



The use of sensors to monitor indoor air quality, and the role of user behaviour in shaping household exposure

20 November 2025

Welsh Air Quality Forum

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CARDIFF  
UNIVERSITY

PRIFYSGOL  
CAERDYDD

20251120

**OVERVIEW:**

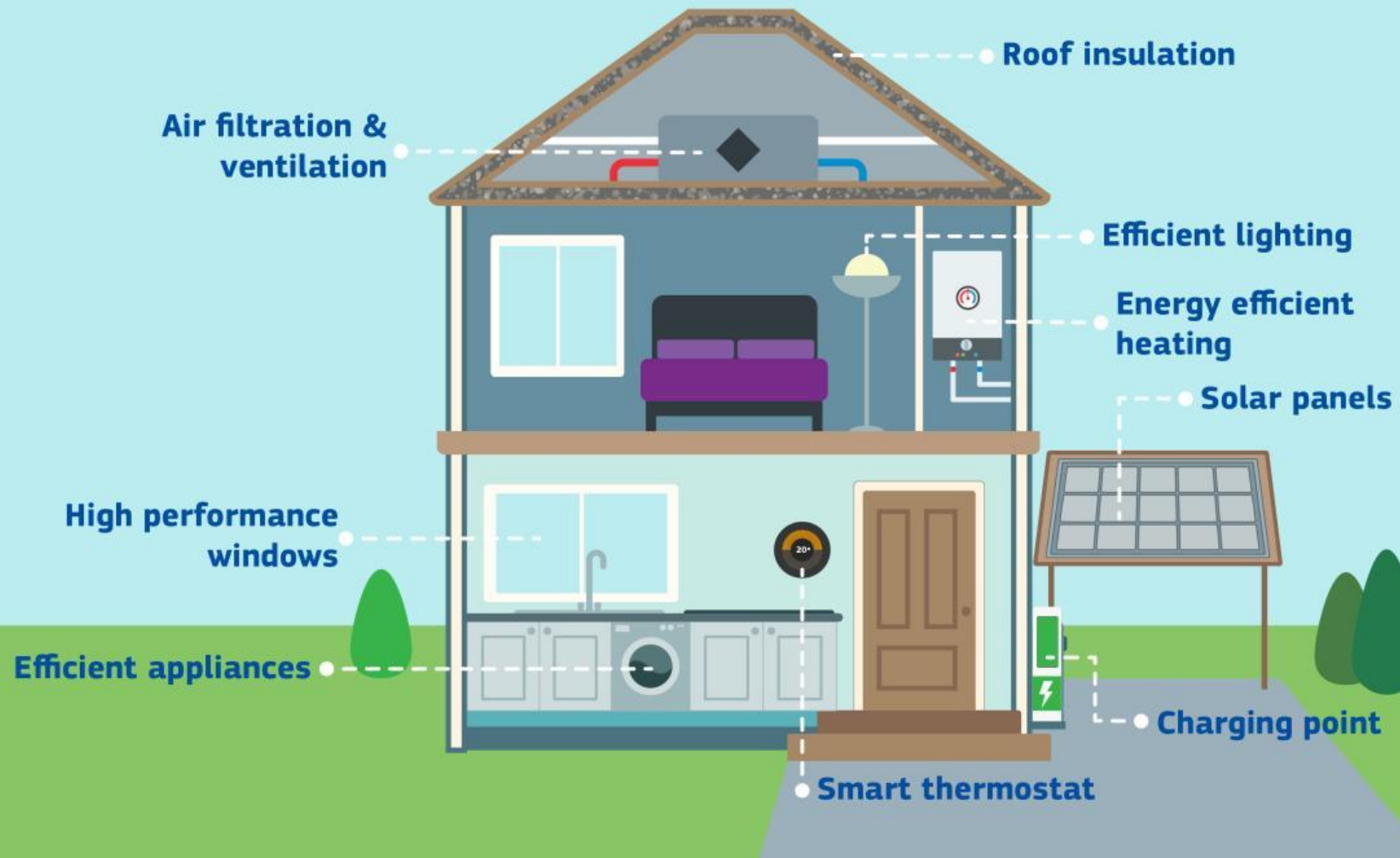
Culture-informed design

RIBA Research project

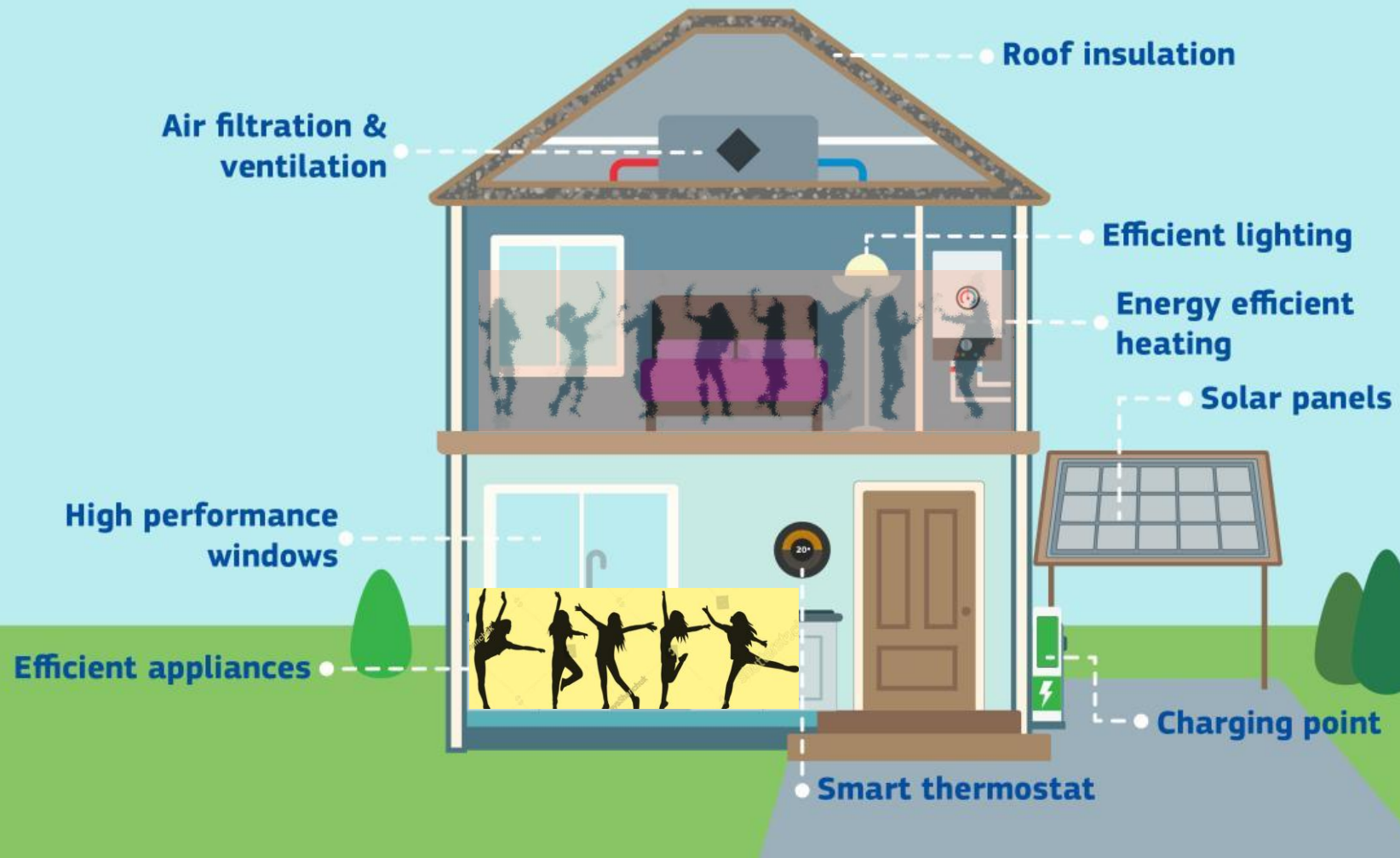
EPSRC – IAA project

Working Summary

# Nearly Zero-Energy Buildings (NZEB)



# Nearly Zero-Energy Buildings (NZEB)





BBC

NEWS

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# Landlord's 'curry smell' letting ban unlawful

8 November 2017



sky news

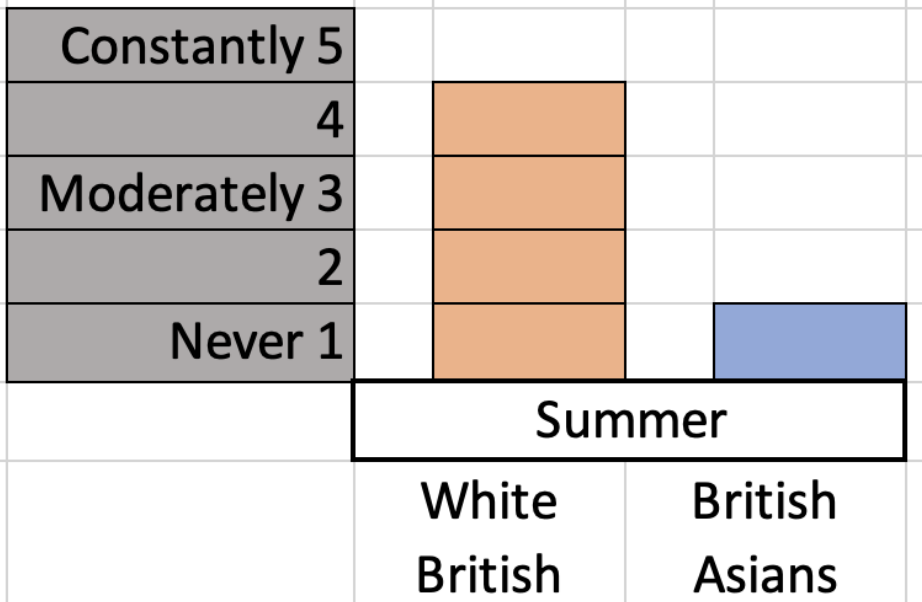
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# Landlord Fergus Wilson's 'curry smell' ban is unlawful, court rules

