION (AUTHOR’S)
Health professionals should work more closely with tobacco farmers to promote tax increases and allocate revenue funds to support diversification.
4. THE HEALTH IMPACT OF THE CAP ALCOHOL REGIME

AUTHOR

POLICY/ PROGRAMME/ PROJECT
CAP on alcohol

PRIMARY AIM OF POLICY (EU objectives)
Original objectives of CAP included:
1. Increasing agricultural production
2. Insuring a fair standard of living for agricultural communities
3. Stabilise markets,
4. Assure availability of supplies
5. Ensuring that supplies reach consumers at reasonable prices

SPECIFIC MECHANISMS BY WHICH POLICY WAS IMPLEMENTED
Ensuring common prices; temporary withdrawals form the market; withdrawals from the market through aid to distillation; production control measures; aid for the use of grape must; market promotion and export refunds, import duties and licences for third world trade.

METHODS USED FOR HIA
Not stated.

SOURCE OF INFORMATION
Refs given. No details of strategy used to determine information needs.

STATED EFFECTS OF CAP ALCOHOL POLICY
New alcohol policy in Sweden since country joined the EU: leading to increased alcohol imports by travellers; pressures to reduce price; predicted increase in per capita consumption; increased availability of beer among young people; increasing consumption and problems among women.

New drinking patterns have emerged: regular drinking with meals added to traditional weekend binge drinking.

Concludes that the aid schemes do not constitute a risk of increased consumption of wine.

Information given on expenditure on wine regime and consumption

PUBLIC HEALTH COMPONENT OF POLICY OBJECTIVE (YES/ NO)
No.

PUBLIC HEALTH OBJECTIVES
To limit the average consumption of alcohol, reduce harmful drinking patterns especially binge drinking. To reduce recruitment of new heavy consumers or abusers. (National Plan of Action, Sweden, 1995)
PUBLIC HEALTH CONCERNS
Alcohol related damage to health include harm related to the effects of alcohol on behaviour and the direct toxic effects on different tissues and mental processes. Mentions current debate on moderate drinking.

PROFILE OF POPULATION ABOUT WHICH CONCERNS ARE EXPRESSED
Against a background of increasing wine consumption in Sweden.

ANY ACTION ON HEALTH CONCERNS RAISED
Not stated.

CONCLUSION (AUTHORS)
Present regulation of in market by the CAP does not constitute an immediate threat to increased consumption there is a clear latent threat.

Any measures which would lower the price of alcohol or actively promote consumption needs to be opposed on public health grounds.
RETROSPECTIVE (OTHER THAN CAP)
Baldassare M. The effects of a modern rapid-transit system on nearby residents.
Aim: to describe how a social impact assessment can help determine the effects of a transportation system on nearby residents.

AUTHOR
Baldassare M. Sociology department and Centre for Social Sciences, Columbia University, New York.

PROJECT
Bay Area Rapid Transit (BART). Railway system to provide mass public transport. Began service in 1972. Track length 71 miles. Included 34 stations. An approximately equal proportion of the track is below ground, at ground level and elevated. About 130,000 one way trips per day were taken at the time of the study. Train service was along 4 routes on weekdays from 6 am to mid-night, with train frequency varying from 6 mins to 20 mins. Commuters journey from home by car or bus and may have to take a bus from their station stop to their destination.

PRIMARY AIM OF PROJECT
To provide a mass transit system within low-density urban environment in San Francisco.

METHODS OF HIA
Retrospective HIA

POPULATION TARGETED BY POLICY
Serves population of approximately 2.4 million.

PUBLIC HEALTH COMPONENT OF ORIGINAL PROJECT
Not stated.

OBJECTIVES OF ORGANISATION CARRYING OUT IMPACT ASSESSMENT.
To identify BART’s effects on the residential environment as judged by individuals exposed to them.

To compare resident’s evaluations with technical assessments.

To specify the BART attributes that influence resident’s perceptions of impacts as well as the role of social, personal and environmental attributes.

To derive implications for future rapid-transit planning, design, construction and operation.

METHODS
Home interviews with 702 residents at 10 sites during the summer of 1976. Sites included ones along track ways and adjacent to BART stations. The sample was stratified by distance from the line. Overall response rate was 70%.

Free-response items and specific questions were included. The following topics were addressed: general attitudes towards BART; specific impacts of BART; residential mobility; and the total neighbourhood environment.
The attitudes were analysed to determine whether the following mediating factors influenced residents' reports: Bart attributes (trackway configuration; train frequency; parking facilities; and linear parks); Environmental differences (distance from BART; background activity; and housing orientation); and Demographic differences and personal attitudes (age, sex, length of residence, income, race, home ownership, hours away from home, use of BART, type of dwelling; orientation to BART, powerlessness, noise sensitivity, environmental concern and BART expectations).

CATEGORIES OF IMPACTS CONSIDERED
General attitudes towards BART: overall satisfaction; local effects; opinion changes over time; and speak out against BART.

Residential mobility: prefer moving; prefer moving in owing to BART; and prefer moving out owing to BART; Specific impacts of BART: noise; vibrations; traffic and parking; barrier to local movement; privacy; visual obtrusiveness; bright lights and shadows; crime; and land use.

Total neighbourhood environment: overall rating of area; best and worst things about the area; and effects of BART's presence on the area.

INFORMATION RECORDED FOR PROFILE
Characteristics of conditions within the 10 selected included the following: income bracket; type and quality of housing; commuter population; capacity of station car parks; educational level; racial mix; marital status; BART users; age; and years of residence.

SOURCES OF BASELINE DATA
Survey undertaken by authors.

RESULTS
General attitude: generally low levels of unhappiness with the BART system and its overall effects on the residential environment.

Residential mobility: differences were observed between sites in perceived migration into and out of the neighbourhood.

The following specific BART impacts were perceived: train noise and vibration, and, to a lesser extent dissatisfaction with shadows, vibrations and loss of privacy at aerial sites; traffic congestion and parking problems at station sites; and barriers to movements at the all-grade sites.

Mediating factors.
BART attributes: BART attributes do have an influence on residents' perceptions especially for parking facilities and trackway configuration.

Demographic differences and personal attitudes: Physical and design factors played a major role in perceptions of impact while demographics and attitudes had inconsistent and small effects.

Total neighbourhood environment: BART was not a major factor in evaluating neighbourhood quality or recent changes in the locality.

RECOMMENDATIONS
Regions considering mass-transit systems should consider the size of the commuter population and must vigorously attempt to recruit regular users.
A follow-up study in perhaps 10 years would determine whether the general and specific attitude found had changed in the interim.

CONCLUSION (AUTHORS)
Nearby residents were generally indifferent or favourable toward BART. Certain physical and design features may mediate specific impacts of a rapid transit system. The only demographic variable with considerable explanatory value was use of BART. The results may not apply to all other planned systems. The study area were predominantly low-density and suburban with low ambient noise and non-BART traffic congestion. There are many questions about the stability and applicability of the findings that require additional research.

