MAST5953 Creating Your Own Data

Measuring Engagement in Sustainable Practices

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Word Count: 1000

Introduction

Recycling, using reusable shopping bags, and avoiding single-use plastics are all examples of sustainable behaviours that may help solve serious environmental challenges, including climate change, pollution, and resource depletion (*12 Ways to Live More Sustainably* n.d.). Individuals participating in these behaviours may substantially contribute to waste reduction and conservation of natural resources. However, the effectiveness of these initiatives is heavily reliant on public knowledge and willingness to engage in sustainable behaviours. Understanding how people perceive and accept these behaviours is critical for designing targeted interventions, educational campaigns and legislation that promote general adoption.

This research is on developing and improving a survey question to assess how frequently people engage in popular sustainable practices. A well-designed survey question is essential for correctly collecting behaviours and attitudes. The Primary question posed as part of this study tries to determine the frequency of measures such as recycling and minimising plastic waste. The idea is to make sure the question is clear, understandable and includes a variety of views.

This study uses a two-phase pre-testing process: cognitive interviews with a small group of participants and a pilot survey with a larger sample of participants. Therefore, it assesses the effectiveness of the survey question in gathering relevant data. The insights gathered from this approach will not only help to improve the question but will also contribute to a better understanding of survey design as a tool for environmental research and policy development.

Method

The study has two phases: a cognitive interview with 2-3 people and a pilot survey with 10-20 participants. Participants were chosen to ensure diversity in background and knowledge with sustainable techniques. Cognitive interview participants gave in-depth insights, while the pilot survey evaluated the new question on a larger population.

Cognitive interview Process

Participants used a think-aloud protocol to verbalise their mental processes while answering survey questions. Pre-designed probes were utilised to investigate critical areas:

1. Comprehension Probe: “What does ‘single-use plastics’ mean to you?
2. Retrieval Probe: “How easy was it to recall your recycling behaviour in the past month?”
3. Judgment Probe: “How did you decide on your answer?”
4. Response Probe: “Were any response options missing?”

Pilot Survey Process

The modified question was evaluated with 10-20 people via Google Forms. The modified survey included clearer phasing and shorter recall timeframe ("past week"), and a larger answer scale with "Occasionally" added. Demographic data was gathered, and validated survey questions were used to ensure consistency.

Data Analysis: Responses were analysed with R and response patterns were summarised using visualisations (e.g. bar charts).

Results

The cognitive interview aimed to assess participants' comprehension, recall and ease of responding to questions regarding sustainability-related behaviours, with a particular emphasis on single-use plastics and recycling. Three participants all who were over the age of 18 participated in this study. Here are the results:

Table 1 shows the Confidence Level (Single-use Plastics and Recycling)

Question	Very confident	Somewhat confident	Not Confident
Single-use Plastic	1	1	1
Recycling	1	1	1

Table 2 shows the ease of Recall

Question	Easy	Moderate	Difficult
Single-use Plastic	1	1	1
Recycling	1	1	1

The pilot survey gathered information about sustainability awareness and behaviours. The study included 14 respondents, all of whom were between the ages of 18-24. They agreed to participate and share the findings given here, which are represented in the following figures.

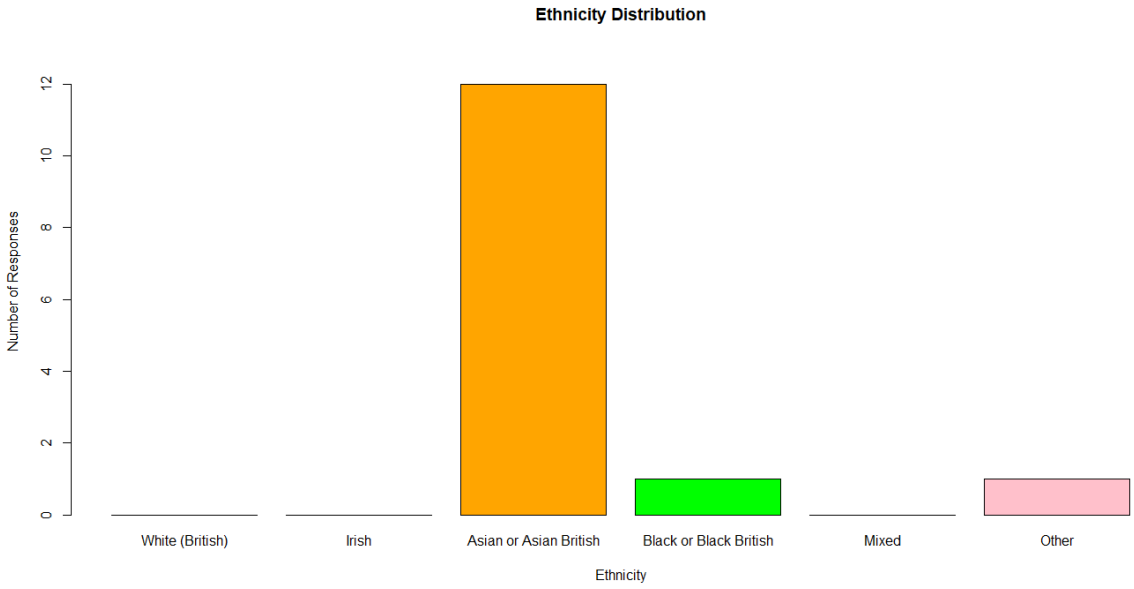


Figure 1 displays the distribution of survey participants based on their ethnicity.