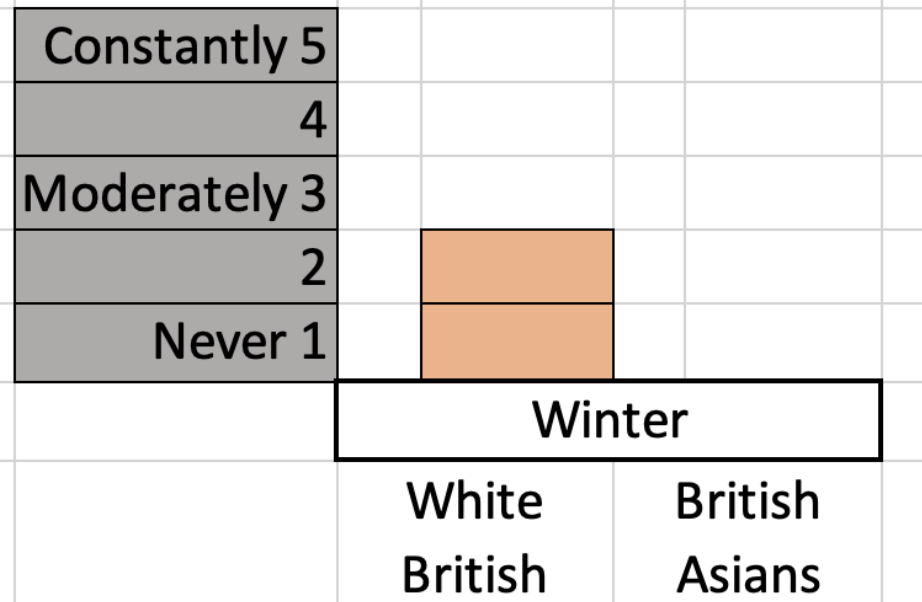
Property tycoon Fergus Wilson had argued that he lost money ridding his homes of a "curry smell" at the end of the tenancy.

By Rebecca Taylor, News Reporter

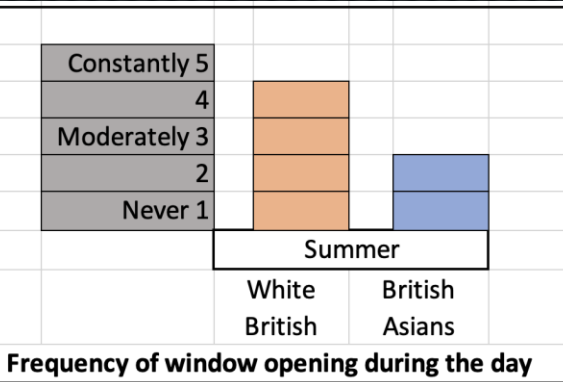
Wednesday 8 November 2017 20:25, UK



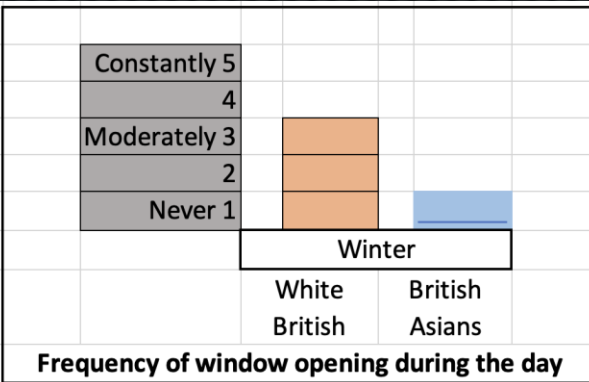
**Frequency of window opening at night**



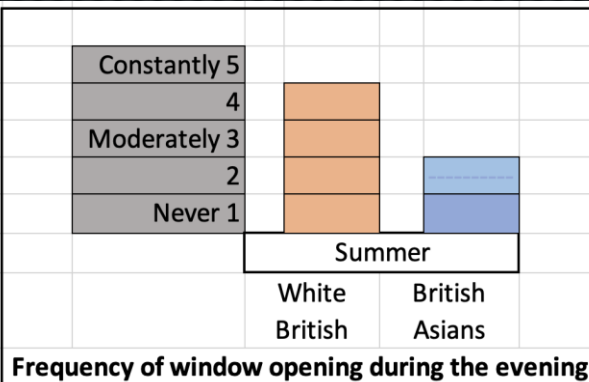
**Frequency of window opening at night**



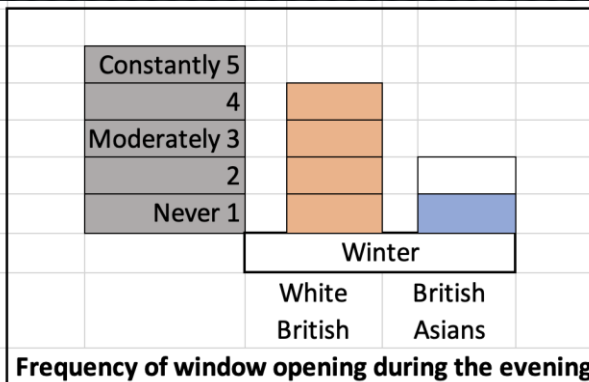
**Frequency of window opening during the day**



**Frequency of window opening during the day**



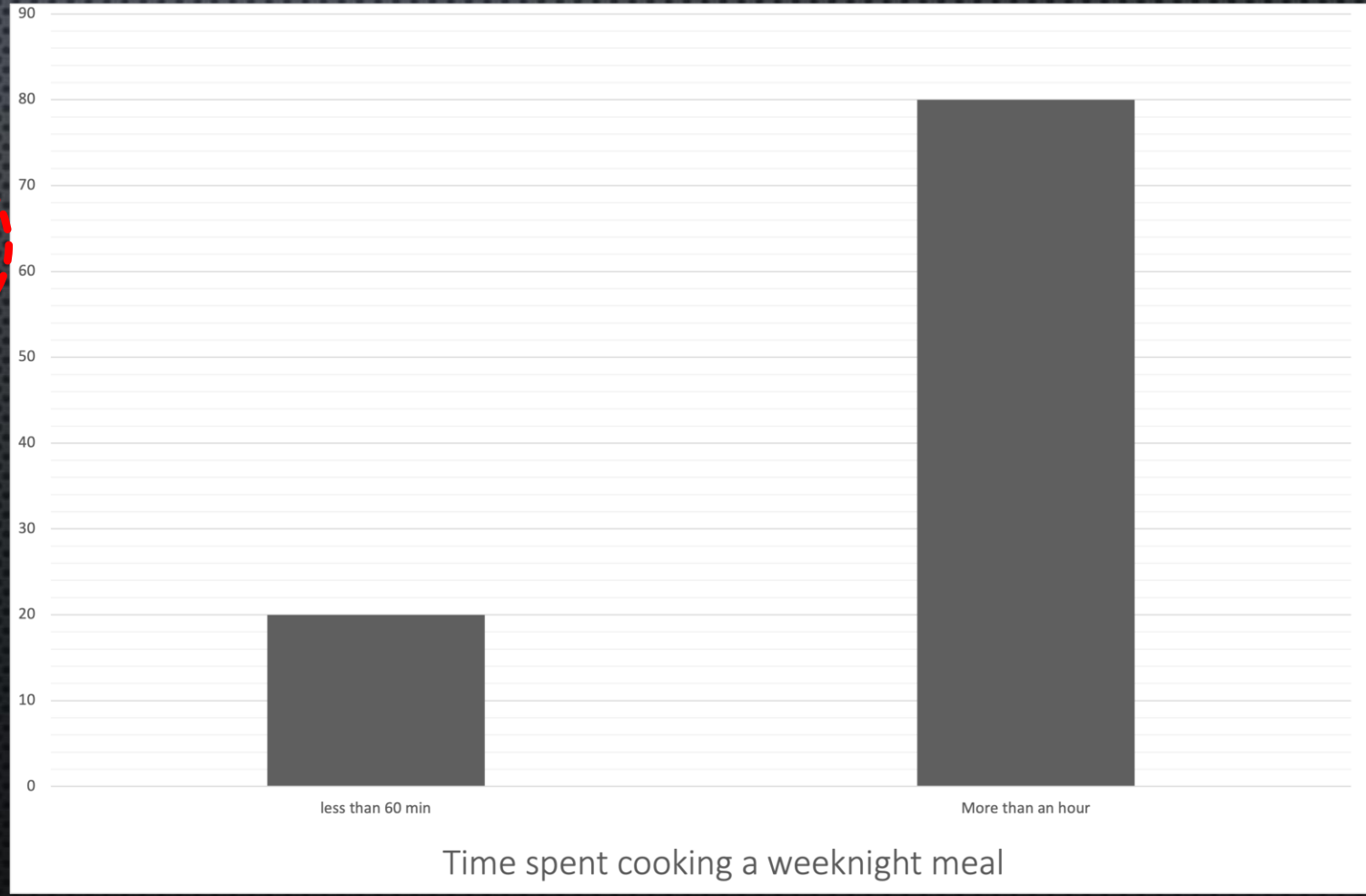
**Frequency of window opening during the evening**



