Spatial Susceptibility: a Scoping and Screening Tool for Health Impact Assessment

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I. Abstract

It is recognised that formal methods for evaluating the effects of development, for example Environmental Impact Assessment (EIA), whether at policy or project level, have often neglected the potential effects of development upon human health. It is now understood that Health Impact Assessment (HIA) is a necessary component of planning and decision-making.

This research addresses the primary stage of HIA, and offers a model so that decision-makers can take health into account when dealing with development change and supports the integration of HIA into regulatory assessments. It comprises a tested and externally evaluated screening model, that is supported by a spatial susceptibility mapping process that, in this case, uses easily accessible UK National Statistics. Such mapping helps to demonstrate that some communities and groups of people are more vulnerable than others to the differential effects of development, and that the distribution of health impacts throughout a community can be just as important as the magnitude of effect. By targeting the primary stage of HIA, and providing a means to consistently yet rapidly screen potential health outcomes, this research has provided a platform to standardise HIA, without foreclosing opportunities for greater refinement to suit particular circumstances.

During this thesis the screening model and spatial susceptibility model were tested both academically and professionally. The findings of which were presented and reviewed by the World Health Organisation (WHO), the UK Health Development Agency (HDA) and the Department of Health in 2003. Furthermore, the conceptual model developed during this thesis has since been applied by two international environmental consultancies on a diverse range of projects including regional and national waste strategies, airport expansions, urban extension and regional regeneration projects that must meet legal, planning and public scrutiny.

Table of contents

II. List of tables

III. List of Figures

IV. Acknowledgements

The author wishes to thank the following individuals, without whom this work would not have been possible. I would first like to thank my internal supervisors at the University of Brighton (UoB) including: Denise Hill, Dr. David Leach, Dr Ian Wright, Dr Ronan Foley, Dr Darren Smith and Professor Andrew Church for their encouragement, knowledge and above all patience. External support has also proved vital including local, national and international agencies, organisations and individuals. In the UK, special thanks are owed to Lorraine Taylor, Rob Quigley and all those people at the Health Development Agency for giving me the opportunity to meet leading UK HIA experts, inviting me to post my research on their renowned HIA web resource and their constant belief in the value of my work.

I owe a debt to the Caribbean Environmental Health Institute for helping to refine the focus of my work at its outset, giving me the opportunity to become more familiar with the core concepts of Environmental Health Impact Assessment with Pierre Gosselin and Roy Kwiatkowski from the Pan American Health Organisation and Health Canada, all in the perfect setting of Castries St Lucia. I must also thank Nannerl Herriott, Gabriel Gulis, Glyn Pritchard, Carolyn Dunn, Jacinthe David, Kamuran Sadar and all those who helped test my research through external peer review. They offered constructive advice and made suggestions and recommendations to improve the thesis and further our understanding of HIA.

A debt of gratitude is also owed to Roger Barrowcliffe from Environmental Resources Management (ERM) for supporting the practical application of this thesis and establishing the first internal HIA capability in an international environmental consultancy.

v. Declaration

I declare that the research contained in this thesis, unless otherwise formally indicated within the text, is the original work of the author. The thesis has not been previously submitted to this or any other university for a degree, and does not incorporate any material submitted for a degree.

Andrew Buroni

6th February 2010

VI. Dedication

This Work is dedicated to:

My parents, Stella and Luigi, whose love, endless support and persistent moaning have made it all possible.

Alla memoria di mio nonno che mi definirebbe come l'idiota piu' educato che lui abbia (mai) conosciuto nella sua vita.

VII. Glossary

Acronym	Name
BAT	Best Available Technique
BATNEEC	Best Available Technique Not Entailing Excessive Cost
BMA	British Medical Association
BMJ	British Medical Journal
CEHI	Caribbean Environmental Health Institute
CEPA	Canadian Environmental Protection Act
CSR	Corporate Social Responsibility
DETR	Department of the Environment, Transport and Regions
DOH	Department of Health
EIA	Environmental Impact Assessment
EC	European Communities
EEHC	European Environmental Health Committee
EHIA	Environmental Health Impact Assessment
ES	Environmental Statement
EPA	Environmental Protection Act
EPI	Environmental Performance Indicators
EqIA	Equalities Impact Assessment
EU	European Union
GIS	Geographical Information Sciences
HC	Health Canada
HDA	Health Development Agency (UK)
HHRA	Human Health Risk Assessment
HIA	Health Impact Assessment
HMSO	Her Majesty's Stationery Office
HSC	Health and Safety Commission
HSE	Health and Safety Executive
IA	Integrated Assessment
IAIA	International Association for Impact Assessment
IMD	Indices of Multiple Deprivation
IMPACT	International Health Impact Assessment Consortium
IPPC	Integrated Pollution Prevention and Control
LA	Local Authority
LAAPC	Local Authority Air Pollution Control

Acronym	Name
LCA	Life Cycle Analysis
NHS	National Health Service
NIMBY	Not in My Back Yard
NOx	Nitrogen Oxides
OHN	Our Healthier Nation
ONS	Office for National Statistics
PAHO	Pan-American Health Organisation
PHO	Public Health Observatories
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SoS	Secretary of State
TIA	Traffic Impact Assessment
ToR	Terms of Reference
WHO	World Health Organisation

CHAPTER ONE

1.0 Introduction

Health and its improvement are a priority of governments. A healthy population will arguably result in lower medical expenses and treatments, but will also increase the productivity and efficiency of communities (Secretary of State for Health 1999) while improving the quality of life and contributing to the elusive nature of wellbeing (RCEP 2007).

It is now recognised that the improvement of the health of a population is not solely the responsibility of its health services, but is also associated with preventative measures that include more health conscious development projects, policies and programmes involving Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) (Population Health Resource Branch 1994).

However, assessment approaches originally developed to address environmental outcomes fail to fully address or communicate potential negative health impacts to communities, the significance of their distribution, subsequent inequality and rarely identify ways in which to maximise health improvement opportunities (BMA 1998). To clarify, technical assessment of environmental pathways with the opportunity to influence health, such as air quality and noise, are assessed to thresholds set to protect the environment for health. However, this is not the same as investigating what the potential health outcome will be, how it will be distributed throughout a community or if there are sensitive groups that may be subject to differential adverse impacts. Equally, the current regulatory assessment structure for new developments does not seek to improve the uptake of health benefits, or identify wider initiatives that may support more effective or more rapid health improvement opportunities.

Following increasing involvement from Primary Care Trusts (PCT) as statutory consultees to specific regulatory assessments (EIA, SEA, Environmental Permitting), such inadequacies have become more apparent; the requirement for a standalone assessment field to address health outcomes and aid decision makers has become a growing priority, and in certain circumstance a formal planning requirement (Casstles (2007). During the course of this thesis Health Impact Assessment (HIA) has rapidly evolved and is now supported by a plethora of articles, journals, government initiatives and training (Barnes 1998, Ison 2000) to which this thesis and its outputs have contributed (Buroni 2004). Though, as with any developing field, HIA has faced a number of embryonic difficulties which this thesis aims to examine.

This chapter provides a background to the thesis, introducing the recognised shortcomings of HIA, the key research areas to investigate and the aims and objectives of this thesis. It also details the scope and purpose of the following literature review.

However, in addition to establishing the justification and focus of research during this thesis, such information has also proved invaluable in demonstrating current shortcomings in HIA and ways of developing a more joined up approach to planning, the environment and health. Certain sections of this chapter have therefore, also been used to raise HIA awareness amongst planners, EIA specialists, Councils and PCTs and has been further applied as the preliminary stage in training new HIA consultants at two international consultancies, Environmental Resources Management (ERM) and RPS Group. Such information has also been applied as part of a Public Health Masters Module at the Brighton and Sussex Joint Medical School and the Environmental Impact Assessment Masters at the University of Brighton.

1.1 Background

Through the initial review of the available literature presented in Chapter 2, it is clear that the early development of HIA has followed similar issues faced during the initial evolution of EIA, and to some extent, that are still affecting EIA. Yet, the more recent development of HIA is experiencing something quite different, to EIA. There are already established fields of health and health protection and promotion through PCTs, Strategic Health Authorities (SHA), Public Health Observatories (PHO) and the National Health Service (NHS). In addition, planners and EIA specialists all maintain they perform some degree of health assessment by assessing threshold limits to prevent significant environmental and health risk to communities. However, as this thesis will argue, the early development of international HIA models and guidance has been typified not only by incompatibilities in regards to process, methods and tools, but also in existing approaches, founding principles, terminology and desired outputs.

This thesis also shows that such inconsistencies are further compounded due to the lack of legal requirement to conduct HIA, and the absence of a regulatory body to ensure the quality of both HIA consultants, reports and their recommendations. Although the benefit of HIA to decision-makers and organisations responsible for the health and wellbeing of communities is clear and has created a commercial market for the practice (Buroni 2004), Chapter 2 indicates it is nonetheless the case that many of the issues facing HIA identified by the British Medical Association in 1998 (BMA 1998) remain unresolved in 2009.

As this thesis argues, there is still:

- No common definition of health or health assessment: a number of definitions can be applied, to suit the relative objectives of a HIA or the community it is targeting, there are therefore different opinions and expectations of what HIA is and can deliver.

- No single clear generic HIA process: due to the multidisciplinary nature of HIA, a number of processes have been developed from varying fields with inconsistent terminology, focus, content and practice.

- No agreed base methodology: HIA methods vary, are inconsistently applied, are not mainstreamed; are often not underpinned by adequate research, are sometimes used without proper expertise and the outcomes are not monitored so as to provide essential feedback.

- An absence of agreed health indicators: evaluation of health impacts draws upon agreed indicators or health determinants, these remain inconsistently applied, and may carry varying weighting or significance.

- No secure national or statutory requirement to perform HIA: HIA is currently motivated by guidance, health targets, best practice and Corporate Social Responsibility (CSR). To date (2009), there is still no single UK legislative requirement. Though, regional obligations such as the Greater London Authority Act, revisions to the Welsh planning requirements, Local Development Frameworks (LDF) and Local Area Agreements (LAA), have resulted in pockets of HIA regulatory requirement.

- No national uniform syllabus or accreditation: though training courses have proliferated in the UK since 1998, these are uncoordinated and largely comprise a two or five day course. The content of such courses varies and is not intended to generate competent HIA consultants, but to act as a first step to gain knowledge in the field. HIA training still very much encourages ‘learning by doing’.

- No secure means to determine when HIA is appropriate: current literature states the purpose, benefit and methods of screening to determine when a HIA is required and what it may entail. However, prior to this research there was no adequate reliable repeatable model to determine when an HIA is required and what it might entail.

With so many issues remaining unresolved, HIA is still performed inconsistently nationally across projects, policies and programmes as Lock (2000) and the WHO (2003) also argued. There is also considerable variance internationally in the relationship/interaction between Environmental Impact Assessment (EIA) and Environmental Health Impact Assessment (EHIA) (Health Canada 2001). This has led to enthusiasm for the development of a single device or at least common material that can help to act as a useful component in preventative health care systems (Lock 2000). As a consequence there is impatience for 'off the shelf process/methods' and the subsequent development of a plethora of tools that are not always reliable, sufficiently tested or conclude with robust outputs (RPS 2008). Such concerns are recognised and during the course of this thesis have been reinforced during consultations by the author with the UK Health Development Agency and Department of Health.

Nevertheless, interest in this field remains weakened through poor understanding of the aims and objectives of HIA, a lack of sound infrastructure and no legal obligation. The result is wariness in the application of HIA, so much so that trailblazers in the UK faced the tenuous balance of performing HIA with a limited evidence base (Cave and Curtis 2001), and the tremendous responsibility associated with the prediction of health outcomes and informing a planning development or policy decision that may present a long term influence upon community health and wellbeing.

Although there are clear potential benefits of HIA in the enhancement of health and well being, contributing towards the realisation of the European health targets of 'health for all' and 'sustainable health' (WHO 1993), and a subsequent reduction in national costs associated with poor health. The development of HIA will not be without cost or resistance.

Similar to the development of EIA, HIA is perceived as another political and planning hurdle for developers (Buroni 2007), it will require significant time to develop expertise and ironically enough, though not currently a legal requirement, can result in significant legal resources and costs as solicitors and legal counsel interrogate the findings of HIA. Though it is not possible to reference all of the transferable knowledge gained by the author during HIA's for major projects, it is becoming increasingly clear from experience that major and contentious HIAs such as for the Kings Cross redevelopment, Crossrail and expansion of Stansted Airport will be put through legal process, as will the HIA practitioners that perform them. As such, the conclusions and recommendations drawn in HIA have to be defensible, or risk being undermined during external peer review or at public inquiry. This point is a particular issue for HIA, and in 2009, something HIA practitioners are only just coming to terms with (RPS 2008). Such concerns mirror those experienced by EIA over 30 years ago, and to an extent still do (Glasson 1995). Though HIA will be tested and on occasion found wanting, such trials by law and peer review are a necessity to ensure the effectiveness, accuracy and value of HIA to the decision making process.

The literature review in Chapter 2 reveals that HIA, though early in its development potentially offers clear benefits in preventing and reducing potential harm to communities, while offering additional opportunities to maximise health improvements (Department of Health 1999). However, inconsistencies in founding principles, approach and data used means HIA cannot be uniformly applied and will differ in content, quality and accuracy (Buroni 2004). Such discrepancies are to be expected in a developing field however, such flexibility is perceived by some as being HIAs key strength (Scott Samuel, Birley and Arden 1998). Such flexibility allows consultants to direct a HIA to key issues, varying health priorities and may even be used to appraise and address the more intangible aspects of health and wellbeing.

In light of the broad concerns raised in the literature review in Chapter 2, it was decided that this thesis should investigate the early stages of the HIA process, namely the screening and scoping stages, so as to secure an effective foundation without sacrificing the flexibility required in latter stages. To clarify, HIA was lacking structure and more importantly, consistency and credibility with developers, planners and decision makers. By focussing this thesis on the development of a practicable means to screen and scope HIA, not only provides an opportunity to develop a consistent and defensible means to establishing when a HIA may or may not be required, but also defines the approach, scope and focus of any following assessment. As such an effective screening and scoping process can lead to more effective objective focussed HIA. Furthermore, it is at this early stage of the HIA process that HIA can be best integrated into parallel regulatory assessments (such as EIA), benefiting from technical assessment outputs and reducing unnecessary repetition of effort and associated costs.

As such, this thesis has targeted the screening and scoping stage as they provide the greatest opportunity to build consistency in HIA, to rationalise the decision for any following HIA (and sometimes more importantly, provide justification for when a HIA is not required), and to seek opportunities to build HIA into planned work streams. In so doing, this thesis has contributed in mainstreaming HIA by establishing objective focussed HIA, reducing the time and cost to developers and decision makers, and providing a more joined up approach to planning, the environment and health. Furthermore, it was understood from the onset of this thesis that in principle, HIA screening and scoping is in effect a rapid HIA exercise and the principles and models developed here can be applied to a more comprehensive HIA (i.e. applied to inform the full HIA process).

1.2 The Aims and Objectives:

The aim of this thesis is to produce, test, evaluate and establish a more consistent and commercial HIA screening and scoping procedure to defining when a full HIA is necessary and to rationalise what it should entail.

The focus upon the initial stages of screening and scoping were not accidental. As the outputs of the model review in Chapter 3 indicate the founding principles set during screening and scoping will define the overall process, focus, methods and outputs of the full HIA. As such, establishing a more consistent approach to screening and scoping has the potential to address the bulk of the key issues currently faced by HIA discussed earlier in this chapter and in more detail during the literature review.

In addition, the combination of screening and scoping was deemed appropriate, as in essence they are closely intertwined and should not be separated. To clarify, when defining if an HIA is necessary during screening, requires an understanding of what the potential health issues are and how a community might respond. This information in part defines if further assessment is necessary but also effectively provides a rationale and scope for any further assessment through a full HIA. By performing screening and scoping in unison therefore not only reduces effort and associated costs, but also provides opportunities to enhance health benefits where a full HIA is not deemed necessary.

The commercial focus of the aim of this thesis was also deemed essential, in that the bulk of HIA guidance is largely academic in nature, and as this thesis shows, in certain circumstance this guidance is not practicable for uniform application throughout the UK and the outputs do not necessarily meet planning or client requirements.

As such, this thesis differs to normal research projects, in that it not only seeks to provide a contribution to advance knowledge of HIA, but specifically aims to apply the outputs of this thesis in a commercial setting to further contribute to knowledge in evolving and mainstreaming HIA best practice in the UK.

The aims of this thesis is achieved through the following objectives:

a) a review of the historical emergence and evolution of HIA;

b) a critical review of national, European and international legal obligations and policy aspirations with respect to health, health promotion, health assessment and health protection;

c) a review of health geography, social science and spatial planning literature;

d) a review and evaluation of current national and international HIA models, methods, guidelines and case studies to establish and inform best practice;

e) the review and testing of national statistics to be applied as potential community health indicators appropriate for profiling relative community susceptibility;

f) the development of a generic HIA screening and scoping model that can be used in parallel or within regulatory assessments such as EIA;

g) the testing of the model in practical circumstances for Brighton & Hove City Council;

h) peer review and external evaluation of the screening and scoping model by leading HIA experts; and

i) application and evaluation of the HIA screening and scoping model on projects in a commercial setting with mainstream environmental and planning consultancies.

The final objective stemmed from the understanding that this thesis, though the work of a single researcher, cannot address all the issues currently faced by HIA. It was therefore hoped that this research would be applied by professional consultancies in real circumstances and projects. This objective was met sooner than anticipated, prior to the end of this thesis, and resulted in the further refinement and supplementation of the model to meet professional consultancy standards and legal rigour. To clarify the role of this final objective, the core stages of the thesis are presented below, as is a summary of the thesis chronology.

1.3 Literature Review, Thesis Premise and Rationale

The primary stage of literature review aided in the identification of research requirements, gaps in current knowledge establishing the consensus on founding principles alongside the benefits and drawbacks of current HIA practice.

Due to the relative development of HIA at the time of initiating this thesis (2000), it was necessary to review not only emerging publications but also available international HIA training courses and to network with leading HIA practitioners. Such an approach provided insight into the HIA process and practice that was not available within the current literature. Furthermore, such consultation paved the way for following stages and ultimately the identification of experts to participate in the peer review and external evaluation of the screening and scoping model.

1.4 Developing the Methodology

The methodology for this thesis emerged through the initial literature review, where it was established that despite clear benefits for HIA, the non-regulatory requirement and a lack of a single agreed approach, process or methods meant HIA development was inconsistent and impaired. Equally it was understood that few HIA models, methods and guidance capitalised on potential integration opportunities with regulatory assessments such as EIA and SEA.

As such, to achieve the thesis objectives, the following key stages of the methodology where deemed appropriate:

- Model review;
- Model development;
- Preliminary testing;
- Peer review and external evaluation; and
- Application and further refinement through actual practice in a commercial consultancy setting.

Each of these key methodological stages are described in more detail below.

1.4.1 Model Review

From the literature review, it was possible to catalogue the available tools, models and guidance supporting HIA and prepare an evaluation framework in keeping with current perceptions and requirements for HIA. The model review, whilst based on a review of existing materials and models, is separate from the literature review as it provides a number of outputs critical to meeting the thesis objectives, including:

- an insight into the circumstance and purpose of the development of key HIA models, tools and guidance, providing valuable transferable knowledge for this thesis;
- a critical appraisal of each of the leading international HIA tools, methods and guidance to assess their viable application during this thesis;
- a review of terminology and context to identify a generic HIA process and potential health indicators to be applied during this thesis;

- the identification of viable methods and tools that could be used and adapted to meet the aims and objectives of this thesis; and

- the identification of potential areas of overlap with conventional forms of assessment in a bid to better integrate HIA into regulatory assessments and the UK Planning Process.

Supplementing the model review, a detailed review of the national statistics available in 2000 that could be applied to support the development of GIS based HIA screening and scoping model was performed (available in appendix 2).

In so doing, the model review provided the means to develop the screening and scoping model and to include common elements, health indicators and other requirements that would provide a platform that would inform any following HIA deemed necessary.

1.4.2 Model Development

Following the literature and model review it was possible to develop a screening and scoping model that combined viable techniques, data and methods to test, present and peer review. A key component of this stage of model development was the investigation into methods to present health indicators spatially. This was deemed necessary as mapping allows a better understanding of how communities will react to developmental changes than information presented in tabular or written formats.

Key stages of the model development included:

- The development of a generic screening and scoping model that drew upon the best practice guidance up until 2003;

- Testing of the generic screening and scoping model on two Brighton & Hove projects to identify potential issues for commercial application;

- External evaluation of the screening and scoping model and Brighton & Hove case study by leading UK and international HIA experts;

- Refinement of the screening and scoping model building from peer review comments and lessons learnt; and

- Final application of the model in a commercial setting.

Each of these stages are explained in more detail in Chapter 4.

1.4.3 Preliminary Testing

Testing of the screening model was performed on two local case studies selected through consultation with Brighton & Hove City Council. It was the intention of the thesis to test the screening and scoping model on real projects to further identify barriers experienced in the field to the development of HIA, but to also provide Brighton & Hove City Council with information that may further aid their decision-making. The preliminary test case was conducted on the Brighton and Hove Greenways green transport policy, of which the results were analysed and subject to internal evaluation by Brighton & Hove Council, resulting in minor refinement of the overall screening and scoping model. The revised screening and scoping model was then subject to a more taxing test case of the proposed Falmer Community Stadium in Brighton & Hove.

1.4.4 Peer Review and External Evaluation

Following testing, the Falmer Community Stadium HIA was chosen for external peer review through presentation at the NHS Health Development Agency, attended by leading HIA practitioners, the Department of Health and commercial consultants. Such evaluation was further supported through a summarised version of the case study and questionnaire being distributed to key health organisations and wider international HIA network groups.

The results and suggestions from both modes of evaluation were compiled and appropriate modifications to the final screening and scoping model implemented. This process provided valuable insight not only into how HIA can be subject to peer review and quality assurance, but also the varying priorities and HIA expectations between planners, academics and health specialists. Furthermore, the findings of this stage were subsequently disseminated into HIA Guidance and published by the Health Development Agency (Taylor and Quigley 2003).

1.4.5 Application and Further Refinement through Actual Practice in a Commercial Consultancy Setting

Following refinement of the final screening and scoping model, it was the intention of the thesis to have commercial consultancies review and where possible apply the screening and scoping model. The initial approach to achieving this was to raise awareness by presenting the screening and scoping modal at appropriate seminars and workshops including:

- the First European Conference on Geographic Information Sciences in Public Health at Sheffield University (2001);
- the Kent, Surrey and Sussex NHS Workforce Development Confederation at the University of Brighton (2002);
- the Health Development Agency ‘HIA Monitoring and Evaluation Workshop’ at the Chartered Management Institute in London (2002);
- the Health Development Agency ‘HIA Informing the Decision Making Process Workshop’ London (2002);

- the South East Public Health Observatory HIA Workshop at Ashburnham Place (2003);

- the Health Development Agency 'HIA Screening Workshop' in London (2003); and

- the National Society for Clean Air, presenting 'IPPC, EIA and HIA, Best Practicable Route Towards Integrated Assessment' (2003).

In addition to generally raising awareness as to the benefits of the screening and scoping model, it was intended to approach key environmental and planning consultancies with the final screening and scoping model and offer a free demonstration on a project of their choosing. However, following the presentation of the screening and scoping model at a National Society for Clean Air seminar in 2003, the author of this thesis was approached by a partner of ERM, and offered the opportunity to personally apply the outputs of this thesis on projects in a commercial setting. Following significant commercial success of the screening and scoping model at ERM, rival consultancies sought to adopt the model, and in 2006, the author was offered the opportunity to further develop and apply the outputs of this thesis at RPS, a more planning focussed environmental consultancy.

Since then, the knowledge and conceptual model generated as part of this thesis has been further tested and refined through the author's involvement as the lead consultant in the following HIAs and planning procedures:

- HIA of the Wales, Durham and Buckinghamshire Waste Strategies;

- HIA of the Brighton & Hove and East Sussex Waste and Minerals Development Framework;

- HIA of the Exeter, Rufford, Runcorn and Dublin Energy from Waste Facilities;

- Health Expert Witness at the Dublin Waste to Energy Facility Oral Hearing;

- Health Expert Witness at the Tipperary bio-diesel and bio-gas facility Oral Hearing;

- HIA Peer review and further assessment of the Birmingham International Airport Runway Extension;

- HIA of increased capacity at London City Airport;

- HIA of expansion at Stansted Airport;

- Health appraisal of the Stansted Airport 2nd runway optioneering study;

- HIA of the 2012 London Olympic Games and their Legacy;

- HIA of the Aire Valley Leeds Regeneration Programme;

- HIA of the London Crossrail Transport Scheme;

- HIA of the proposed London Low Emission Zone;

- HIA of the Edinburgh Airport Transport Link;

- HIA of the Tees Valley Metro;

- Provision of HIA services to the UK Highways Agency;

- Integrated Appraisal of the London Sub Regional Development Frameworks;

- Sustainability Appraisal of the South East Plan; and

- Environmental, Social and Health Impact Assessments (ESHIAs) in Sakhalin, Salym, Kazakhstan, Angola, Ghana, Mauritania and the Arctic.

Chapter 7 presents how the conceptual model was further refined through practice in a commercial setting for over six years to form an approach to planning led and objective focussed HIA in the UK.

1.5 Conclusions and Recommendations of Further Work

The final chapter summarises the entire research project, including problems faced along the way, objectives met and current and future barriers to HIA. This is supported with avenues of research that could be further examined to benefit the further evolution and mainstreaming of HIA.

1.6 Appendices

There are three appendices in total including:

- the model review;
- the tabulation of national statistics available in 2000 that lent themselves as health indicators;
- screening checklists and test case results; and
- external evaluation questionnaire and returns.

1.7 Thesis Chronology

As previously discussed, the normal three year duration of a research thesis was extended in this instance to account for the application and further refinement of thesis outputs through two international environmental consultancies (ERM and RPS Group).

It is, therefore, of value to provide a brief overview on when the key stages of this thesis were performed and the influence this had upon the final project. The thesis started in October 2000, and following the refinement of the focus and core tasks necessary to achieve the aim and objectives, the primary task of literature review was initiated alongside the identification and attendance of appropriate international HIA training courses.

Running parallel to the literature review, the model review (including a review of appropriate national statistics) was completed by 2001, providing information to support the development of the initial screening and scoping model.

In 2002, the supervising team was subject to change which influenced the focus and style of the thesis although the core aim and objectives remained.

In 2002, Brighton and Hove City Council was approached with the opportunity to test the screening and scoping model on available projects, and two test cases were developed. By 2003, leading HIA experts via a mixture of internet questionnaires evaluated the test cases. This was supplemented through presentation of the screening model at the Health Development Agency through a dedicated HIA screening workshop with members of the Department of Health and leading HIA practitioners.

Following the revision of the final screening and scoping model, the first full draft of this thesis was presented to the supervisory team in mid 2003, in preparation for the final stage of application in a commercial setting.

By mid 2003, the author of this thesis was recruited as a consultant at ERM, based at the Cavendish Square office in London. Here, the key outputs of this thesis were firstly applied to develop a HIA training and awareness course for all of the UK offices, and to develop additional HIA capacity in the waste management, planning, transport and oil and gas teams. By training consultants in identifying when and where HIA are necessary or beneficial (i.e. through screening and scoping), supported the development of a successful new market area for ERM, and a catalogue of leading examples of HIA. By 2004, the author was made the ERM HIA practice leader, responsible for identifying and offering HIA services on key international projects, for coordinating full HIA and for further business development throughout the international offices.

Following significant commercial success at ERM, in 2006, the author of this thesis was offered the opportunity to further promote and evolve the outputs of this thesis in a more planning focussed environmental consultancy, supported by a more extensive occupational and public health team (including human health risk assessment, bio-monitoring and mobile health screening capabilities). This allowed adaptation to be made to the screening and scoping model and further assessments and peer review to be completed.

In addition to the appeal of building the principles of HIA into the design stage (i.e. implementing healthy urban design, as opposed to assessing a project following design) and promotion to a senior consultant position, the author was provided the opportunity to work from the RPS Group Brighton office. Such a move further contributed in meeting the original objectives of mainstreaming the outputs of this thesis, while facilitating the completion of this thesis. Throughout this time, further relevant literature and HIA material was assessed and incorporated into the thesis.

Although the extended timeline for this project created challenges, it was also essential to develop and prove the effectiveness of the screening and scoping model, while further contributing in the development of HIA best practice, as well as allowing this thesis to provide new knowledge covering the development and use of HIA in the UK.

This chapter presented the justification behind the aim and objectives of this thesis, outlined the core methods applied and presented the overall timeline for the project. The following chapter constitutes the literature review providing a more in depth discussion upon the thesis premise, rationale and details the key method to the model development, external evaluation and refinement in a commercial setting.

CHAPTER TWO

2.0 Literature Review, Thesis Premise and Rationale

2.1 Introduction

This chapter presents the general practice and theory that support HIA. It includes a review of available research material, criteria that were commonly used in HIA and other prescribed assessments such as EIA and Strategic Environmental Assessment (SEA). The chapter concludes with the founding premise and rationale for this research project, and details the full methodology.

Between 2005 to 2009 literature on HIA grew rapidly, spanning from simple introductory papers, guidelines, proposed methods through to full blown case studies and evaluations. Yet, at the onset of this thesis (2000) the type quantity, quality and relevance of such literature was underdeveloped or poorly accessible. The literature review reflects this issue, and draws upon fields and practices outside of HIA, but which have a basis on health, its determinants and assessment. Such resources included classical epidemiological literature, materials sourced from Health Canada in Environmental Health Impact Assessment (EHIA) and emerging community modelling for public health initiatives.

Though literature relevant to developing a screening and scoping model for England was somewhat scarce, it was possible to supplement the research through materials gathered at numerous workshops, training courses and seminars attended, including:

- Health Impact Assessment training at the University of Liverpool (2000);

- Environmental Health Impact Assessment training with Health Canada and the Pan American Health Institute at the Caribbean Environmental Health Institute in Castries (2000);

- the First European Conference on Geographic Information Sciences in Public Health at Sheffield University (2001);

- the Kent, Surrey and Sussex NHS Workforce Development Confederation at the University of Brighton (2002);

- the Health Development Agency 'HIA Monitoring and Evaluation Workshop' at the Chartered Management Institute in London (2002);

- the Health Development Agency 'HIA Informing the Decision Making Process Workshop' London (2002);

- the South East Public Health Observatory HIA Workshop at Ashburnham Place (2003);

- the Health Development Agency 'HIA Screening Workshop' in London (2003); and

- the National Society for Clean Air presenting 'IPPC, EIA and HIA, Best Practicable Route Towards Integrated Assessment' (2003).

Attending and presenting at such events contributed towards the thesis by gaining conference papers, participant views, concerns and queries that contributed to refining the thesis aim and objectives to the benefit of HIA development.

2.2 The Origins of Health Impact Assessment

The origin of HIA is not clearly understood, in that it seems to embody a form of convergent evolution in that the same requirement to address potential health impacts emerged from different fields over a long period of time. Such fields include studies of changes in perceptions and attitudes towards health from treatment based to preventative based health care by the (Secretary of State for Health 1999), health initiatives from the Department of Health (1998 a-c) and the general development of contemporary risk assessment and epidemiology (Chadwick 1995, Moon et al 2000). However, it remains the case that the process to assess health impacts follows many of the stages and ethos inherent to EIA, yet, in 2009, HIA still does not benefit from a similar regulatory framework or standards to ensure the accuracy, quality, and potentially most importantly, consistency to that of EIA (House of Commons Health Select Committee 2003 and 2009).

The process and standards for EIA were originally established in America through the National Environmental Policy Act (NEPA) in 1969 to assess the impacts of projects on the environment, natural resources and ultimately humans (Glasson 1995). Since then, international development and practice of EIA now provides a refined, comprehensive process and methodology for the assessment of both the physical and socio-economic environment, but does not always include or reflect the best interests of human health (BMA 1998). Glasson (1995) described the breadth of content of contemporary practice in EIA. This is reproduced in Table 1, modified to illustrate issues that are relevant or directly associated with health and its assessment.

Technical Discipline	Issues Addressed	Association to Health
Physical Environment		
Air & Atmosphere	Changes in air quality with a local, regional and potentially global context	Relevant
Water Resources	Changes in water availability, quality and flood risk	Relevant

Soil & Geology	Classification of soil type and sensitivity, risk from environmental changes and contamination	Relevant
Flora & Fauna	Identification of sensitive species, and assessment of potential impact upon the natural environment, habitat and associated species	Relevant
Humans	Assessment of physical health risk	Direct
Landscape	Classification of landscape characteristics and value	Relevant
Cultural Heritage	Characterisation of conservation areas, built heritage and sites of historic and archaeological significance	Relevant
Climate	Characterisation of local climate (i.e. temperature, wind, rainfall etc) and assessment of potential influence or risk from project	Relevant
Energy	Changes in energy requirement and use	Relevant
Socio Economic Environment		
Economic base (direct)	Direct employment (i.e. change in labour market characteristics, trends and uptake)	Direct
Economic base (indirect)	Indirect and induced employment and income	Direct
Demography	Potential impact upon and change of local communities	Direct
Housing	Change in housing stock, quality, availability and affordability	Direct
Local Services	Change in access and accessibility to community resources and social capital	Direct
Socio-cultural	Characterisation of local circumstance, lifestyles, quality of life and socio cultural risk factors	Direct

Table 1 Issues Addressed in Environmental Impact Assessment (Modified from Glasson 1995)

As shown, EIA includes many of the factors that are directly associated with health and its assessment (Sadler 2003), alongside factors or environmental conditions that will contribute to health outcomes such as air, water and land quality. The original intention and key reason for the establishment of EIA was to become an environmental safeguard, ensuring the quality and sustainability of the environment for present and future populations to live in (Glasson 1995).

Though this is the case, EIA was found wanting with respect to the complexities associated with the assessment of health including expertise, time and financial constraints (BMA 1998). Moreover, there is concern that a focus upon health detracts from green issues (Simons 1988) so that the environment is sacrificed in this broader church that includes human health and vice versa. A number of reviews were performed upon Environmental Statements (an ES is the published outcome of EIA) in the UK. The general consensus is that whilst the practice of EIA has improved over time and with experience, it remains the case that it is currently insufficient or incapable of adequately covering the field of health, or securely identifying susceptible target populations (BMA 1998, Lock 2000).

An optimistic report stated that on average 72% of ES's do not include any reference whatsoever to human health or health related issues (BMA 1998). A more damning report suggest that on average 90% to 95% of all ESs lack appropriate health and safety assessments and do not involve health experts (Sloof 1995). Furthermore, varying perceptions of health assessment (i.e. the difference between occupational and public health) can often lead to uncertainty as to the responsibility of EIA practitioners to assess potential health risk 'beyond the fence' (i.e. beyond the perimeter of proposed site). Experience elsewhere, for example in the United States (US), indicates that typically, health impacts and risks were given little attention; and even when this was not the case, the resulting studies were not well integrated into the final ES (Arquiga et al 1994). What is most surprising is that this is generally not considered an issue, as the focus of each of the technical disciplines within an ES were generally considered by planners to be sufficient to assess potential impacts upon the environment for the protection of health.

However, the key shortcoming of this philosophy, is that each of the technical disciplines within an ES are assessed to environmental standards and thresholds and do not actually assess what the potential outcome is to health. (Glasson 1997) Furthermore, they generally fail to investigate the cumulative effect (i.e. changes in air quality, noise and environmental risk) upon a given community and its relative susceptibility.

To clarify, a project that impacts upon air quality may comply with air quality standards, but the relative change in community exposure might represent a potential risk to health with outcomes measurable in terms of morbidity and premature mortality. Furthermore, each of the technical disciplines within an ES are generally not drawn together to assess the cumulative impact upon health, will not address or alleviate community concerns and will not identify and enhance potential opportunities to improve health.

As identified during the literature review, awareness of the failure of EIA to adequately assess human health, combined with the changing nature of views about health and health care has led to the development of a range of independent philosophies, processes and methodologies for conducting HIA. This notably explains a number of the inconsistencies between HIA models alongside the varying terminology and base principles applied.

In short, HIA has evolved partly out of EIA environmental procedures and standards set to protect the environment, which fail to determine the actual outcome on communities and their health, and partly out of health promotion geared to prevent illness and enhance health through more informed decision-making. In theory, the contrasting background of planning and health promotion through HIA is logical. However, there are also contrasting and in certain circumstances opposing objectives, terminology and procedures creating barriers to such a merger.

Planning led HIA, however, need to be robust and withstand planning, public and legal scrutiny (RPS Group 2008). As such, they generally include a stringently set scope of work to address particular planning requirements, and as such, place an emphasis upon quantitative methodologies. In contrast, health promotion led HIA tend to be broader, apply qualitative methodologies and can be more speculative in their assessment as the outputs will be used to inform health initiatives rather than influence the planning decision (RPS Group 2008).

Due to the lack of planning consultancies with health expertise, and equally the lack of health consultancies with planning expertise, current examples of HIA tend to sway one way or the other (RPS Group 2008). As such, the inconsistencies of previous and current HIA often reflect the basis of the HIA and the background/objectives of the HIA practitioner.

2.2.1 Definitions of Health Impact Assessment

Definitions of good health and of HIA abound. They vary in nature, focus and content. However, a key theme that runs throughout the literature is that HIA is similar in purpose to EIA. It is a tool to support decision making by identifying the likely health effects of projects, thus allowing more health conscious decisions to be made. There was and still is, however, disagreement over what HIA comprise, as the following early definitions illustrate:

'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' (Frankish et al 1996).

'a methodology which enables the identification, prediction and evaluation of the likely change in health risk, both positive and negative, of a policy, programme, plan or development action on a defined population' (British Medical Association 1998).

'the estimation of the effects of a specified action on the health of a defined population' (Scott-Samuel 1996).

'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 1995).

'methods 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 risk' (Secretary of State for Health 1999).

'Health Impact Assessment is a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population' (WHO 1999).

Some definitions highlight the importance of the identification, prediction and evaluation of health outcomes, whilst others go further by suggesting that HIA can help to measure and mitigate health effects and improve health at any stage (Secretary of State for Health 1999). An emphasis on the terms risk and potential effects is also noted, highlighting the fact that exact health outcomes are difficult if not impossible to accurately predict or attribute due to human nature, genetic predisposition and social factors, such as lifestyle and occupation playing a significant role in the final exposure, outcome and coping skills of individuals and communities.

It is also suggested that HIA can achieve health equity and more sustainable health (WHO 1999, NHS 2005) and is a means to enhance public participation and involvement in development decisions regardless of the particular local circumstances in which HIA might be applied (Department of Health 1999). HIA is therefore a process that investigates the potential health effects of a proposal, and the likely resultant health outcomes upon populations and their environment. It can be argued that HIA facilitates more health conscious decision-making and the uptake of health benefits.

The NHS Health Development Agency offered one of the most wide-ranging definitions, in keeping with current consensus encompassing most requirements:

‘HIA is a developing approach that can help to identify and consider the potential - or actual – health impacts of a proposal on a population. Its primary output is a set of evidence–based recommendations geared to informing the decision making process. These recommendations aim to highlight practical ways to enhance the positive aspects of a proposal, and to remove or minimise any negative impacts on health, wellbeing and health inequalities that may arise or exist’ (Taylor & Quigley 2002).

This evolution of HIA and its definition is expected, yet it is strangely enough, issues arising from the definition of HIA that are proving to be a barrier to developing a consistent approach to HIA, namely, agreeing on what health is and which definition to apply.

2.3 Health

Health or, more importantly, what constitutes good health is difficult to define and measure. Perceptions about health and expectations of good health vary. Quality of life, longevity, mortality and protection from the deleterious effects of development are issues that concern everyone (Department of Health 1995a, Secretary of State for Health 1999, Corvalan 1999). It is therefore naturally the case that any definition of health applied in HIA will influence its overall content and focus. In these circumstances, consensus about how to define health has been cautious, but it remains the case that the most familiar definition is that put forward by the World Health Organisation (WHO) in 1948.

‘Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’ (WHO 1948).

This definition suggests that for complete or good health there is not only a need to address the physical parameters that avoid disease, but also to take account for the psychological and social parameters that are essential to well being. In its day, this definition was heralded as the new view on health, and although criticised as being too idealistic for practical application (Savolainen-Mäntyjärvi 1999), it has nevertheless been supported internationally, and is the precursor to the socio-economic model of health currently applied in HIA (Rootman 1994).

The WHO concept of well being sparked research into the aspects that influence or are required to secure good health, including the development of the Health Fields Concept (Laylonde 1974, Labonté 1993), illustrated in Table 2.. This suggests that there are four general fields that influence health.

Health Fields	Example
Biology	• genetics, nutrition, age, special senses
Environment	• physical environment:- air, water, housing, • transport, land use, waste, energy, • social environment:- employment, poverty, education, • culture, family and social networks, mental well-being
Lifestyle	• risk taking behaviour, occupation, culture, education
Organisation of Health Care	• primary care, specialist health services, • health policy, relationships with other statutory or non statutory agencies • local community, local and national priorities

Table 2 Laylonde's Health Fields (Laylonde 1974, Labonté 1993. Arden 1996, Winters 1997)

Further research and refinement of the health fields concept led to the development and incorporation of a wide range of 'health determinants' into government policy and objectives (Department of Health 1999). A common way of illustrating how these socio-economic factors interact and influence health and well-being is demonstrated in Figure 1.

Figure 1 Socioeconomic Model of Health Source: Dahlgren and Whitehead (1991)

However, since the 1948 WHO definition of health and its elaboration, other definitions have been put forward to further the understanding of well being including emotional, spiritual and religious aspects of health and the ability to control life's challenges and changes (Frankish et al 1996). Such definitions are emphasised in the following quotes:

'Optimal health to be a balance of physical, emotional, social, spiritual and intellectual health' (O'Donnell, 1989).

'the capacity of people to adapt to, respond to, or control life's challenges and changes' (Frankish et al 1996).

'Health is not a state to be captured and dealt with, or some achievement to be attained with finality. Instead, it has been suggested that it is rather the response of people to their environments. Furthermore, it is a response that allows them to go about their daily activities without personal restrictions, with the knowledge

of what level of health is attainable, and how it is possible to obtain it' (Milo 1981).

In response to this, the WHO attempted to refine and supplement its own definition, stating health to be:

'The extent to which an individual or a group is able, on one hand, to realise aspirations and to satisfy needs, and on the other, to change or cope with the environment' (WHO 1984).

These definitional debates have led to complicated definitions, confusion about the determinants of health and a lack of clarity about the means by which health can be measured and included in other assessments (Berlin 1990, Crawford 1977). However, the numerous definitions do reveal an important fact, which is that there are varying priorities for health. Different communities and individuals will have varying health priorities that will further influence the magnitude and significance of potential health impacts and benefits. There is, therefore, a requirement to gauge local priorities during an assessment, or risk incorrect assumptions, conclusions and inappropriate or ineffective mitigation. This is true at both the UK and international level. In short, it is necessary to understand local health needs and priorities before an HIA is performed. If not, there is a risk of assessing the significance of potential health outcomes on personal assumptions and priorities.

Unlike later versions, the main benefits of the 1948 WHO definition is that it is succinct, it is flexible and allows for health fields and health indicators to be introduced and this in turn allows for different health determinants or health priorities to be taken into account. Thus, it supports a broad understanding of health and what it might comprise whilst allowing room for manoeuvre within its headings. Consequently, this definition is still drawn upon in the majority of key HIA models, tools and guidelines (WHO 2000).

Although this is the case, a key point established from the literature review of UK and international HIA founding principles, is the requirement to investigate local health perceptions and priorities. Assuming a fixed definition of health and rank of health priorities for all communities is incorrect and may potentially lead to ineffective HIA and subsequent recommendations that may compound existing health issue. As such, the HIA screening and scoping stages are necessary to tailor HIA to local circumstance, or risk assessing to incorrect health priorities.

2.4 Current Strategy on Health and its Assessment

The promise of HIA, is not only ethically compelling (Department of Health 1998b), but it also has the potential to improve the outcome of public policy and national targets (Secretary of State for Health 1999). Potentially, HIA could support and inform a range of programmes to reduce the burden of already over stretched health services, the work time lost through illness, while improving the efficiency and effectiveness of a nation as a whole through promoting good health and well being (Secretary of State for Health 1999).

Interest in the UK led to a number of research initiatives that contributed to the Acheson Report that recommends *'that all public policies and projects, not only those in the health sector, should be assessed for their impact on health'* (Acheson 1998). A second document, 'Saving Lives' recommends that local agencies undertake health impact assessments when planning (Secretary of State for Health 1999). These in turn lead to greater emphasis on HIA in government consultative documents on public health strategy.

In 2007, the UK Royal Commission on Environmental Pollution (RCEP) (an independent body established to advise the Queen, the Government, Parliament and the public on environmental issues), provided its second recommendation for HIA to be made a regulatory requirement to the planning process within their Urban Environment Report (RCEP 2007), (Buroni 2007).

Equally in 2009, the House of Commons Health Select Committee also recommended for the second time that HIA be made a regulatory requirement (House of Commons 2003 and 2009), and included recommendations for a Health Planning Policy Statement and that PCTs, be made statutory consultees for major urban developments.

Interest in HIA is further supported internationally for example, through Article 152 of the Amsterdam Treaty calling on the European Union (EU) to see a high level of health protection is ensured in all community policies and activities (WHO 1993, 1998a 1998b 1999b).

Despite lofty aspirations for the promotion and mainstreaming of HIA (Department of Health 1998), in 2009, HIA is still not supported by Statute in the UK and, in practice 'piggybacks' on existing environmental regulation such as EIA and the Environmental Protection Act (EPA 1990). However, it is important to note that as shown below, the EPA only addresses health in terms of risk prevention as opposed to health promotion.

'Harm means harm to the health of living organisms or other interference with the ecological systems of which they form part and, in the case of man, includes offence caused to any of his senses or harm to his property' (EPA 1990).

As such, there is currently no requirement or incentive for local authority planners to build in the principles of healthy urban design or work with PCTs to address existing community health issues, needs or inequality.

HIA as a possible legal obligation has also been considered as part of more general human rights legislation (Seddon 2003). The growing recognition of good health as a basic human right is now evident through a series of international health programmes and targets, including the UN's Millennium Development Goals and the Equator Principles. Furthermore, it is important to note that individuals who felt that their health and wellbeing had not been taken into consideration for major projects have taken the UK Government to the European Court of Human Rights, and won.

A recent example is the Hatton and Others v the United Kingdom. For this case, eight applicants who lived in properties surrounding Heathrow Airport, alleged that Government Policy on night flights at Heathrow Airport gave rise to a violation of their Human Rights under Article 8 (right to respect for private and family life and home). They further stated that they were denied an effective domestic remedy for this complaint, contrary to Article 13 of the same Convention. A complaint against the United Kingdom was lodged on the 6th of May 1997 with the European Court of Human Rights. The applicants were given legal aid and following a four year European Court Judgment found the UK not guilty of breaching Article 8 of the convention, but guilty of violating Article 13 by not providing adequate means to assess and mitigate potential health impacts. The Chamber declared ‘a proper investigation and study, with the aim of finding the best possible solution which would, in reality, strike the right balance, should precede the relevant project’ (paragraph 97 of the judgment). The Court awarded a total of £32,000 for non-pecuniary damage and a total of £70,000 for legal costs and expenses (Hatton and Others 2003).

Such a case emphasises that all countries are increasingly encouraged to implement procedures and legislation that ensure a high level of health protection and that all sectors should recognise and accept their responsibilities for health. If not, projects that fail to provide adequate means to investigate, assess and mitigate potential health impacts risk violating Article 13 of the European Human Rights Convention. However, as the author and HIA practitioners will acknowledge, in 2009, it remains the case that such assessments are not being performed largely due to uncertainties on whether they are required, what they should comprise and who is qualified to do them. However, it is interesting to note that the Aviation White Paper: ‘The Future of Air Transport’ (2003) now implements a requirement for HIA on all UK airport developments and changes in flight operations.

Although the push to develop HIA is both warranted and long overdue, the uncoordinated and un-legislated research and practice of HIA has lead to a number of processes, models and guidelines that can and are used as guidance for independent HIA (Population Health Resources Branch 1994, Birley 1995, Winters 1997, Landstingsforbundet 1998, Scott Samuel 1998, National Assembly for Wales 1998, Fehr R. 1999, Ison 2000, London Health Group 2002).

Such an approach is arguably not in the best interest of the long-term development of HIA, as they are unregulated often incomplete, and promote a laissez-faire attitude (Lock 2000). An initial problem for HIA was a lack of guidance. However, as shown in Table 3 the rapid proliferation of varying guidance material available by 2002 allowed assessors to freely choose a method that it is felt best suits the situation. To some degree this is advantageous since local needs can be taken into account, but a failure to establish a uniform approach, with consistent founding principles, terminology or even desired outputs seriously compromises HIA in the long run.

Organisation	Website
The Health Development Agency	www.hiagateway.org.uk/
Plymouth HIA	www.plymhealthimpact.co.uk/
International Health Impact Consortium	www.ihia.org.uk/
Health Canada	www.hc-sc.gc.ca/
Our Healthier Nation Database	www.ohn.gov.uk/
The Minnesota Department of Health	www.health.state.mn.us/
Environmental Health Project	www.ehproject.org/
Queen Mary Health Research Group	www.geog.qmul.ac.uk
London Health Commission	www.londonshealth.gov.uk/hia.htm
NHS Resource for HIA	www.doh.gov.uk/london/resource.htm
Welsh HIA support unit	www.whiasu.cardiff.ac.uk/index.html
Netherlands School of Public Health HIA	www.hiadatabase.net/
IMPACT	www.ihia.org.uk/
University of Birmingham HIA Research Unit	www.publichealth.bham.ac.uk/hiaru/practice.htm
World Health Organisation Regional Office for Europe	www.who.dk/eprise/main/WHO/Progs/HMS/Home

Table 3 Key HIA Methodology and Guidance Reserves available in 2002

A lack of regulatory framework coupled with no underlying structure to HIA, meant that previous HIA were inconsistent, and varied significantly due to the background and relative expertise of HIA practitioners (RPS Group 2008).

2.5 Thesis Premise and Rationale

Through the review of the current state of HIA a number of points have been identified that require further research, development, and evaluation. The need for the evaluation of HIA procedures is becoming apparent with each HIA, as literature and practice are failing to comply with guidance so that practice has now surpassed the guidance (RPS Group 2008). A barrier to HIA mainstreaming is apparent in that there is no governing body and no means to drive HIA practice other then a mixture of differing best practice guidelines, public relations and peer pressure (Taylor and Quigley 2003).

The scope for research is therefore great, where a number of areas would benefit from further investigation and contribute to the field of HIA. However, it can be argued that uncoordinated research has also become an apparent barrier to the development of HIA, where a number of models, tools and guidelines, with varying focus, coverage and in some cases terminology now exist.

Without care and restraint, this is a criticism that could easily be made to this thesis. Therefore, the rationale behind this thesis is to target an area of the HIA process that would most benefit research, improving current methods, further aiding HIA mainstreaming, and acting as a relevant, reliable, and above all repeatable process. The next chapter, constituting the model review, looks at approaches to HIA in more detail and indicates that even the initial stages of HIA are not agreed or well defined. The next chapter therefore supports the decision that the focus of research should be upon the primary stage of HIA, screening and scoping. Being the initial stage of HIA, such stages will set the parameters of any further work. As is shown in Chapter 3, it is at the screening and scoping stages that:

- the definitions of health are established, setting the founding basis to any following HIA;

- that a proposal (be it a project, policy or programme) is appraised to determine if a HIA is necessary or beneficial;

- that the key health issues and opportunities are identified (albeit speculatively), establishing what any further assessment is to focus upon; and

- it is also the point at which, the greatest opportunity for integration exists with parallel regulatory assessments (such as EIA or SEA).

