



The impact of the HSC/E: A review

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The study contained in this report by the Institute of Employment Studies sets out findings from a review into the evidence of impact of HSC/E. The review located and evaluated evidence supporting claims for the impact of the HSC/E from a variety of sources. It also identifies areas where future development is required in order to develop the evidence base underpinning HSC/E's activities.

The review centres on the outcomes of HSC/E interventions. HSC/E claims for an impact are judged against what outcomes have been achieved and the report presents the methodology for isolating and evaluating material showing such outcomes, primarily changes to the incidence of harm in a workplace. This is achieved by applying various inclusion and evaluation criteria to produce a body of material that can be forwarded as evidence.

Evidence that has been selected and evaluated in the report is further subject to analysis to find those evaluations showing HSC/E impact on outcomes. The report makes clear there is a serious deficiency in the evidence-base of the HSC/E and offers various reasons for this (based on an impact model). It suggests, from the evidence found in the review, which HSC/E activities have the greatest impact and further suggests ways forward for the HSC/E to improve its evidence-base.

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Executive Summary

Introduction

At the end of 2000, The Health and Safety Executive, in response to the *Revitalising Health and Safety* initiative and the setting of targets for the Health and Safety Commission for the first time since its inception, commissioned a review of the evidence of the impact of their work. The Institute for Employment Studies (in conjunction with partners from Middlesex University) were contracted to carry out the study.

The broad aim of the review was to provide a stocktake of evidence on impact, assess its reliability and validity and draw out the relevant findings. Interest centred on what could be termed 'final impact' *ie* the influence on health and safety outcomes (ideally measured by indicators such as incidence of harm in the workplace), rather than just the effectiveness of particular actions in terms of meeting their immediate objectives (*ie* intermediate impact). Our definition of evidence involved documented (but not necessarily published) systematic investigations (subject to minimum criteria) which examined the link between HSE interventions and outcomes. The main findings are presented in this report and show that:

- there is very **little documentary evidence on outcomes** – just two studies out of 1000 identified link improvements in incidents of harm to HSE intervention
- there is **more evidence on effectiveness** – which shows that the HSE does positively influence workplace health and safety behaviour, with significant variations by size, sector and other factors. This is a key link in a chain of impact that can lead to improvements in health and safety outcomes
- **this does not mean the HSE has no impact** – but that the evidence does not exist in the public domain. It is difficult to collect, it may be embedded in HSE collective memory. In the past establishing impact on outcomes has not been a priority in designing and managing interventions
- to build a better evidence base **impact needs to be central to policy design and implementation** – coupled to a more comprehensive evaluation framework and improved data collection.

The evidence base

The study involved a systematic literature search which initially identified almost 1000 pieces of research which might have been of relevance. This long list was whittled down through a process of sifting and selection. Studies were selected for inclusion in the evidence base if they:

- were relevant to the activities of the HSE
- provided some indication of the impact of HSE interventions
- were based on systematically collected data with sample details provided (where appropriate)
- used a valid and reliable methodology (determined by a range of methodological characteristics).

A total of 66 studies made up the final evidence base. Amongst these studies there were many differences in approach. While they may have well suited their original purpose, the evidence base was identified as having a number of deficiencies for the purposes of examining final impact, including:

- the narrow scope of many of the studies, which considered interventions in isolation or from one perspective
- the lack of longitudinal data - this has implications for the strength of the conclusions that can be drawn from the data, as systematic evaluation of impact tends to require the examination of change against a baseline.
- the descriptive nature of much of the work, without an evaluative component
- a lack of outcome related research.

The impact chain

The review centred on a model of impact based on the way in which HSE seeks to influence health and safety practice. The model is centred around 'an impact chain' to examine the relationships between the:

- recognition of a hazard
- understanding of the risk associated with a hazard
- identification and implementation of control measures, and
- eventual improvements in health and safety that result from a reduction in incidence of harm.

The assumption is, validated to an extent in the literature, that there is a flow through the chain with higher levels of understanding associated with greater implementation of controls

and ultimately improved health and safety outcomes, although there may be significant leaks and lags in the process.

HSE activity (eg in the form of research, awareness raising and campaigns, legislation and guidance an inspection) influences various points on this impact chain. There is also a range of indicators which help to assess the impact of these interventions, including:

- employer awareness (indicating that they are more likely to recognise a hazard or understand a risk)
- employer health and safety practices (to reduce and avoid risk)
- outcome indicators such as accident rate data, views on improvements, and any data on intermediary indicators.

Outside the control of the HSE there are also a variety of intervening variables, including macro-level factors, such as the economic or political climate or the state of scientific knowledge and micro-level organisational and business factors affecting the individual workplace, such as management practices and/or employee representation arrangements. Our review was concerned with the extent to which studies in the evidence base took account of these variables when drawing their conclusions about the impact of the HSE.

What the evidence says

Relatively few studies measure impact (in terms of influences on health and safety outcomes). Most were designed to look at effectiveness (*ie* focussing on more immediate objectives such as employer and employee awareness and behaviour). Some of the main findings to emerge include:

- Little is known about the impact of HSE interventions, although in a few places, the evidence base does tell us that legislation can have a positive impact on employee health and well-being. There is some (but not enormously strong) evidence that links the introduction of regulations in the construction and offshore sectors to improved workplace practices to a lower incidence of harm.
- Other evidence shows that the HSE is effective at mounting awareness raising campaigns in that they 'reach' a reasonable proportion of employers, although penetration tends to vary significantly particularly by size of workplace. As a result of such activity significant numbers of employers and employees have a better understanding of health and safety issues in their workplace. However, the evidence suggests that there is a significant element of 'preaching to the converted', *ie* those most likely to register awareness of the campaign are those

most likely to be interested in and aware of health and safety issues.

- The evidence suggests that the additionality of such campaigns may be questionable, as many of those saying that they have taken action as a result of a campaign may have done so in any case, without the HSE intervention. However the campaign may have speeded up such action and/or made it more extensive and/or appropriate. For others, less predisposed towards health and safety issues, initial awareness of both the existence of problems and that they can be controlled is a key starting point for action.
- A few studies examine different ways of approaching employers. Personal contact techniques (*eg* through seminars or workplace visits) appear to be far more effective at changing behaviour than techniques such as mailshots. However different employers in different sectors, facing different risks respond to different techniques. Generally, the evidence suggests that targeted approaches tailored to meet individual needs are the best way of reaching key groups of employers and getting them to change their behaviour. Less is known about the relative cost-effectiveness of various techniques.
- Legislation and associated guidance is a major form of leverage over employers in terms of bringing about change in their health and safety policies and practices. Most employers are motivated to change their practices to comply with the law.
- Awareness of the legislation is a key initiator of action. Not surprisingly, the evidence suggests that the more aware employers are of a piece of legislation, the more likely they are to put in place relevant control measures.
- In these circumstances lack of awareness is a key indicator of lack of impact. Evaluations suggest that 20 to 30 per cent of relevant employers have not heard of regulations that apply to them. The evidence is that these are the employers that are also least likely to have appropriate control measures in place and are therefore those with the 'furthest distance to travel'.
- Those least aware tend to be smaller organisations – they are least likely to know what they should be doing in terms of monitoring and controlling hazards.
- There is some evidence to suggest that when control measures appear to be in place, there can be a significant dissonance between policy and practice with measures not implemented on the ground.
- Inspection is an effective means of securing employer compliance. If targeted at key groups, it can bring about significant improvements in health and safety performance, both in terms of ensuring control measures are effective and,

at least according to the general literature (rather than specific HSE literature), securing improvements in employees' health and safety.

Gaps in the evidence base

The fact that there are gaps in the evidence base may be a result of the methodology employed in this review. However, there are a number of other explanations:

- **Leaks and lags in the system** - the model of impact is not a closed system and some employers are either not made aware of relevant hazards, or do not translate this into action. In addition there can be major discrepancies between developing a corporate policy and implementing it effectively in practice. It can also take time for awareness to translate through to action and for benefits to accrue.
- **The questions were not previously asked** - this is the first time that this type of interpretative framework has been imposed on the work of the HSE and relatively few of the studies found were designed to gather evidence on impact.
- **Methodological problems** - measuring impact can be difficult. There are a range of data problems which get in the way of measuring safety or health outcomes. It can be difficult also to isolate the impact of an HSE intervention from other directly and indirectly influential factors and to spotlight the additional impact of a particular intervention above and beyond what would have happened if no action had been taken. Cost can also be an issue.
- **Embedded knowledge** - a great deal of evidence is embedded within the HSE (*ie* there is a strong body of intuitive knowledge about impact within the HSE). Empirical evidence may exist but it is not accessible in a form which lends itself to public scrutiny. This is a concern if the embedded knowledge is misplaced and if the HSE has to produce reliable evidence of impact for third parties.

Improving the evidence base

There are a range of possible actions which could be taken to make the evidence base more solid, including:

- **Build evaluation in first** - in planning and designing interventions, the HSE should take into account the results of previous evaluations and plan how the impact of the evaluation will be measured.
- **Develop an over-arching evaluation policy** - to serve the interests of the HSE as a whole, rather than particular directorates or programmes. Such a policy could include the

development of common methodological standards, but be able to be adapted to changing issues and priorities.

- **Develop a stronger HSE evidence base** – by conducting more systematic reviews and meta analyses, creating better links across research programmes and making sure all interested parties are made aware of relevant research findings.
- **Improve data collection on outcomes** and measurements of improvements or benefits in health and safety.
- **Increase understanding about the influences on those outcomes** and their causation *ie* by conducting more outcome-led research rather than just input led research.
- **Learn from other policy arenas**, *eg* as to how they evaluate impact.
- **Create a central and regular base of data** – *eg* through regular workplace health and safety surveys or buying into existing employer surveys.
- **Use existing data sources more** – where possible to track general trends *eg* in individuals' health and well-being relating trends to HSE interventions and other factors.
- **Greater use of time-lapsed data** *ie* longitudinal tracking studies, baselines and follow up *etc.*
- **Develop minimum standards in evaluation** – covering method and data analysis.

Conclusions

The evidence in this review suggests that the key to improving occupational health and safety is to ensure maximum compliance with health and safety legislation in terms of implementation of effective control measures both in theory and in practice. The evidence further shows that:

- Compliance with the law is generally a bigger motivator for employers than achieving business benefits.
- Different employers require different approaches to encourage them to implement effective controls.
- Small and medium sized employers are a key target group in terms of being most likely to have the least understanding of the nature of risk and lower standards of health and safety controls.
- While personal contacts from HSE staff are the single most effective (but possibly relatively expensive) way of influencing employer behaviour, a cumulative, multi-layered approach, tailored to meet the circumstances of the target group, is likely to have most immediate and lasting impact.

1. Introduction

1.1 Introduction and background

The Health and Safety at Work Act (1974) provided the framework to ensure that workplaces were required to be kept healthy and safe. At this same time, the Health and Safety Commission (HSC) was created to secure the health and safety of people at work, protect the public from risks arising out of work activities, to conduct research and review legislation. In addition, the HSC oversees the work of the Health and Safety Executive (HSE) which has the mission to

'ensure that risks to people's health and safety from work activities are properly controlled'.

Twenty five years after the introduction of the Health and Safety at Work Act, the *Revitalising Health and Safety* initiative was announced. As part of the initiative a set of challenging targets, related to injuries and ill-health at work, were set for the HSC to be accomplished over the next ten years. These are the first targets to be set for the overall health and safety system in Great Britain. If the work of the Health and Safety Executive (HSE) is to be successful in meeting these targets, there is a need to determine what actions it can take are likely to have a real impact on them. This reflects a shift in the orientation of the HSE from an emphasis on outputs (*ie* how much activity has taken place) towards one based more around outcomes (*ie* what has this activity achieved). This reflects a general trend in Government towards evidence-based policymaking.

The HSE has consistently attempted to evaluate its own activities, commissioning a great deal of technical and evaluative research which constitutes a vast body of research in health and safety practice. However, there was some concern over the quality of the evidence base and its relevance to the current emphasis on outcomes and this review was commissioned as a result.

