

Consumer Knowledge of the Hazards of Carbon Monoxide Poisoning and Faulty Domestic Heating Systems

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INTRODUCTION

This report contains the findings from research conducted by MORI on behalf of the Department of Trade & Industry (DTI). The aim of the research was to examine the extent of knowledge about the hazards of carbon monoxide from faulty domestic heating systems and what, if any, precautions are taken to reduce the risk of such home accidents occurring. The findings of the research will help inform the content of any future safety messages communicated to the public on this topic.

Both qualitative and quantitative methodologies were used for this study. A series of group discussions and a citizen's workshop explored the public's perceptions of, and attitudes towards, home safety and carbon monoxide in particular. The findings fed into the development of a questionnaire and also provided a context for, and detailed understanding of, the quantitative findings. The methodology for each component is described in more detail in Appendix 1.

When interpreting the **qualitative** results a good deal of care is needed because the findings are based on a small sample of a cross-section of the population and, while they provide a valuable insight, are not statistically representative.

When interpreting the **quantitative** findings it is important to remember that the results are based on a sample of, rather than the entire, population. Consequently, results are subject to sampling tolerances, and not all differences between sub-groups are, therefore, statistically significant. A guide to statistical significance is included in the appendices.

CHAID (Chi Squared Automatic Interaction Detector) analysis was also used to segment the data and explore whether any specific groups of the public are particularly unknowledgeable about carbon monoxide safety, or are high risk-takers. An explanation of CHAID analysis is appended.

In tables where percentages do not add up to 100% this is due to multiple answers, to computer rounding, or to the exclusion of 'Don't know' or 'No response' categories. Throughout the tables an asterisk (*) denotes a value greater than zero, but less than 0.5%.

KEY FINDINGS AND IMPLICATIONS

General awareness of the carbon monoxide hazard is reasonably high among the general public, however, practical and specific knowledge is low, ranging from patchy, to non-existent.

The public are also very confused about carbon monoxide issues and have many pre-conceptions based on partial or incorrect knowledge - no single group know all the facts.

The research highlights a number of specific areas of concern:

Awareness of carbon monoxide is largely limited to gas - very few also associate it with other fossil fuels like oil and coal. Over half (56%) think that a coal fire cannot cause carbon monoxide, or simply do not know

One in ten people cannot name any potential sources of carbon monoxide in their home (spontaneous measure)

Just one in four (27%) are aware (unprompted) that poor ventilation can result in a build up of carbon monoxide

Over one in three do not know what colour a flame on a gas boiler will burn if there are traces of carbon monoxide (orange or yellow). One in twenty think that it actually should burn orange or yellow, rather than blue.

Men and people in social classes ABC1 tend to know slightly more about carbon monoxide hazards (although not everything), while women and those in social classes C2DE are less informed.

The public do not necessarily take the recommended safety precautions to reduce the risk of carbon monoxide poisoning in their home:

Three in ten households with a gas boiler or heating system, have not had it serviced in the last year. This is a particular problem among owner-occupiers

Just one in five households (22%) with a chimney in use have had it swept in the last year and 58% have not done so in the last four years, including 8% who have never had it swept

Some believe that it is beyond their control to reduce the risk of carbon monoxide poisoning in their home:

This carbon monoxide thing, that is beyond your control, well within reason
Parent of child under five years

Added to poor knowledge and unsafe behaviour, the public generally do not think that carbon monoxide poisoning is likely to happen in their home. While they are frightened of the consequences, carbon monoxide poisoning is generally viewed as something which happens to "other people"; for example, students in bedsits and holiday-makers on cheap package holidays abroad. Few realise that home owners are at greater risk than renters:

In rented accommodation it [carbon monoxide poisoning] is more common, with students, that type of thing
Workshop respondent

These findings have implications for future publicity campaigns about the hazards of carbon monoxide. Given that knowledge is low, it is important to communicate relevant information, so that decisions about taking the necessary safety precautions are made with full knowledge of the risks involved and the consequences of not doing so. Suggestions for areas to concentrate on are:

Carbon monoxide can result from **all** fossil fuels - not just gas fires and boilers

It is important to ensure rooms are ventilated and what this actually means, for example, making sure chimneys and flues are not blocked. In particular, the need to sweep chimneys, including those being used as a flue for gas fires should be stressed

Boilers and heating systems should be serviced annually - particularly among owner-occupiers

Boiler flames burning orange or yellow may indicate traces of carbon monoxide

The methods of communication should take the complexity and diversity of these messages into account. In some instances it may be more appropriate to use methods which allow more detailed and full information to be communicated, such as leaflets and magazine articles, rather than methods restricted by time limitations, like TV adverts.

Targeting of publicity campaigns also requires careful consideration, taking into account the extent, as well as existence of safety knowledge - people who think they know how to act safely may be at as much risk as those who know nothing at all. Death rates from carbon monoxide should, of course, also be used in conjunction with information about knowledge to better inform any targeting.

Publicity should also dispel the myth that carbon monoxide poisoning happens to "others" and only occurs in bedsits, rented or holiday accommodation - targeting a campaign at owner-occupiers emphasising the risk to them and their families is likely to be beneficial.

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MAIN FINDINGS

Knowledge of Carbon Monoxide Safety

In general, the public have a very poor knowledge of the hazards of carbon monoxide (CO) and ways to reduce the risk of an accident occurring in their home. Despite knowing very little about carbon monoxide, the qualitative research showed that people are very frightened of it, largely because they see it as a killer. However, at the same time the view that 'it won't happen to me' is widely held. The survey findings show that only two per cent think carbon monoxide poisoning is one of the most likely accidents to occur in their home in the next year, while one third (31%) consider it to be the least likely. Added to this, the qualitative work shows that it is largely seen as something that happens to "other people", for example students in bedsits, or holiday makers on cheap package holidays abroad; few realise that home owners are at greater risk than renters.

In rented accommodation it is more common, with students, that type of thing
Workshop respondent

Both the quantitative and qualitative findings suggest that knowledge about carbon monoxide ranges from patchy, to non-existent, to being very confused; indeed some people believe it is something which is totally beyond their control.

This carbon monoxide thing, that is beyond your control, well within reason
Parent of child under five years

Men and ABC1s tend to know slightly more about carbon monoxide than others, while women and social class C2DE know less. However, there is no single group of people who know all the facts - something which is vital in this area of safety. The lack of knowledge, combined with the attitude that it is unlikely to happen to them, means that many people are putting themselves at unnecessary risk.

I thought I knew a lot more about carbon monoxide than I did
Workshop respondent

Knowledge of Carbon Monoxide Sources

To assess the public's knowledge of the potential sources of carbon monoxide in the home, respondents were first asked, unprompted, "*What sort of things can cause carbon monoxide to build up in your home?*". This measure of spontaneous awareness gives a good indication of the types of things people are most likely to know. They were then prompted with a number of possible sources not previously mentioned, to achieve a complete picture of their carbon monoxide knowledge: "*And can you get carbon monoxide poisoning from any of the following . . . ?*"

Figure 1 shows the spontaneous and prompted awareness of sources of carbon monoxide poisoning. Spontaneous awareness focuses mainly on gas systems and is largely limited to gas fires and boilers (60% and 30%). Just 3% spontaneously say that a coal fire can cause carbon monoxide poisoning and the same result is obtained for oil fires, clearly highlighting that the public do not associate the problem with *all* fossil fuels.

Around one in four understand that carbon monoxide can build up in a poorly ventilated room, although fewer specifically mention poor ventilation due to a blocked chimney or flue as a cause. This is supported by the qualitative work; some workshop participants did not understand that blocked chimneys and flues actually impact on ventilation but instead think you need to simply keep windows and doors open - something they are very unlikely to do when it is cold.