Surprisingly, given its role in defining if a HIA is necessary and what any following assessment is to focus upon, it is also the stage of HIA that is performed the least. Although poorly documented, key findings produced at a Health Development Agency screening workshop, highlighted the fact that in practice screening rarely takes place, is unclear, or does not follow the criteria or processes available in literature (Taylor and Quigley 2003).

From the literature review, current HIA are faced with a number of barriers that limit their consistent application and value to the decision making process, all of which could be more effectively managed through the initial process of screening. The core rationale to this thesis is to therefore provide a robust screening and scoping model that can be firstly applied consistently throughout the UK, and provides a solid platform that draws together the principles of both planning and health promotion lead HIA. Though this thesis targets the primary stage of screening and scoping, it is noted in the literature review that many of the methods within the screening and scoping stage are consistent with a full HIA. It is therefore intended that this thesis also develops transferable knowledge that can be applied to aid all stages and levels of HIA, and thus further supporting the refinement of HIA and possibly its integration as a regulatory requirement.

CHAPTER THREE

3.0 Model Review

3.1 Introduction

As Chapter 2 argued, although there is no generally accepted model of HIA, there are various models that can be, and are, used as guidance for independent HIA. The effect of this is currently being observed, where a mix of eagerness to protect and promote health, coupled with an impatience for a national HIA process has resulted in a number of derivatives being produced independently (Winters 1997. Ison 2000. Department of Health 1999, Kemm 2007). This in turn adds to current barriers posed to HIA, as eventually there will not only be difficulties in comparing methods and data between models, but also within the same models as more derivatives and subsequent inconsistencies are produced. In addition, it is important to note that the proliferation of varying HIA approaches (i.e., quantitative v qualitative assessment) and methodologies to investigate and assess potential health outcomes has also led to varying expectations of HIA. A failure to manage such expectations has in itself led to another barrier to the mainstreaming of HIA, where HIA voluntarily commissioned to support a planning application may be found too speculative in their assessment and not suitable for submission (RPS Group 2008). In such cases, not only is additional work required to address and remedy the issue with subsequent financial costs and delay, but clients are unlikely to voluntarily commission future HIA.

The result of this coupled with an absence of a nationally agreed upon syllabus to educate assessors on the process and methodologies of HIA, means that HIA development suffers. HIA will continue to be inconsistently undertaken (Lock 2000, RPS Group 2008). Thus not securing the public or client support and trust that it vitally requires (Health Canada, 1999), HIA development will be further delayed as the development of tools required within the field will be prolonged due to insufficient, inconsistent or simply unworkable data. This point has been emphasised within a number of review groups, including work done by the World Health Organisation (WHO) European Centre for Environment and Health in collaboration with the International Programme on Chemical Safety. Here it was stated that:

‘a systematic and explicit approach to the assessment of epidemiological evidence for health risk assessment is required’ (WHO 2000).

Further conclusions suggest that better communication between regulatory assessment, stakeholders, members of the public and assessors is required (WHO 2000, Kemm 2007). Consequently, a review protocol designed to cover the HIA process along with tools for quantifying and effectively displaying the determinants of health are yet to be developed (Lock 2000, NHS 2000a, Kemm 2007). The following model review identifies and catalogues these issues by examining the current approaches to HIA, the processes followed and tools used. The following evaluation criteria are based on the initial literature review and the key principles and common aspects of HIA found within current practices, journals, and information from workshops designed to add value to HIA development (Department of Health 1999, Frankish 1996).

The results of the model review presents the basis to the development of a more consistent screening and scoping model that is itself tested to allow further refinements to the model. Furthermore, the model review also provides a means to developing a quality assurance summary checklist defining what aspects of HIA are generic and essential to the assessment of health.

3.2 Model Review Methodology

The model review is structured to provide a means to investigate the origin, objectives and focus of the various HIA methods, guidelines and tools used in HIA. In so doing, it provides a basis to establishing common features and a generic HIA process to inform the development of founding principles and tools that can be established at the earliest stages of screening and scoping. Equally, the model review is intended to provide a means to identify the varying perceptions, requirements and barriers between models developed by planners, environmental scientists and health promotion experts.

The evaluation criteria within the model review can be summarised into the following three core appraisal criteria:

- model basis;
- assessment basis; and
- process.

These criteria are discussed in more detail below.

3.2.1 Model Basis

The model basis is targeted at identifying the aim of what is being reviewed, what it hopes to assess and the parameters that will define it. The focus upon a model basis therefore acts as an introduction, in that it will state the approach which the model aims to adopt, be it prospective, concurrent or retrospective.

This stage appraises whether the model is targeted at either a project, policy or programme, and establishes whether the focus is on specific aspects of health, the environment or sustainable development (WHO 1985). The appraisal of the model basis also allows an indication of what the model was developed for, therefore determining the function and objectives of the HIA allowing a context for comparison with other models, guidelines and tools.

In short, by understanding a model's basis, it is possible to gain greater insight into both its founding principles, aim, outputs and ultimately purpose and values as an aid to decision making. Such information provides a means to developing a more robust and commercially orientated HIA model.

3.2.2 Assessment Basis

The appraisal of a model's assessment basis is a relatively short process yet essential to the review in that it identifies the founding principle of the model, determining if the model is based upon a definition of health, determinants of health or applies a tighter focus on selected physical or psychological health conditions such as heart disease or depression. Defining a model's founding principle will provide insight as to the scope, focus and outputs of the model reviewed, allowing a context for comparison with other models and for defining the quality and accuracy of results.

3.2.3 Process

The process section is concerned with the actual assessment procedure and practice. It is split into content, data and involvement, and is aimed at reviewing common elements of the methods and procedures applied in the assessment of health, in order to determine what data is utilised, how it is used and who the stakeholders are.

This evaluation of the available models is used to identify a generic HIA process and appropriate techniques to be adopted in the development of this thesis screening and scoping model.

3.3 Models, Tools and Guidelines Reviewed

The models reviewed during this thesis were developed pre 2003, however, key guidance, models and HIA case studies that emerged following 2003 reinforced some of the conclusions drawn from the following review of models (Kemm 2007). This review therefore supported the development of a screening and scoping model used in a commercial setting.

Though the models, tools and guidelines reviewed listed below differ in scope, practice and in some cases terminology, it is the intention of the review that by applying a systematic review format a comparison can be made, so as to identify areas that at the time were generic and best practice to a comprehensive HIA. This aided in the identification of tools that could be used or adjusted for use within the HIA approach developed, and highlight ways of combining the multidisciplinary techniques required.

The following models reviewed include materials from leading organisations and HIA practitioners, including:

- the Bielefeld Environmental Health Impact Assessment model (Fehr R. 1999);
- the Kirklees Metropolitan Council Model (London Health Group 2002);
- the Birley Health Impact Assessment of Development Projects model (Birley 1995);
- the Sweedish County Councils model Landstingsforbundet, 1998, 2001);
- the Merseyside guidelines on Health Impact Assessment (Scott Samuel 1998);
- the British Colombia model (Population health Resources Branch 1994);

- The Better Health Better Wales, Developing Health Impact Assessment in Wales (National Assembly for Wales 1998); and
- the NHS HIA model (Ison 2000).

At the time, such models and guidance documents constituted the only resources to include within the model review, and were identified during the literature review, during specific HIA training events (including HIA Training with the Caribbean Environmental Health Institute and IMPACT, formally known as the Merseyside HIA Group), and through consultation with leading HIA practitioners and the UK Health Development Agency.

In order to not detract from the main thesis, the detailed review of each of the models is provided within Appendix 1, while the following section presents one of the more significant and influential methods on current HIA practice, followed by a combined model review summary and discussion section.

In addition to the model review, Appendix 2 provides a review of the national statistics available in 2000, suitable for application through GIS (Bracken et al 1990) to support the mapping and assessment of potential health outcomes. Such a data review supplements the model review, in that it identifies health statistics that could be uniformly applied as part of a rapid screening and scoping model. The application of such statistics is discussed in more detail during Chapter 4.

3.4 The NHS Resource for Health Impact Assessment

The NHS Executive commissioned the resource for health impact assessment in November 1999, through the Public Health Resource unit at the Institute of Health Sciences in Oxford. The resource is primarily intended to aid the further development and promotion of HIA, yet as emphasised below, is additionally aimed at supplementing the UK national health policy:

‘The government is committed to improving public health by adding health awareness to policy making at every level and by making concern for improved public health a norm in all decision making’ (NHS 2000a).

The intention of the resource therefore coincides with the objectives set by the Government in their 1999 White Paper, Saving Lives: Our Healthier Nation (Secretary of State for Health, 1999a). Here, the White Paper sets the Government’s policy to improve the health of the population, and reduce health inequalities through a combination of health promotion and better decision-making through more informed assessments in regard to health and the environment (Department of Health 1999).

The NHS (2000a) resource presents high goals for HIA in that it identifies it as a tool to understanding health risks and benefits, and in doing so acts as a means to improving the health of the nation. Yet unlike the other guidelines and models, the resource somewhat optimistically already envisages HIA as a powerful tool that is suggested to be both rigorous and adaptive (NHS 2000a). The resource also acknowledges that though there is a clear requirement for the implementation of HIA methods and procedures, as shown in Figure 2, there are both drivers and restraints to its use nationally.

The resource is primarily intended to inform and educate both the public and experts alike who aim to familiarise themselves with the concepts and methodologies of HIA. Alongside the full text of the resource a number of accompanying publications are also available, which range in detail from the simplest of principles and aims found within ‘A Short Guide to Health Impact Assessment’ (NHS 2000a), to case studies containing methodologies and tools.

Figure 2 Drivers and restraints to the implementation and use of HIA (NHS 2000a

The development and publication of the resource, similar to HIA itself utilises a broad range of expertise from a number of disciplines, and involved the collaboration from some of the leading authorities and pioneers of HIA in the UK.

3.4.1 Model Basis

The NHS resource acknowledges the various approaches, coverage and targets that HIA can, and are often focused towards, and has as a result devoted an extensive proportion of its literature towards defining and explaining each of the concepts that may be taken. The resource also includes a suggested common framework to health assessment, and guidance on how to proceed and promote future assessment of health in the UK.

The resource therefore includes a mix of guidance, model reviews and methodologies towards prospective, concurrent and retrospective assessment of the potential health impacts from policy, programmes and projects. Its intention is to guide those who aim to use or develop HIA through informing them of the concepts, principles, procedures and available case studies and methodologies.

3.4.2 Assessment basis

The assessment basis of the resources is primarily developed through its adopted definition of HIA. As shown below, the definition is that used by the WHO Regional Office for Europe, and is an extrapolation of that originally developed and used by the Canadian Institute of Advanced Research (Frankish 1996).

'A combination of procedures or methods by which a policy, programme or project may be judged as to the affects it may have on the health of a population' (European Centre for Health Policy 1999).

The definition sets the stage for the assessment, in that it clarifies what HIA is intended for and aims to achieve. The definition is then supplemented with an overview of the recognised determinants of health as the key factors that influence health and well being (Department of Health 1998), and therefore the focus to which the assessment is based.

Though the resource provides a wealth of information on the requirement and method of the assessment of health, it strangely avoids the inclusion of a definition of health, or even a reference to the problems associated with current definitions. Instead, the resource skirts round the issue by touching upon the attributes of the definition of health developed by the WHO in 1967.

3.4.3 Process

As shown in Figure 3, the HIA process presented by the resource is based upon a common framework noted within the Better Health Better Wales publication (Secretary of State for Wales 1998), and similarly identified within the NHS resource's own literature and model review. Here it identifies the five core steps of HIA to consist of:

- screening;
- scoping;
- appraisal of potential health impacts;
- decision-making;
- monitoring; and
- evaluation.

The NHS resource does not attempt to re-design the process, and correctly acknowledges the fact that simplicity will be the key to developing and promoting a consistent approach to HIA in the UK. The resource therefore concentrates on supplementing the process with potential approaches and tools taken from a range of different models, guidelines and toolkits.

Figure 3 Core steps in the process of health impact assessment (NHS 2000a)

The five-step process presented by the resource is supported by an extensive body of text that not only describes the methodology and tools required, but similar to the Better Health Better Wales document (Secretary of State for Wales 1998), also dedicates a large portion of the text to explaining the principles behind the tools, and the reason why certain sub-components have to be included.

3.4.3.1 NHS Resource Step 1: Screening

The screening framework provided by the resource is composed of four parts. The first two comprise the primary function of screening, and act as a selection process to identify the nature and parameters of the proposal, and then relate those impacts to the health of the identified population. The second function of the screening process is again made up of two parts, and aims to determine what type of appraisal is required (be it rapid, intermediate or comprehensive), and identify whether the bodies involved are capable of conducting such a health assessment.

The screening process suggested by the resource can therefore be summarised as:

- Parts 1 and 2 focus on the proposal and its potential impacts; and
- Parts 3 and 4 focus on the circumstances surrounding the conduct and quality of the HIA.

Each part of the screening process suggested by the resource is accompanied by its own screening tool, which is presented as a template intended to be developed by those who will use it.

As shown in Figure 4, screening tool one is linked to part one of the screening process, and is intended to not only identify the parameters of the proposal, but to set the thresholds in defining when an assessment is required, what form it will take, and what is acceptable in relation to the potential impacts.

Figure 4 Screening Tool 1 (NHS 2000a)

As shown in Figure 5, screening tool two is related to part two of the screening process, and has more of a resemblance to the classical approach and tools used in EIA. It is designed to aid in identifying the impacts of a proposal by highlighting factors that must be considered. The tool is structured in a simple checklist that is intended to raise further questions dependent upon the result, and therefore lead to the identification of both positive and negative impacts.

Figure 5 Screening Tool 2 (NHS 2000a)

As shown in Figure 6, it is at this stage that the choice of audit is decided upon. The checklist is predominately set on identifying potential health hazards and balances logistical issues such as financial, time and resource constraints, against the opportunity to influence the project.

The intention of the tool is to clarify the requirement of the assessment and to what level it will or can be undertaken depending upon time and finance constraints, or the technical capacity to undertake the assessment.

Figure 6 Screening Tool 3 (NHS 2000a)

As shown in Figure 7, the final screening tool 4 is more orientated towards a quality control exercise, in that it is intended to identify the capacity to which an assessor is competent to conduct the audit, and to aid in the decision to appoint either an internal or external HIA practitioner.

Figure 7 Screening Tool 4 (NHS 2000a)

It is understood that the results gathered from the combined screening process proposed by the NHS resource will therefore:

- firstly determine and set the thresholds to whether an assessment is required, or not;
- give a general indication into what factors need to be focused on, what level of assessment is required, who will conduct it; and
- aid in identifying potential stakeholders for the steering group.

3.4.3.2NHS Resource Step 2: Scoping

If the screening process results in the decision that further investigation is required, the resource recommends a scoping stage. It is within this stage that the HIA will take its shape, in that it will establish a steering group, and refine the appraisal by setting boundaries, and filtering the relative importance of the impacts. As shown in Figure 8, the scoping process will in short determine what will be assessed, how, by whom and for how long. The choices made at this stage will therefore determine the overall quality and relevance of the final assessment, and hence it is important to ensure a detailed repeatable methodology to build on the criteria of current and future assessments.

Figure 8 Aspects of health impact assessment to be addressed during scoping (NHS 2000a)

The NHS resource indicates that the initial step of the scoping process is to establish a steering group; this will primarily be defined by the screening stage that should help to identify potential representatives. However, the resource is somewhat unclear about designating whom should be included within this group. Although it is suggested that several agencies and interested parties should be involved to ensure an array of different expertise, the resource fails to give a list of potential candidates. Instead it suggests that organisations new to HIA could mirror processes from:

- line management structures already in place;
- in local government, standard reporting arrangements to council committees;

- in the voluntary sector, standard reporting arrangements to the board of Director/Trustees.

All of which are more orientated towards involving those supporting the proposal, and not necessarily individuals knowledgeable of HIA, or representatives of the population it may affect.

The imbalance seen within the steering group is countered by the working group. This group is intended to act as a form of community liaison between the public, and aid in both the design and implementation of research. A key function of the working group is to identify all the potential stakeholders on a local scale (see Figure 9 for potential members), and gather the thoughts and perspectives of those that the proposal may directly influence. The working group is similar to that found in EIA, intended to bring the thoughts of the community to the steering group, and in doing so act as a form of filter to the community perceived risks.

3.4.3.3NHS Resource Step 3: Appraisal of Potential Health Impacts

The third step of the NHS resource process can be likened to that of risk assessment found in a number of the proposed HIA models and guidelines covered.

The reasoning behind the decision to change the terminology from risk assessment to potential health impacts is unclear, but seems to be aimed at reducing the negative connotation of the term risk assessment, and allow a stage that leaves itself open to appraise both positive and negative health outcomes.

Figure 9 Potential stakeholders for local HIA (NHS 2000a)

The appraisal process presented by the resource is made up of the four key sub-stages of:

i. policy (programme/project) analysis;
ii. profiling the affected population;
iii. identification and characterisation of the potential health impacts, and
iv. reporting on the impacts, and making recommendations for the management of those impacts.

Each of these are considered in more detail below.

i Policy Analysis

The policy/programme/project analysis, as the name suggests is the component of the NHS process that assesses the proposal in relation to its potential impact upon a population. It is a more detailed version of the screening process, and is intended to not only identify and characterise the potential health outcomes, but also the route in which they will act.

As shown in Figure 10, the NHS resource suggests key aspects that need to be analysed in relation to their impact upon health, yet does not offer any real methodology on how or where such information is obtainable, or even suggestions on how such information can be used or displayed. Furthermore, the list itself is only a basis, to which a multitude of further aspects could be derived from each point.

Figure 10 Key Aspects for Policy (Programme/Project) Analysis (NHS 2000a)

ii Profiling

The following stage in the appraisal process is that of profiling and similarly, although the NHS resource states the importance of providing a baseline and characterisation of potential outcomes, it again fails to offer any real methods or tools to undertaking the task. Instead, as shown in Figure 11, it offers a list of relevant information, that at best is merely a starting point to profiling health impacts of a proposal.

Figure 11 Profiling Community Health (NHS 2000a)

Gathering the profile information suggested by the resource will provide valuable information as to who and how communities may respond. However, in the absence of a structured means to gather and evaluate such information this may become a data collection exercise with no real interpretation of why the information collected is important.

The NHS resource as with other guidance and models also fails to provide a means to mapping the geographic distribution of such health indicators and environmental data, and, as a consequence fails to identify a process for analysing potential health inequalities between and amongst communities.

iii Identification and Characterisation of Potential Health Impacts

The identification and characterisation of health impacts is the third sub stage in the NHS resource appraisal process, and involves the estimation of both the positive and negative impacts upon the health of an identified population. This stage is intended to be undertaken by assessors, and is to give special consideration to projects with multiple stages, sensitive groups and those prone to social exclusion.

The NHS resource states that the identification of potential impacts should be targeted at both positive and negative aspects, in order to aid decision making to its fullest. It is important to note, that although this sounds like an obvious statement, not all examples of HIA provide a balanced assessment (Fehr 1999, Landstingsforbundet 2001). Due to differences in approach (i.e. a risk or health promotion approach to HIA), some HIA solely investigate potential adverse health outcomes.

The NHS resource does not, however, offer any such method to the identification of health impacts, but does mention the use of the health determinants as an approach common to other models with similar stages. Furthermore, the NHS resource (2000a) supplies a somewhat sketchy list of sources of information available to assessors including:

- the views and perceptions of stakeholders and key informants involved in that particular HIA;
- the knowledge base (information and experience) of stakeholders and key informants;
- the evidence base in literature/grey literature, and
- the experience base in the literature/grey literature.

The manner in obtaining information from these sources will be dependant on the circumstances in which the assessment is being taken, but the NHS resource (2000a) suggests a number of techniques commonly used in other forms of assessment, including:

- stakeholder workshop;
- delphi exercises;
- surveys;
- brainstorming;
- focus groups;
- citizen juries; and
- interviews.

The resource fails to mention the various problems surrounding such data collection, in that even from this limited selection of data sources, a great deal of time and human resource will be required to not only organise and obtain such information, but to also document and analyse it.

The type of data is also an issue to consider in that the NHS resource briefly mentions the different forms of data that will be available to different assessors (qualitative or quantitative). Yet, fails to consider the problems associated with the reliability and comparability of such data.

Instead the NHS resource concentrates on the areas of uncertainty surrounding the analysis of the data, rather then the data itself. Here the resource acknowledges the still relatively undetermined associations between health determinants, their relationships with cause and effect, and the possibility that there may yet be other currently unidentified determinants that affect health. As shown in Figure 12. the resources characterisation of health impacts is more detailed in that it supplies a list of aspects to be considered to help clarify the nature and extent of the now identified impact(s).

Figure 12 Health Impact Characterisation (NHS 2000a)

The characterisation of health impacts is therefore intended to firstly highlight the identified potential impacts, to then set the context of the impacts in relation to its hazard zone and nature establishing a means to appraise the significance of effect. The characterisation process also aids in identifying mitigation potential and improvements to the proposal in preparation for the following step.

iv Reporting on the Impacts

The final step of the NHS resource process is that of reporting on the impacts and making recommendations for the management of priority impacts. It is within this stage that the assessors are required to collate all the information obtained and analysed so far, and to prioritise the impacts using the criteria presented by the steering group. Once the prioritisation of the impacts has been agreed upon, the NHS resource proposes two choices:

- to amend specific parts of the proposal, or
- to regard the possibility of different options and not implementing the original proposal.

The fact that there are only two choices, both of which focus towards amending the proposal is indicative of the benefits HIA can bring to a project, as well as the problems. Even if there are no adverse impacts identified, ways in which to enhance the benefits to health will arise, and therefore the need to amend. This is clearly in the best interest of communities. However, the fact that there is no choice to proceed without amendments may result in HIA being perceived as a barrier to development and policy making. Furthermore, the absence of a legal requirement may result in the findings and recommendations of the HIA being ignored.

Because of the variables associated with assessing different plans, projects and procedures, the NHS resource states the importance to frame the potential adverse and positive benefits in relation to the nature, magnitude and target of the impact(s). As shown in Figure 13, the NHS resource therefore presents a simple matrix as an example, showing the different impacts that may result from a proposal upon the population and vulnerable groups.

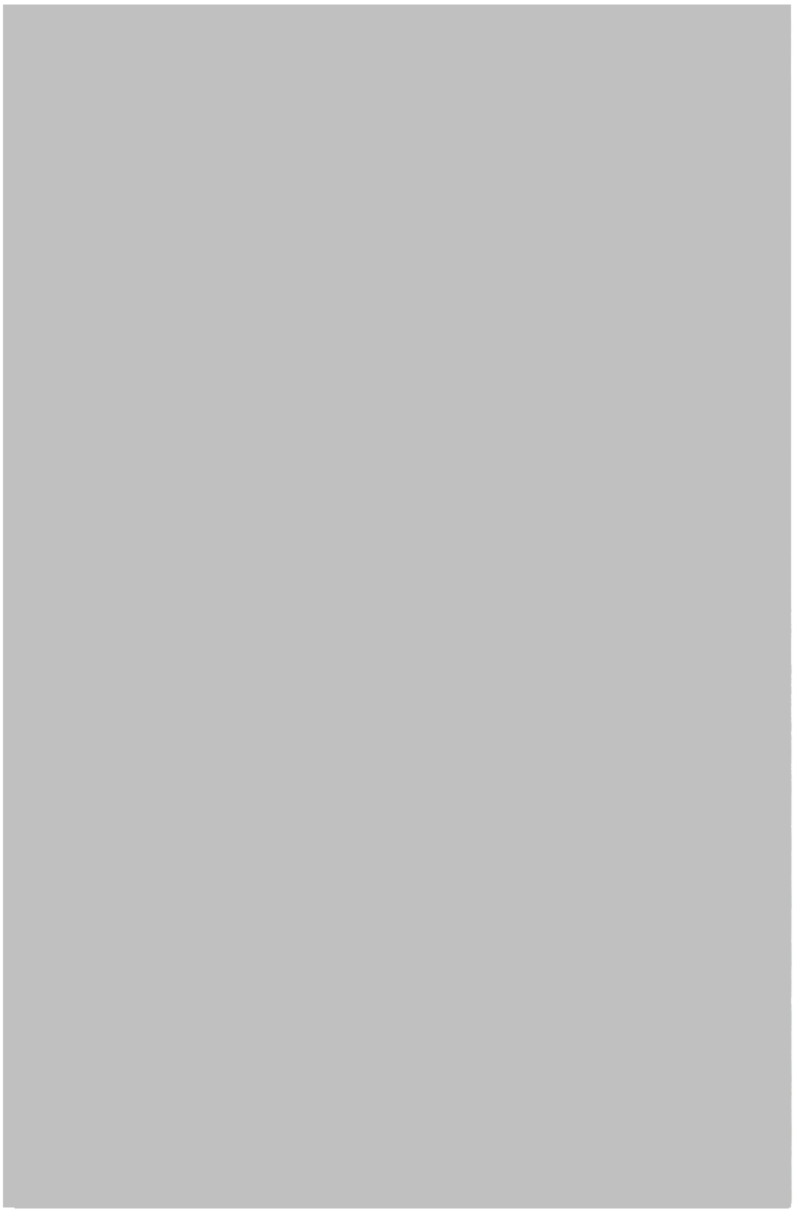


Figure 13 **Health Impact Framing Matrix (NHS 2000a)**

Though the framing method taken by the NHS resource may seem basic in its approach, and simplistic in its results, it is still a valid consideration. This is the case as it is necessary to consider not only what impact a proposal will have, but also to identify the inequalities that may surround it, as well as any modifications that may be the result of the assessment.

The choice of the NHS (2000a) resource in using a matrix to frame the recommendations has some limitations. The matrix is static, and simply reiterates the points that would be identified and discussed in previous stages of the scoping and appraisal processes. As a consequence the matrix does not provide information as to the geographic distribution of impacts and is heavily reliant upon the views and concerns of communities and stakeholders.

3.4.3.4NHS Resource Step 4: Decision Making

The NHS resource is one of the few models to consider decision-making to be a distinct process within HIA and this is the fourth of the five steps. This is the case as those responsible for ultimately deciding on a proposal, may not have been on the steering group, and therefore outside of both the previous and following stages. As shown below, the resource emphasises that in order to utilise HIA to its fullest, in not only minimising adverse impacts, but also enhancing the positive effect the decision making process must be a distinct part of the assessment.

'If HIA is to be an effective tool in mainstreaming health, and a means of providing an opportunity for health gain, decision-making about the proposal must be treated as an integral part of the HIA process' (NHS 2000a).

The NHS resource therefore attempts to offer a tool to aid decision making, in that it presents a matrix showing the level of health outcome against the cost to modify. The use of a matrix in this manner is again not the best approach, highlighting the barriers and varying expectations between health promotion focussed HIA practitioners, planning focussed HIA practitioners and decision makers requirements. To clarify, the NHS resource was written by health practitioners for health practitioners, as such the methods are deemed appropriate to meet their own objectives of identifying potential risks, to inform and support wider health initiatives and to aid in the planning of community health care. However, in a planning context, the matrix in Figure 28 may be considered speculative, in that it is largely populated by community perceptions and concerns, may not necessarily be based on realistic changes in environmental or socio-economic conditions modelled through regulatory processes such as EIA, and may end up conflicting with the technical assessments submitted in an ES.

The key point to draw from this is that there are varying expectations and objectives for HIA. This isn't to say that only one way forward is correct, but that there is a requirement to develop a more objective focused approach to HIA to manage expectations and to be of more value to the decision making process. This is a particularly essential point to consider given the currently voluntary nature of HIA, multiple approaches and methodologies. A bad experience with HIA, or some that are of limited value to the decision making process due to a process driven rather than objective driven HIA, will result in a reluctance to voluntarily commission HIA again in the future.

3.4.3.5NHS Resource Step 5: Monitoring and Evaluation

The final stage of the NHS (2000a) resource is that of monitoring and evaluation. This stage is often avoided within the majority of assessments (not only HIA), due to it not being a uniform requirement, coupled with the problems associated with who will undertake it, finance it, what will be monitored, how long for and what actions will be taken from the results.

The resource boldly states the importance of making monitoring an explicit process within HIA, including its necessity to improve both the future process and knowledge base of the field. But to also ensure that the recommendations made are being taken and are correct. Monitoring is therefore considered essential in not only ensuring the immediate quality of HIA, but also its future direction and potential fate.

The NHS resource again offers a checklist to evaluating the process, and a brief guide to whom should undertake the monitoring. But fails to offer the guidance that is most sought, that of how long monitoring should be scheduled, what factors will be monitored, and what will happen to the gathered information?

Furthermore, the resource does not discuss the inherent problem with monitoring health. Attributing actual health improvements or adverse health impacts is immensely difficult. Though it is possible to monitor life expectancy, hospital admissions and treatments, defining what may have caused change is subject to a multitude of factors ranging from genetic predisposition through to lifestyle and risk taking behaviour throughout life (RPS Group 2008).

In addition to human and socio-economic confounding, there is then the issue of relative exposure. Unfortunately for both epidemiologists and HIA practitioners, people move around and tend not to spend the majority of their time at home. As such, monitoring of demographic and health statistics from residence does not factor in wider environmental and socio-economic influences adding an additional layer of confounding.

This point is critical to HIA, and key to why this research project has placed an emphasis on the determinants of health, as a causal or 'health pathway' concept to infer change at the screening and scoping stage, rather than more speculative judgments to health outcome. To clarify, by focusing screening and scoping to investigate how a project, policy or programme may influence specific determinants of health, and knowing the local circumstance and distribution of such health determinants provides a rapid means to shortlist key health issues and opportunities that may warrant further investigation through full HIA. Such an approach is speculative in nature but is sufficient and supported by an evidence base that will justify the requirement for further HIA, or not.

3.4.4 The NHS Resource for Health Impact Assessment Summary

The resource developed by the NHS is designed to draw the best of a range of UK and international methods, guidelines and tools for HIA. It has been developed by a body well versed in public health including the leading UK HIA experts.

It offers a structured process that can be easily understood and be incorporated with or run alongside the current EIA process and legislation, and is further backed by literature on why the assessment of health is necessary, how to introduce HIA, a model review covering the leading models, guidelines and tools, and sources of further information. The result is a publication that can aid the introduction and development of HIA internationally.

Even though this is the case it must be remembered that the resource is just that, a resource, and not an 'off the shelf' guideline. The resource not only states that local adjustment will be required but also promotes the adoption of methods taken from a range of different models, resulting in the development of a number of derivatives with potentially conflicting results. Such derivatives will further confuse among other things, the terminology of HIA. The resource already noted this problem and states that:

'At the time of writing, there is no national or international consensus on the exact use of these terms' (NHS 2000a).

'This inconsistency in the use of terms can be confusing, especially for those new to HIA' (NHS 2000a).

The NHS resource therefore recognises the issue of the development of derivatives, and even states that the source of confusion may be resolved as HIA evolves a single methodology, yet still condones and promotes the 'pick and mix' approach.

The style in which the NHS resource is presented is also of concern, in that it is written very much in the form of a manifesto. This is the case as the document is optimistic, in that the beneficial attributes of HIA are listed in abundance, and only a few token problematic issues associated with the field are included. This in itself is a barrier to those who intend to use the NHS resource in that they will not be made fully aware of what they are getting into, if they are capable to undertake it and what it may end up costing both them and the health of those they intend to assess in terms of failing to separate and address perceived and actual risks (and the subsequent cost of health care).

Even with the issues pointed out, the resource presented by the NHS (NHS 2000a) is still one of the most comprehensive resource and guideline available in the UK, and is designed to promote the development of HIA guidance, methods and tools. However, for this to occur, more assessments must be performed to add to both the knowledge base and expertise of the field.

The single greatest shortcoming of the NHS resource is the failure to involve the planners and policy makers that the resource intended to inform in its development. As previously mentioned, the resource was developed by health and HIA practitioners for health and HIA practitioners and has not sought to identify what planners, policy makers and decision makers want from HIA. As such, the methods employed and the deliverables achieved may have limited influence upon actual decision-making and risk becoming a tick box exercise. This is not just a shortcoming for the NHS resource, but for the majority of guidance available at the time of this review. Furthermore, the generally accepted and encouraged approach to gaining HIA expertise by ‘learning from doing’ means that HIA is becoming a largely process driven exercise, with the quality of the assessment categorised by the methods employed rather than the outputs achieved.

The tendency for process led HIA rather than objective led HIA is a real issue for the currently non regulatory HIA process. This is to say that current examples of HIA tend to follow a given process to completion without clearly establishing what the HIA is for and how it is to aid decision making (RPS Group 2008). There is, therefore, a requirement to develop a more objective focussed approach to HIA, designed to achieve and address specific project requirements, to meet client expectations (regardless of if it is a health authority, planning authority or developer) and potentially more importantly to ensure the methods employed are necessary to meet such objectives.

A failure to do so will result in unnecessary effort, delay and ultimately unnecessary cost. It is important to note that the most effective way of achieving more objective driven HIA is through more effective screening and scoping tools. It is at these stages that the requirement and objectives for HIA should be established and discussed which those commissioning them on a project by project basis, rather than blindly following a process that may result in an undefined assessment and outcomes that do not fulfil the specific, planning, policy making or client requirements.

3.5 Model Review Results

Though the models and guidelines reviewed differ in approach, scope, terminology, content, detail and objective they all outline a common process and base principles. Additionally, the models reviewed also highlighted the equally important key problems and barriers that surround the assessment of health. The results of the review are summarised in the following checklist in Table 6 that serves as a means to highlight the generic stages and principles inherent in the various international models, and allows a rapid indication to what approach, focus and processes are perceived as necessary and best practice to HIA.

As shown in Table 6, the checklist follows the same structure as the model review, where the column titles include the model basis, assessment basis and process and was iteratively populated during the review stage and scored qualitatively in terms of whether key elements were included, unclear or incomplete.

From the model review and summary checklist presented in Table 4 and summarised in Figure 14, the key components of a generic HIA process were identified.

These points have been presented in the same format as the review checklist summarised in Figure 15, and highlight the general components of the model basis, the assessment basis and process.

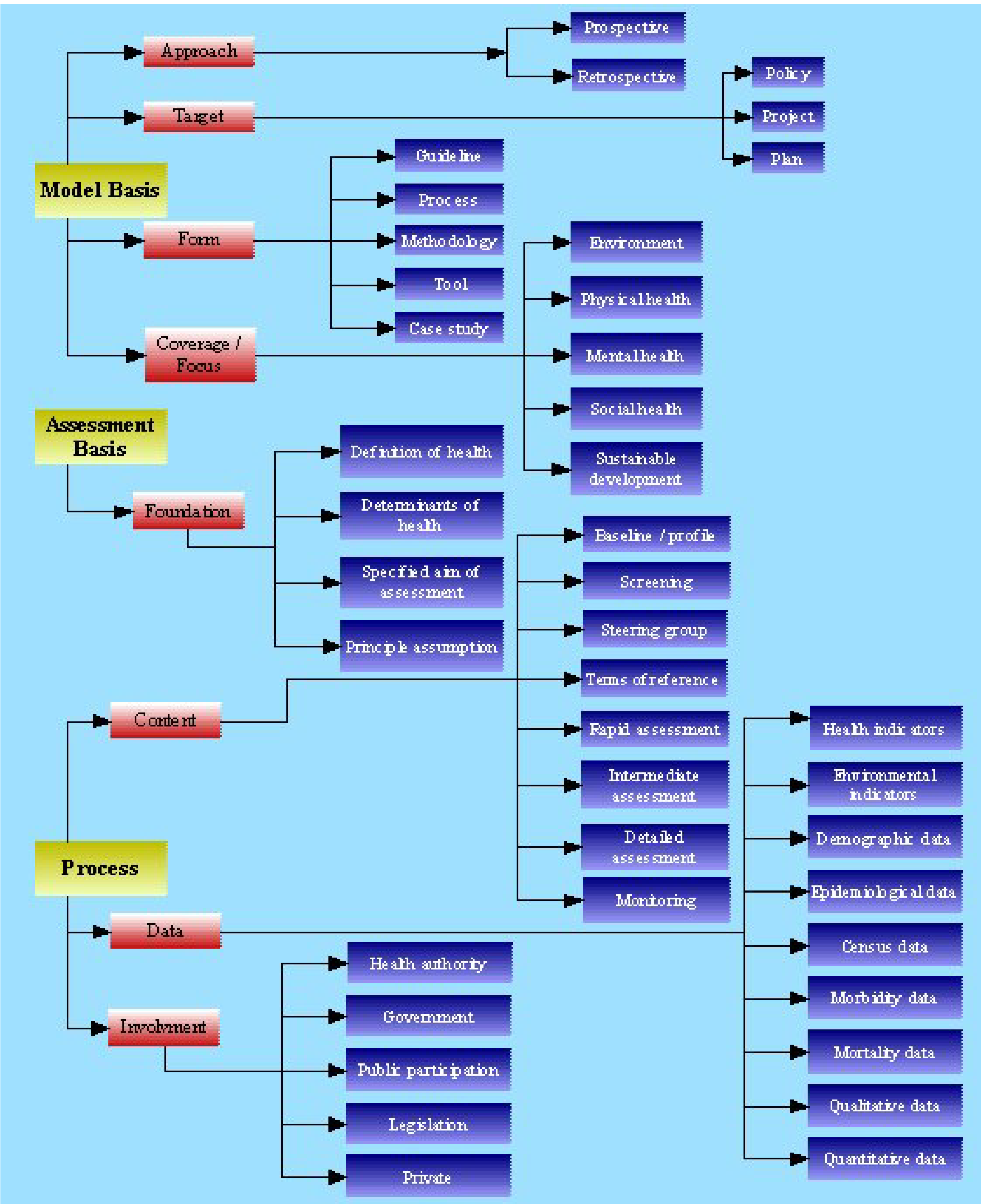


Figure 14 **Model Review Format**

Key: Yes = ✓; No = ✗; Unclear/complete = ●

Title	Model Basis															Assessment Basis			
	Approach			Form				Focus					Target			Foundation			
	Prospective	Retrospective	Guideline	Process	Methodology	Tool	Case study	Environment	Physical health	Mental health	Social health	Sustainable development	Policy	Project	Plan	Definition of health	Determinants of health	Specified aim of assessment	Based on a principle assumption
The Bielefeld model	✓	✓	✗	✓	✓	✗	✗	✓	✓	✗	✗	✗	●	✓	●	✗	●	✗	✗
The Kirklees model	✓	✓	✓	✓	✓	✓	✗	✗	●	●	●	✗	✓	✓	✓	●	✓	✓	✗
The Birley model	✓	✓	✓	✓	✓	✓	✓	✗	✓	●	●	✗	✗	✓	✗	✗	✗	✓	✗
The Swedish CC matrix	✓	✗	✗	✗	✗	✓	✗	✗	✓	✓	✓	●	✓	✗	✗	✗	✓	✗	✗
The Merseyside Guidelines	✓	✗	✓	✗	✗	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓	✗	✓	✗	✗
The British Colombia toolkit	✓	✗	✗	✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✗	✗
Better Health Better Wales	✓	✓	✓	●	●	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	●	✓	✓	✗
NHS HIA guidelines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	●

Table 4 **Model Review Checklist**

Key	
Yes	✓
No	✗
Unclear/incomplete	●

Title	Process																											
	Contents									Data										Involvement					Coverage			
	Baseline / Profile	Screening	Scoping	Steering group	Terms of reference	Rapid assessment	Intermediate assessment	Detailed assessment	Monitoring	Health indicators	Environmental indicators	Demographic data	Epidemiological data	Census Data	Morbidity data	Mortality data	Quantitative data	Qualitative data	Case studies	Health authority	Government	Public participation	Legislation	Private	UK	Europe	Developing countries	Global
The Bielefeld model	✓	✓	●	✗	✗	✗	✗	✓	✗	●	●	✓	✓	●	✗	✗	✓	✓		✓	✓	✗	✓	✓	●	✓	✗	●
The Kirklees model	●	●	✓	✗	✗	●	●	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✓	✓	●	✗	●
The Birely model	✓	✓	✓	✗	●	✓	✓	✓	✗	●	✗	✗	✗	✗	✓	✓	●	●	✓	✓	✓	✗	✗	✓	✗	✗	✓	
The Swedish CC matrix	✗	✓	✓	✗	✗	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓		✗	✓	✗	✓	✗	●	✓	✗	●
The Merseyside Guidelines	●	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	●	✗	✓	✓	●	✗	●
The British Colombia toolkit	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	✓	✗				
Better Health Better Wales	✗	✓	✓	✗	✗	●	●	●	●	✗	✗	✗	✗	✗	✗	✗	●	●	✗	✓	✓	✗	✗	✓	✓	●	✗	●
NHS HIA guidelines	✓	✓	✓	✓	✓	✓	●	●	●	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓

Table 6 Model Review Checklist: Continued

Chapter 3: Model Review

Model basis
The majority of models:-
- advocate prospective *HIA* as the more desired approach to aid planning;
- are presented as guidance, and not "off the shelf" models;
- mention the various aspects of health, yet largely focus on physical health;
- although acknowledge the environment as an important factor in assessing health, do not offer methodologies in including it within the assessment, and
- concentrate broadly on the appraisal of policy's and projects in relation to health.

Assessment basis
The majority of models:-
- attempt to avoid basing the assessment on a definition of health, but rather on an assumption or specified aim;
- are structured loosely around the social, mental, psychological and physical definition of health developed by the WHO;
- acknowledge that health assessment must do more then identify morbidity and mortality. and
- attempt to assess the potential effect of a proposal using the now commonly recognised determinants of health.

Process
The majority of models:-
- indicate that a multi-disciplinary and inter sectoral approach is required;
- include common key elements in both the process, methodologies and tools;
- seem to be either based on, or around the current process of EIA;
- experience overlap, where screening, scoping and appraisal often merge
- include a process that roughly includes hazard identification, translation into health risk and management;
- acknowledge that they are all still in early stages of development, and require among other things refinement;
- acknowledge the costs involved in undertaking *HIA* as a problem, yet do not give any costed examples;
- offer guidance, but do not always follow it
- promote the use of both quantitative and qualitative data, in order to cover areas that as yet cannot be quantified by one singly, and
- do not offer reliable repeatable sources of information.

Figure 15 Model Review Summary Overview

Equally few of the models and guidelines identify the necessary data to adequately profile existing community health consistently throughout the UK, or present methods for displaying such data geographically to establish the geographic distribution of relative community susceptibility. Based on the detail in Figures 14 & 15, a summary discussion of the key findings of the model review are discussed below.

3.6 Model Basis Results

The basis of any model is vital in that it will define what the assessment aims to achieve, what level of focus it will include and at what level it is targeted. Although variation was expected between the models due to different aims and objectives the results gathered showed general similarities in both principles and problems. The review indicates that the majority of models attempt to concentrate broadly on the appraisal of policies and projects in relation to health.

Though some models are designed specifically to assess either policies or projects, there is scope for the use of the tools developed between the two, including tools designed to initially identify aspects of policies and projects with the opportunity to influence key determinants of health (i.e. establishing a rapid screening tool), and profiling the existing burden of health to establish relative community susceptibility.

The result of the model review indicates a unanimous approach in that prospective HIA is condoned as the more desired approach to the assessment of health and although obvious, provides the greatest value to decision making. However, the benefits of retrospective analysis are also acknowledged for their ability to confirm the expected effects of an assessment, supporting the development of the fledgling HIA knowledge base and therefore supporting future prospective assessments.

The general form observed in the review indicates that although a number of the models include a process, methodology and some tools, they are often incomplete and still presented in the form of guidance where a pick and mix approach is often promoted. The purpose of identifying the focus of the models within Table 4 is to determine the approach of the assessment (i.e. the application of a risk or health promotion approach) in that this appears to significantly influence both the methods employed and the objectives sought. From the model review it was noted that the majority of models did include social, mental and physical health, but tended to place the most emphasis upon the physical health component. This again touches on varying objectives for HIA, based upon the origin in which the guideline or method was developed. As previously discussed, planners and environmental specialists place a focus upon risk assessment, that can be appraised, mitigated and where appropriate, defended. In contrast health practitioners, generally place an emphasis upon the wider determinants of health, and although such approaches provide more opportunities to promote health and wellbeing, are generally far more speculative in their appraisal and difficult to defend if subject to criticism.

In reality, both the planning and health approaches are complementary and only separated due to limited experience in the integration of the two approaches. To clarify, planners and environmental specialists have limited experience in health promotion, while equally few HIA practitioners and health experts have a full grasp of planning and policy making. In 2009, such a divide is starting to close, where HIA requirements are emerging in Local Development Frameworks and Local Area Agreements, however, the lack of a single legal requirement and accredited planning and health courses means a complementary approach is still some way off.

It was also noted that though there is an undisputed association between the environment, health and sustainable development, there is a clear difficulty in integrating such elements. This issue seems to be associated with the shear bulk, and complexity of data that would surround such an assessment, alongside the resources, expertise and financial cost it would take to perform. A solution to this problem would be the identification or development of local level health indicators available throughout the UK that best represent each field or health determinant, thereby structuring the assessment of health.

3.7 Assessment Basis Results

Though the basis of the model defines the way in which the assessment will proceed, it is the assessment basis (i.e. the founding health principle of the assessment) that will ultimately characterise the purpose and objective of the model. The review uncovered a mixed approach, where although a definition of health is often offered; it is not always used as the basis of the assessment. The tendency to avoid a definition of health is somewhat perplexing, as some models are designed to assess health yet do not actually determine what health is, or what it is to have good health. Instead there is a common approach to basing the assessment upon the generally accepted determinants of health, such as the health objectives of the Kirklees model previously described (Department of Health 1999).

The majority of models are structured loosely around the WHOs definition of health (WHO 1948), and acknowledge the importance of each aspect. However, they also leave the final selection of what aspects of health are to be included to a relatively undefined and potentially inappropriate and inexperienced steering group.

3.8 Process Results

The purpose of the process review was to identify the content, data, involvement and coverage of the proposed models, and in so doing set the stage for identifying a more comprehensive process, methodology and tools for the assessment of health. This stage is also intended to highlight the areas that are still in need of research. Though some discrepancies were expected due to the models reviewed differing in background (and resultant terminology, order, and coverage), a generic HIA process has been identified throughout the models reviewed, and as shown in Figure 16 has a striking similarity to the process found and currently used within EIA.

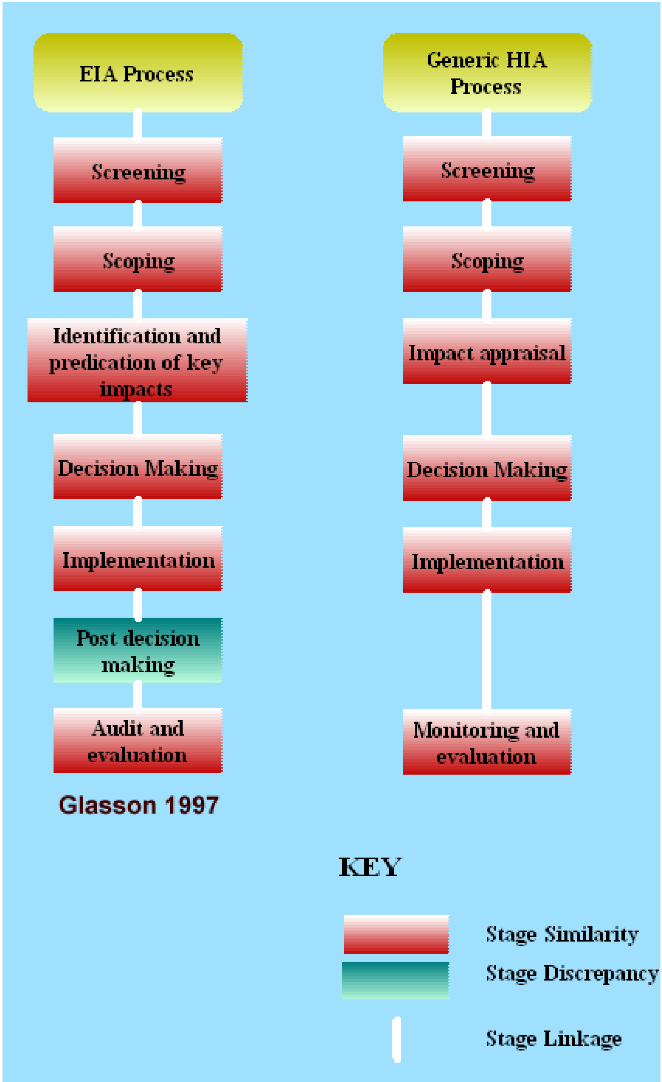


Figure 16 **Comparison of Generic HIA and Conventional EIA Process**

The attempt of some models to redesign the wheel and diverge from EIA (Landstingsforbundet 2001) has had little impact and may reflect the fact that the process developed through EIA is well tested and honed through its use for over 30 years internationally, yet is not commonly known or understood to health and HIA practitioners. As such, a similar process has evolved, between EIA and HIA yet with varying terminology or an appreciation for the level of potential overlap or integration. Conversely, a failure to recognise the opportunities for integration with regulatory assessments has also resulted in certain circumstances where HIA conflict with technical assessments such as EIA (RPS 2008). In such circumstances, poorly scoped, speculative non-regulatory HIA have the potential to result in project delay, subsequent cost and further knock back the mainstreaming of HIA (UK Airport Consultative Committee 2008).

The generic stages of HIA are shown in Figure 17, and described in more detail below. However, a key feature to be aware of is how the focus of the assessment is generally refined the further the process proceeds. This is a common feature of most assessments, necessary to prioritise effort and ensure a robust and effective assessment and mitigation. However, it also emphasises the fact that unless the founding screening and scoping stages are robust, the proceeding stages may be flawed, inappropriate, ineffective and unable to defend if challenged (i.e. it will not be possible to offer a paper trail supporting or justifying the decision as to why certain health elements where assessed and others not if challenged by interest groups, the community or at Public Inquiry).

The key problem is not the generic HIA process that requires development, but the methodology and tools that encompasses it, and the requirement to set clear objectives for HIA through a more informed screening and scoping stage that build upon and supplement the regulatory assessments (EIA, SEA, SA, Equalities Impact Assessment, Environmental Permitting etc).

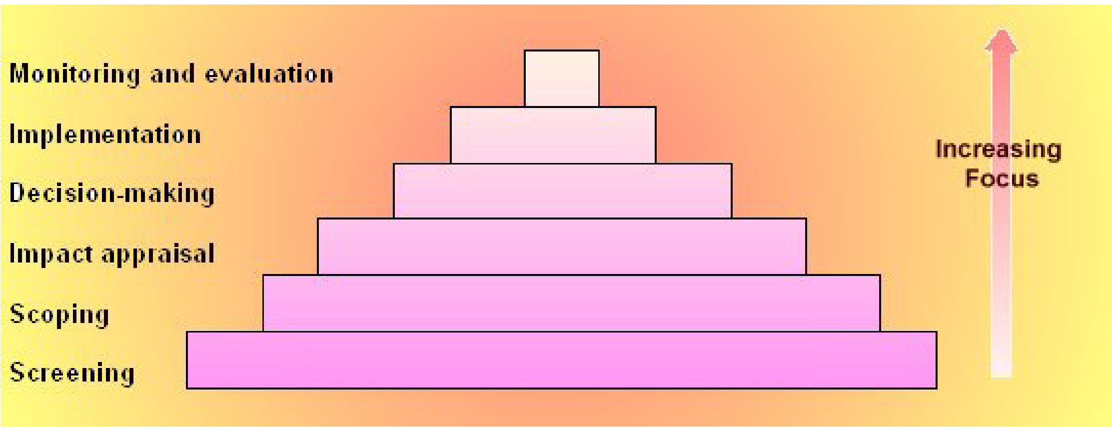


Figure 17 HIA Process Hierarchy

Based upon the conclusions of the model review, each stage of the generic HIA process shown in Figure 32 are discussed in more detail in the rest of the chapter with the purpose of establishing the key objectives of screening and scoping to influence the following stages of a full HIA.

