

**SCIENCE
MUSEUM
GROUP**

OCTOBER 2021

SUSTAINABLE FOOD:

**PUBLIC ATTITUDES AND ENGAGEMENT
IN THE UK, BRAZIL AND INDIA**

MADE POSSIBLE
THANKS TO



WITH THANKS TO

Museum Partners

All those who contributed to
the research of this report

REPORT COMPILED BY

Flow Associates

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- Resources to engage the public with food sustainability

<https://www.flowassociates.com/feeding-tomorrow>

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FOREWORD BY SIR IAN BLATCHFORD

DIRECTOR, SCIENCE MUSEUM GROUP

How can we feed the world without accelerating damaging climate change, when the current global population of 7.6 billion is expected to soar to almost 10 billion in 2050? That is a central question facing all people in all nations and one where museums have an important role to play, not least the Science Museum, which first opened its ground-breaking agriculture gallery in 1951 and has continued to engage people with the history and future of farming.

Now well into the 21st century, we wanted to find new relevant ways to help our audiences explore the science, technology and consumer choices that will enable food to be produced more efficiently, more sustainably and in a way that is kinder to the environment. We need to cut the roughly one-third of food that is wasted globally and, moreover, without losing sight of how three-quarters of the world's poorest people get their food and income from small plots.

With a new gallery of food and farming in mind, and given the need to engage as wide an audience as possible, the museum has commissioned this report about attitudes to food sustainability and methods of engaging audiences from Flow Associates, with Flow India and People's Palace Projects do Brasil, in research supported by Lloyd's Register Foundation.

We were keen to get different perspectives on this global problem. Tapping networks of two long-standing museum partners who are also deeply invested in the future of food – the National Council of Science Museums in India and the Museum of Tomorrow in Rio de Janeiro – 1,604 people from across the UK, India and Brazil shared with us their personal understanding of food sustainability and how we might tackle the current crisis, and how they would like to engage more with these issues: 300 through in-depth interviews and focus groups, another 1,304 in a broad survey, as well as almost 40 professionals who are involved in public engagement around these issues in their work day to day.

Fascinating differences between people in the UK, India and Brazil are revealed in this report, but the common themes are even more compelling, such as the very high level of interest in food issues and even higher concern about the environment.

It's clear from the research that there is an eagerness to learn more about the solutions to the challenge of sustainable food. But people are also uneasy about how our eating habits will need to adapt in the future – respondents weren't keen to see bugs or lab-grown meat on their menus.

Importantly, the report suggests that even on issues where people are well informed, many feel disempowered to effect change themselves.



In all three countries, the report says there are challenges to traditional narrative exhibits in museums. Instead, museums must find new ways to spark debate and curiosity, empowering visitors to explore solutions through hands-on and even 'tongues-on' experiences that connect people and issues in radical ways.

Since the research was commissioned, this report has, if anything, become more salient in the wake of current events which underline how social inequality, extreme weather and climate change are closely interlinked. This research also comes at a critical juncture in climate discussions, as the UK prepares to host COP26 in Glasgow, at which the future direction of global efforts to avert the climate crisis will be determined.

We hope this research might help museums and science communicators across the world to think how we can address this crisis by helping their audiences to take charge of their destiny.

FOREWORD BY DR TIM SLINGSBY

DIRECTOR OF SKILLS AND EDUCATION,
LLOYD'S REGISTER FOUNDATION



Lloyd's Register Foundation exists to improve the safety of the critical infrastructure on which we all rely – and this includes access to safe and sustainable food for people around the world. There are 600 million cases of foodborne illness every year, claiming 420,000 lives, including 125,000 children under five years old. At the same time, the loss of productivity resulting from unsafe food costs low- and middle-income countries at least US\$110 billion every year. With the global population expected to exceed 9 billion by 2050, the need for safe and sustainable food for all is becoming ever more urgent.

This is a global challenge, which requires everyone's involvement. Governments, the private sector and regulators all have roles to play, and public engagement is critical for effective policy-making and implementation. Museums have the opportunity to take a more prominent role in educating public audiences about food safety and food systems, while taking into account the sustainability of our planet.

For this reason, we are delighted to have partnered with the Science Museum Group to better understand people's existing awareness of food system issues and their current appetite for different solutions, in three countries, on three different continents. This report recommends actions that museums and other public engagement professionals can take to help educate and inspire people, giving them the knowledge to make more informed choices about the food they eat.