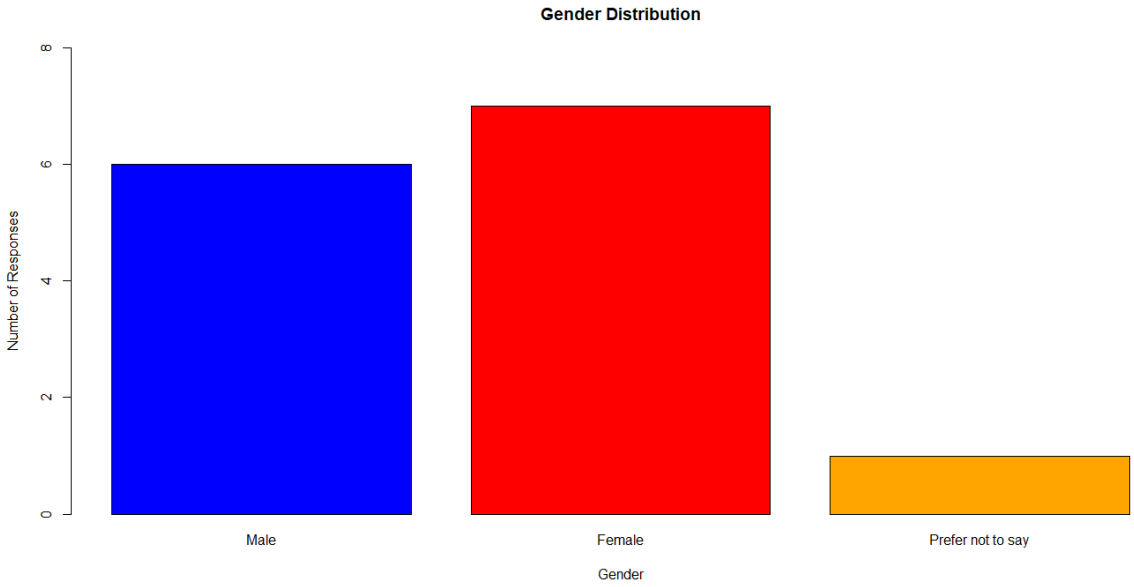


Figure 2 illustrates the gender distribution of survey participant.

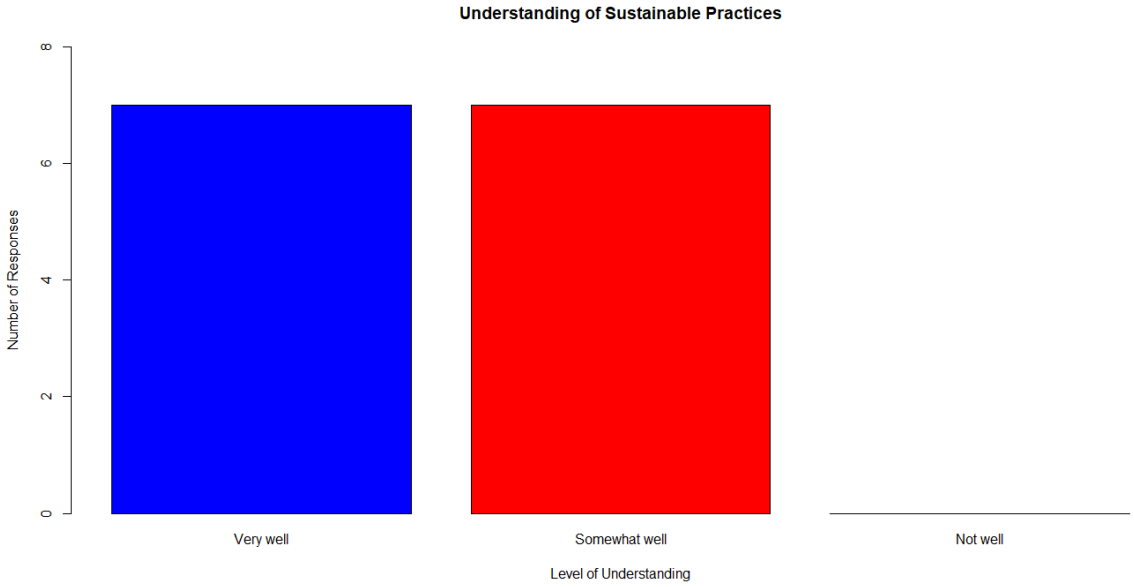


Figure 3 shows how well participants understand the concept of sustainable practices.

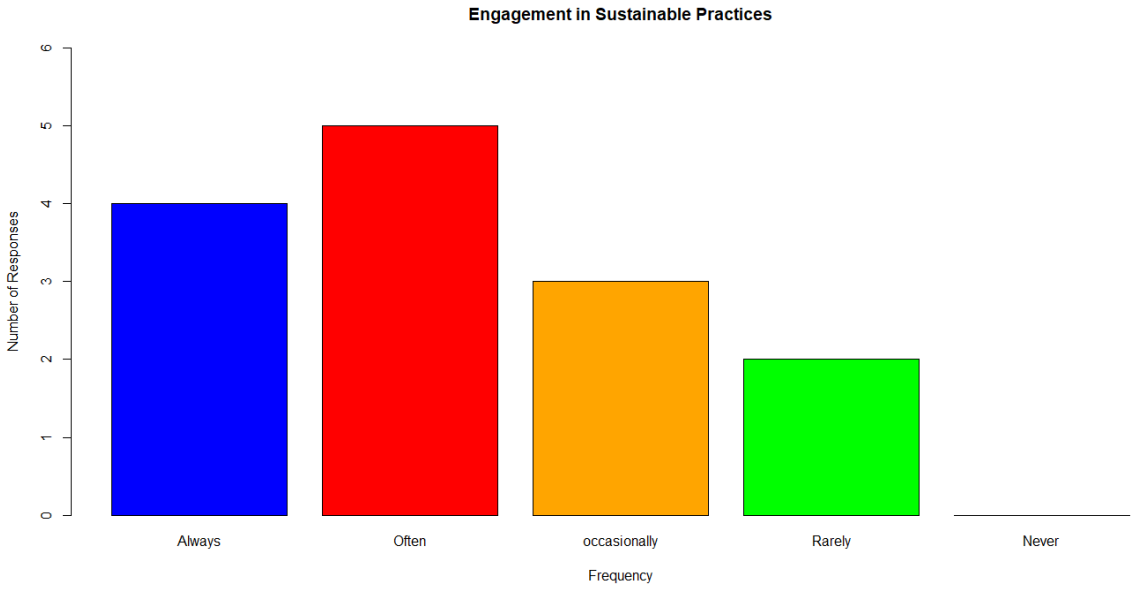


Figure 4 highlights the frequency with which participants engage in sustainable practices.

