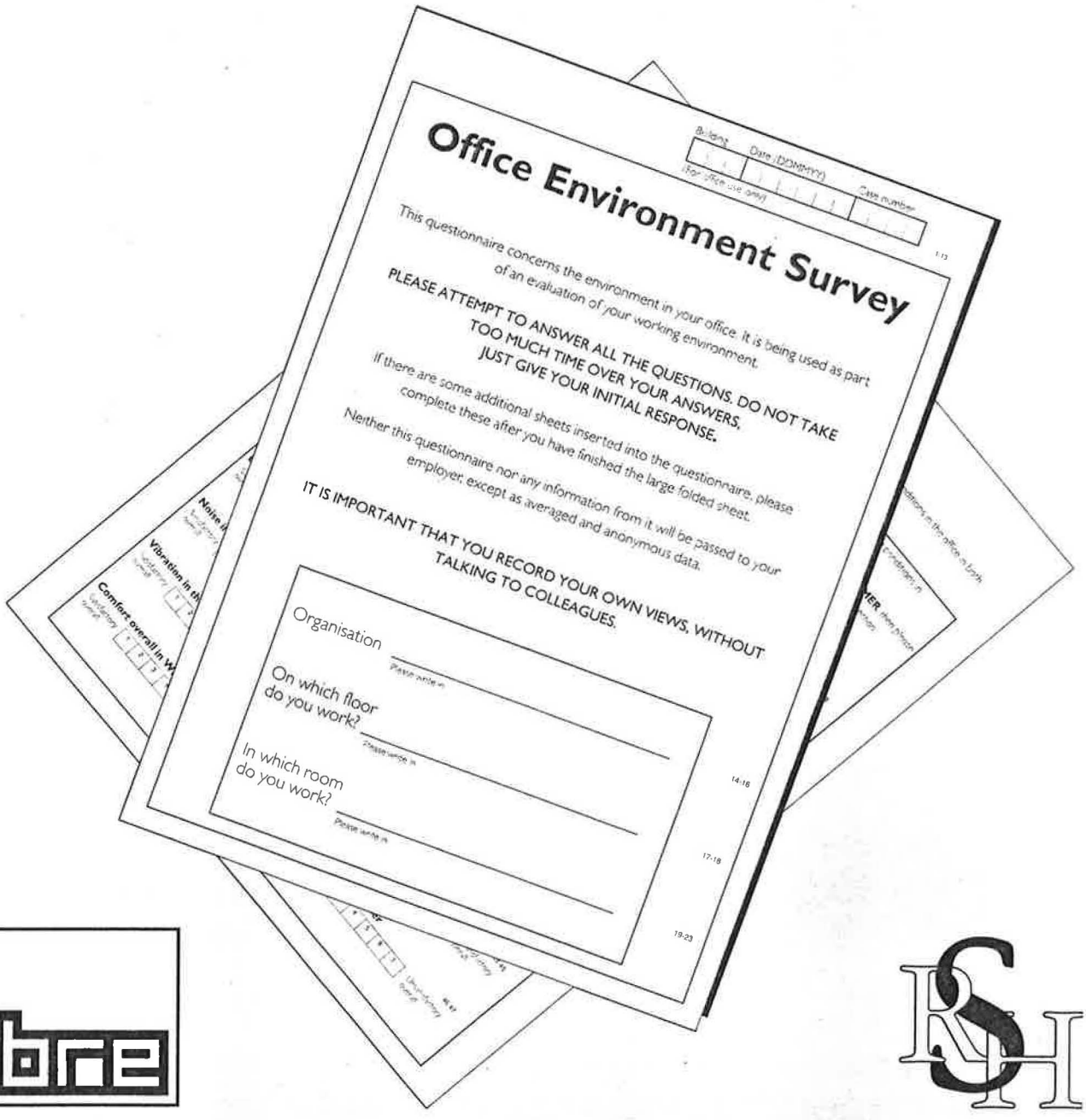
Building Research Establishment Report

1995

A questionnaire for studies of sick building syndrome

A report to The Royal Society of Health Advisory Group on sick building syndrome

Edited by G J Raw



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Preface

This report provides information on the development and use of a recommended standard questionnaire for the investigation of sick building syndrome. The questionnaire was produced by a subgroup of The Royal Society of Health Advisory Group on sick building syndrome. The members of the subgroup were:

- Dr Gary Raw (Building Research Establishment, also representing the British Psychological Society)
- Ms Carolyn Whitehead (Building Use Studies Ltd)
- Dr Alastair Robertson (Department of Occupational Medicine, Birmingham University, representing The British Medical Association)
- Dr Sherwood Burge (Solihull Hospital and Birmingham Heartlands Hospital, representing The British Medical Association)
- Mr Chris Kelly (Health and Safety Executive)
- Dr Paul Leinster (RPS Thomson Ltd, representing the British Occupational Hygiene Society)

The group was chaired by Gary Raw; the questionnaire layout was produced by Carolyn Whitehead and Gary Raw. The guidance on the use of the questionnaire is primarily the work of Gary Raw and Sherwood Burge.