The overall aim of this review was to establish what evidence could be drawn from the research (both HSE commissioned and independent) on the impact of HSC/E policy and practice (*eg* legislation and guidance). In order to reflect the broad remit of the HSC/E it was important that the review examined all aspects of

their policy and practice, including HSC/E work with other agencies (eg local authorities), although material solely relating to local authorities was outside our remit.

Another important consideration was the quality of the evidence. The conclusions of the review must be based on research that is methodologically valid and reliable. However, it is important to note that this review was not designed to undertake primary research of any kind. Answers could only be provided, therefore, on the basis of research questions that had been posed in prior research.

At the heart of the study is the notion of 'impact'. The targets outlined in *Revitalising Health and Safety* focus on reducing the incidence both of rates of accidents and of ill health. This kind of outcome related indicator therefore, provides an important measure of impact and is reflected in current strategic planning in the HSE. However, from initial discussions with the HSE project team it was clear that much of the available evidence to date was likely to focus on 'softer' outcomes related to outcomes, but not the 'Revitalising Targets' themselves (eg awareness of risk, management of health and safety). This may reflect the emphasis on controlling risks in the HSE's mission.

These issues were discussed at an early meeting of the project Steering Group. The decision was therefore taken to concentrate on hard outcomes where such information existed, but also not to overlook or discount other sources of evidence. Similarly, information uncovered in the review relating to the value for money of interventions under examination or their immediate effectiveness would be also be considered where it was available.

Thus there are various levels of impact of interest to this review with intermediate stages covering for example the awareness of risk or the existence of control measures and a final stage where impact can be seen in terms of workplace ill-health or injuries. It was agreed at an early stage that this review should be primarily interested in the latter 'outcome' stage but have regard to the prior intermediate stages as well. This led the study team to develop the notion of a 'chain of impact' discussed in Chapter 3.

The principles of systematic evaluation require that evaluations are planned to link closely with programme design¹. However many evaluations are conducted in an *ad hoc* manner (ie the evaluation is not designed into the programme of activity from the start). Additionally, much evaluative work is also unable to consider the level of impact, for example, of intervening variables (ie the evaluation is *post hoc*). It is important not only to know whether a particular activity has been successful, but also the

¹ As outlined in the HSE Contract Research Report 212/1999, *Evaluating the impact of Contact Techniques*.

reasons why this has been the case. Without this information it is difficult for research to contribute fully to the design and direction of new policies. Another factor in the review, therefore, was to determine how many of the studies considered actually attempted to assess the extent to which potentially intervening factors, outside the control of the intervention under evaluation, could account for any changes found.

In short therefore, the review was designed to prioritise information which could be directly useful to the HSC/E in planning activities to reach the new targets. However, the review would also report on studies which provided evidence of impact that was not outcome related (where the methodology of the study was sound and fully described).

1.2 Aims of the research

The main aims of the study were to:

- Achieve a detailed stocktake of the body of evidence that exists
- Evaluate this evidence against clear and objective criteria
- Identify the key issues for future assessment and development activities of the HSC/E in relation to their policy and practice
- Identify information deficits (gaps and weaknesses) in relation to the HSC/Es continuing aims and mission.

1.3 Approach

A full report of the methodology employed in the review is provided in Appendix A. In this section a summary of the key methodological stages is presented in chronological order. These were:

- A period of discussion with the HSE project team to finalise the details of the approach and the nature of the research outputs.
- In-depth interviews with HSE staff (a list of participants is provided in Appendix B) to gain a thorough background to the role of different directorates and identify key documentation, both published and unpublished.
- A search phase to identify and locate material for the review involving a range of strategies (*eg* electronic database searches and hand searches through key journals. Full details of the sources used is presented in Appendix C).
- The application of a set of inclusion criteria (based on the relevance and evidence base of the studies) to the material to determine what did and did not make it through to final evaluation.

- An evaluation of the study methodologies to determine whether the evidence was sufficiently valid to be included in the impact assessment (the evaluation criteria are presented in Appendix D).
- A consideration of the objectives, results and conclusions of the remaining reports.
- The synthesis of the evidence base (which included the involvement of a range of HSE personnel and external experts at a workshop held on 10 July 2001).

1.4 Definitions

In this report we frequently refer to concepts such as ‘impact’, ‘outcomes’, ‘effectiveness’ and ‘evidence’ and it may be helpful at the outset to clarify exactly what we mean by these terms.

By looking at ‘impact’ we are focussing on the final (and possibly longer-term) results of some form of intervention in terms of its influence on health and safety ‘outcomes’ (as measured for instance, by the incidence of harm, such as accidents or ill-health, in the workplace). This is therefore a wider view than the ‘effectiveness’ of an intervention which we take to mean focussing on the immediate objectives (*eg* in terms of awareness raising or improved control measures). For instance, the effectiveness of a piece of legislation could be measured for instance by the extent to which employers and employees comply with the prescribed control measures. Its impact, on the other hand, would be measured by whether it reduced people’s exposure to risk and ultimately resulted in fewer accidents and/or less occupational illness. Effectiveness could be seen as ‘intermediate impact’ and the outcomes, the ‘final’ or ‘wider’ impact’.

Finally we are looking for ‘evidence’ of these occurrences. The study took a fairly broad view of what constituted evidence, *eg* by including internal HSE papers and not just concentrating on peer reviewed articles. However we were only interested in **documented material**, which followed some form of **systematic investigation** in which the method used was open for examination (and had to pass **minimum criteria**) and which sought to examine **the link between HSE interventions and outcomes**. More detail on the compilation of the evidence base is presented in Chapter 2 and Appendix A.

1.5 Structure of the report

The report has been divided into two main parts. The main body of the report covers:

- the evidence base, providing a description of the studies included in the review

- the model of impact used in the review
- the synthesis of evidence from reviewed research (*ie* what the evidence base says)
- the conclusions of the review.

The second part of the report is the detailed methodology which is presented in a set of Appendices as follows:

- Appendix A: Detailed Study Methodology
- Appendix B: HSE Staff Interviewed as Part of the Study
- Appendix C: Databases used in the Search Phase
- Appendix D: The Evaluation Criteria used in the review
- Appendix E: Bibliography.

2. The Evidence Base

In this section we examine the nature of the evidence base. This is an important element of the study for two reasons: it comprises the report on the 'stocktake' and is therefore a discrete element of the study; and it forms the foundation of the conclusions drawn in the remainder of this report. The full detailed methodology for the research is contained in Appendix A and it is not our intention to dwell on the various phases of the research covering the search for and the sifting and selection of the evidence. However, we start this section by providing some detail of the criteria used to assess the reports and articles considered as part of the in-depth review.

2.1 The process of selecting the evidence

The searching process revealed that there is a great deal of work concerned broadly with occupational health and safety. However, much of this work was only of peripheral relevance to this review. Therefore, the first stage of the in-depth review was to confirm that the report/article was appropriate for inclusion in the review. We used the following criteria:

- the study must have some relevance to the activities of the HSE (as opposed to health and safety in general or concerned with the actions of other agencies or stakeholder);
- it must provide some indication of the impact of HSE interventions (either at an intermediate or final stage); and
- it should be based on systematically collected data rather than opinion or anecdotal evidence, with the basis on which data were drawn fully described.

If a study fulfilled all three of these criteria, the methodology was examined in some detail. Only those studies which were deemed to have a sufficiently robust methodology were then included in the evidence base. Methodological factors considered included:

- whether triangulation took place (*i.e.* data drawn from more than one source)
- whether the sampling (where appropriate) used recognised methods and obtained a reasonable response rate
- whether the study examined data over time

- the type of analysis conducted, and
- whether the research was conducted independently.

Some 160 studies went forward for the methodological review. The results of these tests for all those studies which reached this stage of the review are presented in Table 2.1.

As these data show, studies were less likely to demonstrate an acceptable response rate than any other methodological trait. However, the question of response rate was not strictly applicable to some of the methodologies (*eg* literature reviews, trawl of official statistics or qualitative methods), and this is likely to have been reflected in the results. It is also possible that some studies did have acceptable response rates, but did not fully describe this as part of their reporting and so we could not tell whether it was acceptable or not. Relatively few were based on time-lapsed data (*ie* took evidence at more than one point in time and sought to assess change) or considered the impact of potentially intervening variables, such as the actions of other agencies, or organisational business or macro-economic factors.

A primary aim of the review was to look for evidence that an intervention had a 'final' impact, so it is also interesting to note the relatively small number of evaluations based on time lapsed data (*ie* using a before and after measures design), or research which accounted for potentially intervening variables (*ie* factors other than the intervention itself that could have affected the results). This is likely to be a reflection of the 'real world' nature of much of the research, which makes these kind of methodological considerations more difficult than in a more controlled environment. For example, the costs of the evaluation need to be considered and there are potentially ethical difficulties in the use of a control group due where an intervention is **not** introduced (*eg* in the prevention of a hazard for only some of the population).

If the methodology was judged to be robust enough for review, the objectives and findings of the research were noted and these findings form the evidence of the impact of the HSC/E on which the remainder of the report is based. Whilst the research team operated to clear guidelines which were discussed and agreed, all judgements are to some degree subjective. It is our belief therefore, that whilst the techniques of the review are replicable, it is inevitable that a different research team would generate slightly different classifications, based on the subjective application of criteria.

Around 100 studies were rejected at this stage of the process.

Table 2.1: Results of the methodology testing

Methodological test applied	Studies deemed to pass the test (%)
Independent analysis of results	49
Based on referenced data from more than one source	37
Uses recognised sampling methods	36
Assesses impact of harm associated with identified hazards	31
Considers potentially intervening variables	24
Based on time lapsed data	19
Acceptable response rate (defined as >30%)	11
N = 160	

Source: IES

2.2 The nature of the evidence base

In total, 66 studies were taken to full review and as such are included in the evidence base. However, some of these studies are successive waves of the same research, published separately, but inter-related, so the actual number of independent studies considered within the evidence base is slightly less than this figure. We now go on to examine these studies in terms of a range of characteristics.

2.2.1 Methodologies

The studies included in the final evidence base employed a range of methodologies, often combining a variety of techniques in one piece of research. The results are presented in Table 2.2. As this table shows, surveys were by far the most frequently used data collection method. Over half the sample used this methodology, compared to a third using interviews and less than one in five which referred to official statistics. Very few of the studies involved any kind of international comparison.

Table 2.2: Methodologies used by studies in the evidence base

Methodology	Studies using methodology (%)
Surveys (including telephone and postal)	55
Interviews (qualitative in nature, either one to one or group discussions)	35
Review of official statistics (eg accident rate data)	18
Literature reviews/review of secondary data sources	11
Case studies (which may or may not include a range of data collection points)	8

International comparisons	3
Other techniques	14

N = 66

Note: 'Other techniques' included: workshops, checking safety data sheets, inspectors judgements of changes over time, competitions reviews and tests of equipment in controlled conditions

Source: IES

2.2.2 HSC/E activities

In addition to collecting information about the methodology of the reports/articles included in the evidence base, each reviewer was required (using the HSE Common Process Map as a guide) to describe the area of activity(ies) covered by the study. Studies could relate to more than one activity area. A breakdown of these activities for the studies which entered the final stage of the review is presented in Table 2.3. As this data shows, the main focus of the research is with regulation and the provision of external information and advice, around a third of studies concerned with each. This also reflects the high degree of research activity associated with awareness raising and the testing of awareness as an outcome.

Only one in five studies was concerned with research and information gathering, although this may be a reflection of the fact that studies were required to be in some way evaluative in nature in order to enter the in-depth review. A large number of studies, particularly those from academic journals, were rejected because they were theoretically based rather than reporting empirical findings about the impact of a specific intervention. Other looked at health and safety issues, perhaps based on secondary analysis of accident data for instance, but were not concerned with the role of the HSE directly. It is likely that a great deal of the research sifted out at this stage would be focussed on gathering information about, for example, the nature of hazards. There is a great deal of this exploratory information available, but it does not form part of the evidence base for this study as it does not match our focus on impact of the HSC/E.