Aim: to summarise two evaluations providing information on the performance and socio-economic impacts of the Bhima irrigation project.

AUTHOR
Biswas AK. 1988

PROJECT
Bhima Command Area Development in Maharastra province, India. Consists of storage dam and net irrigable area of 126,000 ha. Inundation required of 29,000 ha.

SETTING
Maharastra province is one of the most industrialised and urbanised provinces. Growth largely confined to two principal cities. Agricultural growth low. Problems with regional income distributions and rural-urban migration. Water is main constraint for further agricultural development. Better use of agricultural land requires a reliable water supply.

PRIMARY AIM OF POLICY
Irrigation to improve provincial economy and welfare.

METHODS OF EVALUATION
First evaluation in 1983 when 10,000 ha under winter irrigation. Second evaluation in 1986 when 17,600 ha under winter irrigation and only 5,008 ha receiving year round irrigation.

No reliable monitoring and evaluation system. Questionnaire surveys of selected individuals from different villages undertaken. Interviewees represented large, medium and small farms and landless labourers. Special emphasis on determining the changing role of women.

MEASURES REPORTED.
The impact of the project on the following categories are discussed: income; employment generation; livestock; energy use; education; transportation; water supply; sanitation; housing; food and nutrition; health; women; public participation and environmental impacts.

The following measures of these aspects are mentioned:

Income: average net income for farmers with year-round irrigation and for winter only irrigation; proportion of farmers above poverty line.

Employment generation: project related construction employment; work patterns of large and small farmers.

Livestock holding: numbers of draft, and milk animals and bullock carts purchased.

Energy use: changing patterns of use of cooking fuel.

Education: number and type of schools and quality of teaching (number of teachers, their experience, educational materials etc).

Housing and sanitation: number of new houses constructed and houses renovated. Changes in sanitation practices.

Food and nutrition: variety and amount of vegetables consumed by household. Numbers of livestock.

Health: number of primary health centres. Changes in health hazards such as flies and other disease vectors.

Women: work loads, attitudes to education, finance, wages, dowries, firewood collection and land levelling.

RESULTS FROM EVALUATION
Average net income has increased for farmers with year-round water and to a lesser extent for those receiving winter irrigation. 35% of families have crossed the poverty barrier. Provision of jobs in project-related construction. Labour scarcity during the harvest. Changes in work patterns of large and small farmers. Migration of people seeking work into the area.

Increase in livestock holdings. Lack of suitable veterinary services in nearly all villages. Transportation is a continuing problem. Problem with lack of farm roads resulting in a lack of cattle-crossings on the channels this results in cattle damaging the channels and thus increased operation and maintenance costs and seepage losses. Access to markets will be difficult. Decreased use of firewood and increased use of animal dung for cooking. More hand pumps being purchased but are problem with maintenance of hand pumps. Not much change in sanitation practices during the post-project period. Problems with increased health hazards from presence of flies and other disease vectors. Problems with illiterate farmers not being aware of potential dangers.

Increased variety of vegetables being consumed. Increased number of primary health centres. Women working increased number of hours per day. General feeling that daughters should be educated.

Relocation programme inadequate. 57,000 people required relocation.

Not possible to comment of enrolments or drop-outs at educational establishments. Lack of data on health and environmental impact.

RECOMMENDATIONS
Urgent need for health education to give information on how to protect water stored for drinking and on family planning.

Steps to control aquatic weeds to reduce potential problems with health from disease vectors; decreasing water quality and increasing water requirements.

Suggestions for monitoring include: meteorological observation to assess impact on microclimate;

observation of water table to assess development of waterlogging and salinity.

CONCLUSION (AUTHORS)
Three important planning problem exist: absence of an adequate drainage system, lack of village and farm roads and incomplete resettlement of people. It is important to identify these type of problems in the early stages of a project so appropriate action may be
taken to resolve them. An effective monitoring programme is required to give feedback on positive and negative impacts and to maximise the benefits from the project.
Cole DC, Eyles J. Combining qualitative and quantitative approaches to assessing impacts of environments on human health and well-being in local community studies. Toxicology and Industrial Health 1997; Vol 13, No2/3: 259-265.

Aim
To describe how qualitative investigations of environmental impacts on human health and well-being in local communities are being carried out.

Facilities assessed
The following three solid waste facilities in Canada facilities were studied: an incinerator operating for more than 20 years in an urban industrial setting; a municipal landfill site operating for approximately 10 years in a low density rural setting; a newly approved landfill in an agricultural area.

Qualitative methods
Telephone survey administered to random samples of people living in four distance zones around each of the three study sites. Questionnaires consisted of the following five sections: attitudes towards the neighbourhood; social networks; health measures; combination of closed and open-ended items to determine residents levels of awareness, knowledge, concern and action regarding the site or more general environmental problems.; standard sociodemographic variables to check on representativeness of the sample and to use as potential mediators in an investigation of psychosocial effect.

Qualitative component consisted of depth interviews; discussion groups and focus groups with residents, and interviews with key informants. In depth interviews were found to be the most informative. In depth interviews (N = 13 from each site) were conducted, coded and analysed.

It was felt that the qualitative stage confirmed the survey findings and enriched them with specific links between environment and health and provided information on residents perceptions of authorities responsible for the facilities.

The authors consider that the increasing emphasis on a broader definition of health and the need to include community concerns support the use of qualitative methods but that few agencies have personnel with the skills or time for rigorous qualitative work.
Derban LKA. Health impacts of the Volta Dam.. Perspectives on Environmental Impact assessment. 1984 p121 -132 . Published by D Reidel Publishing Company. Article discusses the problems encountered in the implementation of a resettlement policy and the action taken.

AUTHOR
Derban LKA. Chief Medical Officer, Votla River Authority.

OBJECTIVES OF ORGANISATION CARRYING OUT IMPACT ASSESSMENT. To discuss the problems encountered in the implementation of a resettlement policy and the action taken

PROJECT
Volta River Authority was authorised to plan, organise and implement a resettlement programme which was required to accommodate the Volta Dam, Ghana. The aim of the Dam was to generate electric power for industrial expansions in Ghana especially to assist in the establishment of an aluminium industry. Construction of the Dam began in 1961 and resulted in formation of the new Volga Lake. This changed the physical, biological and socio-economic environment of some 80,000 people living in 739 villages displaced from the flooded area.

PRIMARY AIM OF PROGRAMME
The main objectives of the resettlement programme were:
1. To provide dwelling, work and recreation places for the settlers.
2. To offer the settlers the opportunity for productive work
3. To improve the physical appearance of their surrounding landscape
4. To help the settlers develop a community spirit.