The working group is grateful for the support and assistance of Dr Hugh John and Susan Hollingworth of The Royal Society of Health, which made this work possible.

1 The development of the RSH questionnaire

INTRODUCTION

This report describes the development of a standard questionnaire for use in investigating sick building syndrome (SBS) in specific cases and in research projects. The questionnaire itself is packaged with the report. It is intended to be used for screening surveys to determine the prevalence of SBS in a particular building. It may be necessary to adapt the questionnaire if it is going to be used for a specific research project or to gather data on particular potential causes of SBS.

The focus has been on achieving standardisation within the United Kingdom. International standardisation is more difficult: there are two main reasons for this. First, translation can never be perfect and words that are nominally equivalent may be used with rather different meanings in different countries. Second, many countries have a database of expected scores based on their own questionnaires. If all these countries were to adopt the same questionnaire, the value of their existing databases would be much reduced — in fact, they could be of no value at all unless some research was carried out to indicate how the new questionnaire related to the old one. This is not to say that a degree of international standardisation should not be attempted, only that it is likely to take longer than progress at national level.

At an early stage, The Royal Society of Health (RSH) working group made the following basic decisions.

- The new questionnaire should contain items on symptoms, indoor environment ratings and confounding factors such as gender, job type, age and location in the building.
- The questionnaire should be accompanied by a brief guide explaining how to use it and how to analyse and interpret the data.
- The work of the group should be cross-referenced to related work being carried out by the Chartered Institution of Building Services Engineers to develop procedures for evaluating buildings in relation to health.

An important principle governing the group's considerations was that no questionnaire can claim absolute validity as a measure of SBS. However, the crucial thing is that, every time a study is done, the same questionnaire should be used so that it has **relative** validity. This is particularly important in troubleshooting investigations, where a building needs to be compared with some kind of standard in order to determine how 'sick' the building is at the start of the investigation.

The working group felt that piloting the questionnaire was unnecessary because it is made up of questions already piloted in previous questionnaires. However, it would be advisable to carry out a survey of a wide range of buildings in order to obtain a new comparison database for the complete questionnaire. The RSH is currently giving this further consideration.

The working group decided that the questionnaire and accompanying guidance should be published and that the questionnaire should be freely available for any competent person or body to use. If the questionnaire was subject to a copyright charge, users would tend to get around the copyright by slightly changing the questionnaire: this would destroy the point of having a standard questionnaire.

QUESTIONS ABOUT SYMPTOMS

Choosing the list of symptoms

The starting-point for choosing the list of symptoms to be included in the questionnaire was the list in the largest UK study of SBS, the Office Environment Survey (or OES)[1,2]. This list has been used in many other UK studies, so using the same list in the RSH questionnaire would mean that the data could immediately be related to an established reference database.

The OES list of symptoms is as follows.

- Dry eyes
- Itching or watering eyes
- Blocked or stuffy nose
- Runny nose
- Dry throat
- Headache
- Tiredness or lethargy
- Flu-like symptoms
- Difficulty breathing
- Chest tightness

It is probably incorrect to regard the last three items on this list as SBS symptoms. 'Runny nose' is also problematic as a defining symptom since it appears primarily to indicate respiratory infections. 'Itching or watering eyes' may also not be essential to the list, since 'itching eyes' partly duplicates 'dry eyes', and watering eyes may indicate specific allergic reactions.

An analysis carried out during the development of the RSH questionnaire[3] showed that a building symptom index (BSI, the mean number of symptoms reported per person in a building) based on the five remaining symptoms is almost perfectly correlated with an index based on all ten symptoms. These symptoms — dry eyes, blocked or stuffy nose, dry throat, headache and

tiredness or lethargy — would therefore be enough to provide an index of SBS. The working group considered including only these five symptoms on the questionnaire, but decided against it for two reasons.

First, the analysis carried out during the development of the questionnaire[3] was based on removing the symptoms at the analysis stage. Removing them from the questionnaire altogether might have a very different effect if people look for the heading which best describes the symptoms they are experiencing. This is borne out by the results of other research[4]. The second reason for keeping the list of symptoms relatively long was that, otherwise, too much information would be entered under the heading of 'other symptoms'.

On the other hand, 'flu-like symptoms', 'difficulty breathing' and 'chest tightness' appeared at the end of the list in previous surveys, and are unlikely to be misreported as earlier symptoms on the list. It was therefore agreed to omit these symptoms from the questionnaire list.

A number of questionnaires, particularly in Scandinavia, have included skin symptoms on the list, such as dry skin, skin rash and redness of the skin. For the sake of greater international compatibility, it was therefore decided to introduce a question about skin symptoms at the end of the list.

The question on 'other symptoms' was simplified to reflect the fact that responses to this question would not normally be analysed.

If investigators or researchers added symptoms to the end of the list, it would still be possible to compare their results with a national database unless the symptoms added were similar to those on the main list. However, if questions were subtracted, or if the symptom descriptions were slightly changed, then comparison with the database would be invalidated.