Table 2.3: Areas of activity covered by studies in the evidence base

Area of activity	Studies concerned (%)
Regulation of duty holders (including enforcement and compliance activities)	51
Provision of external information and advice (including awareness raising activities)	48
Policy, legislation and standards	35
Research and information gathering (including the analysis and collection of accident rate data and understanding the nature of risks)	24

N = 66

Source: IES

2.3 Weaknesses in the evidence base

Having described the evidence base in some detail, we now move on to discuss its weaknesses, in terms of assessing the impact of the HSC/E. This does mean that the research itself was not fit for the purpose it was commissioned. We have not evaluated the efficacy of the each particular study, but have sought to extract evidence on impact. In so doing we found that evidence base as a whole contained a number of deficiencies for our particular purpose. Firstly, we outline the information that was collected but which did not form part of the evidence base, before moving on to discuss the evidence base itself.

2.3.1 What's missing?

In addition to the information described above, a great deal of information was collected which did not eventually form part of the evidence base. There were a number of reasons why this information was rejected from further consideration. The material was sifted out either because it was not relevant, it failed to assess impact or it was not empirically based. In addition to HSE contract research reports, academic journal articles and press clippings, the research team had access to a range of unpublished information from within HSE. Whilst this provided a great deal of useful background information, most of this 'grey material' failed to make it into the in-depth review as a result of its methodology, or the way in which the methodology was (or was not) reported. Some of the conclusions of internal (and external) studies are reports in the HSC's Annual Report, but again it is generally in a form that meant it failed to make the final stages of the review.

Many of the programmes of the HSE, for example, are **perceived** to be a success, although there is very little hard data on impact. This emerged through the interviews conducted with senior staff as part of this research. Much of the grey material reports these perceptions, and is based on *ad hoc* sampling methods without a systematic approach. There is an argument that it would be a waste of precious resources to evaluate extensively a programme that is widely held to be a success, and whilst this carries some weight, in the increasingly evidence based climate within HSC/E it is uncertain whether this argument will hold in the future.

This sort of material, however, does provide a body of evidence about the activities of the HSC/E despite the fact that it failed the criteria of this particular review. There is, to some extent an additive effect of a range of studies (even if they are not methodologically rigid) which point to the same conclusions. So, whilst this information was not included in the evidence base for this study, it remains a useful source of information, albeit in a different context.

2.3.2 What's there?

Taking an overview of the studies within the evidence base, it is evident that there are a number of areas of weakness in terms of analysing impact. For example:

- Most of the studies are very narrow in scope, considering one intervention in isolation. Very few studies take a broader perspective, considering the effects of a range of legislation or enforcement activities *etc.* This makes it very difficult to judge the 'impact of the HSE' in a comprehensive way, based as it is on very specific, highly focussed information.
- There is, as described in Table 2.1, a lack of longitudinal data (only 26 out of the 66 studies finally considered in the review was based at least in part on time-lapsed data). This makes true impact assessment almost impossible, as it is crucial to collect some form of baseline information before an intervention is put in place in order to determine progress and/or any changes made in an authoritative way. At the very least, there are questions about what can be claimed as a result of the findings of evaluations carried out without this element of research design.
- Fewer than half of the studies that made it through to the final stage of the review take account of potentially intervening variables, *eg* even fairly basic ones such as sector or size of workplace, let alone more complex factors such as prevailing management culture or the effect of the business cycle.
- A large proportion of the information considered is mainly descriptive in nature rather than evaluative. Accident rate data or other national statistics, for example, are described, which is of course useful, but an in-depth consideration of **why** any changes had occurred appears to be lacking.
- A related point is the lack of evidence which examines outcome data, such as accident rates or reduced incidence of harm. Much of the research conducted does not examine outcome data. In relation to the model of impact described in this report, the studies could be said to provide evidence of changes to awareness and attitudes, for example, but without evidence of any resulting change in behaviour and/or outcomes. This again is a serious weakness, making any judgement of impact subject to some caveats.

3. The Impact Chain

Implicit in our review is a model which attempts to explain and delineate the way in which the HSE seeks to influence workplace health and safety practice and ultimately reduce the incidence of harm. The model was first explored at a Project Steering Group meeting in January and has since been extended in the light of both a better understanding of what the evidence base looks like (as set out in Chapter 2) and what it actually contains (Chapter 4). The model is not particularly innovative, based loosely on fairly well established principles of hazard management, but it serves well as a basis for our examination of the evidence of impact in the next Chapter.

In this chapter we describe the main features of the model.

3.1 The model

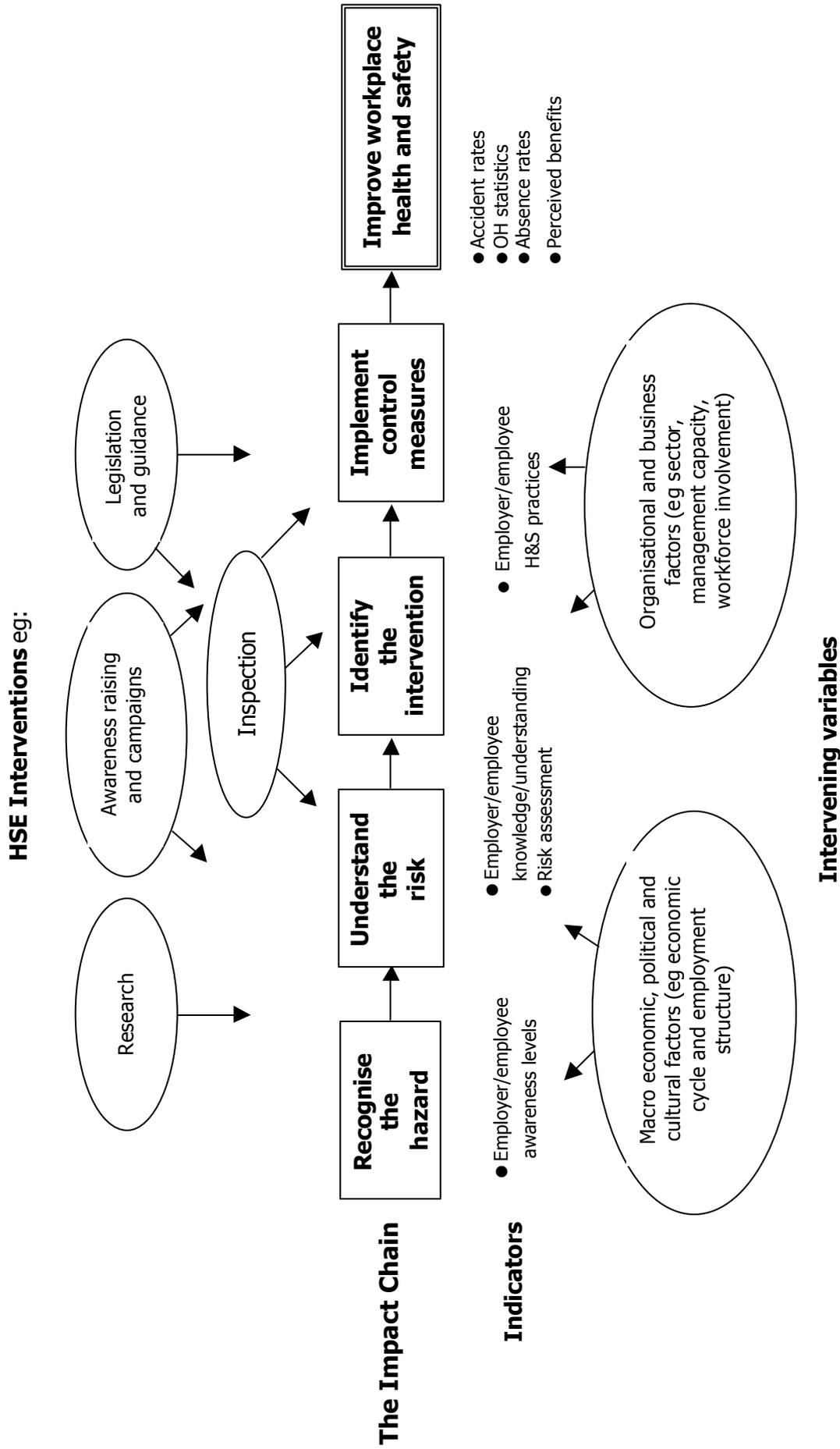
The model (set out in Figure 3.1) has a number of elements. At the centre is what we have termed 'impact chain' which is influenced by a range of HSE interventions (raining down from the top) mediated through and competing with a range of other variables (coming up from the bottom).

3.1.1 The impact chain

At the heart of the model is what we have termed 'the impact chain' which is an essentially simple (and perhaps over-simplistic) linear relationship between:

- Recognising that a hazard exists.
- Understanding the risk associated with the risk that hazard poses.
- Identifying appropriate interventions and control measures that can be made to limit or eliminate the risk.
- Implementing and monitoring those control measures in an effective way.
- Seeing improvements in workplace health and safety, *ie* through a reduction in incidence of harm.

Figure 3.1: Influencing health and safety at work



Source: IES

The assumption is that there is a form of chain reaction in that the greater the level of awareness and understanding of a particular hazard and the risks it poses, the more likely that appropriate interventions will be identified and, perhaps with a time lag, implemented. In turn, the implementation of appropriate control measures will lead to improvements in health and safety in the workplace. Managing a hazard through effective risk assessment and control measures affects the chance of an accident or ill-health. The HSE seeks to influence employers at each of the four left-hand links in the chain, with the aim of bringing about a reduction in the incidence of harm. In this way, the HSE can be seen to be having two levels of impact:

- At an intermediate level on the understanding of and control of hazards in the workplace, and
- At a final or ultimate level on health and safety outcomes.

Interestingly the model is similar, in many respects, to the risk management cycle discussed in Rakel *et al.* (1999) which reports a study evaluating the impact of contact techniques. The authors argued that contact techniques employed by the Field Operations Division (FOD) such as seminars, workshops and mailshots were risk communication activities which sought to influence each point of the cycle. The wider literature also makes the link between hazard identification, risk assessment and risk control implicit in the model (see for example Emmet and Hickling, 1995).

3.1.2 HSE Interventions

We have identified a wide range of interventions taken by the HSE to influence various points on the impact chain, including:

- **Scientific research** - to understand the hazards inherent in using particular materials or working practices (*eg* Miller, 1992 on the causes of accidents with post-drivers).
- **Awareness raising** including **specific campaigns** to raise the level of knowledge and understanding of risks among employers (and employees) in their place of work and/or publicise effective control measures. The Good Health is Good Business Campaign (see Wright *et al.*, 2000) and the Breathe Freely Campaign (Honey *et al.* 1997b) are examples of this approach.
- **Legislation** to compel employers (and employees) to adopt safer working practices and, implicitly, raising awareness of the risks posed (for example the Manual Handling Operations Regulations, 1992)¹. Included here also are **Approved Codes of Practice** or good practice **guidance** to help employers (and

¹ See Tesh *et al.*, 1997 and Lancaster *et al.*, 2001.

employees) to identify appropriate control measures (eg Honey, 1997b).

- Visits by **Health and Safety Inspectors** to educate, persuade or compel employers (and employees) to comply with legislation and improve health and safety practices (see Hussain and Willday, 2000 and Cosman, 1999).

In assessing these interventions discretely we recognise the inter-relationship between them and indeed that HSE is increasingly adopting a 'multi-layered approach' eg perhaps involving combinations of legislative powers, awareness raising and marketing techniques and interventions by Inspectors. We have reported the evidence on the value of such interaction, where it is available.

3.1.3 Using the evidence

We have sought to identify and review available evaluations of each type of intervention, looking in particular at whether they demonstrated any evidence to help us assess the following:

- the validity of the model
- the effectiveness of the intervention at meeting its objectives in influencing the relevant point in the model, and
- their ultimate impact in terms of flowing through the chain and leading to health and safety improvements.

