LIGHTING THE HOMES OF VISUALLY IMPAIRED PEOPLE


Research Group for Inclusive Environments, School of Construction Management and Engineering, The University of Reading, Whiteknights, Reading, RG6 6AW, UK.

ABSTRACT

This paper describes a one-year project to determine the lighting requirements of visually impaired people in their own homes. The findings from this project will form the basis for the development of guidance and recommendations for visually impaired people, community care professionals and designers, on how to achieve the optimum lighting conditions in the home.

1. INTRODUCTION

We already know that one outcome of the ageing population will be an increase in the number of visually impaired people. Also, the recent advances in Assistive Technologies and Smart Housing means that older people are likely to be living in their own homes for longer. However, little research has been carried out on how lighting in a domestic environment may be optimised for visually impaired people (VIPs).

This project aimed to address this need and was funded by the Thomas Pocklington Trust. Pocklington is Britain's largest specialist provider of housing and support services for people with sight loss. Throughout this project the research team have consulted an Advisory Panel, which comprised of a Rehabilitation Worker, an Occupational Therapist, a Lighting Engineer (specialising in lighting in the home of VIPs), two visually impaired people, a Statistician and a representative from the Thomas Pocklington Trust.

The three main phases of data gathering were: Questionnaire Survey; Home Surveys; Implementing Solutions. The first two stages are described below. The Research Team is currently at the stage of developing design solutions for people to trial in their homes and this stage of the project has not been reported here.

2. BACKGROUND TO PROJECT

An earlier study of lighting in the home (Simpson & Tarrant, 1983) reported that in many cases the domestic lighting found in homes in Surrey did not meet the recommendations for similar areas included in the current edition of the IES Code for Interior Lighting (CIBS, 1977). Although this study did not claim to be representative of the UK, the much-needed follow-up study that could have strengthened this argument did not occur. The RNIB publication ‘Building Sight’ (Barker, 1995), although offering general guidance for domestic lighting for visually impaired people, also states the need for further research into the field of artificial lighting.

In the UK there are currently no illuminance recommendations for artificial lighting in private dwellings. Illuminance recommendations have been suggested for residential homes for older and visually impaired people but it is unlikely that these relatively high illuminance levels suggested would be acceptable in private dwellings, see Table 1.
This lack of guidance can be partly explained by the inherent need for individual choice by the building occupier and the low priority given to search and navigation tasks in a familiar environment. However, there remains a need for recommendations to ensure an acceptable illuminance for domestic tasks. There are also safety issues associated with domestic lighting due to the numbers of personal injuries occurring at home. There is also a need to move forward the design recommendations directed at fully sighted people. Recent interest in the quality of lighting provision in interiors has been encouraged by the Commission Internationale de l’Eclairage (Cook, 1998) where any overall assessment of lighting quality must include a subjective and objective component. It is generally accepted that good quality lighting is particularly helpful for visually impaired people (Boyce, 1981).

Table 1. Illuminance recommendations for residential homes in Lux

<table>
<thead>
<tr>
<th>Area</th>
<th>IESNA 1998</th>
<th>CIBSE 1994</th>
<th>LIF&amp;EC 1976</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hall</td>
<td>100</td>
<td>200</td>
<td>225 - 300</td>
</tr>
<tr>
<td>Lounge</td>
<td>300</td>
<td>150</td>
<td>75 - 100</td>
</tr>
<tr>
<td>Kitchen Work Surface</td>
<td>300</td>
<td>150 - 300</td>
<td>450 - 600</td>
</tr>
<tr>
<td>Dining Room</td>
<td>300</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Bathroom</td>
<td>300</td>
<td>150</td>
<td>150 - 200</td>
</tr>
<tr>
<td>Bedroom</td>
<td>300</td>
<td>150</td>
<td>75 - 100</td>
</tr>
<tr>
<td>Stairs</td>
<td>300</td>
<td>100</td>
<td>150 - 200</td>
</tr>
</tbody>
</table>

Note 1: These recommendations for residential buildings are taken from the CIBSE Code for Interior Lighting 1994. For accommodation for visually impaired and older people CIBSE suggest “substantially increasing light levels in hazardous areas such as stairs and kitchens”. The Code does not specifically cover private dwellings.