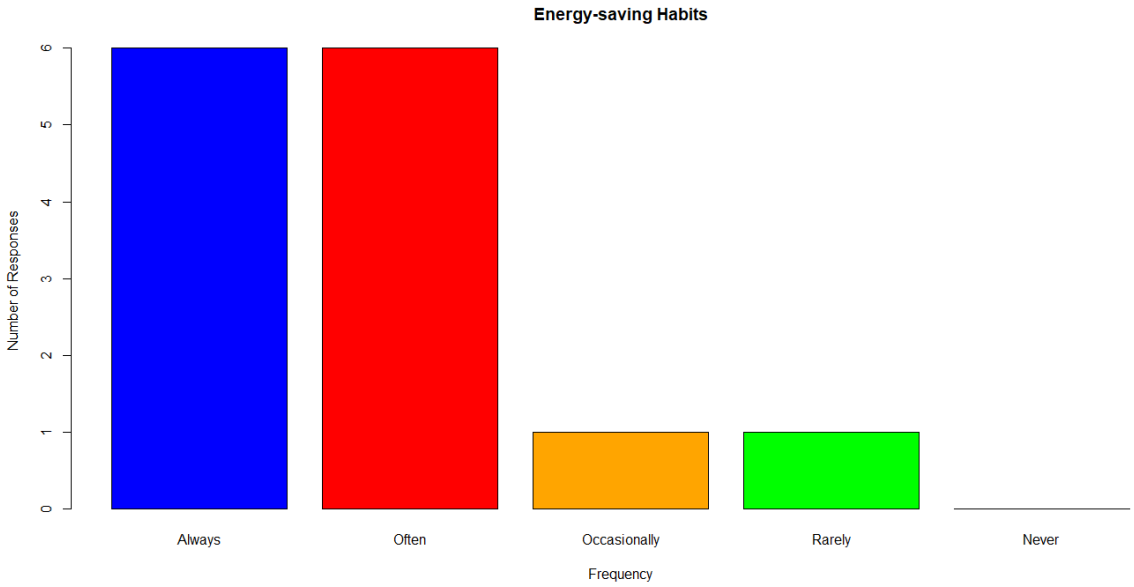


Figure 5 represents how often participants practice energy-saving habits

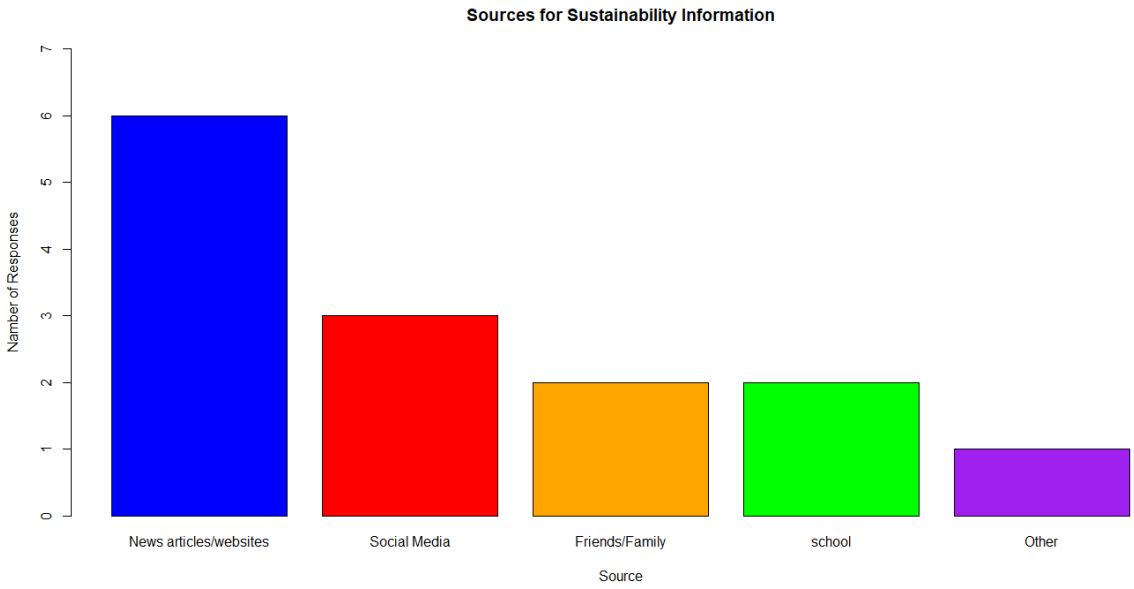


Figure 6 displays where participants obtain information about sustainability.

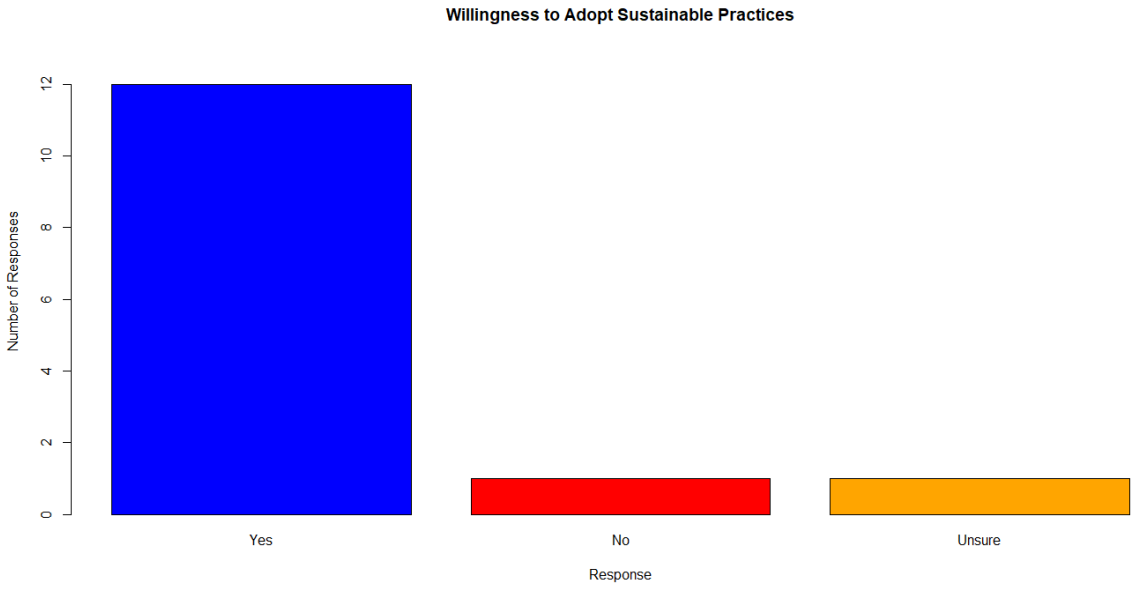


Figure 7 shows participants' willingness to adopt sustainable practices in the future.

Discussion

The cognitive interview found that participants view single-use plastics as throwaway objects and recycling as repurposing resources. Recall of instances varied, with some finding it simple and others having substantial difficulty. Confidence levels were evenly dispersed, indicating inequalities in knowledge and behaviour. Most participants considered the questions simple to answer, however many proposed changes, such as presenting examples for clarification. These findings underscore the need for better language and a chance to raise awareness about sustainable behaviours.

A small sample of 14 participants aged 18-24 completed the pilot survey, which gave useful insights into their sustainability knowledge and behaviours. All participants agreed to the survey and allowed their replies to be analysed and distributed. The findings, shown in Figure 1-7, demonstrate the awareness and engagement with sustainability practices.