3.1.4 Indicators

In scrutinising the evidence we have been interested in a range of indicators, which are also set out in Figure 3.1, movements in which could help the authors of the evaluations and ourselves to see the impact of the particular interventions being investigated. Such indicators include:

- Employers' awareness levels as an indicator that they might recognise a hazard and understand the risks.
- The use of risk assessment, partly as a control measure, but also as an indicator of understanding and awareness.
- Employer health and safety practices, from the use of personal protective equipment to risk avoidance measures and indications of the implementation of control measures. Here we were also particularly interested to see whether measures put in place in theory, eg through a management system, were being carried out in practice, ie by employees and managers in their everyday ways of working.
- Ultimately there are outcome indicators which can take three forms:

- ‘hard’ measures of workplace harm *eg* accident rates or sickness absence levels or duration
- softer perceptual data, *eg* the views of employers or employees on whether there have been improvements in health and safety outcomes associated with changes in working or management practice, and
- in some sectors there are also data on intermediate indicators, *eg* exposure to chemicals which in themselves are not indicators of harm but are strongly associated with an increased likelihood of an accident or occupational illness. Another example is the number of signals passed at danger (SPADs) in the railway industry.

3.1.5 Intervening variables

Finally, the Figure also sets out a number of the intervening variables that will act on the chain outwith any intervention from the HSE. These are many and various and tend to be inter-related, but perhaps among the most important are:

- The state of the economic cycle and the structure of employment (see for example Hillage *et al.*, 1998). These may have differing effects. For instance, health and safety practices may deteriorate as work intensifies and inexperienced workers are taken on during economic booms therefore increasing incidents of harm. However as employment switches away from sectors such as farming or mining with higher than average accident rates and towards sectors *eg* in services with a traditionally lower pattern, overall incidents of harm may decrease. Both have the effect of setting a context for HSE intervention.
- Working and management practices, *eg* such as the use of sub-contract labour (*eg* Mayhew and Quinlan, 1997).
- Production techniques – and the extent to which hazardous practices or pieces of equipment have been engineered out (see Cosman, 1999).
- The state of scientific knowledge (for instance see Williams *et al.*, 1996).

Other potential variables include the extent of joint regulation of health and safety. Nicholls (1990) argued that improvements in the fatal accident rate in manufacturing in the mid to late 1970s could be attributed to the fact that ‘labour was relatively strong’ and the deterioration from 1981 resulted from labour being weakened.

In this review we are not interested in these intervening variables *per se*, other than some, such as the state of scientific knowledge or production equipment design, over which the HSE might have some influence. However we are interested in the extent to which

such factors are taken into account in the studies we examine and their role in mediating or masking the impact that the HSE has on workplace health and safety.

In the model we have distinguished between **macro level factors**, such as the economic or political climate or the state of scientific knowledge and micro-level **organisational and business** factors affecting the individual workplace, such as management practices and/or employee representation arrangements.

3.2 Evidence on the validity of the model

Do we have any evidence to support the validity of the model? A number of items in our review cast some light on both its efficacy and applicability.

As we have already noted, our model is similar to that used for evaluation purposes by Rakel *et al.* (1999). Their study demonstrates a strong association between what they term 'knowledge arrangements and precautions', *ie* the more knowledgeable the employer, the more likely they were to have put in place appropriate health and safety arrangements and precautions.

A review of management, organisational and human factors in the construction industry by Whittington *et al.* (1992), found that safety failures (as manifested by accidents) could be traced back to management issues such as poor contractor selection, lack of supervision, inadequate training and deficiencies in 'basic safety defences' such as identification of hazards, and ensuring safety procedures were maintained on site. Again this suggests a link between inputs (in terms of workplace practices) and outcomes (in terms of incidence of harm). Some of the evaluations also provide confirmatory evidence that at least elements of the model hold true. For instance that there is a linkage between employer awareness and action (Honey, *et al.* 1997a) and the more people are aware of a piece of legislation and understand the health and safety rationale behind it, the more likely they are to put in place relevant control measures.

Some of the studies in the review examine interventions taken outwith the direct ambit of the HSE, but which nevertheless provide further evidence of a horizontal linkage between intervention and outcome. For instance, two studies looked at measures to improve health and safety on construction sites. Duff *et al.* (1993) reports the impact of procedures designed to change safety behaviour on construction sites based on the principles of behaviour change and goal setting. These procedures were tested on several sites and were found to produce marked improvements in safety performance (based on observations of working practices by the study team against a proportional rating scale of safety). Robertson *et al.* (1999) in a follow-up study found a significant

increase in average safety performance (as measured by the researchers) across all categories of behaviour for all completed sites. The key driving force behind the improvement in safety performance was increased management and operative commitment to a safe working environment.

4. What the Evidence Says

In this chapter we examine what the material that passed into the final stage of our review tells us about the impact the HSE has on health and safety at work. Most of the evidence tends to concern the effectiveness of particular interventions (*eg* in terms of research, awareness raising and campaigns, legislation and inspection, as set out in general terms in our model in Chapter 3). We have broadly based the structure of this chapter around this aspect of the model and therefore examine in turn evidence on:

- research
- modifications to equipment
- awareness raising in general and through specific campaigns, including evidence on the effectiveness of specific techniques. Some of these campaigns cover a range of activities and often involve HSE Inspectors
- legislation, and
- inspection as a discrete activity (*ie* planned visits, investigations and enforcement work).

We also consider a few more wider ranging interventions which do not fall neatly into the above category and (the very limited) evidence we collected on comparative health and safety regimes.

4.1 Research

A significant proportion of the health and safety literature is devoted to scientific reports on technical issues that fell outside the scope of our review. In that the HSE sponsors and contributes to the body of scientific literature it could be said to be impacting on workplace health and safety in two ways:

- indirectly by adding to the stock of knowledge on which policy and the regulatory framework is based (as evidenced by Nussey, 1994), and
- directly by adding to the awareness and understanding of workplace hazards among employers through dissemination of the research to them.

There was very little material which examined either the intermediate or final impact of research and, for instance, showed how research affected the understanding of hazards in the workplace. One study that was able to comment on impact, by Spencer and Tatsis (1999), concluded that the HSE's research and development work on kick control has made a 'significant contribution' to improving the well design ability and thus potentially improving the control of kicks in the offshore industry.

On the other hand, a review of the HSE's Technology Report series (WS Atkins, 1998) found that the research was considered academically rigorous and authoritative. However it also found that there was low awareness of the research, that the research was felt to be 'off the pace and behind the times' and that it lacked practical focus. This finding suggests therefore that at least in respect of dissemination through the technology report series, the direct influence and impact of HSE research on workplace health and safety may be limited.

4.2 Awareness raising

A number of studies (14) examined issues to do with raising the awareness and understanding of employers and employees about health and safety issues. Some dealt with fairly general issues, such as awareness of the HSE itself among small and medium sized companies and their views on the material HSE disseminates (eg Greenwood and Bush, 1994, Rogers, 1998). There was little in these studies which shed light on the overall impact of the HSE other than a conclusion that the HSE has a positive image in terms of literature provided and has improved its previously held negative image among SMEs as an 'enforcer'.

Consideration of the other studies is made under two not mutually exclusive headings:

- those covering the effectiveness of specific campaigns (nine studies, some of which refer to elements of the same campaign)
- those covering the effectiveness of particular awareness raising techniques (five).

4.2.1 Specific campaigns

The HSE has run a number of campaigns in recent years covering specific topics or more general issues. As such many are more than just 'awareness raising' in that they encourage recipients of the message to take action and support them in so doing with guidance, materials and visits *etc.*

One of the largest campaigns in recent years has been the five year-long Good Health is Good Business (GHGB) campaign,

which was a multi-faceted effort aimed (in part) at raising awareness of occupational health and improving employers' competence in managing health risks in the workplace. Activities included publicity, publications, conferences and compliance initiatives involving the HSE's Inspectorate. The final evaluation (Wright *et al.*, 2000) found that:

- Penetration rates varied significantly by size, with some 28 per cent of small employers aware of the campaign, compared with 73 per cent of larger organisations.
- 'Aware' organisations (*ie* those who had heard of the campaign) displayed a more positive attitude towards occupational health and a more comprehensive approach using risk assessment, changes to health risk management systems and auditing. However aware organisations were more predisposed towards having an interest in health and safety issues in general so the changes need not necessarily be attributable to the campaign.
- Nevertheless, one in ten survey respondents attributed all their improvements to contacts with the HSE (in seminars organised under the GHGB banner) and a further half attributed some of their improvements to such an intervention.
- Improved understanding of health and safety issues and how to manage health risks was a stronger 'driver' of change than business considerations (*eg* savings in the costs of ill-health) – further evidence perhaps that the flow in our model (Figure 3.1) between awareness and action is valid.

The authors calculated that around 200,000 organisations changed their safety management system for the better and close to one million employers placed a higher priority on health and safety issues as a result of the campaign. They concluded:

'Such campaigns can make a significant contribution to the further improvement of occupational health'

However, partly because of the difficulties inherent in so doing, and also perhaps because of the overall design of the campaign evaluation, the report has little conclusive data about the final impact of the campaign on employee health and well-being.

A separate study of occupational health and safety in the construction industry (Brabazon *et al.*, 2000) found 40 per cent of respondents thought that the Good Health is Good Business campaign yielded either a large or (more commonly) a slight benefit, although the nature of the benefit is not quantified.

Another campaign which has been evaluated is 'Breathe Freely' – which again achieved a lower penetration among the target smaller companies (one in four) than among medium sized employers (two in five) (Honey *et al.*, 1997b). People who had

heard of the campaign and received some or all of the materials liked what they saw. However, there was little evidence that it had led to action – partly because those who had heard of the campaign were already fairly aware of the risks involved and taken appropriate action prior to the campaign. In other words, it was ‘preaching to the converted’.

Other campaign evaluations and studies show a similar picture (*eg* Aspect Marketing (2000), Kovacs M (1996), Andrew Irving Associates (1996b), Bunt K (1993), Scantel (1992)) *ie*:

- The HSE can ‘reach’ significant proportions of employers although the penetration of a campaign vary – depending on the medium used and the length and strength of the initiative
- more limited success in reaching the real target audience (of employers with a hazard and limited knowledge of it or what to do about it)
- very little evidence that being ‘reached’ by the campaign actually translates into action, let alone positive and demonstrable benefits in occupational health.

4.2.2 Specific techniques

Some of the studies focussed on the effectiveness of specific awareness raising and education techniques such as advertising and personal contacts.

Advertising

Studies of the methods used in the Good Health is Good Business Campaign found that television advertising was more effective than radio or press advertising at getting the campaign message across to the target audience (Andrew Irving Associates, 1996b). The studies also found that while there was some evidence that awareness of the campaign did improve employers understanding about health issues and the range of measures that could be taken to improve health at work (the immediate objectives of the campaign), there was no real evidence of employers actually doing anything different as a result (partly because of the design of the research).

Television was also an effective medium for the Gas Safety advertising campaign (Andrew Irving Associates 1996a), particularly for the ‘forty-something’ age group. However for other groups more targeted techniques worked best. Again the research showed little evidence that awareness translated into action.

Personal contacts

The University of East Anglia study looked at the contact techniques employed by HSE Inspectors and compared the effectiveness of mailshots, seminars and inspections in bringing about action on health and safety in a sample of small firms (Rakel, 1999). This comprehensive evaluation demonstrates that personal contact through seminars and, to a slightly lesser extent, inspections was a much more effective technique than were mailshots at stimulating change in the workplace, although costs were not taken into account. Some 47 per cent of workplaces contacted through a seminar and 43 per cent contacted through an inspection took or planned action, compared with nine per cent contacted via a mailshot, although results varied by sector. However the authors concluded that there were significant advantages to a multi-layer approach in reaching target employers. The value of personal contacts from the HSE as a means of engineering workplace change also emerged from the Good Health is Good Business evaluation (Wright *et al.*, 2000).