3.8.1 Screening

Screening is comprehensively acknowledged as the primary stage of HIA (Ison 2000, Winters 1997), in which a proposal is gauged as to its potential health impacts, with a determination of whether a HIA is beneficial, practical or worthwhile. This would in turn indicate what level of further assessment is required (be it rapid, intermediate or comprehensive) the key health pathways to be assessed and potentially more importantly, what the key objectives of the assessment are. As the intended function of screening is to quickly assess potential health pathways, and determine the level of assessment that is to follow.

To determine if a HIA is required, a proposal (be it a project, policy or programme) must be profiled as to its potential health outcomes and its life cycle taken into account. This can then be used to estimate as to a HIAs potential target population, and the extent of its potential influence. Screening can hence be likened to a rapid assessment, in that health outcomes are identified, and evaluated (all be it speculatively) to determine if the implications are serious enough to warrant a more detailed assessment.

In theory screening would be performed on all projects, policies and programmes, indicating those that require HIA from those that don't. Unfortunately, this is not the case; in reality screening rarely take place. Due to a lack of regulatory requirement, financial constraints and the time and resources required, applying current techniques, it is not feasible to screen every proposal. What is more likely is that a proposal will be selected for a full HIA with regard to public interest or where there is controversy over a particular development (thereby potentially skipping the screening and scoping stages, or rationalising the requirement or benefit of the HIA).

This selection of projects for HIA is further influenced by whether a HIA can be performed in time to make a difference, the likelihood of changes being made, or if there is money available. There are also examples, however, of projects selected for HIA on a simply ‘dropped on the desk’ basis (i.e. when a HIA is instructed with no clear rationale or objective to the decision) (Taylor and Quigley 2003).

Furthermore, there is a tendency of current guidance to require the development of a voluntary, multidisciplinary steering group to perform or inform this screening stage. However, this is simply not always practicable or reliable. Steering group members typically comprise individuals from Strategic Health Authorities (SHA), Primary Care Trusts (PCT), Local Authorities, academic institutes and on occasion, community interest groups. This approach runs the risk of assessment by committee and will be dependent upon the relative skills base, abilities and political motivation of the people that volunteer their time.

Then there is the issue of the time factor required and participants availability or willingness to attend. Individuals from the SHA, PCT and Local Authorities have a number of other pressing requirements and although willing, may not be able to participate in screening. There is also a requirement to consider the relatively high turnover of staff, this is not to say that SHA, PCT and Local Authorities typically loose staff on a regular basis, but staff positions and responsibilities can vary and relocate frequently within the public sector.

A reliance upon such voluntary participants to provide local level health knowledge to screen when and if a HIA is necessary or beneficial is therefore not necessarily ideal for mainstreaming HIA. This is not just in regards to the varying skills base and experience that will lead to inconsistency and varying quality, or the time factor required to coordinate such individuals, but also the risk to HIA on being dependent upon such a structure.

To clarify, under this arraignment there is a risk that HIA (being largely voluntary) may be put aside due to other priorities. A perfect example of this was during the restructuring of the PCTs in 2006. Up until this point, the PCTs were the key advocates for HIA, championing a preventative approach to health care over the previous treatment based approach. The restructuring constituted a significant change in staff roles and responsibilities and resulted in a noticeable one-year blip for HIA, where PCT staff recovered and acclimatised to the change. Another problem with this arrangement is that it is detached from planners, policy makers and decision makers, and if HIAs are performed in isolation as the model review showed, it will not only lack technical inputs, but also reduces the level of influence on decision making.

The findings of the model review further indicate that screening is the founding stage of HIA, defining the communities that may be influenced and the level and scope of any following assessment. As shown in Figure 17, screening, being the primary stage in a hierarchical process will define both the boundaries, and ultimate extent of any further assessment, it is therefore required to be, to some degree, uniformly conducted in the UK so that all HIA apply similar criteria and threshold values.

Screening therefore demands a solid basis and criteria for determining when a HIA is required. It is the key step to current and the future of HIA, in that without a reliable screening approach HIA will remain inconsistent throughout the UK and internationally.

There is therefore a requirement to integrate HIA screening into the current regulatory structure, to streamline the process in order to make screening practicable and to aid in setting clear and achievable HIA objectives. Such requirements are the reason that later chapters concentrate on the screening and scoping process of HIA.

3.8.1.1Screening Requirements

Though the majority of screening processes considered in the model review identified the need to develop a profile or background level of health, such methods do not meet the requirements of screening in that they can often be time consuming and costly. They do not always offer a stable means of establishing a profile, or repeating the exercise to the same quality elsewhere. This stage is often not clearly defined in the models reviewed, merging as it does into the scoping and appraisal stage.

3.8.1.2Current Screening Methods

The current method for screening involves a mixture of checklists, matrices and expert opinion, which though has proved to be successful in Sweden (Landstingsforbundet 2001), with the application of the health questionnaire and matrix, backed by politicians, public officials and county councils trained in the instrument of HIA, it has as yet to be perfected in the UK. The checklists in the models reviewed intended to screen or rapidly asses potential health outcomes do not include aspects that can be reliably repeated to the same quality elsewhere, while the difficulties inherent in producing, combining and clearly displaying multidisciplinary information within HIA makes transparency often difficult.

The final decision on whether HIA is performed or not, therefore reflects such methods, in that if it is the decision to continue, the choice and potential scope of assessment will be based upon the limited information drawn during the questionnaire. Similarly, if the assessment is not deemed necessary, only the limited information drawn at this screening stage will be available to influence any decision making to support the improvement in potential health benefits linked to a development or proposal.

The use of checklists, matrices and expert opinion is limited, but not without merit. What is required is a means to substantiate or support such qualitative evidence. One such method is the use of quantitative nationally available demographic and health statistics. Reference to the use of national statistics in the early HIA literature would show that such an approach remained relatively untapped. The detailed analyses later in Chapters 4 & 5, therefore, consider the role and application of national data.

A quantitative approach not only utilises a range of multidisciplinary data including environmental, socio-economic and physical health information, but is potentially able to incorporate areas of health that are generally avoided (i.e. the determinants of health). One of the few reviewed models to include this approach is the Bielefeld model (Fehr 1999). Here, as previously indicated a population analysis utilising general demographic information such as size, age, sex, the status of general health in that population, and their behavioural patterns is combined for both a project level and regional analysis to develop a background situation or Community Profile. Such a technique not only allows a rapid repeatable methodology to develop a baseline of health, but can also be built upon to estimate the effect on communities from a specific proposal. Surprisingly, such application of national statistics to establish relative susceptibility comes from a model that places an emphasis upon risk assessment as opposed to health promotion. Yet such an approach can be applied to identify how sensitive local communities are to health benefits brought about from specific projects, policies and programmes.

Though this technique allows a rapid indication of the general health of a population, and areas of concern, it is not being applied to its fullest, where its benefits, similarly to other HIA tools, are often lost in the way the information is presented. The majority of models still utilise checklists as a means to gather and display information, resulting in static views with no real definition of whom will be affected, how, when and if the potential effects will be evenly distributed, or result in spatial health inequalities.

Despite the opinion that screening can be systematic (Ison 2000), this is far from the case. Apparently, in the case of HIA in the UK, methods applied may involve a mixture of checklists, matrices, informed/expert opinion supported by any available material.

The quality and reliability of any screening process is therefore subject to:

- the founding principle or definition of health used;
- the type, relevance and reliability of data available;
- the level of expertise applied;
- perceptions and prioritises of experts involved;
- the type and level of health thresholds used; and
- the practitioners coordinating it.

In the models reviewed, there is no screening process or guideline that sufficiently meets these criteria, and more importantly, no screening process or tool reviewed that incorporates the spatial mapping of health indicators to establish the likely distribution of health outcomes. When further considering that it is screening that sets the founding principles for any following assessment, inconsistencies on how screening is performed, if at all, plays a key role in the inconsistencies currently experienced in HIA.

3.8.2 Scoping

In theory, the scoping stage of a HIA builds on the recommendations of screening setting the stage for any following assessment in terms of workload, target population, and tailoring the assessment to the time and financial constraints of the project. It is at this stage that the Terms of Reference (ToR) for a HIA are set and experts consulted alongside stakeholders and decision-makers. The methods used at this stage are again varied but often include stakeholder and steering group sessions. From the model review it was found that the majority of scoping processes are also somewhat limited.

There is a definite lack of suitable criteria to determine and rationalise the extent of the HIA, what components of health assessment are required, what aspects of health are the priority, and the selection of relevant experts and individuals to the steering group, although the NHS (2000a) resource attempted to advance this situation.

Ultimately, the reliance upon an undefined voluntary steering group with a high likelihood of significant participant variation not only between regions, but between projects within the same area is fraught with issues. The core issue being that of assessment by committee and a subsequent danger of following a process without clear objectives or an understanding as to how the HIA will inform and improve decision making. In addition, the labour intensive nature of such an approach coupled with inconsistency and the current lack of a regulatory requirement will not inspire commercial confidence, and when further considering the cost, are unlikely to be voluntarily commissioned by developers.

Despite guidance indicating that scoping is a separate stage, in reality, scoping is largely defined by screening, and does not necessarily always require input from an undisclosed steering group to establish if a HIA is required and what it would entail. To clarify, screening, although rapid, has to establish what the potential issues and opportunities are, therefore defining what needs further assessment and providing justification for what does not in later stages of HIA. As such, for the purpose of this thesis screening and scoping are considered together as they relatively interlinked.

Although the use of a multidisciplinary independent steering group was of value in the early evolution of HIA (where HIA practitioners had varying backgrounds, capabilities and expertise), it was never a viable long-term option for a mainstream assessment process, and only implemented to ensure the HIA focused on the key issues and that local community circumstance were considered. To clarify, it is not practicable, or of value to form an appropriate and robust steering group to scope every project that might require a HIA in the UK. Although such input from a steering group may be of value in later stages of a full HIA, the resource and time cost of such participation on every project during scoping would be detrimental to the mainstreaming of HIA.

3.8.3 Impact Appraisal

Although terminology within current guidance varies, it includes health hazards identification and risk assessment within the same heading, for example it is at this point that potentially positive and negative impacts are investigated and public perceptions and fears discussed, in order to determine a proposal's potential direct and indirect effect on the health of a population.

The methods and techniques implemented at this stage vary, where a 'pick and mix' option is greatly favoured (Winters 1997) in order to fit the project requirements, steering group views and local circumstance. Furthermore, depending on the selection of rapid, intermediate or detailed analysis within the scoping stage, the focus of the impact appraisal may vary from a mix of experts, decision-makers and stakeholder sessions, to a more in-depth panel, backed by surveys, quantitative and qualitative data. Varying style and expertise of practitioners will therefore greatly influence the effectiveness and final value of the analysis. This indicates that without an effective screening and scoping process to define the objectives of the HIA, coupled with a lack of a nationally available syllabus, or acknowledged HIA qualification or accreditation, the overall quality and value of HIA is at risk, as is the value to decision making. To clarify, there is a risk that process driven HIA, as opposed to objective driven HIA developed through more informed screening and scoping, do not consider how the outputs of the final HIA will actually aid decision makers (UK Airport Consultative Committee 2008).

3.8.4 Decision Making

The decision making process is included within the generic HIA process in Figure 31. Though it is sometimes missed in guidance, it is a key stage for decision-makers to reflect upon the findings and recommendations of the previous HIA stages. This offers the opportunity to influence a proposal to minimise negative impacts and further enhance positive health outcomes through direct proposal changes and mitigation. If health assessment is not deemed necessary during the screening stage, it may be the case that screening itself may also highlight areas to further enhance the health benefits of a proposal (i.e. developing a Health Action or Management Plan to influence planned work streams as opposed to requiring a full HIA).

It is important to consider that the benefit of HIA to decision making will ultimately be dependant upon the initial objectives of the assessment. However, as previously discussed, in 2009, there is a tendency for process led HIA rather than objective led HIA. This is to say that current examples of HIA tend to follow a given process to completion without clearly establishing what the objectives for HIA are at the start, or how these can be achieved or applied to inform decision making (RPS Group 2008).

In short, the general failure to perform the initial stages of screening and scoping means HIA tend to be requested without a clear understanding of what HIA can achieve or how the results will be applied. Not only does this significantly limit the value to decision-makers, but can also result in a potentially inappropriate scope of work and additional cost and delay to amend or re-assess. As such, this thesis focuses on the screening and scoping stages of HIA, and how these stages can be applied to support the development of more robust and effective later stages of a HIA.

3.8.5 Implementation

The implementation stage is again often missed in current guidance, yet is important to make sure the recommendations and subsequently more health conscious decisions made, are actually implemented. Implementation is a common problem, where in some cases the HIA is finished after the project decision making process, making the results and recommendations hard to act upon. Furthermore, there is also the concern that without legislation, there is no commitment for decision-makers to implement the recommendations made (Taylor and Quigley 2003). As such, there is a requirement to streamline the generic HIA process, so that it can be performed in time, and often within limited budgets to inform and be of value to the decision making process. This stage is again significantly influenced by the screening and scoping stages, as an understanding and appreciation of how the findings of the HIA can be applied must be clearly set from the start. If not, there is a risk that HIA fail to meet expectations and/or becomes more of a tick box exercise.

3.8.6 Monitoring and Evaluation

The final stage of monitoring and evaluation is again sometimes missed within current guidance, but essential to the development of HIA, in that it is necessary to review the quality of the assessment, monitor the accuracy of the predicted outcomes, the effectiveness of recommendations and to further develop a catalogue and evidence base for future assessments. However, no model or guideline offered advice on how this monitoring should be approached, how long such monitoring should continue, who would manage the information, how and who meets the costs.

Though this thesis does not intend to explore this stage, the identification of suitable health indicators will lend itself to developing a quantitative resource that in time can be applied to monitor outcomes, and evaluate health assessments and the accuracy of its predicted outcomes. Furthermore, in terms of evaluating HIA, this thesis has established the key stages of HIA and provided a structured framework for quality appraisal during the model review. Again, although this thesis does not intend to focus upon this particular area of research, further investigation is warranted.

3.9 HIA Methods and Tools

A number of HIA methods and tools offered in the model review apply a mixture of the health field's concepts and determinants of health to identify and appraise potential health outcomes through a mixture of checklists, matrices and input from stakeholders and steering groups. However, few models actually offer a definitive tool for establishing and quantifying what the likely health outcomes will be, and potentially more importantly fail to offer methods or tools to map the likely distribution of such impacts upon existing burdens of health or local susceptibility. One of the few models to apply such an approach is the Bielefeld model (Fehr 1999) which is in essence a health risk assessment tool applied in EIA and Environmental Permitting to quantifying health risk from exposure to specific pollutants.

The data component of the model review was set to identify the type, quality and source of information used within the various models and the screening and scoping stages. However, at the time of the review, obtaining relevant reliable statistics that best represent the key determinants of health proved to be more difficult then first expected. Unfortunately as previously shown in summary Figure 15, no model or guideline within the review adequately covered the identification of sources of information for the assessment of health. Though public consultation, literature review and expert assistance are suggested, no single source of information was offered for reliable repeatable use throughout the UK.

Furthermore, the general approach to data gathering is to identify the health fields set in the terms of reference (largely aspects of the determinants of health), and allow the assessor to identify these sources through their own experiences, expertise and contacts. This unstructured approach is another example of the uncoordinated development of HIA, as the suggested sources of information will result in a differing focus, objectivity and quality between organisations, HIA practitioners and the relative experience and structure of both.

The only model to include the use of nationally stored quantitative data was that developed in Bielefeld (Fehr 1999). The reason why this was the case is not clear, as available demographic data alone can supply a wealth of information on the structure and make up of a population, susceptible groups, and future trends. The tendency for the majority of models to shy away from quantitative information in the screening and scoping stages, relying upon qualitative information (Winters 1997) obtained from the perceptions of key stakeholders and the public alone may prove unreliable, and if solely applied, is ultimately unfeasible for a national uniform approach and application.

On further examination through workshops and networking it was noted that through 'field work in progress' approaches utilising quantitative data such as national demographics existed and were being applied, but were not currently available within literature, pointing again to the requirement of a recognised HIA syllabus and accredited HIA qualification to ensure knowledge and experience is shared.

For a national HIA process to evolve, sources of information have to be identified that are relevant, repeatable, fast and above all reliable. A more consistent approach is required, where the same information is available for small areas nationally. This in turn will allow HIA to have a common basis for comparison, and a direct indication of the susceptibility of the area to a specific project, policy or programme.

3.10 Model Review Summary

As unveiled during this model review, HIA is valued internationally and is being applied to facilitate a preventative approach to health care and to foster healthy, vibrant and sustainable communities. However, HIA is not without limitations and warrants further research in a number of areas to improve the consistency of approach, the quality of assessment and value to decision makers.

Being a hierarchal voluntary process, the most important stages of HIA to develop are the initial screening and scoping stages, as it is here that:

- it is determined if a HIA is required, necessary or beneficial;
- that the objectives and necessary deliverable of a HIA are established;
- the basis and founding principles to the HIA are set;
- the scope of the assessment is set (i.e. what is to be assessed and sometimes more importantly justification for what is not);
- that parallel assessments such as EIA are identified; and
- a steering group may be established if necessary and a suitable consultancy or analyst commissioned.

In short, the screening and scoping stage is intended to structure the assessment, establish what information decision-makers require to inform their decision-making and as such guide the choice of methods and subsequent outputs of the assessment (i.e. an objective driven HIA).

Furthermore, it is at this stage that it is possible to investigate what other assessments are to be commissioned, in order to better integrate HIA into the process and to avoid needless repetition of effort and cost. Not only does this enable the HIA to piggy back on mandatory assessments, but also avoids the situation where a voluntary HIA contradicts a regulatory assessment such as EIA.

By defining the scope and focus of the assessment, these stages also provide the basis to more informed procurement requirements sent out for competitive tender. This is important as a lack of such information will rely on the HIA consultancies ability to determine project/client requirements and runs the risk of a process led HIA as opposed to the more effective objective led HIA.

Finally, in the instance that a full HIA is not deemed necessary, the information collected during these initial stages are still of value and can be applied to inform decision making or influence a project, policy or programme through a dedicated health action plan (i.e. by establishing how planned work streams can be adjusted to further address potential health issues and opportunities, even when a HIA is not conducted). Furthermore, such a process provides a paper trail establishing how community health was considered at the onset of a project and provides justification for decisions made. This point is of particular importance to the public sector, where Government, local Authorities and PCTs may be publicly criticised for not investigating the health risks associated with a proposed project (e.g., energy from waste facilities, windfarms, infrastructure, airports, mining etc). Equally, both the public and private sectors need to rationalise the decision to commission HIA or not, or risk setting a precedent, which could force them into future HIA that are not necessary.

As such, a more informed screening and scoping stage will not only support a more consistent approach to HIA throughout the UK, but has the potential to enhance the quality and value of HIA to decision-makers by refining the assessment objectives, establishing potential integration with parallel assessments and ultimately offer better value for money.

The findings from the literature and model review suggest that developing a an effective screening and scoping process needs to involve a rapid repeatable process that takes account of local circumstance and enables a transparent means to establishing the requirement, aim and objectives for any following HIA deemed necessary.

These findings highlighted within the model review have not only confirmed the thesis premise and rationale outlined in Section 2.5, but have further influenced the screening and scoping stages model development in the following chapter, providing a source of inspiration for the 'Spatial Susceptibility' model that implements a spatial element to mapping specific health indicators that best represent community susceptibility.

The following chapter, therefore, contributes to the aim of the Thesis, to produce test and evaluate an approach to screening and scoping in the UK, and its subsequent external evaluation by leading international HIA experts and application for over seven years through two environmental and planning consultancies (ERM and RPS Group).

CHAPTER Four

4.0 Model Development

4.1 Introduction

This chapter covers the justification and inspiration behind a spatial approach to HIA, discusses the necessary data requirements to develop such an approach, and presents an initial screening and scoping model that includes best practice from the models and guidance previously reviewed.

Supporting this chapter, Appendix 2 provides a review of national statistics available in 2000 that best represented the key determinants of health (e.g., income, employment, education, housing etc) and could be applied at the local level uniformly throughout the county. This chapter concludes with a discussion on key stages of the initial screening and scoping model, and the methodology for its further application and refinement through external peer review prior to application and further refinement in a commercial setting.

4.2 Screening and Scoping Model Design

The model was developed in response to the key findings of the model review in Chapter 3. Key elements in the model review that in part met these criteria and contributed to the final model design included:

- the quantitative element of the Bielefeld ten step Model (Fehr 1999);

- the Swedish County Councils screening question and matrix (Landstingsforbundet 2001); and
- the principle methodologies and guidelines from the British Columbia toolkit (Ison 2000).

By combining key aspects from these examples it was possible to develop a model that was rapid and repeatable using a combination of a structured checklist based upon the determinants of health, and the use of specific national statistics on health and environmental information mapped spatially.

In order to incorporate the use of national health statistics into the screening and scoping model, it was necessary to assess the health data available and the degree to which it could be spatially disaggregated. As noted in the model review in Chapter 2, assessing the potential health impacts of a proposal requires data that can reveal how the potential impacts are distributed both geographically and socially, as all communities will respond differently based upon the type of impacts and relative spatial susceptibility to those impacts (Asthana et al., 2004). The next section, therefore, considers health data availability before the screening and scoping model using this data is presented. The model presented includes a spatial susceptibility model that uses geographically disaggregated national health statistics and this is described first, followed by the details of the screening and scoping model.

4.3 Health Indicators and Data Availability

Geographical Information Systems (GIS) is a combination of hardware and software for capturing, storing and analysing data that has a geographic reference. It is, therefore, a tool that not only aids in visualising information in regards to location, but also allows multiple layers or themes to overlap allowing a more informed insight upon the chosen layers (Lang 2000). During the initial stages of this thesis in 2001, the use of GIS by health authorities in the UK was limited and varied regionally in its application (Smith et al 2001b). However, the application of GIS within HIA lends itself to combining a range of factors, making a more transparent means to identifying and visualising the existing burden of poor health (Higgs and Gould 2001), potential susceptibilities, inequalities (Higgs et al 1998) and targeting areas for health improvement (Kidner et al 2002). Thus it provides a more effective means to compare and contrast existing burdens of health in a spatial context, and associated levels of social and health inequality (White et al 1997, Doran et al 2004).

The advancement of both available data and tools means that health no longer needs to be assessed by utilising qualitative information (More et al 1998), or the tail end of effects on health such as morbidity and mortality (Gould et al 2004). Health can now be assessed in a more systematic, prospective and holistic manner by utilising nationally gathered data on the factors that influence health and lead to final health outcomes (i.e. the determinants of health) (Higgs et al 2001). Though this is the case there is currently insufficient guidance on potential health indicators that best represent the determinants of health or should be included or applied in HIA or HIA screening and scoping (Kemm 2007).

Further issues in the development and use of human health indicators were pointed out by Rootman (1990) in that:

- indicators are required for the positive dimensions of health and well being, but these are difficult to define let alone quantify;
- problems exist in developing holistic measures that combine objective and subjective dimensions of health;
- uncertainty exists on how to develop indicators to substantiate the contextual factors related to health status, and
- there are no indicators targeted specifically at the community level; only indicators based on the aggregation of individual measures.

These issues led to the problem of what statistics to select, how reliable they could be at a local level (Boulos 2004), and if such data were available (Cooper 2000, Cockings et al 1997).

The internationally accepted determinants of health have been extensively called upon throughout key HIA models (Laylonde 1974), However, by 2000, many had not been developed into anything more than a checklist, matrix or structured questionnaire that aimed to simply guide and inform assessors and decision makers (BMJ 2000, WHO 1993).

In contrast, by selecting and mapping national statistics that can be spatially disaggregated and can best represent the key determinants of health, it is possible to generate a rapid community profile that indicates spatial susceptibility to specific health pathways. To clarify, income and employment are considered to be key determinants of health, by mapping statistics that best represent such health determinants such as employment deprivation, areas indicating high levels of susceptibility to this specific determinant of health can be quickly identified. As shown in Figure 18, additional social, mental and physical health indicators can then be further layered using GIS to establish relative community circumstance and susceptibility (Jones et al 2000).

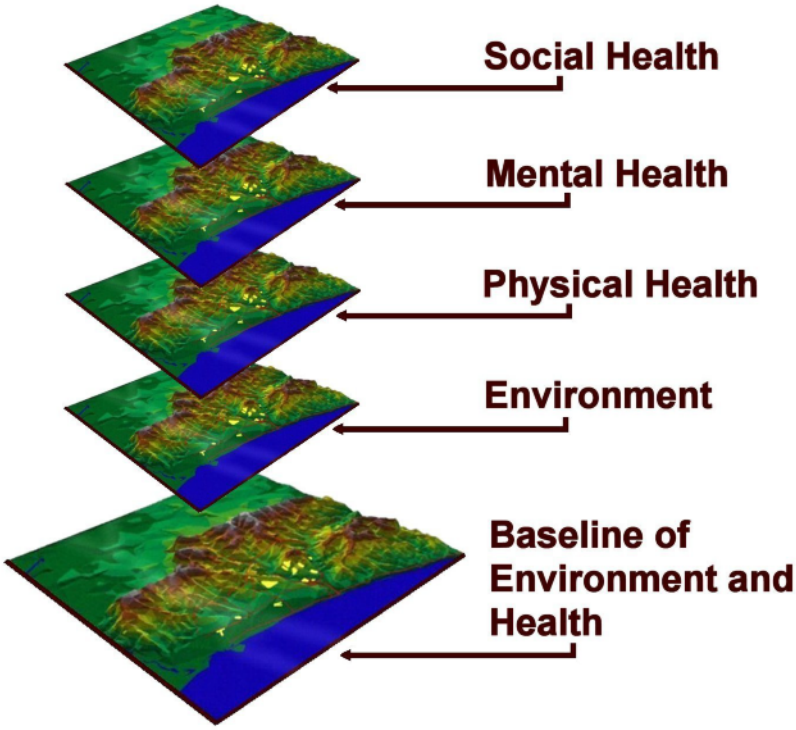


Figure 18 Combination of Health Determinants to Develop a Community and Environmental Profile

With the increased development and use of the internet, statistics on a number of health related fields including demographics, socio-economics, morbidity and mortality(Cromley et al 2002, Thrall 2000), the health care process and health outcomes have become made readily available at the local, regional and national level (National Statistics 2003, Neighbourhood Statistics 2003).

This information is often presented in a manner that not only encourages its use for research but also lends itself for application to other fields and the advancement of more spatial approaches to health promotion (Higgs and Gould 2001, Richards et al 1999, Rushton 1998). As shown in Figure 17 national statistics can be kept up to date and are often structured in uniform tables, titles, rows and columns, allowing easy retrieval and uniform analysis through a number of statistical and analytical programmes including GIS (Crooner 2003).

Figure 19 Example of Data available for Download from National Statistics in 2000 Source Neighbourhood Statistics

Sources for such information are now widespread ranging from a number of government departments through to academic data reserves. A common theme identified from the sources is the partnerships between government, academic research and other statistical databases and search sites (Neighbourhood Statistics 2003).

A review of potentially relevant data was performed to identify potential health indicators that can be mapped to reveal the relative sensitivities of communities at a local level nationally. The data review reviewed sources available in 2000 categorised by:

- the health determinant they represent;

- the geographic level they are available at; and

- by relevance as to their application as a potential health indicator.

However, it is worth noting that since 2000, the availability, type and resolution of data has advanced considerably. However, it is worth noting that the data sources identified during this thesis (e.g. the indices of multiple deprivation) have been advanced and are now commonly applied to appraise and monitor the key determinants of health.

Appropriate health indicators identified during the data review included data sets on:

- income and social status;
- social support networks;
- education;
- employment and working conditions;
- physical environments;
- personal health practices and coping skills;
- healthy child development, and
- health services

A full account of the 2000 data review is available within the Appendices.

The data review highlighted a number of sources with the potential for application as health indicators. However, for the purpose of HIA screening and scoping, statistics that proved most transferable included basic demographic data from the National Census to accurately profile the distribution, population structure and type of communities. Basic demographic information is then best supported by the Indices of Multiple Deprivation (IMD) providing an overall measure of health susceptibility and a breakdown as to housing, education, employment and health deprivation and inequality (i.e. the key determinants of health) through the individual sub domains of IMD. In 2009, such data is freely accessible from the Office for National Statistics, neighbourhood statistics section, and can be further supplemented/supported by more frequent data from the regional Public Health Observatories and local PCT.

The combination of such statistics through a geographic mapping media is the premise behind the spatial susceptibility tool, allowing an immediate and nationally comparable profile as to the circumstance of communities, their relative susceptibility, and measures that may improve their physical, social and mental health through a health pathway concept.

The health pathway concept, although basic terminology for technical fields such as Human Health Risk Assessment is relatively new to HIA, and is predominately applied to develop a conceptual model to quantify risk from a change in exposure to specific environmental stimuli (i.e. exposure pathway to pollutants) (Environment Agency 2003). However, such an approach can also be applied in a wider health context, and in part addresses the difficulties in profiling, assessing and monitoring the more qualitative elements of health. To clarify, in a HIA context, a ‘health pathway’ can be defined as any action or activity with the opportunity to influence a determinant of health. As an example, income and employment are recognised as key determinants of health, influencing the quality of housing, coping skills, the quality of health care and are closely associated with levels of morbidity and mortality (Acheson 1998). In a screening and scoping context this can be simplified to identify projects with the potential to influence income and employment, and to determine the likely distribution and significance of effect on local circumstance (Secretary of State for Health 1999). Although speculative in nature (i.e. establishing relative community susceptibility as opposed to actual risk or health outcome) this is sufficient as a screening and scoping tool to focus further HIA, or provide a justification when no further HIA is required.

Through the provision of appropriate indicators on key health determinants, it is therefore possible to establish how a community may respond to specific activities identified from a project, policy or programme. Therefore, screening and scoping can be based upon relative socio-economic and health circumstance, as opposed to faceless thresholds limits that do not account for local susceptibility or inequality. To date (2010), the application of the health pathways concept in this manner within screening and scoping, is unique to the outputs of this thesis and the projects it has been applied on.

4.4 Spatial Susceptibility Model Design

The screening and scoping model to be tested is summarised in section 4.5. It includes a proposed spatial susceptibility model designed to profile the relative health circumstance of a defined population, and has a wide range of potential benefits to full HIA including providing a more detailed and informative approach to assessing the relative distribution, likelihood and significance of health outcomes upon local circumstance (Jacquez 1998, Khan et al 2003). However, when the spatial susceptibility model is applied through an appropriate screening and scoping model it is also possible to define how a proposed project, policy or programme might influence key determinants of health in order to determine if a formal HIA is required, and what it might include.

It differs from conventional health screening tools in that it is based upon the premise that population composition and environmental conditions, result in a variety of circumstances that make relative susceptibility to proposals locally determined. Deciding when a HIA is required cannot therefore, solely draw upon the nature or past experiences of similar proposals, but is also dependant on a combination of factors including the relative susceptibility of the local population, the type of proposal and the particular direct and cumulative effects of what is proposed. The spatial susceptibility tool draws upon the World Health Organisation's definition of health (WHO 1948), in that the model utilises national statistics available at the local level that indicate social, physical and mental well being.

By mapping statistics that best represent the key determinants of health it is therefore possible to rapidly profile the relative circumstance and susceptibility of a community uniformly throughout the UK. This approach is not only of value to screening and scoping, where a checklist can be applied alongside such mapping to establish what key determinants of health a project, policy or programme may influence and how a community is likely to respond, (warranting further assessment or not). With the increasing availability of data sources the selection process for suitable indicators involved evaluating data for their initial relevance to the determinants of health. These included data sets on:

- income and social status;
- social support networks;
- education;
- employment and working conditions;
- physical environments;
- personal health practices and coping skills;
- healthy child development; and
- health services.

Although a wide range of health indicators were reviewed (please refer to Appendix 2 for full data review), an emphasis was placed on targeting data that could be used in a prospective manner, rather than amassing morbidity and mortality data. The motivation for such targeting is associated with the core of HIA, in that it is intended to benefit health in a preventative manner. Utilising data on morbidity and mortality is insightful for picking out areas experiencing a high level of poor health. But is not necessarily useful in indicating areas that can be prevented from reaching such tail end effects of poor health, or in determining how a proposal may affect an otherwise healthy population or community. Following the data review in Appendix 2, the statistics applied in the spatial susceptibility tool included Indices of Multiple Deprivation (IMD), Vital Statistics and population estimates at the wards level. A brief account is provided on each below.

4.4.1 Indices of Multiple Deprivation (1998, 2000)

The primary statistics identified that met the screening criteria follow those compiled for the Index of Multiple Deprivation (IMD). This is the case as the criteria set for selecting the indicators within the IMD followed very similar criteria to that developed during this thesis. The IMD utilised data that is defined as statistically robust by National Statistics, is regularly updated, available at the small area level for the whole of England and a direct measure of key determinants of health (DETR 2000). The availability of such an index available at the local level throughout the UK and specifically targeted key determinants of health proved the most viable data set for use as an HIA screening information base. The IMD 2000 (DETR 2000), as shown in Figure 20, is made up of weighted non-overlapping health domains, utilising updated information from 33 indicators intended to highlight spatial patterns of deprivation in England.

Figure 20 The Indices of Multiple Deprivation (IMD 2000 - Department of Transport, Local Government & the Regions)

The IMD is ranked nationally, covering all 8,414 2001 Census wards in England to aid regeneration and determine both national and local trends. There are eight indices for each ward in the country, six domain indices and an overall Index of Multiple Deprivation and a supplementary child poverty index. Each domain is assigned a national rank, where the most deprived ward is given the rank of 1, while the least deprived is ranked 8,414. This ranking system allows a comparison of wards and potentially aids in the development of a threshold to be established nationally, where a ward falling within the 10% most deprived can be said to be more deprived than another in the 50% category.

The relationship between deprivation, spatially susceptibility and the ability to monitor health is therefore a function of how these particular statistics are applied. A ward said to be educationally deprived translates as a ward with a relatively low-level attainment of academic qualifications or skills base, and therefore a ward that will be susceptible to any proposal that further impacts the availability or access to education. Equally, such an indicator also identifies a barrier to potential socio-economic health benefits, in that such communities will require additional support to gain potential employment opportunities from a proposed plan, project or programme. A failure to do so might result in a further widening of socio-economic and health inequality.

Furthermore, as originally intended, the IMD is designed to identify deprivation, poor health and inequality. In the case of HIA the combined index score for multiple deprivation is not as important as the individual domains that it comprises. This is the case as the domains are a better indication of the impacts of deprivation upon the individual determinants of health, and therefore both indications of the key areas that influence health and healthy living, but is also a measure of their susceptibility to specific health pathways. They can therefore be applied to provide a rapid community profile, and offer a base level of health indicators that can be combined with additional data allowing an insight into health and its interactions with the surrounding environment.

Apart from the combined Indices of Multiple Deprivation, the domains that best represent the determinants of health (Acheson 1998), (Secretary of State for Health 1999) (Royal Commission on Environmental Pollution 2007) and to be applied during this thesis include:

- income domain;
- employment domain;
- housing domain;
- education domain; and
- health domain.

4.4.2 Population Estimates for Wards in England, mid 1998

The Oxford University population estimates were selected as they were produced by the Social Disadvantage Research Group of Oxford University using a methodology derived from work that lead to the Indices of Deprivation 2000. These statistics therefore provide a ward-level estimation of general demographic information including:

- Total Population;
- Children under 16;
- Persons aged 16-59;
- Adults 60 and over; and
- Economically active adults aged 16 to 59

It must be emphasised though that they are not classified as a National Statistic, they can be used as ward level estimates of populations and their composition as from 1st April 1998 for England.

Though the Office for National Statistics (ONS) have now released mid 2004 estimates based on the latest census data, the Oxford University population estimates were applied due to their availability at the onset of testing.

4.4.3 Vital Statistics

The 1998 Vital Statistics are available from the Office for National Statistics (ONS) at the ward-level, they differ from the 1998 population statistics in that they are labelled as a National Statistic standing for ‘relevance, quality, integrity and freedom from political interference’ (Neighbourhood Statistics 2003). Though this is the case, its selection is more to identify correlation’s between morbidity, mortality and the determinants of health and to act as a means to catalogue hotspots of existing poor health and susceptibility. The 1998 Vital Statistics includes data on male and female births and deaths, assigned to areas according to usual residence. If the usual residence address is outside of England and Wales then the data is included in any aggregate for England and Wales as a whole, but excluded from the figures for any individual region or area.

4.4.4 Additional Data

Due to the multidisciplinary nature of health, additional data-sets were deemed necessary to include in the spatial susceptibility model in order to offer a means to holistic health screening, but to also act as a means to integration or linkage with other more conventional forms of assessment such as EIA.

The requirement for such data was broken down into the three fields of:-

- environmental data;
- area hotspot data, &
- built environment and planning data.

Environmental data, including general geographic and topographic information including landscape, water courses and limited land use data available through Ordnance Survey.

The use of geographic and topographic information is not only useful when indicating areas that may be at environmental risk from flooding; the dispersal of contaminants though both wind patterns and watercourses, but is also useful in displaying rural, built environment and community areas. By further layering general demographic and national statistics upon such environmental data, it is therefore possible to use the spatial approach to screening to further define the potential distribution of effect in both an environmental and community health context.

Additional land use data is also required as communities do not conveniently stay in their resident locations, and often frequent areas of work, recreation, education and community facilities and amenities. As a consequence, land use data is required to provide an element of reality to the screening tool, but to also consider the relative sensitivities of receptors that are acknowledged by Government to be more susceptible to harm (Secretary of State for Health 1998), including children, the elderly and the infirm. Land use data of value therefore include all schools, playing fields, hospitals and nursing homes.

As an example, a playing field with no associated resident population poses no real risk. However, a proposal that increases road traffic in proximity to that area may pose an increased risk of road traffic accidents to susceptible groups such as children that frequent the playing field. The source for such information is again wide spread, where although the location and general description of such hotspots can be gathered and entered manually. It is often less time consuming, easier and more reliable to purchase the information from controlled and regularly updated organisations.

Educational facility information is obtainable from Education Direct, which owns and manages a comprehensive database of schools, colleges, universities and support services called the 'Education List', for the whole of the United Kingdom at the:

- local education authority;
- royal mail areas;
- postcode;
- county, and
- ordnance survey grid referencing level.

Hospital and care home hotspots are obtainable from a number of sources including The Hospital Records database, the NHS database or through manual input. Unfortunately, the availability of data associated with playing fields and Greenfield sites is limited, but can be obtained through research organisations, some university sources and Ordnance Survey.

Built environment data is obtainable from a mixture of bodies, including local authorities and government agencies including Ordnance Survey. However, the more detailed information intended to indicate cumulative impacts are currently only available in 'hard copy' from the Local Planning Office. Here the 'Local Plan' can be reviewed and digitised to show all major proposals for the following ten years.

The proposed screening tool applies these data sets through GIS where they are joined and layered using a process called SQL select in Mapinfo, or the join function in Arcview. The result is a subsequent project file containing all relevant profiling material embedded within it. As shown in Figure 21, the base statistics of the IMD are expressed as a national percentage (i.e. the national IMD ranking is expressed as a percentage to indicate how a community fairs on a national perspective), in order to simplify ward rankings, where the lower the percentage the higher the national deprivation and associated susceptibility in that field. This information can then be used to profile and display a range of human health indicators for every ward in the UK in relation to income, employment, education, housing and health susceptibility, alongside national demographic, environmental and hotspot information.

Figure 21 National Ranking of Combined Indices Combined Multiple Deprivation (expressed as a percentage) Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

By developing a population profile using statistics that represent the determinants of health, it is possible to layer aspects of a proposal identified to affect such determinants, targeting populations, indicating spatial susceptibility in terms of the aspects of health that will be most affected by a proposal.

The following section outlines the application of such a spatial susceptibility model as part of a nine stage screening and scoping model.

4.5 Screening and Scoping Model Process

The initial screening and scoping model presented in Figure 22, draws upon the key components of the available screening and scoping processes established through the model review, and comprises nine stages, including:

1. Checklist;
2. Questionnaire;
3. Site visit;
4. Literature review;
5. Spatial susceptibility analysis;
6. Identification of key stakeholders;
7. Rapid analysis and risk assessment;
8. Screening summary; and
9. Presentation of findings.

Each stage is discussed in more detail below, prior to testing, evaluation and refinement of the final model for application in a commercial setting.

This initial model represents the academic, or theoretical stages deemed appropriate for screening and scoping, and is not the final model to be applied in a commercial basis. This is important to establish, as it is often a failing of HIA research and guidance to present a model, that albeit meets all the theoretical criteria, but does not prove effective or appropriate for real application. This point is often a key factor separating academic, process driven HIA, from commercial HIA.

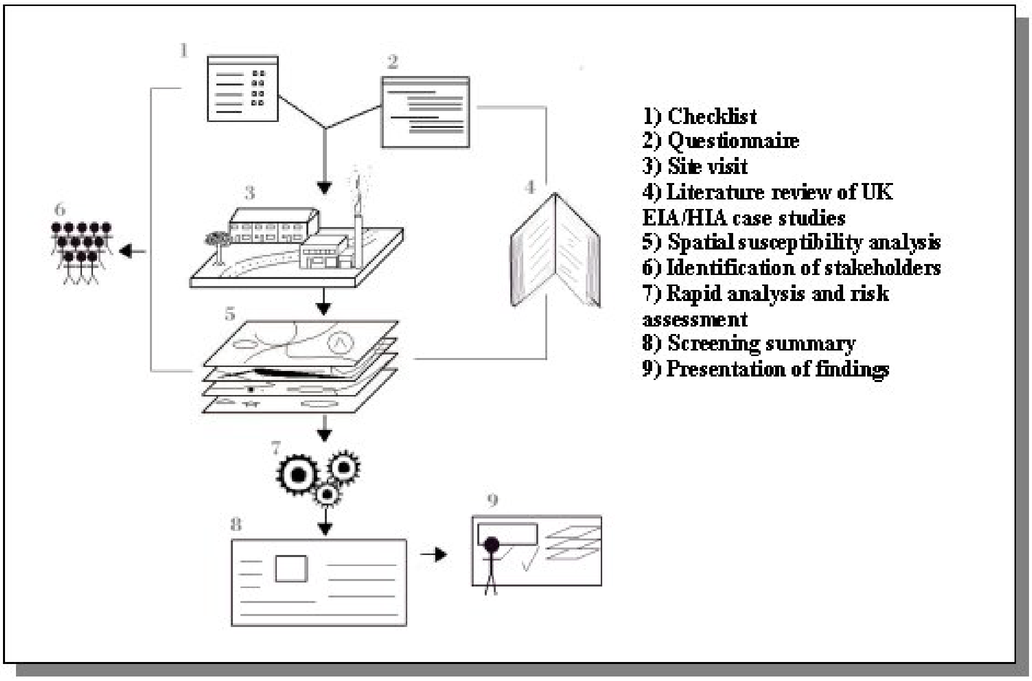


Figure 22 **Initial Screening and Scoping Model**

As such, following testing of the initial model in Chapter 5, Chapter 6 applies an external evaluation to refine a final screening and scoping model suitable for application in a commercial setting.

4.5.1 Checklist

The primary stage of the screening and scoping model is the initial checklist. This is intended to identify the key stages of a proposal (be it a project, policy or programme), resulting in the creation of a distinct Project Profile (a full copy of the checklist is available in the Appendix 3).

The questions set are designed to indicate the nature of the proposal, its inputs, outputs, product, or intention, along with a general enquiry into the various processes to be involved, and associated potential health pathways (i.e. activities with the opportunity to influence key determinants of health).

It is also important to acknowledge the reason behind the purpose of the HIA, as the proponent(s) may already be aware of underlying health issues or community concerns they wish to consider or focus upon. The intention at this point is to gather as much information as possible in order to build a project profile identifying areas that need to be focused upon, and immediate areas of concern. The checklist is, therefore, separated into the four categories of:

- general information;
- project profile (proposal nature) ;
- environment; and
- health.

The questions set draw upon the findings of the model review, and aim to identify areas or aspects of a proposal that will indicate the type, nature and magnitude of potential effects, indicating what individuals, groups or communities will be most susceptible, via which health determinants and for how long.

Due to the changing nature of a proposal throughout its life cycle, it is imperative that each stage of the proposal and the influence they may have upon the determinants of health are investigated (as shown in Figure 23). In so doing, it is possible to provide a more informative and balanced assessment, where short term health impacts during construction may be considered in contrast to long term health benefits once operational.

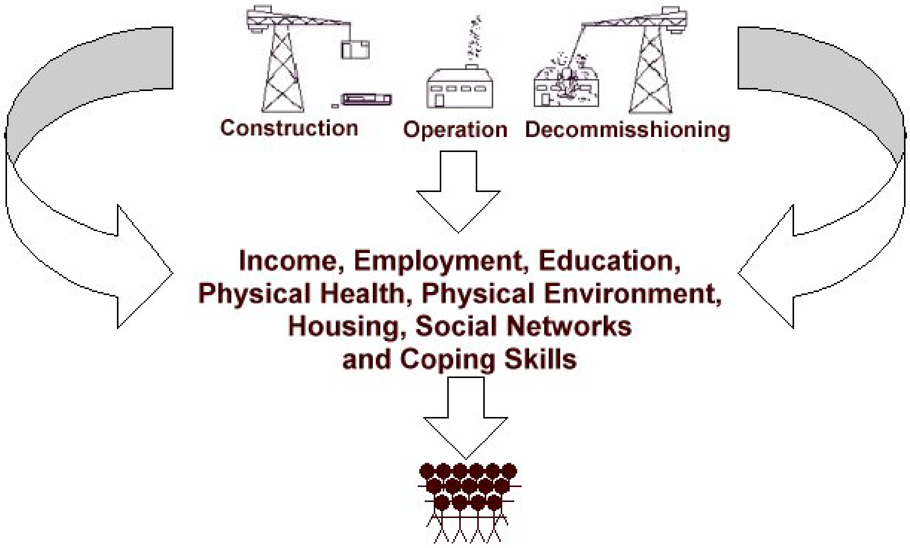


Figure 23 **Life cycle influence upon the determinants of health**

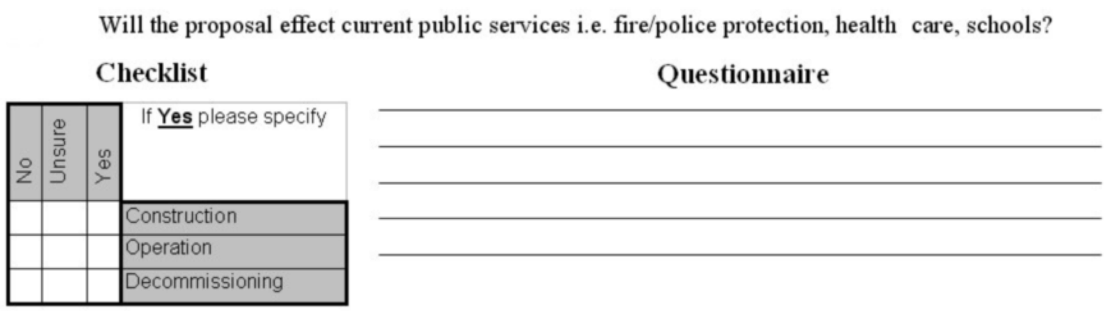
Given the information required, copies of the checklist are to be sent to the proponent's development team and facilitated through support by the HIA practitioner conducting the screening and scoping exercise. This is necessary to identify the wider technical assessments available or underway that may further inform the screening and scoping exercise and or its conclusion, (i.e. a full HIA may not be necessary, subject to the integration of health in planned work streams, or, identify opportunities where further HIA can integrate with and utilise technical outputs).

During the facilitation of the checklist, it is important to establish with the proponent that the HIA screening and scoping exercise is not intended to trip up or delay a proposed project, policy or programme. But is ultimately in their interest for basic risk management, to establish how they have implicitly considered community health, to enable them to further demonstrate the health benefits of the proposal, and where possible enhance such benefits. In so doing, it will be possible to alleviate a number of common misconceptions for HIA, aid the development of more informed screening and scoping outputs, as well as gain support and buy in for any subsequent health action plan or HIA.

4.5.2 Questionnaire

The questionnaire stage is integrated with the checklist, in a manner similar to the BC model (Appendix 1), it provides a means to further discuss potential health issues and opportunities if prompted by the checklist. As such, the questionnaire, does not intend to repeat the checklist, but to further probe a proposal, building knowledge to develop the project profile and likely health pathways.

As shown in Figure 24, the structure and nature of the questions follows that of the initial screening checklist, and is intended to provide a second opportunity to gather information that does not fit neatly into closed box questions (please refer to Appendix 3 for the full checklist/questionnaire).



Will the proposal effect current public services i.e. fire/police protection, health care, schools?

Checklist | Questionnaire

No	Unsure	Yes	If **Yes** please specify
			Construction
			Operation
			Decommissioning

Figure 24 HIA questionnaire: Example Question (see Appendix 3 for full Questionnaire)

The open box questions focus upon the uncertainties of the proposal and how they influence key determinants of health and areas of concern identified during the screening checklist.

As before, it is advised that the questionnaire be sent to the proponent and facilitated through support from the HIA practitioner performing the screening and scoping exercise.

4.5.3 Site Visit

The structure of the site visit follows that of a number of the technical assessment fields conducted as part of an EIA. Initial preparation for the site visit is developed through the checklist and questionnaire to build a knowledge base for what is proposed and the scope of the site visit required, including:

- establish the scale and duration of the proposal;
- identify each stage of the proposal's life cycle, and associated effects to establish how this might influence local surroundings;
- identify communities potentially within the range of the proposal (not just those that may be directly influenced i.e. visual or auditory range, but also those who may be influenced by secondary effects i.e. transportation and links to or from the proposed area);
- determine the demographic situation i.e. population numbers and statistics;
- investigate other projects, plans and policies that may have cumulative/synergistic effects (through the local plan);
- identify sensitive receptors (schools, playing fields, social grounds or capital, public amenities, care homes and health facilities);
- obtain any environmental, socio-economic, hydro-geological, historical or health related site surveys undertaken for proposal; and
- review any available traffic modelling.

Similarly to other technical assessment site surveys conducted as part of EIA, it is also important to carefully consider and rationalise when the site survey is conducted. There are not only daily fluctuations to consider (traffic patterns and the use of public facilities and amenities), but possibly also seasonal variations depending upon the type of project.

4.5.4 Literature Review

The initial screening checklist and questionnaire will identify the bulk of information to develop an appropriate project profile (i.e. identify relevant project information and supporting technical assessments to base the exercise on realistic changes in environmental and socio-economic conditions directly attributed to the proposal). However, due to the relatively early development of HIA, a further literature review should be undertaken of similar proposals and HIA case studies to inform and support the screening and scoping conclusion.

The literature review as a minimum should cover similar case studies and associated health impacts to define transferable knowledge and lessons learned. At the time of writing this thesis, core reserves of HIA case studies largely reflected information available through the Merseyside HIA group (discussed in the model review). However, in 2009 a growing body of case studies are freely available in the UK through the HIA Gateway currently maintained by the Public Health Observatory, Strategic Health Authorities, PCT and the London Health Commission.

Furthermore, it is recommended that the review also include the areas 'Local Plan' (or Local Development Frameworks) available from local planning offices, in order to identify current and future developments that may present a cumulative influence upon the area and associated population.

4.5.5 Spatial Susceptibility Mapping

By applying the previously discussed statistics that best represent the key determinants of health through GIS, it is possible to map relative community circumstance and susceptibility at a local level nationally. In theory, once applied, such mapping will act as a community profiling resource, enabling HIA practitioners to select specific areas and quickly map and identify relative community susceptibility by key health determinants. However, where possible, such mapping should be further layered with project specific information (i.e. the proposal footprint and activities that extend beyond the boundary of the proposal's site footprint such as changes in road transport patterns). When such base mapping is tailored to best represent the project, policy or programme, it is possible to progress to the rapid analysis stage.