The majority of respondents identified their ethnicity as Asian or Asian British, which is shown in Figure 1, with one identifying as Black or Black British and another choosing other. There were no replies for White (British), Irish or Mixed categories indicating that the same mostly represents a certain ethnic population. The gender distribution, figure 2, was fairly balanced, with slightly more females (7) than males (6) and one person choosing not to real their gender which provides a diverse viewpoint on sustainability knowledge and actions.

Participants indicated a high level of understanding of sustainable practices, which is shown in Figure 3, with responses evenly divided between "Very well" and "Somewhat well", indicating a strong basis for encouraging more sustainable behaviours. Engagement in sustainable behaviours varied in Figure 4, with the majority of participants choosing "Always" or "often", and none picking "Never", indicating a baseline level of sustainable

behaviour among all respondents. Energy-saving practices were widely practised, as shown in Figure 5, with “Always” and “Often” being the most popular replies, indicating a strong commitment to decreasing energy use.

The common sources of sustainability information, which is represented in Figure 6, are News articles and websites. This was then followed by social media, friends and family and then school, which highlighted the importance of digital platforms in teaching this age group. Finally, the majority of participants (12) reported a willingness to embrace more sustainable behaviours in the future (shown in Figure 7), with just one undecided and another refusing, indicating a favourable attitude towards sustainability and the opportunity for more education and efforts.

Increasing the sample size and diversity would improve the study which allows more viewpoints on sustainability. Incorporating behavioural observations with self-reported data, such as tracking recycling practices, may help to verify replies and eliminate bias. Exploring impediments (e.g. cost, convenience) and motives for sustainable behaviours would give more information on participants’ attitudes and actions.

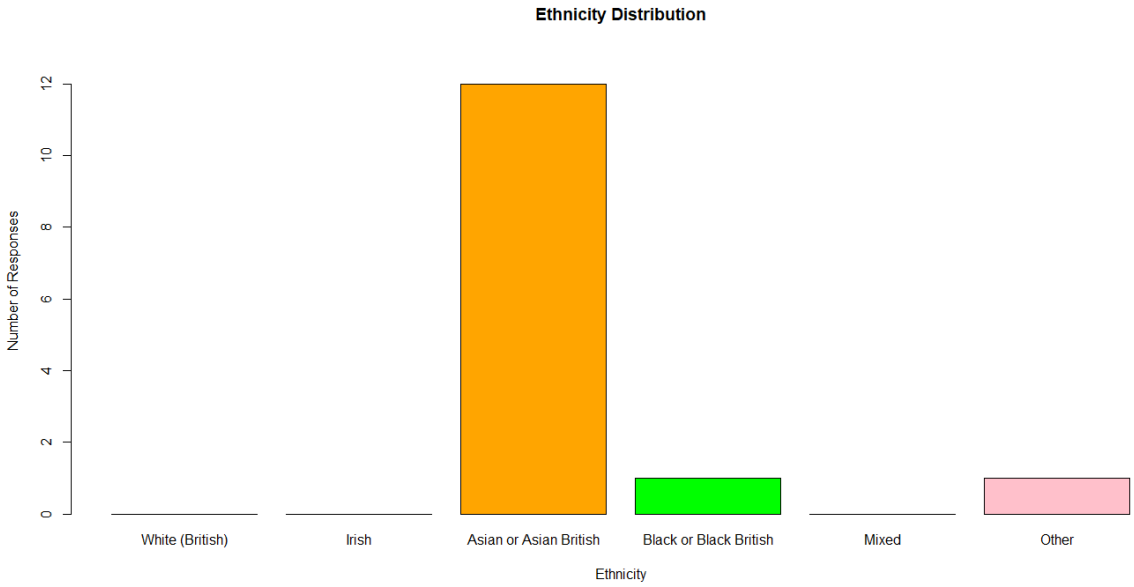
This study emphasises the need for cognitive interviews and pilot surveys in measuring sustainable behaviours. Insights indicated varying memory capacities, confidence levels and the need for more specific enquiries. Increasing sample variety, including behavioural observation and investigating obstacles can benefit future research and improve sustainability.

Appendix

Appendix 1: This R code shows what instructions were used to make figure 1

```
> #Data for Ethnicity
> ethnicity <- c(0, 0, 12, 1, 0, 1)
> names(ethnicity) <- c("White (British)", "Irish",
+                       "Asian or Asian British", "Black or Black British", "Mixed", "Other")
>
> #Bar chart for Ethnicity
> barplot(ethnicity,
+         main = "Ethnicity Distribution",
+         xlab = "Ethnicity",
+         ylab = "Number of Responses",
+         col = c("blue", "red", "orange", "green", "purple", "pink"),
+         ylim = c(0,max(ethnicity)+1))
>
```

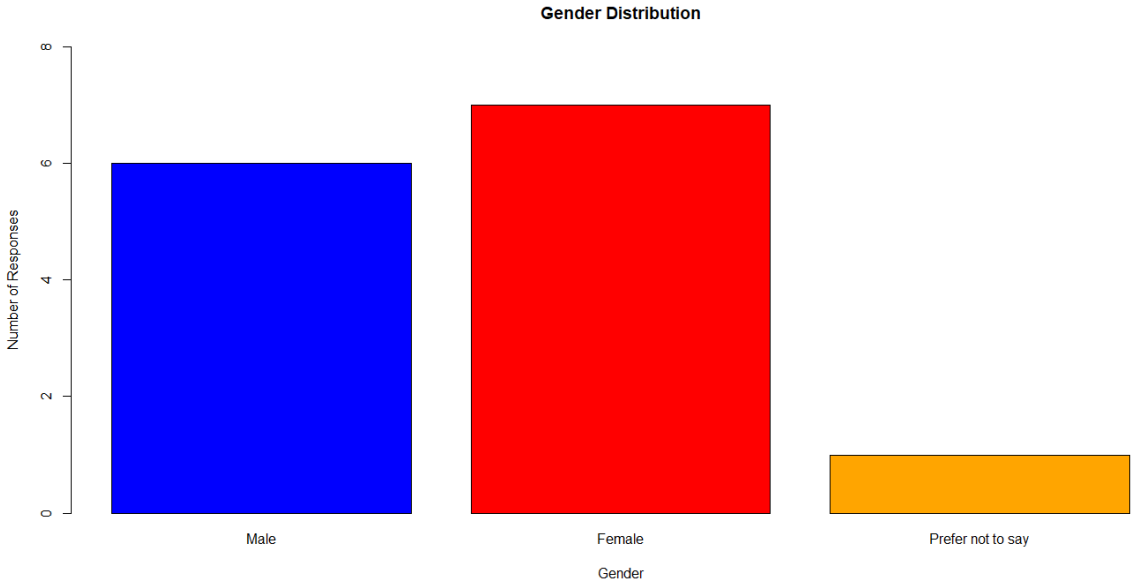
This is what the r code produced:



Appendix 2: This R code shows what instructions were used to make figure 2.

```
> #Data for Gender
> gender <- c(6,7,1)
> names(gender) <- c("Male", "Female", "Prefer not to say")
>
> #Barchart for Gender
> barplot(gender,
+         main = "Gender Distribution",
+         xlab = "Gender",
+         ylab = "Number of Responses",
+         col = c("blue","red", "orange"),
+         ylim = c(0, max(gender)+1))
>
```

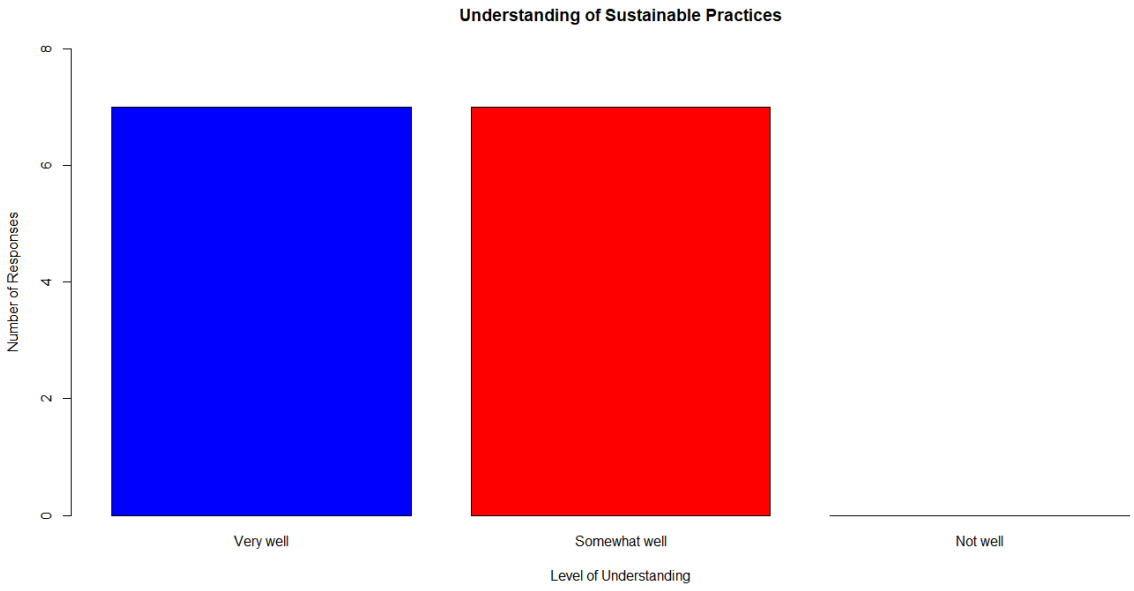
This is what the r code produced:



Appendix 3: R code shows what instructions were used to make figure 3.

```
> #Data for Understanding Sustainability
> understanding <- c(7,7,0)
> names(understanding) <- c("Very well", "Somewhat well", "Not well")
>
> #Bar chart for Understading Sustainability
> barplot(understanding,
+         main = "Understanding of Sustainable Practices",
+         xlab = "Level of Understanding",
+         ylab = "Number of Responses",
+         col = c("blue", "red", "orange"),
+         ylim = c(0,max(understanding)+1))
>
```

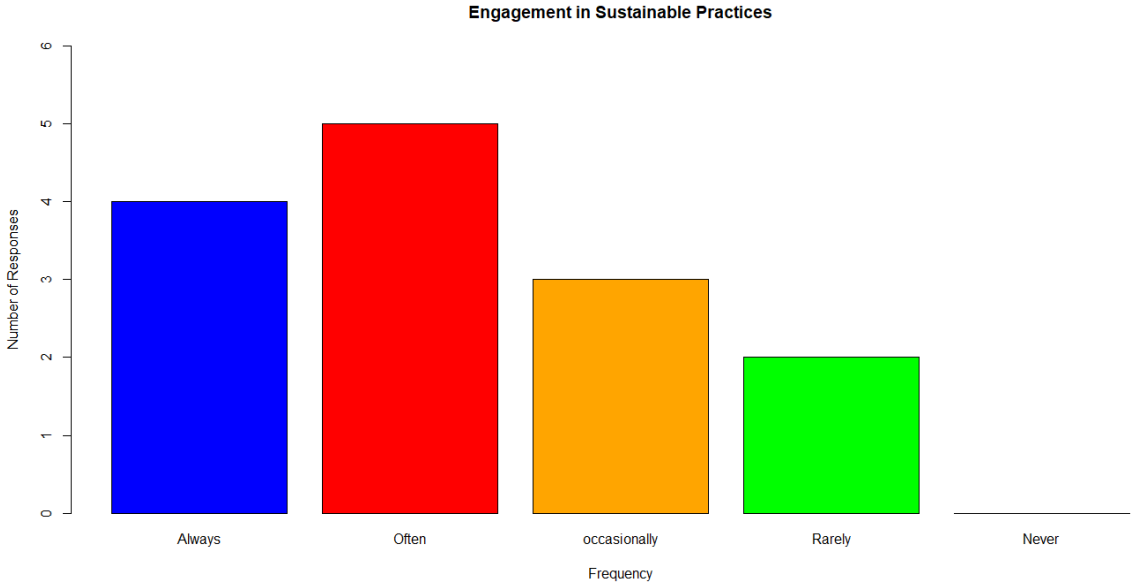
This is what the r code produced:



Appendix 4 R code shows what instructions were used to make figure 4.

```
> #Data for Engagement in Systainable Practices
> engagement <- c(4,5,3,2,0)
> names(engagement) <- c("Always", "Often", "occasionally", "Rarely", "Never")
>
> #Bar chart for Engagement in Sustainable Practices
> barplot(engagement,
+         main = "Engagement in Sustainable Practices",
+         xlab = "Frequency",
+         ylab = "Number of Responses",
+         col = c("blue", "red", "orange", "green", "purple"),
+         ylim = c(0, max(engagement) +1))
>
```