Other methods

The HSE Infoline provides external information and advice. As opposed to campaigns it is a responsive service, reacting to individual enquires. A recent evaluation (Wiseman and Gilbert, 1999) found that callers were very satisfied with the service and most had taken some form of action as a result of their contact (mainly to ensure that they complied with legislation).

4.3 Legislation

A number of studies (ten) evaluated specific regulations or aspects of legislation. Some of these related to specific sectors such as offshore installations or construction. Others covered specific hazards such as noise or manual handling. They form a substantial and potentially useful battery of evidence, in that they are generally seeking to examine the impact of the legislative intervention which has been authored within the HSE/C. However, as most of the studies are conducted *post hoc* with a single wave of data collection and contain little outcome data, they actually provide very limited conclusive evidence on the ultimate effect that the legislation has had on health and safety at work.

The findings of the studies follow a broadly similar pattern and offer data on:

- the awareness of the relevant regulations among those covered
- the existence of the recommended or prescribed control measures

- evidence on the perception of impact among those covered, with little more objective data on impact.

4.3.1 Awareness of legislation

Generally, many, if not most, of the relevant group of employers, but by no means all, had heard of the health and safety regulations being evaluated. In one study, (Tesh *et al.*, 1997) only 30 per cent of employers had heard of the Manual Handling Regulations, with the lowest levels of awareness among small employers (although a wider ranging study of the 'Six-Pack' regulations which include the Manual Handling Regulations found a higher level of awareness (Hanson *et al.*, 1998). The studies also show that not all those aware of the regulations, understood what they were about. For example both the review of the Manual Handling Regulations (Tesh *et al.*, 1997) and the Display Screen Regulations (Honey *et al.*, 1997a) found misconceptions among employers about the nature of the risk involved or the best way to control it. However Honey *et al.* also found that awareness was a more important factor than understanding in explaining why employers had taken control measures such as conducting risk assessments.

4.3.2 Compliance with legislation

The regulations were generally associated with a change in employer practice, among those who were aware of them. Hanson *et al.*'s (1998) review of the Six Pack Regulations found a steady increase in the proportion of employers conducting risk assessments from 30 per cent before the regulations were introduced in 1992 to more than 80 per cent at the time of the study in 1998. The evaluation of the Noise at Work Regulations (Honey *et al.* 1996b) found a similar effect, *eg* with evidence to suggest that a significant proportion of employers (35 to 40 per cent) had introduced ear protection following the introduction of the legislation. Other studies find a similar level of impact (*eg* Lancaster *et al.*, 2001).

Therefore, although there is quite strong evidence that the introduction of regulations can affect both employer behaviour, workplace practices and lead to the introduction of relevant control measures, the same studies also show that not all employers are thus affected. Many did not fully comply with the regulations, despite being aware of them. In some cases it was specific details of the regulations that employers did not comply with, for example Swan *et al.*, (1998) found that while there was a high general awareness of COSHH, there was low compliance with the details of Schedule 9 and the Approved Code of Practice (ACoP). Other studies found that while employers fulfilled some aspects of the regulations, they often did not take the required comprehensive action. For example the second review of the Manual Handling Regulations (Lancaster *et al.*, 2001) found that

while the most common actions taken involved conducting risk assessments and/or awareness-raising training, fewer than one in six employers took action in terms of avoidance, risk assessment *and* risk reduction.

Implementation of control measures

One of the issues that only a few of the studies in our review consider is the extent to which management policies on control measures are actually implemented on the ground. A company may have a theoretical framework of risk assessment, prevention and even avoidance (and tick boxes on questionnaires to that effect) but few of their employees or supervisors actually comply with the procedures.

To look at this question studies need to employ an element of triangulation and question both employer and employee (and/or their representative). One study which did adopt such an approach was the review of the offshore safety legislation (AUPEC, 1999). Interestingly it found that although employers said that the introduction of the 'safety case' following the Cullen Inquiry had led them to bring a range of new practices, the study found little evidence of 'platform floor' impact from surveys of the workforce. Having analysed responses from two workforce surveys in 1995 and 1998, the authors could find 'no clear evidence of a major shift in workforce experiences and view' for instance in terms of their understanding of the law, risk perception, and safety representative training.

The recent study of the CDM Regulations (Brabazon *et al.*, 2000) in construction concluded that while legislation was a major driver in improving health and safety standards in the industry, implementation had been limited by a range of organisational, operational factors. Short falls in health and safety knowledge, particularly among clients designers and workers, the complexity of the regulations and a perceived lack of enforcement were other factors impeding implementation.

4.3.3 Perceptions of impact

In most cases, the evaluators of legislation found that the majority of employers felt that there were health and safety benefits associated with the regulations and that these generally outweighed any costs involved. For instance:

- Six out of ten employers undertaking health surveillance thought that the benefits outweighed the costs and only three per cent took the opposite view (Honey *et al.* 1996a). Similarly five out of ten employers thought that the benefits of the Manual Handling Regulations outweighed the cost of taking action (Lancaster *et al.*, 2001).

- A range of benefits were perceived by employers affected by the Construction (Design and Management) (CDM) Regulations (The Consultancy Company, 1997). These included (in order of importance) increased awareness, better health and safety planning, behavioural changes on site, less risks to manage on site and (interestingly in last place) fewer incidents. Brabazon *et al.* (2000) report similar findings in their study of the construction sector, with better health and safety procedures and better understanding resulting from the CDM Regulations.
- One in five employers in a survey conducted for the first evaluation of the manual handling regulations (Tesh *et al.*, 1997) reported that 'lost time' accidents and sickness absence had decreased as a result of the Regulations. By the time of the second evaluation (conducted on a different basis), 37 per cent of the employers taking action felt it had reduced the overall time lost through sickness absence. Twenty-eight per cent felt that the number of incidents of sickness absence had been reduced by taking action.
- The 'overwhelming majority' of a sample of duty-holding companies surveyed for an evaluation of the offshore safety legislative regime (AUPEC, 1999) felt that the regulations had improved their ability to manage safety.

4.3.4 Harder evidence

Some of the studies generate case study evidence which indicates that individual organisations have secured real health and safety benefits from introducing new procedures or working processes as a result of a piece of legislation. For instance the first review of the Manual Handling Regulations (Tesh *et al.*, 1997) provide details of one organisation that reported a six per cent reduction in sickness absence and a 50 per cent fall in lost time due to accidents directly as a result of measures introduced to comply with the law.

The number and rate of fatal injuries in construction is reported to have declined (by around ten per cent) since the introduction of the CDM Regulations, although the data on major injury statistics do not show a similar trend (Brabazon, 2000). The extent to which this study took into account potential intervening factors (such as the effect of the business cycle) is not clear.

The review of the offshore safety regime (AUPEC, 1999) examines oil industry accident and incident data and found it hard to discern a clear pattern because of data inconsistencies and measurement difficulties. Despite these problems, the study concludes that 'the overall safety performance data indicate good progress in reducing relative rates of personal accidents and incidents', although the evidence presented in the report was inconsistent. However better quality indicators were required to be more precise about the safety performance record. In a wider

study of the offshore oil and gas industry, Crawley (1999) argues that since 1990 and the introduction of a new legislative regime, indicators of major accidents and three-day lost-time accidents show a downward trend. He concludes that 'while the new regime cannot be judged with any confidence, there appears to be a reduction in fatalities and general improvement in safety standards.' However the causality is not clear as safety data were improving prior to the Piper Alpha disaster (which led to the Cullen Inquiry and the new legislation). Secondly, employers may argue that the introduction of the industry's Safety Management System has been the key driver behind improvements rather than legislation which merely codified what was happening in any event.

Role of regulation

A number of studies shed light on issues surrounding how the HSE achieves maximum impact. Although this was not directly part of our remit it seems sensible to report the main findings, if only in passing. In so doing we look at issues related to the role of regulation and enforcement as a factor motivating employers to take action on health and safety.

The evaluations of specific legislation generally concluded that compliance with the law was the most important reason that employers took actions to improve their health and safety practices and procedures (eg Honey et al., 1996b, Lancaster et al. 2001). Hillage et al. (1997) found that among SMEs the threat of prosecution can raise awareness and understanding of workplace risks and can lead to the adoption of better health and safety practices. The two most influential factors identified by Lancaster et al. in their examination of the factors motivating practice health and safety management were the fear of loss of credibility and the belief that it is morally necessary and correct to comply with health and safety regulations. Ashby and Diacon (1996) found that the most influential factors motivating companies to take action to limit the risk of occupational harm were compliance with government health and safety regulations and limiting possible legal liabilities. These were found to be far more influential than business factors such as reducing wage costs or improving productivity. The evidence therefore seems to suggest that there are at least two related factors at work here:

- the fear of being taken to court and/or receiving claims for compensation if found to be in breach of the law;
- the acceptance that the law is an expression of what should be done and that there is a moral duty to meet it.

If this (very simple) analysis is broadly correct then it suggests that different actions need to be taken by the HSE in different circumstances. Wright (1998) concluded that no single regulatory strategy is ideally suited to all sectors or sizes or organisation. However their report also argues that the motivation of firms varied in a reasonably predictable way and that HSE intervention strategies should be based on an understanding of these variations. A qualitative study by Hazel Genn (1993) reached a similar conclusion that self-regulation only worked under a specific set of circumstances and that a greater understanding of the way companies worked could lead to a more differentiated response by the HSE.

4.4 Inspection

The operational activities considered under this heading are primarily planned inspections; reactive work (investigation of accidents and complaints); and, enforcement (both formal and informal) (Hussain and Willday, 2000). Non-inspection work (such as campaigns, seminars, lectures and educational work) is considered under 'awareness raising' above.

Cosman (1999) reviews a number of studies looking at the effectiveness of the HSE's inspection regime and found few that looked at whether inspection was causally associated with improvements in health and safety. Many showed that employers valued the advice and guidance provided by inspectors and that generally most (but not normally all) of the improvements they required were implemented. For example, he cites an internal review conducted in 1991 (A Review of Effectiveness Measurement in HSE, EAU, Effectiveness Support Branch, HSE, (1991) not covered by our own review) which found that planned inspection resulted in 70 per cent of the requirements made by inspectors, although the sample was not thought to be statistically sound. Cosman concludes that the broad mix of techniques adopted by the HSE Inspection team is 'about right' however more and continuous evaluation is required to 'further refine or justify the overall balance of resources and the particular techniques employed'.

The Cosman study was followed up by a wider-ranging review conducted by the Health and Safety Laboratory (Hussain and Willday, 2000) which looked at international literature on a range of inspection regimes from coastguards to environmental agencies. It found that 'almost all studies concluded that inspection works'. Of particular relevance to our review were studies of the Occupational Safety and Health Administration (OSHA) in the United States of America which found:

- statistically significant reductions in injury rates attributable to inspections, and
- that the first inspection had the strongest impact.

A study of the Safety Management Review Lead Partnership Scheme found that the approach worked successfully and (based on perceptual evidence only) that it had led to participating companies improving their health and safety management systems.

4.5 Other interventions

An early report on the PABIAC initiative in the paper and board industry found a generally positive feel among participants about their involvement, but could not corroborate the benefits with evidence from an examination of accident data (HSL, 2001). However it may have been too early to reach definitive conclusions and another later study may be more illuminating on this point.

The impact of a FOD campaign to improve the provision of welfare facilities at work was examined by Bell (2001), based on a comparison of data collected in 1998 and 2000. The report identified significant improvements in handwashing, rest, eating and drinking and clothing and changing facilities between the two years. The author states that although the improvements cannot be directly related to FOD welfare campaign, there may be at least an association.

4.5.1 Modifications to equipment design

We found very little literature which examined the impact of working with equipment manufacturers to improve the design of equipment to make it safer to use, despite this being an area where the HSE could (at least in theory) have a very powerful impact on health and safety outcomes. However where this has been researched, a clear impact can be demonstrated.