3. QUESTIONNAIRE SURVEY

The aim of the questionnaire survey was to discover the types of lighting that visually impaired people have at home, and its influence on everyday tasks such as answering the phone, cooking and climbing the stairs. A secondary aim was to discover whether any alterations had been made to the lighting and if so, by whom and why. The wide and varied scope of this questionnaire was an interesting challenge for the Research Team. The problems faced and how were these were resolved are described below.

Asking people to report on the types of artificial lighting that they had meant that the first problem was to devise a way of describing the wide range of domestic light fittings that are available. It was also important that people would be familiar with the terminology used and not feel alienated by technical terms, which were kept to a minimum e.g. using the term light bulbs instead of lamp. The approach adopted involved producing a separate booklet, containing a simple description and line drawing of the most common lighting types, see Figure 1. The information was presented in two sections: light bulbs (ordinary (i.e. tungsten filament), spotlights, fluorescent, energy saving) and lighting fittings. Depending on the surface on which they were mounted light fittings were categorised as follows: ceiling lights, wall lights, table lamps, floor standing lights or under unit lights.
The presentation of the questionnaire required careful consideration, as its target audience was visually impaired people many of whom would be older people. It was appreciated that respondents were more likely to get tired so the main aim was to ensure that the questionnaire was as user friendly as possible. Instructions were kept to a minimum and written in plain English. The main text was 14 point Arial (a sans serif font) as recommended in the RNIB’s Clear Print guidelines (RNIB). Tick boxes were joined using horizontal lines in order to assist with visual tracking across the page, see Figure 2. Clear headings were used to distinguish between sections and adequate spacing was provided between individual questions.

Considerable time was spent developing a suitable format for respondents to record the type of lighting that they had in their home. The method devised asks people to write down the number of a particular fitting that they had, and then circle the type of light bulb used in that fitting, see Figure 3. Every effort was made to make this section of the questionnaire as intuitive as possible alleviating the need for lengthy instructions. Finally it was decided that a sample question would be included to assist
Before issue the questionnaire was piloted with encouraging results. The few issues that were identified by the pilot study were incorporated into the final version. The resulting questionnaire comprised of 95 questions over 52 pages and was issued with an 11-page booklet of ‘Useful Information’. Obviously the questionnaire had to be available in alternative formats. The use of a Braille or tape version was rejected, as these formats were not appropriate for a questionnaire of this scale or format. As an alternative to the print version respondents were offered the options of completing the questionnaire over the phone or on-line via the Internet.

The structure of the questionnaire was as follows:

- **How to fill in the questionnaire** A simple set of instructions, also asking people to look at the accompanying booklet before starting the questionnaire.

- **About you** Basic data such as gender, age, region of country. Providing name, address and contact details was optional.

- **Your vision** A short set of questions to assess the type and extent of the respondent’s sight loss

- **About your home** In this section respondents recorded the types of light fitting they had in each room of their home. These were introduced in a logical progression from entrance, to hall, to lounge etc. In each room respondents were also asked to assess the lighting for the various tasks carried out there, on a five point scale from ‘very good’ to very poor’. They were also asked to report any incidences of glare, either directly from light fittings or reflected from surfaces.

- **General Questions** The final section covered safety (e.g. how often respondents fell or bumped into objects). The Research Team also wanted to find out if the respondent’s lighting had been altered either by themselves, their friends or family, or by a qualified professional and if so why. If no changes had been made they were asked what would motivate them to alter their lighting. If they shared their home, respondents were asked whether the lighting was set up to meet their needs or was a compromise with the person/people they shared with.