When prompted, almost all (96%) are aware that a gas fire can cause carbon monoxide poisoning, but knowledge does not increase among households with a gas fire. This means that 4% of households with a gas fire are not aware of its potential dangers. Similarly, prompting significantly increases the proportion of the public who say they are aware that faulty boilers, poor ventilation, blocked flues and chimneys can be a cause of carbon monoxide poisoning.

The proportion who recognise a coal fire as a potential source rises to 45% when prompted; alarmingly however, an equal proportion (42%) wrongly think that a coal fire cannot cause carbon monoxide poisoning and a further 15% do not know.

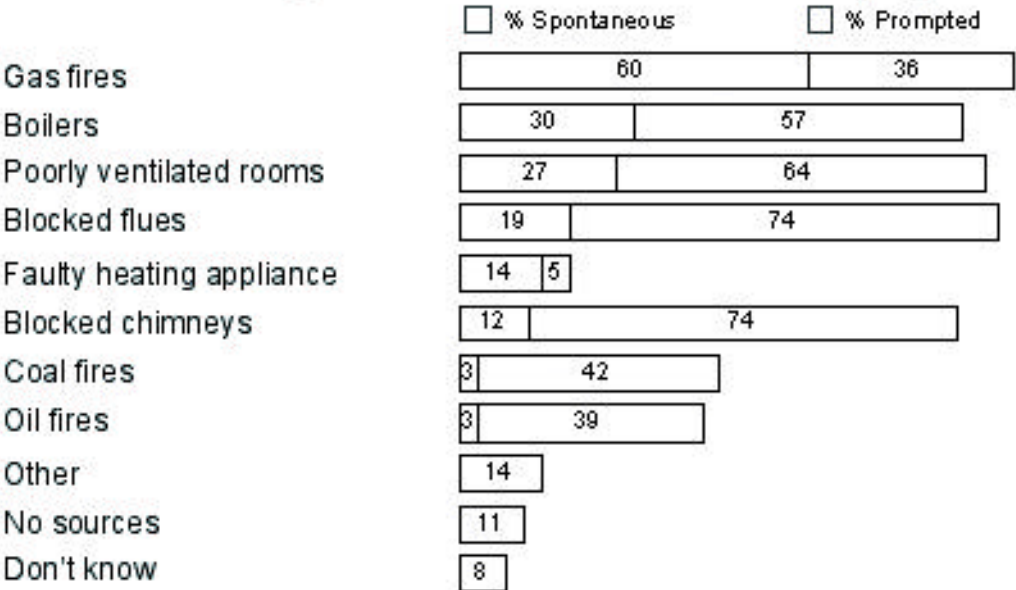
It is important to note that one in ten people (11%) cannot spontaneously name any causes of carbon monoxide poisoning and knowledge is particularly low among DEs: 18% of DEs cannot name any causes - twice as many as ABC1s (9%). Similarly, those in rented accommodation are much more likely (20%) than owner occupiers (8%) to be lacking in knowledge.

In terms of age, young people (under 35) and the over 60s are least aware: 14% and 18% respectively cannot spontaneously mention any sources compared with just 6% of those aged 35-60. Regionally, knowledge about sources of carbon monoxide is lowest in Scotland and the North West (21% and 15% cannot mention any sources). CHAID analysis identifies DEs who are unemployed or retired, as a group of particular concern in these regions, as well as London - 40% of whom cannot spontaneously name any causes. Their counterparts in other regions are close to the average (13%). The CHAID tree displaying this analysis can be found in the appendices (CHAID Tree 1).

The implications of these findings for future publicity are, however, quite complex. Partial knowledge about the hazards of carbon monoxide can be as dangerous as no knowledge at all because you will not necessarily be safe if you are only taking some of the safety precautions. Therefore, it does not necessarily follow that publicity should be targeted in regions where people are most likely to know nothing, it is equally important to improve the knowledge of people who think they know about the hazards but only know some of the facts. Indeed we believe it may well be more beneficial to target publicity in areas where the death rate from carbon monoxide poisoning is highest, rather than areas where knowledge is lowest.