Cosman (1999) looked at instances where initiatives had been taken to persuade manufacturers and suppliers of pieces of industrial equipment to change to a safer design. The full role of the HSE is not clear from the report, although in subsequent discussion it appears that HSE inspectors facilitated the supply of new safer equipment and helped persuade employers to adopt the new kit. He found that in the agricultural sector a new design of potato harvesters, introduced through such concerted action, saw a reduction in injuries from this class of machine 'from three fatal and 32 serious injuries in 1992/3 to only eight serious accidents in 1995/6.' Discussion with HSE personnel about this example highlighted the importance of working with other agencies, in this case employers and trade associations, as a group and also acting on both the suppliers of equipment (to modify it) and purchasers of equipment (to buy new, safer machines).

Other initiatives cited by Cosman include:

- A campaign to successfully reduce the number of 50kg bags used in the construction sector associated with a wide range of manual handling injuries, and their replacement with 25kg bags.
- A campaign to introduce safety nets in industrial roofing sites.

Unfortunately, for our purposes, in each of these examples the report does not provide data on injuries to back up the impact of these positive measures on incidence of harm. Additionally, there was insufficient information reported on the method used to assess whether all these instances met the criteria for being included in our review (see Appendix A for details of these criteria).

4.6 Comparative studies

We found very few studies comparing the situation in the UK with that in other countries. One of the few which was reviewed involved a comparative analysis of health and safety management in a sample of UK and Spanish SMEs (Vassie *et al.* 2000). It found that in the UK there was a relatively enhanced level of awareness of health and safety legislation, a higher prevalence of safety and quality management systems and greater involvement of senior managers in health and safety issues. However, the study did not link comparative performance to the country's health and safety regulatory framework, although a positive view of the impact of the HSE could be inferred from the findings. A more comprehensive study looking at the major intervening variables would be needed before any conclusive inferences could be drawn.

5. Conclusions

This study set out to locate and evaluate research evidence that existed which examines the impact of the Health and Safety Commission and Executive on workplace health and safety. In this final chapter we draw together our conclusions on what the evidence shows and the implications for the development of HSE policies and practices.

5.1 What the evidence shows

5.1.1 More on effectiveness than impact

The vast bulk of the studies in our review take a rather narrow perspective and examine issues to do with the *effectiveness* of a particular intervention rather than its *impact*. The distinction is important. The former refers to whether the initiative was successful in achieving its immediate objectives (*eg* in terms of raising awareness, or bringing about a change in employer practices or behaviour). Impact on the other hand looks at what has happened as a result of the achievement of those objectives, did they have the desired end result (*ie* in terms of improving the health and well-being of employees)?. In terms of our model (Figure 3.1) effectiveness looks at the vertical dimension at each particular link, while impact looks horizontally along the connections in the chain.

This conclusion is not surprising given that most of the studies were commissioned to examine effectiveness (*ie* intermediate impact) and were not designed to assess impact on health and safety outcomes. It emerged in our workshop with HSE officials that is only relatively recently that attention within the HSE has focussed more sharply on 'final impact'.

5.1.2 What works?

Some of the main findings on effectiveness to emerge include:

- The HSE is effective at mounting awareness raising campaigns in that they 'reach' a reasonable proportion of employers, although penetration tends to vary significantly particularly by size of workplace. As a result of such activity significant

numbers of employers and employees have a better understanding of health and safety issues in their workplace. However, the evidence suggests that there is a significant element of 'preaching to the converted', *ie* those most likely to register awareness of the campaign are those most likely to be interested in and aware of health and safety issues.

- The evidence suggests that the additionality of such campaigns may be questionable, as many of those saying that they have taken action as a result of a campaign may have done so in any case, without the HSE intervention. However the campaign may have speeded up such action and/or made it more extensive and/or appropriate. For others, less predisposed towards health and safety issues, initial awareness of both the existence of problems and that they can be controlled is a key starting point for action.
- A few studies examine different ways of approaching employers. Personal contact techniques (*eg* through seminars or workplace visits) appear to be far more effective at changing behaviour than techniques such as mailshots. However different employers in different sectors, facing different risks respond to different techniques. Generally, the evidence suggests that targeted approaches tailored to meet individual needs are the best way of reaching key groups of employers and getting them to change their behaviour. Less is known about the relative cost-effectiveness of various techniques.
- Legislation and associated guidance is a major form of leverage over employers in terms of bringing about change in their health and safety policies and practices. Most employers are motivated to change their practices to comply with the law.
- Awareness of the legislation is a key initiator of action. Not surprisingly, the evidence suggests that the more aware employers are of a piece of legislation, the more likely they are to put in place relevant control measures.
- In these circumstances lack of awareness is a key indicator of lack of impact. Evaluations suggest that 20 to 30 per cent of relevant employers have not heard of regulations that apply to them. The evidence is that these are the employers that are also least likely to have appropriate control measures in place and are therefore those with the 'furthest distance to travel'.
- Those least aware tend to be smaller organisations - they are least likely to know what they should be doing in terms of monitoring and controlling hazards
- There is some evidence to suggest that when control measures appear to be in place, there can be a significant dissonance between policy and practice with measures not implemented on the ground.

- Inspection is an effective means of securing employer compliance. If targeted at key groups, it can bring about significant improvements in health and safety performance, both in terms of ensuring control measures are effective and, at least according to the general literature (rather than specific HSE literature), securing improvements in employees' health and safety.

5.1.3 What's the result?

Much less is known about the final impact of these initiatives. Generally, health and safety outcomes have shown a positive trend over the last ten years or so, but few studies have been able to link improvements directly to legislative or other action and many other factors may be at work. In a few places, the evidence base does tell us that legislation can have a positive impact on employee health and well-being, as there is some (but not enormously strong) evidence that links the introduction of regulations in the construction and offshore sectors to improved workplace practices to a lower incidence of harm.

5.2 Why is the evidence not stronger?

There are a range of reasons which could help explain why the evidence on the impact of the HSC/E is relatively weak. In summary:

- there is evidence but we have not found it, because either we did not look hard enough, or
- there is evidence but we have not found it because we looked in the wrong way or our approach (and the model at the heart of it) was unsound, or
- there is no evidence, because the causal links in the model are not strong in practice, *ie* there are leaks and lags in the system, or
- there is no evidence (or at least evidence which matches our criteria), because there are significant gaps in the evidence base, the relevant research has not been done and/or data not collected, either because it was not required in the past or because it is too difficult to do.

Below we examine each of these potential reasons in more detail.

5.2.1 The search

We believe that we have made a thorough search of all the likely sources of literature, both published and unpublished, that consider the immediate question we are seeking to answer concerning the impact of the HSC/E. There is a wider body of literature about the management of workplace hazards in general

(regardless of the HSC/E interventions) which we have not considered here and which may be indirectly relevant. Other than broadening the scope of the review we are reasonably confident that we have incorporated most, if not all, of the relevant evidence.

5.2.2 The model

We have sought to apply a model of impact which may not be theoretically sound. While there is some empirical evidence to suggest that the model does have some validity it is not conclusive and our discussion in this paper lacks any theoretical underpinning. To counter-balance this point, more work on the theoretical justification of the model needs to be undertaken. Secondly there are certain aspects of the model which warrant more detailed scrutiny, for example:

- What is the HSE's influence on the stock of scientific knowledge and, in turn, the influence that has on the wider understanding of hazards and risks?
- In which ways do different interventions (from any source) lead to changes in employer behaviour? For instance, what is the impact of prosecutions? What is the relative impact of proactive as opposed to reactive inspections.
- What are the key drivers along the impact chain, what are the levers that propel awareness into action and on to effective control?
- What are the barriers that impede the flow along the chain and what could be done to alleviate them? (see 5.2.3)
- Why is it in some cases (eg in the area of mental well-being) the links between harm and hazard remain unclear?
- What is the indirect influence of the HSE through other intermediaries - becoming ever more important as the HSE and others adopt a more 'partnership-based' approach?
- Should there be a cost dimension, so that judgements about cost effectiveness can be made? Or would the costs of doing so outweigh the benefits?
- To what extent do the other intervening variables merely set a context for HSE action (rather than act as mitigating circumstances)? Can their effect on health and safety outcomes be measured?

The answers to some of these questions may well be known, but there may be benefit in drawing them together to provide a more sophisticated and comprehensive understanding of the factors (within the HSE's influence) which have an impact on workplace health and safety. We believe that the model could be developed either to apply it to particular sectors or interventions or to look at the particular linkages between the main elements in the chain.

5.2.3 Leaks and lags

One practical reading of our model is that activities which effectively raise the awareness and understanding of employers about a hazard, coupled to clear (legislatively backed) guidance as to appropriate control measures should lead to such measures being introduced with ensuing benefits in terms of health and safety incidents. However there is also some evidence to suggest that the model 'leaks', at various points. It is not a closed system. Thus some employers are not made aware of relevant hazards by campaigns or other publicity drives. Some that are, do not translate awareness into action. Finally (and perhaps most importantly) there is a mismatch between policy and practice, between rhetoric and reality, in terms of actually implementing control measures effectively.

Furthermore, it can take time for messages to get through to employers, for them to change behaviour and for such changes to be seen in terms of beneficial outcomes (Crawley, 1999). Time lags could account for some of the lack of evidence.

There is scope for more research on the leaks and lags in the model which would necessarily involve gathering data from a range of sources (*eg* employers, employees and health and safety agencies).

5.2.4 Gaps in the evidence base

It is not a great surprise that the evidence base is rather sketchy given that this is one of the first times that this type of interpretative framework has been imposed on the work of HSE. As we have found, few studies have looked at impact and also relatively few have adopted such a systematic approach to evidence gathering. Therefore, for the first time significant 'gaps' in the evidence base have become apparent. In the past, research at the HSE has tended to be activity driven (which in turn tends to be needs driven in terms of perceived problems). Despite the existence of guidelines, the HSE has never rigorously pursued the gathering of robust research evidence of reductions in the incidence of harm due to HSE intervention and the evidence base reflects that. Furthermore, research has generally not been commissioned with subsequent systematic reviews and meta analyses in mind.

It can be easy, with the benefit of hindsight, to be over-critical of work done in the past for a different purpose. However looking forward there may be other reasons for the current gaps that need to be taken into account if a useful evidence base on final impact is to be developed.

- **Data problems** - measuring impact can be difficult. Although in some ways indicators such as accidents and ill-health have a relatively hard edge to them and lend themselves to consistent

measurement (eg compared with, say, skill levels or social deprivation), there are issues around the consistency of data collection (eg the reporting of accidents in small firms and among the self-employed). On the health side there are problems about latency and the time lags between cause and effect. If examining major incidents, is the absence of a catastrophe sufficient evidence of success? Here perhaps a range of intermediate indicators (ie measurable occurrences that are associated with catastrophic incidents) or 'near miss' indicators should be used. So there are a range of data problems which get in the way (but would appear to be largely technical in nature and surmountable with sufficient resources and expertise).

- **Embedded knowledge** - in the informant interviews for this study it was apparent that there a strong body of intuitive knowledge about impact within the HSE, which may be based on empirical data, but is unpublished (at least in a form suitable for this review). For example, we were told about the successful impact of legislation on power presses, head protection on building sites (where a 30 per cent decline in head injuries on construction sites is associated with the introduction of relevant legislation in the 1991/992 HSE Annual Report), safety nets for roof installers *etc.* However in no case were we able to find independent confirmatory evidence. This does not mean that the evidence does not exist, but that it is embedded within the organisation and not accessible in a form which lends itself to public scrutiny. Does this matter? It does if a) the embedded knowledge is misplaced and based on unsound data, and b) if the HSE has to produce reliable evidence of impact for third parties. A view emerged from the workshop that 'knowledge management' within the HSE could be significantly improved.
- **Accounting for intervening factors** - isolating the impact of a particular intervention (in this case the HSE) from other directly and indirectly influential factors is always fraught with methodological difficulties. However we were struck by the lack of consideration of a range of factors in many of the studies we reviewed. This is a question for the researchers and those involved in the design and management of evaluations.
- **Identifying the counter-factual** - ie being able to spotlight the additional impact of a particular intervention above and beyond what would have happened if no action had been taken is a further key element of any impact analysis and largely absent from the studies in our review. This is largely a question for the designers of policy interventions to consider along with how they build impact evaluation and comprehensive progress indicators into their policy development framework.