SPECIFIC MECHANISMS BY WHICH POLICY WAS IMPLEMENTED
The resettlement programme involved the construction of 52 new villages containing houses, schools, markets, water systems, pipes, new roads and the establishment of new farmlands.

POPULATION TARGETED BY PROGRAMME
80,000 people living in 739 villages displaced from the flooded area.

METHODS OF HIA
Retrospective HIA.

PROBLEMS ENCOUNTERED IN IMPLEMENTATION OF PROGRAMME
Socio-economic problems:
1. Took a long time to develop reasonable efficiency in fishing and farming: needed to supply food. The accountable organisation was not fully equipped to handle the administration.
2. Lack of integration of the roles of traditional and statutory authorities affected social cohesion and order.
3. Lack of community life and slow improvement in physical and economic environment led to drift from settlements of able-bodied people.
4. Difficulties were encountered with the acquisition of land.
5. Unauthorised new fishing villages were established.

Sanitation and health problems:
Communal latrines that were provided broke down due to lack of proper use and maintenance and pipe water systems fuelled by diesel ceased to work due to
breakdowns and lack of fuel. This led to favourable conditions for a potential increase in water-borne diseases. More favourable results were obtained by introducing hand pumps, deep pit latrines and an intensive health education programme.

Mental health: psychological trauma of removal to strange environment led to settlers requiring much encouragement and support.

Specific diseases:
1. Urinary schistosomiasis (snail borne). Great increase in prevalence. Need for long term education programme, and effective sanitary measures and adequate water supply, bathing and washing facilities.
2. Onchocerciasis (carried by small black biting fly). Breeds in fast flowing streams. Drastic reduction in prevalence after lake creation. Area now part of comprehensive WHO onchocerciasis eradication programme.
3. Trypanosomiasis (carried by tsetse fly). Prevalence has been low. Currently monitoring development of new breeding foci and clinical cases.

RESULTS
It was realised there was a need for a comprehensive study to assess the full potential of the scheme and the extent of problems to be solved.

RECOMMENDATIONS
Volta Dam research project formed with the aim of assessing the full potential of the scheme and the extent of problems to be solved. Phase 1 (1968-1971) strengthened research in fisheries and hydro biology, public health and the resettlement of displaced people. Activities in three sectors: fisheries and hydro biology, public health, and social agricultural and economics.

ANY ACTION TAKEN
Volta Dam research project included activities in three sectors: fisheries and hydro biology, public health, and social agricultural and economics.

The public health component involved the establishment of baseline epidemiological data on water borne diseases and the drawing up of control programmes.

Results of the research project have made it possible for recommendations to be made for exploiting the benefits from the formation of the new lake and finding solutions to some of the problems encountered.

CONCLUSION (AUTHORS)
Lessons learnt:
1. The importance of assessing, at the feasibility stage, the environmental social and health impact at the same time as the engineering, economic and socio-political assessment.
2. Sufficient time must be allowed for a detailed outline programme and for ensuring adequate consultations with and proper care of the people to be affected.
3. Resettlement lands and social requirements must take the same priority as the dam construction.
4. Sufficient finance must be provided for social planning and implementation.
5. The importance of an inter-disciplinary approach to water resource development and management.

Aim: to discuss the problems in the design and conduct of the community impact assessment conducted after Concorde operations were initiated at Dullas International Airport.

Details of original study are as reported in this article.

PROGRAMME:
Concorde operations at Dullas International Airport. Almost all operations were between 9 am and 5 pm with no more than 3 arrivals and / or departures per day. Only departures yield a substantial increase in aircraft noise compared to subsonic planes.

METHODS
Two major components:
1. Physical noise and vibration monitoring program.
2. An assessment of community reaction to Concorde operations. Focused on three areas: monitoring of spontaneous noise-related complaints; media content analysis which monitored the quantity and quality of Concorde information available to the public; and an attitudinal survey.

Study design: three waves of surveys were conducted:
1. Telephone interviews conducted immediately prior to initial Concorde operations.
2. Interviews of different sample 7 months after operations started.
3. Interviews with different sample 12 months after operations started.
Sampling plan divided respondents into four equal size noise impact groups: high, moderate, and light impact and currently unimpacted. 550 respondents selected within each impact group.

PRIMARY AIM OF PROJECT
Not stated.

PUBLIC HEALTH COMPONENT OF ORIGINAL POLICY OBJECTIVE
Not stated.

RECOMMENDATIONS
Major findings of the original study were: very little change in cumulative noise in areas already exposed to aircraft noise; greater number of complaints due to Concorde than from other aircraft (3.7 complaints for Concorde for every complaint about conventional aircraft); no discernable change in annoyance due to aircraft noise in most communities; in the more highly exposed areas approval of Concorde increased marginally;

RECOMMENDATIONS AND MITIGATION
Made by Secretary of Transportation.
Concordes allowed to operate provided current noise levels do not increase. Concordes not to operate at supersonic speeds over the US; no operations between the hours of 10pm and 7 am; airports to retain option to limit/ ban operations through reasonable non-discriminatory noise rules; any second generation Concordes required to meet noise standards at least as stringent as the standard for subsonic aircraft.
CONCLUSION (AUTHORS)
The methods used to conduct the Dullas study are such as to preclude the unambiguous assertion of casual linkages and clear interpretation of the results.

PROBLEMS WITH METHODOLOGY DISCUSSED
Design problems fall into 3 categories

1. Administration: Potential concerns include lack of specification of criteria for selection of interviewers; limited training of interviewers; inexperience of interviewers; different completion rates from first to other two surveys.

2. Sampling: Concerns were expressed about the representativeness of the sample selected; and the equivalence between groups for the purpose of comparison and/or causal inference.

Sample selected: Investigators failed to make explicit the population to be targeted and to sample that population. It was not clear whether the aim was to sample those maximally exposed to Concorde or to gain information on reactions of the whole community. A significant number of surveys were conducted at night and/or weekends. Sex ratio of respondents was female: male = 2:1. Respondents were selected from those listed in telephone directories thus excluding 15% to 18% of households. Only the head of the household or their spouse were interviewed.

Equivalence: samples consisted of different respondents at separate points in time. Response rates were: 845 for first; and 735 in the others. Communities in the non-high impact regions suffered a disproportionate loss of subjects in later surveys. Changes in sample sizes may lead to a decrease in precision of the estimates. The interaction of history and selection may have resulted in the selection of different types of respondents at baseline and post-test surveys.


Reliability: It is not clear whether the lack of substantial change in attitude was due to Concorde having little impact or whether the instrument utilised were incapable of detecting it. Statistically significant change may differ from socially significant change. Validity: The authors question the capacity of the items used in the questionnaire to completely represent the construct of interest.

REVISED DESIGN PROPOSED
Administration
Interview data to be collected over a short time period e.g. 7 -10 days.
Number of interviewers selected to take account of the time frame for data collection and length of interview.