To find out more about how Lloyd's Register Foundation is engineering a safer world, visit www.lrfoundation.org.uk

1.

EXECUTIVE SUMMARY

1.1 OUR FINDINGS

In an increasingly disparate world, there is no aspect of life so universally shared as the consumption of food. Yet there is an intimate relationship between the current environmental crisis and the production, distribution, consumption and wastage of food which is threatening our ability to feed tomorrow. Global food systems are unhealthy for the planet and there is inequality in the provision of nourishing food. Through this research we have sought to explore what people understand of these challenges and how we can better communicate them to enable us all to play a part in tackling these issues.

This research was commissioned by the Science Museum Group, supported by Lloyd's Register Foundation. Flow Associates formed a research team with Flow India and People's Palace Projects do Brasil to consult adults, families, schools and professionals in the UK, Brazil and India to discover their knowledge and views about food sustainability, and how they could be engaged more effectively.

In total 1,604 people participated, 300 through in-depth interviews and focus groups. A light-touch survey was sent out to networks of the three museum partners, including the National Council of Science Museums in India and the Museum of Tomorrow in Brazil.

MOTIVATIONS AND ATTITUDES

Those we consulted shared a **very high level of interest in food issues**, and even **greater concern about the environment**. To understand their motivations we used a 'Three Lenses'¹ coding model, grouping responses in terms of mindsets: **Self and Family, Society and Community and Ecosystems and Climate**.

Conversations in India and Brazil reflected a focus on Society and Community. Here people talked of needing to **reconnect to family roots, culinary traditions and ancestry of native peoples**, with respect for cultural diversity and political sensitivity. They expressed **empathy for those living in poverty** and concern for human rights to access nutritious food. In Brazil 29% of survey respondents felt that **changes must be made by those in power**. Those in India were most likely to mention initiatives to **educate people for societal change**.

In the UK the focus was more often divided between Self and Family (with themes such as household budgets or children's needs) or Ecosystems and Climate (with themes of nature disconnection, animal welfare and global food transportation). Those in the UK were the most likely to focus on **making small step changes as consumers**.

Flow

Three Lenses

¹ The coding is based on Flow Associates' Three Lenses framework. See section 2.4 for more detail.

We found that once people learn about how the food system causes harm, they want to see change.

However, people in all countries struggle to know **what they can do to effect change**. We observed a 'value-action gap' expressed as a tension between **knowing** about some food sustainability issues, and yet **not feeling able**, informed or motivated enough to take effective action.

The more confused people are, the less motivated they feel to change their own food practices, and the less agency they feel they have to effect change in global food systems. Typical confusions or conundrums that arose included: nature-friendly versus high-tech solutions, maintaining the status quo (eg with meat alternatives) versus disruption of the system, affordable food versus paying for ethical food, reducing harm versus feeding populations.

AWARENESS OF FOOD SUSTAINABILITY

Across the three countries, awareness of food sustainability is influenced by two somewhat conflicting factors:

- Key facts, or specific issues about harms of the food system, that are most visible in campaigns, public messaging or regional cultures.
- The need for their own families, communities or hungry people worldwide to access affordable nutrition, which many acknowledge requires an efficient but unsustainable farming system and convenient but sometimes unhealthy produce.

Despite this, awareness of causes and potential increases in food insecurity is fairly low, and there were **some gaps in understanding**, reflecting confusions in public discourse and a lack of available information about food systems and environmental sustainability.

Brazilians expressed the strongest awareness that the **food system has negative impacts on ecosystems and climate**. However, some, particularly young people, were surprised by statistics about potential threats to food security. All spoke with sharp awareness of the **role of the state** in either causing or tackling environmental harms.

Indians, particularly adults, showed the strongest awareness that **climate change can impact on food security**, although they talked with less detail about other environmental impacts of agriculture. As in Brazil, there was awareness of the role of the state, albeit with a **stronger emphasis on public information**.

UK audiences expressed comparatively **low awareness of harmful flows** in the food system and of environmental causes of food insecurity, although some were well informed about particular issues such as overfishing. Here the **role of the state was rarely mentioned**.