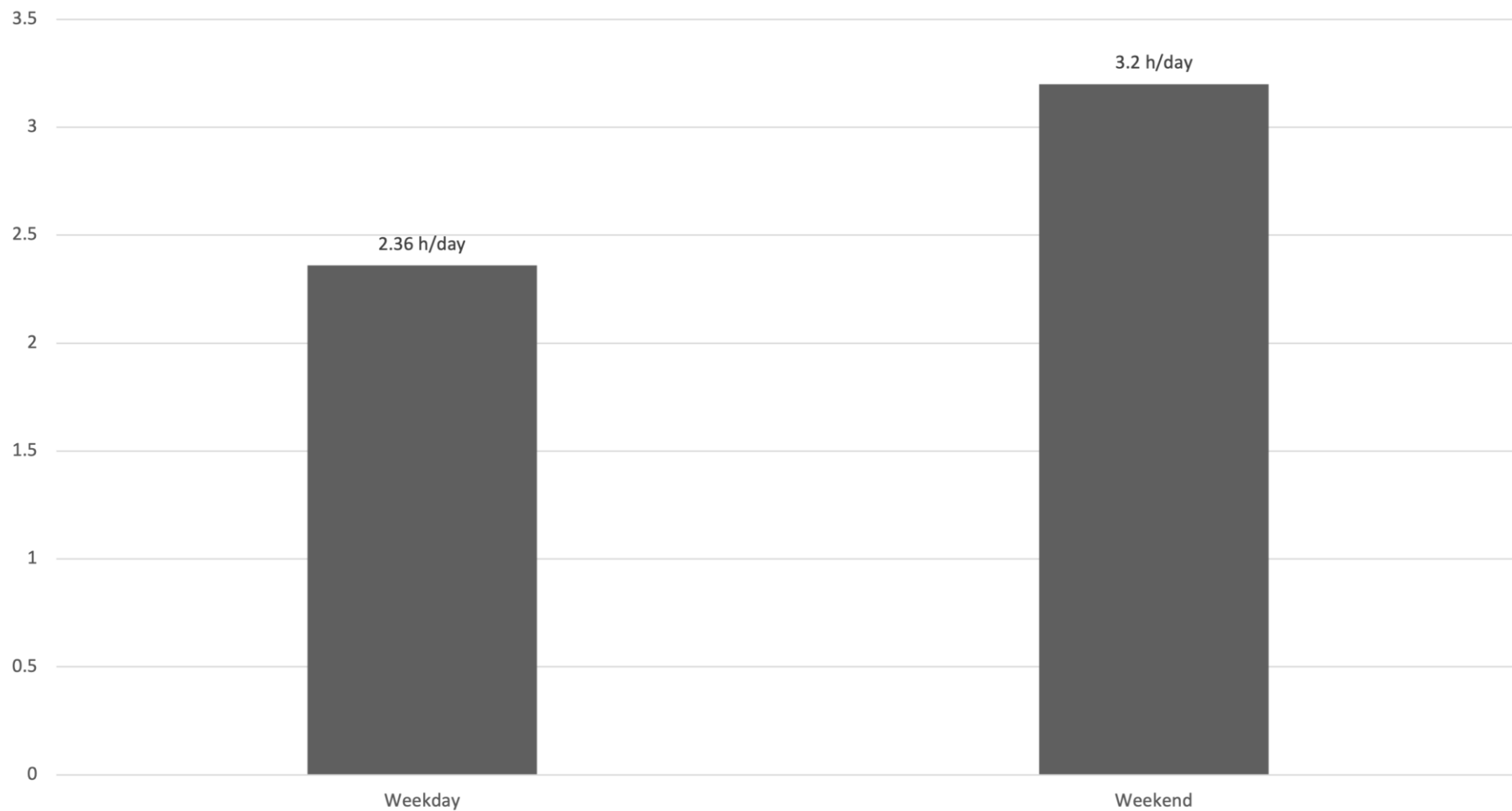
**Frequency of window opening during the evening**



UK residents (Statista, 2019)



On average, time spent cooking a weeknight meal ...rey conducted in Plymouth- Jun BRITISH ASIAN HOUSEHOLDS



Average time spent cooking  
using stovetop/oven

**On average, time spent cooking**

BRITISH ASIAN HOUSEHOLDS



Contains OS data © Crown copyright and database right 2021

Data Collection:  
Plymouth and  
Cardiff, UK

Questionnaire Survey  
(cooking habits and related aspects)  
60 BA and 57 WB



Environmental data  
(Temp, Humidity, CO2 level)  
six comparable homes



White British Home

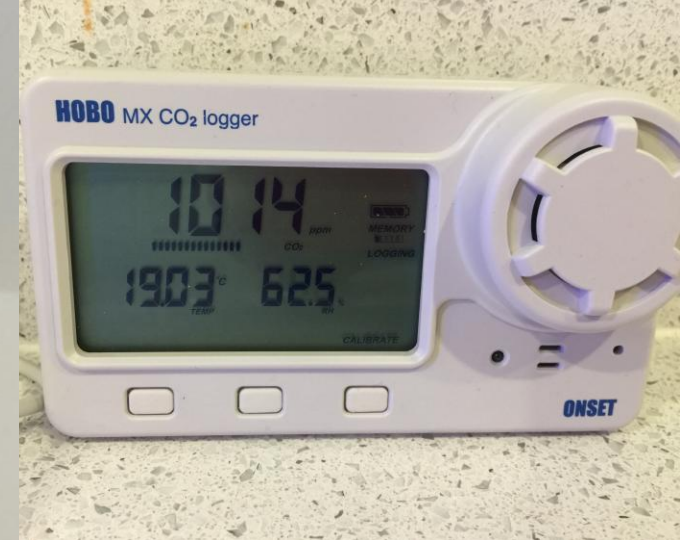


British Asian Home



Sensory Ethnography Filmmaking

Data loggers



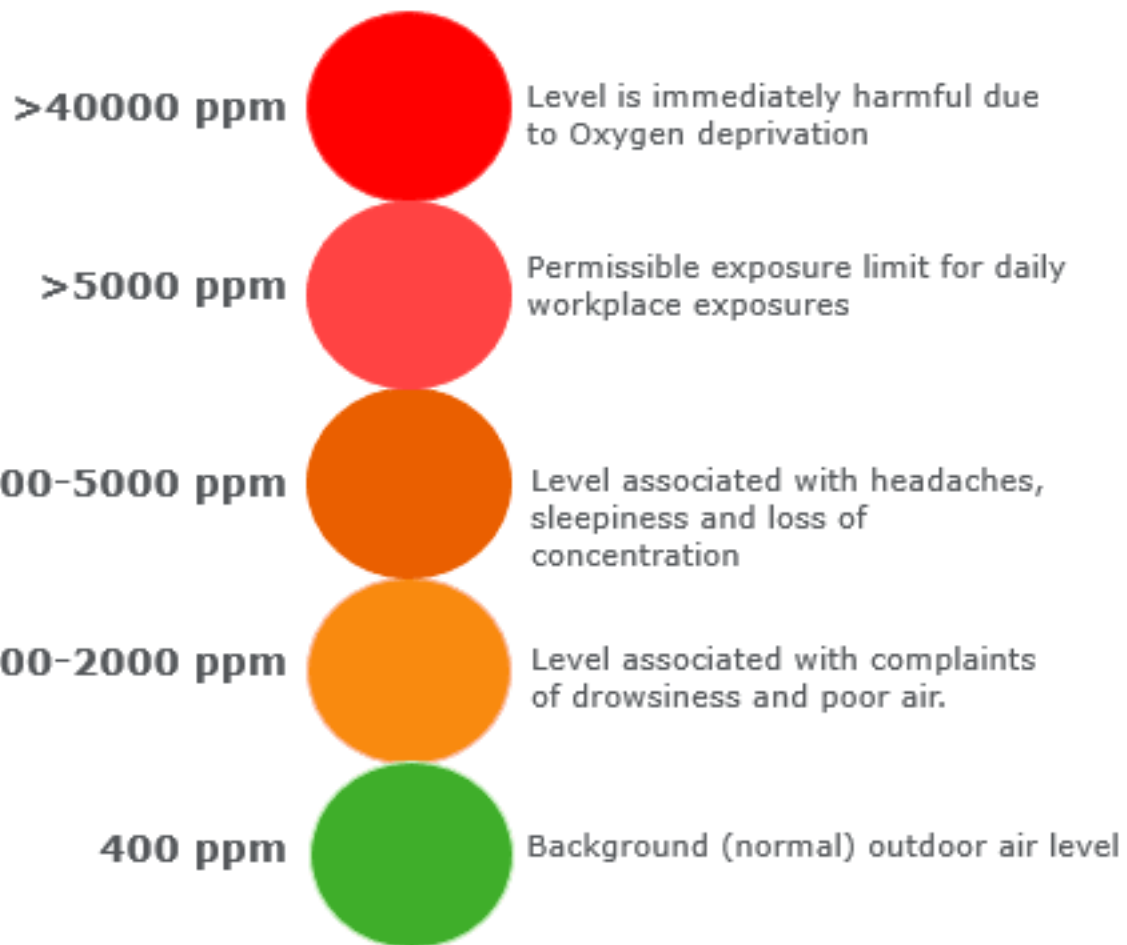
# My House, My Rules

Examining the impact of cultural behaviour on air quality  
in White British and British Asian Homes

Acknowledgement:

This film is part of the ongoing research,  
and the research was made possible by the RIBA Research Fund 2021.

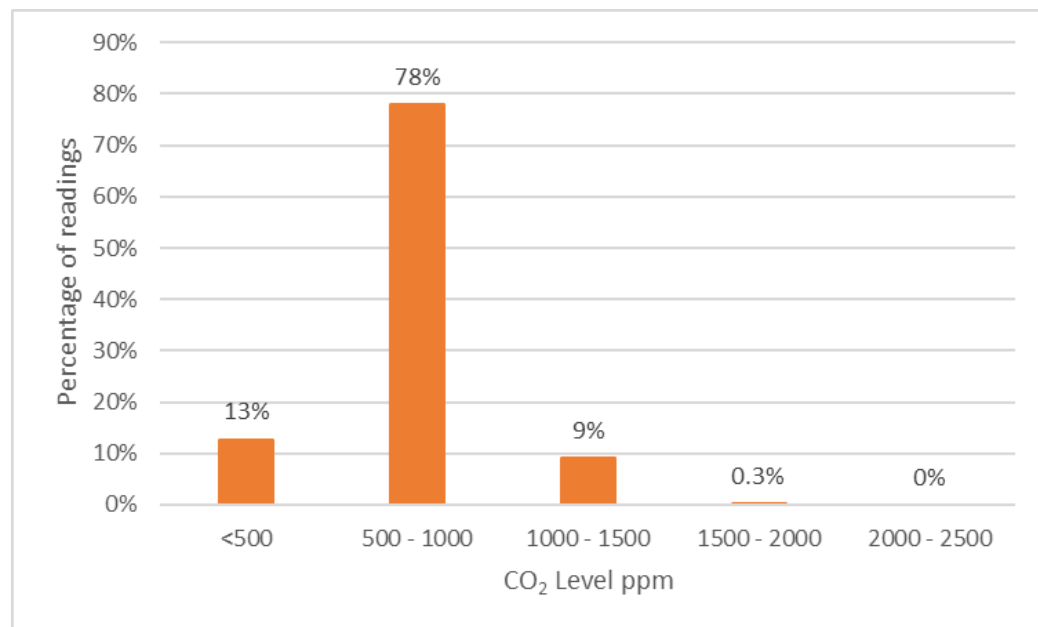
## How CO2 levels impact on the human body