Interviewers should have experience, be rigorously trained, and subject to adequate supervision and quality checks. Interviewers to be randomly allocated to respondents.

Telephone interviews to be retained though it is recognised that this may lead to under representation of low-income and minority groups. Suggested methods of dealing with the problem of unlisted subscribers are to take random sample of all listed residential numbers and: truncate last three digits and replace them with random numbers; or add a constant to each selected number.
Sampling
Stratification: to improve upon the representativeness of the sample must decide which populations are the most important to examine. Relevant questions may require the analysis of certain sub-populations in which case proportionally stratified random sampling is appropriate. Stratification may have to be considered at various levels such as regional (e.g. amount of exposure to aircraft noise prior to operations and proximity to flight patterns), community (time of day when are most likely to be affected, and sex).
Sample design: The use of panel studies in which the same sample is repeatedly sampled may lead to bias from repeated measurement (contamination) and it maybe difficult and expensive to repeatedly locate the same sample. The use of independent samples may result in increased sample variance over time and introduce the possibility of non-equivalence across time. Alternative strategy is to sample a portion (suggests 1/3) repeatedly and a portion independently sampled.

Study design
Suggest the use of a cross-sectional interrupted time series with switching replication (refs and details given). This design is categorised by a series of observations across equal time intervals with data collected before and after an intervention with the use of more than one respondent group. Suggests that communities selected as controls should be those most likely to next receive intervention. Effect is considered replicated if similar patterns of change are found across communities. This will enhance generalisability of the results.

Measurement
Use of some of the indicators used in the Heathrow study may help address the reliability and validity of the instruments used.

An accurate assessment of whether respondents had indeed heard Concorde would aid reliability.

Develop relevant but unobtrusive measures to follow reactions over time such as recording the number of complaints, admissions to hospitals or clinics with noise-related disorders.

Enhance casual inferences by including measures that are expected to be influenced in the same manner (e.g. other environmental noise) and compilation of more fine-grained demographic information.

Aim: to examine the combined effects of a severe economic decline since 1989 and a tightening of the US embargo in 1992 on health and health care in Cuba.

AUTHOR
Garfield R, Santana S. Columbia. University School of Nursing, New York, NY and International Human Rights Committee of the APHA; Division of Epidemiology and Data services, Maricopa County Department of Public Health Arizona.

POLICY

PRIMARY AIM OF POLICY
Direct impact upon aid, trade and domestic economic activity.

SPECIFIC MECHANISMS BY WHICH POLICY WAS IMPLEMENTED
All US subsidiary trade including trade in food and medicine has been prohibited since 1992. Ships from other countries not allowed to dock at US ports for 6 months after visiting Cuba.

POPULATION TARGETED BY POLICY
Cuban population.

PUBLIC HEALTH COMPONENT OF ORIGINAL POLICY OBJECTIVE
Not stated.

OBJECTIVES OF ORGANISATION CARRYING OUT IMPACT ASSESSMENT.
to examine the combined effects of a severe economic decline since 1989 and a tightening of the US embargo in 1992 on health and health care in Cuba.

MEASURES USED TO ASSESS HEALTH IMPACT
Newborns weighing under 2500 g; Weight and weight gain of pregnant women; rates of anaemia in pregnant women and infants; incidence of optic neuropathy; mortality from diarrhoeal disease, TB, infections and parasitic diseases, influenza and pneumonia, unintentional poisonings, motor-vehicle and bicycle related. Mortality in specific populations: aged 65 and over, infants and maternal.

Proportion of population with the following: domestic water connections, access to potable water; covered by chlorinated water system. Per capita funding of health services, number of hospital beds, physician per population ratio, laboratory investigations and ambulances in working order.

SOURCE OF INFORMATION ON IMPACT
Data from surveillance systems for nutrition, reportable diseases and hospital diagnosis. Cuba reported to provide high-quality data from a health system with universal access.

RESULTS
The embargo has raised the cost of medical supplies and food.

Changes include declining nutritional health, rising rates of infectious diseases and violent deaths and deteriorating public health infrastructure. Cuba has acted to minimise the impact of the embargo and the economic crisis on vulnerable groups such that
mortality levels for children and women remains low. Much of the health impact had fallen upon adult men and the elderly.

CONCLUSION (AUTHORS)
Rationing, universal access to primary health services, a highly educated population and preferential access to scarce goods for women and children help protect most Cubans from what might have been a health disaster.

PROPOSED DATA EXTRACTION FORMAT FOR RHIA (CAP)

AUTHOR
Wolff SP, Gillham CJ.

POLICY/ PROGRAMME/ PROJECT
British urban transport policy

PRIMARY AIM OF POLICY
? To reduce road traffic accidents (RTA)

SPECIFIC MECHANISMS BY WHICH POLICY WAS IMPLEMENTED
Improve road safety using the following methods: vehicle engineering changes to make vehicles more 'crash worthy'; introduction of seat belts and drink-driving laws; speed restrictions; road engineering measures focusing on the identification of characteristics of roads that make roads 'safe' or less 'safe'. Child road safety campaigns. Public policies regarding land use; car taxation and public transport policy (includes policy on land use, car taxation, public transport subsidy, company car subsidy, building increased road capacity in urban areas).

METHODS
Retrospective HIA

POPULATION TARGETED BY POLICY
Population of UK

STATED EFFECT OF POLICY
Air pollution
Disruption caused by road-building
Restricted personal freedom
Social isolation and community severance
Separation from health-protective amenities (nutrition, health-care)
Decreased exercise and restricted play area
Stress, danger, noise and anxiety.
Road traffic accidents.

PUBLIC HEALTH COMPONENT OF ORIGINAL POLICY OBJECTIVE
To reduce road traffic accidents.

OBJECTIVES OF EVALUATORS OF POLICY
To protect and improve public health.

PUBLIC HEALTH CONCERNS
Exacerbation of social and health inequalities due to current policy
Air pollution; Disruption caused by road-building; Restricted personal freedom; Social isolation and community severance; Separation from health-protective amenities (nutrition, health-care); Decreased exercise and restricted play area; Stress, danger, noise and anxiety; Road traffic accidents.
PROFILE OF POPULATION ABOUT WHICH CONCERNS ARE EXPRESSED
Those without access to a car (quoted as 38% of all UK households). Those in lower social class. Children. Elderly. Economically disadvantaged communities may be less vociferous and influential and thus less adept at objecting to planning proposals.

ANY ACTION ON HEALTH CONCERNS RAISED, BY WHOM,
Not stated.