- **Isolating the HSE as a variable** – may be too difficult a task (and increasingly difficult as it works with and through a wider range of stakeholders).
- **The cost of data collection** – in some cases the cost of collecting sufficient data or evaluating a certain intervention may be felt to be disproportionate to the benefit gained. This is most obviously the case when the benefits of the intervention are largely self-evident or not rooted in health and safety outcomes. If neither case applies, there is a danger that success is measured purely in terms of spending the time, effort and money and not in terms of material improvements in occupational well-being.

5.3 Where do we go from here?

We are left with two conclusions, one relating to the evidence base itself and the other relating more to policy development and HSE activities.

5.3.1 Improving the evidence base

What could be done to make the evidence base more solid? There are a range of possible solutions, large and small, which may be worth considering (some of which may already be underway within the HSE).

- **Build evaluation in first** – In planning and designing interventions, the HSE should take into account the results of previous evaluations and plan how the impact of the evaluation will be measured. It is encouraging to note that evaluation is being built into HSE policy initiatives more consistently. For instance the work related stress campaign launched at the end of June 2001 was preceded by a baseline survey of employers' responses to work-related stress (Pilkington *et al.*, 2001). This should enable the HSE to measure more clearly the impact of its campaign on employer behaviour, if not its ultimate impact on employee health and well-being.
- **Develop an over-arching evaluation policy** – to serve the interests of the HSE as a whole, rather than particular directorates or programmes. It is likely that the introduction of targets for the HSE as a whole and in also in the health area will have already provided an impetus towards this goal. Such a policy could include the development of common methodological standards, but be able to be adapted to changing issues and priorities.
- **Develop a stronger HSE evidence base** – by conducting more systematic reviews and meta analyses (implying minimum data collection standards), creating better links across research programmes and making sure all interested parties are made

aware of relevant research findings. This will have implications for the way in which evaluations are conducted, *ie* to ensure that they are amenable to aggregation *etc.*

- **Improve data collection on outcomes** (*ie* in terms of accidents, ill-health, workplace absence *etc.*) and measurements of improvements or benefits in health and safety. Decrease reliance on respondents' perceptions (which may have limited reliability) unless validated in some way by hard data.
- **Increase understanding about the influences on those outcomes** and their causation *ie* by conducting more outcome-led research (why is absence higher in transport than in construction? why is absence higher in public rather than private services?), rather than just input led research (*ie* what has been the impact of this or that intervention?).
- **Learn from other policy arenas**, *eg* as to how they evaluate impact.
- **Create a central and regular base of data** – *eg* regular employer surveys of health and safety practice to track progress, or a regular omnibus 'workplace health and safety' survey with a common core element and different modules from time to time covering topical issues. There may be scope to buy into existing employer surveys for this purpose.
- **Use existing data sources more** – where possible to track general trends *eg* in individuals' health and well-being with the aim of relating trends to HSE interventions and other factors.
- **Greater use of time-lapsed data** *ie* longitudinal tracking studies, (perhaps built around a panel element to a regular survey) baselines and follow up *etc.*
- **Minimum standards in evaluation** – *eg* should they always have an element of triangulation? Should all data be analysed to a certain standard (*eg* significance tests published)?

5.3.2 Secure compliance

The evidence in this review suggests that the key to improving occupational health and safety is to ensure maximum compliance with health and safety legislation in terms of implementation of effective control measures both in theory and in practice. Obviously there are a range of policies at the HSE's disposal in order to bring this about and there is much debate over the virtues of a 'policing' or a 'persuasion' approach *ie* between forcing employers to comply or securing their compliance by making them see the benefits and value of doing so. Our review has little to offer one side of the argument or the other, save as to indicate that:

- Compliance with the law is generally a bigger motivator for employers than achieving business benefits.

- Different employers require different approaches, *ie* 'horses for courses' rather than 'one size fits all' to encourage them to implement effective controls.
- Small and medium sized employers are a key target group in terms of being most likely to have the least understanding of the nature of risk and lower standards of health and safety controls.
- While, personal contacts from HSE staff are the single most effective (but possibly relatively expensive) way of influencing employer behaviour, a cumulative, multi-layered approach, tailored to meet the circumstances of the target group, is likely to have most immediate and lasting impact.

The evidence base suggests that there is plenty of scope for more experimentation with different approaches. In devising such approaches, evaluation of impact should be 'built in' from the beginning through the development of control groups and randomised assignments *etc.*

Appendix A: Detailed Study Methodology

In this section we outline our approach to this review by discussing the various methodological stages involved. These were:

- in-depth interviews with HSE staff
- a co-ordinated and intensive search phase using electronic search engines and hand searching
- a sifting and selection phase where studies were selected for further consideration
- an evaluation of the evidence from these studies
- a final consultation phase with HSE and a broader audience.

We also include a preliminary discussion of the methodology.

Interviews with HSE staff

The project team at HSE were involved at all stages of the research. Additionally, the first phase of the research involved interviews with a number of senior managers or staff with a particular interest or expertise in research. Fifteen in-depth interviews were conducted in total (names of the interviewees are presented in Appendix B), with individuals suggested by the HSE research team, some of whom also sat on the project steering committee.

The aim of the interviews was to collect data which would shape the search and evaluation criteria by tapping into expert and in-depth knowledge of the policies and practices of the HSC/E. The topics covered during the interviews included:

- background to the directorate of the interviewee (*eg* departmental function, links with other departments, links with external agencies *etc.*)
- the aims of the directorate and the plans to achieve these aims, including any planned impact assessments
- details of any published or unpublished material that could be useful in the review
- any ideas for the selection and evaluation criteria

- the key issues of interest for the directorate, that the review's final report should cover.

In addition to these face to face interviews, a number of telephone interviews were conducted or, where this was not possible, e-mail contacts were made with the heads of sector from the Field Operations Division (the names of these individuals are also presented in Appendix B). The main purpose of these interviews was to collect any internal documents of relevance to the review.

Search phase

As the exact nature of the available evidence was relatively unknown, a number of different search strategies were investigated by the research team. These included the use of electronic databases; searching through the bibliographies of key reports; and hand searching key journals in addition to a request for information internally within HSE.

Databases used

A wide range of electronic, online databases were used to conduct the searching. These databases provide indexes and abstracts from a range of different disciplines from economics, business management and legislation, to sociology and politics. A full listing of the databases used are shown in Appendix C.

Initial key search terms used

A number of different methods were employed when searching the databases. These methods were reviewed as part of an iterative search cycle to ensure the best use of resources. Initially, the research team used the HSE process map as a reference for a broad search. Very specific search terms were entered for a number of HSE activities as a test (see Appendix C). These searches resulted in a very large number of 'hits' but only a small percentage of them were of relevance to the study.

Building on this, the very specific search terms were entered in tandem with the words 'Health and Safety and Executive/Commission'. This narrowed down the number of 'hits' and resulted in far more relevant material, however the same results could be obtained using the relatively simple search method of 'Health and Safety and Executive/Commission' alone. Therefore, this proved to be the most productive search strategy in terms of finding relevant articles without the expenditure of a disproportionate amount of resources in sifting out irrelevant material.

HSE internal search

A request was made to staff at the HSE to put forward any internal documents that were thought to be of potential relevance to the study. Some staff were also shown a copy of the EndNote database in order for them to check through and ensure that no key studies were missing.

Other search strategies

Another strategy involved searching through the bibliographies of the HSE contract research reports. This strategy was advantageous because there was an increased likelihood of the material being relevant as it had been used by researchers in previous work.

Additionally, leading academics in the field were contacted by e-mail letter. The letter explained the study objectives and requested their assistance in locating relevant studies.

A limited web search was also conducted, examining important sites such as *Royal Society for the Prevention of Accidents*, *Institute of Occupational Safety and Health*, *British Institute of Occupational Hygiene* and the *World Health Organisation*.

Finally, the research team conducted a 'hand-search' through a number of key journals *eg Safety Science, Occupational Health Review, New Law Journal* (full details are presented in Appendix C), over the last five years of publication, to ensure key research had not been missed.

EndNote

In order to be able to manage and store this vast amount of information, the research team used a 'bibliographic management software program' called *EndNote*. *EndNote* allows users to create and maintain a database (or library) of references or citations. Additional information such as keywords, notes and abstracts can also be stored in these references. In addition to the reference data, the library contains indexes that are used for speed searching and sorting and Term lists which facilitate the entry of commonly used words.

As well as typing in references manually, *EndNote* provided the team with a very simple way to search online bibliographic databases and save the references directly into *EndNote*, which reduced the time required to document the search process. Thus *EndNote* was used in order to make the collection and storage of references easier and much quicker than conventional methods.

Sifting and selection phase

At an early stage it became apparent that identifying evidence from papers was not as straightforward as had initially been

anticipated. It was therefore recognised that a number of sifting and selection strategies would be required at different stages in order to make the sifting as comprehensive as possible. For the initial sifting and selecting phase we used a very broad and exclusive strategy which was not strictly systematic. At each stage of the sifting, different members of the research team used their common sense and judgement to decide what was and wasn't relevant to the project, based on fairly loose criteria (such as the relevance of the study to the HSE and the exact nature of the work, as it must be empirical). After the initial key search phase, references were selected as suitable for the study, by looking at their title (and where possible their abstract) and then ordered. For the third stage of the selection process, other members of the research team sifted through the whole articles to determine their relevance to the study.

Evaluation

Following the sift and selection phase, 160 articles and reports were carried forward to the fourth stage and evaluated using our initial criteria (see Appendix D) as a double check on their suitability for inclusion. This fifth stage involved the references passing the methodology review. Only those studies which were considered methodologically sound (*ie* those studies which passed at least three out of the seven methodology) passed through to the final stage and were included into the evidence base. A total of 66 studies made it through to this final review stage. As part of the final evaluative stage the objectives, results, and conclusions of the research were noted and considered. These reports formed the evidence base on which the conclusions of the review are mainly based.

Access

In order to organise, store and collect the information on the evaluation criteria of the studies, we created our own *Access* database. The benefits of this package include the fact that it is a multi-user database, giving unlimited access for all of the research team. Additionally the software is widely available making it easy to share with interested parties.

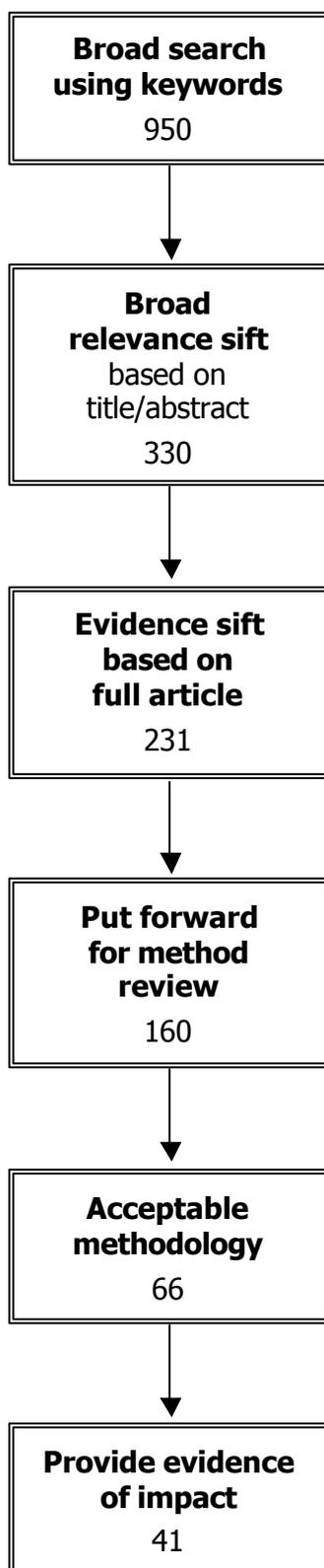
For a summary of the sift and search stage, see Table A.1 below.