The layout of the symptom questions was changed from that used in the OES[1,2]. The opening question — *In the past 12 months have you had more than two episodes of any of the following symptoms?* — was considered ambiguous and, with the questions now covering more than one page, likely to be forgotten by the respondent. In the RSH questionnaire, this question is therefore asked separately for each symptom (as at least one revision of the OES questionnaire has been doing for some time). This creates some monotony but at least the question is clear.

Recall period

As in most other current UK questionnaires, the reference period for reporting symptoms is 12 months, based on two or more occurrences over the period. Seasonal variation of the symptoms could be addressed separately if it was suspected that this was likely to occur in a particular building.

Recall over a 12-month period is unlikely to be reliable in absolute terms: it would be mainly of the previous few weeks, possibly moderated by recall of particularly severe symptoms at an earlier time or recall of a marked seasonal variation. **It is necessary to emphasise here that the questionnaire's validity is in making comparisons among buildings, or over time for a particular building.** Thus it is not appropriate to attempt to assign absolute meanings to the questionnaire responses. The use of relative ratings largely circumvents the problem of recall, since it is the same for each building and each occasion.

The test–retest reliability of the symptom questions is good, but they should not be repeated within too short a period because this tends to create a decline in the number of symptoms reported[5]. An interval of a year between surveys is probably adequate to prevent this effect: there would normally be no reason to conduct screening surveys at shorter intervals than this.

The only alternative to using 12-month recall would be to repeat the questionnaire during the course of a year, perhaps four times with 3-month recall on each occasion. However, a requirement to carry out surveys as frequently as this would increase costs and discourage use of the questionnaire. Frequent repetition would also affect interpretation of the symptom scores, and it would therefore be necessary to generate a new database for comparison.

Building-relatedness of symptoms

The OES questionnaire seeks to establish whether a symptom is related to being in the target building by asking *Was this* [symptom] *better on days away from the office?* From the point of view of comparison with the OES data, it is probably better to stick to this approach for the present. However, the question is not specific about the comparison to be made, and demands interpretation on the part of the respondent. For example, does it mean 'on whole days away from the office'? Does it mean 'away from the office at home', or 'away from the office in other buildings' or 'outdoors' or 'on holiday'?

The main thing is that comparison is valid at a building level if it can be assumed that people will, on average, interpret the question in the same way. It appears, in fact, that the phrasing of the building-relatedness question has little effect on symptom reporting[6].

Frequency of occurrence

For screening purposes, it is not necessary to include ratings of the frequency of the symptoms, although such a scale can be useful. The working group decided to include a frequency scale but, in order to maintain compatibility with the UK database, it is placed after the building-relatedness question. The scale suggested is a new one which — unlike those in previous questionnaires — covers the complete scale of frequency without having overlap between categories.

Layout

The layout of the questions (whether it is question-by-question or with the responses given in a grid) may be significant. Where responses are given in a grid, research[6] shows that respondents tend to tick the symptoms that particularly apply, and not respond to the others at all. There is also less variance in response within respondents, as though there is a tendency to stay within or close to a particular column (frequency category) of the grid. Therefore the RSH questionnaire does not use a grid, even though it would save space.

QUESTIONS ABOUT THE ENVIRONMENT

Ratings of the environment can help to identify the causes of SBS, but they cannot always be taken at face value. The primary purpose of the environmental comfort ratings is to indicate which aspects of the environment give rise to most concern — and therefore which aspects might hold the best chance of improvement.

A very large number of ratings could be included in the questionnaire, depending on the level of detail with which environmental factors need to be specified. In a screening survey, only the main likely problem areas should be evaluated. Analysis of the OES data indicates that separate ratings are required for summer and winter. The ratings should relate to likely environmental measurements, ie they should cover temperature, humidity, air movement, air quality, lighting, noise and vibration.

Lighting, noise and vibration are probably the less important factors in most cases of SBS, and therefore only a single question is devoted to each of them for each season. More detailed questions, or a follow-up questionnaire, could be added in specific surveys if the investigator wished to do so.

The proposals in this report render direct comparison with the OES impossible, but this is less critical than the comparison of symptom scores, and in time it will be possible to generate a new database.

A rating of office cleanliness has also been added. BRE and others have previously used a rating of 'office cleaning', but this wording was felt to be potentially ambiguous: for example, the answer could reflect the extent to which cleaners interrupt work, or the respondent's feelings about the use of chemicals which may damage the indoor or global environment.

The OES question on personal control over heating, ventilation and lighting has been rephrased to remove any ambiguity concerning which part of the office the 'control' refers to. The question about exposure to tobacco smoke has also been made less ambiguous.

If the environment questions are not required in a particular survey, they can be omitted by taking out the central pages of the questionnaire.

QUESTIONS ABOUT CONFOUNDING FACTORS

Two kinds of confounding factors can be included in an SBS questionnaire:

- variables which permit correction of the building symptom score, and
- variables which may provide insight into the reasons for problems in the building.