RECOMMENDATIONS & CONCLUSION (AUTHORS)
The current focus of the Transport Policy on accident reduction as the sole means of avoiding adverse effects of transport distracts attention from the wide health erosive effects of road traffic. Universally accessible public transport facilities will have to be developed, walking and bicycling encouraged and the use of the private car, particularly in urban areas, discouraged. Universal mobility and accessibility independent of the car is required for public health protection and advancement.
EXCLUDED STUDIES


Aim: to undertake a risk assessment of inhalation exposure to predicted air emissions from a Regional Pollution Control Facility in Illinois

AUTHOR
Hallenbeck WH. University of Illinois at Chicago School of Public Health, Division of Environmental and Occupational Health Sciences, Chicago, Illinois, USA.

PROJECT
Waste-to energy combustor located about three miles from Chicago. Facility designed to operate continuously for 40-45 years, process 1600 tons of municipal solid waste per day and produce over 50 megawatts of electricity. All of the operating fuel to be refuse derived. Designed to recover 25% of waste in form of specified recyclable materials.

CATEGORIES OF IMPACTS CONSIDERED
Maximum theoretical cancer risk due to emissions of 23 chemicals and chemical classes.

METHODS
Maximum ground level concentrations computed using a computer model. IEPA permit limits used to determine maximum ground level concentrations for specified particulates. Maximum ground level concentrations for specified pollutants based on worst case emission factors derived from operating facilities similar to one under consideration. Maximum average ground concentrations used to evaluate long term exposure and potential for generating cancer. Inhalation cancer risk factors from USEPA. Maximum annual average ground level air concentrations used to estimate maximum theoretical cancer risks due to lifetime (70 years) inhalation exposure. Maximum short-term ground level concentrations used to evaluate potential for immediate and delayed health effects due to non-carcinogen.

Concentration compared to the following standards and guidelines: USEPA; National Ambient Air Quality Standards; National Emission Standards for Hazardous Air Pollutants; Threshold Limit Values.

Maximum short-term ground level concentration of lead compared to the ambient air quality standard. Long-term inhalation exposure of children evaluated using predicted maximum annual average ground level concentration of airborne lead.

METHODS USED TO PRIORITISE IMPACTS
Not stated.

RECOMMENDATIONS/ MITIGATION
Not stated.

METHODS OF VALIDATION
Not stated.

MONITORING
Not stated.
CONCLUSION
Based on standard air emission modelling techniques and risk assessment of the inhalation route, no immediate or delayed health effects of any type including cancer, will be generated by the facility over the expected 45 years of operation.

Aim: to present the findings of a HIA in order to increase awareness of its use and to facilitate a discussion regarding various methodologies.

AUTHOR
Konradsen F, Chimbari M, Furu P, Birley MH, Christensen NØ. Authors from the following organisations: Danish Bilharziasis Laboratory, International Irrigation Management Institute, Blair Research Laboratory, Liverpool School of Tropical Medicine.

PROGRAMME:
Small scale irrigation and dam development project, the Mupfure Irrigation Project in northern Zimbabwe.

SCREENING
Screened for possible health hazard and their implications. Initial HIA based on readily available information such as project documents, reference handbooks, general country information, national statistics year-books, maps and information regarding health hazards typically associated with the type of project. Proceeded with full HIA.

Scoping determined the following: which health concerns, health hazards and health opportunities should be assessed; timing and boundaries of HIA; and sources of expertise required.

INTENDED OUTCOMES OF PROJECT
To improve the living standard of the rural community through irrigation development and by increasing production of cash crops and to a lesser extent food crops.

METHODS

4 person Steering committee with representatives from relevant local authorities was established to facilitate information gathering and promote local ownership of the results.

CATEGORIES OF IMPACTS CONSIDERED
Specific potential health hazards were tabulated against the following three variables: environmental factors that could affect potential for specific health hazards; vulnerable communities, their susceptibilities and behaviour and demographic changes resulting from the project; and capabilities of health protection agencies to detect, monitor, inform, safeguard and mitigate risk. The health risk was categorised as increasing, or reducing with mention made of any periods of the project, and an estimate of the altered risk.

Potential health hazards considered were as follows: schistosomiasis; malaria; agrochemical poisoning; sexually transmitted diseases; malnutrition; skin and eye diseases; and enteric diseases such as diarrhoea and typhoid.

SOURCES OF INFORMATION ON IMPACTS
Existing project documents, scientific papers, government and donor statistics; interviewing key informants at central, provincial, district and village levels. Visits made to project site.

INFORMATION RECORDED ON HEALTH IMPACTS
Malaria: importance of disease in the area, type of malaria most prevalent; surveys of vector; effect of project on numbers of breeding vectors; number of villagers in highly
vulnerable areas post-project; lack of current vector control, disease reporting and distance from project area to health care; expense of personal protection against malaria.

Agrochemical poisoning: use of chemicals post-project; population vulnerable to health risks; problems of unsafe storage and contamination; capacity of local health services to deal with this risk; lack of data collection.

Sexually transmitted disease: potential effect of migrant workers during construction phase; limited ability of local health services to monitor or manage estimated increase in STD, or to carry out health prevention.

Water-washed diseases: prevalence in area; vulnerability of children; effect of project on water supply; problems of safety of drinking water.

Malnutrition: estimated increases in food production and dependence of effects upon these estimates; groups vulnerable due to loss of land; decrease in production during construction phase.

No figures given for estimates specified above.

INFORMATION RECORDED FOR PROFILE
Description of area affected. Including number of villages, population and ethnicity.

METHODS USED TO PRIORITISE IMPACTS
Safeguards and mitigation were based upon findings of HIA and follow-up discussions with specialists from government departments, universities, private consulting firms and NGO.

High priority given to interventions with a positive impact on the general health status and less emphasis on specific disease interventions.

RECOMMENDATIONS/ MITIGATION
Mitigation measures are the responsibility of the implementing agency.

18 items specified with estimated cost, agency responsible for implementation and details of health hazard impacted upon.

Free draining hydraulic structures; de-weeding and de-silting of irrigation structures; NSP bypass structure and spillway; training of farmers in water management; pipelining of conveyance canal; foot bridges; reducing eutrophication of the Gooro Dam; promotion of water supply and sanitary facilities; survey to improve design of health protection interventions; storeroom for agrochemicals; protective clothing for canal maintenance workers; support to community based health education during five years of project implementation; improved drug supply to local health centre during a 10-year period; levelling of borrow pits following construction of the Goora Dam; measures to reduce the number of STDs during dam construction; one additional EHT stationed in the project area; one microscopist and one microscope; improved intersectoral co-operation during project implementation.

VALIDATION OF IMPACT ASSESSMENT
Not stated.

METHODS OF VALIDATION
Not stated.
MONITORING
Not stated.

COMMENTS FROM AUTHORS
This study shows that: adequate data are available for a sound HIA; integration of HIA into project feasibility studies is prudent; complexity and methodological problems exist but a systematic evaluation of health impacts yields valuable results; and cost-benefit analysis should be used to prioritise mitigation measures.