4.5.6 Rapid Analysis and Risk Assessment

The rapid analysis (stage 7) is intended to compile and conclude upon all the outputs of the previous stages. To clarify, the outputs of the checklist, questionnaire and site survey develop a project profile and establish the likely health pathways of the proposed project, policy or programme. The literature review, further supports and supplements this base information with transferable knowledge from project specific information (i.e. the EIA) and wider HIA case studies.

The spatial susceptibility modelling, coupled with the site survey establish relative susceptibility (i.e. in that every community will respond differently to a specific project, policy or programme), and forms the basis to a qualitative appraisal as to the potential type, distribution, magnitude and significance of health outcome.

It should be noted that such an appraisal is not intended as a comprehensive assessment to quantify the likely health outcome. But to establish if local communities are at risk or benefit from the proposed project, policy or programme, and also identify any potential barriers to benefit uptake. As an example, a project that generates employment opportunities in an area with high levels of employment deprivation can be interpreted as a potential benefit to local circumstance and health. However, potential barriers limiting the uptake of such benefits such as a low skills base should also be considered, as in such cases, generating employment opportunities without supporting local uptake can result in the widening of local inequalities and subsequent widening of health in equalities. As such, the appraisal stage can be summarised as needing to address the following four questions:

- What are the potential health issues?
- What are the potential health opportunities?
- What is the distribution and significance of both?
- Are there any barriers to benefit uptake?

If the answers to these questions are known, or can be addressed though a health action plan informing planned work streams, decision makers and key stakeholders, then no further HIA is required. However, in the instance where specific health issues and opportunities are unclear or warrant further investigation this will result in the requirement of a HIA. Please note, that by establishing what the potential health pathways that warrant further investigation are, and identifying the communities that are likely to be susceptible to such issues and opportunities, provides an objective focused scope of work for the following HIA to investigate. Equally, where no further assessment is required, or where such issues and opportunities can be addressed through planned work streams, this method provides a rationale and justification for such an outcome.

4.5.7 Screening Summary and Presentation of Findings

The screening summary (stage 8) and presentation of findings (stage 9) have been included within the initial screening and scoping model as, where identified during the model review, it is considered important to provide feedback and discuss key outputs with both decision makers, wider stakeholders, and potentially local communities. This is in part to ensure transparency, but is also required to establish appropriate partnerships where screening and scoping recommendations (either through the health action plan or HIA scope of work) can be applied to reduce community risk, maximise health opportunities and improve local health benefit uptake. As an example, improved communications between developers, Local Authorities and PCTs can facilitate a more joined up approach to the delivery of a project that complements local community support initiatives. In addition, it is recognised that HIA (be it screening/scoping or full HIA) can be applied to alleviate community concerns and anxiety by establishing how health has been implicitly considered and addressed during the planning and policy making process.

4.6 Summary

In this chapter the methodology and justification behind the development for the screening and scoping model has been outlined, as has the spatial susceptibility model and the datasets that currently best represent the key determinants of health. The next chapter includes the primary testing of the initial nine stage screening and scoping model on both a policy and a proposed project in Brighton & Hove. The purpose of such testing is in part to test the ability of the model to be of value on both policies and projects, but to also develop case studies that can be appraised externally, in order to identify stages of the model that although they work in theory, are less practicable or of less value in practice. In so doing, the testing and evaluation stages play a key role in the development of a final screening and scoping model that can then be applied in a commercial setting.

Key issues experienced during the model development stage included identifying appropriate national statistics that both acted as a proxy indicator for specific determinants of health, but were also available at the local level throughout the country and hence suitable for mapping in a consistent manner throughout the UK. It is also important to consider the need to revise the choice of statistics applied for any project that seeks to apply the outputs of this thesis. Indeed, this implies that courses and training for the next generation of HIA practitioners that seek to apply this approach need to include modules on GIS and statistical data, selection, management and analysis (preferably through a specific HIA syllabus).

Another issue identified during the model development stage is the difference between theory and practice. The initial screening and scoping model draws together HIA best practice to develop a theoretical model that meets the model review criteria and likely expectations of HIA practitioners. However, prior to testing, evaluation and refinement, there are already concerns that the initial model in its current form may need adjusting for use in many situations. To clarify, the initial model applies all of the principles and aspirations of HIA, and provides points to integrate with parallel regulatory assessments. However, it is important to remember that HIA is still a non-regulatory requirement, and any effort is voluntary. The initial screening and scoping model may therefore still be considered too detailed for the private and public sector to apply. Such issues are further investigated during testing and evaluation stage, leading to the final refinement and application of the model in a commercial setting.

CHAPTER Five

5.0 Model Testing and Evaluation

5.1 Introduction

This chapter outlines the rationale behind the case study selection for model testing, followed by summarised versions of the preliminary testing results. The full checklist and questionnaire results have been omitted in order not to detract from the main testing results, and are available in Appendix 3. The purpose of preliminary testing of the screening and scoping model is twofold in that it is intended to first identify the shortcomings and areas for improvement, and secondly to highlight the practical issues of developing a screening and scoping model for HIA for use in the public and private sector .

5.2 Proposal Selection

The screening and scoping model was tested on two proposed initiatives, one being a policy, and the other a proposed project. In order to identify two proposed initiatives a proposal selection process was undertaken to set the stage of the assessment, identifying what location and scale the model should be targeted at to best indicate the practicalities and inherent problems the model may have. The selection was also intended to meet the current consensus discussed in the literature and model review in that HIA is best performed prospectively (NHS 2000a), and targeted at a point where the outcomes identified can be implemented in the final decision making process (Taylor and Quigley 2003).

Being located in Brighton, it was deemed appropriate to perform the two test cases on Brighton and Hove examples. The proposal selection process was therefore conducted through consultation with Brighton & Hove City Council during a discussion of the thesis aim and objectives and the initial screening and scoping model. Following the initial discussion, Brighton & Hove City Council suggested a number of projects, policies and programmes that the initial model could be applied, and where the findings may be of value to the City Council. Following further discussion two particular case studies were selected for their broad variations in regards to type, nature, scope, potential impacts and the ability of the analysis to feedback into the decision-making process at Brighton & Hove City Council. The only constraint around the selection was the time in which the model could be performed. Insuring the results fed into the final outcome and timeline of both the research project and the Brighton and Hove City Council decision-making process.

The final proposal selections included:

- the Greenways green transport plan, and
- the Falmer North community stadium.

The following case studies provide a general introduction to each case study, and presents the concluding points from the various stages of the screening and scoping model as they would be if applied in practice. To aid the reader, additional commentary is provided to indicate how each of stage of the nine stage screening model was applied to generate the output and screening and scoping conclusion.

5.3 Case Study 1: The Greenways Green Transport Policy

5.3.1 Case Study 1 Introduction

As shown in Figure 25, the Brighton & Hove Greenways route is policy that at the time was unpublished, but has subsequently formed policy QD19 of the Brighton & Hove 2005 Local Plan intended to offer green transport options (including footpaths, cycle paths and public bridal ways), connecting people to facilities and open spaces in and around towns, cities and the countryside (Brighton & Hove 2005).

The purpose of this screening and scoping exercise is to investigate the health implications such a plan may have upon the population of Brighton & Hove, assess the spatial dimensions of health impacts and, to determine if any formal health assessment is required, and offer suggestions for the consideration of any further health benefits.

The Greenways plan intends to promote the use of green transport by enhancing existing routes and creating connections between routes where none currently exist in Brighton & Hove. Due to the relatively benign nature of the plan (in that the majority of routes will follow existing paths), no environmental impact assessment was required or produced. The information available to the screening and scoping exercise was therefore limited to the emerging Brighton & Hove Local Plan (2005) that presents the Greenways Plan.

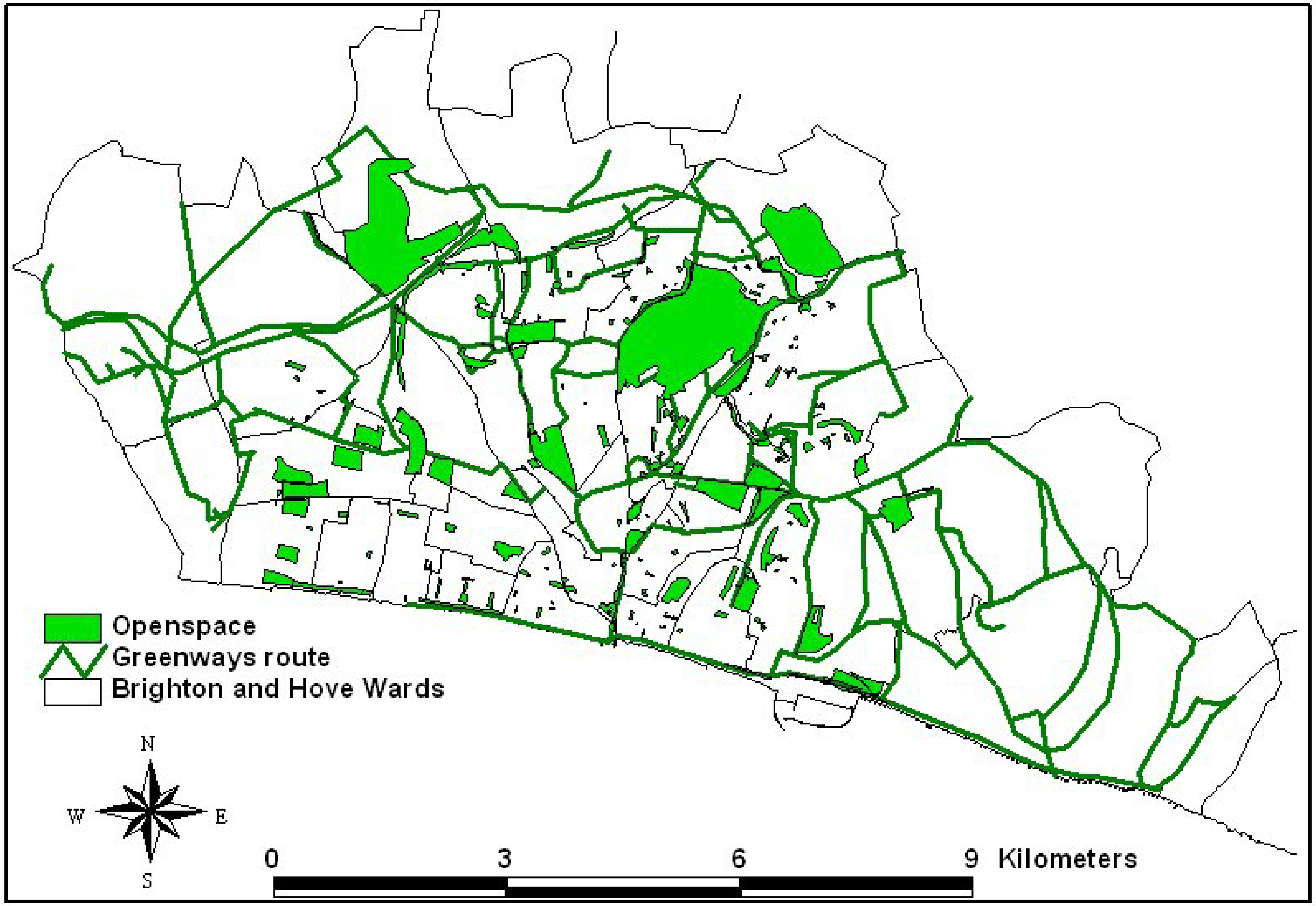


Figure 25 The Brighton & Hove Greenways Route: Data courtesy of Ordnance Survey

5.3.2 Project Profile

The following project profile has been developed though a combination of stage1, 2, 3 and 4 of the screening and scoping method (i.e. the checklist, questionnaire, site visit and review of available technical information on the proposed policy). For copies of the checklist and questionnaire results, please refer to Appendix 3. However, as previously indicated, being a policy there was limited technical information to review (i.e. ES or technical assessment outputs at such an early stage). Furthermore, considering the extent of the policy, with routes networked throughout Brighton & Hove, a site visit was not necessarily effective in this instance. The following information is therefore a summary of the likely health pathways associated with the proposed Greenways plan, providing the basis to targeting the following stages of spatial susceptibility modelling and appraisal.

5.3.2.1Location and Geographic Scope

Though the Greenways route has a relatively small footprint following a majority of existing routes, the resulting network is spread over the entire city. With this as the case an analysis of all the wards within Brighton and Hove was deemed appropriate.

5.3.2.2Lifecycle

The Greenways plan has only two stages with the opportunity to influence health, being that of construction (or enhancement of existing routes), and operation. The construction stage itself is minimal, in that the bulk of routes are already available, requiring minor adjustment or enhancement. Details on the new connecting routes are not available, However, it is anticipated that such new routes will be subject to planning, and appropriate assessments commissioned accordingly.

Once operational the Greenways route is intended to influence local transport behaviour contributing towards a modal offset from cars and public transport to modes of green transport such as walking and cycling.

5.3.2.3Potential Health Pathways

As shown in Table 5, (summarised from the checklist and questionnaire available in Appendix 3), the potential health pathways associated with the construction and operation of the proposed Greenways plan are anticipated to include:

Construction

- potential local level environmental disruption (including air quality and noise impacts) during construction of new routes and modification of the existing transport network;
- potential local level disruption to road users and pedestrians;
- potential temporary local level decrease in access and accessibility during construction and modification works;
- direct and indirect employment opportunities; and
- potential risk of opportunistic crime on unsecured construction areas.

Operation

- Improved access and accessibility throughout Brighton & Hove;
- Improved green transport contributing towards a modal offset away road transport (with subsequent decrease in associated emissions, congestion and risk of road traffic collisions);

- Increased pedestrian and cycling movements with a potential risk of increased accident and injury;

- Potential increase in induced income and employment opportunities (through increased flow of pedestrians along routes and visitation); and

- Potential increase in physical activity contributing towards healthy lifestyles.

The proposal will	Effect
Increase the prevalence of disease vectors	U
increase the likelihood of disease	U
result in demographic changes	✗
affect population settlements or workplaces	✗
affect vulnerable communities	✗
segregate or isolate groups	✗
result in employment opportunities	✓
result in an increase in local income	✓
affect affordable housing	✗
affect crime	U
affect learning opportunities	✓
promote healthier living	✓
affect social networks	U
affect availability of amenities	✓
add to any known cumulative impacts	✗
affect traffic frequency type or nature	✓
increase visitation	✓
community concerns	U

Key

✗	No expected effect
✓	Expected effect
U	Unknown

Table 5 Health Checklist/Questionnaires Summarised Results (see Appendix 3 for full details)

The Greenways plan is therefore anticipated to present a minor risk of disruption to local communities during construction, that will be appropriately addressed through both planning and regulatory assessments. Once operational, potential health pathways are largely associated with increased access and accessibility to areas of work, recreation, community amenities and social networks, while providing the opportunity to increase levels of physical activity.

As identified during the checklist and questionnaire, the majority of potential and unknown effects are associated with aspects of travel and tourism, such as an increase in the number of visitors. The consequential environmental burden, crime and the potential impact upon local communities in proximity to such routes, none of which are thought to be significant in this case, but might benefit in further assessment to support the delivery of the policy.

5.3.3 Spatial Susceptibility

The following spatial susceptibility section is broken down into the individual domains of multiple deprivation. As previously discussed, such domains can be applied as a means to establish local level susceptibility to specific health pathways including income, employment, education, health, housing and access to amenities.

The use of this particular field is to obtain a rapid means to identify sensitive communities to a wide range of health pathways. Following such identification, the screening exercise can then further focus on individual health pathways to determine if further assessment is required and what it is to focus upon. In the case of the Greenways plan, as indicated in Figure 26, the initial observation is that the wards in the east of Brighton & Hove are those that would be most susceptible in relation to a combined income, employment, education, health, housing and amenity access impact.

From this particular category, it is observed that although there are a number of routes in the east of Brighton & Hove, they are relatively less extensively networked to other areas with more terminal routes, and limited access to other wards. Future Greenways routes would benefit from these findings as additional routes within these wards and additional links with schools, recreational and employment areas will aid in improving their social and economic interactions and general well being, while also reducing their environmental burden by offering alternative green transport.

Other observations noted included the obvious lack of routes along the main retail and sea-front areas. This is thought to be due to a combination of factors including a lack of safe car free zones, and the sheer intensity of visitors to these areas making certain forms of transport network unpractical and in some cases hazardous. Yet more networks to the periphery of these sites would be advantageous, in both the centre, and adjoining areas in need of regeneration.

Figure 26 2000 Ward Analysis Ranking of Combined Indices of Multiple Deprivation (expressed as a percentage): Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.3.3.1Income

The immediate indication shown in Figure 27 is that the east Brighton & Hove have national ranks of income at or below the 6% most deprived wards in the UK. In a Greenways context, the route will have no further detrimental effect upon these wards, but could be modified to improve relative income deprivation. The route could be arranged to network current or future employment areas, and could be used to promote recreational activities to the residing countryside and coastal areas, resulting in indirect and induced income and employment opportunities through these areas of high income deprivation.

Figure 27 2000 Ward Analysis of Income Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.3.3.2 Employment

Similar to patterns of income deprivation, wards in east Brighton & Hove are again seen to have low employment levels amongst the resident population, but were not the most susceptible in relation to employment. As shown in Figure 28, the more central wards are highlighted as falling within the 6% most deprived wards in England in terms of employment.

Initial indications would suggest that these areas would again benefit from increased routes to employment opportunities, yet the fact that these wards exhibit high levels of employment deprivation, yet have a relatively average income level suggests that further investigation is required (i.e. age distribution, the number of economically active etc).

Figure 28 2000 Ward Analysis of Employment Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.3.3.3 Education

As shown in Figure 29, wards in east Brighton & Hove again exhibit high levels of deprivation, where in this case the wards fall within the 6% most deprived wards in the UK for education attainment. Poor education has a major influence upon health that extends throughout life influencing income and employment opportunities, the type and quality of housing, access to health care and lifestyle and behaviour.

In this instance, the Greenways plan has no direct influence upon education. However, there is the potential that this particular plan can be applied to further influence and support wider regeneration programmes. As an example, the route can be promoted as conduit to education facilities (both children and adult education programmes), and where possible target specific improvements in the local skills base. As such, there are wider opportunities and partnerships to which the Greenways plan can influence and support local education attainment.

Figure 29 2000 Ward Analysis of Education Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.3.3.4Health

A key aim of the Greenways plan is to promote healthier living through a modal offset from vehicles to green (i.e. walking and cycling) and public transport. Although an increase in physical activity will have a wide range of physical and mental health benefits to communities throughout Brighton and Hove, it is important to consider areas already exhibiting high burdens of poor health and the barriers this may present to the success of the Greenways plan. To clarify, communities exhibiting a high burden of poor health, may require additional support or specific design features (wider paths, bench rest stops, improved lighting, policing etc) to improve uptake of the route.

The IMD health domain provides a means to rank national limiting long-term illness and comparative mortality rates at a local level throughout the country. Applying such data, it is possible as shown in Figure 30 to indicate wards that have a history of poor health. Although areas of poor health are closely associated with areas of socio-economic deprivation including wards in east Brighton & Hove, it is also important to clarify that pockets of poor health towards the south west of Brighton and Hove (i.e. the Westbourne and Vallance wards), despite being relatively affluent wards. It should be noted however, that as shown in Figure 31, this is largely due to the higher proportion of elderly individuals residing in such areas and associated health circumstance.

Figure 30 2000 Ward Analysis of Health Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

Figure 31 **Percentage of Local Population over 60. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey**

As previously indicated, there are few direct health pathways associated with the Greenways plan with the opportunity to adversely impact upon health. In this instance, the proposed plan is not anticipated to further impact upon existing health burdens. However, the screening exercise has indicated that Brighton & Hove exhibits distinct demographic structures at the ward level (i.e. trends towards specific age groups). As such, although further assessment may not be warranted, it is the case that the outputs of the screening exercise be applied to deliver the proposed plan and to address relative community requirements. In this case, consideration should be played towards making east Brighton & Hove routes accessible, safe and appealing for the use of the less able. Such considerations may include wider and more ramped pavements for wheel and motorised chairs, benches strategically located between routes, additional lighting and possibly the instalment of video cameras or inclusion of the routes within police foot patrols.

5.3.3.5Housing

Due to the nature of the Greenways plan there are no obvious effects associated with housing, apart from those linked to reducing the nature of traffic, improving access and accessibility to community amenities, facilities, education and employment and potentially improving the long-term aesthetic value of housing. As such, this particular health pathway has been scoped out of any further assessment.

5.4 Screening and Scoping Summary

The Greenways route is well planned, meeting its requirement by linking areas of urban open space to the surrounding communities and on into the countryside. Through the HIA screening exercise, it has been shown that the plan will have negligible adverse health outcome on communities during construction and operation stages, with clear benefits to the health of residents throughout Brighton and Hove. Such health benefits are anticipated to be delivered through a combination of increased physical activity, reduced risk from road traffic and a wide range of socio-economic health opportunities (i.e. improved access to education, income, employment and opportunities to improve social cohesion). Although in this instance a detailed HIA is not deemed necessary, the screening and scoping model has advantages over previous models, in that it has identified additional health related actions to enhance and support the delivery of the plan and facilitate wider health benefits, including:

- Link the Greenways plan with wider regeneration and community support programmes in order to facilitate mutually beneficially outcomes and address relative, education, income, employment and health deprivation throughout Brighton and Hove;

- Consult with key community and demographic groups to identify potential barriers that might restrict their use of the Greenways routes. In particular consult with schools and parent associations, representatives for the elderly and disabled and community support officers at the Primary Care Trust.

- Consider providing/expanding cycling proficiency tests at schools to include raising awareness of the benefit of the Greenways routes as both a means to safely commuting to schools, town and as means of recreation throughout the countryside and along the seafront.

- Consider additional infrastructure and amenities along the routes to address local circumstance and requirements. These may include additional lighting to improve visibility, an increased number or proximity of public phones in case of emergency, additional policing, wider pavements, slope access for wheel chairs, and secure facilities to lock up bicycles around the city. Such support will aid the delivery of the Greenways plan, and further aid in addressing local community barriers.

- During construction, provide advanced notification to local communities and sensitive groups that may be particularly sensitive to a reduction in access and accessibility (i.e., the elderly and infirm, local schools, nurseries and care homes).

5.5 Case Study 2: The Falmer North Community Stadium

5.5.1 Case Study 2 Introduction

The following case study focuses upon a development proposal for the construction of a community stadium at Village Way, Brighton. The application of the screening and scoping model in these circumstances aims to:

- identify the potential impacts such a development may have on the health of the local population;
- highlight those communities most likely to be susceptible to the various processes involved in the development;
- determine if a detailed Health Impact Assessment (HIA) is required, and
- offer guidance on the approach, method and detail such an assessment might require.

5.6 Literature Review and Project Profile

As with the previous case study, stages 1, 2, 3 and 4 of the screening and scoping model (i.e. the checklist, questionnaire, site visit and review of available technical information on the proposed policy), were implemented to develop the project profile (i.e. to determine the scope of the project and the key health pathways associated with its development and operation).

The following information is therefore a summary of the likely health pathways associated with the proposed development, providing the basis to targeting the following stages of spatial susceptibility modelling and appraisal.

For copies of the checklist and questionnaire results, please refer to Appendix 3.

5.6.1 Location and Geographic Scope

In planning for a new community stadium, the City Council commissioned a site identification exercise that yielded sixteen potential sites. The sites were then subject to a feasibility study using an agreed set of criteria to best meet the needs and priorities of the City. In February 1999 the City announced its final site selection of land North of Village Way with land South of Village Way being considered the most likely best alternative shown below in Figure 32 (WSP Environmental Statement 2002). Should neither site be developed as a stadium, they are likely to remain as potential development sites, for example, for research and development to expand the higher education establishments nearby (Brighton and Hove City Council Ten Year Local City Plan 2000). Therefore, there must be careful consideration given to what will most benefit the community, the economy, the environment, and the resulting opportunities foregone (i.e. the opportunity costs).

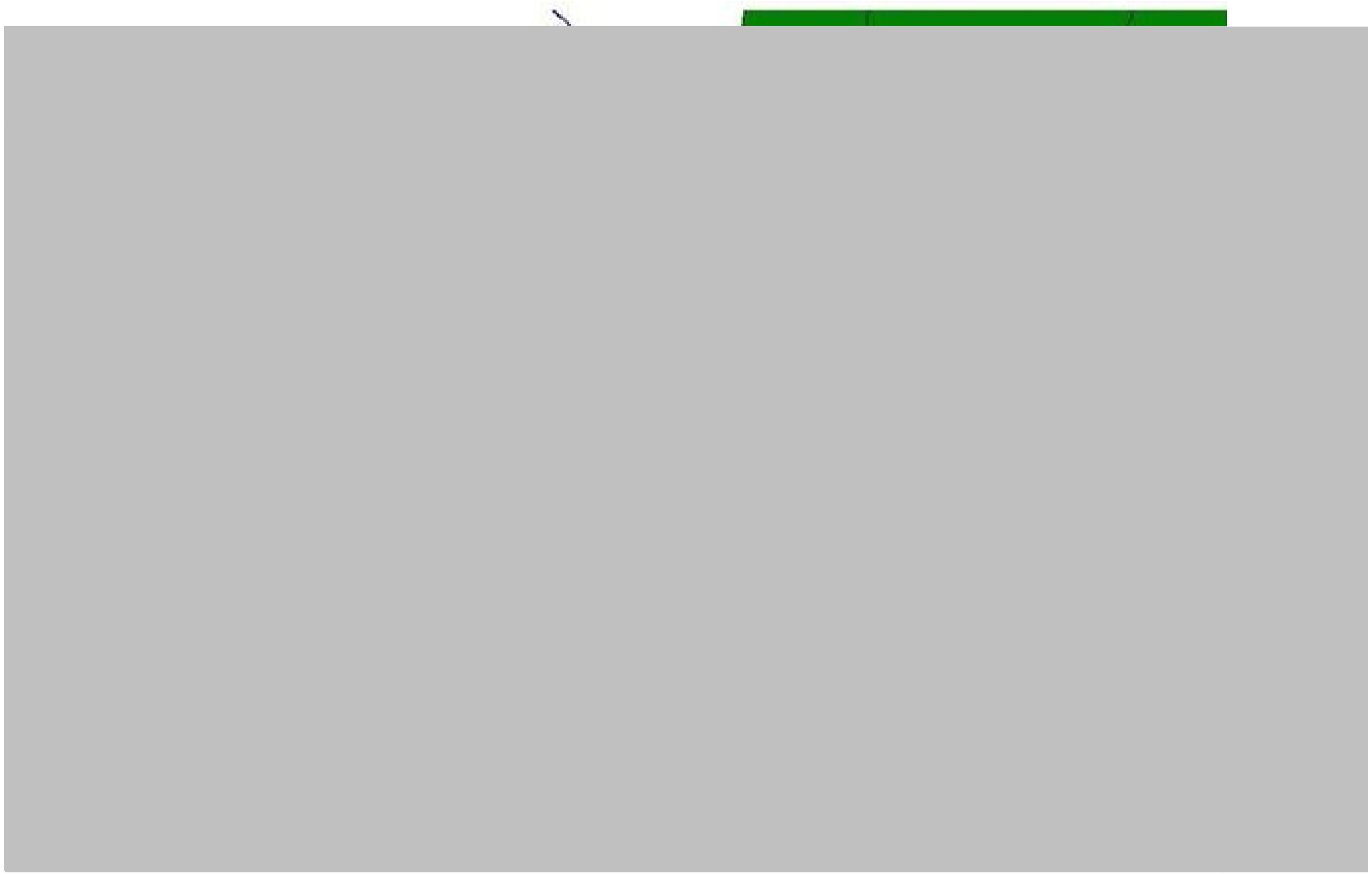


Figure 32 Proposed Falmer North Site Location: Data Courtesy of Ordnance Survey

Due to the nature, magnitude and potential cumulative effects of the proposal a number of technical assessments (listed in Table 6) were considered necessary to accompany the planning application. In order to obtain as wide a field of views as possible all such documents were reviewed and the relevant information incorporated into the HIA screening and scoping exercise.

Assessment / statements available	Obtainable from
Planning statement	DMH Planning & SPBS Planning Services
Environmental Impact Assessment	WSP Environmental Ltd
Landscape Impact Assessment	Hyland Edgar Driver
Transportation Assessment	Savell Bird & Axon
Architectural Design and Landscape Statement	Scheme architects KISS Sports, Leisure Design Ltd and Landscaping Architects Hyland Edgar Driver
Socio-economic and Community Assessment	BHAFC and Fleury Manico with Humberts Leisure

Table 6 Documents related to the Proposed Community Stadium Reviewed

5.6.1.1 Project Profile

The proposed community stadium at Falmer displayed in Figure 33 will have a total footprint of approximately 18 hectares, constructed on Grade II agricultural land over a proposed 7 to 10 year phased period. Once completed the stadium will have a seated capacity of 22,374 people, extending to a capacity of approximately 35,000 for concerts (WSP Environmental Statement 2002). The project is expected to attract approximately 450,000 visitors a year to Brighton & Hove. Additional applications include:

- daily use of the stadium for hospitality and conference events;
- daily use by those employed at the stadium sport, catering, and the projected sports science and medicine facilities;
- daily use of the projected multi-purpose sports hall;
- daily use of ancillary facilities, and
- will act as a stadium, conference, concert, recreational, retail, educational facility.

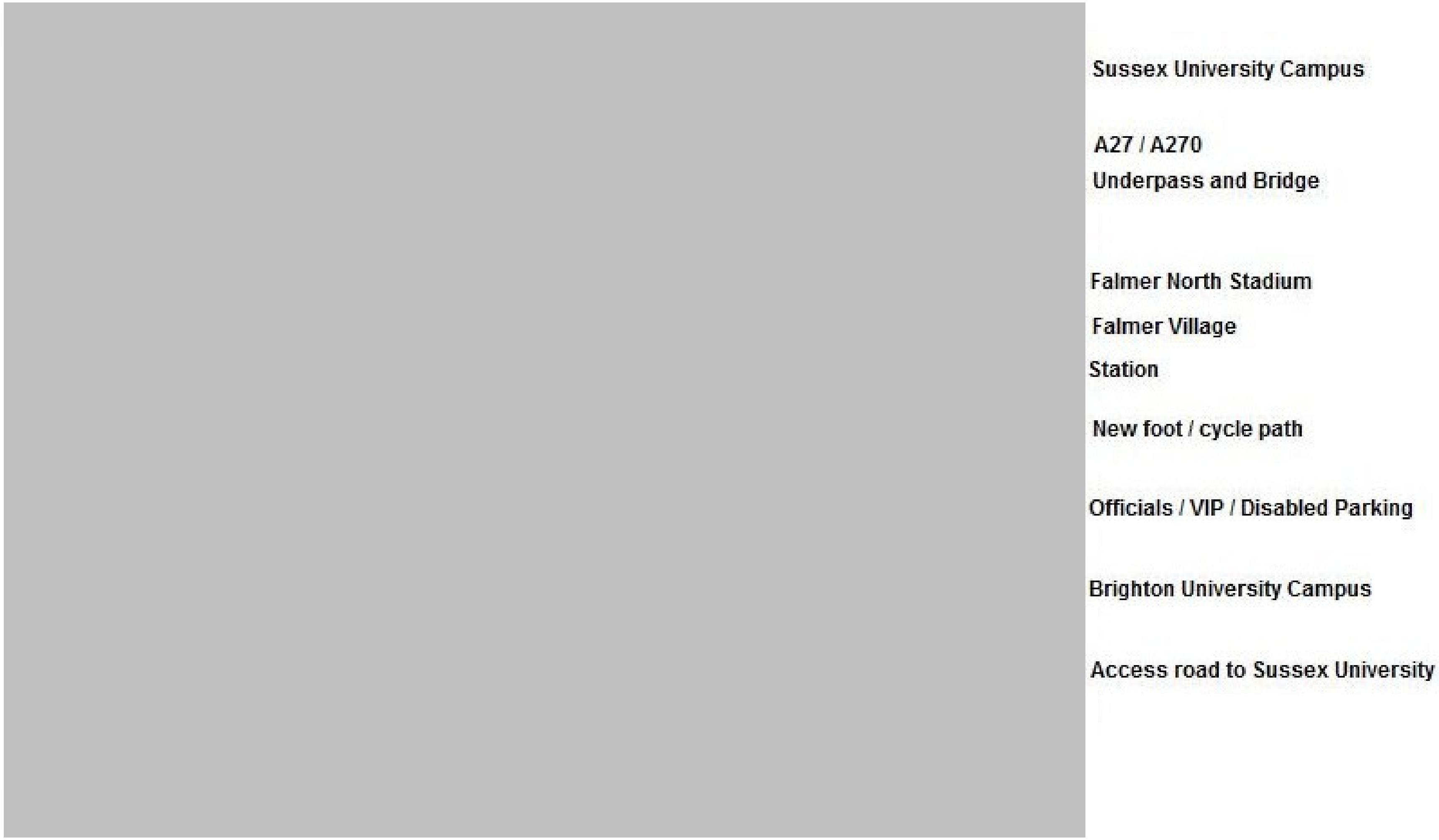


Figure 33 **Proposed Community Stadium Falmer Village Way North Source Environmental Statement-Architectural Drawings**

Ancillary elements, (see Figure 33) identified through the environmental statement (WSP Environmental Statement 2002) comprise:

- parking for 40 coaches and coach drop off point;
- new footpath and cycle ways to Falmer Station, University of Sussex and through Falmer High School to Moulsecoomb;
- parking for officials, players and disabled people visiting the stadium;
- use of existing car parks at the University of Sussex;
- re-use of the existing underpass to new dual reinforced grass car parking areas at Falmer High School;
- new access road through part of Stanmer Park to the University of Sussex, and
- rail station alterations and improvements.

5.6.1.2Life Cycle

As established during the checklist and questionnaire stages (available in Appendix 3), the proposed development has three distinct activities with the opportunity to influence health, namely during the construction, operation and through associated transportation during both.

5.6.1.3Potential Health Pathways

The potential health pathways associated with the construction and operation of the proposed development are anticipated to include the following:

Construction

- potential environmental impacts and disruption (including air quality and noise impacts) during site preparation and a lengthy construction period;

- potential mobilisation of dust and spoil beyond the site during site preparation and construction activities;

- potential decrease in access and accessibility during site preparation and construction;

- potential site risk during site preparation and construction (i.e. increased hazards from construction activities, equipment and vehicles);

- direct, indirect and induced employment opportunities;

- potential risk of opportunistic crime on unsecured construction areas.

Operation

- provision of a new community resource, including education, social events, entertainment, recreation and social network opportunities;

- significant increased income and employment opportunities (direct, indirect and induced) at the local level and throughout Brighton & Hove to cater to significant venues and events; and

- increased visitation, with a potential increase in environmental burden (pollution, traffic, parking etc).

Transportation

- a potential increase in construction traffic (including construction staff), increasing congestion, reducing parking availability and mobilising dust and spoil beyond the site boundary;

- once operational, increased road vehicle movements to park and ride schemes beyond the site boundary and potential fly parking in communities surrounding the site, leading to increased community disruption and risk of accident and injury; and

- once operational, increased public and green transport to the proposed site, with a wider environmental burden through existing communities.

5.6.1.4 Site Visit

Particularly sensitive communities identified during the site visit include the Falmer Village and the student population in immediate proximity to the proposed site. In regards to transport related impacts, sensitive communities include those of the Falmer Village, Brighton and Sussex University campus, of whom are likely to be subject to fly parking. In addition, the Moulsecoomb community is also likely to be subject to fly parking and environmental burden brought by being a key route from the centre of Brighton.

During the visit, local community concerns were identified through a number of protesting posters outlining the impact the stadium will have upon Falmer village. Key community issues identified included, environmental disruption during both construction and operation and parking issues.

5.6.2 Spatial Susceptibility Analysis

Analysis was performed at ward level including factors such as combined income, employment, education, health and housing. As shown in Figure 34, the Moulsecoomb and Marine wards appear most sensitive to any health effects arising from the proposed stadium. From this preliminary observation it is therefore possible to illustrate that any resultant environmental burden will be borne by the least advantaged, making the case for investment or, on the other hand to demonstrate the potential benefits of the development to otherwise deprived communities.

Figure 34 2000 Ward Analysis of the Indices of Combined Multiple Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.6.2.1 Income

As shown in Table 7 (identified during the literature review of the ES), the proposed stadium will significantly affect the local economy via both the direct economic effect of the stadium and through increased indirect and induced spending of visitors in the city on its hotel, tourism and leisure industry.

Cumulative increases in economic activity following completion of :-	Million £	% Contribution to Local GDP
Phase 1	7	0.02%
Phase 2	7	0.02%
Phase 3	9	0.03%
Phase 4	10	0.03%

Table 7 Direct Economic Benefit of the Stadium: Source Environmental Statement - Executive (Non-Technical) Summary vol. 7

Not only will the facilities at the stadium and their relationship with the city generate significant income for local communities, but they will also help to offset the current trend of seasonal jobs within the city, promoting more sustainable and secure employment opportunities. The immediate indication is that the Moulsecoomb and Marine wards shown in Figure 35 have national ranks of income amongst the 9% most deprived wards nationally.

Figure 35 **Ward Analysis of Income Deprivation. Data Courtesy of Department of Environment Transport and Regions & Ordnance Survey**

The proposed stadium therefore has the potential to positively influence local income through increased visitation, a potential rise in employment and the further benefit of the stadium to the city will result in direct, indirect and induced economic benefits.

5.6.2.2Employment

There will be a considerable need for human resources throughout the construction and operation of the stadium. It is estimated that the total number of construction jobs will peak during phase 1 and the number of people employed on the site will be in the order of 1,500 at its busiest period (WSP Environmental Statement 2002). Following construction additional employment opportunities will fall into the following main areas:

- Football club;
- Stadium management;
- Stadium commercial activity;
- Supply chain businesses; and
- Hotel, tourism and leisure industry in the city and surrounding area.

Similar to income the Moulsecoomb and Marine wards are again indicated to exhibit a high level of employment deprivation, but are not the most susceptible in relation to employment. In this case the central Brighton & Hove wards are highlighted in Figure 36 as being within the 6% most deprived in the UK.

Figure 36 Ward Analysis of Employment Deprivation. Data courtesy of Department of Environment

5.6.2.3 Education

As shown in Figure 37, the Moulsecoomb and Marine wards exhibit relatively low levels of education attainment, ranking amongst the 6% most deprived wards for education throughout the UK.

Brighton & Hove Albion Football Club have considered the benefits that education will play in the community, and have indicated that they will develop skills and training programmes for a range of sports and leisure fields. Further opportunities suggested by Brighton and Hove Albion Football Club include a potential growing interest in sports sciences, through proximity to such a development and community pride (WSP Environmental Statement 2002).

However, low levels of academic qualifications within Moulsecoomb coupled with a relatively low skills base will significantly impede the uptake of employment and income opportunities during the construction and operation of the proposed stadium. Furthermore, subject to an employment strategy, it is important to consider that once operational, a large contingency of university students may sway the choice of employment due to the abundance of young minimum wage individuals within sports orientated education.

As such, there is the potential that the proposed facility may further widen socio-economic and health inequality within Moulsecoomb.

Figure 37 2000 Ward Analysis of Education Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.6.2.4 Health

As shown in Figure 38, wards in proximity to the proposed site exhibit a relatively high burden of poor health largely associated with socio-economic deprivation. As such, the proposed development presents an opportunity to improve health via both socio-economic benefits and the opportunity for improved access to sports and recreational facilities and amenities.

However, it is also important to consider that such communities are equally sensitive to environmental disruption during construction and operation that may compound existing ailments (i.e. the potential to exacerbate respiratory ailments through exposure to loaded wind patterns during construction).

Figure 38 2000 Ward Analysis of Health Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.6.2.5Housing

The Moulsecoomb ward is among the 3% most deprived wards for housing quality in the UK. The level of relative inequality is made more apparent in Figure 39 when Moulsecoomb is compared against the Kingston ward, rated amongst the 85% least deprived wards in England.

A potential impact associated with this particular inequality is how the development will affect housing. Optimistic predictions would state that housing prices would increase, improving the area and resultant accommodation problems. A more realistic prediction would again expect the rise in real estate, but also emphasise the loss of affordable housing, a subsequent increase in rent, and a gradual social exclusion brought on by potentially high varying property values at a ward level.

Further investigation into the affects upon housing is required, identifying the possibility of fringe benefits associated with the stadium complex. As well as fringe impacts associated with aspects of the stadium that are less appealing, including housing situated around the proposed rail improvements, main road, and those that will experience effects from traffic, fly parking and subsequent increases in environmental burden and pollution from significant increased traffic movements through such communities. It is recommended that such an investigation also consider the wider impact transport and parking will have on surrounding communities, risk of road traffic accidents and the subsequent impact upon the aesthetic and financial value of housing in the area.

Figure 39 2000 Ward Analysis of Housing Deprivation. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

5.6.3 Screening and Scoping Summary

The following section provides a summary of the potential health pathways associated with the three key lifecycle activities of the proposed development, and the relative sensitivity of local communities.

5.6.3.1 Construction

Construction issues include the movement of large amounts of soil, the delivery and storage of building materials, noise, dust, air and soil pollution, and a change to the nature of vehicular activity, to an 8-acre site area designated as an Area of Outstanding National Beauty (AONB). These aspects have been considered within the environmental and traffic assessment (WSP 2002, Savell Bird & Axon 2000), but need to be reiterated in a health context in order to fully comprehend the potential effects on the surrounding communities.

Stadium construction will obviously influence the health of those living within the vicinity; noise, vibration, light, gaseous emissions and particulate matter have already been identified during the construction stages of the site within the Environmental Statement (ES). Although the emissions have been quoted as being below the regulatory threshold (WSP Environmental Statement 2002), and can be further minimised through reduction mechanisms, the community that will be most affected has not been sufficiently identified or addressed.

During stages 1, 2 and 3 of the screening and scoping model (i.e. checklist, questionnaire and site visit) Brighton and Sussex Universities Academic Registry were contacted to establish the total resident student population at the site (see Figure 56). During 2002 the student populations that reside on campus include approximately 2,550 at Sussex, and 469 students at the University of Brighton's Falmer campus, while a further 5,736 students are registered to study at the Falmer campus alone. These individuals, particularly those at Falmer will be those most affected by each stage of the proposed stadium, and are expected to be the most heavily disrupted community during the 7 to 10 year construction periods. Though it is likely they will be a mobile community, and therefore exposure limits will vary, the disruption to studies at this site may potentially be more serious.

More detailed investigations into the potential health effects and risk is required for the resident student community, as well as the potential effects the development may have upon students studying in proximity to the construction site. Furthermore, the Moulsecoomb ward and Falmer village (see Figure 56) communities need to be investigated in more detail in relation to construction impacts, loaded wind patterns (suspended particulate carried by wind), and the effect construction traffic may pose to the area.

5.6.3.2Operation

Operation of the stadium will have various benefits to a number of areas, but special attention must be paid to the Moulsecoomb and Marine wards, due to their proximity to the stadium and their relative susceptibility in comparison to other surrounding wards.

Noise, vibration and light have been noted to be the main emission during the operational phase of the stadium. These have been proposed to be minimised through special techniques and programs within the ES, but will still have an effect upon both the student and resident communities. Additionally to this, the sheer number of visitors will increase the burden upon the local environment potentially increasing pollution, crime and subsequent health effects to the area.

Careful consideration and mitigation will be required in regards to employment during the operational phase, where an employment strategy would be recommended. This is the case as a high recruitment of students may prove to be an impact in itself. The high levels of employment deprivation observed within the Moulsecoomb and Marine wards would greatly benefit from such employment opportunities, which in turn would further promote local pride, social links and interest in the stadium, reducing local deprivation while also potentially reducing the requirement of staff parking facilities due to short journeys to work. However, it is important to note that a key barrier to benefit uptake for these wards is a relatively low skills base. As such, it is recommended that wider initiatives (from the Council and Primary Care Trust) are implemented to raise the local skills base and improve the uptake of direct and indirect employment opportunities.

5.6.3.3Transport

Although a number of potential construction and operational phase health effects have been identified, it is the health effects associated with transportation that may ultimately have the greatest effect upon health in Brighton & Hove. This is partially due to the sheer number of people that would attend the community stadium, but will also be dependent on the mode of transportation, and the course of the routes such transportation will follow.

The impacts of transportation are now well documented where both benefits and costs are recognised unequivocally nationally and internationally (Department of Health 1998a&c). From the completed traffic assessment (Savell Bird & Axon 2000), it was identified that the mode of visitation is predicted to be broken down via a number of methods shown in Table 8, each have a varying effect on the environment and local health. Although the benefits of green transport such as physical exercise and access to amenities will be welcomed, it must be noted that there is a high rate of predicted private car use. This does not necessarily take into account additional cars entering and parking within Brighton & Hove in order to utilise park and ride schemes.

%	Method of transportation
16	via walking / cycling / bus
14	via rail
3-4	via stage carriage bus service
16-18	via park and ride services
5-6	via dedicated spectator coach services
3	via taxi
28-32	via private car

Table 8 Predicted Mode of Transport to and from the Community Stadium Transportation Assessment (Savell Bird & Axon 2000)

The effect such transportation will have is again dependant on the nature, magnitude and frequency of traffic, but must also take into account the route, and sensitivity of surrounding communities. Although a traffic assessment did identify routes that will have an increased frequency of traffic, it failed to identify the health effects such an increase would have, and the subsequent enlargement of the proposals combined environmental and health impact footprint.

The areas in Brighton & Hove identified to be at most risk from the predicted transportation effects shown in Figure 40 include the Moulsecoomb, Marine, Hollingbury and Tenantry wards. These wards have been previously identified as susceptible to both the construction and operational phases of the community stadium. They are expected to be most at risk from traffic related health issues, due to their proximity to roads and parking areas expected to experience a rise in magnitude and frequency (Savell Bird & Axon 2000).

High levels of traffic noise not only has the potential to cause serious annoyance and sleep loss, but also communication problems and even learning problems in children. Furthermore, there is emerging evidence of an association between hypertension and ischemic heart disease with high levels of noise (Stansfield 2005). Although the community stadium has proposed to instigate measures to reduce the noise and vibration output of the stadium, and has stated that there will only be a minimal increase in road noise, no road noise reduction measures have been proposed.

Road transport is a major contributor to human exposure to air pollution. Long term exposure to air pollutants is associated with respiratory and cardiovascular diseases, and may lead to reductions in life expectancy (Department of Health 2006). With an increase in traffic there will be a subsequent increase in pollutants to sensitive wards including:

- Suspended particulate matter
- Sulphur dioxide
- Ground level ozone
- Oxides of nitrogen
- Carbon monoxide
- Volatile organic compounds
- Lead

Figure 40 2000 Ward Analysis: Traffic Footprint. Data courtesy of Department of Environment Transport and Regions & Ordnance Survey

These potential and actual carcinogenic substances are known to act in a point source manner, where prolonged proximity to the source can increase long term cancer risk (Department of Health 2006). The routes identified to expect an increase in traffic are situated close to residential areas indicated as susceptible. It is recommended that a detailed health risk assessment be undertaken, and measures are made that reduce traffic on these routes and address the potential impact upon the significant increase in parking requirement.

Finally, with an increase in both pedestrian and road traffic volume the routes to and from the community stadium can expect a subsequent increase in road traffic incidents. Although the sensitivity of the wards will not necessarily result in impacts being more or less severe. It is important to point out that the roads identified are situated near schools, shops and main routes to both Brighton and Sussex University, as well as a main route to and from the city centre. The cumulative effect to these highly used routes is therefore a concern to be included in any further assessment and the final decision making process.

As stated, the effects of transportation upon health are now well recognised, especially where the more detrimental effects are known to be concentrated in the more disadvantaged communities. It is, therefore, important for Local Authorities to work in conjunction with proposals that will significantly contribute to alterations in traffic nature, magnitude and frequency, in order to ensure that they are fully aware of the resultant impacts.

5.6.4 Screening Recommendation

The health and well being of individuals is affected to a large extent by the environment in which that person lives, and where that person works. In the case of the community stadium, national statistics indicate that residents of the Falmer Village and Moulsecoomb ward will be in close proximity to the proposed site and display varying susceptibility to key activities during construction and operation.

However, through a combination of stage 1 and 2 of the screening process, the exercise identified a key resident community that is not accounted for in national statistics, namely the resident community at the university. Although the residents of the Falmer Village and Moulsecoomb wards may be subject to more long-term effects through various health pathways, it is the students who both work and reside at the Falmer campus that will experience the greatest disruption as a result of construction, operation and transportation during both. The significance of potential health impacts upon the resident student community will be largely dependant upon the quality of any Construction Environmental Management Plan implemented and the scheduling of stadium events once operational that may impact upon access and accessibility to the university, parking, and disruption of lectures.

The development and operation of the Falmer North Community Stadium has the potential to adversely impact upon the health and wellbeing of communities in close proximity to the site and along the transport routes.

It is therefore the recommendation of this screening exercise that a detailed HIA is performed upon the immediate and long-term effect of the community stadium. The recommended assessment should focus upon the following three key stages, including construction, operation and transportation and build upon the recommendations of this screening exercise.

5.6.4.1 Construction Issues

Clarification is required on the noise impact during both construction and operational stages of the proposed stadium and the potential significance of effect upon the health pathways affecting the resident student community and academic performance. In particular, noise modelling is required to ascertain the likely changes in the ambient noise within lecture rooms and student accommodation during both construction and operational stages, and the provision of appropriate sound insulation schemes.

A Construction Environmental Management Plan (CEMP) is also required to address potential impacts and disruption to Falmer Village, the Moulsecoomb ward and the universities. In particular, it is recommended that the CEMP, as a minimum include the following:

- Independent site access will be necessary for construction vehicles and staff to minimise disruption to Falmer Campus's only access point;

- On site construction staff parking is to be provided to prevent parking within Falmer Village, within the university grounds or in Moulsecoomb. Where appropriate, construction staff should be encouraged to utilise public transport and/or a staff transport programme implemented (i.e. private bus). Such measures are necessary to prevent community disruption, competition for parking at the university and to avoid impacts upon access and accessibility;

- Due to proximity to an academic institute, weekday and weekend working hours will be strictly applied to prevent disruption and particularly impulsive and disruptive construction activities(such as piling) will only take place within agreed day time working hours avoiding disruption to the resident student community and lectures;

- Advanced notification will be provided to the universities and all communities in proximity to the site for major construction activities.

- Storage sites, fixed plan, machinery and temporary buildings etc, would be located to further limit nuisance and excessive noise affecting the communities of Falmer Village and the Universities;

- where appropriate, dust suppression will be implemented and measures established to prevent the transfer of dust, mud and spoil during transportation;

- where appropriate, street cleaning will be implemented to prevent transfer of dust on local road networks and the university campus;

It is also recommended that a public relations officer be commissioned to manage and address community complaints, to work with the university to minimise disruption and amend the CEMP where appropriate.

5.6.4.2 Operational issues

It is recommended that an operational employment strategy be developed to aid local employment uptake and support the reduction of income and employment deprivation in the area. To facilitate this, it is recommended that the developer inform the Primary Care Trust and City Council as to the type of employment opportunities the stadium will generate and the necessary skills set. In so doing, the Council and PCT can establish and target appropriate training programmes and support the local uptake of both direct and wider indirect employment opportunities. This is necessary, to avoid a situation where the majority of employment opportunities are taken up by minimum wage highly skilled students with a relatively high staff turnover. To clarify, it is important to establish a balanced employment strategy that benefits both the developer and the wider community. If not, the primary health benefit of the proposed stadium (that of direct income and employment opportunities) will not be achieved locally, and may widen local inequality.

As previously stated, noise modelling is required to ascertain the likely impact upon the resident student community and academic activities on campus and appropriate noise insulation and mitigation implemented to prevent disruption. It is also recommended that the university be provided with advanced notification as to any major event at the stadium, and that the scheduling of such events consider important academic activities (i.e. exams, seminars, open days etc).

