WellHome study protocol for investigating indoor air pollution

In London, we are all aware of air pollution in the outside environment, but have you ever considered whether there is pollution in your home? Inside our houses, air pollution can be caused by cooking, using cleaning products or even burning candles. This can possibly cause serious health issues, especially for more vulnerable people like children with asthma and allergies. But there isn't a lot of research on indoor air pollution in the UK, so we don't know how big this problem is.

We worked with the local community in West London to investigate where indoor air pollution comes from, and how it affects us. For this study to succeed, we needed to collect data from inside people's houses, so it was really important that we included the community from the beginning of the project. Before our research started we asked local residents to tell us what they wanted to know about indoor air pollution, and how they would like to be included in the research. This helped us to make sure that this research would be useful for the people involved in the study, and without whom, the study would not have been possible.

To understand this complicated issue, we measured indoor pollution in 100 homes across West London. Through our engagement team and local parters, we invited local households to volunteer to be a part of this research. When we were selecting the homes, we prioritised families with children that have asthma or allergies and made sure that the sample reflected the diversity of the community. We made clear that participants could choose to leave the study at any time, and that any personal information collected will be stored securely.

Imperial College London

Data was collected from each of these homes over two 28-day periods. To learn more about where indoor air pollution comes from, at the start and the end of this period, we gave participants questionnaires to understand more about their everyday activities at home before and during the test period (e.g. how they cook, clean and ventilate their homes). We asked the child with asthma or allergies, alongside a parent, to complete health questionnaires so that we could learn more about their asthma and allergy symptoms, and how they affect their lives. We also asked them to fill out a diary to document their daily activities.

We collected data on pollutants, like gases and particulate matter, using air pollution sensors placed in the kitchen, living room, and the child's bedroom. We also placed passive samples (small trays that collect pollutants from the environment) to capture chemical, biological and microplastics contaminants present in the participants' home. After the first 28-day period was over, we waited for between 3-6 months before starting the next data collection period in the same home.

During the monitoring period, data from the air quality sensors was automatically sent from the homes to the researchers via Wi-Fi. Passive samplers were collected at the end of each monitoring period, and their contents were analysed in our labs to shed a light on the types and quantities of different air pollutants in homes across West London. Through different methods of analysis we were able to identify the variety of chemicals, microplastics, particulate matter, and mould spores present in homes. We also used data from the Breathe London network (an existing network of outdoor air quality sensors) to learn more about the relationship between indoor and outdoor air pollution, and to understand how people are affected differently by air pollution in different places.

By combining the data from the air monitors with the information from the questionnaires we will be able to identify which activities inside the home are producing dangerous air pollutants. We can use this information to recommend ways people could change their indoor activities to reduce exposure to these health hazards, and to identify if there are any policy recommendations we can suggest to the government and local authorities to decrease indoor air pollutants in West London. By working closely

with the local community, we will make sure to only give fair recommendations that wouldn’t increase existing inequalities for people from disadvantaged backgrounds.