Aim: to examine the limits of epidemiology and some aspects of environmental risk assessment process in assessing environmental health risk.

AUTHOR
Rissel CE, School of Community Health, University of Sydney.

PROGRAMME:
Third runway at Sydney’s Kingsford- Smith Airport, Sydney, Australia (KSA).
Expansion of existing airport facilities at KSA including the addition of a third runway.
EIA conducted by Kinhill Engineers

SCREENING
Draft Environmental Impact Statement (EIS) included discussion of aircraft noise. EIS employed consultants over a two month period to assess the health effects of the third runway.

INTENDED OUTCOMES OF PROJECT
Increase in tourism and associated revenue.

METHODS
Consultants were employed to assess the health effects of the proposed third runway. Used an ecological study design where local government areas surrounding KSA were ranked according to the degree to which these geographical areas were affected by noise. Mortality and hospital morbidity rates from a variety of causes for each government area were examined. Tests of statistical association were conducted to test for significant differences in the ranking of mortality and hospital morbidity rates between areas exposed to aircraft noise and those areas not exposed. No statistically significant differences were reported.

CATEGORIES OF IMPACTS CONSIDERED
The health impacts were limited to an investigation of hospital mortality and morbidity rates according to noise levels.

SOURCES OF INFORMATION ON IMPACTS
Concerns about adverse health effects were based principally on the experience of overseas airports such as Heathrow, Los Angeles and New York.

PRIORITY AREAS
Aircraft noise

METHODS USED TO PRIORITISE HEALTH IMPACTS
Not stated

RECOMMENDATIONS/ MITIGATION
Some discussion of mitigating factors was included in the report. Not included in this article.

VALIDATION OF IMPACT ASSESSMENT
Not stated.
METHODS OF VALIDATION
Not stated.

MONITORING
Rissel considers that ANEF contours should be re-calibrated.

COMMENTS FROM AUTHORS
Rissel discussed the limitations of this EIA under the following headings:
1. Heterogeneous nature of the population
2. Small size of population affected
3. Poor definition of actual population exposures
4. Health outcomes of interest may have long latency periods, have not been routinely recorded prior to investigation, and instruments used to measure health outcomes are generally insensitive
5. Publicity may affect reporting bias.

Other concerns were as follows: the unresolved issue of setting safety standards; uncertainty of statistical and methodological methods involved in assessments of health impact; and the political nature of environmental assessments for development planning. Only one designated section of the EIS discussed the health effect of aircraft noise and this focused on morbidity and mortality. The effect of aircraft noise on other factors was scattered in other sections.

Relating the above to the proposed third runway.
1. Heterogeneous nature of the population
Population affected shown to be disadvantaged and this could act as a confounder of the association between environmental hazard and health.

Other factors to be considered include: heterogeneity with respect to the type, level, duration and timing of exposure; inward and outward migration in study area; geographical mobility within study area. The ecological design of the study did not take these factors into account.

Heterogeneity also exists between different sub-groups with some being more sensitive to noise than others. Noise may have a greater impact upon children, shift workers, the aged and hospital and nursing home patients.

2. Small size of population affected
There are problems in defining the population affected. The EIS assumed no change in the population characteristics of the area; no increase in population; and that people newly exposed to aircraft noise will respond in the same way as people originally surveyed.

Rissel considers that the links between morbidity and mortality and aircraft noise are extremely tenuous and questions the appropriateness of indicators such as mortality and morbidity where causal links with hazards are unclear. The difference between statistical significance and social or clinical significance must also be considered. Aircraft noise is not the only environmental hazard to which affected residents will be exposed. Other hazards include increased air pollution and serious air crash.

3. Poor definition of actual population exposures
Noise was measured using the Australian Noise exposure Forecasts (ANEF) system. At best, rough estimates of noise exposure result from the use of this system. Rissel considers reliance on statistical significance when the measurement of exposure to noise
is so weak difficult to substantiate. He also questions the precision of the boundary definition used in the EIS.

3. Health outcomes of interest may have long latency periods, have not been routinely recorded prior to investigation, and instruments used to measure health outcomes are generally insensitive.

Morbidity and mortality are often used in epidemiology since they are easily defined and data are routinely collected often used. However, mortality and morbidity may not have been the most appropriate or sensitive indicators of exposure to environmental hazard exposure. More sensitive measures of outcome are required. Suggested alternatives include: psychiatric admissions, use of sedatives and minor tranquillisers, use of alcohol or other drugs, and visits to local pharmacists or GPs. Collection of such data is costly and time consuming. Time and cost constraints may prohibit the use of alternative outcomes.

Measurement should also be considered the cumulative effect of several hazards. It may be difficult to quantify the impact of an additional hazard.

5. Publicity may affect reporting bias. Community involvement means that it is not possible to conduct epidemiological studies with affected populations who have not been exposed to some information about the issues being investigated.

Environmental Impact Statements. ‘Decisions about exposure standards or safety levels and their relationship to health require a complex balance of scientific, ethical, political and economic considerations’. Rissel considers that imprecise science and political factors determined the acceptable risk levels for the third runway at KSA. The sensory (qualitative) and the quantitative approach are contrasted. Rissel considers that the quantitative approach based on standards dominates environmental assessments with the qualitative approach being dismissed. However the standards approach has limitations and there is a need to review standards.

In this EIS, further consideration should be given to re-calibration of the ANEF contours to take account of new settlement, population growth, actual noise levels and other factors.

Rissel considers that the emphasis for developments to be considered safe unless shown scientifically to be otherwise should be abandoned in favour of the view that developments are dangerous until proven safe.

Rissel concludes ‘that the image of EIA being based on pure objective science is not justified given the problems of measurement and epidemiology in detecting health risks and the inherently political nature of setting environmental safety standards’. He favours a greater focus on the views of people affected with an emphasis on potential developments being considered dangerous until proven safe. Considers that protection of the environment, health promotion and sustainable development should be the outcome of the environmental impact assessment process.

Aim: to provide a quantitative assessment from a Canadian perspective of the costs and benefits of recent international policy initiatives to protect the stratospheric ozone layer.

AUTHOR

POLICY
The Montreal Protocol established a schedule for reducing the consumption of the ozone-depleting substances CFCs and halons in a series of staged reductions.

SETTING/ BACKGROUND
In Canada CFCs are used in the production of foamed plastic for insulation products and furniture foam and as a coolant in refrigeration and air conditioning systems. Halons are used in portable fire extinguishers. The various fluorocarbons and halons have differential impacts upon the ozone layer. Each substance has been assigned a number on an ozone depletion potential index (ODP).

The ozone layer is an international open access resource and no single country acting unilaterally has a significant incentive to incur the costs associated with emission reduction resulting in a potential free rider effect. The Montreal protocol attempts to deal with the free rider potential through trade penalties against non-participants.