Table A.1 Search Results from databases

	Broad search using key words	Broad relevance sift based on title /abstract	Evidence sift based on full article	Put forward for method review	Acceptable methodology	Provide evidence of impact
BIDS/WOS	497	102	62	40	11	1
Psychinfo	156	15	12	7	0	0
Lawtel	22	22	19	5	1	1
Assia	28	13	13	7	2	1
Econlit	77	14	7	3	1	0
IBSS	10	0	0	0	0	0
Contract Research Reports		143	106	87	47	35
Hand Search (British Library)		13	6	6	2	2
Others (including WHO, Eurolaw, EUInfobase, firstsearch, Zetoc etc.)	39	8	6	5	2	1
Total	807	330	231	160	66	41

Note: In addition, ABI/Inform was used but this generated no useable references

Figure A.1: Sift and selection stages



Final consultation phase

The aim from the outset of the review was to involve internal HSE (and external) experts to help draw together the final results. Consequently, a workshop was planned during which individuals could discuss the results and conclusion of the researchers at an early stage before the recommendations were finalised. This workshop was timed to coincide with the Chief Scientist's Seminar, bringing together two distinct audiences.

A discussion of the following topics took place:

- the methodology used in the review
- the proposed conclusion of the review and whether these are felt to be justified by the results
- the future of evaluation in the HSC/E including any insights from other government departments or the private sector
- the format and focus of the final report and how it should/should not differ from the draft presented.

Limitations of the methodology

In these discussions and others, the limitations of the methodology used have been highlighted.

The scope of the review was fairly broad, involving any study which assessed the impact of the HSC/E. However, there were some areas of activity that were not covered. These include HSE's effectiveness as a legislator (*ie* the scope of the law or interpretation of the law). Whilst the review would have welcomed the opportunity to discuss and consider the efficacy of the law using workplace-based data, the search methods employed failed to lead to any studies of this kind. The studies that were located tended to involve discussion of the details of the law and its effectiveness without any reference to empirical data. Another area that is potentially of interest, but which was not covered within the search for information on the impact of HSC/E, is Occupational Health Management Systems. A broader brief would be required in order to consider such information.

Another limitation is that the methodology precluded the use of any first hand data analysis. There are a number of potential data sources which could add to the body of evidence on impact if analysed with this purpose in mind, but it was not part of this review to take on this analysis. For example, the HSE holds a great deal of data on accident rates and occupational health which could be analysed. The TUC conducts periodic surveys of safety representatives which include questions on contact with HSE representatives. Data is also available from such sources as the *Labour Force Survey* on the extent to which employers comply with their duties relating to the reporting of injuries *etc.* Other potential

sources of information include the *Workplace Employee Relations Survey* and data held by the *Confederation of British Industry* or the *Industrial Society* to name a few. A different study might usefully examine the extent to which the evidence base could be expanded by the analysis of such secondary sources.

As has been noted, this study is very much focussed on the impact of actions taken by the HSE and in particular the impact on outcomes as measured by incidents of harm. Although we have tried to capture evidence which looks at intermediate impacts (eg on various parts of the model of the chain of impact we have developed) we may have missed information which may be generally informative about the HSE's approaches but not directly relevant. We have excluded information that does not specifically focus on HSE activity, although that too may indirectly inform a wider assessment of the appropriateness of HSE activity.

This review was designed to be as systematic as possible within the time and using the resources available. However, there are a number of areas where the review could more accurately be described as 'pragmatic' rather than systematic.¹

A deliberate decision was taken to design the evaluation criteria specifically for this review, rather than referring to more established criteria. The research team designed the criteria based on their knowledge of the body of research available and general research methods, in addition to the thoughts of the expert interviewees. Throughout the course of the expert interviews it became clear that HSE were concerned that there would be very little evidence available which would fulfil very strict criteria. Therefore the criteria were designed to be as inclusive as possible, in terms of the methodologies of the studies considered, without invalidating the results of the review. Internal documents were included where they were empirically based and referenced.

¹ Readers are referred to the work of the *Cochrane Collaboration* for an outline of how to conduct a systematic review.

Appendix B: HSE Staff Interviewed as part of the Study

The following is a list of individuals involved in the face to face interviews:

Bal Sahota	John McElwaine
Bill Callaghan	Linda Derrick
Bob Miles	Mike Cosman
Brian Etheridge	Nick Hallet
Carol Grainger	Paul Davies
Clive Norris	Phil Scott
Elizabeth Gyngell	Shelagh Malloy
Howard Saunders	Timothy Walker

Below are the names of the sector heads from within the Field Operations Division who were interviewed by telephone, or contacted by e-mail:

Andrew Porter	John Cullen
Geoff Baker	Norman Swain
Geoff Cox	Peter Buckley
Gill Dixie	Rosi Edwards
Greg Bungay	Stuart Campbell

Appendix C: Search Terms and Databases used

Initial key search terms used

health and safety	AND executive AND land AND use AND planning
health and safety	AND executive AND hazardous AND substances
health and safety	AND executive AND waste
health and safety	AND executive AND land AND use
health and safety	AND executive AND ionising AND radiations
health and safety	AND executive AND asbestos
health and safety	AND executive AND fuel
health and safety	AND executive AND rail* (no hits)
health and safety	AND executive AND first AND aid (no hits)
health and safety	AND executive AND freight (no hits)
health and safety	AND executive AND COSHH
health and safety	AND executive AND noise
health and safety	AND executive AND mines
health and safety	AND executive AND mining
health and safety	AND executive AND gas
health and safety	AND executive AND pharmaceutical
health and safety	AND executive AND oil
health and safety	AND executive AND microbiological
health and safety	AND executive AND diving
health and safety	AND executive AND aid
health and safety	AND executive AND fatigue
health and safety	AND executive AND nuclear
health and safety	AND executive AND coal

Databases used in search

- **ABI/Inform** which covers economics, business and management.
- **ASSIA** (Applied Social Sciences Index and Abstracts) which contains references from 650 key social science journals back to 1987.

- **BOPCAS** (British Official Publications Current Awareness Service) which is an index to new United Kingdom Official Publications from December 1995 to the present.
- **Econlit** indexes and abstracts from economic journals, books and papers.
- **EUIInfobase** which contains EU legislation and proposed legislation, other EU publications, together with periodical articles about Europe from 1983 onwards.
- **Eurolaw** contains the text of EU legislation and proposed legislation, Court of Justices cases and other legislative material.
- **IBSS** (International Bibliography of Social Science) which contains articles and reviews from journals and chapters from some books in economics, sociology, politics and anthropology.
- **Lawtel** which is an index to UK case law and legal journals, plus the text of legislation.
- **OCLC Firstsearch** contains a collection of indexes to books and articles in all subject areas.
- **Psychinfo** contains periodical articles from 1887 and books from 1987 and dissertations on psychology.
- **Web of Science** contains journal articles and comprises the Arts and Humanities Citation Index, the Sciences Citation Index, the Social Sciences Citation Index and the Index to Science and Technological Proceedings. The Web of Science also allows a search to be conducted on the bibliographies of the articles indexed in the databases, so that it is possible to find work which cites particular authors/papers. The citation indices cover the period 1981 to present.
- **Westlaw** which includes the full text of UK, EU and US case law and legislation, the Legal Journals Index to UK journals and the full text of many UK newspapers.
- **WHO** occupational health and safety database.
- **ZETOC** Contains the British Library's Electronic Table of Contents database of over 15 million article titles derived from the 20,000 most important research journals in the world dating back to 1993.

Journals hand-searched

- Annals of Occupational Hygiene
- Environmental Law Review
- Industrial Law Journal
- Industrial Relations Journal
- Journal of Safety Research

- Law and Policy
- Law Gazette
- Modern Law Journal
- New Law Journal
- Occupational Hazards
- Occupational Health Review
- Safety Science
- Safety Management.

Appendix D: The Evaluation Criteria used in the Review

EVALUATION OF EVIDENCE – PRO FORMA



Completed by the Institute for Employment Studies/
Middlesex University

Background Information

Project reference number: Article

Study title:

Authors:

Year of publication:

1st reviewer..... Date of 1st review

2nd reviewer..... Date of 2nd review

Please note down the area of activity covered (using the HSE activity map where possible) and the sector covered (may be multi-sector):

1. Minimum Criteria

to check whether the study should have got to the review stage

If any of the minimum criteria are not met (ie answer is NO to any of questions 1, 3 and 5) then the study SHOULD NOT be reviewed as the inclusion criteria have not been met.

Relevance

1. Does the research examine health and safety issues within the ambit of the HSC/E?

Yes No Not clear Can't tell

2. If Yes, please provide details:

3. Does the research assess any impact of HSE interventions on identification and control of hazards?

Yes No Not clear Can't tell

4. If Yes, please provide details:

Evidence base

5. Is the research based on referenced data?

Yes No Not clear Can't tell

6. If Yes, please provide details:

Overall inclusion

7. Is study to be included in the in-depth review?

Yes No Not clear Can't tell

8. If answer is no, or not clear, please supply any additional information that will help to explain why the study has been rejected.

2. Evaluation criteria: to check whether the study is robust enough to be reviewed

Relevance

9. Does the research assess any impact of HSE interventions on the incidence of harm associated with identified hazards (*ie* outcomes)?

Yes No Not clear Can't tell

10. If Yes, please provide details:

Evidence base

11. Is the research based on referenced data from more than one source?

Yes No Not clear Can't tell

12. If Yes, please provide details:

13. Does it uses recognised sampling methods (*eg.* Whole population, randomised or systematic)

Yes No Not clear Can't tell

14. If yes, please provide details of how the sample was achieved and what methods were used.

15. Does the response rate exceed 30 per cent?

Yes No Not clear Can't tell

16. Whether Yes or No, what is the response rate?

> 60 per cent > 50 per cent > 40 per cent > 30 per cent > 20 per cent < 10 per cent

17. Is response rate considered when interpreting the results?

Yes No Not clear Can't tell

18. Is the research based on time lapsed data (*ie* measures behaviour or incidence over time)?

Yes No Not clear Can't tell

19. If yes, please provide brief details:

Analysis

20. Is the analysis conducted independently (*eg* by people who were not involved in the programme under evaluation)?

Yes No Not clear Can't tell

21. If yes, please provide brief details, including the type of analysis used (*eg* multi-variate).

22. Does the research consider the effect of potentially intervening variables?

Yes No Not clear Can't tell

23. If yes, please provide brief details (*eg* whether range of variables covered, whether any potential influences have been neglected).

Further comments

24. Please provide any further information which you feel should be considered as part of the evaluation of this particular piece of work.

Inclusion in review

If the study passes three of the seven Evaluation Criteria (ie three of questions 9 to 20 have been answered 'Yes') then complete the Research Findings Form.

3. Research Findings

Study aims and objectives

25. Please provide an overview of the study aims and objectives

Not clear Can't tell

26. Were these met? Please provide details

Not clear Can't tell

Results and conclusions

27. What were the results of the research (please consider in relation to the impact of the HSE in relation to: awareness; behaviour and; incidence of harm)?

28. Was the research subject to a peer review?

Yes No Not clear Can't tell

29. If yes, please provide brief details:

30. In your opinion, were the conclusions of the research warranted by the results?

Yes No Not clear Can't tell

31. Please provide details.

Additional information

32. Does the study report tests of statistical significance?

Yes No Not clear Can't tell

33. If yes, please provide details of tests used

34. Do you require the research to be reviewed by another member of the team to confirm your findings or clarify issues of confusion?

Yes No

Notes:

Appendix E: Bibliography

Please note: as some of the studies are unpublished reports from HSE, in a few cases we do not have full reference information. Items prefaced with an asterisk (*) went through to the final stage of the review and form the evidence base on which the preceding chapters have drawn. The other items listed below were studies which fell out at the methodological review stage or were not included in latter stages of the review but were cited in the preceding chapters (as background material *etc.*).

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