Figure 1 Awareness of the Causes of CO Poisoning

Q What sort of things can cause carbon monoxide to build up in your home?



Base: 1002 British 18+, 29 March-23 April 1999

Knowledge about sources of carbon monoxide does vary within different sub-groups of the population. The differences in both spontaneous and prompted knowledge are discussed in each of the relevant sections below. Tables providing a detailed breakdown of responses are included in Appendix 2.

Gas Fires

Spontaneous awareness of gas fires as a source of carbon monoxide poisoning is highest in the North East (77%), while those in Wales are least likely to mention it spontaneously (48%). In terms of age, older households - with at least one person over 60 years - are less aware than younger households that gas fires are a potential carbon monoxide hazard (55% versus 63%). Those with gas fires in their home show slightly greater awareness (67%).

When prompted, almost all (96%) are aware that a gas fire can cause carbon monoxide poisoning and there is very little variance by sub-groups. As pointed out earlier, this does mean that 4% of gas fire owners are not aware of the potential danger in their home.

Boilers

Unprompted awareness of boilers as a potential carbon monoxide hazard is limited to one in three (30%). Those most likely to spontaneously name it as a source are high income households (42% versus 19% low income), owner occupiers and private renters (34% and 29% versus council and registered social landlord (RSL) tenants 17%). One parent families are particularly unlikely to spontaneously mention gas boilers as a potential hazard (15%). Once again, ownership does not necessarily result in increased awareness - those who have boilers are not more aware of the possible dangers.

Again when prompted, the majority (87%) know that a faulty boiler may result in carbon monoxide poisoning. There are very few differences between sub-groups, however, men's awareness is slightly higher than women (90% versus 85%) and high and medium earners have greater awareness than low earners (92% versus 82%). Regionally, prompted awareness is highest in the North East (95%) and lowest in the South West (82%), as well as Scotland, the West Midlands and London (83%, 83% and 84%).

Ventilation, Blocked Flues and Chimneys

A quarter (27%) are aware that a lack of ventilation can cause carbon monoxide poisoning. Fewer spontaneously mention specific sources of poor ventilation such as blocked flues (19%) or chimneys (12%). There is greater awareness about lack of ventilation among higher social classes: one in three (32%) ABC1s spontaneously mention it compared with 22% of C2DEs. Men also show slightly greater awareness than women (30% versus 23%).

Prompting significantly increases the proportion of the public who recognise the potential hazard from poor ventilation. However, women are again less aware than men that blocked flues and chimneys can cause problems (83% versus 90% chimneys; 90% versus 96% flues). There is little variation among the other sub-groups.

Coal Fires

Awareness that coal fires are a potential source of carbon monoxide poisoning is extremely low - just 3% spontaneously mention it. One possible explanation is the relatively low incidence of coal heating across the country (7%); however, households using a coal fire are only slightly more aware of the risks (11%), clearly showing that the majority of coal fire users are not aware of the potential hazard and that knowledge is not associated with ownership. Spontaneous knowledge of the risk from coal fires is slightly higher in Wales (9%), and this raised awareness, which although only marginally significant, may perhaps reflect the 1999 DTI publicity campaign in this region.

When prompted, awareness increases to 45%, however, what is of greater concern is that 42% think that coal fires cannot cause carbon monoxide poisoning (including 30% of coal fire users) and a further 15% do not know. Women and young people are least likely to know that coal fires can be a carbon monoxide hazard (each 37%). Regionally, Welsh households again show significantly greater knowledge about the risk from coal fires (67%), while those in Scotland and the West Midlands demonstrate much less knowledge (27% and 33%).

The low awareness of the connection between coal fires and carbon monoxide poisoning is borne out in the qualitative findings. Respondents in the focus groups and workshop were genuinely shocked to realise the connection.