The BSI can be corrected for gender, job type and VDU use (the latter is a relatively minor modifying factor). Where some staff are part-time or spend time in different parts of the building, this may also need to be taken into account.

Identifying the causes of SBS is only a limited part of a screening questionnaire's job: the existence of a problem has to be determined before its causes. However, it was considered worthwhile to include questions about the office environment, plus questions about the speed and effectiveness of the management in dealing with indoor environment problems, privacy, office layout and decor.

Ratings of overall working conditions, productivity, personal medical history, alcohol consumption and work breaks are not included because they are not likely to add significantly to data at the building level. Questions about the job and the quality of management are also not included since these are not primary issues in screening (although they may be relevant in certain research studies). These questions might also inhibit some managers from agreeing to the survey and some staff from returning the questionnaire.

Consideration was also given to including some kind of 'lie scale' — a check for honest reporting — to improve the validity of responses. However, this could significantly increase the length of the questionnaire, and the usefulness of a lie scale is likely to reduce over time as people become aware of its existence. In any case, the required comparisons are probably valid without this kind of check, since the database used for comparison would have any tendency to misreport built into it. The presence of unusual patterns of response to the questionnaire could in principle be used as a form of lie scale, but this idea has not been developed.

2 Guidelines for using the RSH questionnaire

INTRODUCTION

The symptoms of SBS are common in the population as a whole: headaches, lethargy and irritation of the eyes, nose, throat and skin. However, these symptoms are more common in some buildings than in others, and this is why the term 'sick building syndrome' has been used. Apart from being distressing to people experiencing the symptoms, SBS reduces productivity, increases sickness absence and takes up valuable time in making complaints and dealing with those complaints. If a building gets a reputation for being 'sick', it can be difficult to change that reputation, even if the building itself is improved. Proactive monitoring to alert management about growing problems is therefore a valuable exercise.

In spite of its name, SBS is a complaint suffered by people, not buildings, and can only be diagnosed by assessing the health of building occupants, not by examining the building itself. The simplest way of doing this is with a questionnaire — one designed to collect all the relevant data and which is easy for the building occupants to complete. The advantage of using a standard questionnaire, such as the RSH questionnaire, is that the results of the survey can be compared with a wider database. In the case of the RSH questionnaire, the relevant database is the OES[1,2].

PLANNING THE SURVEY

A questionnaire study is an important part of monitoring the health of people in the workplace, so it is worth organising properly. Much effort can be wasted through simple oversights, but a few basic principles will make the task more manageable.

The survey should be carried out by an organisation which can guarantee (to the satisfaction of the staff) that the survey is confidential and that information about individuals will not reach management or other staff in the building. Eligible organisations could be, for example, a body which is independent of the building management or, if one exists, the occupational health department of the organisation occupying the building.

It is of value to plan the survey with all the parties involved in it. The essential elements of this planning process are listed in the box in the opposite column. It is particularly important to ensure confidentiality: important not only from the point of view of motivating the respondents, but also for evaluation of the results. **The RSH questionnaire has been validated, and comparison data obtained, only for use in independently conducted confidential surveys.**

Before starting the survey

- ☑ Hold preliminary discussions between the organisation carrying out the survey, management, unions and other representatives of the building occupants, safety officer, maintenance staff, etc. The survey should nonetheless be seen by staff to be independent of management and unions.
- ☑ Ensure that staff know the survey is approved by management and unions and can therefore be regarded as part of their work, not a distraction from it.
- ☑ Establish rules about confidentiality and lines of communication between all parties.
- ☑ Agree to inform building management immediately about health risks which are discovered.

It is always tempting to collect too much information, much of which will never be subjected to any useful analysis. The RSH questionnaire is designed with this in mind: it is a basic screening questionnaire to determine whether there are problems with occupant health and comfort, not a way of identifying what is causing the problems. If there is any intention, in a particular survey, to add to this questionnaire it will be useful to ask the following questions.

- Is it possible or necessary to carry out a statistical analysis of the information to be gathered?
- Approximately how much should the study cost, how long should it take to complete and what uncertainty can be tolerated in the results?
- What are the motives and purposes of the study for gathering particular items of information, and would they be credible to the respondents?

SURVEY SAMPLING

The total number of people who could, in principle, complete the questionnaire may be referred to as the 'target population'. This might be, for example, all the staff in a particular building, or in certain parts of the building. The advantage of defining the target population is that the exclusion of any subgroups is explicit and the restrictions of the survey will be known.

When practical constraints are considered (eg the target population may be very large), the target population is often replaced by a 'survey population' or 'sample'. About 100 workers need to be included in a sample to produce reliable results: if the target population exceeds 100, a sample of approximately 100 workers can be used. The sample size should be increased if different areas of the same building are being compared (eg 100 from an area where complaints have been made, and 100 from a comparison area).

If fewer than 100 workers are available, a survey can still be conducted. However, as the number of workers is reduced there is a progressive decrease in the reliability of the results and an increase in risk of bias due to variation in individual sensitivity.