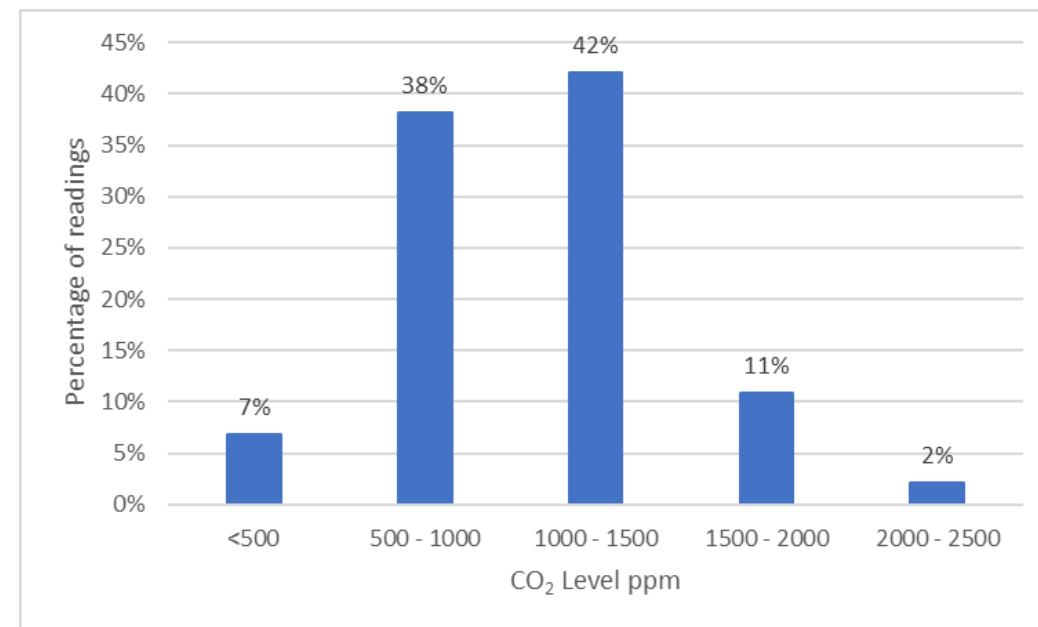
Source: Occupational Health & Safety | <https://ohsonline.com>

### Indoor air quality

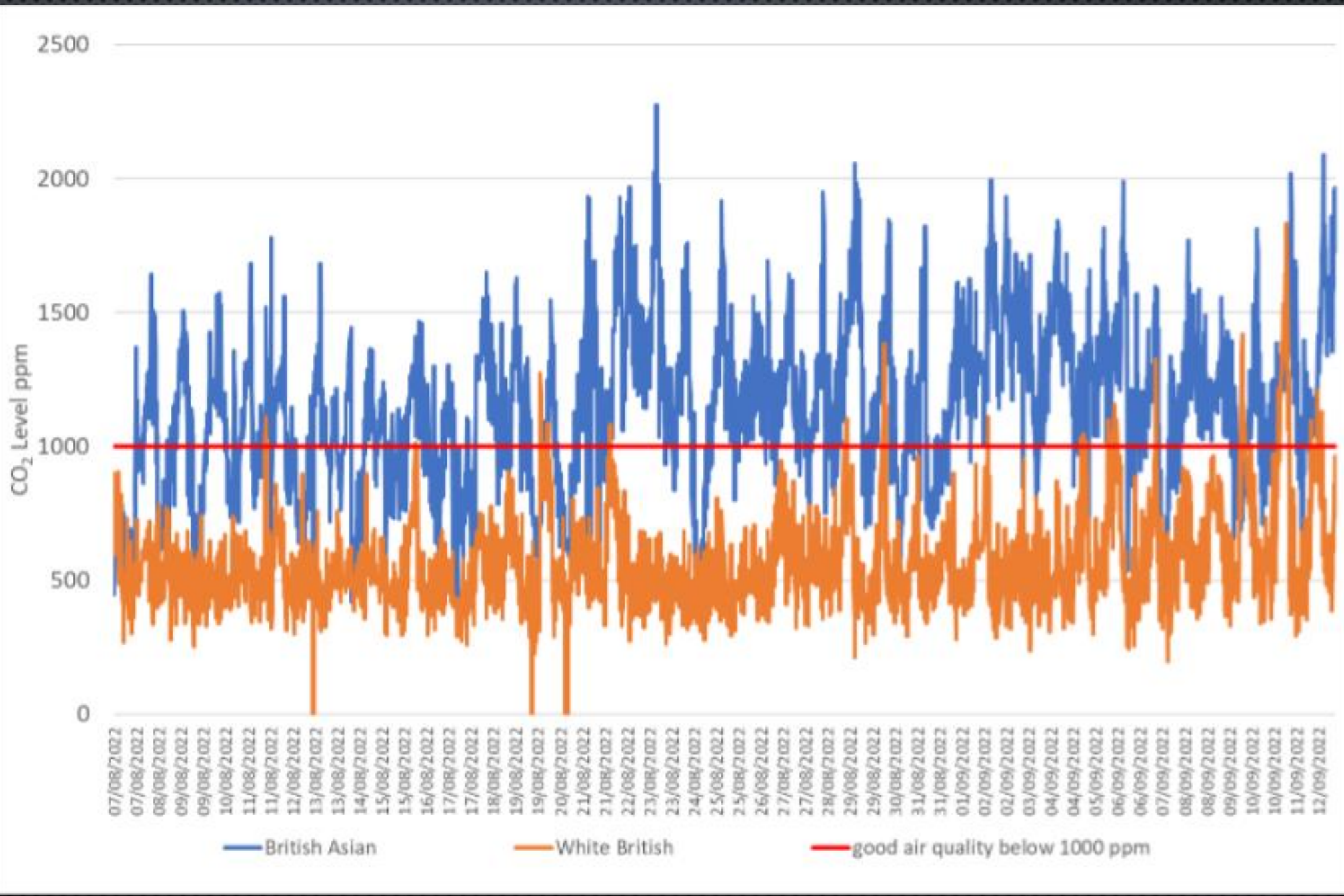
- Common guidance
- Building regulations Part F no specific CO<sub>2</sub> levels