INTENDED OUTCOMES OF POLICY
To reduce the consumption of the ozone-depleting substances CFCs and halons

CATEGORIES OF IMPACTS CONSIDERED
The most important are considered to be fatal and non-fatal melanoma and non-melanoma skin cancers and cataracts. Other impacts are not considered.

SOURCES OF INFORMATION ON IMPACTS
US Environmental Protection Agency.

METHODS: MODELLING HEALTH IMPACT
The major Canadian health impacts in terms of numbers with fatal and non-fatal melanoma and non-melanoma skin cancers and cataracts were estimated on a health effects model developed in the US for the Environmental Protection Agency. Projections were made for the Canadian population to 2031 with extrapolations to 2075. Since skin cancer rates are dependent upon skin colour, estimates were based on the European origin stated in the 1981 census. Annual health impacts for Canada were generated through an equation linking incidence rates and greater exposure to ultraviolet radiation due to ozone depletion. Health impacts model likely to provide an underestimate in the no controls case due to simplifying assumptions such as skin cancer being restricted to the ‘white’ population only. Impacts used to calculate present discounted value of Protocol to year 2075. Costs of Canadian compliance estimated using input demand curves consisting of the likely response of CFC and halon users to the higher prices associated with the quantity restrictions. Industry responses to higher CFC prices include: switch to other products; vary quantity of CFC per unit of output by recycling; and switch to alternative chemicals.
The cost model is subject to uncertainty which include the effect of increases in CFC prices beyond pat price changes and the development of new chemicals or processes. Sensitivity analysis performed by varying the social discount rate and the firm investment expenditures.

RESULTS
Health benefits summarised. Present discounted rate to year 2075 estimated at $3.2 billion with approximately 90% attributable to CFC reductions. Costs included medical costs and foregone income but did not include compensation. The results are quite sensitive to the discount rate and relatively insensitive to the value of life.

IMPLEMENTATION OF PROTOCOL
Allocation of rights to the restricted quantities of CFCs in Canada will be by allocating rights to producers.

CONCLUSIONS
The market orientated approach to reducing consumption of ozone-depleting substances increases the likelihood that reductions will be undertaken when control costs are lowest.

INFORMATION RECORDED FOR PROFILE

SOURCES OF BASELINE DATA
Statistics Canada.

PRIORITY AREAS
As categories of impact considered.

METHODS USED TO PRIORITISE IMPACTS
Based on information from US Environmental Protection Agency.

RECOMMENDATIONS/ MITIGATION
N/A

VALIDATION OF IMPACT ASSESSMENT
N/A

METHODS OF VALIDATION PROPOSED
Not stated

MONITORING
Not stated.

Aim: to estimate likely public health benefits of current and future global-climate-change mitigation policies in the first two decades of the 21st century in developed and developing countries.

AUTHOR
Working Group on Public Health and Fossil-Fuel Combustion

PROGRAMME
The UN Framework Convention on Climate Change established the objectives of stabilisation atmospheric greenhouse-gas concentrations at levels that would avoid dangerous anthropogenic interferences with the global-climate system.

SETTING
Developed and developing countries.

SCREENING
N/A

INTENDED OUTCOMES OF POLICY
Avoidance of dangerous anthropogenic interferences with the global-climate system.

METHODS USED TO EVALUATE POLICY
Estimate of the likely public health benefits of two possible CO₂ emission scenarios: business as usual which updates IPCCs 1992 analysis of expected trends in energy consumption and associated CO₂ emissions; and a hypothetical climate policy scenario which assumes that developed countries make efforts to reduce energy related CO₂ emissions 15% below 1990 levels by 2010 and developing countries reduce their emissions 10% below their levels of emissions forecast for 2010.

Emissions of particulate matter (particles less than 10mm and fine particles of less than 2.5 mm) are taken as representative of general ambient air pollution. Estimated number of annual and cumulative numbers of avoidable deaths are based on projected concentrations of particulate matter (PM). Scenarios required complex modelling of energy-use trends, estimated emissions of carbon, projected levels of PM and associated impacts on mortality. Details of methods used are given.

CATEGORIES OF HEALTH IMPACTS CONSIDERED
Particles less than 10mm and fine particles of less than 2.5 mm.

SOURCES OF INFORMATION ON IMPACTS
Studies from several countries that have associated PM with cardiovascular and respiratory mortality. Results from animal studies.

RESULTS
By the end of 2010 the policy could avoid 700,000 deaths annually (95%CI: 385,000; 1,034,000) The implementation of the policy could prevent up to 8 million deaths worldwide up to the year 2020.
LIMITATIONS REPORTED BY AUTHORS
Scenarios required the use of complex models and many assumptions which are detailed in the article. Mortality impacts were only calculated for adults over 30 years of age and for infants between 1 month and 1 year.

The estimates are a first approximation of the likely order of magnitude of the effect and do not represent precise predictions of avoidable mortalities.

The most critical set of assumptions is that present levels of PM are causing the adverse effects on mortality of the magnitude reported by Pope and colleagues; and that fine particles are the direct cause of these effects.

Many uncertainties are mentioned as being associated with the use of prospective studies for estimation of mortality effects from PM exposures worldwide.

PROJECT EVALUATED
Industrial waste dump in a city of 6,000 inhabitants in France. Opened in 1979 and received 400,000 tones of waste including waste water treatment sludge, dehydrated hydroxide sludge, and various materials with an important component of solvents. Facility situated within 100m of the nearest houses. Community concerns increased and led to mandated closure of site in 1988. Site subsequently covered with a few centimetres of fine clay.

METHODS USED FOR EVALUATION OF HAZARD
Two air pollution studies carried out 6 - 15 months after landfill site was closed (None had been carried out during plant operation). Mass spectrometry / chromatography used to monitor volatile organic compounds (VOC) in dumped material, site ambient air and town centre.

METHODS USED TO EVALUATE HEALTH IMPACT
Two epidemiological studies were launched in 1990 with the mandate to evaluate the short-term health risks associated with air-pollutants released from the site. To assess possible long term health impact, a cancer registry was opened.

Case -control design used. Practices of 7 physicians used for case and control ascertainment. Cases were defined as patients with ailments that were liable to be caused by the landfill emissions. Control patients consulted for reasons not related to landfill. The list of case and control conditions was based on toxicological profiles of the compounds that had been measured in the air 1989 and on a review of studies dealing with waste sites. Cases included isolated biological abnormalities, respiratory diseases, cutaneous diseases, eye diseases, ENT conditions, psychological disorders, miscellaneous conditions. Control conditions included: vascular diseases, dermatology (acne), hepato-gastroenterology, gynaecology, infectious diseases, rheumatology and trauma. Conditions for cases and controls are specified within the categories given above. Potential confounders such as age, sex, professions, occupational exposure, smoking habits, alcohol consumption, date of moving to present address were also recorded. Inclusion criteria for subjects are stated. Exposure was estimated from time-activity patterns of the subjects (details of methods used are stated). The case and control patients were compared as to their exposure to VOCs emitted. Incident and prevalent cases were analysed separately.