Unless the target population is very large, it is often easier — logistically and politically — to include every person present during the survey, rather than go through the process of selecting a sample and then finding the selected persons. The box below briefly describes some common sampling procedures. However, if you wish to select a sample and do not have training in sample selection, it is advisable to obtain expert advice.

Some common sampling procedures

The most basic sampling procedure is *simple random sampling*, which requires that each person or workstation has an equal probability of being included in the sample. Strictly, this means that a list of people or a plan of workstations should be available. For example, people might be chosen randomly from a staff list. In this way, selection biases are avoided.

If the sampling is based on a plan of workstations, it is important to follow the plan, and not select only the workers who are present at the time of the first visit to the workstation. With any sampling strategy, a complete sample will only be obtained if those who are unavailable through absence or for other reasons are contacted at later date.

There are several common practical sampling designs which are modifications of simple random sampling[7,8].

- With *systematic sampling*, each n^{th} element is selected after a random start in a list or a chosen route around the building.
- *Stratified random sampling* classifies population elements (eg people) into strata (eg departments, job grades), and random sampling is then carried out separately from each stratum. This can be complex but may be useful to ensure an adequate statistical sample of any population subgroups. Any mean values calculated for the building as a whole would then have to be corrected to take account of the over-representation of particular groups.
- *Multistage cluster sampling* can be used when the population is very large, such as on an estate of many buildings. Clusters of elements are selected randomly in one or more stages, eg 5 out of 20 buildings, then half the floors on each selected building. At the final stage individuals are randomly sampled.
- *Probability-proportional-to-size sampling* would select, for example, a sample of rooms weighted by the number of individuals in each room: in other words, the more people in the room, the more likely it is to be selected.

In general, samples should be balanced for workers near windows and near the centre and on different faces and floors of the building.

MOTIVATING THE RESPONDENTS

Busy respondents can perceive questionnaire studies as time-wasting, and they do not always understand the purpose of the survey. The loss of respondents from the sample is therefore a risk if proper care has not been taken.

The workers surveyed should be representative of workers in the building as a whole. To achieve this, response rates of over 80% are needed from either whole working populations or from workers randomly selected from a working population. In practice, it should be possible to achieve over 90% for a single survey (this can be difficult to maintain if repeated surveys are conducted of the same population at short intervals). It should not be necessary to use payments, gifts or the chance of a prize to achieve a high response rate.

Loss of respondents can result in two problems. First, there may be insufficient responses for satisfactory statistical analysis, particularly if there is a small sample to start with. Second, there may be biased sampling. In particular, people with more complaints may become over-represented in the sample. The rest of this section gives recommendations for recruiting and retaining a sample.

If the number of respondents is sufficiently small, a meeting could be held in advance of the survey. The alternative is to hold a meeting with representatives (possibly trade unions) and/or send a letter to the respondents. This exercise should seek to meet the objectives listed in the box below

Communicating with respondents

- ☑ Convey the value of the study (this ought to be straightforward if the study may lead to remedial measures to improve the indoor environment).
- ☑ Explain why it important for everyone who has been selected to participate.
- ☑ Make clear who is carrying out the study: an independent researcher, neutral in any conflicts within the building, is likely to have an advantage.
- ☑ Make the information collected completely confidential and inform the respondent of this.
- ☑ Give a contact point for queries.

A model letter to staff is shown in Appendix A. This information can be repeated in a note accompanying the questionnaire.

Direct social interaction — showing appreciation, understanding that they are tired and busy, showing a presence — can also be valuable. A few minutes dealing with a simple misunderstanding or objection can prevent non-response. Of course, it is critical that the investigators do not actively influence the answers that respondents give in questionnaires, so social interaction should be kept at a moderate and professional level.

This interaction should be achieved by delivering the questionnaire personally to each selected person and collecting the questionnaire a short time later. Certainly the questionnaire should be collected the same day if possible in case the respondent is absent the following day. On collection, the questionnaire should be briefly checked for any obvious errors and for completeness. Errors can then be corrected at this time or the respondent can be encouraged to complete the whole questionnaire. **The validity of the questionnaire cannot be guaranteed if this method of distribution and collection is not followed.**

It can be helpful to monitor non-responses and, where possible, to identify the reasons for them. This may make it possible to reinstate a respondent or to avoid the non-response of others. Analysis of non-response is not necessary if the target of 80% is achieved.

ANALYSING THE DATA

Data preparation

Some analysis can be done by hand, depending on the amount of analysis required and the size of the sample. Normally it is easier to carry out the analysis by computer, particularly if more than one survey is to be carried out. If the organisation carrying out the survey does not have the facilities or the expertise to do this, it can be done relatively easily under contract. If computer analysis is used, checks should be made for obvious errors and miscodings in the data.

Calculating the index of symptoms

The principal measure to be obtained from the questionnaire will normally be the sum of symptoms reported. The building-related symptoms are summed for each person to give the Person Symptom Index (PSI). The mean PSI of a random sample of building occupants is the Building Symptom Index (BSI). The BSI can be used in one of two ways: for comparison with the OES database, or for comparing over time using repeated surveys of the same building.