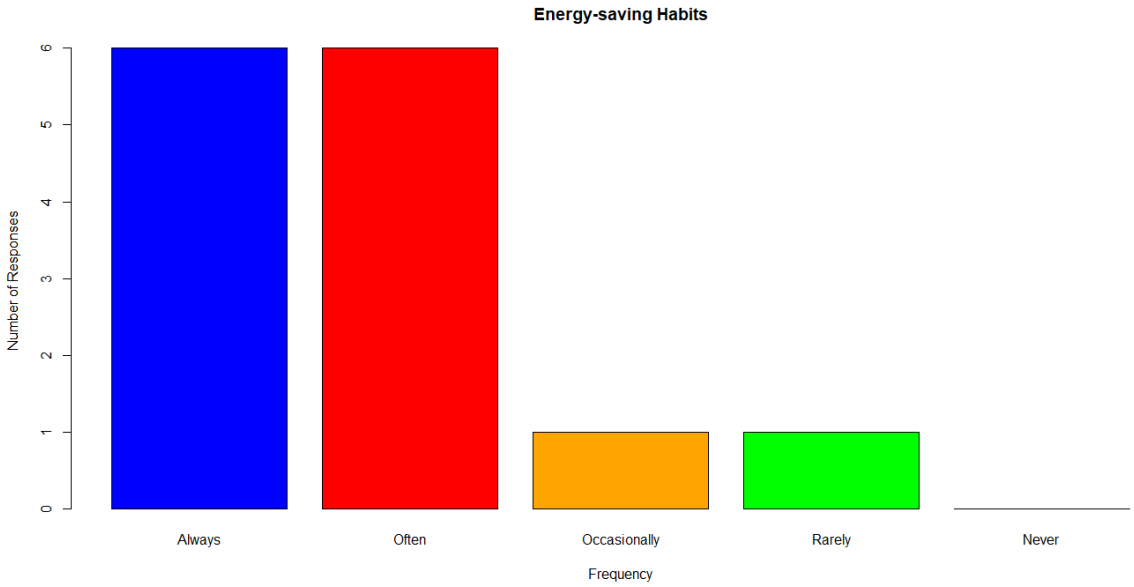
This is what the r code produced:



Appendix 5: R code shows what instructions were used to make figure 5

```
> # Data for Energy-saving Habits
> energy_saving <- c(6, 6, 1, 1, 0)
> names(energy_saving) <- c("Always", "Often", "Occasionally", "Rarely", "Never")
>
> # Bar chart for Energy-saving Habits
> barplot(energy_saving,
+         main = "Energy-saving Habits",
+         xlab = "Frequency",
+         ylab = "Number of Responses",
+         col = c("blue", "red", "orange", "green", "purple"))
>
```

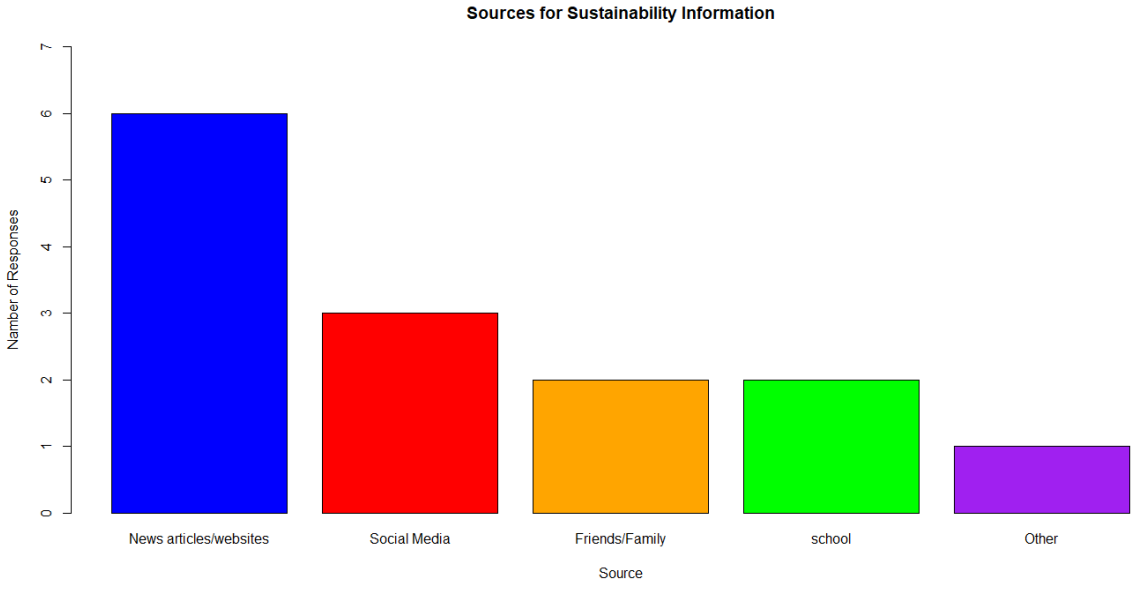
This is what the r code produced:



Appendix 6: R code shows what instructions were used to make figure 6

```
> #Data for Sources of Sustainability Information
> info_sources <- c(6,3,2,2,1)
> names(info_sources) <- c("News articles/websites", "Social Media",
+                          "Friends/Family", "school", "Other")
>
> #Bar chart for Sources of Sustainability Information
> barplot(info_sources,
+         main = "Sources for Sustainability Information",
+         xlab = "Source",
+         ylab = "Namber of Responses",
+         col = c("blue", "red", "orange","green", "purple"),
+         ylim = c(0, max(info_sources)+1))
>
```