Wider impacts are largely associated with the general increase in environmental burden brought on from increased visitation to the stadium. Potential impacts are largely anticipated to include general wear and tear on infrastructure and littering along the pedestrian route, and the requirement for additional policing. Where appropriate, the stadium is to support post event clean up teams including the main pedestrian routes.

5.6.4.3 Transport Issues

Green transport schemes should be further developed, reducing the burden upon road networks, excessive parking and subsequent local long term-health effects. A detailed health risk assessment of local communities will be required to determine the distribution and significance of effect that increased traffic nature and frequency will have upon short and long-term health.

Noise reduction schemes and general roadside improvements should also be further explored along main roads leading to the stadium.

Parking strategies have to be reconsidered. As outlined in the Environmental Statement (WSP 2002) the current strategy is to implement a park and ride scheme that utilises existing parking facilities at Brighton and Sussex University including those located on the Lewes Road at the Cockcroft and Watts Buildings. This approach implements an unusual situation where visitors will be required to drive into town to be shuttled out.

The current approach does not seem to consider existing parking restrictions at the universities or congestion along the major routes serving such parking facilities. Equally, the current strategy does not consider the impact of increased parking in residential areas in proximity to the proposed stadium including both Falmer Village and Moulsecoomb. Unless an appropriate strategy is implemented, there is the potential for significant disruption to local communities as a consequence of inappropriate levels of parking within residential areas surrounding the stadium.

Although it is the recommendation of this screening and scoping exercise that further health assessment is required, it must also be stipulated that the development of the Falmer North Community Stadium would have profound improvements through various health pathways upon the health of the local area, ranging from socio-economic through to physical and educational benefits.

The Stadium offers a unique opportunity to serve the immediate local community with a high standard of sport, business and recreational facilities, creating local employment and community benefits, potentially improving all aspects of health and general well being of the area. The recommended HIA is to therefore address remaining issues and support the delivery of the proposed stadium and its inherent health benefits through Brighton & Hove.

5.7 Screening Process Summary

By updating and combining qualitative techniques through checklists and questionnaires with quantitative nationally available statistics to profile relative community sensitivity, the screening and scoping model meets the requirements of screening in that the model provides a rapid and repeatable approach that can be consistently applied throughout the UK. A key feature of the model is in its ability to establish potential health pathways which a project, policy or programme has the opportunity to influence. To clarify, by highlighting how a project's activities may influence key determinants of health (income, employment, education, housing etc), and by then profiling and mapping relative community circumstance, it is possible to perform a rapid appraisal as to the likely magnitude and distribution of health outcomes on a population (both adverse and beneficial). Although largely speculative at this screening and scoping stage, it is possible to identify the key issues and opportunities, and this aids in justifying the requirement and scope for any further assessment through regulatory assessments (i.e. EIA), or through a standalone HIA.

The screening and scoping model can therefore be described as a rapid HIA, which not only profiles the proposal and identifies target populations and susceptibilities, but also leads to the determination of potential health outcomes, gauging the detail, scope and extent of any following full HIA deemed necessary.

Preliminary testing of the screening and scoping model through two case studies has shown the benefit of the model in that it identified aspects of the proposals that have the potential for adverse health consequences. Furthermore, regardless of whether a detailed HIA is deemed necessary or not, the screening and scoping exercise is still of value to the decision making process and may even support the delivery of a project by identifying wider partnerships and initiatives to remove barriers to the uptake of health benefits. In addition to supporting the delivery of a project, the use of health indicators, can also be applied to monitor the effectiveness of a plan, project or programme upon key health determinants.

A key concern at this stage is the time required to perform such screening and scoping. For the two case studies performed, the Greenways project took five days to collate data and documents, while the Falmer Community Stadium took ten days. The timescale is linked to the screening and scoping models attempt to meet the various requirements identified for screening during the literature review. The result is an informative means to systematically screen for health outcomes, but which requires time to collect and review available planning and policy material, to identify potential health pathways, engage with stakeholders and to develop the conclusions and recommendations.

In short, although still considered rapid in contrast with other methods, the current screening and scoping model tested in this chapter, has in part repeated previous criticism identified during the model review of merging into a full HIA, and possibly being too complicated for commercial use.

The following chapter is intended to further identify such barriers to the application of the screening and scoping model through peer review and external evaluation by leading international HIA experts. The outputs of which have then been applied to develop a revised screening and scoping model, of which is then tested in a commercial setting with two mainstream environmental consultancies.

CHAPTER SIX

6.0 Peer Review, External Evaluation and Final Model Refinement

6.1 Introduction

Preliminary testing of the screening and scoping model has demonstrated it as a potentially viable approach that can be applied by Local Authorities, PCTs or by developers and regeneration agencies to influence decision making at an early stage. Although the benefits of the model are apparent, it is necessary to determine issues of practicality. This is the case as both case studies were performed in the relatively controlled confines of the University, and may have practical limitations in the field. This issue has in part been addressed through consultation with Brighton and Hove City Council for both of the case studies applied. However, such issues can be further investigated through external peer review and evaluation by leading HIA practitioners and experts. An external evaluation was deemed appropriate to in part, present the outputs of this thesis to the wider HIA community, to gain expert input and to support the application of the model on real projects. This chapter provides an overview as to how the peer review and external evaluation was performed, and presents key comments and recommendations from leading international experts, leading to changes to the final screening and scoping model.

6.2 Mode of External Evaluation

Following initial feedback from Brighton & Hove, that the screening and scoping conclusions clearly identified and rationalised the requirement for further assessment, the Falmer community stadium case study was selected for external evaluation.

The choice for the mode of external evaluation was largely influenced by the resource constraints associated with the research project. Two approaches for evaluation were identified, the first was distribution through the Internet, and the second was presentation of a case study during an appropriate HIA seminar. Both were identified as viable and complementary means to obtaining a combination of closed and open ended comments from leading experts. Each approach is considered in turn below, including a discussion of the nature of the approach, the results obtained and the conclusions.

6.2.1 Distribution through the Internet

Benefits associated with distribution via the Internet include the audience to which the case study can reach, to a field of experts and practitioners internationally. Evaluation can therefore be performed electronically where replies can in theory be returned via the same means, facilitating a rapid wide-ranging evaluation (Kelle 1995).

However, the nature of such distribution means that its success is directly linked to the ease of evaluating and returning comments. Internet distribution therefore favours small documents with simple tick box answers. Yet, to ensure the quality of evaluation returns, written material including a brief description of the purpose and process of the model and summarised version of a case study, and evaluation questionnaire are required. Successful and informative returns via this mode of evaluation therefore requires a carefully balance of brevity, information and reducing the effort for the participant to review and respond (please refer to appendix 4 for examples of the distributed materials).

The two key routes identified for internet distribution included the WHO European Centre for Health Policy, and the UK Health Development Agency (HDA) Health Gateway web resource. At the time, both organisations were internationally recognised sites for the promotion of HIA, and their websites often the first stop for HIA practitioners. Here, a cover letter, case study and the evaluation questionnaire (available in Appendix 4 were posted on the websites and emailed through the dedicated HIA practitioner contact list held by these organisations.

It was appreciated at an early stage that such an approach would involve receiving expert comments from individuals from different countries, and thus, varying interpretations on HIA practice, methods, aims and objectives. However, such an approach was still deemed appropriate and beneficial, in that current HIA practitioners with an understanding of HIA theory (and what works in practice) would be able to comment on the screening and scoping model and share transferable knowledge.

It was intended to limit over-dispersal of the case study and to better manage returns from the HIA community, by limiting distribution to these two key HIA web sites. In this way it was hoped that the questionnaire would be passed through linked sites, within organisations practising or researching HIA, increasing the number and relevance of returns.

The final document distributed (available in Appendix 4) presented a brief outline as to the process and approach of the model, followed by a summarised version of the case study demonstrating the models ability to combine multidisciplinary data, to identify areas of potential concern and supply a framework for any necessary further HIA.

The evaluation questionnaire (available in Appendix 4) included the following four sections:

- general return information,
- process and approach,
- data; and
- concluding information.

Each respondent was asked to complete each section aimed to identify specific aspects of the model and case study commenting on failings and areas for improvement while generally reflecting on:

- If there is a need for the screening and scoping model?
- Would the screening and scoping model be beneficial to them?
- What are its problems?
- What does it lack?
- How might it be improved?
- How quickly could the screening and scoping model be adopted into current practice?
- How would local level nationally available HIA data benefit the current structure, nature and quality of HIA?

The questionnaire and accompanying documentation were the minimum required for respondent to understand the screening and scoping model. Nevertheless, this was still a large amount of information, and only a limited number of questionnaires where returned. Of those returned a small range of international expertise was amassed which included:

- Canadian Environmental Assessment (EA) Officers;
- a Health Promotion Strategist from a UK Primary Care Trust;
- a Post Doc Research fellow from the Health Promotion Unit of the University of Southern Denmark; and
- an Environmental Epidemiologist from a Chemical Incident Response Service.

Variation in the answers was expected, due to different international practice, expectations and even application of HIA. Although this is the case, the evaluation is still beneficial in that it is an indication of the models flexibility and its ability to be applied under a range of varying requirements that often confront HIA.

6.2.1.1 General Return Information

As shown In Table 9, the first section of the questionnaire was intended to reveal the returnee's level of use and understanding of HIA, along with an overall rating of the screening and scoping model.

Although it may seem that the majority of returnees have not conducted an HIA, this is not necessarily the case as the Canadian EA officers assess health under the guise of EHIA, thereby still offering a relevant and robust evaluation of the model, with an additional environmental perspective. The relevance of the returnee's evaluation was further expressed through the fact that all returnees established that they would conduct an HIA in the near future, establishing that they have or are currently researching available practice and techniques, supporting the validity and justification of their results.

Organisation	Position held	Performed an HIA	Likely to perform an HIA	Suitable for screening health	Toolkit meets screening needs	Over-complicated	Toolkit unclear	Which stages unclear	Rating of model
Health Canada	Environmental Assessment Officer	✗	✔	✔	✔	✔	✔	Checklist / Questionnaire	G
Health Canada	Environmental Assessment Officer	✗	✔	✔	✔	✔	✔	Checklist / Questionnaire	G
Health Canada	Environmental Assessment Officer	✗	✔	✔	✔	✔	✔	Checklist / Questionnaire	G
Castle Point & Rochford PCT	Health Promotion Strategist	✗	✔	✔	✔	✗	✔	Link process & outcome	G
University of Southern Denmark Health Promotion Unit	Post Doc research fellow	✔	✔	✔	✔	✔	✗		G
Chemical Incident Response Service	Environmental Epidemiologist	✔	✔	✔	✗	✔	✔		G
Key									
Excellent E	**Good G**		**Fair F**		**Poor P**	**Yes ✔**		**No ✗**	

Table 9 Internet Questionnaire: General Return Information

From this section of the questionnaire an overall indication as to how the model performed can be observed. As shown above, all returnees indicate the screening and scoping model suitable for screening health, while the majority verifies that the model meets current screening requirements. Although it was made apparent that the model may be overcomplicated, with certain stages being unclear, complex and even unnecessary, the model still received unanimous rating as a good screening process.

6.2.1.2Process and Approach Evaluation

The stage and approach section of the questionnaire shown in Table 10, aimed to identify attributes to each of the stages in the model, and attitudes towards a largely qualitative approach to screening and scoping HIA. A scored rating between 'Vital' to 'not required' was identified for each of the stages. The results were further tabulated in Table 11, offering a final score and therefore overall rating of the stages in regards to determining the requirement and content of subsequent HIA.

	Rating of individual stages									Approach				
Organisation	**Check list**	**Questionnaire**	**Site visit**	**Lit review**	**Spatial analysis**	**ID of stakeholder**	**Rapid analysis**	**Screening summary**	**Present findings**	**reliant on quantitative data**	**Nat Stats suitable to screen health**	**Nat Stat health domains useful**	**Use HIA data set**	**Require such data**
Health Canada	NA	NA	U	U	U	V	V	V	V	✔	✔	✔	✔	✔
Health Canada	NA	NA	U	U	U	V	V	V	V	✔	✔	✔	✔	✔
Health Canada	NA	NA	U	U	U	V	V	V	V	✔	✔	✔	✔	✔
Rochford PCT	U	U	U	V	U	V	V	U	V	NA	NA	✔	✔	✔
University of Southern Denmark	V	R	V	V	U	V	R	V	V	✔	✔	✔	✔	✕
CIRS	U	U	V	V	U	V	U	U	V	✔	✔	✔	✔	NA

Key							
Vital V	Useful U	Relevant R	Non- Relevant NR	Yes ✔	No ✕	No Awnser NA	

Table 10 **Internet Questionnaire: Process and Approach Evaluation**

When rating the nine stages of the model, as shown below, respondents placed an emphasis upon the stages that identify stakeholders, and aid in developing and presenting concise conclusions. It also emphasises the current dilemma of screening and scoping, in that in order to determine the benefits of a HIA, an investigation as to the likely health outcomes is required (i.e. a HIA is required to determine if a HIA is required).

Key/Scoring Criteria			
Vital = 4	Useful =3	Relevant = 2	Non Relevant = 1
Stage			Total Score
Presentation of findings			48
Identification of stakeholders			48
Screening summary			38
Rapid analysis			37
Literature review			21
Site visit			20
Spatial Susceptibility analysis			18
Checklist			10
Questionnaire			8

Table 11 Internet Questionnaire: Model Stage Rating

As shown above, the questionnaire, checklist and spatial analysis stages where given predominantly low scores in contrast to the rapid analysis, screening summary, the identification of stakeholders and presentation of findings. It is postulated that such low scoring of the initial stages is due to the participant's interpretation of the question, and subsequent scoring of the stages that are vital to the final screening decision and not the process to informing that decision. To clarify, the participants scored the stages that present the outputs of the screening process and not the stages necessary to inform and develop such outputs.

6.2.1.3Data Set Evaluation

The data set section of the evaluation aimed to indicate the relevance of core data sets applied in the case study, alongside the potential addition of data sets that would prove useful in screening health, thus improving the practical application of the screening and scoping model. As anticipated the core data sets applied within the case study fared well, where as shown in Table 12, participants provided ratings of vital and useful. Yet when scored against additional data sets in Table 13 it showed that the addition of further core data sets such as environmental indictors of quality, community well being information and child health data were also required.

	Rating of domains						Additional domains / data-sets						
Organisation	Income	Employment	Education	Housing	Health	Access to facilities & amenities	Pop & vital statistics	Environmental indicators of quality	Definition of areas (i.e. rural, urban)	Community well being/social environment	Parliamentary electorate	Crime	Other
Health Canada	V	V	U	U	V	U	V	V	R	V	NR	U	Child Health
Health Canada	V	V	U	U	V	U	V	V	R	V	NR	U	Child Health
Health Canada	V	V	U	U	V	U	V	V	R	V	NR	U	Child Health
Rochford PCT	V	V	V	V	V	V	NA	U	NA	U	NA	NA	NA
University of Southern Denmark	U	V	V	V	NA	V	V	V	R	V	NR	U	NA
CIRS	V	V	V	V	V	V	U	U	U	V	U	U	NA
Key													
Vital V		Useful U				Relevant R		Non Relevant NR			No Answer NA		

Table 12 Internet Questionnaire: Data Set Requirements

Key				
Vital = 4	Useful =3	Relevant = 2	Non Relevant = 1	

Stage	Total Score
Employment	24
Income	23
Community well being / social environment	23
Environmental indicators of quality	21
Education	21
Housing	21
Access to facilities and amenities	21
Health	20
Population and vital statistics	19
Crime	15
Definitions of areas	11
Parliamentary electorate	7

Table 13 Internet Questionnaire: Data Set Rating

The data section of the evaluation proved valuable in that although the majority of responses stated the model is heavily reliant on quantitative data, it was further indicated that such a quantitative approach is suitable for screening health, and that dedicated HIA data sets would be both useful and applied in current practice.

6.2.1.4Overall Evaluation

The concluding section of the evaluation shown in Table 14 is primarily intended to identify the overall effectiveness of the screening and scoping model, highlighting potential use, adoption into current practice, any alteration required and its further potential throughout HIA.

Organisation	Model determines HIA requirement / detail	Screening and Scoping Model Use	Catalogue of screening studies	Extend spatial approach throughout HIA	spatial approach to monitor and evaluate HIA	Adopt the principle or part of Model	Adopt Model into current practice	Adapt or alter it	Results returned	Partnership for further testing
Health Canada	×	×	✓	×	×	✓	×	✓	✓	×
Health Canada	×	×	✓	×	×	✓	×	✓	✓	×
Health Canada	×	×	✓	×	×	✓	×	✓	✓	×
Rochford PCT	NA	NA	NA	NA	NA	NA	✓	NA	✓	×
University of Southern Denmark	✓	✓	✓	✓	✓	✓	✓	✓	✓	×
CIRS	✓		✓	✓	✓	✓	✓	✓	✓	×

Key		
Yes ✓	No ×	No Answer NA

Table 14 Internet Questionnaire: Overall Evaluation

As shown above, in its current form, participants expressed mixed feelings as to whether screening and scoping model is practicable to establish if a HIA is required and what it might entail. Furthermore, participants also expressed mixed feelings as to whether they would apply the model it in its current form. However, the majority of participants expressed that they would seek to adopt the principles of the model, or seek to adapt and alter the model to their requirements. Furthermore, the majority of participants expressed their interest in receiving information on the final revised model suitable for application in a commercial setting.

6.3 Internet Distribution Conclusion

The screening and scoping model was indicated to be a good method for screening health, yet a number of issues need to be addressed before it can be applied. The key concern highlighted was the sheer complexity of the model. As shown in the quotes below, it was suggested that the model was over constructed, attempting to achieve more than is required at the screening and scoping stage, likened more to a rapid HIA.

'*I think it may be too complex and time consuming to use as a screening tool***'**

'*for a practising HIA person it may look a bit over complicated, but for research and development its fine***'**

'*I would use it in either a rapid HIA or as a part of a larger HIA***.'**

Such criticism is encouraging as the principle of screening for spatial susceptibility was one intended to be applied throughout the HIA process, further enhancing current practice, allowing a means to compare, evaluate and monitor future HIAs.

Some respondents indicated concerns surrounding the largely quantitative approach to screening health through nationally available statistics. However, despite this issue, they also unanimously indicated that such an approach and data was not only suitable for screening health, but also stipulated that an HIA data set would be beneficial.

'*I would rather say from international view point that it would be nice to have such statistics*'

The further benefits of the model were also recognised, where not only was it agreed that such a screening and scoping model could be applied throughout the HIA process, combining and displaying quantitative and qualitative techniques, but it also offered a means to potentially monitor changes in health attributable to a project over time.

'I see possibility to use some of the parts in each step of HIA. For example the data or rather indicators used in the screening process might serve as basic indicators for monitoring the impacts after implementation of recommendations of HIA'.

The limited number of returns from the external evaluation made statistical analysis unfeasible. It was generally emphasised that more information was required to fully evaluate the model (resulting in gaps in the questionnaire responses). Nevertheless, the points made and information obtained are still insightful and were vital in preparing for the second mode of external evaluation, presentation to experts and practitioners through an appropriate HIA seminar.

6.4 Evaluation via Presentation of the Model

The second and key mode of external evaluation was implemented through the presentation of the model during Health Development Agency (HDA) workshops on HIA Screening held on the 10th January 2003. Such an opportunity enabled a greater level of open feedback (i.e. not limited by a structured questionnaire), but also enabled further discussion and the sharing of transferable knowledge during a dedicated HIA Screening workshop with leading UK HIA experts. As the author of this thesis was presenting during the workshop, the key mode of capturing input and recommendations was recording the question and answer section, of which is discussed in more detail below. However, the case study presented and key findings of the workshop, were developed and published by the HDA as screening and scoping guidance (Taylor & Quigley, 2003).

Of particular interest in the workshop was how the screening and scoping model developed during this thesis was presented and questioned alongside an alternative screening approach and methodologies developed by a leading and well respected HIA practitioner, Anthea Cooke.

Here, the spatial susceptibility approach, applying a standardised method to establish local circumstance and susceptibility to projects, policies or programmes was contrasted against a qualitative approach reliant upon the stakeholder input during a dedicated workshop. Such a contrast proved both useful and insightful. Not only were such contrasting approaches to screening and HIA brought to light, but so were the inherent benefits and costs of each.

The key differences between the two approaches was the time required, financial constraints and overall content and repeatability of screening. The qualitative approach developed by Anthea Cooke required a high level of stakeholder coordination, including identification of an appropriate and available steering group, coordinating diaries for an appropriate HIA screening session, preparation of an appropriate presentation of the proposed project, facilitating the workshop and then reporting the conclusion.

It was commented that such an approach is personnel intensive requiring a backlog of work before such a stakeholder session can be organised, and although it provides a means to identify local community issues and concerns, is reliant upon voluntary participation that does not lend itself well to more frequent, rapid, reliable and repeatable screening throughout the country.

In contrast, the quantitative approach to profiling relative community circumstance through the screening and scoping model was received as a rapid, reliable and repeatable means to identify relative sensitivity. Furthermore the approach provides a means to perform a rapid appraisal as to what elements of a project have the opportunity to result in a health outcome (both adverse and beneficial), and what the distribution and significance of that outcome is likely to be. Furthermore, by providing a means to appraise the individual determinants of health and how a local community may respond, it is possible to focus any further HIA on both a health determinant level and for specific communities. In so doing, the screening and scoping model also encourages the integration of HIA into regulatory assessments, where the outputs of the exercise can be used to inform the scoping stage of EIA, SEA or Sustainability Appraisal.

As such, the screening and scoping model was perceived as more objective focussed, rather than process driven, providing a rational and justification for any further assessment deemed necessary or beneficial, as opposed to the views of a potentially inappropriate or ill informed steering group.

Key questions and discussion points specifically raised for the screening and scoping model included:

- practicality issues such as availability of suitable health statistics and indicators;

- the expertise required to perform such an approach (i.e. the minimum skill set to perform the model robustly); and

- concerns over the over engineered approach of the model, where it was again suggested that the model currently represents a rapid HIA rather than a screening exercise.

Questions that were not well represented in the original questionnaire, yet focused on at the workshop were associated with the administrative/resource requirements. How many people were involved, what was the likely cost and most importantly, how long might it take? It was highlighted that in order to screen all projects, policies and programmes any screening and scoping model or tool used must take into account administrative/resource issues and be rapid, cheap yet relevant, reliable and repeatable to the same quality elsewhere.

The screening and scoping model was acknowledged to in part meet these requirements but would need further streamlining to reduce the time constraints, while also noting the requirement for further health pathway data sets to be created in order to support and continue the practice of the spatial approach.

6.4.1 Presentation Evaluation

At the closure of the workshop both the screening and scoping model and the more qualitative approach developed by Anthea Cooke were praised for their relative merits. However, a key conclusion supported the thesis premise and rationale, in that a single repeatable approach is required to ensure HIA is performed consistently and that specific HIA and health determinant indicators (available through a web resource) would greatly aid current practice. Furthermore, it was also commented that the principle of spatial susceptibility and the mapping of key health determinants would prove useful throughout the HIA process (Taylor and Quigley, 2003).

6.5 Final Refinement of the Screening and Scoping Model

The external evaluation concurred with the key findings of the model review, that there is a requirement for a rapid, cheap, reliable and repeatable approach to determining if HIA is required and what it might entail. The initial screening and scoping model touched on, but did not address all such criteria. A repeating criticism was that the model is found to be overly complex, acting more as a rapid HIA than a screening and scoping tool. It also requires potentially too much time, human resource and expertise, offering too much information and interpretation at such an early stage.

Such criticism was in part anticipated, as the model was designed to fulfil a wide range of perceptions and expectations gained during the model and literature review, and there is generally difficulty in ascertaining where HIA screening and scoping finishes and where full HIA starts.

An essential question is to therefore determine what is wanted from screening and scoping, and what organisations are prepared to substantiate such a decision upon. The boundaries of screening require resolution, screening itself is only intended to determine if HIA is required and what form it will take. Both case studies presented at the HDA workshop were criticised for overstepping this mark, bordering on further stages of HIA such as stakeholder engagement, analysis and risk assessment.

The external evaluation identified that although public participation is vital throughout the various stages of HIA, for practicable national screening on projects, policies and programmes, this may prove impracticable/impossible as it will not be possible to rely on voluntary participation for the screening of every project, policy or programme.

The application of national statistics as the key means to screening health is therefore clear, and although contested, is to some accepted. Although results from the external evaluation indicated that aspects of the screening and scoping model is particularly reliant upon quantitative data. It was still regarded as a valid approach to screening health rapidly, with clear benefits in quickly and clearly demonstrating the requirement of HIA and potential routes to health benefits consistently.

The results of the external evaluation therefore proved fruitful in indicating aspects of the model that required refinement, but also in determining how the model would be received in the current field. The outcomes from both the internet questionnaire and the workshop presentation indicated that the models quantitative approach and limited stakeholder involvement were well received, and the key aspects identified for refinement where largely concerned with reduction and simplification of the stages. This is the case as a key criticism of the screening and scoping model is that it proved over engineered, overstepping its intended purpose and crossing into the appraisal stage of HIA.

Key modifications to the overall process therefore emphasise such criticisms reducing and simplifying as much of the model as possible without sacrificing overall quality and reliability.

All stages of the model are indicated to require some level of modification, yet as shown in Figure 41, it was the, checklist, follow up questionnaire, site visit and rapid analysis that were identified to require major modification and potentially removal from the process. Such modifications are discussed in more detail below, prior to application in a commercial setting.

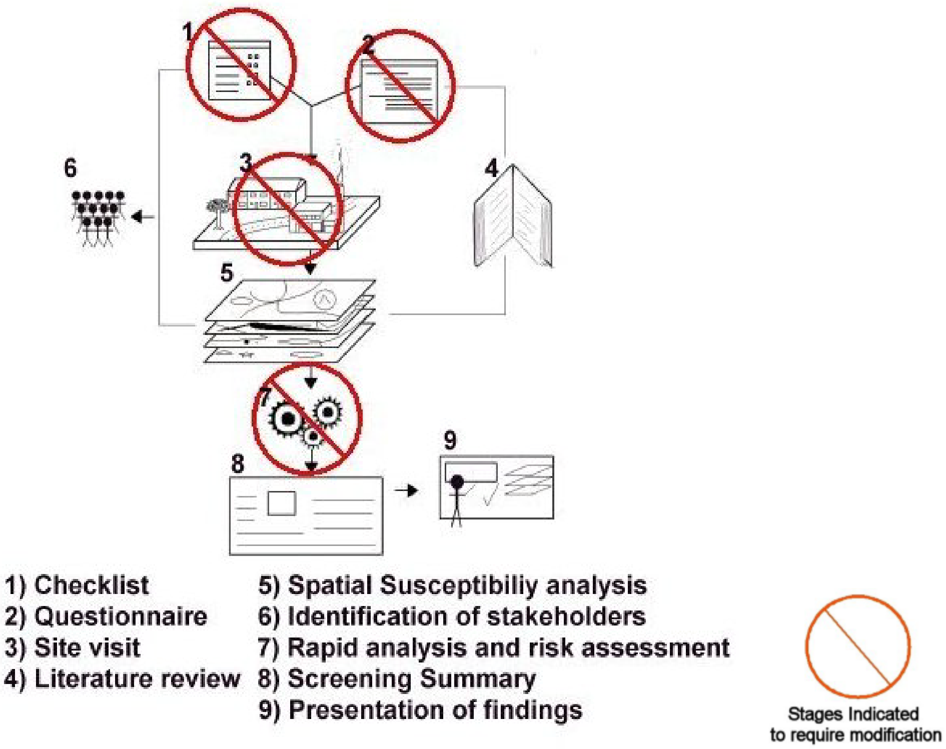


Figure 41 Screening and Scoping Model Modification

6.5.1 Checklist and Questionnaire

Checklists are often the key process to HIA screening, condoned as a means of establishing proposal specifications, yet the models checklist is indicated to be potentially overly complex, incorporating environmental, socio-economic and project profile questions aimed at identifying potential health pathways, rather then conventional questions ascertaining known and expected health outcomes.

Furthermore, the proposed follow up questionnaire proved unfeasible, requiring excessive time and resources from a range of stakeholders, while also implying that the checklist may be inadequate on its own. In light of such criticism the checklist and questionnaire were further amalgamated and refined, ensuring the relevance and reliability of the checklist without the requirement for supplementation as a questionnaire. Such modification undoubtedly increased the time-required filling and processing the revised checklist, but was deemed necessary in order to ensure the overall quality and relevance of this key process.

6.5.2 Site Visit

The site visit is suggested to be useful by the majority in the external evaluation. Although the relevance of this stage is made apparent it is still regarded as costly in regards to preparation time and resources required, whilst potentially overstepping what is required within the screening stage. For this reason it was removed from the screening and scoping model, relying instead on information gathered through the literature review and available environmental, socio-economic and health data profiling local circumstance. The practice of site visits is still recommended but more practicable and relevant to full HIA.

6.5.3 Literature Review

The literature review stage comprises developing an appropriate project profile by reviewing project specific information such as the EA, SEA and supporting technical assessments. It also originally included a literature review of similar projects and HIA to gain transferable knowledge. Although any such wider review beyond specific project information will prove beneficial, it again requires additional time, expertise and resources that overstep what is necessary and practicable for screening and scoping. As such, a generic evidence base of HIAs on the web is not recommended to replace this aspect of the literature review.

6.5.4 Spatial Susceptibility Modelling

The mapping of key determinants of health to inform screening and scoping was recognised by respondents as a unique and important addition to HIA practice. Enabling a rapid means to identify relative susceptibility, inequality and to assess how a proposal (be it a project, policy or programme) might impact upon the health and wellbeing of communities and what the distribution of that impact might be.

Equally, it was recognised that regardless of whether a HIA was necessary or not, such an approach enables decision makers to identify opportunities to improve health and to support more effective delivery of mitigation initiatives.

As such, key recommendations were geared at enhancing elements of this screening and scoping stage, and not reducing it. In particular, it was recommended by some respondents that screening and scoping extend beyond the mapping of key determinants of health and include patterns of morbidity and mortality. Although this is easily achieved, it is important to note that the key approach to the Spatial Susceptibility approach is to best map the key determinants of health, and not the end effect. To clarify, this stage of the model is intended to act as a prospective means to address and manage factors that might lead to adverse and beneficial health outcomes. By focusing on the determinants of health it is possible to identify areas that will be more susceptible to aspects of proposals, therefore preventing the onset of poor health, the eventual outcome of which is morbidity and mortality, and allowing a greater insight into how proposals affect health pathways and can be modified to benefit health. The mapping of morbidity and mortality although of value in other settings is of less value to planners and decision makers in such a prospective approach to health care.

6.5.5 Identification of Stakeholders

The identification of stakeholders likely to be influenced by a project, plan or programme is a recognised key priority to HIA. However, there is some uncertainty as to whether engagement with stakeholders at the screening and scoping stage is necessary, practicable or even useful. Can stakeholders be included in every screening decision, are they to be involved at the decision making stage, or would their participation be more effectively applied during the more detailed assessment stage?

It is currently not feasible, favourable or possible to involve stakeholders in every screening and scoping exercise, yet a key point made throughout HIA and apparent in the external evaluation is 'transparency'. Any information used or decisions made must be clear and available to the public and stakeholders. The identification of stakeholders therefore remains in the model, yet the point to which they may be involved is moved to the engagement strategy developed during parallel assessments (such as the EIA or SEA) or through a standalone HIA.

6.5.6 Rapid Analysis and Risk Assessment

The rapid analysis stage was originally intended to analyse, compile and conclude the data retrieved through the checklist, literature review and spatial analysis, offering a simplified appraisal of which communities may be affected and how. This stage was never intended to fully quantify health outcomes, yet was suggested to be overly informative at such an early stage of the HIA process. For this reason the stage was removed, as it steps beyond the requirement of screening and scoping. Although some conclusions drawn from the previous stages are required, this will be performed in the screening summary stage.

6.5.7 Screening Summary and Presentation of Findings

Both the screening summary and presentation stages are noted in the external evaluation for their vital role, where the sum of the model is presented to clearly determine the requirement of HIA. Although the external evaluation failed to indicate any major modifications, the emphasised reduction of the model led to the combination of the two stages summarising and presenting final recommendations to decision makers.

6.6 Suggested Model Modifications

The result of the external evaluation and refinement of the process has resulted in the reduction of the original 9-stage model, streamlined to its core 4 stages shown in Figure 42. Such refinement greatly reduces the time requirement to perform screening, yet retains a reliable and repeatable means to determine if a HIA is required and what it should entail.

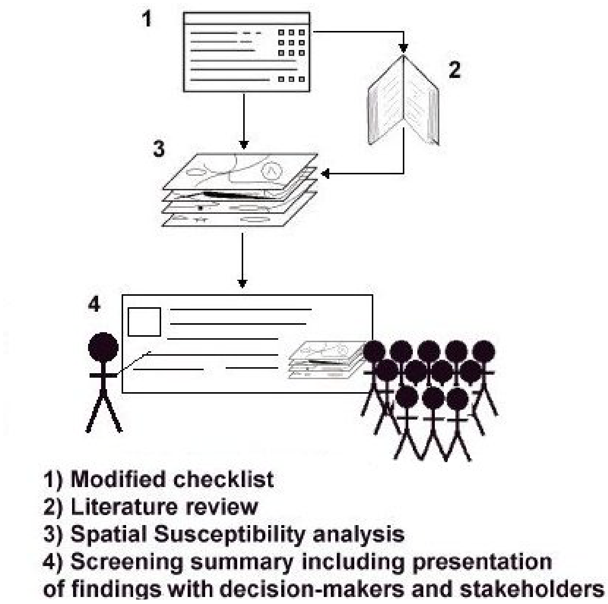


Figure 42 Final Spatial Susceptibility Process

Though reduced the model still retains much of its original character, relying on the modified checklist and a literature review to build the project profile (identifying activities with the opportunity to influence key determinants of health), to which the spatial susceptibility stage can then investigate and rapidly appraise potential health outcomes. The final screening summary, therefore, presents a more simplified breakdown of the key health pathways associated with the project, plan or programme and their likely outcome and distribution within a given community.

6.6.1 Stage 1 Checklist Modifications

Changes to the checklist largely include reducing it to its barest form to identify what the potential health issues and opportunities are throughout a proposals lifecycle (be it a project, policy or programme). Such a simplification was deemed appropriate for the screening and scoping stage, of which only requires to identify the potential health pathways and opportunities to integrate health into planed work streams. However, such a reduction, requires a minimum of HIA training to ensure health pathways are suitably identified.

The checklist is to be completed in parallel to stage two of the revised model (the literature review of available project information) to ensure the screening and scoping exercise is suitably informed. As such, the revised checklist, should as a minimum includes the following questions.

1) What are key stages of the proposal (be it a project, policy or programme), with the opportunity to influence communities and health?

2) For each of the key stages identified what are the potential health issues and opportunities upon the following determinants of health:

    a. Income;

    b. Employment;

    c. Housing;

    d. Education;

    e. Environment;

    f. Transport;

g. Access and accessibility;

h. Crime and the perception of crime;

i. Social networks;

j. Lifestyle and recreation; and

k. Health care.

3) What are the likely distribution of both the issues and opportunities; and

4) Are there any barriers to benefit uptake?

By reducing the checklist to these four key questions will enable the identification of key health pathways, that can then be analysed further through the spatial susceptibility analysis, but also retains the wider benefit of identifying opportunities to support the delivery of a proposal and integration with parallel studies

6.6.2 Stage 2 Literature Review

As previously discussed, a literature review is recommended in order to firstly develop a project profile through a review of the relevant documentation linked to the project, policy or programme, but was also intended to draw from upon transferable knowledge gained through other projects and HIA. In reality, the latter is intended to support individuals with limited HIA experience and can be addressed through appropriate training, guidance and a generic web based resource of HIA projects.

In regards to training, please note it is important that future HIA practitioners are knowledgeable of the various regulatory and complementary assessments to HIA (including SEA, SA, Equalities Impact Assessment, EIA, Environmental

Permitting etc). This is necessary in order to better integrate elements of HIA into regulatory assessment, to prevent needless repetition of effort, delay to the planning and decision-making process, and the potential for conflict.

In terms of the revised literature review stage, the HIA practitioner should establish what technical information is available on which to base HIA screening and scoping at the onset of the exercise. This will differ between projects and policies and the relative stage of both. In each case, such information should be recorded, providing an auditable trail to the information applied.

6.6.3 Stage 3 Spatial Susceptibility Analysis

Modifications made to the spatial susceptibility analysis are principally centred on the choice of the health indicators applied and the data available. From the findings of the external review it was determined that the domains within the indices of multiple deprivation will not always prove insightful, as different proposals will require different or additional health indicators in order to gauge HIA requirements.

Though the sole use of the IMD domains is not thought optimal for all situations, it is the case that at the time of development they were the most practicable for use as a prospective human health indicator, and a good starting point to develop dedicated HIA data-sets.

A key modification is that the selection of appropriate health indicators, is therefore to be informed by the key health pathways identified during the checklist. To clarify, where a project has the potential to influence income, employment and education, suitable health and socio-economic indicators will be mapped to inform the likely outcome and distribution of effect in a targeted community.

As raised during the external review, morbidity and mortality data can also be applied on specific projects to indicate existing burdens of poor health and relative susceptibility to certain health pathways. Such statistics are generally complementary to the IMD health domain, yet possibly of more value during more detailed full HIA.

By ensuring that such indicators are available at the local level nationally, it is therefore possible to provide a rapid and consistent approach to screening throughout the UK.

6.6.4 Stage 4 Screening Summary and Presentation

The amalgamation of the summary and presentation stage is intended to further reduce the complexity of the screening and scoping model, and as suggested in the external evaluation is considered vital to the final decision, and the promotion of potential beneficial outcomes.

It was also recognised that a key requirement of this stage was not only to determine if further HIA is required, but where it isn't, to provide appropriate justification to this decision (i.e. an audit trail).

The final screening summary should therefore, as a minimum indicate:

- the key health pathways associated with a proposed project policy or programme;
- the likely magnitude and geographical distribution of health outcome (adverse and beneficial expressed in broad qualitative terms);
- the requirement for further assessment (structured by key health determinants to aid scoping);
- potential barriers to benefit uptake;

- additional measures, initiatives and wider partnerships to support health benefit uptake; and

- additional mitigation to prevent or reduce potential health impacts and inequality.

6.7 Summary

This chapter covered the methods employed to externally evaluate the proposed screening and scoping model leading to its final refinement for use by practitioners on live projects.

The overall evaluation of the screening and scoping model indicates that it is a valid means to developing a more consistent and informed approach to HIA screening throughout the UK. It offers a reliable, repeatable technique that although it required refinement and streamlining has sparked significant interest for both its primary screening role, but also for its secondary objective of developing a more robust platform to HIA and in providing an additional tool to full HIA (i.e. a spatial tool for appraising the distribution and significance of potential health outcome upon local circumstance and susceptibility).

The following penultimate chapter, provides an overview of how the refined model has since been applied in a commercial setting to advise both public and private sector decision makers on major international infrastructure projects, national strategies and programmes since 2003.

CHAPTER SEVEN

7.0 Conclusions, Reflections and Future Directions

7.1 Introduction

The following section provides a summary of how the concepts and outputs of this thesis have been applied, refined and further enhanced in a commercial setting to achieve the objectives of this thesis. This section then evaluates and reflects upon academic and commercial success, the further potential of the model and outlines research to further develop the field of HIA.

7.2 Application of the Screening and Scoping Model in a Commercial Setting 2003-2010

As stated in section 1.3, one of the aims of this thesis was to promote and apply the uptake of the screening model by mainstream environmental and planning consultancies. The purpose of this was to further support the development and integration of HIA into planning and decision-making. In addition, it was recognised that the assessment of a multidisciplinary concept such as health, requires and benefits from the multidisciplinary expertise that some consultancies afford. Robust HIA, therefore, require input from the technical assessment fields such as air quality, noise and vibration, transport as well as knowledge of the planning policy and strategic guidance set to protect environment and health. As such, a HIA team supported by such expertise is likely to be more informed, will reduce unnecessary repetition of effort and present an opportunity to support more health conscious planning and mitigation.

This aim was met sooner than anticipated prior to the end of this thesis, and although this resulted in delay in submission, the author has benefited by applying the academic outputs of this thesis through two internationally recognised mainstream consultancies. The following sections outline how the screening and scoping model has been applied since 2003, to not only screen and scope HIA, but to also raise awareness as to the benefits of HIA to the public and private sector, and how the outputs of this thesis have further supported the development of HIA as a whole.

7.2.1 Application of the Screening and Scoping Model through ERM (2003-2006)

In 2003, following a presentation to the National Association of Clean Air on the integration of HIA, EIA and Integrated Pollution Prevention and Control (IPPC), a partner of Environmental Resources Management (ERM) provided an opportunity to develop the first HIA team within a mainstream international environmental consultancy. Following discussion with the research supervisor, it was determined that this research project should be temporarily paused in order to implement the research outputs in practice.

The primary task at ERM was to raise awareness as to the principles and objectives of HIA in order to stimulate internal HIA cross marketing and generate work. As such, the outputs of this thesis including the literature and model review provided the basis to a HIA awareness training programme provided for ERM staff. However, in the absence of any regulatory requirement for HIA, it was also necessary to provide training on when a HIA would be recommended and or beneficial to a client, namely training on the screening and scoping model. This training programme was rolled out to the waste, transport, environmental, planning, social, economic, energy and oil and gas teams in over seven UK offices, while further sector specific information sheets (waste management, urban development, transport, civil aviation, oil and gas and international development) were distributed to over 145 offices in 41 countries.

The refined/streamlined model proved most effective in enabling ERM consultants to identify aspects of a project with the opportunity to influence health and to recommend to clients if further assessment is necessary to manage potential risk, or to improve potential health outcomes. As a consequence, ERM had managed to implement the first uniform HIA screening and scoping mechanism within an environmental consultancy generating significant opportunities for HIA.

In addition to identifying when a HIA is recommended on existing projects, the screening and scoping model also provided an advantage on competitive tenders. The screening and scoping model was applied to outline the key issues the HIA is to focus upon, providing a rationale for elements scoped out and thereby providing a more cost effective and objective focussed HIA, in contrast to the more frequent process driven approach. To clarify, the process driven approach normally repeats guidance with generic aims and objectives, and is not necessarily tailored to project or local circumstance. HIA that are based on a process driven approach are generally, more costly and have less influence on the decision making process.

By 2005, ERM had become one of the leading mainstream HIA consultancy in the UK with key projects completed including but not limited to the following:

- the London Crossrail Transport Scheme;
- the Aire Valley Leeds Regeneration Programme;
- the 2012 London Olympic Games and their Legacy;
- expansion at Stansted Airport;

- the proposed London Low Emission Zone;
- the Durham Waste Strategy;
- the Edinburgh Airport Transport Link;
- the Tees Valley Metro;
- the London Sub Regional Development Frameworks;
- Sustainability Appraisal of the South East Plan; and
- Integrated Environmental, Social and Health Impact Assessments (ESHIAs) in Sakhalin, Salym, Kazakhstan, Angola, Ghana, Mauritania and the Arctic.

For copies of the UK case studies, please refer to the Association for Public Health Observatories HIA gateway website.

During this time, the spatial susceptibility element of the screening and scoping model evolved alongside emerging health statistics at ever increasing spatial resolution at the sub-ward level (i.e. Super Output Area). The spatial susceptibility element of the model was further developed as a more detailed assessment tool to integrate more quantitative health assessment methods. As an example, by 2004, the principle of spatial susceptibility was being applied on projects such as the HIA of Stansted Airport to incorporate:

- exposure response mechanisms developed by the Committee for the Medical Effects of Air Pollution (COMEAP) to quantify the potential change in hospital admissions and reduction in relative life expectancy from local changes in air quality;

- Civil Aviation Authority guidance to quantify relative changes in the distribution and magnitude of community annoyance and sleep disruption;

- research on the effect of noise on the cognitive effect on children to quantify relative noise impacts upon performance in schools; and

- the quantification of potential changes in risk from road traffic accidents along specific road networks and the associated risk to local communities.

For specific examples, please refer to HIA of expansion at Stansted Airport, or the proposed London Low Emission Zone. Both are available from the Association for Public Health Observatories HIA gateway website.

Although successful at ERM and benefiting from a wealth of transferable knowledge from other technical disciplines, the model and the principles behind spatial susceptibility had been largely confined to assessing the potential health outcomes of projects, policies or programmes, but had not been implemented at the earlier stage to influence the design of such projects, policies or programmes. To clarify, it is one thing to assess a plan, project or programme as to its potential health outcome and to then generate appropriate mitigation, and another to design a plan, project or programme to inherently consider and manage potential health outcomes. As a consequence, by 2006, RPS Group, an internationally recognised planning led environmental consultancy provided the author of the thesis an opportunity to further drive and evolve HIA at the more prospective level, supported by an internal, public and occupational health and health risk team, whilst also presenting an opportunity to return to Brighton to complete this research project.

7.2.2 Application of the Screening and Scoping Model through RPS Group (2006-2010)

Following similar internal HIA awareness training and the provision of sector specific information sheets to over 50 offices throughout the UK, Europe, Russia, the South Pacific, Australia and North America. RPS started to develop its HIA market, with stiff competition from the now established ERM HIA team, and other mainstream environmental and health consultancies following ERM's success. By the close of 2009, RPS had established a recognised and leading HIA capability, with a reputation for providing HIA services specifically designed to enhance the health benefits of projects, policies and programmes, and to coordinate more holistic and cost effective HIA services through integration with parallel work streams. Key RPS UK HIA examples include but are not limited to the following:

- the Wales and Buckinghamshire Waste Strategies;
- the Brighton & Hove and East Sussex Waste and Minerals Development Framework;
- the Runcorn, Exeter, Rufford, Cheshire and Dublin Energy from Waste facilities;
- Health Expert Witness at the Dublin Energy from Waste Facility and Tipperary Bio-Gas and Bio-Diesel Facility Oral Hearing;
- Birmingham International, London City Airport and Belfast City Airport;
- the Adur Core Strategy, Joint Area Action plan and Shoreham Harbour Development;

- the Kent Regeneration, Dartford Town Centre Masterplan and Dartford Core Strategy;
- the Barton Seagrave, Aylesbury and Brighton General Hospital Urban Extension;
- the Kent International Gateway Intermodal Transfer Facility; and
- HIA services to the UK Highways Agency.
- HIA of an Algerian oil and gas facility and pipeline; and
- HIA support to the World Health Organisation (WHO) and International Finance Corporation (IFC) in the development of international, sector specific best practice.

UK examples are available from the Association for Public Health Observatories HIA gateway website, or available upon request from the author of this thesis.

7.3 Commercial Refinement of the Screening and Scoping Model

The refinement of the screening and scoping model during the external evaluation proved essential in achieving success at two international environmental consultancies. In 2010, the core stages of the model remain the same, although, due to increased knowledge and expertise gained from exposure to a range of technical disciplines, there has been some further streamlining (i.e. less requirement for the literature review due to a firmer understanding of the supporting evidence base).

To date the screening and scoping model has been further refined to the following three stages:

1) Project Profile;

2) Community Profile; and

3) Screening and Scoping Recommendation.

Each of these stages are discussed in more detail below.

7.3.1 Project Profile

The project profile combines the former checklist and literature review stages. The purpose of the project profile is to identify those relevant features associated with a proposal (be it a project, policy or programme) with the potential to influence health. However, as shown in Table 15, the checklist has now been further simplified, providing a more consistent approach to establishing the potential health pathways associated with a proposal, if further assessment is necessary or beneficial and importantly, who is responsible for any further action. The benefit of this improved checklist is that it can be applied at an early stage by planners policy makers and decision makers to support the development of a more health conscious project, policy or programme. The same checklist can also be applied as a means to test and evaluate a proposal, and facilitate a more informed means to integrating HIA into planned work streams (saving time and unnecessary repetition of effort).

What Health Determinant	**How** Health Pathway (i.e. how the health determinant will be influenced)	**When and for How Long** Construction and operation, short and long term	**Who** Distribution of effect, in terms of geography and sensitive groups	**Outcome** Adverse or beneficial	**Requirement for further study/action** Is further study necessary/beneficial Can measures to minimise harm, enhance benefits or address inequality be implemented	**Responsible** Who should action, when and how
Income						
Employment						
Education						
Housing						
Environment						
Transport						
Crime						
Access and Accessibility						
Services and Amenities						
Lifestyle						
Social Networks and Recreation						
Health Care						

Table 15 **Project Profile Questionnaire, as used by RPS in HIA Screening**

The development of the project profile, still requires a review of available project information, yet provides a far more consistent means to investigate the influence upon each determinant of health and in rationalising the requirement for any further assessment. Equally, in the instance that a HIA is not considered necessary, the process provides a means to justify the decision whilst further supporting the delivery of more health conscious projects.

7.3.2 Community Profile

The Community Profile has replaced the Spatial Susceptibility Analysis in name only. This is principally to further refine and simplify the approach, where the lay person was often confused by the term and objective of the analysis. In contrast, the community profile, is more readily understood and accepted by the general public.

This stage still draws upon and supplements the project profile, where evidence suggests that different communities have varying susceptibilities to health impacts and benefits as a result of social and demographic structure and relative economic circumstance (Dahlgren et al 1995), (Acheson 1998). A community profile therefore not only forms the basis to the process but also allows an insight as to how potential health pathways identified by the project profile might act disproportionately upon certain communities and sensitive receptors. In particular, the spatial approach to screening and assessing the distribution and significance of potential health outcomes, has significantly benefited from advances in both the range of data now available, and the geographic resolution that is can be applied.

7.3.3 Screening and Scoping Recommendation

The final stage of the screening and scoping model follows the process refined through the external evaluation in Chapter 6 (i.e. presenting the screening and scoping recommendation). This stage is intended to provide a concise and justified recommendation to decision making for any further assessment. Where further HIA is required, the model lists the specific health pathways to be investigated, sensitive communities and key objectives/deliverables for the study. In so doing the report provides a means to either integrate such assessment into planned and parallel work streams (such as the EIA, SEA, SA and Equalities Impact Assessment), or to support the development of an invitation to tender for an objective driven HIA (i.e. a focused assessment with specific deliverables required to inform decision-making).

7.4 Refinement through Commercial Practice

Following minor changes in terminology, the screening and scoping model refined through the external review in Chapter 6 and the commercial application discussed here, has facilitated a more consistent and robust approach to using the screening and scoping method to determine when a HIA is required, what it should entail, and where possible, how to integrate further studies into planned and parallel work streams.

The benefit of the model in a commercial setting is apparent, where within six years the model has enabled two mainstream environmental consultancies, with no previous HIA experience to develop key examples of HIA and influence major projects, policies and programmes at the national and international level. Furthermore, the model has also proved essential in providing an auditable means in demonstrating how community health has been inherently considered in the decision making process, regardless of whether a HIA was commissioned or not. To clarify, both the public and private sector are being made increasingly accountable for preventable health outcomes. As such the screening and scoping model provides a robust means to catalogue and review how health was considered to influence decision making.

7.5 Objectives Achieved

The aim of this research project was to contribute towards the academic and commercial development of HIA. The relative contribution to each is summarised below.

7.5.1 Contribution to Academic Knowledge

The core outputs of this thesis have provided a significant contribution to the HIA knowledge base. The literature and model review have been applied as a means to train the next generation of HIA consultants at two international consultancies, as a masters module at Brighton and Sussex University, through publication as specific HIA screening guidance by the Health Development Agency (Taylor & Quigley 2003), and to inform the development of WHO HIA guidance. Furthermore, the ‘spatial susceptibility’ and ‘health pathway’ concepts have been presented at a number of academic seminars, including:

- the First European Conference on Geographic Information Sciences in Public Health (University of Sheffield 2001);

- the Kent, Surrey and Sussex NHS Workforce Development Confederation at the University of Brighton (2002);

- the Health Development Agency ‘HIA Monitoring and Evaluation Workshop’ at the Chartered Management Institute in London (2002);

- the Health Development Agency ‘HIA Informing the Decision Making Process Workshop’ London (2002);

- the South East Public Health Observatory HIA Workshop at Ashburnham Place (2003);

- the Health Development Agency 'HIA Screening Workshop' in London (2003); and

- the National Society for Clean Air, presenting 'IPPC, EIA and HIA, Best Practicable Route Towards Integrated Assessment' (2003).