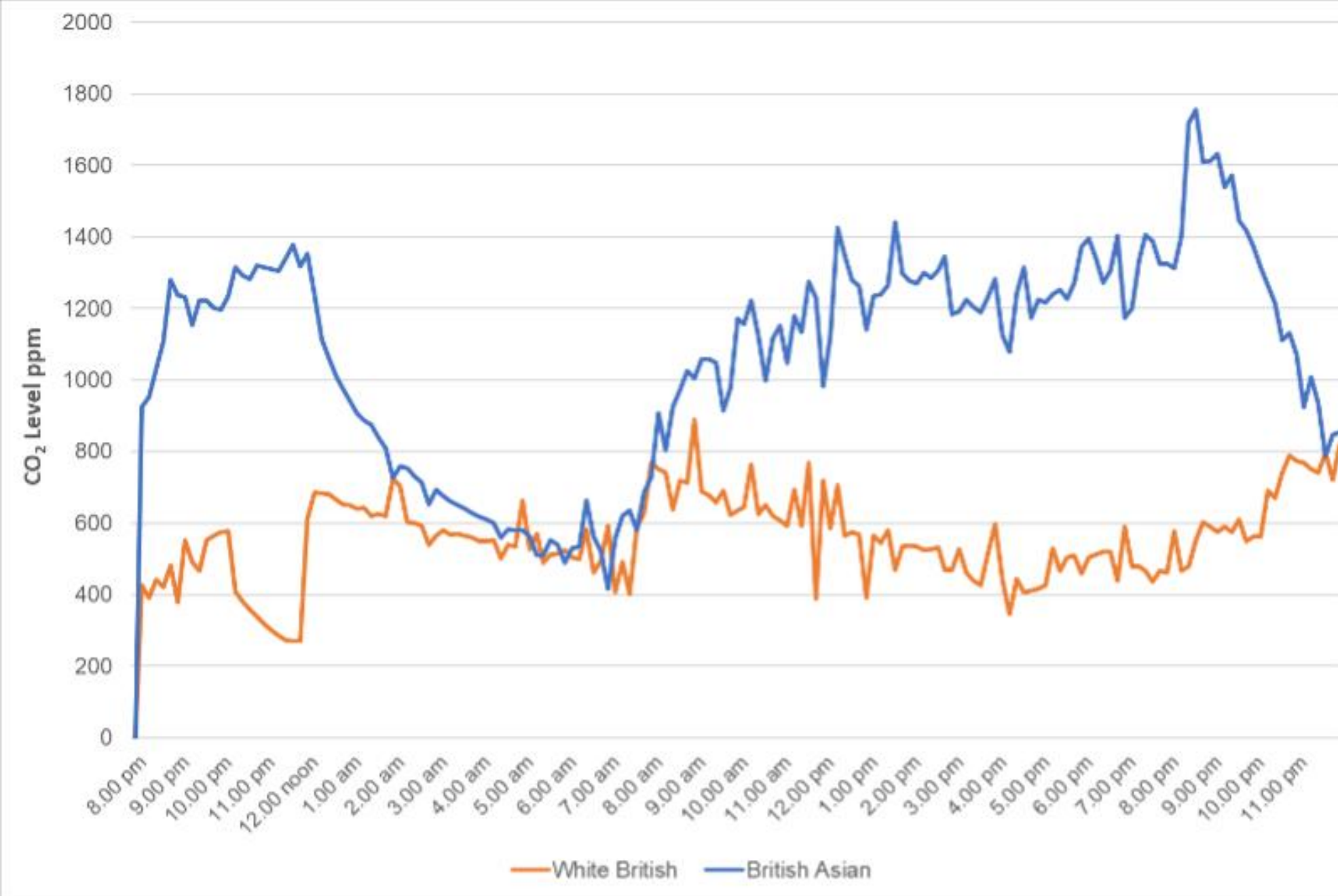
White British home



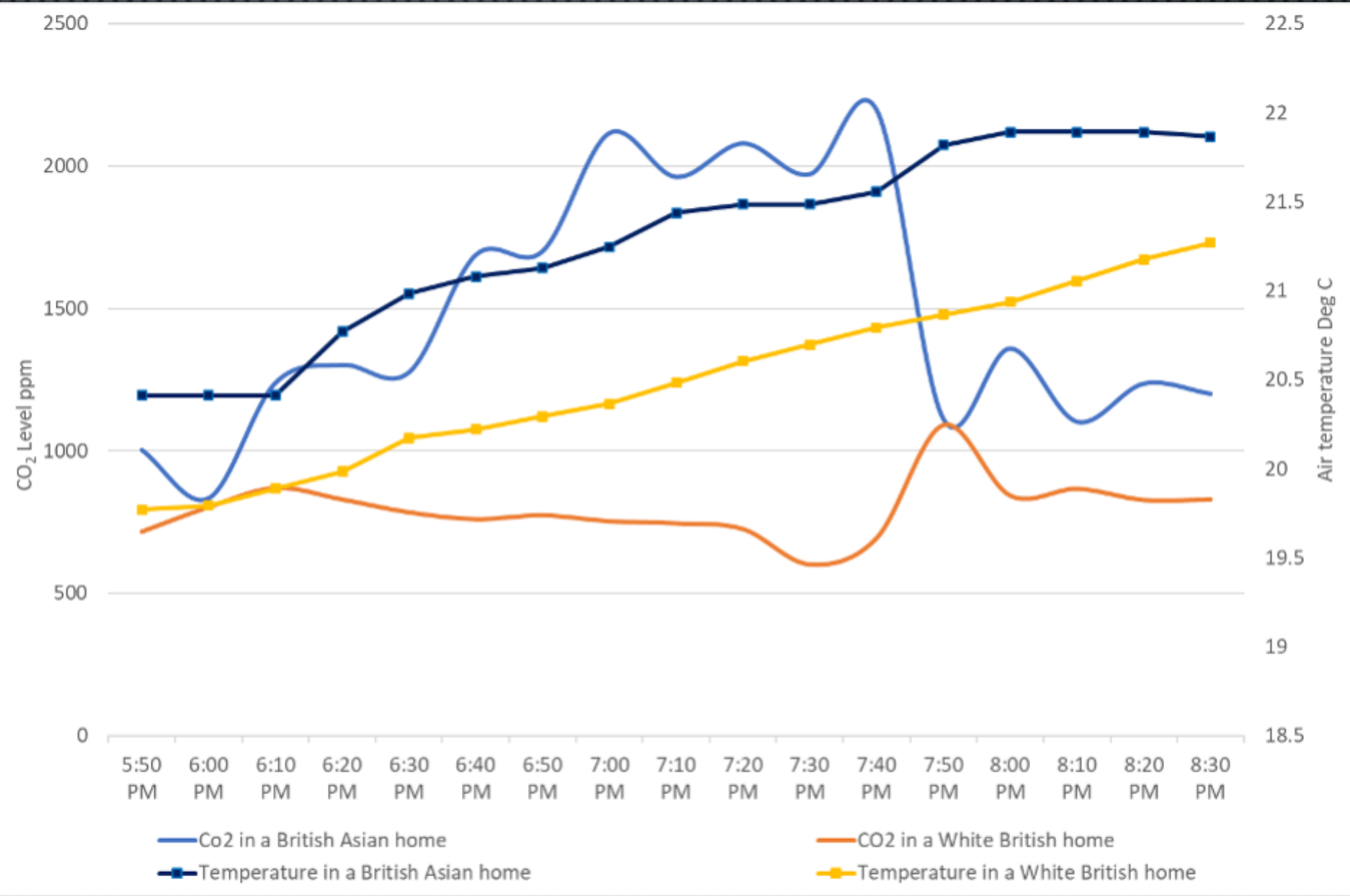
British Asian home



Comparative CO<sub>2</sub> level in the British Asian and White British home

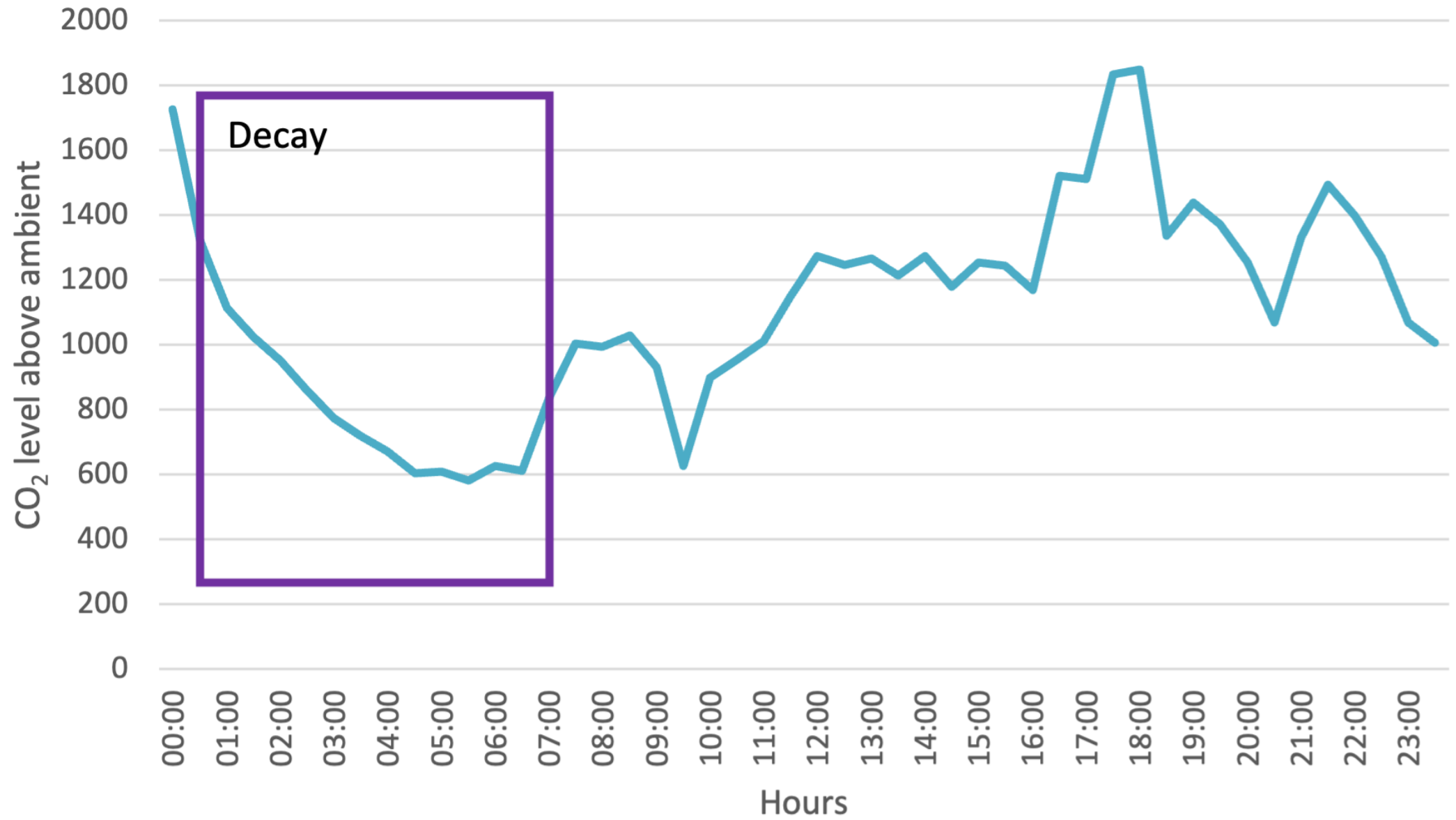


Comparative CO<sub>2</sub> level in the British Asian and White British home – one day



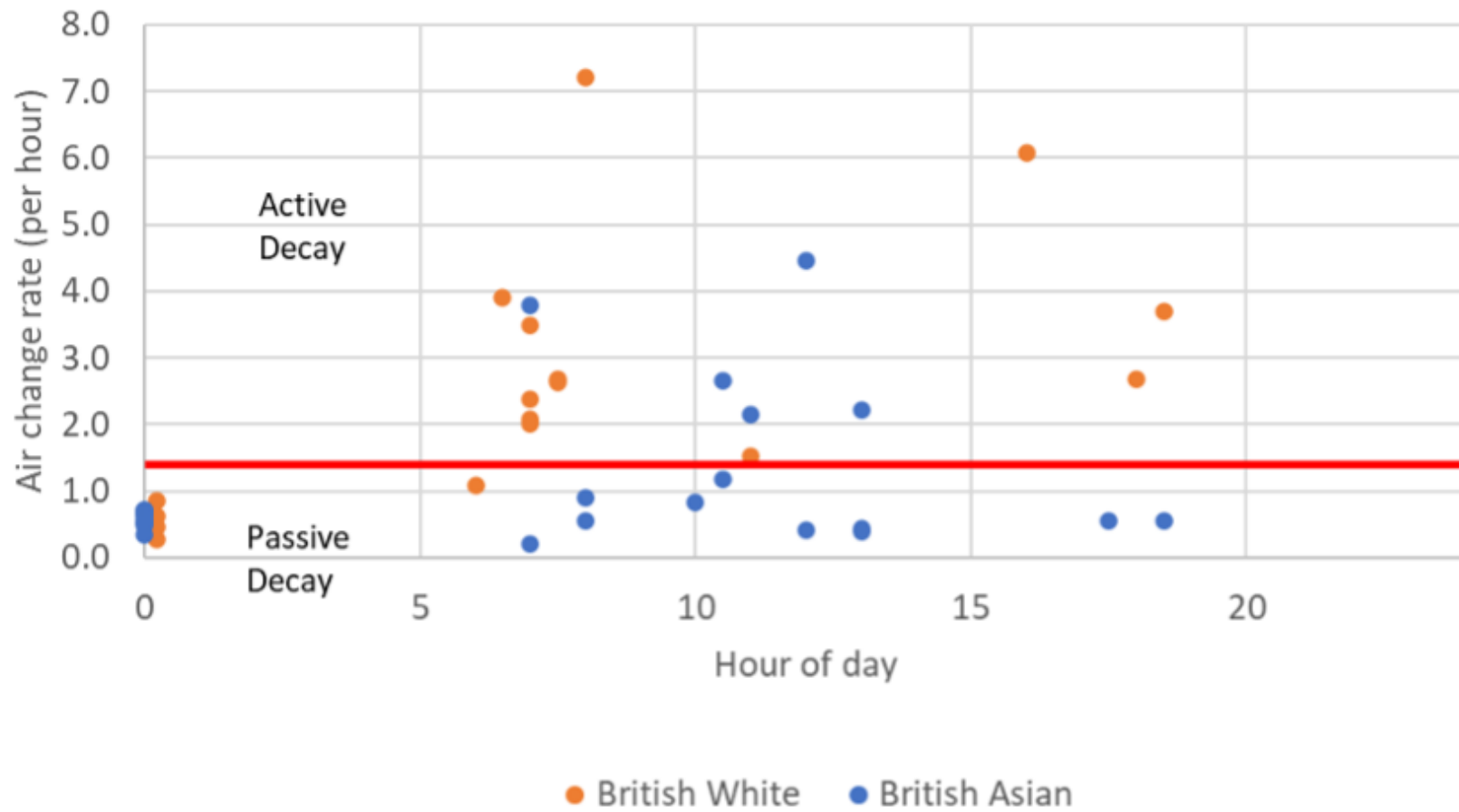
Comparative CO<sub>2</sub> level in the British Asian and White British home – three hours