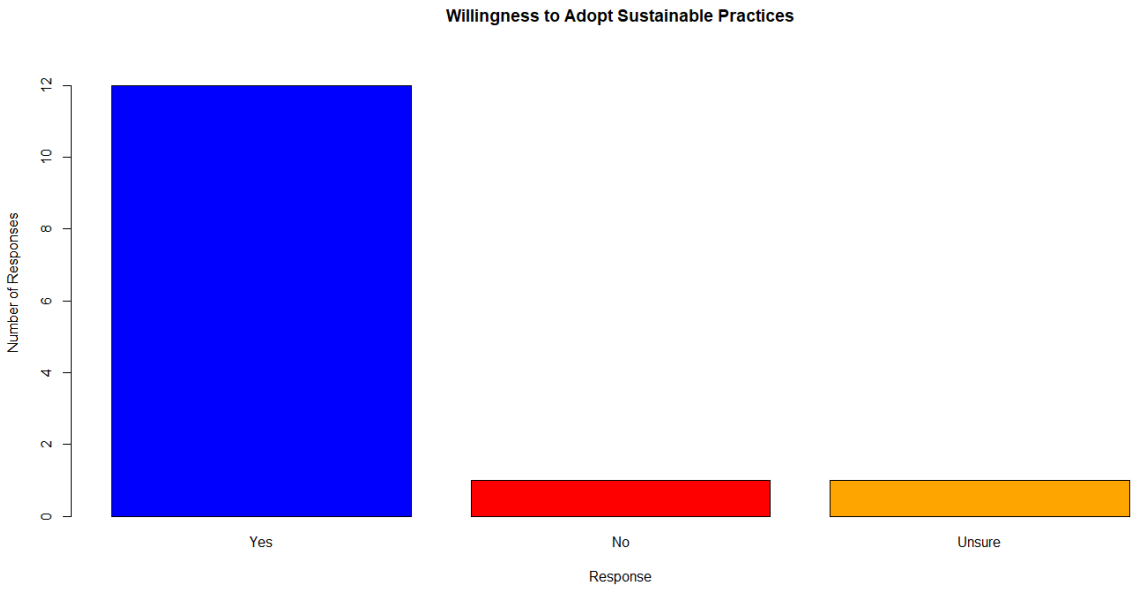
This is what the r code produced:



Appendix 7: R code shows what instructions were used to make figure 7

```
> #Data for Willingness to Adopt Sustainable Practices
> Willingness <- c(12,1,1)
> names(Willingness) <- c("Yes", "No", "Unsure")
>
> #Bar chart for Willingness to Adopt Sustainable Practices
> barplot(Willingness,
+         main = "Willingness to Adopt Sustainable Practices",
+         xlab = "Response",
+         ylab = "Number of Responses",
+         col = c("blue", "red", "orange"),
+         ylim = c(0, max(Willingness)+1))
>
```

This is what the r code produced:



INFORMATION LEAFLET

Title of Project: Measuring Engagement in Sustainable Practices

Researcher Name: Sagari Muraliegaran
Institution: University of Kent
Contact Information: sm2288@kent.ac.uk

What is this study about?
This research aims to determine how frequently people engage in sustainable measures such as recycling, using reusable shopping bags and avoiding single-use plastics. The study is part of a project to develop and evaluate survey questions for data gathering on sustainable behaviours.

Why have I been chosen?
You have been invited to participate because your insights will help refine the survey question and improve its effectiveness.

Do I have to take part?
Participation is completely optional. If you agree to participate you may withdraw at any time without providing a reason, and your decision will have no effect on your rights or access to services.

What will happen if I take part?
Cognitive Interview: You will be asked to respond to and discuss 4-6 probes (questions) about sustainable practices. The session will last approximately 15-20 minutes.
Pilot Survey: After refining the question, you may be invited to complete a short survey.
Recording: The cognitive interview will be video recorded either via Zoom or Teams to ensure accuracy. You can request the recording to be stopped at any time.

Are there any risks or benefits?
Risks: None anticipated

Benefits: While there are no direct benefits to you, your participation will help improve research on sustainable practices.

What happens to the data I provide?
Confidentiality: All responses will be anonymised, and your personal information will not be identified.
Storage: Data will be securely saved on an encrypted, password-protected device and deleted after the project is completed.
Usage: The results will be included in an academic report submitted to the University of Kent.

Thank you for taking the time to read this information sheet and for considering participation in this study. If you agree to participate, please complete and sign the consent form provided.

CONSENT FORM

Title of Project: Measuring Engagement in Sustainable Practices

Researcher Name: Sagari Muraliegaran

Please read and sign with your initials to indicate your consent:

- I confirm that I have read and understood the information leaflet for this study and have had the opportunity to ask questions.
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason.
- I consent to my responses being video-recorded and understand that the recording will be securely stored and destroyed after the study.
- I agree that my anonymised responses may be used for research purposes, including publication.
- I agree to take part in this study.

Participant's Name: Anbakan Varatharasan

Participant's Signature: _____

Date: 20/01/2025

Researcher's Name: Sagari Muraliegaran

Researcher's Signature: _____

Date: 20/01/2025

CONSENT FORM

Title of Project: Measuring Engagement in Sustainable Practices

Researcher Name: Sagari Muraliegaran

Please read and sign with your initials to indicate your consent:

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- I consent to my responses being video-recorded and understand that the recording will be securely stored and destroyed after the study.
- I agree that my anonymised responses may be used for research purposes, including publication.
- I agree to take part in this study.

Participant's Name: Mathyvathanee Muraliegaran

Participant's Signature: _____

Date: 20/01/2025

Researcher's Name: Sagari Muraliegaran

Researcher's Signature: _____

Date: 20/01/2025

CONSENT FORM

Title of Project: Measuring Engagement in Sustainable Practices

Researcher Name: Sagari Muraliegaran

Please read and sign with your initials to indicate your consent:

- I confirm that I have read and understood the information leaflet for this study and have had the opportunity to ask questions.
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason.
- I consent to my responses being video-recorded and understand that the recording will be securely stored and destroyed after the study.
- I agree that my anonymised responses may be used for research purposes, including publication.
- I agree to take part in this study.

Participant's Name: Suntheralingam Muraliegaran

Participant's Signature: _____

Date: 20/01/2025

Researcher's Name: Sagari Muraliegaran

Researcher's Signature: _____

Date: 20/01/2025

Cognitive Interview Questions

Comprehension Probe: What does the term 'single-use plastics' mean to you?

Responses:
Participant 1 – "Items used once and thrown away, like plastic straws or bags"
Participant 2 – "Plastics designed for one-time use, such as takeaway"
Participant 3 – "Disposables like plastic packaging and water bottles"

Retrieval Probe: How easy or difficult was it to recall examples of single-use plastics you've encountered or used recently?

Responses:
Participant 1 – "Easy; I encounter them daily, like plastic cutlery at work"
Participant 2 – "Moderately easy; I remembered my last takeaway meal"
Participant 3 – "Somewhat difficult; I try to avoid single-use plastics"

Judgement: How confident are you that the answer you gave reflects your actual behaviour regarding single-use plastics?

Responses:
Participant 1 – "Very confident; I actively try to reduce their use"
Participant 2 – "Somewhat confident; I sometimes use them without realising"
Participant 3 – "Not very confident, I know I use them more than I think"

Response: How easy or difficult was it to respond to the question? Should this question be phased in a different way?

Response:
Participant 1 – "Easy to repond; the question was clear"
Participant 2 – "Relatively easy; an example could make it clearer"

Participant 3 – “Moderate; it would help to specify what counts as single-use plastics”

Comprehension Probe: What does the term ‘recycle’ mean to you?