I always thought that carbon monoxide poisoning was from gas fires, I didn't realise it was coal fires as well.

Workshop respondent

Oil Fires

Knowledge of oil fires as a source of carbon monoxide is again low, both spontaneously and when prompted (3% and 42%). Again this might be explained by the low incidence of oil fires in the population (4%) but clearly highlights that the majority of the public only link gas with carbon monoxide build up, rather than all fossil fuels.

Faulty Heating Appliances

Unprompted, one in seven (14%) are aware that a faulty heating appliance could be a cause of carbon monoxide poisoning. Those with high educational qualifications (19%, 'A' levels or above vs. 7%, no qualifications) and social classes ABC1 (17% vs. C2DE, 11%) are more likely to be aware of the potential hazard from faulty heating appliances. People in the South East (22%) are also more likely to recognise this than those in other regions.

Identifying the presence of Carbon Monoxide

Respondents were asked what colour a flame on a gas boiler should burn, and then what colour it will burn if there are traces of carbon monoxide (Figure 2). The majority of the population (89%) are aware that the flame should burn blue, although a significant minority (6%) incorrectly state that the flame should be another colour. Again it is of some concern that knowledge is not better among people who actually have a boiler in the household.

Women (86%), social classes C2DE (88%), and those on a low income (80%) are less likely to correctly identify the colour the flame should burn. In contrast, virtually all men are aware of this (92%). CHAID analysis shows that women in older households (over 60) and single parents, both in lower social classes (C1C2DE), are least likely to know what colour their boiler flame should be. Of this group, only 76% know the right colour (CHAID Tree 2 appended).

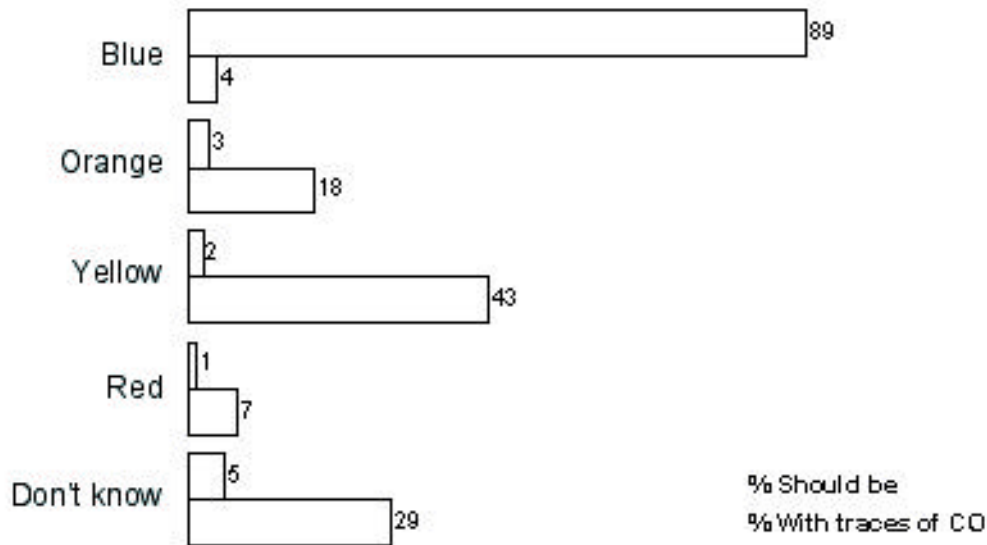
Overall, three in five (61%) recognise that a flame will burn yellow or orange if there are traces of carbon monoxide present. Again men are more likely to be aware of the effects carbon monoxide has on the colour of the flame than women (67% versus 54%).