Eight symptoms are listed on the questionnaire. The final symptom on the list — 'dry, itching or irritated skin' — has been added to the questionnaire since the OES, and comparison data therefore do not exist. As the use of the RSH questionnaire progresses, comparison data will become available. Of the remaining symptoms, two — 'itchy or watery eyes' and 'runny nose' — have been included to maintain comparability with the OES data and to avoid too many symptoms being entered under 'Other'. They are probably less relevant to SBS than the remaining five symptoms on the list.

If the results from different buildings are being compared with each other or with the OES figures, it is recommended to use a BSI based on five symptoms: dry eyes, blocked or stuffy nose, dry throat, headache, and tiredness or lethargy. This index, the BSI_5, is very highly correlated with the 10-symptom index used in the OES (see box in the opposite column).

How to calculate the BSI_5

Each symptom which a respondent experienced on at least two occasions in 12 months, and which was better on days away from the office

OR

Where a respondent has not marked either 'yes' or 'no' to the question about whether a symptom has been experienced, but has indicated that the symptom is better when away from the office.

} **Scores 1**

All other responses. **Score zero**

The PSI_5 and BSI_5 will therefore range from a minimum of 0 to a maximum of 5.

Of the 46 buildings in the OES, the best eight (all naturally ventilated) had a BSI_5 of less than 1.5 symptoms. This level indicates minimal problems with SBS. The worst 13 buildings — 11 of which were air-conditioned — had a BSI_5 of over 2.5 (maximum 3.4). At this level, action is definitely required to tackle SBS problems. Between 1.5 and 2.5 there is a case for taking action, but the levels are more open to interpretation, depending on the frequency of the symptoms, other health and safety problems in the workplace and the degree of commitment to health in the workplace. Table 1 shows the percentage of respondents reporting each symptom.

Table 1 Percentage of respondents reporting the occurrence of each symptom

Symptom	Percentage of respondents reporting occurrence
Lethargy	57
Blocked or stuffy nose	47
Dry throat	46
Headache	43
Itchy or watery eyes	28
Dry eyes	27
Runny nose	23

A case can be made for correcting the BSI_5 for gender and job category. This produces a basis for comparing buildings while reducing any bias which might be due to the particular people who happen to be occupying the building at the time of the survey. The correction is most easily done by applying weightings to the individual scores. Dividing a PSI_5 by the appropriate weighting (see Table 2) will standardise the score to that which would be expected of a male manager. The 'Other' category is excluded because it can represent quite different job types in different buildings. However, the corrected scores need to be carefully interpreted. This is because part of the variance attributed to gender and job type may, in fact, be a

Table 2 Correction factors for gender and job type

Gender	Job type		
	Managerial	Professional	Secretarial
Male	1.000	1.193	1.376
Female	1.324	1.500	1.609

result of non-random allocation of staff to working locations. For example, people in lower paid, more routine jobs might have poorer quality accommodation and less power to get conditions changed.

The BSI can be based on all eight symptoms on the questionnaire if comparisons within a particular building are being made. This may arise, for example, if the survey is repeated at intervals as a monitoring procedure to determine whether good environmental conditions are being maintained. In cases like this, a different sample of respondents can be used on different occasions so long as the sampling procedure is the same. In these circumstances there is little to be gained from adjusting scores for gender and job type. Given an interval of a year or more between surveys, the results should be stable over time unless the environment has changed. Note, however, that short intervals between surveys will reduce the BSI if the same respondents are used in each survey.

Interpretation of environmental ratings

There is no absolute interpretation of the ratings of environmental comfort. Each individual rating should be taken as what it is claimed to be: a subjective rating. This means that there are three major limitations on the interpretation of the ratings. A poor rating means that something is wrong with the environment, but there are some important qualifications.

- The obvious interpretation is not necessarily the correct one: ratings of dry air can mean that the air is dusty or polluted with organic vapours, and ratings of stuffiness can mean that the air is too warm. Reports of offices which are too warm can be due to low air movement rather than air temperatures in excess of recommended levels.
- The suggested failing in the environment may well be present, but it is not necessarily related to SBS in the building.
- Symptoms could cause adverse perceptions of the indoor environment, rather than vice-versa.

Comparison figures from the OES are given as a guide in Table 3 (see next page). The figures do not cover all the ratings in the RSH questionnaire, but further comparison figures will be published when available. The mean is not necessarily the optimum, but it does give an indication of what can reasonably be expected.

Most of the scales are unipolar: one extreme is 'good' and the other 'bad'. In these cases, any score higher than the mean should be investigated further, and any figure more than one standard deviation above the mean should be a cause for concern. Three scales (temperature, air movement, humidity) are bipolar: neither end of the scale is ideal, and a deviation above or below the mean of more than one standard deviation represents a cause for concern.

Where a comparison figure is not available from the OES data, the interim guidance is as follows.