Responses:
Participant 1 – “Sorting waste to reuse materials like paper, plastic and glass”
Participant 2 – “Converting old items into reusable products, such as bottles or cans”
Participant 3 – “Repurposing materials instead of sending them to landfills”

Retrieval Probe: How easy or difficult was it to recall examples of items that you have encountered or used recently that can be recycled?

Responses:
Participant 1 – “Very easy, I thought of plastic bottles and cardboard boxes”
Participant 2 – “Moderately easy; I had to think of my last grocery shop”
Participant 3 – “Somewhat difficult; I wasn’t sure about some items like coffee cups”

Judgement: How confident are you that the answer you gave reflects your actual behaviour regarding the term ‘recycle’?

Responses:
Participant 1 – “Very confident; I recycle daily”
Participant 2 – “Somewhat confident, I might miss some items that are recyclable”
Participant 3 – “Not very confident; I often guess what items to recycle”

Response: How easy or difficult was it to choose a response to the question? Should this question be phased in a different way?

Response:
Participant 1 – “Easy; the question was clear”
Participant 2 – “Relatively easy; including examples would make it easier”
Participant 3 – “Moderate; the question could clarify common recyclable items”

Research Ethics Committee (REC) Application Form

Name of Applicant: Sagari Muraliegaran

Name of your Degree: UG Biomedical Science with a Year in Data Analytics

Campus: Canterbury

Title of Project: Measuring Engagement in Sustainable Practices

Please provide a brief jargon free background to the project in no more than 150 words**:**

The study aims to better understand and improve survey questions that measure people's everyday sustainable activities, such as recycling and reducing single-use plastics. These behaviours are critical to tackling environmental issues such as climate change and resource depletion. However, effective surveys are required for reliably collecting public knowledge, attitudes and behaviours about sustainability. To do this, the study is split into two steps. First, cognitive interviews were done with a small sample of individuals to learn how they understand and respond to survey questions. Second, a pilot survey was distributed to a broader sample to evaluate the amended questions and collect information on sustainable practices. This project intends to improve survey design and response analysis in order to provide tools that better assess and promote sustainable behaviours, offering insights that may direct educational initiatives legislation and interventions to encourage greater responsibility.

Research Methods:

A) **Selection & number of interviewees/participants:**

Cognitive interview: 3 participants
Pilot Survey: 14 participants

B) **How will your project comply with the General Data Protection Regulation (GDPR)? Please address the following questions:**

a) What data do you need to collect (e.g. is this the minimum necessary for the research purposes)? The data gathered includes participants' personal information (e.g., age, gender and ethnicity) as well as their repies to survey questions about sustainable behaviours. This is the least required to meet the study aims of understanding and improving survey design in relation to sustainable practices.
b) Does it infringe on any personal rights? The data acquired does not violate personal rights because participation is voluntary and all participants provide informed consent. The questions are non-invasive and simply focused on sustainability behaviours and attitudes.
c) What would happen if the data was leaked? If data were leaked, it may violate participants' orivacy, especially if demographic information was connected to their replies. However, the risk of harm is low due to the data's non-sensitive nature.
d) What measures have been put in place to mitigate risks to individuals? To reduce danger, all data is annoymised by eliminating identifiers. Informed permission governs data use, and access is limited to authorised member.
e) How do you plan to store, access and work with, the data you collect? Data will be stored using google forums and personal device.
f) Will there be any third party involvement in processing the data? No
g) Can you fully anonymise the data and still achieve the same results? Yes
h) What will you do with the data once you've finished with it? Once the research is completed, the data will be securely deleted from all systems.

C) **Anticipated start date & duration of data collection: 1st January 2025 to 27th January 2025**

D) **Details of payment, if any, to interviewees/participants? NA**

E) **Source of funding (if any): NA**

F) **List questionnaire and other techniques to be used: *N.B do not forget to attach these to your application***

https://docs.google.com/forms/d/e/1FAIpQLSf8BTXpLWuTn3iKoaH-T1lbNtvHR0WSjH1X8a-5XMDuXcFT8g/viewform?usp=header

Ethical Considerations:

A) **Indicate potential risks to participants (e.g. distress, embarrassment) and means adopted to safeguard against them:**

Distress or Embarrassment: Participants may feel slightly uneasy presenting their sustainability behaviours if they believe their efforts are adequate or conflicting with environmental standards.

Privacy concerns: Sharing demographic information such as age, gender and ethnicity and bahaviourak data may create issues regarding confidentiality.

B) **What confidentiality issues might arise during data collection, analysis, and dissemination of results? How do you plan to protect participants' anonymity?**

Confidentiality concerns may emerge if participants's demographic information or replies are revealed during data collection, analysis or dissemination. To safeguard anonymity, all data will be anonymised by eliminating identifiers.

C) **What difficulties might arise (e.g. regarding power and/or dependency imbalances between researcher and participants) and how do you safeguard against them?**

Poer imblances may occur if participants feel compelled to offer specific replies because of the reseacher's role. To address this, participation is fully voluntary.

D) **How will the project take into consideration cultural diversity (e.g. through provision of interpreters where necessary)?**

The questions are provided to a variety of people in clear standard English.

E) **Why, if at all, are you paying participants? What is the potential impact on them of such financial inducement?**

I am not paying.

F) **What provision are you making for giving feedback to participants about your findings?**

The google forums will provided the collected results.

G) **What other ethics review procedures has this project already undergone (e.g. with funding bodies)?**

NA

Consent:

A) **What procedures are you using to secure participants' informed consent (please append any forms etc. use for this)?**

No name is being asked in the pilot survey so therefore it is annoymus, however names are provided for the cognitive interview however, age and background were not asked.

B) **What procedures will you use with participants unable to give their own informed consent?**

Will not ptovide there results in the reseach

C) **Explain, where applicable, why the informed consent of the participants is not being sought?**

This research seeks information consent by providing participants with explicit information about the study's objective, procedures, and data usage before decisding to participate. This assures their free and informed participation.

Security Sensitive Material

Does your research involve access to or use of material covered by the Terrorism Act?

No

(The Terrorism Act (2006) outlaws the dissemination of records, statements and other documents that can be interpreted as promoting and endorsing terrorist acts. By answering 'yes' you are registering your legitimate use of this material with the Research Ethics Advisory Group. In the event of a police investigation, this registration will help you to demonstrate that your use of this material is legitimate and lawful).

Researcher, please sign to testify the accuracy of this completed application:

Sign:

Print Name: Sagari Muraliegaran

Date: 20/01/2025