In addition, the key thesis outputs (and the majority of case studies derived from the outputs) are available at the Public Health Observatory HIA Gateway Website, and have led to debating and supporting the development of further HIA research, and a Masters Thesis on 'Health, EIA & Energy from Waste' at oxford Brookes University (Hill 2007). On this basis, the core thesis outputs have contributed towards the academic development of HIA through research, guidance and training.

7.5.2 Contribution to Commercial Knowledge and Best Practice

The commercial aim of this research project has been to produce, test and evaluate a model in the UK that sets core principles for screening and scoping, designed to inform the scoping of development plans, projects and programmes for their potential influence on the wider determinants of health. In setting a more consistent approach in defining when further HIA is necessary and justification for what it should entail, it was also the aim of this research project to further contribute in developing more objective focused HIA, thereby further mainstreaming HIA in the UK and supporting the re-integration with current regulatory assessments.

The development of the screening and scoping model meets these aims, has been tested through, peer review and external evaluation and proven through application in a commercial setting for the last seven years (2003 to 2010). The model and the principles developed during this thesis, including the 'health pathways' and 'spatial susceptibility' concept, and the introduction of GIS as a tool to support the assessment of the relative significance and distribution of potential health outcomes has significantly contributed in advancing the field and credibility of HIA in planning and environmental assessment fields.

The outputs of this research project have therefore met the aim of the thesis and have supported the development of a more consistent approach to HIA that has informed major decision-making and has proven to stand legal, planning and public scrutiny during oral hearings (RPS Group 2008) and legal challenge (UK Airport Consultative Committee 2008). Furthermore, in 2010, despite a lack of a regulatory requirement for HIA in the UK, the screening and scoping model enabled developers and decision makers to appreciate the benefits of performing full HIA, and in so doing, generated a commercial market and sparked interest from mainstream consultancies driving the evolution of HIA through a competitive market.

For recognition of services to health and health promotion, both the Royal Society for the Promotion of Health and the Royal Society of Medicine has provided the author of this thesis Fellowship, and has resulted in a position on the Royal Town Planning Institute's (RTPI) climate change and health group. Furthermore, the principles behind the screening and scoping model coupled with experience gained on international projects has led to the provision of guidance and support to the World Health Organisation in the development of international, sector specific health awareness sheets. The purpose of these sheets, mirror the aim and objectives of this thesis, in that they are indented to facilitate a more consistent approach to identifying and managing potential health outcomes, and to scope further assessment where appropriate. As such, the aims and objectives of this thesis have been met in both an academic and professional context.

7.5.3 Thesis Limitations

Although the thesis objectives have been met, the key limitations to the screening and scoping model include:

- the selection of robust and consistent data underpinning the 'spatial susceptibility' concept; and

- the modifiable areal unit problem associated with applying spatial data.

7.5.3.1 Selection of Robust and Consistent Data Underpinning Spatial Susceptibility

As discussed in Chapter 4, the 'spatial susceptibility' concept applies demographic, health and socio-economic statistics that best represent the key determinants of health, providing the basis to defining local community circumstance and susceptibility to potential health pathways. During this thesis, the selection of appropriate statistics (available at the ward and sub-ward level consistently throughout the UK) were identified through an in-depth statistical review (Appendix 2). However, it is appreciated that such statistics are secondary in nature, were never specifically intended for the application in this manner, have since been modified (including different data sets) and may no longer best represent the key determinants of health. It is also important to note that such statistics are static, and therefore have a shelf life before they no longer best represent local community circumstance. On this basis, caution is recommended when repeating the methods employed in this thesis, and in particular, the choice of statistics employed to represent the key determinants of health. This particular limitation is further discussed in Section 7.6.2, under the heading of 'Creation of Dedicated HIA Data Set'.

7.5.3.2 The Modifiable Areal Unit Problem

Following on from the selection of appropriate statistics to underpin the 'spatial susceptibility' concept, another limitation of applying demographic, health and socio-economic statistics spatially, is that the statistics themselves may be subject to some form of geographic bias when they are aggregated into spatial areas (i.e. ward areas, postcode areas, super output areas etc). To clarify, depending on the size and shape of a spatial area that point based data are aggregated into, can influence the final statistical results. This is a phenomenon known as the Modifiable Area Unit Problem (MAUP) (Openshaw 1984, Fotheringham et al 1991).

In the context of the 'spatial susceptibility', the choice of spatial area applied can therefore have a significant influence on the effectiveness of highlighting pockets of inequality and relative susceptibility. For this reason, an appreciation of the MAUP is required, and caution recommended when interpreting relative community circumstance, inequality and susceptibility (Huby et al 2009). Although caution is therefore required in the selection of both spatial areas and the data to be applied, any such disadvantage is offset by the benefits of identifying inequalities that are masked at coarser resolutions (Huby et al 2009). Furthermore, such a limitation also highlights the benefit of triangulating between qualitative and quantitative approaches when profiling local community circumstance and relative 'spatial susceptibility'.

7.6 Recommendations for Further Research

7.6.1 Mapping of National, Regional and Local HIA Drivers

During the course of this research project, the development of a single regulatory requirement for HIA in the UK has been discussed by the author at numerous HIA seminars, network meetings and directly with the Department of Health as a major barrier to the development of HIA. A lack of a single regulatory requirement, means that HIA are applied inconsistently throughout the UK, to varying levels of expertise and with no governing body to ensure HIA consultants are appropriately qualified, and the conclusions and recommendations are accurate or appropriate. In the absence of a 'top down' approach to driving the quality and necessity of HIA, there has been an increase in local and regional level drivers through the inclusion of HIA in Local Development Frameworks, Local Area Agreements, voluntary initiatives such as the WHO Healthy Cities Programme, and though Supplementary Planning Guidance.

However, this uncoordinated, ‘bottom up’ approach to developing the requirement for HIA presents a number of issues, including:

- Regional inconsistency, where neighbouring regions may have different requirements and or thresholds for HIA. This not only presents confusion to developers and decision makers (with subsequent delay and cost), but can have equality and legal implications during projects and programmes that span regions.

- The reinforcement of inconsistencies in HIA practice as regions develop their own approaches and methodologies to HIA. This can result in varying expectations and objectives for HIA, that ultimately reduces the value to decision making and limits the transfer of expertise and knowledge between regions.

- HIA is perceived as a barrier to development, and a process to be avoided rather than embraced by developers.

- Consultants will be wary in choosing a career path in HIA or further research, as prospects are unclear.

As such, it is recommended that research is implemented to catalogue and map the various regional and local level drivers throughout the UK, in order to re-approach Government and demonstrate that HIA is a valued process and is being made a requirement despite their lack of action. In so doing, such research will firstly enable regions to review, compare and refine a more consistent requirement and driver for HIA throughout the UK, but also reinforce the necessity for a single regulatory HIA requirement. This additional research has been discussed with the Department of Health and is scheduled for initiation by RPS. The proposed approach requires RPS Planners, Waste and Energy teams to send through regional and sector specific HIA requirements. This will be largely transferable knowledge from UK projects including policy and planning reviews from project EIA and their involvement in emerging Local Development Frameworks. Following compilation of the regional and local HIA drivers a gap analysis will be performed and a GIS based resource of regional HIA drivers will be made available on line. The outcome of the study will be reported and presented to the Department of Health for their consideration.

7.6.2 Creation of Dedicated HIA Data Set

During the course of the research project, it was established that a single nationally available local level UK HIA data set is required to inform the screening and scoping stage, as well as support more detailed health assessment, enabling a more uniform approach to triangulating health outcomes throughout HIA. This recommendation has in part been met though the development and refinement of UK national health statistics alongside a specific community profiling tool developed by the Department of Health. However, there is still insufficient knowledge of how such information can be applied to not only screen HIA, but also to facilitate more informed and accurate health assessment. Further research is therefore required to build upon the data review performed as part of this research project in order to disseminate the wealth of statistics and community health indicators available through the Office of National Statistics, the Public Health Observatories and the Department of Health to the benefit and advancement of HIA practice.

7.6.3 HIA Training, Qualification and Accreditation

Although in 2009, there are number of HIA training courses available both nationally and internationally, there is currently no agreed national syllabus or accreditation system in place ensuring practitioners are qualified, that assessments are appropriate or the recommendations and initiatives are effective. There is therefore a necessity for a UK national syllabus and accreditation to enforce the quality of HIA practitioners and accuracy of HIA. Unfortunately, the lack of a regulatory requirement for HIA casts doubt upon career paths and therefore the demand for specific academic courses.

Although there is discussion by leading HIA practitioners to develop a HIA competency framework, this still lacks the development of uniform base principles to enable consistent and robust HIA, favouring instead, practitioners with experience. A recommended approach is to therefore build HIA training as a module within parallel and complementary studies including public health, EIA and SEA. In so doing, it will be possible to prepare the next generation of HIA practitioners and further support the integration of HIA into regulatory requirements. In 2009, there are signs that such research is underway, most notably at the Brighton and Sussex Joint Medical School, where this research has been presented as a module (Meeting the Challenges of Public Health in Practice 2008). Further research is therefore recommended to catalogue where similar courses are provided elsewhere and to ensure they are consistent and appropriate.

7.6.4 Co-ordination of Future Research

It is the case that the lack of national HIA coordination is proving a barrier to HIA development. This is the case as a range of methods, tools and even terminology is being developed to meet the current interest and gaps in HIA. Though central reserves are now becoming more readily available there is still a lack of a governing body to aid in the further development or evolution of HIA practice. There is therefore a requirement for a managing or overarching organisation to link these resources, establishing a single HIA process and appropriate methods and tools. More importantly by co-ordinating the various reserves available it will be possible to set up a dedicated HIA research web page. This would not only speed up research in that it will offer a means to review work underway, completed or required but could prevent any further overlap and inconsistent practice. Furthermore, such an approach would also aid in bridging the varying yet complimentary HIA methods, providing the basis to developing more rounded HIA practitioners and delivering more consistent HIA. Such co-ordination is slowly developing, where partnerships, case studies, workshops and training is being made more readily available through the Welsh Health Impact Assessment Support Unit (WHIASU), The Irish and Scottish HIA Networks and through the UK Public Health Observatories.

7.7 Final Conclusion

A key difficulty common to postgraduate research is in reigning in the objectives in order to deliver realistic achievements and provide a contribution to knowledge within limited time constraints. This research thesis was no exception, where the aims and objectives were developed to address a wide range of issues within HIA. The decision to target research at the preliminary stage of HIA (i.e. screening and scoping) was therefore intended to address the key barrier to HIA practice, in that previous practice, was:

- inconsistent;
- largely process driven (rather than objective driven);
- lacked reliable and repeatable means to scope and justify the requirement for further assessment; and
- often faced incompatibilities with regulatory assessments (through differing terminology, timing, conflicting outputs etc).

Following a case study test in Brighton& Hove, peer/external evaluation of the screening and scoping model, and by establishing and implementing the process within two mainstream environmental consultancies it has been possible to refine the model for use in a commercial setting. The outputs of this research project have also influenced decision making at the national and international level.

Furthermore, the literature and model review used to develop the model have since been applied as a means to train the next generation of HIA consultants at two international consultancies, as a masters module at Brighton and Sussex University and through publication as guidance by the HDA (Taylor & Quigley 2003). Furthermore, current examples of HIA that apply the principles developed during this thesis have proved to stand public and planning scrutiny, and subsequent submission as Supplementary Planning Documents, Ministerial and National Assembly Briefs and presentation at Public Inquiry (RPS Group 2008a). In 2009, such accomplishments for HIA are still rare. In conclusion, the screening and scoping model, as well as the outputs essential to its delivery has significantly contributed to the advancement of knowledge and HIA best practice.

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APPENDICES

9.0 Appendix 1 Model Review

9.1 Model Review Introduction

In order to not detract from the main thesis output, the following section constitutes the detailed model review discussed in Chapter 3, including:

- the Bielefeld Environmental Health Impact Assessment model (Fehr R. 1999);
- the Kirklees Metropolitan Council Model (London Health Group 2002);
- the Birley Health Impact Assessment of Development Projects model (Birley 1995);
- the Sweedish County Councils model Landstingsforbundet, 1998, 2001);
- the Merseyside guidelines on Health Impact Assessment (Scott Samuel 1998);
- the British Colombia model (Population health Resources Branch 1994);
- The Better Health Better Wales, Developing Health Impact Assessment in Wales (National Assembly for Wales 1998); and

9.2 The Bielefeld Environmental Health Impact Assessment Model (EHIA)

The Bielefeld model was designed by the University of Bielefeld in partnership with the Institute of Public Health for North Rhine-Westphalia in Germany in

1999, and was specifically intended to improve the current coverage of human health in the process of EIA (Fehr 1999). As such, the model was derived to support the planning process in Germany, but would be applied to any region or country that has a well-established EIA process. During the development of the Bielefield model the project surveyed current practice and procedures of EHIA, including legislation, perceptions and coverage of health, and research into the methodologies, practice and procedures that could be used to develop a comprehensive EHIA process (Fehr 1999).

As with the majority of the other HIA models the Bielefeld system was designed out of necessity due to the failure of EIA to adequately cover health issues (Fehr, 1999) during the planning process. This point is emphasised by a number of bodies, but was proven again through their own in depth analysis of 51 EIA documents. Here the analysis found limited or missing coverage of health aspects in the majority of ES, and a complete lack of a systematic approach. Following this, a survey covering the local health departments in the state of North Rhine-Westphalia was undertaken to identify the level of involvement from the public health service. Of the 46 departments that responded, 91% expressed the need for specific health assessment training in methods, procedures and tools.

9.2.1 Model Basis

The model itself is aimed at the project level (i.e. upon a specific development) during the planning process but can be adjusted for plans and policies. It has been designed to run alongside EIA in either a prospective or retrospective approach, and it is applied under legislation governing EIA in Germany. With this as the case, as shown in Figure 43 the structure and layout of the model is somewhat unconventional in that it does not embellish any of the layout, stages or terminology now common to HIA.

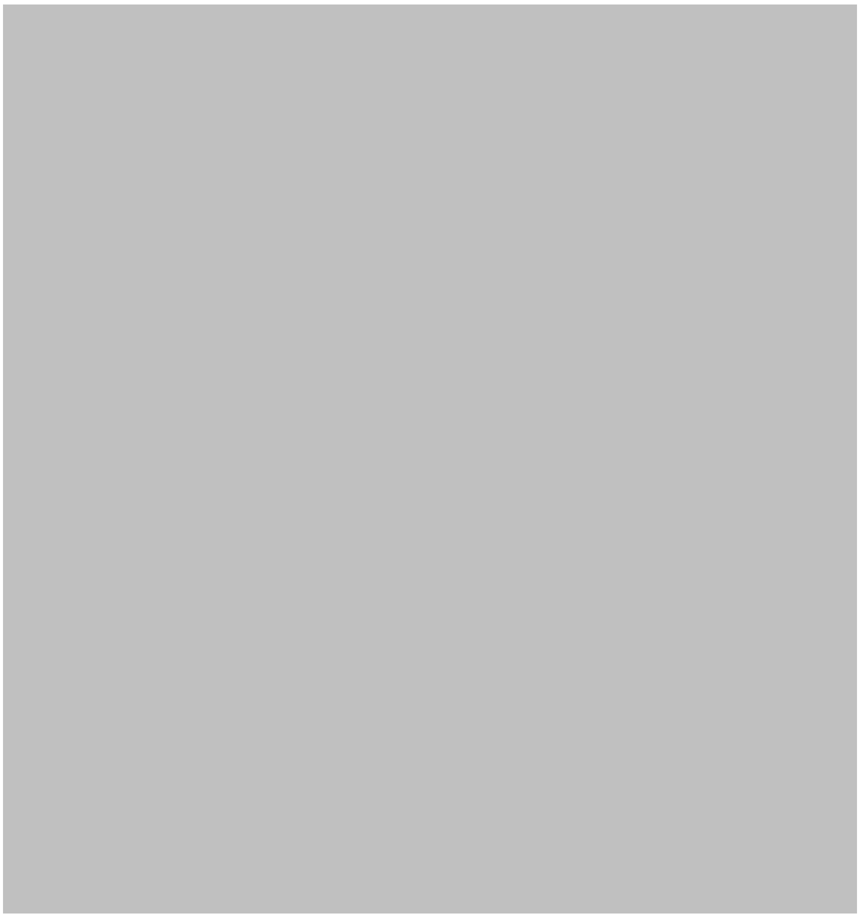


Figure 43 EHIA a Ten Step Model (Fehr. 1999)

9.2.2 Assessment basis

As shown in Figure 2, the basis for the assessment in the Bielefeld model is somewhat unclear; the supporting text to the model emphasises the need to integrate a number of approaches in the assessment of health, but never actually defines what aspects of health it will target. The only indication into what aspects are covered is with the focus of the models tools being solely targeted at physical health. This is partially due to the fact that this model is designed for use by health authorities and bodies well versed in the definitions and determinants of health. Yet the lack of a founding principle will result in a varying focus, and discrepancies when applied elsewhere.

9.2.3 Process

The model consists of ten stages that build on each other to identify the 'status quo' of the environment and human health, in order to identify potential impacts of a development. The model then translates those predictions into health risks to be addressed by management and decision-making. These ten steps in Figure 2 can be summarised as follows:

1) The first stage of project analysis includes the development of a detailed project profile (i.e. a breakdown of the key activities with the potential to influence physical health) using both qualitative and quantitative values, and expected emissions during accidental releases in order to characterise expected hazards.

2) The regional analysis takes into account the local environmental conditions, meteorology, natural features, and land use of both the study area for investigation, and the area surrounding it.

3) The population analysis includes the population structure in terms of size, age, sex, health status of the population, and behavioural patterns (diet, and activity).

4) The background situation stage is designed to identify the existing environmental quality, and the identification of additional data needs through the use of environmental monitoring.

5) The prognosis of future pollution stage uses dispersion modelling based on data obtained from similar developments; dispersion patterns of chemical and physical agents from point sources that are modelled in the various environmental media, and the food chain.

6) During the prognosis of health impact stage, a prediction is made on the impact to the population at hand using three inter-related components:

- qualitative assessment of changes to neighbourhood features, and quality of life, including ‘citizen concerns’;

- for chemical agents (i.e. pollutants) that have a threshold of exposure, a comparison is made between predicted values and appropriate (e.g. medium–specific) limit values to determine the hazard index’s/quotient for each target organ/system affected by the combination of threshold agents which act on that organ/system; and

- for agents that do not have a threshold of exposure (e.g. carcinogens), quantitative risk assessment is undertaken, including all relevant pathways and agents, to determine the additional risk.

It is also at this point that the opportunity to consider community concerns occurs.

7) The summary assessment of impacts involves a summary of the predicted impacts, for the threshold agents the assessment is implied in the comparison between predicted and the limit values, but for non-threshold agents the level of ‘acceptable additional risk’ (Fehr 1999) needs to be determined;

8) The recommendations stage is designed to display all the apparent options to the impacts identified and predicted in the previous stages, and generally involves either planning alternatives or modifications to the planning proposal e.g. the need for emission control, monitoring, public information, and post-project analysis.

9) The communication stage is recognised as an essential step that requires special efforts if the results of the EHIA are to be disseminated correctly and

efficiently to all parties involved, including the public. Suggested aids to communication are risk comparisons and visualisation methods.

10) The final evaluation stage involves the use of monitoring to compare the predicted impacts against the actual situation, with respect to the state of the environment, human exposures and health outcomes.

The benefits of this model are directly linked to its ability to effectively utilise both environmental and epidemiological information. The result is not only the identification of a baseline of local health, but also the ability to estimate potential future pollution and the subsequent health risks to that population using both quantitative and qualitative data.

The model also sets the stage for building a catalogue on specific developments, in that developments will have a range of hazards, and therefore should have a minimum requirement for assessment (e.g. the minimum EHIA list for a traffic project may include chemical air pollution, traffic, noise and injury hazard from traffic collision).

Unfortunately the benefit of this model is also its failing, by focusing so tightly around the environment and its influence on physical health it has failed to consider the other social, mental and psychological aspects clearly stated within the WHO's definition of health. The model is also one of the few models to not clearly incorporate the now internationally recognised determinants of health (Secretary of State for Wales, 1998). Further criticisms are that although public participation is mentioned, there is no clear point for its integration or involvement, as it is at a stage that does not allow participation to add to the hazard identification, prediction or mitigation. The lack of public participation within the model may result in the inability to address community perceived risks and ultimately public trust.

In addition, as shown in Figure 44, although the model seems to be original, on closer examination it is again very similar in content to the processes already set out and currently used in EIA as summarised by Glasson (Glasson 1997). From Figure 44 it can be seen that all steps of the Bielefeld model fall within existing EIA categories. The Bielefield model also fails to include points to return to previous stages, therefore preventing refinement of the assessment.

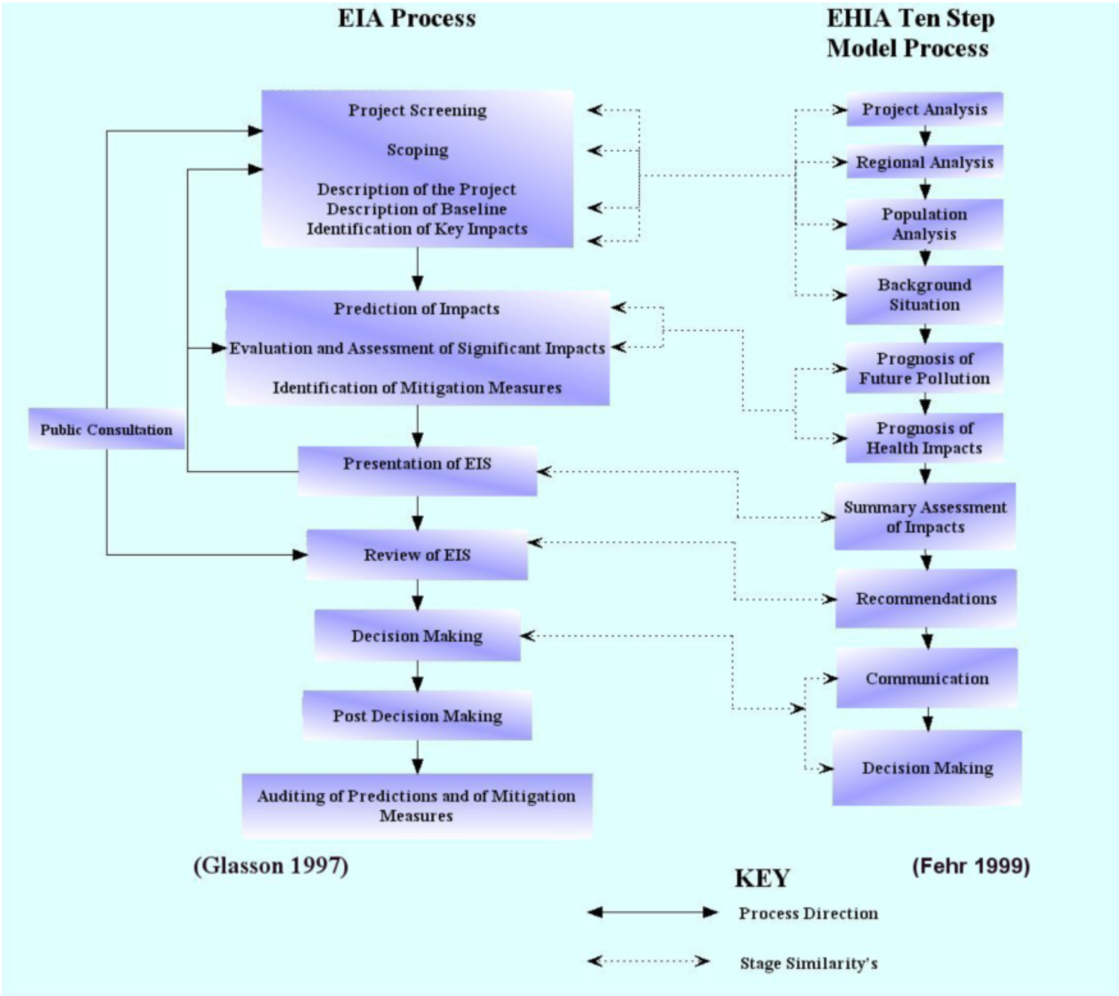


Figure 44 **Comparison of Bielefeld Model and Current EIA Approach**

9.2.4 Bielefeld Model Summary

The Bielefeld model is useful for identifying and quantifying potential adverse impacts to physical health through the detailed study of the environment, and utilises the now recognised need to include more quantitative tools and information. Yet it fails to adequately cover all the aspects of health, and does not allow an adequate level of public participation. The result is not an HIA model, but a very specific tool that can be applied in HIA to quantify the potential distribution and magnitude of physical health impacts in relation to specific environmental health pathways (i.e. the modelling of emissions, meteorological conditions and subsequent worst case exposure through inhalation, absorption through skin and pollutant concentration via the food chain).

It is important to note that although the Bielefield model is labelled as a HIA, in actuality it is more commonly known as a Human Health Risk Assessment (HHRA). Such assessments often stem from a planning requirement on specific projects such as the planning and environmental permitting of incinerators (Environment Agency 2003).

The reason why the model was included within the review, was partially due to the previously mentioned inconsistent terminology applied within both HIA and EIA. It was deemed important to keep the Bielefield HHRA model within the model review as it firstly demonstrates the varying approaches and expectations between planners and health practitioners. To clarify, planners generally regard health in terms of risk and project liability, while health practitioners have a wider remit including the socio-economic determinants of health and place an emphasis and expectation on facilitating good health.

This difference in both the definition and priority of health is often the key issue faced by health practitioners when participating in the planning process. Equally, this has also proved one of the key barriers to integrating HIA into the planning process, as following two recommendations by the Royal Commission on Environmental Pollution (RCEP 2007) to make HIA a regulatory requirement, the UK Government still considers health or more precisely health risk, to be covered through current regulatory assessments.

The review of the Bielefeld HHRA model also identified aspects that need to be incorporated in to the next generation of HIA models, in that it recognises that a single consensus on a coherent concept of HIA is essential. That the overall procedure needs to be broken down into manageable components, that exposure response mechanisms require further research and that collaboration is needed to:

- establish and implement a consistent definition and priority for health (i.e. incorporate both health risk and health promotion);
- develop recommendations concerning a standard procedure, quality and evaluation criteria;
- develop specific tools and resources including software and databases; and
- provide dedicated EHIA training programs.

9.3 The Kirklees Metropolitan Council (MC) Model

The model (Department of Health 1999) was commissioned by Kirklees MC in Northern England in 1998, and intended for use by local authorities in the UK. The model is effectively made up of two parts, the first phase is a transitional component, designed to adapt the model to the settings, conditions and requirements of the intended area, while the second phase is the HIA tailored to local circumstance and objectives through the primary stage.

9.3.1 Model Basis

The Kirklees model summarised in Figures 45 & 47, is flexible in that it can be used in both a prospective, concurrent or retrospective manner for projects, policies and programmes. It is designed as both a model and a guideline, in that it establishes how the HIA process should be set up, what should be assessed, and how it should be undertaken (Department of Health 1999). The focus of the model is unclear, and will vary, as it is determined through the primary phase shown in Figure 47, and will change with where and what type of development is being assessed, as well as by who is undertaking it. The model also includes a range of determinants of health (see step 2 phase 1) meaning that social, mental and physical health are to be considered when tailoring the HIA to local health priorities.

9.3.2 Assessment Basis

The basis for the assessment is again very flexible, in that the primary phase of the model is devoted to establishing what definition of health will be used, and the development of revised health objectives or priorities. Unfortunately, by failing to actually provide a definition of health, and opting to allow whoever chooses to use the model to set their own definition, will result in discrepancies between case studies.

9.3.3 Process

As previously stated the model is comprised of two distinct phases:

- phase one is the transitional model, including the key steps to establishing health assessment to a new area Figure 45; and
- phase two is the final revised HIA model for that new area.

The purpose of phase one is to establish the parameters for undertaking HIA to a new area, and therefore to promote its application, relevance and development.

Figure 45 Kirklees Health Impact Assessment model - Phase 1 (Department of Health 1999)

Step 1 is the identification of a workable definition of health; this stage is considered paramount, as it will effectively determine what aspects of health will be covered within the assessment. It therefore determines the level of coverage within the transitional HIA model, and all the following assessments are undertaken using its guidance.

Step 2 is then undertaken to not only extend the definition and identify the potential impacts to health, but to also identify the determinants of health and how these relate to the area at hand.

Step 3 of the process is where the transitional model takes effect, as it is at this point that the assessment of the direct affects and determinants of health is undertaken. Once reviewed they are scored in the attempt to prioritise the impacts and determinants for future HIAs in that area. The defined health priorities are then entered into step 4, where explicit health objectives are written up under the influence of the SMART criteria (Figure 46).

S	Specific	(to the intended achievement)
M	Measurable	(using quantitative or qualitative methods)
A	Achievable	
R	Realistic	(in the context of the starting position, and resources available)
T	Time-bound	

Figure 46 The SMART Criteria set within the Kirklees HIA model phase 1 (Department of Health 1999)

The purpose of the criteria is to further mould the use of HIA to the specified area and to establish clear HIA objectives and deliverables necessary to inform decision-making. The fifth and final step of phase 1 is that of review and implementation. Here, if the objectives meet the requirement for undertaking HIA for the specified area, it will then proceed to the implementation of the Kirklees HIA model phase 2.

Phase 2 is the finalised model set for specific health requirements within an area. It is intended to ensure that both public participation occurs, and that action taken matches the identified priority health needs. The model is set up to firstly identify the health requirements of an area, and then to identify the stakeholders involved (Figure 6). Once the relevant individuals have been informed a plan of the desired health outcomes is derived, and an audit of current health promotion and facilities is established to form a baseline. The model then proceeds to assess health using both the process and information gathered in phase 1. Once the impacts have been scored and prioritised, a review of how the impacts could be mediated is undertaken and then planned on how such measures can be implemented.

Figure 47 Kirklees Health Impact Assessment Model Phase 2 (Department of Health 1999)

The main benefit of the model is in its transitional ability allowing it to be adapted not only regionally and nationally, but potentially globally. Phase 1 of the model is relevant to the HIA process, as there are factors that vary between areas resulting in a shuffling of the health determinants, objectives, and a subsequent variance in the priorities of health and its protection.

Therefore, by establishing the set up process of phase 1, this model has managed to avoid the assumptions that most of the other models reviewed in this chapter are forced into making, and has enhanced its relevance to specific community needs, priorities and circumstance. In short, the primary phase aids in setting the objectives of what the HIA is to achieve and what deliverables are required through a form of regional or local HIA screening and scoping exercise.

A criticism to be made about phase 1, is in its approach to the selection and use of a steering group to guide the phase (Department of Health 1999). At no point did it specify the composition of the group, or indicate if health experts, consultants or public participation will be involved in the development of the health affects in step 2. The result of this uncoordinated and potentially inappropriate selection of individuals may lead to the misrepresentation of health, and a barrier to future health assessments utilising their guidelines.

9.3.4 The Kirklees Metropolitan Council (MC) Model Summary

Although the Kirklees model has been both packaged and labelled as an HIA model, in reality it is not set up to adequately identify impacts from project, policies and programmes to the health of a community or region. Instead, it is more orientated towards health promotion and health needs assessment, both of which are components to HIA, but are not sufficient to adequately comprise an HIA model. To clarify, the model is more geared to establishing changes in future health care requirements, and therefore focussed upon health treatment as opposed to a more preventative approach to health care and a key objective of HIA (Taylor and Quigley 2003).

9.4 The Health Impact Assessment of Development Projects (Birley 1995)

Martin Birley is one of the UK's founding HIA practitioners, partly responsible for the development of the Merseyside HIA group (now known as International Health Impact Assessment Consortium or IMPACT), and has made a significant contribution in the development, evolution and practice of HIA, and international HIA in particular. The HIA of Development Projects book (Birley 1995) published by HMSO in March 1995 in association with the Overseas Development Administration is a key example of such a contribution.

The book emphasises that governments and international agencies invest large sums on development projects in energy, agriculture, industry and other sectors. The environmental impact of these projects is frequently assessed. But it is the experience of many health professionals that the health impact component receives too little attention. This book has been written to redress that balance.

The approach taken within the Birley text is orientated towards construction in developing countries, and is intended to incorporate a methodology to the assessment of health hazards that can run alongside conventional forms of assessment such as EIA (Birley 1995). The text identifies that the influence of a development extends well beyond the project site (i.e. considers both occupational and public health risk), and acknowledges that health impact assessments may be required at a much larger scope than project EIA's in both a spatial and temporal perspective.

The target audience of the book modelled by Birley (1995) is mixed, and includes an audience of non-health specialists, academics and professionals aiming for an introduction to health and development issues. However, the real focus is to inform project managers and decision-makers as to the potential health impacts project activities can have on the wider communities ‘beyond the fence’ (Birley 1995), and how these can be managed through HIA.

Being a model designed to work in the developing world means that the perceptions on health differ to those normally identified in the west, and the focus is placed on physical health. Yet the benefits of including this methodology in the model review are valid, as although the focus is different the approach and process has features of many other HIA models.

9.4.1 Model Basis

The model is specifically aimed at identifying health impacts of major construction sites in developing countries, and is principally intended for use in a prospective approach within the planning process or to adhere to lending requirements such as the International Finance Committee (IFC) and World Bank’s Social and Community Health Standards. Although this is the case it can be applied retrospectively to determine the affects to physical health and some aspects of social and mental health issues.

9.4.2 Assessment Basis

The first indication that this model is specifically designed for use in developing countries is with the lack of definition of health applying the wider determinants of health. To clarify, the model applies a risk approach to health, with less emphasis on socio-economic health pathways or wellbeing.

Health objectives have been noted to differ regionally (Lalonde, 1981), but these differences are more apparent when compared against the spectrum of national development and wealth. Therefore the use of more social and well being weighted impact assessments to a community heavily inflicted with malaria due to the development of a local sewage plant is inappropriate. The priorities of health are therefore adjusted to the requirements and perceptions made at a local level.

9.4.3 Process

The proposed procedure for assessing health is similar to other models in that it is based upon the keystone principles of hazard identification, interpretation into health risk and health risk management. The process for implementing these principles is simplistic but effective in its aim to rapidly assess the likely impacts of physical health hazards upon a population (Figure 48).

Figure 48 Birley Process for Developmental HIA (Birley, 1995).

The initial screening process or hazard identification is undertaken by reviewing a catalogue of developments and their known impacts to human health, then applying it to the intended area. Principally the project officer undertakes this stage, and as with most processes based on hierarchical management will determine whether or not the development would require any further consideration. It is at this stage that an attempt to define a term on which to base the assessment is founded as:

‘A health hazard has a potential to cause disease or infirmity’ (Birely, 1995).

By basing the assessment on health hazard, rather then just health the model limits the scope of the assessment by removing potential socio-cultural and economic health pathways. In this sense it allows project planners and decision-makers to target the more immediate components of development that may pose a risk to health in a given area, of which the five main categories are listed below.

The following stage is that of the initial health examination (IHE) or rapid assessment. Here, identified health hazards are interpreted into health risk through the use of a health risk assessment matrix, and used to establish a health impact classification for the project.

As shown in Table 16, the matrix will differ depending on the type of project, but it is suggested that the matrix include information on the type of impact, project, its boundaries, and the capability of authorities to manage them.

Table 16 Health Matrix (Birley 1995)

As shown in Table 17, a simple scoring system is then used, and a brief description of the type of impact, its magnitude and potential mitigation is included. The outcome of this stage, will therefore aid in the identification of significant health hazards, and classify the project as either A, B or C.

Table 17 Health Scoring (Birley 1995)

The use of the significance classification table will then aid the project officer in the decision to advance to a full HIA. If a full HIA is required then a terms of reference will be developed utilising the information gathered from the IHE which in effect is a pre-assessment (or screening) processes. Specialist consultants will then be commissioned to undertake the assessment building upon the findings so far, and following the objectives and health hazards already prioritised.

In summary, the Birley model is designed to:

- identify potential health hazards;
- to determine their significance;
- to classify developments; and
- to determine if a detailed HIA is to be undertaken and what it will compromise.

With this as the case it should be made clear that although the model does not include a complete HIA process, it is in effect a methodology for screening and undertaking a rapid HIA.

The problems associated with the models use in developed countries include its vague definition of health hazards (environmental, social, cultural, economic etc), its unregulated and undefined participatory body, and the fact that the model does not provide a comprehensive HIA by the standards in more developed countries.

However, the Birley (1995) method still proves to be a valid process as it can be built upon to assess a wider definition of health. Firstly, by setting health hazards as the basis to the assessment and avoiding wider definitions of health means that specific aspects of health can be targeted, and may prove more practical for developers to identify and manage risk/liability. Secondly, the models ability to classify a project by the significance of the impact, and the ability to mitigate the affects, may prove useful as a method that can be adapted to identify, and build up a catalogue of processes with the potential to result in adverse health outcomes.

The final advantage is in its ability to rapidly identify and interpret health outcomes. This is normally a process taken within HIA, yet by extending many of the tools to a screening and scoping role, any following full HIA can concentrate on the key issues.

9.4.4 The Birley Model Summary

The Birley model is backed with numerous case studies supporting its use as an approach to undertaking HIA (Birley 1995). However, it is not a complete process to HIA. Instead it has been developed to guide project officers and decision-makers in how to best proceed when considering a development that may have adverse impacts upon human health. The model establishes how to initially scope the potential site, identify the hazards, and interprets the risks at an early stage. It further develops methods to mitigation, and constructs a good basis for the development of a thorough screening and scoping conclusion for decision-makers to act upon.

What it does not do is truly assess health, as it fails to identify or even define the wider determinants of health. Furthermore, it does not realise its potential to actually promote or improve health, as it is more targeted at reducing health risk from developments.

However, the model presents an effective screening tool to address key health risks at an early stage and with slight adjustment to consider the wider determinants of health would result in a relevant tool to rapidly undertaking HIA, as well as a method for establishing a classification system to aid future assessments.

9.5 The Swedish County Council (CC) Model

The Swedish CC model was published in 1998, and is intended to assess the health impacts of non-health policies of local authorities throughout Sweden. It was developed as part of the public health program run jointly by the federation of Swedish County Council and the association of the Swedish local government authorities, in their own push to improve the health of the nation (Landstingsforbundet 2001).

9.5.1 Model Basis

The model is principally a prospective tool to assess health implications of local Government policies at the strategic level, and set to identify and prevent potential health inequalities caused by policies. The model's development is due to a combination of affects including increasing legislation on health, its protection and promotion, and the growing recognition that the decisions made at the governmental level will have both direct, and indirect affects on the health of populations (Figure 49).

Figure 49 The Effect of Policy on Health (Landstingsforbundet 2001)

9.5.2 Assessment basis

The basis for the policy assessment is somewhat unclear, although the concepts of the key health determinants are incorporated within the checklists, matrix and health impact analysis. There is no clear statement, definition or foundation of health from which the model should start.

This is possibly due to it being covered within the tuition of policy makers that takes place before the tools are used, but it should be emphasised within the methodology for the tools use. An underlying principle incorporated in the assessment basis is the fact that when designing concrete health policies there are, as in other arenas, a large number of conflicts between goals. These tools are therefore aimed to identify not only the potential direct risks involved, but also the indirect affects that the policy may inadvertently create.

9.5.3 Process

The model is broken up into three levels of assessment, and has been formulated for the use of government officials so that rapid assessment of policies can be undertaken. All three levels are based on the central question of ‘How is the health of different groups affected by the proposed policy decision at hand’, but progressively differ in detail and scope. The first level is that of ‘The Health Question’ presented in Figure 50. It involves a simple checklist determining if there is any health impact potential, and can be used prior to consideration of an individual policy proposal, or before collective decisions are made at meetings of local boards/committees.

Figure 50 Swedish County Council Model: The Health Question (Landstingsforbundet 2001)

As shown in Figure 51, the second level of the three is that of the ‘Health Matrix’, here the potential health impact is broken down into the various health determinants and are further separated into short or long-term affects.

Figure 51 Swedish County Council Model: The Health Matrix (Landstingsforbundet 2001)

The final level is that of the 'Health Impact Analysis' presented in Figure 52. This level incorporates all the questions posed so far in the attempt to identify potential groups that may be more susceptible, as well as determine any cumulative impacts and potential alternatives to the policy.

Figure 52 Swedish County Council Model: Health Impact Analysis (Landstingsforbundet 2001)

The choice of which component of the model should be utilised is dependant on the complexity of the proposal, the time constraints that may govern it, or the very nature of the policy. However, it is presumed that if the policy fails to pass level one it will progress upward until a solution is found, or the proposal is rejected.

The real success of the model is in its promotion, this is the case as after its initial test in 1998 at Stockholm County Council, support was applied offering training to politicians, public officials and county councils in the factors that determine health, and in the instrument of HIA. Following this support a number of projects were proposed and assessed using the Swedish CC model, resulting in a number of case studies discussed below and subsequent revisions to the original model.

The benefit of the model has been expressed in that all the case studies that used it have emphasised improved decision making in regards to public health, its promotion and sustainable development. Such cases include assessments of the following non health related policies:

- Municipality of Kristianstad;

  The model was applied to Government grants for local investment programmes (The Municipality of Kristianstad 1998). This policy was aimed at reducing waste in the municipality, increasing recycling and supplying safe jobs to individuals with mental health problems. The assessment added value to the decision making process, in that it not only aided in the planning of a waste minimisation plant, but aided equal opportunities improving environmental, social, financial, and general well being to the local population and work force.

- City of Malmö;

  The model was used to assess changes to the urban environment with 30 km/hour speed limit (The City of Malmö 1997). The strategic decision to reduce the speed limit within the city limits was improved in that it was also determined that such a reduction would drastically change the way in which people spent time and perceived the city. Further recommendations were proposed in that the attractiveness and accessibility of the public transport was to be improved. The model therefore aided in the identification of hazards but also the areas that could best benefit and be improved alongside the project to encourage walking, cycling and public transport.

The model was applied to the allocation of 1 million SEK for democracy in Kirseberg (The City of Malmö 1997). This strategic decision was aimed at improving the training in information technology to both students and parents, and to develop a workbook promoting local involvement in agenda 21 issues, improving public participation, knowledge and health.

These examples can be labelled as politically influenced in that all the strategies were aimed principally to benefiting the environment and health, yet the model was also applied to cases where the public perception of the proposed policy was predominately negative. Such a case included the proposed closure of a gynaecological and antenatal hospital ward in Malmö. Here it was recommended that due to a reduction of both patients and staff, the wards should be permanently closed. After the assessment and identification of affected populace, and proximity study of other hospitals, it was unanimously determined that health would not be at risk, nor would jobs be greatly effected. As such, the HIA was used in not only investigating the potential health outcome, but also in rationalising a decision to the general public to address concerns and anxiety.

Since the models initial test it has lead to the delegation of responsibility and the creation of a Public Health and the Environment body, linked to the County Executive Board guarantying the promotion of HIA. This body has the main responsibility for running the HIA process, training official HIA assessors, ensuring the validity, consistent quality and development of both the model and subsequent HIA procedures and legislation into policy plans and eventually development (Landstingsforbundet 2001).

The model acknowledges its limitations and barriers to HIA in that current statistics are almost exclusively concerned with disease, and very rarely relate to health in its wider sense, and states that methods and tools need to be developed further in order to:

- quantify the affects of various risk factors on different diseases;
- quantify the burden imposed by different diseases in terms of life-years lost, periods of illness, and disabilities; and
- weigh together the joint affects of the extent of ill-health and its distribution

(Landstingsforbundet, 2001).

9.5.4 The Swedish County Council Model Summary

The model is exceptional in its prospective role in the assessment of policies for health impacts, and clearly shows not only the benefits of preventing adverse health impacts, but also the benefits in promoting the opportunities to improve health and in managing community concerns. By highlighting health issues within all policies, it also greatly adds to the decision-making, policy development and policy appraisal process. Furthermore by establishing the model through official training, and promoting its use in neighbouring county councils has resulted in instigating its use nationally building health into regulatory requirements and providing a more joined up approach to environment, health and decision-making.

The main difference of this model from others is that the majority of models reviewed here include well thought out processes and aspects that need to be considered, yet lack methodologies and tools. While in this case the Swedish CC model, it is the direct opposite as it contains three methods for reviewing potential health impacts with varying levels of detail, yet no set process. This lack of a process is partially due to the fact that the model is aimed for use solely at the strategic level.

The result of a comprehensive strategic HIA, means in theory that the normal processes undertaken within developmental HIA's such as the development of a steering group or wide stakeholder engagement are not required, and therefore the familiar criticisms of a lack of process or the incorporation of public participation are not as valid. Yet it should be emphasised that public support for this method is still essential. If such support is lost, or public perception views the model as another bureaucratic tool, then such processes and future work may be subject to criticism, opposition and faced with conjecture.

Criticisms of the model are linked to its design, in that it is only intended to be used at the strategic level. Although HIA in Sweden will undoubtedly proceed to the development level, this will require additional research and the development and promotion of an entirely different process.

It is also important to note that on hindsight, the Swedish CC model represents a precursor to Strategic Environmental Assessment (SEA) and the coverage of health mirrors the recommendations set by the UK Department of Health for the integration of health in SEA in 2006 (Department of Health 2007).

9.6 The Merseyside Model

The Merseyside HIA model (Winters 1997) was developed through the joint expertise of Dr Alex Scott-Samuel, Dr Martin Birely and Dr Kate Arden, through a commission by the four Merseyside health authorities from the Liverpool Public Health Observatory in April 1997. They produced the first documented HIA in the UK and in 2009, their guidelines and training are still the leading influence upon local councils and health authorities in promoting HIA within the UK (Kemm 2007).

Since the initial development of the model the Merseyside group have been responsible for much of the advancement of HIA within the UK, as they have held a number of UK conferences on the requirement and application of HIA. They have been a key contributor to much of the texts on the subject, including:

- Health and the Environment Impact Assessment (British Medical Association 1998);

- Health Impact Assessment of Development Projects (Birley 1995);
- Health aspects of environmental assessment (WHO EIA Sourcebook 1997); and
- Merseyside Guidelines for Health Impact Assessment (Scott Samuel, Birley and Ardern 1998).

The group continues to run a five day workshop promoting the application and promotion of HIA, and provides a key HIA resource including examples of their work dating from 1997.

To date (2009) the Merseyside/Liverpool group has formed IMPACT – the International Health Impact Assessment Consortium, and has established a steering group, consisting of representatives from the Department of Health (Department of Health), the Health Development Agency (HDA) and the leading experts in national HIA.

The development of the Merseyside model proceeded due to the growing recognition that there is a requirement for a process to adequately identify and evaluate health impacts on populations in the UK. Furthermore, through their research they identified the problems associated with defining health, and the numerous determinants associated with it.

The model was therefore developed with the understanding that a multidisciplinary approach was required, and that a combination of methodologies including aspects of EIA, SEA, and EHIA would be necessary to ensure the development and mainstreaming of HIA. It also agreed with the growing consensus that existing expertise was not sufficient to perform an HIA, and that ‘health alliances’ involving participants from many sectors and the public is required (Winters 1997).

9.6.1 Model Basis

The proposed aim of the Merseyside model was ‘*to develop a proactive model of HIA to be used for planning proposals as an integral part of any EIA’* (Winters 1997). The model is therefore intended to be flexible enough so that it may be used both independently or in partnership with EIA to ensure an objective assessment of all health affects, no matter the level of interest or concern.

The application of the model was therefore expected to further aid the development of HIA, by building a catalogue of case studies allowing retrospective analysis, and by instigating a point for gathering quantitative data. The Merseyside model is not a rigorously set process and methodology, as it recognises that different projects, areas and assessments will require different approaches. Therefore, the model acts as a guideline for establishing HIA primarily in the UK and encourages a ‘learning by doing approach’.

9.6.2 Assessment Basis

Although the model defines health in its literature review (Winters1997), the basis for the assessment again avoids using a set definition of health, and instead uses an extrapolation of the definition that was produced by Lalonde (Lalonde 1974). The advantage of the Lalonde’s health fields is that it simplifies the otherwise awkward definitions of health into four broad categories (see Table 2).

The benefit of using the health fields is similar to the approach taken by Birley (1995) in his previous model, where by replacing a suggested definition of health with set fields allows a more specific and repeatable criteria to assess health.

9.6.3 Process

As shown in Figure 53, the suggested steps of the Merseyside guidelines consist of nine self-evident procedures. Yet it is this simplicity that works in the favour of the guidelines, as they allow a general level of understanding within the assessment that can be easily understood and applied by local agencies.

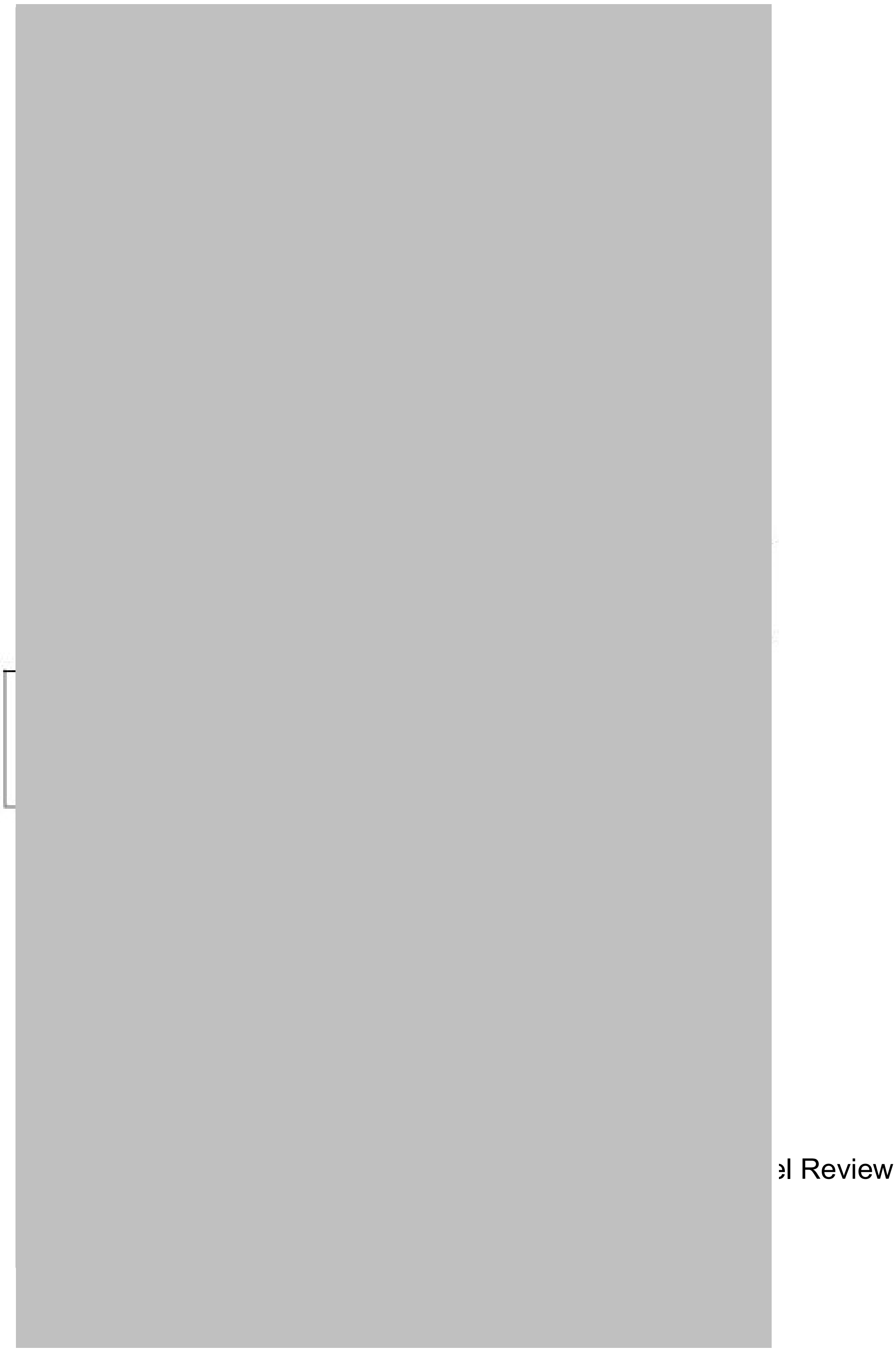


Figure 53 Merseyside Process Diagram (Winters 1997)

The initial stage refers to applying screening criteria to select potential projects or polices that may have an adverse effect to health. This is assessed through the use of an initial questionnaire/checklist presented in Figure 54.