The questionnaires were distributed via Occupational Therapists, Rehabilitation Workers and other Sensory Team workers. Also via Local Societies and individuals who had contacted us directly having read the project publicity. No questionnaires were sent out ‘cold’, as this was felt to be an unreasonable approach with a questionnaire of this size; an unfair request of the person receiving the questionnaire and unlikely to yield a good response rate. One thousand questionnaires have been distributed via the channels outlined above. The response rate to date has been very encouraging.
4. HOME SURVEYS

The aim of the home surveys was to collect quantitative data on typical light levels found in people’s homes and more in depth qualitative data, to build on the findings from the questionnaire. The procedure that was adopted for the home surveys is outlined below:

4.1 Pre Lighting Survey

All participants were sent pre survey information and a preliminary consent form. The aims of the information and preliminary consent form were to confirm:

- that respondents were still happy for a visit to their home
- that respondents were agreeable to having photos taken in their own home
- confidentiality of information and anonymity if photos of their home are published
- any areas of their home that participants did not want researchers to enter
- their availability and willingness to participate in a follow up visit
- their eye condition

The postal questionnaire described in Section 3, minus the section for recording types of light fittings, was sent out to participants two weeks before the visit, which they were asked to complete as fully as possible and return a week before the visit.

Receiving these sections of the questionnaire prior to the visit gave the Research Team an opportunity to identify some of the key issues e.g. the types of task that were being carried out, the areas where lighting was rated ‘very good’ or ‘very poor’. Any areas where respondents felt very strongly about their lighting either positively or negatively were explored in more detail during the semi-structured interview carried out at the end of each survey.

4.2 Lighting Survey

Two researchers attended each lighting survey. It was envisaged that each visit would take around 2 hours but in reality the length of surveys varied from 1.5 to 4 hours depending on the size of the participant’s home and their enthusiasm to convey their views as fully and accurately as possible. Before commencing the lighting survey a consent form was read out to the participant. This was to reiterate the purpose and nature of the survey, the confidentiality agreement and to remind participants that they could stop the survey at any time if they wished.

The lighting survey consisted of three main parts:

1. Using the information provided in the questionnaire participants were asked to demonstrate how the lighting was normally set up for the tasks identified; lux levels were recorded for these specific tasks. The respondent’s own issues and priorities in relation to their lighting led this section of the survey. A more structured interview carried out at the end of each survey ensured that all the relevant points had been covered. Since this project was interested in artificial lighting, efforts were made to exclude daylight when illuminance measurements were being taken. When this was not possible a repeat evening visit was arranged so that more accurate readings could be taken.

2. Photos of each room were taken as a record of the décor, layout of furniture and overall lighting effect, see Figure 4. General illuminance measurements were taken on the major room surfaces, horizontal and vertical. Luminance measurements were taken in any areas where glare was identified as a problem. In addition luminance measurements were taken so that reflectance values could be determined.
3. The final stage of the survey was a semi-structured interview. Each interview was recorded onto minidisk and then transferred to CD for transcription and subsequent content analysis. In addition to exploring further the issues addressed in the final section of the postal questionnaire, the interview gave an opportunity for a general discussion on the issues raised during the survey.

A structure for the interview was developed to ensure the following seven themes were covered:

- Experiences, needs and awareness of lighting
- Knowledge of new technology
- Experimentation with lighting
- Other approaches to improving living/home environment
- Attitudes to changing existing lighting
- Support in terms of alterations to lighting
- Safety in the home in relation to the lighting

For this stage of the project twenty four-people were visited in their own homes. The extensive information gathered from the surveys is currently being input for analysis.

5. RESULTS AND RECOMMENDATIONS

This paper describes a project that is still underway at the time of writing (October 2002) and the process of data gathering and input is still progressing. By April 2003, full analysis of the data will have been carried out and the Research Team look forward to presenting the final results and latest recommendations at the 11th International Mobility Conference. Following the conference the project findings presented at IMC11 will be made available to all delegates on the Research Group for Inclusive Environments Website at www.reading.ac.uk/ie.

REFERENCES