VIEWS THROUGH FLOWS THREE LENSES

CHARACTER

Self and Family:

Concerns such as personal health, food costs, or children

CAPACITIES

Society and Community:

Concerns such as social equality, local issues or rights to land

CONTEXT

Ecosystems and Climate:

Concerns that focus on more-than-human life, science, or future climate impacts

AWARENESS OF AND PREFERENCES FOR SOLUTIONS

Food waste and **plastic waste** were problems at the top of many minds in the three countries, which if tackled have the potential to solve multiple issues concerning sustainability and pollution.² Food waste was highlighted by 51% of all survey respondents, plastic and packaging by 43%.³ **Regenerative and community-supported farming and greener aquaculture** were also popular solutions of those we suggested, with people wanting to know more. **Eating insects, lab-grown meat** and **GMO food** were the least popular solutions, as they raised more challenges about uncertain benefits, costs and ethics.

In all countries, in focus groups and interviews, there was relatively low scientific awareness of the **environmental benefits of reducing meat and dairy consumption**, in terms of both ecosystem damage and climate impacts. Animal welfare, religious ethics or health were often expressed as stronger causes for concern about an animal-based diet. After solutions were discussed, **awareness about links between the food system and climate change increased**, but initially this was not raised by many. This could be related to psychological tendencies to avoid or minimise climate change, and to perceive it as distant in time and geography⁴.

Differences between countries tended to reflect their wider context. Brazilians were more likely to favour, and know about, solutions that **provide alternatives to industrial land-grabbing and deforestation**, and that support communities to grow food fairly and sustainably. Indians were more likely to **focus on household choices and practices** that reduce waste, provide good nutrition and encourage a diverse diet of unprocessed plant-based foods. UK audiences, particularly adults, **challenged solutions that might be too unpopular with politicians or consumers to be taken up by them**, or that might need too much state intervention or investment.

ENGAGEMENT AND THE ROLE OF MUSEUMS

People in all countries were strongly influenced by **audiovisual media**, mostly shared in social media and in news. The same films and TV programmes, for example *Cowspiracy* and *Blue Planet*, were cited everywhere, showing the **international currency of documentary films** on global issues. People want more powerful, simple and **visual communication showing systemic effects**, and they want these messages to be disseminated in inclusive ways to touch all sectors of society.

In all countries there were **challenges to traditional narrative exhibits in museums**. Visitors want to be supported to create social change through **hands-on and 'tongues-on' experiences** that reach out into communities and connect people in ways that are overt about opportunities for change. There were many creative suggestions that museums be transformed into greenhouses, food laboratories or experimental restaurants. For some, especially families and particularly in the UK, museums were seen as having potential to become even more sensory, fun and interactive to deal with this topic. Others, particularly professionals in all countries, and adults in Brazil, also wanted to see more outreach in places where food is produced and consumed, to tackle systemic issues more directly.

² This aligns with the UN Peoples' Climate Vote, January 2021, in which 1.2 million people in 170 countries were surveyed. It found that wasting less food was more popular than wasting less energy. www.undp.org/publications/peoples-climate-vote

³ Other top choices were less easy to tackle: deforestation was mentioned by 51%, hunger and malnutrition by 42%.

⁴ R Maiella et al, 'The psychological distance and climate change: a systematic review on the mitigation and adaptation behaviors', *Frontiers in Psychology* (19 November 2020). www.frontiersin.org/articles/10.3389/fpsyg.2020.568899/full