The next step is the formation of a steering group, and the agreement upon a terms of reference. The purpose of the steering group is largely an artefact of the lack of experienced HIA consultants and to ensure the scope and focus of the assessment is correct, while further supporting the impartiality and transparency of the assessment. The guidance for establishing a steering group is vague in that it solely states 'a multidisciplinary steering group should be established' (Scott-Samuel.1998). However, it does not divulge the actual content the group should ascertain, a minimum of fields to be covered, the minimum or maximum number of people to be involved, or the inclusion of public participation.

Figure 54 Merseyside Screening Criteria (Winters 1997)

The lack of a method for ensuring a multidisciplinary steering group, or even previous examples, will affect the quality and value of the entire assessment to decision makers, and can significantly increase the cost to manage particularly large steering groups. This is the case as a potential misrepresentation within the steering group could significantly influence the development of the terms of reference and subsequent stages of the HIA.

What would have been of use is a simple list of what fields must be represented, what representation could be of use for different projects, plans or policies or if such steering groups are necessary depending upon the HIA practitioners capability and expertise.

The guidance on the terms of reference is then addressed (Winters 1997), where it states the importance to thoroughly discuss the project, assessment and potential impacts to health. The guidelines then proceed to list points to be covered to ensure the quality of both current and future assessments including the following points:

- steering group membership should be listed in the terms of reference, together with members roles, including those of Chair and Secretary;
- the nature and frequency of feedback to the steering group should be specified;
- the methods to be used in the assessment should be described in adequate detail;
- the terms of reference should outline the form and content of the project's outputs, and any conditions associated with the production and publication. Issues associated with publication of outputs include ownership, confidentiality and copyright;
- the scope of the work should be outlined – what is to be included and excluded, and the boundaries of the HIA in time and space;
- an outline programme – including any deadlines – should be provided; and
- the budget and source(s) of funding should be specified (Scott-Samuel 1998).

However, the guidance does not prepare practitioners or organisations that commission HIA for the human resource required to manage the steering group, difficulties in coordinating the time of voluntary participants, or the additional effort required to input comments from an undisclosed number of individuals upon the final HIA.

The following stage of conducting the assessment is where the guidelines become vague, as it lists the process but not the methods. The methodology for policy analysis involves a short description stating that an initial policy review is needed to determine the key aspects that the HIA will need to address, and then states some potential sources of current information that may be of use to build upon. However, it does not state how to undertake the policy review, offer health focused appraisal criteria or what aspects should be targeted (e.g. primary, secondary impacts, seasonal variation and resultant impacts to development and health, susceptible group's etc).

The methodology for profiling the community is similarly lacking, in that it states the importance of covering socio-demographic and health information in order to identify the characteristics of groups and those most susceptible. Yet, does not go into detail stating where or how this information could be gathered, used or displayed.

The methodology is clearer for the identification of key stakeholders and key informants. Here, it states the importance for co-operation from a wide range of participants, and although the composure of participation will change in accordance with certain projects, the following components will always be of importance:

- representative(s) of affected communities;
- proponents of the project;

- experts whose knowledge is relevant to the project and who may or may not be from the locality concerned;
- relevant health professionals, e.g. general practitioners, health visitors, social or community workers;
- relevant voluntary organisations, and
- key decision makers.

The identification of potential health impacts is again another area of concern, as the opening comment states that the quality of the health assessment will be dependant on the definition of health that is used (Winters 1997), yet the group does not actively use a health definition in its assessment. Instead it utilises a model based on Lalonde (1974) developed to identify the factors that influence health, rather than health itself.

The guidance on the collection of information on potential health impacts (i.e. gathering an appropriate evidence base) states that although the nature and magnitude of impacts will be project specific, it can be recorded through a mixture of methods, including: semi-structured interviews, focus groups and Delphi exercises. The product of which it is then suggested should be filed on a form designed to separately record the following information:

- potential health impacts during project development and operation phases;
- positive and negative health impacts;
- health categories and determinants resulting in the impacts identified;
- project activities altering health determinants;
- nature and size of potential impacts;

- measurability of potential impact - qualitative, estimable or calculable;
- certainty (risk) of potential impact - definite, probable or speculative.

The following stage of assessing the health risks is then undertaken through quantifying the impact through ranking the anticipated key impacts. The recommendations derived from these methods will then be considered and are likely to include:

- the stage(s) of the project development or operation when the recommendation will be implemented;
- the precise timing of implementation;
- the health determinants which will be affected by implementation;
- the nature of these affects and qualitative judgment as to the probability that they will occur;
- the agencies that will implement and fund the carrying out of the recommendation;
- the technical adequacy of the recommendation;
- the social equity and acceptability of the recommendation;
- the costs of the recommendation - direct/indirect; capital/revenue; fixed/variable; and
- how the implementation of the recommendation will be monitored.

Following the methods for assessing health impacts the guidelines then move on to the decision making process, monitoring and mitigation.

Problems with the Merseyside guidelines for assessing health impacts primarily start with the lack of a detailed process for its implementation. This is the case as the key process previously shown in Figure 53 is somewhat unclear as to how the assessment is actually conducted. Here it shows that the screening and establishment of the steering group proceeds before the assessment, but by all accounts is part of the assessment.

Further problems associated with the guidelines is the lack of a definition of health, although health is defined in the groups publication of the literature review, it is only a reference to the WHO definition, and later absent when compiling its own process and methodology. This is of concern as Scott-Samuel from the Merseyside group has defined HIA as:

'the estimation of the affects of a specified action on the health of a defined population' (Scott-Samuel 1998).

Yet, the underlying principle for their health assessment is played upon Lalonde's (1974) model of health determinants, and not health itself.

The reliance upon mainly qualitative data gathered through the steering group is also of concern, as in some cases it can be considered as having limitations, and may change with varying backgrounds and risk perceptions. This point was raised within the guidelines but the importance was dismissed as:

'quantifiable data are in no sense superior to speculative, qualitative data' (Scott-Samuel. 1998).

The point that the guideline was trying to approach is that there is a difficulty in valuing certain impacts to health in numerical terms, and that currently in many terms health impacts can only be recorded qualitatively. Yet, such a statement is a detriment to HIA development, because although HIA require methods combining both quantitative and qualitative data in a reliable and repeatable manner, it is also essential that robust quantitative methods are part of this process. Relying on qualitative information obtained from the perceptions of a small percentage of the population may prove to be a significant limitation of the Merseyside methodology, as such unsupported evidence is credible in planning and legal processes and if subject to challenge will be difficult to defend (RPS Group 2008d, UK Airport Consultative Committee 2008).

9.6.4 The Merseyside Model Summary

It must be noted that the Merseyside group did not publish a working model for undertaking HIA. Instead they produced guidelines on how to best approach HIA, and methods on how to identify relevant stakeholders, develop a terms of reference and gather information.

For this reason, a critical evaluation of the guidelines as a model must be acknowledged due to the fact that its application will vary with who is using it, how and to what it is being applied to, and the amendments that will be made to it. Despite such limitations the process developed is of a clear benefit to the HIA process. However, the lack of tools and specific methods will result in a varying quality of assessments outside of the experienced influence of the Merseyside group. This may potentially lead to HIA based upon stakeholder concerns conflicting with more quantitative regulatory assessment based upon realistic changes in environmental and socio-economic conditions.

The model also has difficulty in defining the distribution of potential impacts, relying instead on information gathered and presented in tabular format. This makes the identification of inequalities and varying levels of community susceptibility difficult to interpret.

9.7 HIA Toolkit for Policy Development in British Columbia (BC)

The BC toolkit (Population Health Resource Branch 1994) was commissioned by the Population Health Resources Branch of the Ministry of Health, following the publication of the New Directions for a Healthy British Columbia in 1993 (British Columbia 1993). It was designed as a resource for government analysts in the formulation of policy within Canada, and was intended to bring a strengthened environmental health basis to the policy making procedure. The toolkit, therefore, differs from most in that it will be applied to both the highly developed areas of Canada, as well as to relatively underdeveloped rural areas.

9.7.1 Model Basis

The BC toolkit can be described as a guide to addressing aspects of policy that will have an impact upon health. It is not set to give solutions to those impacts but to aid in their identification, and set the basis for decision-makers to further develop the proposed policy, programme or legislation. The BC toolkit is intended for use prospectively and focuses on all the aspects of health through questions targeted at the determinants of health and the environment. The BC toolkit, unlike other models and tools, also identifies the importance of considering the opportunity cost of proposals. In that how a decision may redirect resources from other initiatives that may better aid the health of a population is also to be considered. The incorporation of an opportunity cost element to the assessment basis is in keeping with the idea of sustainable development, and well thought out decision making, that are essential in the development of policies that will influence the lifestyle and health of a nation.

9.7.2 Assessment Basis

The toolkit is based upon a wealth of previous work produced in Canada, and incorporates Lalonde's health fields and the determinants of health through a structured set of questions aimed to probe a proposed policy, for both beneficial or adverse health outcomes (Lalonde, 1974). In short, although the guidance does not suggest so, the assessment basis applies a health pathway concept, where a policy is appraised against its opportunity to influence a determinant of health. In so doing, policies are influenced to minimise risk and improve opportunities to improve health through a more preventative health care approach (i.e. prevention is better than a cure).

9.7.3 Process

The toolkit does not have a set structure or methodology, instead it is solely managed through legislation that states:

'a health impact assessment is required by government ministries as part of the Cabinet Submission process. All proposed policies, regardless of the ministry of origin, must be reviewed for potential impact upon the health of British Columbians' (Health Canada 2001).

The toolkit consists of eleven main questions that reflect the key underlying factors that effect population health, concentrated in what on first glance appears to be a simple checklist (Figure 55). However, underpinning the checklist are a number of more detailed questions aimed to add value to the answer generated in the checklist, and to the decisions made as a result (Population Health Resource Branch, 1994).

Figure 55 The British Columbia HIA Toolkit (Population Health Resource Branch, 1994)

Figure 56 presents the supporting questions for each of the 11 checklist questions listed above.

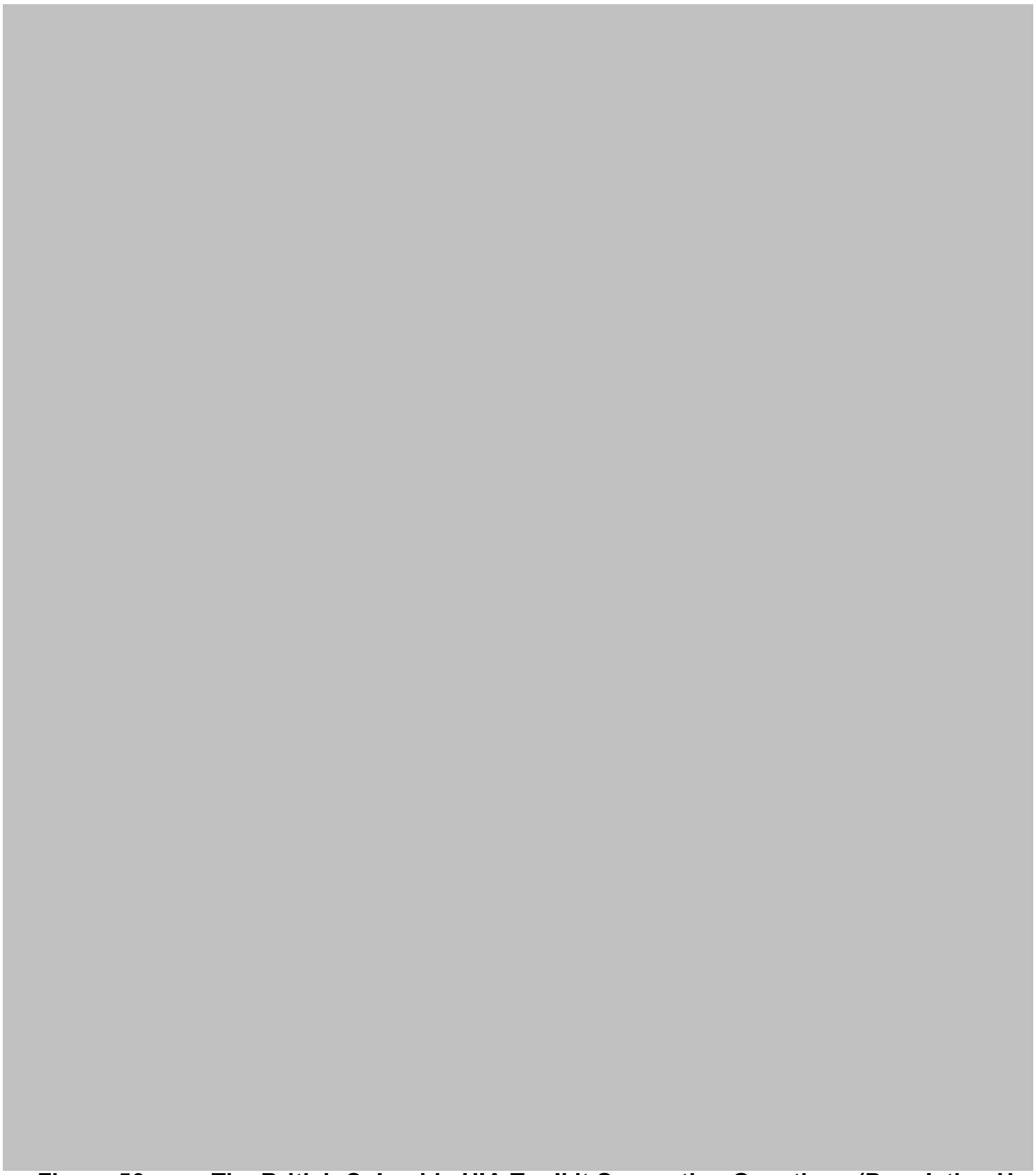


Figure 56 The British Columbia HIA Toolkit Supporting Questions (Population Health Resource Branch, 1994)

As such, the toolkit is essentially a well-structured policy health appraisal tool, and has been set up to ensure that polices programmes and legislation's are well versed in health issues at the regional level and national level. Such a detailed health appraisal is today more consistent with draft guidance to integrate health into SEA process (Department of Health 2007).

9.7.4 The British Columbia Model Summary

The toolkit itself is well thought out, yet potentially over-engineered. This is the case as the toolkit delves deeply into the determinants of health and expects to result in a clear indication on whether the policy will result in a beneficial or adverse health outcome. In practice this will not be the case, as the use of potentially uninformed qualitative information from ministries (i.e. Ministers lacking specific environmental, planning and health training), and the strategic nature of such policies, with little technical information of which to base a more detailed assessment, will result in various answers to the toolkit, but will still result in decisions being made that might negate any information that is uncovered. The BC toolkit does not have any means to evaluate the impact, nor estimate the likelihood, level or cost of potential health impacts. Instead it is simply applied as a criteria to which policies are evaluated, of which the original checklist, without the underlying questions would suffice in the task.

Furthermore, as with other models the BC toolkit again fails to consider the distribution of potential impacts between different communities or take into account varying community sensitivities.

9.8 The Better Health Better Wales Model

The document published by the Health Promotion Division of the National Assembly for Wales (The National Assembly for Wales 1998) is designed as a platform to further develop the use of HIA specifically in Wales. It is part of a series of documents aimed to reduce social inequalities, improve the health of the nation, and attempts to improve the prospects of communities and individuals through raising awareness and education.

As shown below, the document sets out a basis to develop a confident, outward looking programme designed to not only prevent poor health, but also improve health in Wales, and to aid individuals to realise their potential, making the most from life.

'The development and use of HIA in Wales will, given that health is an issue that cuts across policy areas, also help to identify further opportunities to make a positive difference to health of people in Wales' (The National Assembly for Wales 1998).

Although the document is intended for use solely within Wales, it utilises a wealth of international information, and is written in a form that makes it readily available for use internationally.

9.8.1 Model Basis

The document is in the form of a guideline, in that it summarises common elements of HIA taken from a range of international models, guidelines and toolkits. In the hope that the information will be useful to those attempting to perform or develop an HIA.

The document covers a multitude of perspectives in that various components within the text include a number of international approaches covering both prospective, concurrent and retrospective HIA methods, for projects, policies and programmes and draws upon a number of the models reviewed during this thesis.

9.8.2 Assessment basis

The basis for the assessment is principally modelled upon the definition of health developed by the World Health Organisation:

'A state of complete physical, mental and social well-being and not merely the absence of disease and infirmity' (WHO, 1946).

Yet the document declares the WHO's definition as utopian, and suggests a more practical goal with sustainable health for Wales being achieved when:

'People and communities can take control of their lives and are able to live their lives to the full' (National Assembly for Wales 1998).

Unfortunately this founding principle is faced with similar conjecture to the WHO's definition, in that it is practically impossible to identify the level of control that individuals require or want in order to reach their aspirations. With this as the case it should be remembered that this document is intended to aid the development of HIA in Wales, and not actually perform one. Instead the document promotes HIA in general, and helps assessors to choose a model that best suits their requirements. The assessment basis is therefore dependent on whichever model is chosen, the combination of methodologies taken, and who intends to use it.

9.8.3 Process

As emphasised below, the document acknowledges the fact that HIA is still relatively underdeveloped for effective use.

'There is no doubt that we need to develop better tools to help assess the affects on health policies, programmes and other developments in sectors outside of health service' (The National Assembly for Wales, 1998).

The document concurs with the consensus view on HIA, in that HIA is still unregulated, unsure in its footing, lacks basic tools, and in some cases is misunderstood (BMA 1998, Lock 2000, WHO 2000). This misunderstanding is related to accepting the limitations of HIA, what it is intended to do and most importantly what it cannot do.

The Better Health Better Wales document (Secretary of State for Wales 1998), intended to set out a preventative approach to health care in Wales, simplifies this misunderstanding, in that although a wealth of information may be found through an HIA, what occurs as a result is still speculative. The document therefore avoids setting what HIA should do or achieve, and states the core principle required to be true to HIA as:

'HIA will, as a minimum, help to ensure that the health consequences and affects of future decisions are not overlooked' (The National Assembly for Wales, 1998).

Such a statement provides a clear realistic indication on what HIA is intended for and can achieve.

As a guideline the process for the document is fairly general in that it describes and explains their interpretation of the brief history and evolution of HIA, and then proceeds to list the various models that were available in 1998. A brief evaluation of these models then identifies the five main steps of HIA as:

- screening;
- scoping;
- risk assessment;
- decision making, and
- implementation and monitoring.

Rather then presenting a single process or methodology using the stages above, the document then proceeds to list the different approaches taken by the various models, yet fails to comment upon their benefits or limitations. Instead, the document makes more effort to explain why certain processes are required, rather then stating the stages that should be performed. Such an open approach informing individuals on the options and importance of stages is more consistent with a teaching resource than a guideline, as it aims to promote HIA through increasing the knowledge base surrounding it. With this as the case, the ‘Better Health’ document is an excellent starting point for any organisation intending to start using or developing HIA.

As shown in Figure 57, the document highlights the fact that very few proposals will be solely positive or solely negative for health, instead there will always be a mix of impacts, and that the distribution of impact may be as important as the magnitude of effect. (i.e., there will always be winners and losers from projects, policies and programmes). Decision-making is therefore dependant upon the balance of these impacts, what the impacts are, who is affected and the reliability/quality of the information gathered.

Figure 57 Health Impact Model (The National Assembly for Wales, 1998)

The use of qualitative and quantitative data is always contested, where there is a common divide over which is deemed more reliable or in certain circumstances appropriate. This is also the case within the Better Health Better Wales document (Secretary of State for Wales 1998), where although it is stated that in certain circumstances information may only be currently available in a qualitative form, this is only the case for now.

The document differs from the majority of models in that it emphasises that HIA must develop a more scientific approach towards data collection and use, where as emphasised below, in the future a more quantitative approach is desired:

'One goal must be to develop health impact assessment to a level where knowledge and understanding are sufficient to make quantitative predications of the consequences of proposals' (The National Assembly for Wales, 1998).

Although this is the case the document does recognise the potential pitfalls involved by limiting itself to one form of data.

'The danger in this quantitative approach is that particular hazards which have been omitted from calculations because of insufficient information are believed to be unimportant' (The National Assembly for Wales, 1998).

Further considerations to data include how certain the predictions made will be. This is the case as impacts can be labelled as suggested in the Merseyside model (winters 1996) in accordance with their certainty (Scott-Samuel 1998), and therefore can be re-categorised in order of importance and probability.

9.8.4 The Better Health Better Wales Model Summary

The benefits of the document published by the National Assembly for Wales (1998) are not necessarily focused upon the methodologies that it briefly reviews, nor is it for its own evaluation and identification of the key stages found within HIA. Instead, the benefits come from the document's interpretation of the requirements of HIA, what it is, and more importantly, what it must become. It allows a deeper level of understanding around the subject of health, its assessment and promotion, and focuses on further developing HIA in the hope that it will be used to facilitate improvements in health throughout Wales. Although the document fails to identify a single process or methodology, it does open the debate on current approaches to the assessment of health, the extent to which it should proceed, the factors that must be considered, and how to choose an appropriate methodology from the models at hand.

Furthermore, the document is one of the few sources of guidance that highlights a requirement to investigate the distribution of impact (i.e. who will be affected and how). Though this is often a presumed outcome of HIA, it is not often the case, as some models fail to consider where, when and how activities will interface with communities, relying instead on sweeping assumptions that all members of a community will respond to impacts and benefits in the same way. However, the document does not provide a means to map the distribution of impact. Another key benefit of the document is in its own critique of HIA and illustrates how further research is required before HIA will fulfil its potential, including the following broad requirements:

- to raise the awareness of HIA and its potential contribution to the achievement of better health;
- to increase understanding of the approach among policy and decision makers, professional and practitioners in different sectors, and the community and voluntary sectors;
- to help people to become more familiar with the approach, the processes and the tools available for the purpose; and

- to explore and test the approach as a means of assessing the impact on health of proposed policies and other developments and its potential as a means of identifying further opportunities to address cross-cutting issues.

Though a number of models, guidelines, toolkits and texts have been produced since the Better Health Better Wales publication (Secretary of State for Wales 1998), few have managed to incorporate the principles, methods and approaches of HIA in such a comprehensive yet easily accessible text.

APPENDICES

10.0 Appendix 2 Data Review

10.1 Data Review Key

10.1.1 Proxy Indicator

Proxy Indicator for:	Key
Income	I
Environment	Env
Employment	Emp
Education	EDU
Social	S
Physical health	PH
Self perceived health	SPH
Demographic	D
Housing	H
Coping Skills	CS
Children's health	CH
Crime	CR

10.1.2 Score of Indicator Value

Indicator Value as a Proxy for key Health Determinants	Score
not useful	1
Useful	2
Good	3
Very good	4
Excellent	5

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
National Census	2001	Yes	England & Wales	Local Authority	Age structure	D	3	Crown copyright
					Cars or vans	S, I	3	
					Communal establishment residents	H	3	
					Country of Birth	D	2	
					Economic activity - females aged 16 to 74	S, I	3	
					Economic activity- males aged 16 to 74	S, I	3	
					Economic activity- people aged 16 - 74	S, I	3	
					Ethnic group and identification as Welsh	D, S	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Ethnic group	D, S	2	
					Health and provision of unpaid care	PH, SPH	4	
					Hours worked- people aged 16 - 74 in employment	S, I	4	
					Household composition	H, CS	4	
					Household spaces and accommodation type	H	4	
					Households with limiting long-term illness and dependent children	PH, CH	4	
					Industry of employment - females aged 16 - 74 in employment	EMP, EDU	4	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Industry of employment - males aged 16 - 74 in employment	EMP, EDU	4	
					Industry of employment- people aged 16 - 74 in employment	EMP, EDU	4	
					Knowledge of Welsh - people aged 3 and over	S, CS	1	
					Living Arrangements- people aged 16 and over on households	D, CS	3	
					Lone parent households with dependent children	CH	3	
					Marital status - people aged 16 and over	S, CS		
					National Statistics Socio-economic Classification - Females aged 16 - 74	EMP, S, I	4	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					National Statistics Socio-economic Classification - males aged 16 - 74	EMP, S, I	4	
					National Statistics Socio-economic Classification - people aged 16 - 74	EMP, S, I	4	
					Occupation groups - females aged 16 - 74 in employment	EMP, S, I	4	
					Occupation groups- males aged 16 - 74 in employment	EMP, S, I	4	
					Occupation groups- people aged 16 - 74 in employment	EMP, S, I	4	
					Qualifications and students - people aged 16 - 74	EDU	4	
					Religion	CS	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Rooms, amenities, central heating and lowest floor level	H	5	
					Tenure	H, I	4	
					Travel to work - people aged 16 - 74 in employment	I	2	
					Usual resident population	D	3	
Noticeable offences recorded by the police	1999 -2000	yes	England & Wales	Local Authority	Crime incidents	CR	2	Home Office
Child Benefit claimants	1990-2000	No	England Scotland & Wales	Local Authority & Ward	child benefit total child	D, CH, I, S	2	Department of work and pensions
					age bands under 5	D, CH, I, S	2	
					age 5 - 10	D, CH, I, S	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					age 11-15	D, CH, I, S	2	
					age 16 and over	D, CH, I, S	2	
					Girls	D, CH, I, S	1	
					Boys	D, CH, I, S	1	
					Total number of Families	D, CH, I, S	2	
					Families with one child	D, CH, I, S	2	
					Families with two children	D, CH, I, S	2	
					Families with three children	D, CH, I, S	2	
					Four or more	D, CH, I, S	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
Family credit claimants	1999	No	England Scotland & Wales	Local Authority & Ward	Family credit claimants	I, S	1	Department of work and pensions
					aged under 30	I, S	1	
					30 - 39	I, S	1	
					40 - 49	I, S	1	
					50 +	I, S	1	
					female	I, S	1	
					male	I, S	1	
					single	I, S	1	
					couple	I, S	1	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					dependant of family credit claimant	I, S, CH	2	
					dependant of family credit claimant aged under 5	I, S, CH	2	
					dependant of family credit claimant aged 5-10	I, S, CH	2	
					dependant of family credit claimant aged 11-15	I, S, CH	2	
					dependant of family credit claimant aged 16-19	I, S, CH	2	
Income support claimant	1998-2000	no	England Scotland & Wales	Local Authority & Ward	Income support claimants	I	2	Department of work and pensions
					Under 20	I	2	
					20-29	I	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					30-39	I	2	
					40-49	I	2	
					50-59	I	2	
					60+	I	2	
					female	I	2	
					male	I	2	
					unknown gender	I	2	
					single	I	2	
					part of a couple	I,CS	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					single and or working age	I,CS	2	
					single and of pensionable age	I,CS	2	
					part of a couple and of a working age	I,CS	2	
					part of a couple and of a pensionable age	I,CS	2	
					in receipt of their pensions premium	I,CS	2	
					in receipt of their disability premium	I	2	
					in receipt of lone parent premium	I, CS	2	
					not in receipt of pensioners or lone parent premium	I, CS	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					dependants of income support	I	2	
					dependants of income support aged under 5	I, CH	3	
					dependants of income support aged 5-10	I, CH	3	
					dependants of income support aged 11-15	I, CH	3	
					dependants of income support aged 16-19	I, CH	3	
Working families, tax credit claimants	2000	No	England Scotland & Wales	Local Authority & Ward	total	I	2	Inland revenue analysis and research
					under 30	I	2	
					30-39	I	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					40-49	I	2	
					50+	I	2	
					couple	I	2	
					single	I	2	
					male	I	2	
					female	I	2	
					age of claimants children	I, CH	3	
					under 5	I, CH	3	
					aged 5-10	I, CH	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					aged 11-15	I, CH	3	
					aged 16+	I, CH	3	
Primary school pupils at Key Stage 2	1998	No	England	Ward	number of scores below level 4 for key stage primary pupils	EDU	4	Oxford University
					number of scores at level 4 for key stage primary pupils	EDU	4	
					number of scores above level 4 for key stage primary pupils	EDU	4	
					Primary school pupils at Key Stage 2	EDU	4	
					Primary school pupils average Key Stage 2 score	EDU	4	
University admission by	1997-1998	No	England	Local Authority &	Successful applicants of all ages	EDU	4	Oxford University

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
place of residence				Ward	successful applicants under 20	EDU	4	
Attendance allowance claimants	1998-2000	No	England Scotland & Wales	Local authority and Ward	Attendance Allowance claimants	H	2	Department of work and pensions
					higher rate claimants	H	4	
					lower rate claimants	H	2	
Disability living allowance	1998-2000	No	England Scotland & Wales	Local authority and Ward	Disability living allowance claimants	H	3	Department of work and pensions
					Higher rate	H	3	
					Middle rate	H	2	
					Lower rate	H	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Higher rate mobility component	H	3	
					lower rate mobility component	H	2	
Drug miss-users presenting for treatment	1999-2000	Yes	England	Health authority	Users starting agency episodes	S, H, CR	1	Department of Health
					Users starting agency episodes male	S, H, CR	1	
					Users starting agency episodes female	S, H, CR	1	
					Users starting agency episodes all ages	S, H, CR	1	
					Users starting agency episodes under 20	S, H, CR	1	
					Users starting agency episodes aged 20-24	S, H, CR	1	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Users starting agency episodes 25-29	S, H, CR	1	
					Users starting agency episodes aged 30+	S, H, CR	1	
					misusing Heroin as main drug	S, H, CR	1	
					misusing Methadone as main drug	S, H, CR	1	
					misusing Cannabis as main drug	S, H, CR	1	
					misusing amphetamines as main drug	S, H, CR	1	
					misusing all other drugs	S, H, CR	1	
Hospital episodes statistics	1999-2000	No	England	Local Authority	Finished consultant episodes male / females aged 16	H	2	Department of Health

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					CHD males / females under 16	H	2	
					Strokes male / females under 16	H	2	
					Cancer diognosis male / females under 16	H	2	
					Hip op male / females under 16	H	2	
					CABG + PTCA males / females under 16	H	2	
					Cataract operation male under 16	H	2	
					Finished consultant episodes males / females aged 16-59	H	2	
					CHD diagnosis episodes, males / females aged 16-59	H	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Cancer diagnosis episodes, males / females aged 16-59	H	2	
					Accident diagnosis episodes, males / females aged 16-59	H	2	
					Hip operation episodess, males aged 16-59	H	2	
					CABG + PTCA operation episodess, males / females aged 16-59	H	2	
					Cataract operation episodess, males / females aged 16-59	H	2	
					Finished consultant episodes, males / females aged 60 +	H	2	
					CHD diagnosis episodes males / females aged 60+	H	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Strokes diagnosis episodes, males / females aged 60 +	H	2	
					Cancer diagnosis episodes, males / females aged 60+	H	2	
					Accident diagnosis episodes, males / females aged 60+	H	2	
					Hip operation episodess, males / females aged 60+	H	2	
					CABG + PTCA operation episodes, males / females aged 60+	H	2	
					Cataract operation episodes, males / females aged 60+	H	2	
Changes of Ownership by Dwelling Price	2001	No	England & Wales	Local Authority & Ward	Number of Transactions by Dwelling Type - Detached	I, H, Env	2	Land registry

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Number of Transactions by Dwelling Type - Flat	I, H, Env	2	
					Number of Transactions by Dwelling Type - Semi-detached	I, H, Env	2	
					Number of Transactions by Dwelling Type - Terraced	I, H, Env	2	
					Number of Transactions by Dwelling Type - Not Known	I, H, Env	1	
					Number of Transactions by Dwelling Type - Total Sale	I, H, Env	2	
					Type of Sale - Cash	I, H, Env	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Type of Sale - Mortgage	I, H, Env	2	
					Type of Sale - Cash as Percentage of All Sales	I, H, Env	2	
					Price Indicators for All Dwellings - 2 Percentile	I, H, Env	3	
					Price Indicators for All Dwellings - Lower Quartile	I, H, Env	3	
					Price Indicators for All Dwellings - Median	I, H, Env	3	
					Price Indicators for All Dwellings - Upper Quartile	I, H, Env	3	
					Price Indicators for All Dwellings - 98 Percentile	I, H, Env	3	
					Price Indicators for All	I, H, Env	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Dwellings - Mean			
					Price Indicators by Dwelling Type - Detached - Median	I, H, Env	2	
					Price Indicators by Dwelling Type - Detached - Mean	I, H, Env	2	
					Price Indicators by Dwelling Type - Flat - Median	I, H, Env	2	
					Price Indicators by Dwelling Type - Flat - Mean	I, H, Env	2	
					Price Indicators by Dwelling Type - Semi-detached - Median	I, H, Env	2	
					Price Indicators by Dwelling Type - Semi-detached - Mean	I, H, Env	2	
					Price Indicators by Dwelling	I, H, Env	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Type - Terraced - Median			
					Price Indicators by Dwelling Type - Terraced - Mean	I, H, Env	2	
					Number of Outliers - < £1000	I, H, Env	3	
					Number of Outliers - < £10000	I, H, Env	3	
					Number of Outliers - > £20m	I, H, Env	3	
Dwelling Stock by Council Tax Band	2001	No	England & Wales	Local Authority & Ward	Council Tax Band A	I, H, Env	3	Valuation Office Agency
					Council Tax Band B	I, H, Env	3	
					Council Tax Band C	I, H, Env	3	
					Council Tax Band D	I, H, Env	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Council Tax Band E	I, H, Env	3	
					Council Tax Band F	I, H, Env	3	
					Council Tax Band G	I, H, Env	3	
					Council Tax Band H	I, H, Env	3	
					Percentage of Properties in Local Authority in Tax Band A	I, H, Env	3	
					Percentage of Properties in Local Authority in Tax Band B	I, H, Env	3	
					Percentage of Properties in Local Authority in Tax Band C	I, H, Env	3	
					Percentage of Properties in Local Authority in Tax Band D	I, H, Env	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Percentage of Properties in Local Authority in Tax Band E	I, H, Env	3	
					Percentage of Properties in Local Authority in Tax Band F	I, H, Env	3	
					Percentage of Properties in Local Authority in Tax Band G	I, H, Env	3	
					Percentage of Properties in Local Authority in Tax Band H	I, H, Env	3	
					Total Number of Properties Taxed	I, H, Env	1	
Indices of Deprivation for districts in England	2000	No	England	Local Authority	number of employment deprived	Emp	3	Office of the Deputy Prime Minister
					rank of employment	Emp	3	
					number of income deprived	I	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					rank of income	I	3	
					average of Ward scores	I, Emp, Edu, H, S, PH,	1	
					rank of average of Ward scores	I, Emp, Edu, H, S, PH,	2	
					average of Ward ranks	I, Emp, Edu, H, S, PH,	2	
					rank of average of Ward ranks	I, Emp, Edu, H, S, PH,	2	
					extent score	I, Emp, Edu, H, S, PH,	4	
					extent rank	I, Emp, Edu, H, S, PH,	4	
					local concentration score	I, Emp, Edu, H,	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
						S, PH,		
					local concentration rank	I, Emp, Edu, H, S, PH,	3	
Indices of Deprivation for electoral divisions in Wales	2000	No	Wales	Ward	index of multiple deprivation score	I, Emp, Edu, H, S, PH,	3	National Assembly for Wales
					rank of index of multiple deprivation	I, Emp, Edu, H, S, PH,	3	
					income domain score	I	5	
					rank of income domain	I	5	
					employment domain score	Emp	5	
					rank of employment domain	Emp	5	
					health domain score	PH	5	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					rank of health domain	PH	5	
					education domain score	Edu	5	
					rank of education domain	Edu	5	
					housing domain score	H	5	
					rank of housing domain	H	5	
					access domain score	Env	4	
					rank of access domain	Env	4	
					child poverty index score	I, CH	5	
					rank of child poverty index	I, CH	5	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
Indices of Deprivation for wards in England	2000	No	England	Ward	index of multiple deprivation score	I, Emp, Edu, H, S, PH,	3	Office of the Deputy Prime Minister
					rank of index of multiple deprivation	I, Emp, Edu, H, S, PH,	3	
					income domain score	I	5	
					rank of income domain	I	5	
					employment domain score	Emp	5	
					rank of employment domain	Emp	5	
					health domain score	PH	5	
					rank of health domain	PH	5	
					education domain score	Edu	5	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					rank of education domain	Edu	5	
					housing domain score	H	5	
					rank of housing domain	H	5	
					access domain score	Env	4	
					rank of access domain	Env	4	
					child poverty index score	I, CH	5	
					rank of child poverty index	I, CH	5	
Oxford University population estimates	mid 1998	No	England	Ward	Resident population	D	2	Oxford University
					Resident population who were aged under sixteen	D	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Percentage of the resident population who were aged under sixteen	D	2	
					Resident population aged 16-59	D	2	
					Percentage of the resident population aged 16-59	D	2	
					Resident population aged 60 or over	D	2	
					Percentage of the resident population aged 60 or over	D	2	
					Number of Economically Active aged 16-59	D, Emp	3	
					The number of Economically Active residents aged 16-59 as a percentage of all residents	D, Emp	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
Resident population estimates	mid 1998	Yes	England	Local Authority	Resident population, mid 1998	D	2	Office For National Statistics
					Resident population who were aged under sixteen	D	2	
					Percentage of the resident population who were aged under sixteen	D	2	
					Resident population aged 16-59	D	2	
					Percentage of the resident population aged 16-59	D	2	
					Resident population aged 60 or over	D	2	
					Percentage of the resident population aged 60 or over	D	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
Vital statistics	1998	Yes	England & Wales	Local Authority & Ward	Total male live births	D	2	Office For National Statistics
					Total female live births	D	2	
					Total live births	D	2	
					Total male deaths	D	2	
					Total female deaths	D	2	
					Total deaths	D	2	
Claimant count	May-98	No	England	Ward	Claimant count	I, Emp	3	Oxford university
	Aug-98				Claimant count	I, Emp	3	
	Nov-98				Claimant count	I, Emp	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
	Feb-99				Claimant count	I, Emp	3	
Claimant count and claimant count rate	Feb-98				Claimant count / rate, males / female	I, Emp	2	The Labour Market Statistics
	May-98				Claimant count / rate, males / female	I, Emp	2	
	Aug-98				Claimant count / rate, males / female	I, Emp	2	
	Nov-98				Claimant count / rate, males / female	I, Emp	2	
	Feb-99				Claimant count / rate, males / female	I, Emp	2	
	May-99				Claimant count / rate, males / female	I, Emp	2	
	Aug-99				Claimant count / rate, males /	I, Emp	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					female			
	Nov-99				Claimant count / rate, males / female	I, Emp	2	
	Feb-00				Claimant count / rate, males / female	I, Emp	2	
	May-00				Claimant count / rate, males / female	I, Emp	2	
	Aug-00				Claimant count / rate, males / female	I, Emp	2	
	Nov-00				Claimant count / rate, males / female	I, Emp	2	
	Feb-01				Claimant count / rate, males / female	I, Emp	2	
	May-01				Claimant count / rate, males /	I, Emp	2	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					female			
Employee jobs	Sep-98	Yes	England Scotland & Wales	local Authority & Ward	Male employee jobs	Emp	2	Annual Employment Survey
					Female employee jobs	Emp	2	
					All employee jobs	Emp	3	
Incapacity Benefit claimants	1998-2000	No	England Scotland & Wales	local Authority & Ward	Incapacity Benefit claimants	PH	3	Information Centre Information and Analysis Directorate Department for Work and Pensions
					Incapacity Benefit claimants aged under 30	PH	3	
					Incapacity Benefit claimants aged 30-39	PH	3	
					Incapacity Benefit claimants aged 40-49	PH	3	
					Incapacity Benefit claimants	PH	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					aged 50-59			
					Incapacity Benefit claimants aged 60 and over	PH	3	
					Incapacity Benefit claimants - credits only	PH	3	
					Incapacity Benefit claimants - lower rate	PH	3	
					Incapacity Benefit claimants - higher rate	PH	3	
					Incapacity Benefit claimants - long-term	PH	3	
					Incapacity Benefit claimants male / female	PH	3	
					Dependents of Incapacity	PH	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Benefit claimants			
					Dependents of Incapacity Benefit claimants aged under 5	PH, Ch	3	
					Dependents of Incapacity Benefit claimants aged 5-10	PH, Ch	3	
					Dependents of Incapacity Benefit claimants aged 11-15	PH, Ch	3	
					Dependents of Incapacity Benefit claimants aged 16 and over	PH, Ch	3	
Jobseeker's Allowance claimants	1998-2000	No	England Scotland & Wales	local Authority & Ward	Jobseeker's Allowance claimants	Emp	3	ICIA DDWP
					Jobseeker's Allowance claimants with benefit in payment	Emp	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Jobseeker's Allowance claimants contribution and income based	Emp	3	
					Jobseeker's Allowance claimants - contribution based only	Emp	3	
					Jobseeker's Allowance claimants - income based only	Emp	3	
					Jobseeker's Allowance claimants - no benefit in payment	Emp	3	
					Jobseeker's Allowance income based claimants	Emp	3	
					Jobseeker's Allowance income based claimants aged under 20	Emp	3	
					Jobseeker's Allowance income	Emp	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					based claimants aged 20-29			
					Jobseeker's Allowance income based claimants aged 30-39	Emp	3	
					Jobseeker's Allowance income based claimants aged 40-49	Emp	3	
					Jobseeker's Allowance income based claimants aged 50 and over	Emp	3	
					Income based Jobseeker's Allowance - Child dependants	Emp Ch	3	
					Income based Jobseeker's Allowance - Child dependants under 5	Emp Ch	3	
					Income based Jobseeker's Allowance - Child dependants aged 5 - 10	Emp Ch	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Income based Jobseeker's Allowance - Child dependants aged 11 - 15	Emp Ch	3	
					Income based Jobseeker's Allowance - Child dependants aged 16 and over	Emp Ch	3	
Severe Disablement Allowance claimants	1999-2000	No	England Scotland & Wales	local Authority & Ward	Severe Disability Allowance claimants	PH	3	
					Severe Disability Allowance claimants aged under 50	PH	3	
					Severe Disability Allowance claimants aged 50 and over	PH	3	
					Severe Disability Allowance claimants (male /female)	PH	3	
					Dependents of Severe Disability Allowance claimants	PH	3	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					Dependant of Severe Disability Allowance claimants aged under 5	PH, Ch	3	
					Dependents of Severe Disability Allowance claimants aged 5-10	PH, Ch	3	
					Dependents of Severe Disability Allowance claimants aged 11-15	PH, Ch	3	
					Dependents of Severe Disability Allowance claimants aged 16-18	PH, Ch	3	
VAT registered enterprises by employment sizeband	2000	Yes	England Scotland Wales Northern Ireland	Ward	VAT registered enterprises with 1-49 employees	Emp	4	Inter-Departmental Business Register, Office for National Statistics
					VAT registered enterprises with 50-249 employees	Emp	4	

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					VAT registered enterprises with 250 or more employees	Emp	4	
					Total number of VAT registered enterprises by employment sizeband	Emp	2	
VAT registered enterprises by industry group	2000	Yes	England Scotland Wales Northern Ireland	Ward	VAT registered enterprises in the Agriculture industry group	Emp	3	IDBR OFNS
					VAT registered enterprises in the Production industry group	Emp	3	
					VAT registered enterprises in the Construction and Other industry groups	Emp	3	
					VAT registered enterprises by industry group	Emp	2	
Countryside Agency's Ward Level Definition of Rural Areas		No	England	Ward	Rural Urban Indicator	Env	3	Countryside Agency

Title	Date	National statistic	Coverage	Level	Indicator	Proxy indicator	Value as indicator	Source
					no			

APPENDICES

11.0 Appendix 3 Screening Checklist and Results

11.1 Case Study One: Checklist Results Greenways Green Transport Network

Screening Checklist

General information

Name of applicant:	**Brighton & Hove County Council**
Date:	2002
Proposal type:	Plan
Coverage:	Local
Location:	Brighton and Hove
Alternative location(s):	No
Is an Environmental Impact assessment	No
Please specify any EIA organisation used including reference numbers	NA
List any environmental, traffic, health or strategic information that has or will be prepared in relation to the proposal	NA

Nature of proposal	
Title purpose and physical character	Promotion of green transport network through existing roads and some newly constructed or enhanced routes. Reduce transport burden through alternatives.
Key processes involved:	Planning, implementation and maintenance.
Product(s) / aim:	Alternative green transport network
Proposal footprint:	Network encompasses all of Brighton and Hove
Estimated duration:	Start 2000 No limit set
Time restrictions associated with any assessments performed	NA
Estimated cost:	NA
Estimated turnover	NA
Economic sector(s) involved / affected:	Agriculture, Transport, Social services, Travel & tourism, Wildlife
A health assessment required to:	identify unknown negative/positive effects and

	improve public relations and support. The greenways route does not require EIA, with no serious health impacts expected due to its benign nature, minimal construction or development, and obvious benefits.
Environmental	
List any permits / approvals required (attach copies), E.g. hazardous materials, waste disposal, water effluent / commercial discharge etc.	NA
Will the proposal use or store any raw materials of a hazardous nature?	Construction no Operation no
Will the proposal require the construction of new trade links for supply of materials?	New and enhanced access roads
Will the proposal effect the traffic frequency, type or nature?	Yes during operation. Potential reductions in traffic through alternative green options.
Will the proposal release any effluents into the following areas of the environment Atmosphere, Soil Water?	Yes during construction (some particulate and minor emissions)
Will the proposal generate radiation, noise, light, heat, vibration, odour or any other emissions?	Yes during construction (noise, vibration and dust).
Will the proposal improve the quality of the atmosphere, soil, water, built environment or social capital?	Yes during operation through the creation of sustainable transportation's alternative.
Will the proposal require the use of specialist waste handlers?	No
Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or waste that could occur as a result of this proposal?	No, road accidents will be reduced through a safe network designed to avoid road vehicles
Has the proposal developed a worst case scenario in relation to fire, flood, accidental spills or explosions?	No
Will the proposal effect the quality or quantity of watercourses?	No
Will the proposal effect the risk to flooding?	No
Will the proposal effect any areas classified as environmentally sensitive, or areas of outstanding national beauty?	Unclear, some routes pass thorough scenic well used trails, but will not have any discernible impact.
Human Health	
Will the proposal influence income, employment, physical health, housing, education, access to services, social networks or coping skills in any way?	Yes during construction and operation, some constructional and maintenance related jobs, improvements to air quality, physical health improvements through exercise and links to

	other communities).
Are there any known health effects or risks associated with the proposal?	Unclear during operational stage, there may be an increase in risk of road traffic accidents.
Will the proposal increase the prevalence of disease vectors in the environment?	Although increased visitation, minimal risk or likelihood.
Will the proposal increase the likelihood of communicable and non-communicable disease?	Although increased visitation, minimal risk or likelihood.
Will the proposal effect the physical safety and security of individuals and communities?	No
Will the proposal reduce the incidence of preventable injuries and deaths?	Yes during operation through safer transportation alternative routes.
Will the proposal result in demographic or geographic changes within the community?	No
Will the proposal segregate or isolate individuals or groups?	No, Will offer / advertise routes linking communities.
Will the proposal effect vulnerable groups or communities?	No
Will the proposal effect population settlements or workplaces?	No
Will the proposal result in the creation of local employment?	Yes during construction and operation
Approximately how many jobs will be created from the proposal?	Unclear
Will employment be sustainable?	Unclear
Will the proposal offer risk free employment and working conditions?	No
What type of employment will be generated?	Construction
Will the proposal increase local income / wealth?	Plans to link communities, schools and work places, may result in Indirect employment and income opportunities through increased use of routes and subsequent required services.
Will the proposal affect housing?	No
Will the proposal effect the number and quality of affordable housing?	No
Approximately how many housing units would be created / terminated / at risk?	NA
Will the proposal have an effect on public safety/ crime?	Potential increase of vandalism and assault associated with subsequent increase in use and visitation of

	routes
Will the proposal effect personal health practices and coping skills?	Yes, improvement to physical health through the promotion of exercise
Will the proposal effect learning opportunities?	Healthier lifestyles
Will the proposal effect the development of healthier lifestyles i.e. diet, exercise, smoking alcohol, sexual behaviour and drugs?	Promotion of healthier lifestyles to children and adults alike, alongside green issues and sustainable development of Sussex.
Will the proposal effect the number and quality of personal interactions, i.e. with friends, families, colleagues and community groups?	Will offer the opportunity for better community networks.
Will the proposal effect social networks?	Yes, see above
Will the proposal effect access to health care and welfare services?	Some benefits due to alternative routes to amenities
Will the proposal effect recreational or open spaces in urban areas?	No, routes are proposed through existing routes.
Will the proposal effect current public services i.e. fire/police protection, health care, schools?	Yes, alternative green transportation route
Will the proposal effect public amenities i.e. electrical, gas, water, refuse service, telephone, sanitary sewer, sceptic systems, public transport?	Yes, alternative green transportation routes
Will the proposal effect public transport, cycling, walking?	Yes, alternative green transportation routes
General	
Will the proposal add to any known cumulative effects or processes?	No
Will the proposal increase visitation?	Yes
Is the proposal consistent with local, regional and national health targets and objectives?	Constriction is minimal along existing routes operation is inline with green transport policy and promotion of healthier lifestyles.
Are there alternative proposals that may result in better health for exposed groups and populations?	No
Are the incentives of the proposal sustainable?	Yes
Has the proposal a system to identify community concerns?	No
Are there community concerns about potential health impacts?	No
Does the proposal have any plans for future development alteration, expansions or further activity related to this proposal?	Unclear. If successful, additional routes to the network may be investigated.