For unipolar scales	
A score of 1	The ideal score
A score higher than 3	Requires further investigation
A score above 5	Cause for concern

For bipolar scales	
A score of 4	The ideal score*
A score outside the range 3–5	Requires further investigation
A score outside the range 2–6	Cause for concern

*The ideal score is more difficult to specify for bipolar scales, but can be taken nominally as 4

In all cases, interpretation of the environmental ratings should be complemented by local knowledge of the conditions in the building and/or by objective monitoring of the indoor environment.

FURTHER ASSISTANCE

The information given in this report should be enough to carry out a survey and conduct the essential analysis. Further advice on methods and interpretation can be obtained from BRE or other experienced consultants. Some addresses are given in the box below.

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Table 3 Means and ranges of environmental ratings from the OES

Factor	Mean	Standard deviation	Mean plus standard deviation	Mean minus standard deviation*	Maximum	Minimum
Winter temperature	3.65	1.58	5.23	2.07	5.35	2.40
Winter humidity	2.76	1.36	4.12	1.40	3.59	1.49
Summer temperature	2.68	1.65	4.33	1.04	3.95	1.50
Summer humidity	2.62	1.66	4.28	*0.96*	3.31	1.42
Control of temperature	2.05	1.77	3.82	*0.28*	5.07	1.00
Control of ventilation	2.35	2.01	4.36	*0.34*	5.75	1.00
Control of lighting	3.31	2.39	5.70	*0.91*	5.77	1.09

*Italics indicate figures outside the range of the scale, ie 1–7

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Appendix A Model letter to staff

To staff of [company/building]

I am writing to tell you more about a survey which [surveying organisation] is to conduct in your building. The survey has the approval of [both] the management[and the trades unions], and is therefore a legitimate use of your working hours.

The survey is about the quality of the indoor environment and any effects which it may have on the health or comfort of people who work in the building. Over the coming [period of time], [surveying organisation] will be in the building to carry out the survey.

In previous work of this kind it has been possible to recommend changes to bring about a substantial improvement in the health and comfort of office workers. BUT THE SUCCESS OF THE STUDY DEPENDS ON YOU. [surveying organisation] will explain what you should do.

Any information you provide will be treated in strictest confidence and will not be shown or passed on to [employer] or anyone else except by your specific written request.

Yours faithfully

Personal Well-being

The following questions ask about your general well-being over the last 12 months.

Please tick the box representing your answer to each question. If you are undecided about your answer to any question, then please tick 'No' for that question.

You do not need to report the frequency of a symptom unless it was better on days away from the office.

In the past 12 months have you had more than **two** episodes of:

Dryness of the eyes
Please tick a box

Yes [1] [2] No — 61

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No — 62

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

63

In the past 12 months have you had more than **two** episodes of:

Itchy or watery eyes
Please tick a box

Yes [1] [2] No — 64

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No — 65

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

66

In the past 12 months have you had more than **two** episodes of:

Blocked or stuffy nose
Please tick a box

Yes [1] [2] No — 67

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No — 68

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

69

In the past 12 months have you had more than **two** episodes of:

Runny nose
Please tick a box

Yes [1] [2] No — 70

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No — 71

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

72

(continued on opposite page)

Environmental Comfort

This section of the questionnaire asks you to judge how comfortable you find your typical working conditions in the office in both winter and summer.

How would you describe typical working conditions in the office in **WINTER**?

If you have not worked in the office in the winter, then please leave these questions blank and go on to the questions about working conditions in the summer (on this page).

Please tick one box on each scale.

Temperature in Winter

Comfortable	1	2	3	4	5	6	7	Uncomfortable
Too hot	1	2	3	4	5	6	7	Too cold
Stable	1	2	3	4	5	6	7	Varies during the day

Air Movement in Winter

Too still	1	2	3	4	5	6	7	Too draughty

Air Quality in Winter

Dry	1	2	3	4	5	6	7	Humid
Fresh	1	2	3	4	5	6	7	Stuffy
Odourless	1	2	3	4	5	6	7	Smelly
Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Light in Winter

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Noise in Winter

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Vibration in the building in Winter

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Comfort overall in Winter

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

How would you describe typical working conditions in the office in **SUMMER**?

If you have not worked in the office in the **SUMMER**, *then please leave these questions blank and go on to the next section (on next page).*

Please tick one box on each scale.

Temperature in Summer 24-29

Comfortable	1	2	3	4	5	6	7	Uncomfortable
Too hot	1	2	3	4	5	6	7	Too cold
Stable	1	2	3	4	5	6	7	Varies during the day

Air Movement in Summer 30-31

Too still	1	2	3	4	5	6	7	Too draughty

Air Quality in Summer 32-39

Dry	1	2	3	4	5	6	7	Humid
Fresh	1	2	3	4	5	6	7	Stuffy
Odourless	1	2	3	4	5	6	7	Smelly
Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Light in Summer 40-41

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Noise in Summer 42-43

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Vibration in the building in Summer 44-45

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Comfort overall in Summer 46-47

Satisfactory overall	1	2	3	4	5	6	7	Unsatisfactory overall

Other Aspects of Your Office Environment

How much control do you personally have over the following aspects of your working environment?
Please tick one box on each of the following scales.