# Sample day



Sample CO<sub>2</sub>  
Decay

# Decay results



Kitchen CO<sub>2</sub> Decays from all homes



UKRI-IAA Project:  
Good practice guide to raise awareness of indoor air quality on the health and well-being of ethnic minorities.

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Engineering and  
Physical Sciences  
Research Council



Ethnic Minorities  
and Youth Support  
Team Wales

Tim Cymorth  
Lleiafrifoedd Ethnig  
ac Ieuenctid Cymru

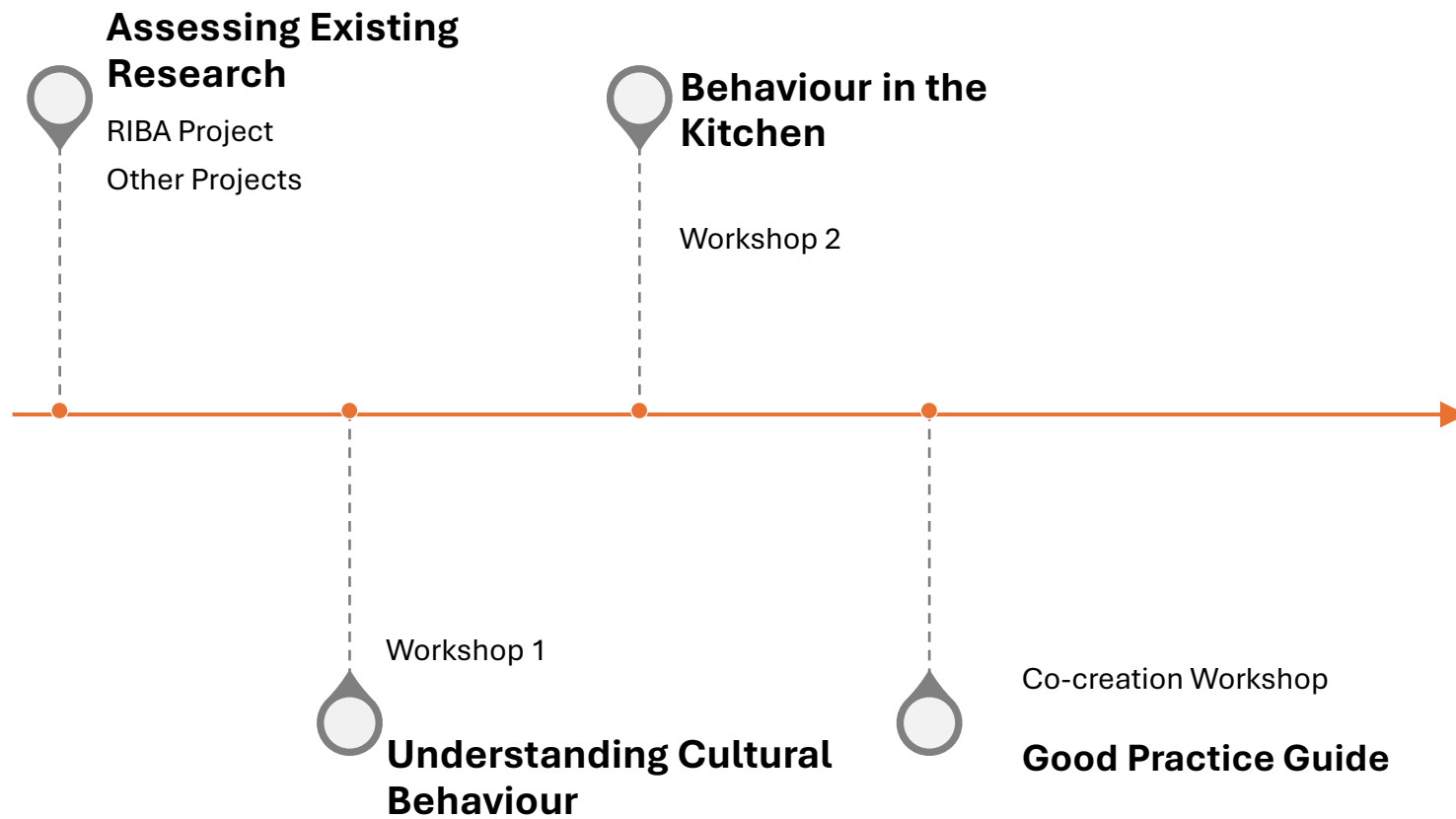


Llywodraeth Cymru  
Welsh Government

# Cultural Pattern and IAQ:

## Raising Awareness on Health and Well-Being in Ethnic Minority Homes.

### EPSRC-IAA project



**INTRODUCTION**

The EPSRC funded project explores how cultural practices in ethnic minority households affect indoor air quality. Working on reduced Carbon Dioxide levels from cooking and ventilation health. The resulting Good Practice Guide developed with local residents, FOSH and Cardiff Council, offers practical advice on how to reduce indoor air pollution. It is part of the **Wellbeing of Future Generations (Wales) Act 2015**. The project understands the importance of air quality in promoting health and well-being. Following these guidelines can reduce the harmful effects of cooking fumes, heating appliances, and more outdoor connections in new Wales.

**A More Equal Wales**

The project supports a more equal Wales by targeting health disparities in ethnic minority communities through focused support and education.

**A Healthier Wales**

The project promotes a healthier Wales by advocating environmental connections about opening windows and applying to reduce indoor air quality. The project also provides participants always mechanical ventilation (MVR) more emphasizing for apartment of their properties by providing well-being and promoting health effects.

**A Resilient Wales**

The project strengthens Welsh communities resilience by providing better indoor air quality for sustainability and health.

**A Wales of Diverse Culture & Talking Welsh Language**

The project promotes inclusive cultural engagement and environmental change within ethnic minority communities, supporting the goal of building inclusive communities in new Wales.

**A Wales of Cohesive Communities**

The project's workshops and activities foster community spirit to partner and shared responsibility, supporting the goal of building inclusive communities in new Wales.

**A Globally Responsible Wales**

The project focuses on sustainability and better living conditions support global goals and aligns with the vision for a globally responsible Wales.

**Partnership Statement:**

Developing a new programme to improve indoor air quality in ethnic minority homes and how it affects the wellbeing? "I engaged the workshop, I learnt how to measure the quality of my indoor environment" "Before the project, I thought indoor air quality was not such a big issue, but now I know it is" "Before the project, I thought indoor air quality was not such a big issue, but now I know it is"

For more information:  
Scan the code or visit:  
<https://www.epsrc.gov.uk/funding/epsrc-iaa-wales-good-practice-guide>

**Cooking Up Good Air Quality for Better Wellbeing**

### Good Practice Guide

	Before Cooking	While Cooking	After Cooking
<b>Wellbeing &amp; Indoor Environment Quality</b>	<ul style="list-style-type: none"> <li>Open windows and external doors to manage steam and odour.</li> <li>Turn on extractor fan if available.</li> <li><b>Tip</b> Consider daily ventilation for the kitchen, even if not cooking.</li> </ul>	<ul style="list-style-type: none"> <li>Keep windows open and extractor fans on to manage steam and odour.</li> <li>Keep the internal kitchen door closed.</li> <li>Open windows in adjoining rooms to open up both floors and/or the garden door to promote cross ventilation.</li> <li><b>FACT</b> Keeping the fan on while opening the window can result in cross ventilation.</li> </ul>	<ul style="list-style-type: none"> <li>Leave fans on for a minimum of 10 minutes to reduce moisture and prevent condensation.</li> <li>Keep windows open for at least 30 minutes to allow fresh air circulation.</li> <li><b>Tip</b> Use aluminium if applicable to control moisture levels.</li> </ul>
<b>Cleanliness</b>	<p><b>In order to keep the cooking area clean and free from other sources of contamination, follow this:</b></p> <ol style="list-style-type: none"> <li>1. Ensure the cooking area is clean and free from clutter.</li> <li>2. Remove food waste prior to starting cooking.</li> <li>3. Wash hands thoroughly before handling food.</li> </ol>	<ul style="list-style-type: none"> <li>Frequent cleaning helps reduce the pollution in the kitchen.</li> <li><b>FACT</b> Clean as you go.</li> <li>Wash the dishes.</li> <li><b>Tip</b> Store some equipment while cooking.</li> </ul>	<p><b>After finishing cooking practices make sure to complete the following:</b></p> <ol style="list-style-type: none"> <li>1. Wash all dishes and clean the kitchen thoroughly, including wiping down surfaces.</li> <li>2. Clear any remaining contamination from windows.</li> </ol>
<b>Time saving</b>	<ul style="list-style-type: none"> <li><b>FACT</b> Limiting cooking time can reduce stress &amp; support a healthier lifestyle.</li> <li>Take out necessary cooking equipment (pans, chopping boards).</li> <li>Prepare all ingredients (chop vegetables, wash etc) before starting to cook.</li> </ul>	<ul style="list-style-type: none"> <li>Consider bulk cooking for time saving and less exposure to cooking fumes with prepping the meals and refrigerating them in advance for future cooking.</li> <li>Use the right pan size that matches the gas burner to improve the heating process.</li> </ul>	<ul style="list-style-type: none"> <li>Publishers from cooking can be more harmful than outdoor pollution.</li> <li><b>FACT</b> For your wellbeing, if you don't need to be in the kitchen, step by:</li> <li>Reading a book</li> <li>Have a cuppa</li> <li>Light activities such as gardening</li> <li>Decorate your kitchen with indoor plants</li> </ul>