11.2 Case Study Two: Falmer North Community Stadium

Screening Checklist

General information

Name of applicant:	**Brighton & Hove County Council**
Date:	2002
Proposal type:	Project, Plan
Coverage:	Local
Location:	North of Falmer Village
Alternative location(s):	Yes
Is an Environmental Impact assessment	16 potential sites, reduced to the fional selection of the Falmer North or Falmer South plots.
Please specify any EIA organisation used including reference numbers	Two ES prepared, for north and alternative south plot. EIA:- WSP Environmental Ltd, Falmer North
List any environmental, traffic, health or strategic information that has or will be prepared in relation to the proposal	• Planning Statement:- DMH& SPBS Planning Services • LIA:- Hyland Edgar Driver • TIA:- Savell Bird & Axon • Architectural Design and Landscape Statement:- Scheme architects KISS Sports, Leisure Design Ltd and Landscaping Architects Hyland Edgar Driver • Socio-economic and Community Assessment:- BHAFC & Fleury Manico with Humberts Leisure
Nature of proposal	
Title purpose and physical character	Proposed development of a new community stadium with a total footprint of 18hectares constructed over a 7 to 10 year-phased period. Will offer stadium events, concert, seminar rooms, and other events alongside community support, education and access to sports and recreational amenities.
Key processes involved:	Phased construction, Operation. Decommissioning not envisaged
Product(s) / aim:	Development of maximum capacity 22,374 seated, 35,000 standing community stadium, conference amenities, catering, multipurpose sports hall, and additional facilities.
Proposal footprint:	18 Hectares
Estimated duration:	7-10 year phased construction / operation
Time restrictions associated with any assessments performed	NA
Estimated cost:	NA

Name of applicant:	**Brighton & Hove County Council**
Estimated turnover	NA
Economic sector(s) involved / affected:	Agriculture, Transport, Social services, Travel & tourism, Gas & water, Power industry, Emergency services, Wildlife, Farming, Waste processing & storage, Road works, Infrastructure projects, Housing and Education
A health assessment required to:	• reduce known negative health effects • enhance known positive health effects • identify unknown negative/positive effects • improve public relations and support
The proposed site is controversial in that it is against local policy, is sited upon grade II agricultural land, and located in an area of outstanding national beauty. The requirement of the stadium has therefore brought up both strong opposition and agreement for the development.	
Environmental	
List any permits / approvals required (attach copies), E.g. hazardous materials, waste disposal, water effluent / commercial discharge etc.	Commercial waste licence
Will the proposal use or store any raw materials of a hazardous nature?	
Will the proposal require the construction of new trade links for supply of materials?	Road rail and pedestrian / cycle path construction are planned, alongside parking for 40 buss drop off points, satellite park and ride schemes. Gas water electricity, sewers and water interception points are planned. New access road through part of Stanmer park, underpass alteration and structural changes to A27 / A270. (See non tech summary and transport impact assessment).
Will the proposal effect the traffic frequency, type or nature?	Increase in number frequency and nature, dependent on event during operation. Main predicted mode of transport is private car 28-32% (see traffic impact assessment for more details)
Will the proposal release any effluents into the following areas of the environment Atmosphere, Soil Water?	Particulate associated with heavy soil movement, emissions from heavy machinery and vehicles, Cox, Nox, Dioxin, Increase emissions associated with increase in traffic. Expected increase in environmental burden due to significant increase in visitation
Will the proposal generate radiation, noise, light, heat, vibration, odour or any other emissions?	Noise, light, vibration and heat expected, minimised and mitigated through planning and EIA. Traffic assessment does not identify areas that will experience increase in emissions associated with traffic changes. (See non tech summary)
Will the proposal improve the quality of the atmosphere, soil, water, built environment or social capital?	Community stadium = huge increases in social capital to the city
Will the proposal require the use of	Yes

Name of applicant:	Brighton & Hove County Council
specialist waste handlers?	
Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or waste that could occur as a result of this proposal?	Construction and operation will require substances of a hazardous nature, but not listed at this point. Further enquiry required
Has the proposal developed a worst case scenario in relation to fire, flood, accidental spills or explosions?	No
Will the proposal effect the quality or quantity of watercourses?	Increased water interception and collection zones, expected significant increase to water bodies during heavy rainfall. Further investigation into water traps and slow release storm drains required. Some effluent discharge may result from bus stop area.
Will the proposal effect the risk to flooding?	Though water interception points are planned, they are typical storm drains with no time delay. This increased interception and collection zone will likely have an effect on the local water table. Unclear at this point.
Will the proposal effect any areas classified as environmentally sensitive, or areas of outstanding national beauty?	Located in and Area of Outstanding National Beauty, close to both a small village, and on university land
Human Health	
Will the proposal influence income, employment, physical health, housing, education, access to services, social networks or coping skills in any way?	Huge employment and income opportunity, physical health is expected to be enhanced by offering state of the art amenities, as is education through links with the universities and an increase in sports sciences. Housing, access and social networks are unclear.
Are there any known health effects or risks associated with the proposal?	Heavy construction has its own risks as does operation, the increase in traffic is unclear as to how it will affect local communities and those that will experience fringe effects from park and ride, rail alterations etc. Significant increased visitation will result in further environmental burden, decommissioning is unclear.
Will the proposal increase the prevalence of disease vectors in the environment?	Construction may result in still water bodies, possible disturbance to wildlife. Operation is more likely to increase vectors through significant increase in visitation and close prolonged proximity during operation.
Will the proposal increase the likelihood of communicable and non-communicable disease?	See above
Will the proposal effect the physical safety and security of individuals and communities?	Construction and decommissioning may have adverse health effects, but target group identified within EIA has been mitigated. Crime is an issue, but cameras and other deterrents proposed. Additional policing will be required.

Name of applicant:	Brighton & Hove County Council
Will the proposal reduce the incidence of preventable injuries and deaths?	No
Will the proposal result in demographic or geographic changes within the community?	Some changes may occur due to rail and road adjustments alongside dense residential areas, and some issues of parking have been identified. Effect is unknown.
Will the proposal segregate or isolate individuals or groups?	Unclear
Will the proposal effect vulnerable groups or communities?	Unclear
Will the proposal effect population settlements or workplaces?	The Falmer village will experience some disruption as will Brighton and Sussex university campuses, Falmer High School, part of the Moulsecoomb area bordering the planned road and rail alterations.
Will the proposal result in the creation of local employment?	Huge potential for both direct employment of the stadium and indirect employment through increased visitation, leisure industry and accommodation demand.
Approximately how many jobs will be created from the proposal?	The total number of jobs will peak during phase one with employment In the order of 1,500 jobs at its busiest point. Following construction additional employment opportunities will emerge.
Will employment be sustainable?	Operational Jobs will be long lasting, with career prospects leading in to business management, leisure sports medicine and sports industry.
Will the proposal offer risk free employment and working conditions?	Hazards associated with construction and decommissioning minimised through controlled safe working practice.
What type of employment will be generated?	Football club, commercial activity, hotel, tourism, catering, supply and leisure industry. Indirect employment will strengthen local businesses in similar fields as overflow spills into Brighton and Hove.
Will the proposal increase local income / wealth?	0.03% contribution to local GDP equating to £10M (see socio-economic assessment)
Will the proposal affect housing?	Unclear
Will the proposal effect the number and quality of affordable housing?	Unclear
Approximately how many housing units would be created / terminated / at risk?	NA
Will the proposal have an effect on public safety/ crime?	Increase in petty crimes, has been planned for with increased lighting and security around the stadium.
Will the proposal effect personal health practices and coping skills?	Will encourage local participation, exercise and education in sports and sports sciences
Will the proposal effect learning opportunities?	Education in sports, sports sciences/ medicine, training and management opportunities.
Will the proposal effect the development of healthier lifestyles i.e.	Increased physical exercise and community interaction opportunities

Name of applicant:	Brighton & Hove County Council
diet, exercise, smoking alcohol, sexual behaviour and drugs?	
Will the proposal effect the number and quality of personal interactions, i.e. with friends, families, colleagues and community groups?	Visitation, participation, community support and open facilities.
Will the proposal effect social networks?	Visitation, participation, community support and open facilities.
Will the proposal effect access to health care and welfare services?	No
Will the proposal effect recreational or open spaces in urban areas?	The stadium is proposed on agricultural land, but will offers the opportunity for increased sports and leisure in a state of the art facility.
Will the proposal effect current public services i.e. fire/police protection, health care, schools?	Will draw on current fire, police, and ambulance services
Will the proposal effect public amenities i.e. electrical, gas, water, refuse service, telephone, sanitary sewer, sceptic systems, public transport?	Transport expected to be main impact
Will the proposal effect public transport, cycling, walking?	Predicted transport mode = 16% via walking/ cycling / bus, 14% rail, 3-4% stage carriage bus service, 16-18% park and ride, 5-6 spectator coach service, 3% taxi, 28 – 32 private car (see traffic impact assessment)
General	
Will the proposal add to any known cumulative effects or processes?	Joint university Medical School construction underway
Will the proposal increase visitation?	In the region of 450,000 visitors a year to Brighton and Hove
Is the proposal consistent with local, regional and national health targets and objectives?	Construction on ANOB, out of town site and agricultural land is not local or national policy. Yet requirement of stadium is pushing development.
Are there alternative proposals that may result in better health for exposed groups and populations?	Though the land is indicated for development in the local plan, no alternative plan for the land is proposed. Might be used as an academic corridor as the university expands.
Are the incentives of the proposal sustainable?	There are opportunities associated with education, employment, income, social interactions and coping skills that will be sustainable as long as the site is operational and managed correctly.
Has the proposal a system to identify community concerns?	EIA, SIA and public enquiry
Are there community concerns about potential health impacts?	Site location opens up construction on green belt, proximity to Falmer village, located on AONB, debate over the requirement of the stadium and alternative sites.
Does the proposal have any plans for future development alteration, expansions or further activity related	If constructed referbs are expected with some modifications made throughout its lifetime.

Name of applicant:	Brighton & Hove County Council
to this proposal?	

APPENDICES

12.0 Appendix 5 External Evaluation Presentation and Results

12.1 External Evaluation Cases Study & Questionnaire

The following exercise is part of an ongoing research project at the University of Brighton to help the development and application of Health Impact Assessment (HIA). The project includes a digital toolkit to screen development proposals for the application of HIA.

The case study presents the general process for use of the toolkit, demonstrates the toolkit's ability to combine multidisciplinary data, clearly identify areas of potential concern and supply a framework for any necessary further assessment.

The end questionnaire is intended to feedback your views on the benefits of the toolkit, its failings and areas for improvement. It reflects on the questions below and your comments will be fed into the final stage of the research to culminate in an off the shelf HIA screening tool for immediate use.

Please read through the case study with the following questions in mind:

- Do you need the toolkit?
- Would you find it beneficial?
- What are its problems?

- What does it lack?

- How might it be improved?

- How quickly could you adopt the toolkit for use in current practice?, and more generally

- How would local level nationally available HIA data benefit the current structure, nature and quality of HIA?

12.1.1 Introduction

The spatial susceptibility screening toolkit is primarily a means to profile the health of a defined population and its likely response to a development project or change in policy in order to determine if a formal HIA is required, and what it might include. It differs from most current health screening processes, working on the premise that population composition and environmental conditions, result in a variety of circumstances that make spatial susceptibility to development proposals unique. Therefore, determining when a HIA is required can not solely draw upon the nature or past experiences of similar proposals. It relies upon a combination of factors including the relative susceptibility of the local population / area, the type of proposal and the particular direct and cumulative effects of what is proposed.

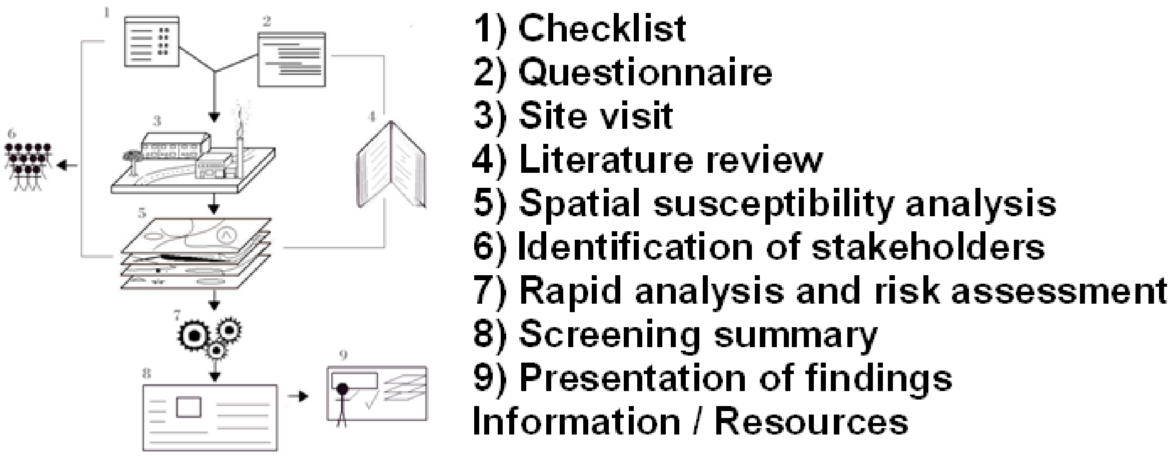
The toolkit was designed to fill a number of criteria identified through various HIA workshops and a detailed HIA model, guideline and process review performed at the University of Brighton. It therefore complies with current requirements in that it is prospective i.e. looks forward rather than backcasting, can be integrated with Environmental Impact Assessment (EIA) (DOH 1999), Strategic Environmental Assessment (SEA) (BMA 1998) and Social Impact Assessment (SIA). It delivers a means to quantitatively profile the health of a community or area. It is fast, economic, reliable and moreover provides the opportunity to monitor the outcomes of a proposal, compare assessments and evaluate the development and quality of Health Impact Assessment (BMJ 2000).

12.1.2 Process

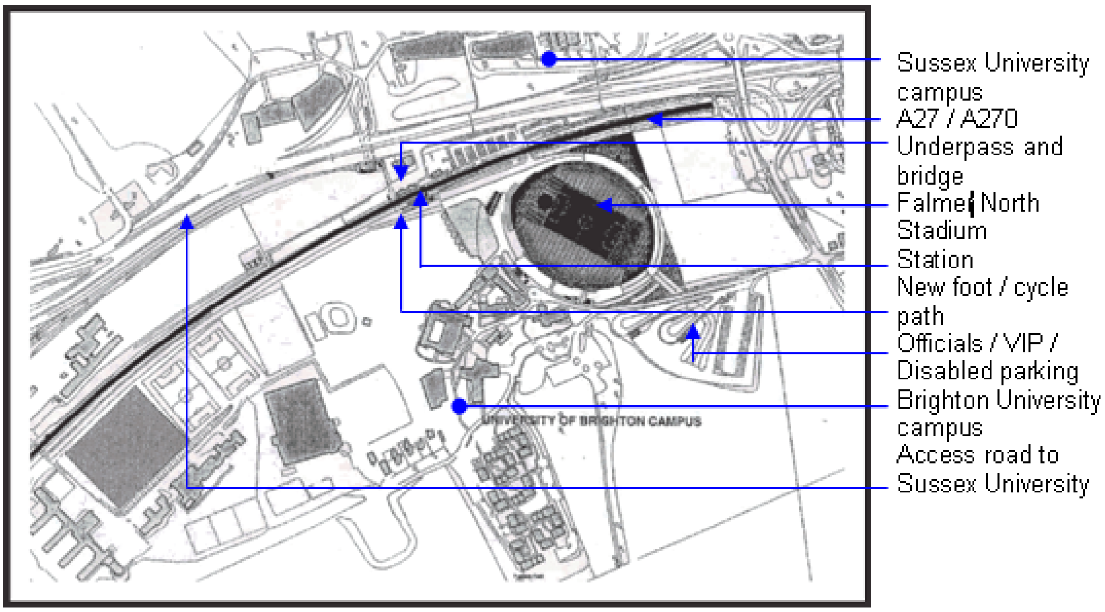
The toolkit draws upon the World Health Organisation's definition of health (WHO 1948), utilising statistics that are considered best to indicate social, physical and mental well being (Frankish 1996). These aspects are then further applied through the use of the determinants of health, resulting in a process that integrates social, mental and physical health with environmental and socio-economic factors known to have a significant impact upon the health of populations (SOS 1999).

It comprises nine key stages (fig1); the first stage is based upon information obtained from the proponent(s) of a development project via a structured checklist. This information is then rapidly processed to develop a proposal specification, which in turn sets the structure and focus of the following more detailed questionnaire and literature review. This information is then built upon using a key stakeholder analysis and risk assessment to identify areas of potential concern. For the sake of reducing the size of the exercise the following case study is presented in a condensed version of the presentation of findings stage (Figure 1).

Figure 1 The Spatial Susceptibility Screening Process



12.2 Case Study 02: The Proposed Community Stadium Village Way North



Source: Environmental Statement-Architectural Drawings

12.3 Introduction

The following case study focuses upon a development proposal for the construction of a community stadium at Village Way, Brighton. The application of the toolkit in these circumstances aims to:

- identify the potential impacts such a development may have on the local population;
- highlight those people most likely to be susceptible to the various processes involved;
- in the development;
- determine if a detailed Health Impact Assessment (HIA) is required; and
- offer guidance on the approach, method and detail such an assessment might require.

It was undertaken as part of the preliminary testing of the toolkit and with the knowledge of Brighton and Hove City Council. However, the results and views expressed are the author's own.

12.4 Site Selection

In planning for a new community stadium, the City Council commissioned a site identification exercise that yielded sixteen potential sites. The sites were then subject to a feasibility study using an agreed set of criteria best to meet the needs and priorities of the City. In February 1999 the City announced its final site selection of land North of Village Way with land South of Village Way being considered the most likely best alternative. Should neither site be developed as a stadium, they are likely to remain as potential development sites, for example, for research and development to expand the higher education establishments nearby. Therefore, their use must be carefully considered with respect to what will most benefit the community, the economy, the environment, and the resulting opportunities foregone (opportunity costs).

12.5 Material Reviewed

Due to the nature, magnitude and potential cumulative effects of the proposal, and as shown below, a number of assessments were considered necessary to accompany the planning application. To produce this case study, all documents were reviewed and the relevant information incorporated into the HIA screening process.

- Planning statement – DMH Planning & SPBS Planning Services;
- Environmental Impact Assessment prepared by WSP Environmental Ltd;
- Landscape Impact Assessment by Hyland Edgar Driver;
- Transportation Assessment prepared by Savell Bird & Axon;
- Architectural Design and Landscape Statement by scheme architects KISS Sports and Leisure Design Ltd and Landscaping Architects Hyland Edgar Driver;
- Socio-economic and Community Assessment by BHAFC and Fleury Manico with Humberts Leisure; and
- The EIA Executive (Non- Technical) Summary.

12.6 Project Specifications

The proposed community stadium at Falmer will have a total footprint of approximately 18 hectares, constructed on Grade II agricultural land over a phased 7 to 10 year period. Once completed the stadium will have a seated capacity of 22,374 people, extending to a capacity of approximately 35,000 for concerts. It is expected to attract approximately 450,000 visitors a year to Brighton & Hove.

The principal community stadium included:

- daily use of the stadium for hospitality and conference events;
- daily use by those employed at the stadium sport, catering, and the projected sports science and medicine facilities;
- daily use of the projected multi-purpose sports hall;
- daily use of ancillary facilities; and
- will act as a stadium, conference, concert, recreational, retail, educational facility.

Ancillary elements comprise the following:

- parking for 40 coaches and coach drop off point;
- new footpath and cycle ways to Falmer Station, University of Sussex and through Falmer High School to Moulsecoomb;
- parking for officials, players and disabled people visiting the stadium;

- use of existing car parks at the University of Sussex;
- re-use of the existing underpass to new dual reinforced grass car parking areas at Falmer High School;
- new access road through part of Stanmer Park to the University of Sussex, and
- rail station alterations and improvements.

12.7 Initial Screening Process

Using the planning and assessment material available, a detailed project specification was devised through the initial screening process. The results indicate that the following broad areas are involved and therefore are areas to consider in relation to further assessments and cumulative impacts:

- Agriculture;
- Education;
- Travel and Tourism;
- Housing;
- Transport;
- Gas, water and power;
- Emergency Services Communication;
- Social Services; and

- Environmental Conservation.

In addition, on a general note, the proposed stadium will generate a number of emissions to the atmosphere, water and soil, including noise, vibration, and various potential contaminants. With these in mind, the original plans included measures to reduce the impacts of these emissions during construction and operation. Stored or used materials on the site were not identified, and would require further investigation into the type, quantity, and potentially hazardous materials that might occur and what storage, supply and disposal arrangements would be made.

Three key aspects of the proposal were identified to have potential health costs and benefits. These concern the construction of the stadium, its operation and transport requirements. Each has specific health issues and is discussed separately after the Spatial Susceptibility Analysis. They are also referred to in the conclusion and recommendations.

12.8 Analysis

12.8.1 National Statistics

The statistics used within the spatial susceptibility analysis follow those compiled for the Index of Multiple Deprivation (IMD). The IMD is an index made up of weighted non-overlapping domains utilising up-to date information intended to highlight spatial patterns of deprivation in England at the ward level.

In the case of spatial susceptibility the final IMD score is not as important as the individual domains that it comprises. This is the case as the sub-domains are an indication of aspects of health known to influence / determine health, and can therefore be applied to analyse a population’s health profile, and its interactions with the surrounding environment. The nationally ranked statistics can be converted into a national percentage, allowing an immediate indication to those most deprived /

susceptible in relation to specific health aspects, and when combined with data obtained from the project analysis, allows the impact catchment to be allotted. The relationship between deprivation, susceptibility and the ability to monitor health is therefore a function of how these particular statistics are applied.

12.8.2 Wards

On the face of it Moulsecoomb and Marine wards appeared most sensitive to any health effects arising from the proposed stadium (fig 3). From this preliminary observation it is therefore possible to illustrate that the environmental burden is often borne by the least advantaged and to make the case for investment or, on the other hand to demonstrate the potential benefits of the development to otherwise deprived communities.

Figure 3

Data sets courtesy of National Statistics

12.8.3 Employment

The proposed stadium will significantly affect the local economy via both the direct economic effect of the stadium and through increased secondary spending of visitors in the city on its hotel, tourism and leisure industry as a result of stadium events (Figure 4).

Figure 4 Direct Economic Benefit of the Stadium

Cumulative Increases in Economic Activity Following Completion of:	£ Million	Percentage Contribution to the Local GDP
Phase 1	7	0.022%
Phase 2	7	0.024%
Phase 3	9	0.031%
Phase 4	10	0.032%

Source Environmental Statement - Executive (Non-Technical) Summary vol. 7

Not only will the facilities at the stadium and their relationship with the city generate significant income for local communities, but they will also help to offset the current trend of seasonal jobs within the city, promoting more sustainable and secure employment opportunities.

The immediate indication is that the Moulsecoomb and Marine wards have national ranks of income at or below the 6% most deprived (Fig 5). The proposed stadium therefore has the potential to positively influence this score as visitation, employment and the following prestige of the development result in primary and secondary economic benefits.

Figure 5

Data sets courtesy of National Statistics

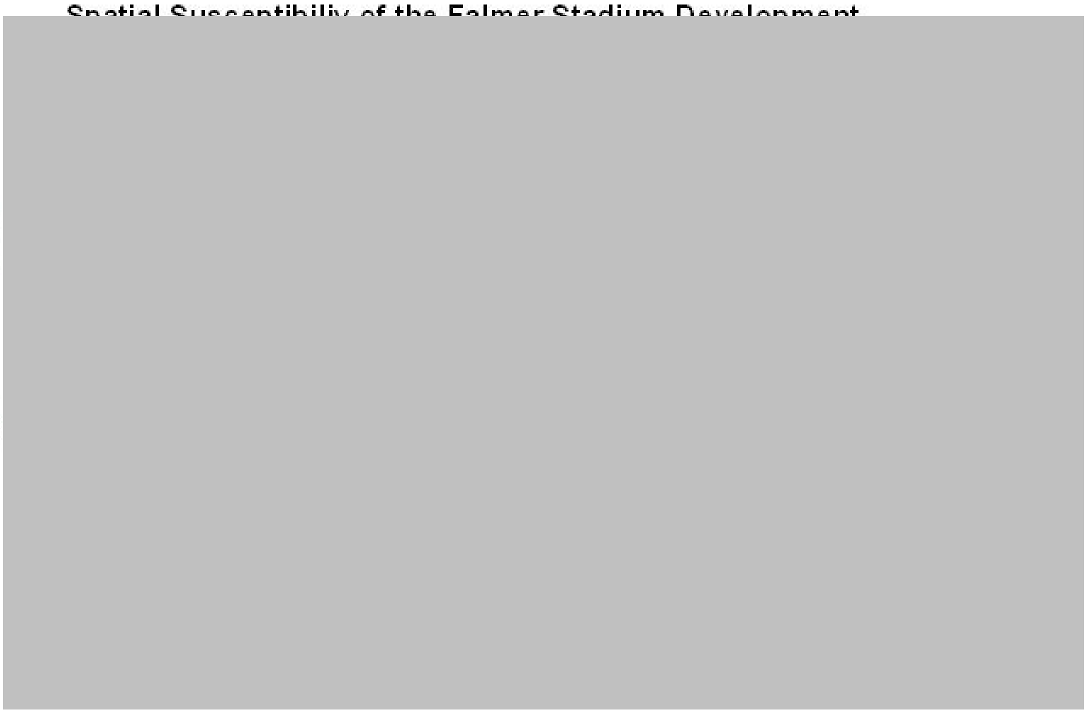
There will be a considerable need for human resources throughout the construction and operation of the stadium. It is estimated that the total number of construction jobs will peak during phase 1 and the number of people employed on the site will be in the order of 1,500 at its busiest period. Following construction additional employment opportunities will fall into three main areas:

- Football club;
- Stadium management;
- Stadium commercial activity;
- Supply chain businesses; and
- Hotel, tourism and leisure industry in the city and surrounding area.

Similar to Income the Moulsecoomb and Marine wards are again indicated to have a low employment level, but are not the most susceptible in relation to employment. In this case the regency and Queen’s park wards are highlighted as being within the 6% most deprived in the UK (Fig 6). Initial indications suggest that these areas would again benefit to increased routes to employment, yet further investigation is required, such as age, the number of economically active (16-59 years of age) etc. Such information can be obtained through national statistics, but would be better represented through the use of additional qualitative means.

Figure 6

Spatial Susceptibiliy of the Falmer Stadium Development



Data sets courtesy of National Statistics

A key concern at this stage is the employment strategy, although a number of jobs with varying skills and abilities has been indicated, would the residence of the Moulsecoomb and Marine wards benefit? The large quantity of university students may sway the choice of employment due to the abundance of young minimum wage individuals within sports orientated education.

The result of such a situation may have a potentially significant negative health effect to these wards, as these communities will bear the environmental burden of the development with limited benefits in regards to direct employment and earnings (Health Canada 2001).

12.8.4 Education

The Moulsecoomb and Marine wards are again indicated as the most susceptible within Brighton & Hove and among the 6% most deprived nationally (Figure 7). Poor education has a major influence upon health, that extends to family and social networks, resulting in an effect to healthy living, employment, income and over all well being (Banken 1999). The fact that the Moulsecoomb and Marine wards are again highlighted indicates the relative social exclusion to these areas, and the need for improvement and regeneration.

Figure 7

Data sets courtesy of National Statistics

12.8.5 Housing

The Moulsecoomb ward is among the 3% most deprived wards in the UK in regards to housing. this is only made more apparent when compared against Kingston which is amongst the 85% least deprived wards in the UK (Figure 9).

Figure 9

Spatial Susceptibility of the Falmer Stadium Development

Data sets courtesy of National Statistics

The problem faced here is how will the development affect housing. Optimistic predictions would state that housing prices would increase, improving the area and resultant accommodation problems. A more realistic prediction would again expect the rise in real estate, but also emphasise the loss of affordable housing, a subsequent increase in rent, and a gradual exclusion brought on by potentially high varying property values at a ward level. Housing must therefore be further investigated, identifying the possibility of fringe benefits associated with the stadium complex. As well as fringe impacts associated with aspects of the stadium that are less appealing, including housing situated around the proposed rail improvements, main road, and those that will experience effects from traffic, parking and subsequent increases in environmental burden and pollution.

12.8.6 Access

As indicated in the access diagram, there is not only a high level of access to retail areas, post offices, GPs and primary schools throughout Brighton & Hove (Figure 10), it is also very evenly distributed. The stadium is expected to add to these amenities, and to also develop new greener routes to them including foot and cycle paths to and around the Falmer School, Moulsecoomb estate, the universities of Sussex and Brighton campus, and links to the city centre.

Figure 10

Data sets courtesy of National Statistics

12.9 Key Aspects identified to influence health

From the spatial susceptibility analysis a detailed population profile has been displayed, identifying the benefits of the stadium, and indicating the communities that would require extended or additional planning in order to minimise negative health effects and maximise the benefits. The following section will now analyse the affects that the three key operational phases of the development will have to the identified sensitive wards and susceptible communities.

12.9.1 Construction

Construction issues include the movement of large amounts of soil, the delivery and storage of building materials, noise, dust, air and soil pollution, and a change to the nature of vehicular activity, to an 8-acre site area designated as an Area of Outstanding National Beauty (AONB). These aspects have been considered within the environmental and traffic assessment, but need to be reiterated in a health context in order to fully comprehend the potential effects on the surrounding communities.

Stadium construction will obviously influence the health of those living within the vicinity; noise, vibration, light, gaseous emissions and particulate matter have already been identified during the construction stages of the site. Although the emissions have been quoted as being below the government threshold, and can be further minimised through reduction mechanisms, the community that will be most effected has been poorly identified or represented.

The student populations that reside on campus include approximately 2,550 at Sussex, and 469 students at the Falmer campus, while a further 5,736 students are registered to study at the Falmer campus alone. These individuals, particularly those at Falmer will be those most effected by all the stages of the proposed stadium, and are expected to be most disrupted during the 7 to 10 year construction periods.

More detailed investigations into the potential health effects and risk is required for the resident student community, as well as the potential effects the development may have upon students studying in proximity to the construction site. Furthermore, the Moulsecoomb ward and Falmer village communities need to be investigated in relation to construction impacts, loaded wind patterns, and the affect construction traffic may pose to the area.

12.9.2 Operation

Operation of the stadium will have various benefits to a number of areas, but special attention must be paid to the Moulsecoomb and Marine wards, due to their inclusion within the stadium footprint and relative susceptibility in comparison to other surrounding wards.

Noise, vibration and light have been noted to be the main emission during the operational phase of the stadium, these have been proposed to be minimised through special techniques and programs, but will still have an effect upon both the student and resident communities. Additionally to this the shear number of visitors will increase the burden upon the local environment increasing pollution, crime and subsequent health effects to the area.

Careful consideration and mitigation will be required in regards to employment during the operational phase, where an employment strategy would be recommended. This is the case as a high recruitment of students may prove to be an impact in itself. The low levels of employment observed within the Moulsecoomb and Marine wards would greatly benefit from such employment opportunities, which in turn would further promote local pride, social links and interest in the stadium, reducing local deprivation while also reducing the requirement of staff parking facilities.

Further investigation into the operational phase of the stadium is required, including the use or storage of any hazardous materials, the noise, vibration, light and pollution impacts identified, monitoring of the operational phase, and the cumulative effects the operational phase will have within its own phased construction periods. Although the proposal has assessed the relative impacts of each phase of the development, the combination of construction and operational impacts by the proposal has failed to be considered. Further investigation into the intra and inter cumulative impacts of the proposal is required in order to identify potential synergistic impacts upon the health of sensitive communities within the area.

12.9.3 Transport

Although a number of potential constructional and operational health effects have been identified, it is the health effects related to transportation that may ultimately have the most effect upon health in Brighton & Hove. This is partially due to the shear number of people that would attend the community stadium, but also dependent on the method of transportation they chose to take, and the course of the routes such transportation will follow. The impacts of transportation are now well documented where both benefits and costs are recognised unequivocally nationally and internationally (DOH 1998).

From the completed traffic assessment it was identified that the mode of visitation is predicted to be broken down via a number of methods (Figure 11), each have a varying effect on the environment and local health. Although the benefits of green transport such as physical exercise and access to amenities will be welcomed, it must be noted that there is a high number of predicted private car use. Which does not necessarily take into account additional cars entering and parking within Brighton and Hove in order to utilise park and ride schemes.

Figure 11 Predicted Mode of Transport to and from the Community Stadium

- 16% via walking / cycling / bus
- 14% via rail
- 3-4% via stage carriage bus service
- 16-18% via park and ride services
- 5-6% via dedicated spectator coach services
- 3% via taxi
- 28-32% via private car.

Transportation Assessment (Savell Bird & Axon)

The affect such transportation will have is again dependant on the nature, magnitude and frequency of traffic, but must also take into account the route, and sensitivity of surrounding communities. Although a traffic assessment did identify routes that will have an increased frequency of traffic, it failed to identify the health effects such an increase would have, and the subsequent enlargement of the proposals combined environmental and health impact footprint.

The areas identified to be at most risk from the predicted transportation effects include the Moulsecoomb, Marine, Hollingbury and Tenantry wards (Fig 12). These wards have been previously identified as susceptible to both the constructional and operational phases of the community stadium, but are expected to be most at risk from traffic related health issues, due to their proximity to roads and parking areas expected to experience a rise in magnitude and frequency (NHS 2002).

Figure 12

Spatial Susceptibility of the Falmer Stadium Development

Data sets courtesy of National Statistics

High levels of traffic noise can not only cause serious annoyance and sleep loss, but also communication problems and even learning problems in children. Furthermore, there is emerging evidence of an association between hypertension and ischemic heart disease with high levels of noise. Although the community stadium has proposed to instigate measures to reduce the noise and vibration output of the stadium, and has stated that there will only be a minimal increase in road noise, no road noise reduction measures have been proposed.

Road transport is a major contributor to human exposure to air pollution. Long term exposure to air pollutants is associated with respiratory and cardiovascular diseases, and may lead to reductions in life expectancy. With an increase in traffic there will be a subsequent increase in pollutants to sensitive wards including:-

- Suspended particulate matter;
- Sulphur dioxide;
- Ground level ozone;
- Oxides of nitrogen;
- Carbon monoxide;
- Volatile organic compounds; and
- Lead.

These potential and actual carcinogenic substances, such as fine particulate and benzene, are known to act in a point source manner, where prolonged proximity to the source can increase long term cancer risk (DOH 1998). The routes identified to expect an increase in traffic are situated close to residential areas indicated as susceptible. It is recommended that a detailed health risk assessment is undertaken, and measures are made that reduce traffic on these routes.

Finally, with an increase in both pedestrian and road traffic volume the routes to and from the community stadium can expect a subsequent increase in road traffic incidents. Although the sensitivity of the wards will not necessarily result in impacts being more or less severe. It is important to point out that the roads identified are situated near schools, shops and main routes to both Brighton and Sussex University, as well as a main route to and from the city centre. The cumulative effect to these highly used routes is therefore a concern to be included in any further assessment and the final decision making process.

As stated the effects of transportation upon health are now well recognised, where the more detrimental effects are known to be concentrated in the more disadvantaged communities. It is therefore important for Local Authorities to work in conjunction with proposals that will significantly contribute to alterations in traffic nature, magnitude and frequency, in order to ensure that they are fully aware of the resultant impacts.

12.10 Conclusion

The health and well being of individuals is effected to a large extent by the environment in which that person lives, and where that person works. In the case of the community stadium, although both the residents of the Falmer Village and Moulsecoomb have been identified to be susceptible communities to the proposal. It is the students who both work and reside at the Falmer campus that will experience the greatest disruption as a result of construction and operation, while more long-term effects will be maid apparent in residents of the Moulsecoomb and Marine wards.

The development and operation of the Falmer North Community Stadium will have significant health issues, yet these issues are mainly focussed around transportation, pollution and subsequent related health risks. It is therefore the recommendation of this assessment that a detailed Health Impact Assessment is performed upon the immediate and long-term effect of the community stadium regarding construction, operation and transportation effects upon health. The recommended assessment should focus upon the following areas, and build upon the recommendations of this assessment.

Construction issues:

- Further investigation in type, hazard and quantity of materials required / stored at the site, including transport arrangements, storage, security requirements and public opinion.

- Inter and Intra cumulative effects need to be addressed, what are the combined effects of construction, operation and transportation of visitors over the predicted seven to ten year construction / operation period. And will they act synergistically with other developments or proposals.

Operational issues:

- Employment strategies would be recommended in order to avoid unbalanced student to local resident employment. One of the key local benefits of the proposal is in the reduction of the nationally high level of unemployment in the area.

- The increase in environmental burden is to be considered including waste management programs ranging from local clean up crews to waste recycling and disposal.

Transport issues:

- Green transport schemes should be further developed, reducing the burden upon road networks, excessive parking and subsequent local long term-health effects.

- A detailed health risk assessment of local communities will be required to determine the effect of increased traffic frequency and duration upon short and long-term health.

- Nose reduction schemes and general roadside improvements should be further explored along roads targeted.

- Parking strategies have to be reconsidered regarding the use of Brighton and Sussex University land; it is recommended that park and ride schemes out of the city be implemented, reducing pollution, road traffic accidents and associated health effects.

Although it is the recommendation of this document that further health assessment is required, it must also be stipulated that the development of the Falmer North Community Stadium will have profound improvements upon the health of the local area, ranging from socio-economical through to physical and educational benefits.

The Stadium offers a unique opportunity to serve the immediate local community with a high standard of sport, business and recreational facilities, creating local annual employment and community benefits, potentially improving all aspects of health and general well being of the area. Furthermore, when considering the opportunity cost of the development, in that failing the approval of the Community Stadium the land will remain open for development, sets the question of will the next proposal meet the city’s needs, aid regeneration and benefit local health as well.

12.10.1 Screening project details

Time required:

- One auditor - 10 working days after completion and return of initial questionnaire.

- The spatial susceptibility data is planned to be made available over the internet so that GIS expertise will not be required speeding up the process to hours rather then days.

Items required:

- Local planning guide;
- Proposal specifications or plan;
- Planning data, permission or consent forms;
- Environmental impact statements;
- Data sets courtesy of National Statistics; and
- Additional data sets available from local health agency and council.

Expertise required:

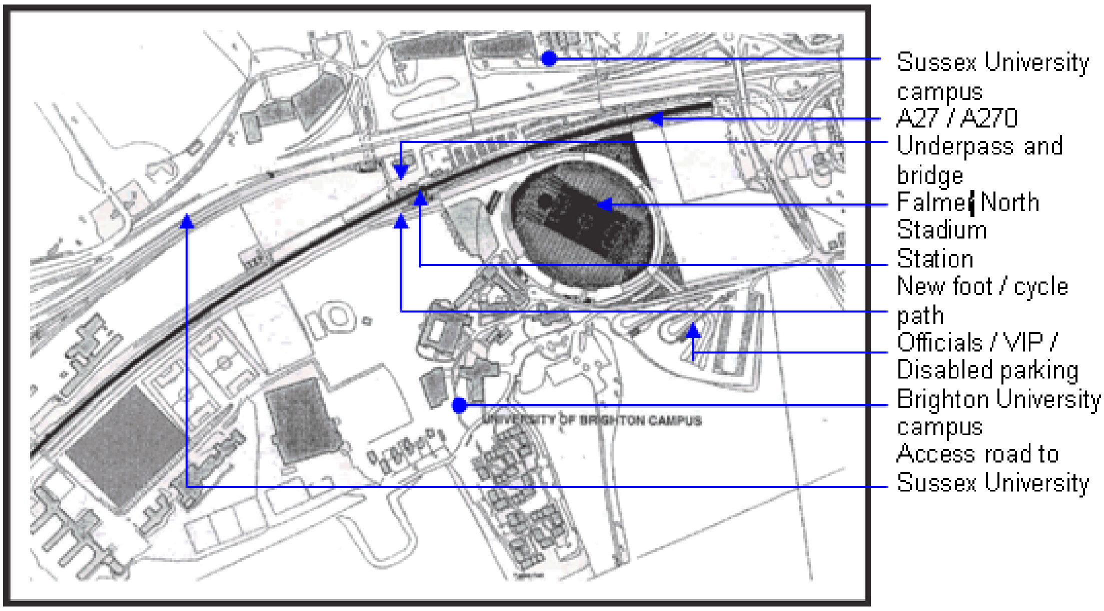
- HIA;
- Geographical Information Systems (GIS);
- Statistics sources and analysis; and
- Town planning.

12.11 Health Development Agency Presentation

12.11.1 Spatial Susceptibility Screening of Falmer North Community Stadium

The spatial susceptibility screening toolkit is primarily a method developed to profile the health of a defined population in order to determine if a formal HIA is required, and what it might include.

Test case: - Proposed Community Stadium Village Way North

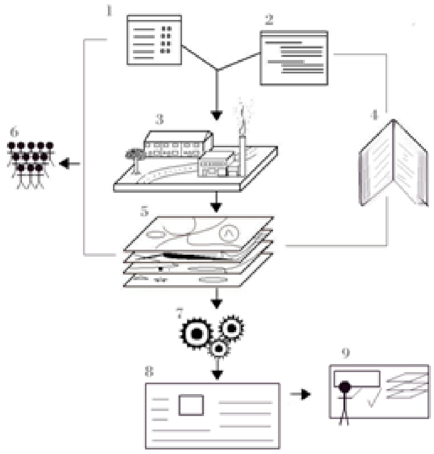


Source Environmental Statement-Architectural Drawings

The proposed community stadium at Falmer will have a total footprint of approximately 18 hectares, constructed on grade II agricultural land over a phased 7 to 10 year period. Once completed the stadium will have a seated capacity of 22,374 people, extending to a capacity of approximately 35,000 for concerts, resulting in the stadium expected to attract approximately 450,000 visitors a year to Brighton & Hove.

12.11.2 Method

The Spatial Susceptibility Screening Process



1) Checklist
2) Questionnaire
3) Site visit
4) Literature review
5) Spatial susceptibility analysis
6) Identification of stakeholders
7) Rapid analysis and risk assessment
8) Screening summary
9) Presentation of findings
Information / Resources

Indices of multiple deprivation - individual domains of income, employment, education, housing and health. Layered with schools, hospitals, parks, roads, train links rivers, water level, and available environmental indictors of quality and general demographic information. Local planning office.

12.11.3 Results

Construction issues: Inter and Intra cumulative effects need to be addressed, what are the combined effects of construction, operation and transportation of visitors over the predicted seven to ten year construction / operation period. And will they act synergistically with other developments or proposals.

Operational issues: Employment strategies would be recommended in order to avoid unbalanced student to local resident employment. One of the key local benefits of the proposal is in the reduction of the nationally high level of unemployment in the area.

Transport issues: Green transport schemes should be further developed, reducing the burden upon road networks, excessive parking and subsequent local long term-health effects.

A detailed health risk assessment of local communities will be required to determine the effect of increased traffic frequency and duration upon short and long-term health. Noise reduction schemes and general roadside improvements should be further explored along roads targeted.

Parking strategies have to be reconsidered regarding the use of Brighton and Sussex University land; it is recommended that park and ride schemes out of the city be implemented, reducing pollution, road traffic accidents and associated health effects.

12.11.4 Final Conclusion

Although it was the recommendation of the document that further health assessment is required, it must also be stipulated that the development of the Falmer North Community Stadium will have profound improvements upon the health of the local area, ranging from socio-economical through to physical and educational benefits.

The Stadium offers a unique opportunity to serve the immediate local community with a high standard of sport, business and recreational facilities, creating local annual employment and community benefits, potentially improving all aspects of health and general well being of the area. Furthermore, when considering the opportunity cost of the development, in that failing the approval of the Community Stadium the land will remain open for development, sets the question of will the next proposal meet the city's needs, aid regeneration and benefit local health as well.

Barriers of this approach: No longer a shortage of health data, rather how to structure / apply it There is a requirement for further ward level environmental indicators

Benefits of this approach: Quick, cheap, can be easily updated, acts as a platform allowing comparisons and evaluations to be made, and in time could be a means to monitor.

Criticisms: Complex, not practical, does not include public input, does not have outcomes, does not adequately cover health

HIA is the difference between "improving not proving" health effects (Frankish 1999)

WARNING This case study is not a full HIA

12.12 External Evaluation Questionnaire Returns

Name	**Nannerl Herriot**			
Organisation	Chemical Incident Response Service			
Position held in organisation	Environmental Epidemiologist			
Date	07/01/03			
Have you performed a health impact assessment?	Yes			
Are you likely to perform a health impact assessment in the future?	Yes			
Process				
Is the process clear?				
Is the process suitable for screening health impacts?				
Does the process meet the needs for health screening?	**No**			
Is the process over complicated?	**Yes**			
Is there any stage of the process that is unclear?	**Yes**			
How would you rate this screening process?	Good			
Please tick the description that you feel best describes each of the stages used in the screening process	Vital	Useful	Relevant	Not-relevant

Name		Nannerl Herriot		
Checklist		x		
Questionnaire		x		
Site visit	x			
Literature review	x			
Spatial susceptibility analysis		x		
Identification of stakeholders	x			
Rapid analysis and risk assessment		x		
Screening summary		x		
Presentation of findings	x			
Data				
Does the toolkit rely too heavily upon quantitative national statistics?				**Yes**
Are national statistics suitable to rapidly screen poor health and susceptibility				**Yes**
Is the segregation of national statistics into domains of health determinants useful?				**Yes**
Would you or your organisation use a nationally available health impact assessment data set?				**Yes**
Should a data set be created and maintained nationally to aid the assessment of health?				**Yes**
How would you rank the health domains used in relation to screening health?	Vital	Useful	Relevant	Not-relevant
Income	**X**			
Employment	**X**			
Education	**X**			
Education				
Housing	**X**			
Health	**X**			
Access to facilities and amenities	**X**			
What further domains or individual data sets would be of use in screening health?				
Population and Vital Statistics		**x**		
Physical Environment indicators of quality		**x**		
Countryside Agency's Definition of Rural Areas		**x**		
Community Well-being/Social Environment	x			
Parliamentary Electorate		x		
Crime		x		
Other (please specify)				
Conclusion				
Would the toolkit help aid in determining if a detailed HIA is required and the elements that it might focus upon ?				Yes
Would you use the spatial susceptibility toolkit?				
Would you find a catalogue of screening studies useful?				Yes
Would you extend the use of the screening tool throughout the health assessment?				Yes
Given that the data is regularly updated would you extend the screening toolkit to follow or monitor a proposal and its subsequent effects?				Yes
Would you adopt the principle or part of the toolkit into your own process?				Yes

Name	**Nannerl Herriot**

Could you adopt the screening process as part of current practice?		
Will you have to adapt or alter it?		
If so how	Parts of it would be useful to use in doing a HIA. I think it may be too complex and time consuming to use as a screening tool but maybe this depends you're your definition of screening. I think of a screening tool as something that allows you to filter a large number of proposals and prioritise those that would need an HIA. I think the work that you have done is very interesting and I would use it in either a rapid HIA or as part of a larger HIA.	
Would you like a copy of the results from this survey?		Yes
Are you interested in participating in the final trial of the spatial susceptibility screening toolkit?		Yes

Name	**Gabriel Gulis**			
Organisation	**University of Southern Denmark Unit of Health Promotion Research**			
Position held in organisation	**post doc research fellow**			
Date	**December 23, 2002**			
Have you performed a health impact assessment?	**Yes**			
Are you likely to perform a health impact assessment in the future?	**Yes**			
Process				
Is the process clear?	**Yes**			
Is the process suitable for screening health impacts?	**Yes**			
Does the process meet the needs for health screening?	**Yes**			
Is the process over complicated?	**Yes** **But here I must add something more. On one side as from routine health impact assessment practise in Slovakia I would consider it over complicated and as screening maybe the chapter "4. Key aspects identified to influence health" would be enough. On other side, one cannot get this chapter good enough without looking carefully into previously described parts. So, for a practising HIA person it may look a bit over complicated, but for research and development person it is fine. Of course, the best would be to produce something between. And give a "routine tool" (checklist what must be included, maybe, however I am not sure)**			
Is there any stage of the process that is unclear?	**No**			
How would you rate this screening process?	**Good**			
Please tick the description that you feel best describes each of the stages used in the screening process	Vital	Useful	Relevant	Not-relevant
Checklist	**x**			
Questionnaire			**x**	

Name	**Gabriel Gulis**			
Site visit	**x**			
Literature review	**x**			
Spatial susceptibility analysis		**x**		
Identification of stakeholders	**x**			
Rapid analysis and risk assessment		**x**		
Screening summary	**x**			
Presentation of findings	**x**			
Data				
Does the toolkit rely too heavily upon quantitative national statistics?				**Yes**
however, I would rather say from international view point that it would be nice to have such a national statistics				
Are national statistics suitable to rapidly screen poor health and susceptibility				**Yes**
Is the segregation of national statistics into domains of health determinants useful?				**Yes**
definitely if the national statistics allows for				
Would you or your organisation use a nationally available health impact assessment data set?				**Yes**
Should a data set be created and maintained nationally to aid the assessment of health?				**No**
I do not believe this might be feasible. I guess a routine, well conducted, valid, representative and multi-purpose National statistics would be fine at least for screening part of HIA. Then, one usually needs more specific data, which might be collected through specific tools				
How would you rank the health domains used in relation to screening health?	Vital	Useful	Relevant	Not-relevant
In general since, the groups of determinants of health may serve as domains for screening. Then depending on the topic of proposal to assess, there might be other sub-domains within determinants of health that is my perception, so, here my answers are related to the presented case, rather then generally				
Income		**x**		
Employment	**x**			
Education	**x**			
Housing	**x**			
Health				
Access to facilities and amenities	**x**			
What further domains or individual data sets would be of use in screening health?				
Population and Vital Statistics	**x**			
Physical Environment indicators of quality	**x**			
Countryside Agency's Definition of Rural Areas			**x**	
Community Well-being/Social Environment	**x**			
Parliamentary Electorate				**x**
Crime		**x**		
Other (please specify)				
Conclusion				
Would the toolkit help aid in determining if a detailed HIA is required and the elements that it might focus upon ?				**Yes**
Would you use the spatial susceptibility toolkit?				**Yes**
maybe, depending on topic of screened project or programme				
Would you find a catalogue of screening studies useful?				**yes**
Would you extend the use of the screening tool throughout the health assessment?				

Name	Gabriel Gulis	
maybe, I see possibility to use some of the parts in each step of HIA. For example the data or rather indicators used in screening process might serve as basic indicators for monitoring the impact after implementation of recommendations of HIA		
Given that the data is regularly updated would you extend the screening toolkit to follow or monitor a proposal and its subsequent effects?		**Yes**
Would you adopt the principle or part of the toolkit into your own process?		**Yes**
Could you adopt the screening process as part of current practice?		**Yes**
Will you have to adapt or alter it?		**Yes**
If so how	**As described earlier**	
Would you like a copy of the results from this survey?		**Yes**
Are you interested in participating in the final trial of the spatial susceptibility screening toolkit?		**No**

Name	**Glyn Pritchard**			
Organisation	**Castle Point & Rochford PCT**			
Position held in organisation	**Health Promotion Strategist**			
Date	**16th December 2002**			
Have you performed a health impact assessment?	**No**			
Are you likely to perform a health impact assessment in the future?	**Yes**			
Process				
Is the process clear?	**No**			
Is the process suitable for screening health impacts?	**Yes**			
Does the process meet the needs for health screening?	**Yes**			
Is the process over complicated?	**No**			
Is there any stage of the process that is unclear?	**Yes**			
	The link between tool, process and outcome			
How would you rate this screening process?	**Good**			
Please tick the description that you feel best describes each of the stages used in the screening process	Vital	Useful	Relevant	Not-relevant
Checklist		**X**		
Questionnaire		**X**		
Site visit		**X**		
Literature review	**X**			

Name	**Glyn Pritchard**			
Spatial susceptibility analysis		**X**		
Identification of stakeholders	**X**			
Rapid analysis and risk assessment	**x**			
Screening summary		**x**		
Presentation of findings	**x**			
Data				
Does the toolkit rely too heavily upon quantitative national statistics?				
Are national statistics suitable to rapidly screen poor health and susceptibility				
Is the segregation of national statistics into domains of health determinants useful?				Yes
Would you or your organisation use a nationally available health impact assessment data set?				Yes
Should a data set be created and maintained nationally to aid the assessment of health?				Yes
How would you rank the health domains used in relation to screening health?	Vital	Useful	Relevant	Not-relevant
Income	X			
Employment	X			
Education	X			
Housing	X			
Health	X			
Access to facilities and amenities	X			
What further domains or individual data sets would be of use in screening health?				
Population and Vital Statistics		X		
Physical Environment indicators of quality				
Countryside Agency's Definition of Rural Areas				
Community Well-being/Social Environment		X		
Parliamentary Electorate				
Crime				
Other (please specify)				
Conclusion				
Would the toolkit help aid in determining if a detailed HIA is required and the elements that it might focus upon ?				
Would you use the spatial susceptibility toolkit?				
Would you find a catalogue of screening studies useful?				
Would you extend the use of the screening tool throughout the health assessment?				
Given that the data is regularly updated would you extend the screening toolkit to follow or monitor a proposal and its subsequent effects?				
Would you adopt the principle or part of the toolkit into your own process?				
Could you adopt the screening process as part of current practice?				Yes
Will you have to adapt or alter it?				
If so how				
Would you like a copy of the results from this survey?				Yes
Are you interested in participating in the final trial of the spatial susceptibility screening toolkit?				No