Temperature	None at all	1 2 3 4 5 6 7	Full control	48
Ventilation	None at all	1 2 3 4 5 6 7	Full control	49
Lighting	None at all	1 2 3 4 5 6 7	Full control	50

Is the amount of privacy which you have at work satisfactory or unsatisfactory?

Satisfactory 1 2 3 4 5 6 7 Unsatisfactory 51

How much do you like the following in your office?
Please tick one box on each of the following scales.

Layout
(eg furniture, space, storage, privacy)
Like very much 1 2 3 4 5 6 7 Do not like at all 52

Decor
(including any plants, posters etc you might have added)
Like very much 1 2 3 4 5 6 7 Do not like at all 53

How would you describe the cleanliness of your office? *Please tick one box*
Satisfactory overall 1 2 3 4 5 6 7 Unsatisfactory overall 54

Have you or your colleagues ever made requests for improvements to the heating, ventilation or air-conditioning in your office? *Please tick a box and give details*

Yes [1] [2] No

Brief details

If 'Yes', how satisfied were you with the following?
Please tick one box on each scale. 55

Speed of response	Satisfactory	1 2 3 4 5 6 7	Unsatisfactory	56
Effectiveness of response	Satisfactory	1 2 3 4 5 6 7	Unsatisfactory	57

Have you or your colleagues ever made requests for improvements to other aspects of your office environment? *Please tick a box and give details*

Yes [1] [2] No

Brief details

If 'Yes', how satisfied were you with the following?
Please tick one box on each scale. 58

Speed of response	Satisfactory	1 2 3 4 5 6 7	Unsatisfactory	59
Effectiveness of response	Satisfactory	1 2 3 4 5 6 7	Unsatisfactory	60

In the past 12 months have you had more than **two** episodes of:

Dry throat
Please tick a box

Yes [1] [2] No

73

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No

74

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

75

In the past 12 months have you had more than **two** episodes of:

Lethargy and/or tiredness
Please tick a box

Yes [1] [2] No

76

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No

77

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

78

In the past 12 months have you had more than **two** episodes of:

Headache
Please tick a box

Yes [1] [2] No

79

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No

80

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

81

In the past 12 months have you had more than **two** episodes of:

Dry, itching or irritated skin
Please tick a box

Yes [1] [2] No

82

If 'Yes', was this better on days away from the office? *Please tick a box*

Yes [1] [2] No

83

How frequent was the symptom?
Please tick a box

Every day spent at work	3-4 days each week	1-2 days each week	Every 2-3 weeks	Less often
[1]	[2]	[3]	[4]	[5]

84

In the past 12 months have you had any other symptoms which you think are related to working in this building?

Yes [1] [2] No

85

If 'YES', please describe

Background Information

How long have you been working in this building? *Please write in* ☐☐ Years ☐☐ Months* 86-89

How long have you been working in this particular office? *Please write in* ☐☐ Years ☐☐ Months* 90-93

**Months not necessary if more than 2 years*

How would you describe the type of work you do? *Please tick a box* 94

Managerial [1] Professional [2]

Clerical/Secretarial [3] Other [4] _____ *Please describe*

How old are you? *Please write in* ☐☐ Years 95-96

What is your sex? *Please tick a box* [1] Male [2] Female 97

On average, how many hours per week do you spend in this building? *(to nearest whole number)* ☐☐ Hours 98-99

On average, how many hours per week do you operate a VDU at work? *(to nearest whole number)* ☐☐ Hours 100-101

How many people, including yourself, normally share the room or open-plan space where you work? *Please write in* ☐☐ 102

Do you smoke while in the office? *Please tick a box* Yes [1] [2] No

Do others in your immediate working environment smoke in the office? *Please tick a box* Yes [1] [2] No 103-104

Comments

Is there anything else you would like to say about your office environment? 105-106
Please write in

Signature _____

Please sign and print your name here. ***This is optional but would greatly assist our survey.***

Thank you for helping us with this survey.

Also available from BRE

Sick building syndrome: a review of the evidence on causes and solutions
G J Raw
Ref EP14 £25 HSE Publishing 1992
This report seeks to define sick building syndrome (SBS) and distinguish it from other building-related health issues. It summarises what is known about possible causes, and gives some initial guidance on how to design, construct and maintain buildings in such a way that they do not cause SBS. The report also describes remedial action which can be taken in existing buildings where SBS is a problem.

The importance of indoor surface pollution in sick building syndrome
G J Raw
BRE Information Paper IP3/94 £3.50
There is growing evidence that indoor surface pollution (ISP) is one of the causes of sick building syndrome. ISP includes contaminants such as dust, fibres and micro-organisms, which are deposited on building surfaces and in office furnishings. This paper addresses the relative importance for sick building syndrome of ISP and airborne pollution, and recommends ways to reduce ISP in offices.

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