Of more concern, is the fact that a significant minority of the population (29%) do not know what colour the flame will burn with traces of carbon monoxide (rising to 37% of women), or incorrectly think the flame will burn a colour other than yellow/orange (15%). There is clearly confusion over the correct colour of the flame - a minority (5%) actually believe that the flame should be burning yellow or orange and therefore will not recognise a potentially dangerous situation. Again knowledge levels are not any better among those who actually have a gas boiler in the household.

Figure 2

Knowledge of Colour Gas Boiler Flames Burn

- Q *What colour do you think the flame on a gas boiler should be?*
- Q *What colour do you think the flame on a gas boiler is when there are traces of carbon monoxide?*



Base: 771 British 18+, 29 March-29 April 1999

Carbon Monoxide Safety Behaviour

As well as finding out the extent of the public's knowledge about carbon monoxide, a number of questions were also asked to establish whether or not people actually follow safety guidelines. Questions were asked to ascertain when they last had their central heating or gas boiler serviced and when their chimney, if in use, was last swept.

Central heating and boiler servicing

Seven in ten households (70%) with gas central heating, or a gas boiler have had their system serviced within the last year - as recommended. However, this means that three in ten households have not, thus putting themselves at risk of carbon monoxide poisoning. A further one in six (16%) have had their boiler serviced within the last two years.

Older households are considerably more likely to have had their boiler serviced within the last year (households with a single adult 60+, 80%, and couples 60+, 81%). The focus groups also showed that older people are more conscientious about getting their boiler serviced each year, although they do not necessarily realise this helps to reduce the risk of carbon monoxide poisoning - they are simply more wary of gas and its dangers in general.

Tenants (both private and council/Registered Social Landlord) are more likely to say their boiler has been serviced in the last year than owner occupiers (80% and 78% versus 68%). The qualitative findings suggest that these differences are probably largely explained by decisions about spending priorities. Whilst it is a legal requirement for landlords to have boilers and gas central heating systems serviced each year, owner-occupiers can decide whether or not to spend the money having their systems serviced. The research showed that people do not necessarily realise that having their boiler serviced can significantly reduce the risk of carbon monoxide poisoning and, therefore, are much more likely to postpone, or ignore the need for a service, thus putting themselves at much greater risk:

And times are hard for everyone really, they can just about pay their mortgage and whatever. That's why they don't [get their boiler checked] sometimes, because they are cutting corners
Workshop respondent

In both the focus groups and workshop, respondents were very shocked that they are putting themselves in real danger by foregoing a service and, given this knowledge, would be much more willing to prioritise expenditure on having their boiler serviced. Emphasising this message in future carbon monoxide safety campaigns may, therefore, prove successful.

CHAID analysis shows that the households least likely to have had their boiler serviced in the last year are under 35s without children (50% - CHAID Tree 3 in Appendices). Again this is likely to be partly explained by spending priorities, but also by the lack of responsibility for other people. The qualitative research showed that having responsibility for another person's safety tends to affect how safely they behave - for example, parents are much more likely to take safety precautions than those without children.

Chimney sweeping

Half of respondents (52%) have a chimney which acts as a flue - that is, one that is acting as a flue to either a coal, or gas fire. Chimney 'use' is generally spread across all the sub-groups, although has a higher regional concentration in households in the North (North East, 80%; Yorkshire & Humberside, 71%; North West, 65%). Working chimneys are less common in council and Registered Social Landlord rented properties (40%).

Less than one in four households (22%) who have a chimney in use have had it swept within the last year. Furthermore, a total of 58% have not done so in the last four years, including 8% who have never had their chimney swept and 27% who simply do not know. This shows that many people are either not aware of, or not following, advice to have their chimney swept regularly. Regionally, households in the South East, South West and North East are most likely to have had their chimney swept in the last year (33%, 30% and 29%). In Scotland, none of the 37 chimney users had had their chimney swept in the last year, while households in Wales and London are also much less likely to have done so (7% and 13%). Families with children are also more likely than others to have taken this precaution (27% versus 19%) - again tying in with the qualitative research findings which show the positive impact of increased responsibility on safety behaviour.