## CO-CREATION WORKSHOPS

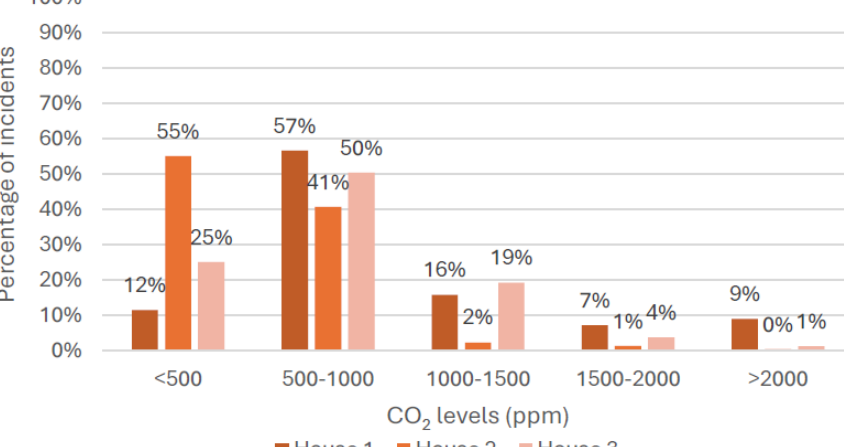
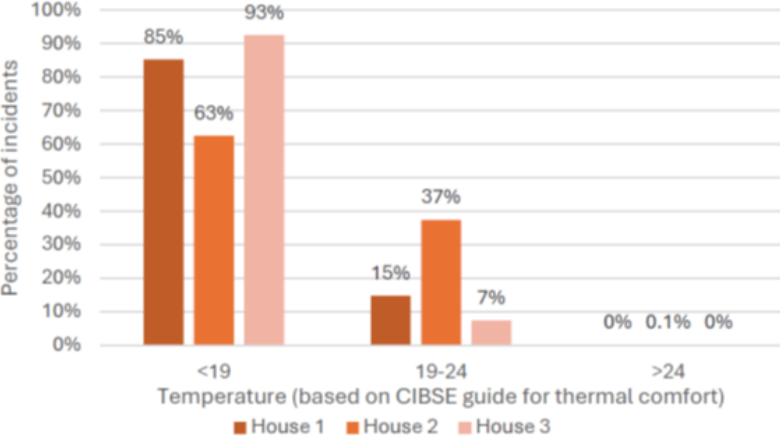
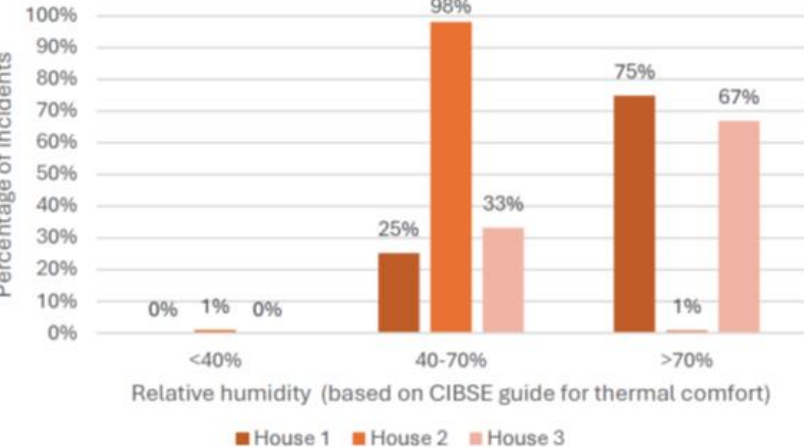
# Monitoring Data and Diary Logging



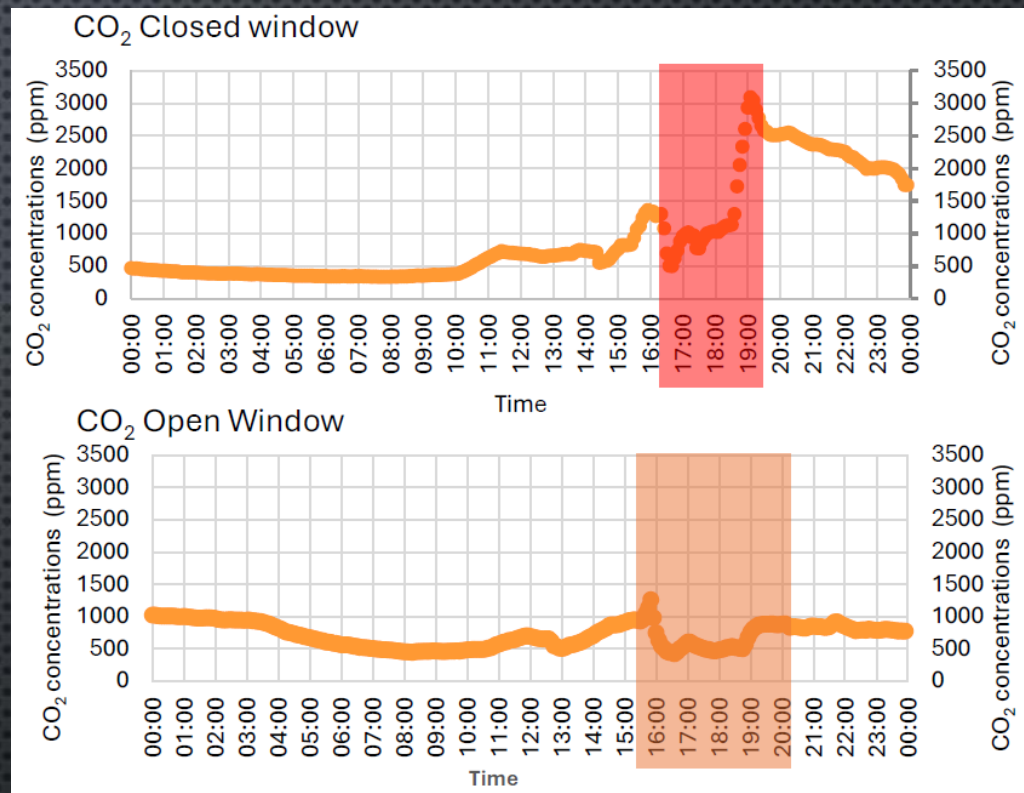
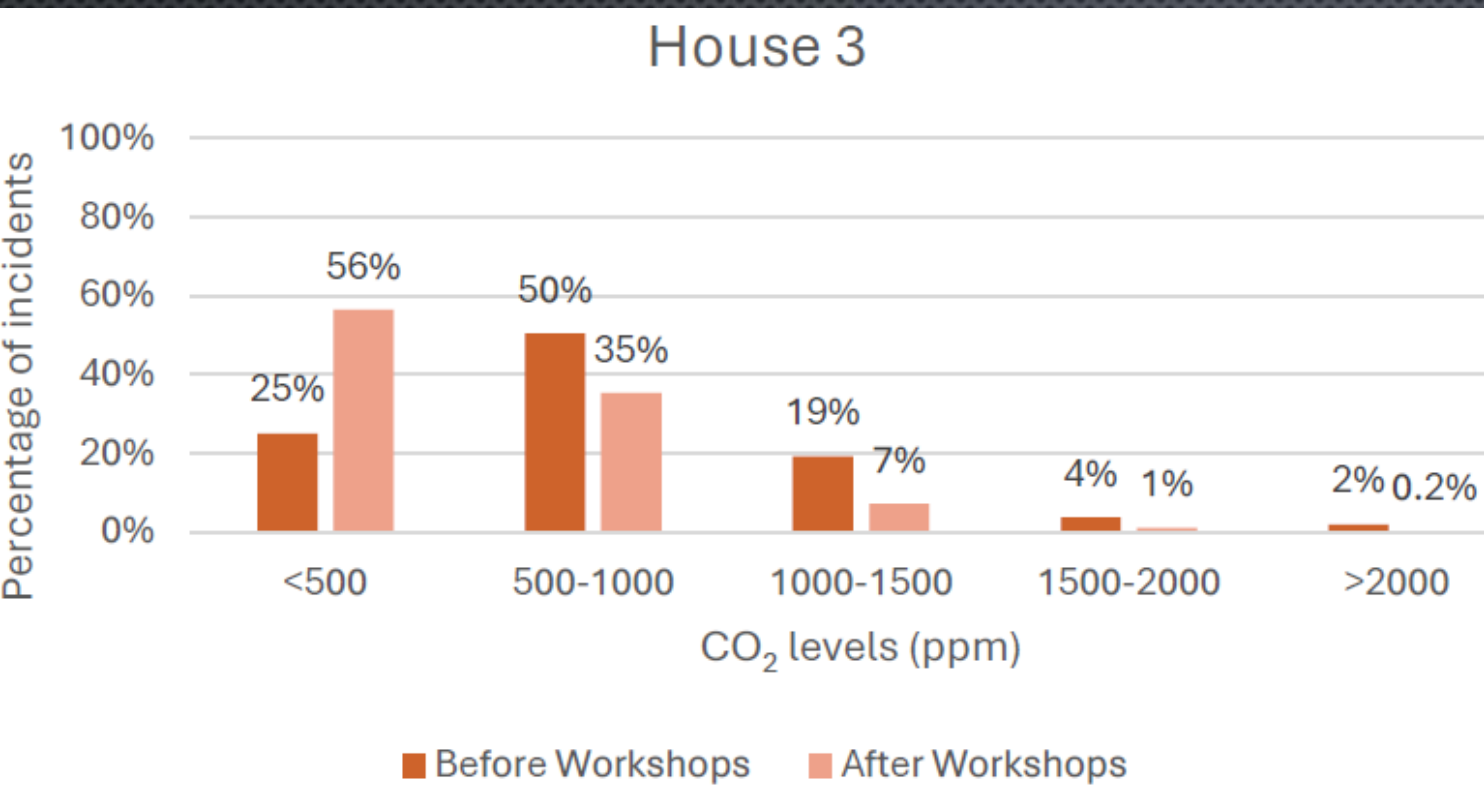
Project: Good practice guide to raise awareness of indoor air quality on the health and well-being of ethnic minorities.