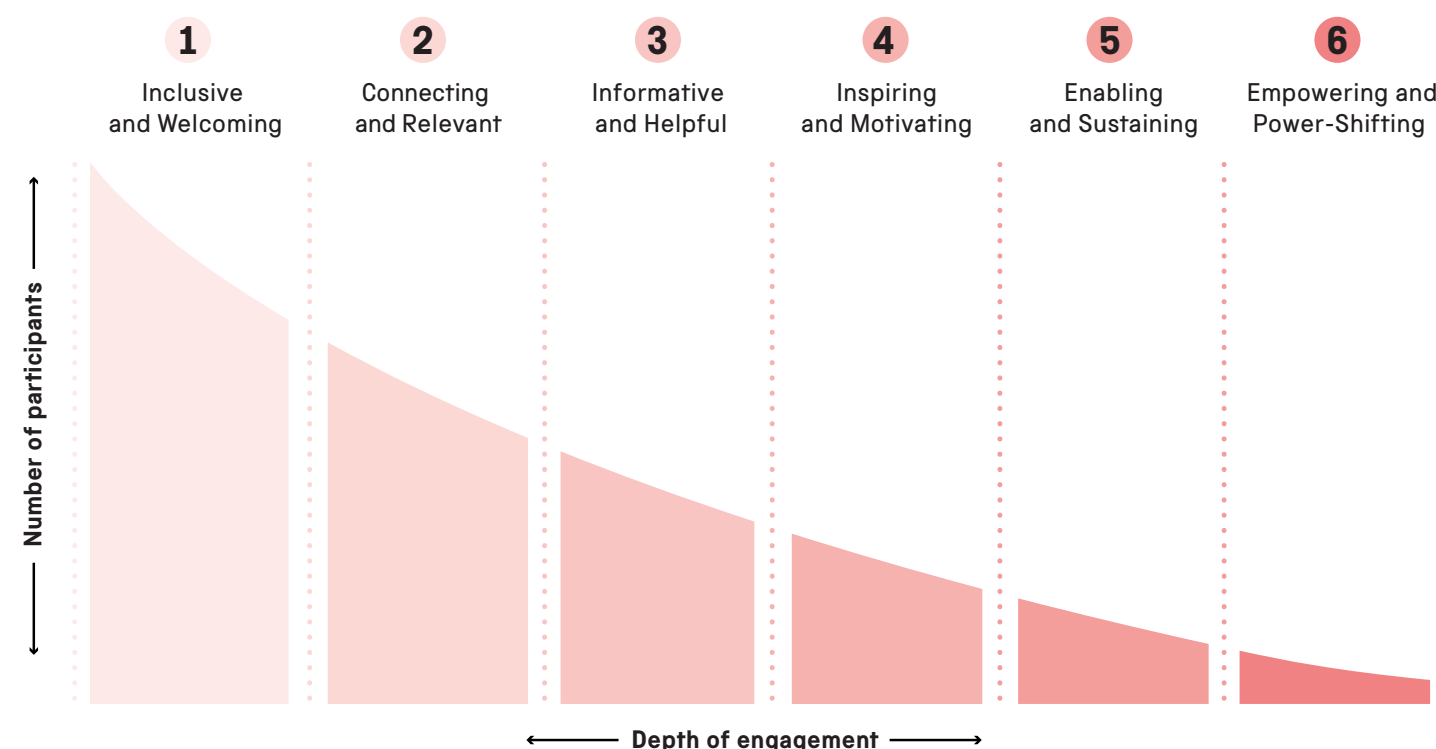
1.2 RECOMMENDATIONS FROM THE FINDINGS

EMPOWERMENT TO INCREASE IMPACT

Engaging people with food has great potential to empower them to take action on bigger issues of environmental and social justice. However, people said that they feel disempowered by the complexities and direct impacts of the environmental emergency, which many understand is worsened by the food system, particularly from the climate impact of livestock and of food waste. The most obvious route to increase empowerment is to inform and help people take action in their own lives as consumers. Flow's Engagement Thresholds model (below) sets out a route to deepen engagement and empowerment to ease thresholds and overcome this value-action gap⁵.

People want to know what they can do to pull bigger levers to change the food system, whether in their own lifestyle changes or by expanding the horizons of their activism. Professionals agree that cultural education can help people organise, campaign, invent, trade and grow their way to positive change, if it is designed with these purposes in mind.

HOW CAN YOU EASE THRESHOLDS TO ENGAGEMENT



⁵ For more on Flow's Engagement Thresholds model see <https://medium.com/flow-associates/flows-engagement-thresholds-model-d9d3fc6dfb11>

ENGAGE THROUGH MINDSETS

Organisations wishing to educate and activate people to support personal and collective action need to design programmes in ways that fit their mindset and situation. The diagram below lays out how engagement can be designed to consider people in three mindsets, based on the Three Lenses coding, to support their concerns, grow their science knowledge and widen their focus.

ENGAGE PEOPLE ON FOOD SUSTAINABILITY THROUGH THREE MINDSETS

	FOCUS ON SELF AND FAMILY	FOCUS ON SOCIETY AND COMMUNITY	FOCUS ON ECOSYSTEMS AND CLIMATE
Support concerns through empowerment	Support concerns for health, food prices and needs of their children. Provide tools and simple steps.	Support concerns for human rights, equalities and justice. Empower them to organise & advocate.	Support concerns about climate futures and biodiversity loss. Help them scale up actions.
Increase science knowledge in suitable ways	Grow science knowledge through achievable and sensory actions for food resilience.	Grow science knowledge through traditions, cultural conversations and social activities.	Grow science knowledge through graphics and data about systems. Resource them to share solutions.
Widen focus to increase connection	Food seen as a way to increase connection to community, to meet their needs and help others.	Food seen as a way to increase connection to the more-than-human world and Earth systems.	Food seen as a way to increase connection with the fundamental needs of themselves and others.