RESULTS
300 volatile organic compounds (VOC) were identified. Rain could increase flows. Toxicity over the damped materials, site ambient air and town centre ranged from toxic to very toxic according to Microtox criteria.

Data on 481 cases and 335 control were collected. Individual exposures were classified into three categories. The proportion of total prevalent cases is significantly greater among the most exposed category and follows an increasing trend (P = 0.004). Incident cases follow a similar trend (P = 0.03). Adjusted odds ratios for prevalent cases : significant trend for psychological disorders (P for trend 0.02); irritative respiratory complaints (P for trend 0.013). None of the associations is significant for incident ailments. This may be due to power limitations.
The figures do not suggest an important effect of residual exposure on the incidence of new medical conditions.

LIMITATION OF STUDY DISCUSSED BY THE AUTHORS
Selection bias: the physicians' knowledge of the place of residence of the patients could have influenced the categorisation as case or control; consultation with a certain condition could be related to the fears people have of dump emissions; misclassification of health end points is possible since many of the conditions used to select the study population were not specific.

Routes of exposure other than air pollution (such as soil, ground, surface water contamination) were disregarded (drinking water obtained from distant source; landfill considered to be adequately enclosed; fish no longer present in locally contaminated ponds).

Psychological symptoms may be related to the fear of living in proximity to the landfill site. ‘Behavioural sensibilisation ‘following acute exposure to an irritant can trigger symptoms even after very low exposure.

The possibility of some level of exposure misclassification is likely.

CONCLUSION
About 2 years after the landfill site was closed, some residual short-term health effects might still be present. The fact that many disparate populations throughout the world have experienced similar consequences of exposure to hazardous waste sites lends credibility to the biological plausibility.

RECOMMENDATIONS
Thorough remedial action should be taken by the local authorities.

An example of monitoring of health outcomes as a condition of implementing a project.

AUTHOR
Goren AI, Hellman S, Glaser ED. Institute for Environmental Research, Ministry of the Environment, School of Medicine, Association of Towns for Environmental Protection. Israel

PROJECT
First coal-fired power plant in Israel. Permit was issued with the condition that a comprehensive network to monitor its effects on the environment, health and agriculture must be installed and operated around the plant.

METHODS
Retrospective HIA. Four type of epidemiological monitoring program were included: mortality analysis; monitoring of requests for out-patient services; studies of pulmonary symptoms and lung function in school children; and panel studies of adults, both with and without chronic obstructive pulmonary disease.

Baseline data was recorded for one year before the plant was in operation and for the following ten years up to the end of 1991.

This report focuses on requests for out-patient services.

MONITORING OF HAZARD
12 fully automatic monitoring stations measured the following: SO\textsubscript{2}, NO\textsubscript{X}, O\textsubscript{3}, CO, total hydrocarbons, and meteorological parameters (such as temperature, barometric pressure, humidity, and precipitation).

Number of air pollution ‘events’ in which the half hourly concentrations of SO\textsubscript{2} and NO\textsubscript{X} exceeded an arbitrary level were recorded. Threshold values are stated. The sources responsible for these ‘events’ were identified according to the wind direction measured at the time of the event.

MONITORING OF HEALTH OUTCOMES
Requests for health services in 8 Sick Fund clinics whose distribution represented a gradient of expected low, medium and high pollution according to the Environmental Impact Statement. The Sick Fund clinics treated patients insured under the ‘General Sick Fund’ (80% of people in the area were insured under this fund). All visits and diagnosis were recorded separately for visits to paediatricians and general physicians and for visits for respiratory tract complaints. Data concerning flu epidemics (with diagnosis of flu being based on symptoms) was collected. About 30,000 patients were followed up. 70,000 people live within 10km radius of power plant.

RESULTS
A substantial decline in the total number of visits occurred between 1988 and 1990. For children a moderate decline in the number of visits especially the number of respiratory tract complaints occurred between 1982 and 1984.

Among adults a seasonal trend of most frequent use of outpatient clinics due to respiratory tract complaints was observed between December and March. The major
explanatory variable for use of out-patient clinics among both children and adult was ambient temperatures with a higher number of visits being associated with a lower temperature. The most frequent additional factor was a flu epidemic. No effect was found for SO$_2$ levels on use of out-patient clinics apparently due to the extremely low SO$_2$ levels even in the regions expected to be most polluted. The number of ‘events’ of SO$_2$ peaked during the summer months whereas visits due to respiratory complaints peaked during the winter months.

During the study period the ambient air pollution levels did not exceed the Israeli air quality standard.

A peak of ‘events’ of high NO$_2$ was noted during the summer months. This was accounted for by radiative heat from the ground, combined with an on-shore breeze, causing a strong convective layer extending to a height of several hundred metres. When plumes from the high stacks entered the convective layer, fumigation occurred and pollution was brought down to ground level.

LIMITATIONS OF STUDY
The authors were unable to distinguish between acute and planned visits and could not identify multiple visits of the same patients. They acknowledge that the trend in moderate decline in the use of ‘General Sick Fund’ medical services may have been due to more frequent private consultations.

CONCLUSION
Air pollution levels measured around the coal-fired power plant were low and did not seem to cause adverse health effects.

COMMENT
Baseline data was recorded and monitoring continued for the following ten years. During this time a moderate decline in out-patient attendances was noted. No reasons are offered for the observed decline in attendances over the monitoring period.

One vulnerable group (children) was considered separately.

It is not clear how the Israeli standards for air pollution were determined. The authors acknowledge that private out-patient consultations were omitted from the model. Monitoring was limited to respiratory illness in patients.

Positive effects resulting from the power plant (such as employment and improved economic position of workers) are not considered.

It was interesting to note the reasons for the peaks of episodes of high NO$_2$ levels in the summer. This highlights the need for projects to be assessed on an individual basis taking account of local factors.

It may be helpful to compare the distribution and level of pollutants found during the monitoring process with predictions to improve future forecasts of pollution patterns.
Appendix 3 Excluded studies

Outcomes limited to disease (various specified diseases).

Outcomes limited to disease (request for health service).

Outcomes limited to disease (tumours due to benzene).

Hallenbeck WH. University of Illinois at Chicago School of Public Health, Division of Environmental and Occupational Health Sciences, Chicago, Illinois, USA.
Outcomes limited to disease (cancer risks).

Outcomes limited to disease (diarrhoea).

Outcomes limited to disease (morbidity and hospital mortality).

Outcomes limited to disease (fatal and non-fatal melanoma).

Outcomes limited to disease (mortality).
References


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