## Daily activity log

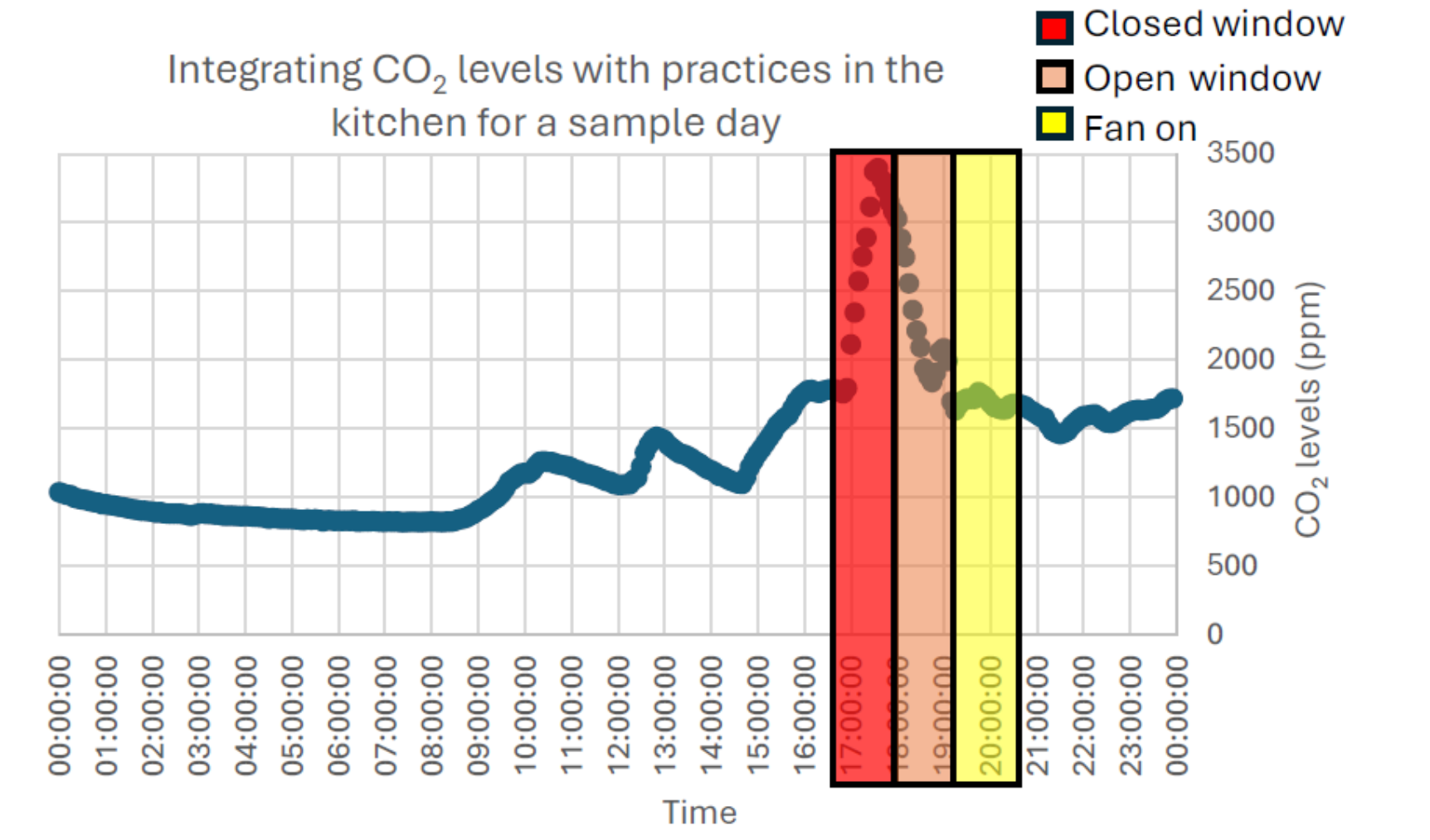
Date:	Kitchen Activities				How did you feel being in the kitchen? (Headaches, Fatigue, Dizzy, No difference, etc)	Any other observations (High humidity, increased temperature, Window condensation, etc)
	Activity	If cooking, what type? (Frying, Grilling, etc)	Duration	Associated Activity (Open/Close window, wash dishes, etc)		
6.00 am						
6.15 am						
6.30 am						
6.45 pm						
7.00 am						
7.15 am						
7.30 am						
7.45 pm						
8.00 am						
8.15 am						
8.30 am						
8.45 am						
9.00 am						
9.15 am						
9.30 am						
9.45 am						
10.00 am						
10.15 am						
10.30 am						
10.45 am						
11.00 am						
11.15 am						
11.30 am						
11.45 am						
12.00 pm						
12.15 pm						
12.30 pm						



# Integrating Behavioural Patterns with Monitoring Data



# Impact of behaviour and fans



## INTRODUCTION

This EPSRC-funded project explores how cultural practices in ethnic minority households affect indoor air quality, focusing on elevated Carbon Dioxide levels from cooking and ventilation habits. The resulting 'Good Practice Guide,' developed with local residents, EYST, and Cardiff Council, offers culturally sensitive advice to enhance indoor air quality. By aligning with the **Wellbeing of Future Generations (Wales) Act 2015**, this project underscores the important role of air quality in promoting health and well-being. Following these guidelines can reduce the harmful effects of cooking fumes, fostering healthier, more resilient communities across Wales.



### A More Equal Wales

The project supports a more equal Wales by targeting health disparities in ethnic minority communities through focused support and information.



### A Healthier Wales

The project promotes a healthier Wales by educating ethnic minority communities about improving indoor air quality to reduce health issues. After the workshops, our project participants' diaries mentioned ventilation 18% more, emphasising the importance of these practices for protecting well-being and preventing harmful effects.



### A Resilient Wales

The project strengthens Welsh communities' resilience by promoting better indoor air quality for sustainability and health.



### A Wales of Vibrant Culture & Thriving Welsh Language

The project promotes inclusive cultural engagement and intercultural dialogue within ethnic minority communities, using culture as a tool for social change and preserving diverse practices in Wales.



### A Wales of Cohesive Communities

The project's workshops and collaboration foster community participation and shared responsibility, supporting the goal of building cohesive communities in Wales.



### A Globally Responsible Wales

The project's focus on sustainability and better living conditions supports global goals and aligns with the vision for a globally responsible Wales.

## Participants Testimonies

"participating in the project was a learning curve for me, I understood my kitchen environment and how it affects my wellbeing"

"I enjoyed the workshops, I learnt how to maintain the quality of my kitchen environment"

"Before this project, I hadn't realised how much cooking fumes could negatively impact my health."

This guide the outcome of the EPSRC IAA Project 'Good practice guide to raise awareness of indoor air quality on the health and wellbeing of ethnic minorities.'












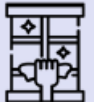






# Cooking Up Good Air Quality for Better Wellbeing



For more information:



Scan the code / visit:  
<https://tinyurl.com/y5vab7xf>  
email: [satish.bk@cardiff.ac.uk](mailto:satish.bk@cardiff.ac.uk)

	Before Cooking	While Cooking	After Cooking	
Ventilation & Indoor Environment Quality	<p> Open windows and external doors to ensure proper airflow</p> <p> Turn on extractor fans if available.</p> <p><b>Also Try to</b> Consider daily ventilation for the kitchen, even if not cooking</p>	<p>Keep windows open and extractor fans on to manage steam and odors.</p> <p>Keep the internal kitchen door closed </p> <p>Open windows in adjoining rooms in open-plan kitchens and/or the garden door to promote cross ventilation.</p> <p><b>FACT</b> Keeping the fan on while opening the window can create a cross ventilation.</p>	<p>Leave fans on for a minimum of 10 minutes to reduce moisture and prevent condensation. </p> <p> Keep windows open for at least 30 minutes to allow fresh air circulation</p> <p><b>Also Try to</b> Use dehumidifiers if applicable to control moisture levels. </p>	Ventilation & Indoor Environment Quality
Cleanliness	<p><b>In order to keep the cooking area clean and free from extra sources of contamination, Follow this:</b></p> <p><b>1</b> Ensure the cooking area is clean and free from clutter </p> <p><b>2</b> Remove food waste prior to starting cooking</p> <p><b>3</b> Wash hands thoroughly before handling food. </p>	<p>Frequent cleaning helps reduce the indoor pollutants in kitchens. <b>FACT</b></p> <p>Clean as you go </p> <p>Wash the dishes </p> <p><b>Also Try to</b> Reuse some equipment while cooking.</p>	<p><b>After finishing cooking practices make sure to complete the following:</b></p> <p><b>1</b> Wash all dishes and clean the kitchen thoroughly, including wiping down surfaces. </p> <p><b>2</b> Clear any remaining condensation from windows. </p>	Cleanliness
Time saving	<p><b>FACT</b> Limiting cooking time can reduce stress &amp; support a healthier lifestyle.</p> <p> Take out necessary cooking equipment (pans, chopping boards).</p> <p> Prepare all ingredients (chop vegetables, wash rice, prepare meat) before cooking.</p>	<p> Consider bulk cooking for time-saving and less exposure to cooking fumes such as preparing the sauces and refrigerating them in advance for future cooking.</p> <p> Use the right pan size that matches the gas burner to improve the burning process.</p>	<p>Pollution from cooking can be more harmful than outdoor pollution. <b>FACT</b></p> <p>For your wellbeing, if you don't need to be in the kitchen, relax by:</p> <ul style="list-style-type: none"> <li>Reading a book</li> <li>Have a cuppa </li> <li>Light activities such as gardening </li> </ul> <p>Decorate your kitchen with indoor plants</p>	Health, Safety & wellbeing

QUESTIONS...

THANK YOU



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