FOCUS ON SOLUTIONS

- Across all countries and audiences, people were more engaged in our conversations when **exploring solutions** than by learning about causes and impacts. Public engagement should always include solutions, and even foreground them to inform people about causes and impacts, and the science behind them.
- Solutions need to be selected and conveyed to show how people can **get involved**, not just presented as technical interventions that only experts, companies or governments can engage with.
- In all three countries, audiences could benefit from more public education to promote and normalise diets based on a **diversity of plants**, including heritage varieties, nonconventional food plants (PANCs, *from plantas alimentícias não convencionais*⁶), plant-based proteins and sourcing local seasonal produce⁷.

SENSORY AND ACTIVE ENGAGEMENT

- Public engagement programmes should develop **graphic, dynamic and sensory ways** to convey the complexities of the food system, its impacts on ecosystems and the climate, and in turn how food supplies are threatened by these impacts.
- Museums and science centres should design experiences as **‘activations’**, that is, deliberately aiming to inspire action, which might mean thinking beyond conventional exhibitions of narratives and objects. In addition to activating museum experiences, people need to be reached online, with powerful audiovisual content, in communities and in settings related to food.

‘I think you have to try to get the balance right between saying that this is a hugely serious problem and trying to put a positive spin on it’

I, male, 55–64, UK

⁶ T Meireles, ‘Have you heard of PANC: non-conventional food plants?’, WWF, 17 January 2020, www.wwf.org.br/?74882/Have-you-heard-of-PANC-Non-Conventional-Food-Plants
⁷ Professionals across all three countries emphasised these as solutions within the grasp of consumer action that also have direct environmental benefits.

2.

INTRODUCTION

2.1 USING THESE FINDINGS

EVERY READER OF THIS REPORT SHOULD KNOW THAT:

- Most people know about some issues of food sustainability but they do not have enough knowledge of different actions they can take, as consumers and citizens, to make a big enough impact. This puts them off taking action.
- On the other hand, food is a very accessible and motivating way to engage people with wider issues of environmental harm and climate change, because food is both a basic need and a cultural connector.
- People can be activated to take personal and collective action if programmes are designed with a clear purpose, to fit the mindset and situation of particular groups.
- People are more engaged by exploring solutions than by learning about causes and impacts, especially solutions that are already effective, that help restore biodiversity, and which people can support as consumers, educators and citizens.

IF YOU ARE A CAMPAIGNER IN FOOD AND ENVIRONMENTAL ISSUES

- There are gaps in public understanding of the flows of harm between the food system, ecosystem harm and climate change.
- Understanding of food sustainability is strongly influenced by broadcast media that focus on specific issues such as overfishing, animal welfare or plastic waste. This shows that well-promoted documentary films are powerful but, without reinforcement through experience, they can lead to partial awareness, anxiety and a lack of change.
- There is poor understanding of the causes, likelihood and risks of food insecurity, particularly in the UK, and among young people in the three countries.
- Consumers, particularly parents, need positive encouragement, accessible education and policy changes to afford and choose food that is beneficial to human health, ecosystems and the climate.
- All audiences are motivated to learn more about regenerative agriculture and other nature-based solutions such as greener aquaculture. They also feel empowered and motivated to reduce their own food waste, and need practical help to do so.

IF YOU ARE A PUBLIC ENGAGEMENT PROFESSIONAL IN MUSEUMS OR SCIENCE

- Sustainable attitudes to food will grow through hands-on, 'tongues-on' experiences that connect communities, that tap into culinary traditions and that take a nature-based approach to solutions.
- Factual information must be delivered in graphic ways that 'join the dots', showing the connections between food, land use, ecosystem harm and climate change.
- Help people to cut through areas of confusion or binary debate perpetuated by the media, so that they know what causes most harm, what they can easily do as consumers and how they can support the most effective solutions as citizens.
- In all countries there were challenges to traditional narrative exhibits in museums, with ideas that museums be transformed into greenhouses, food laboratories or experimental restaurants, to make a direct impact on the availability and sustainability of food.

IF YOU ARE A TEACHER

- Teachers in all three countries are concerned that children's development and ability to learn are challenged by a lack of nutritious food and by an increase in food poverty.
- Schools can address this by putting nutrition and environmental issues at the centre of both curriculum and management, for example by creating school gardens or by using cookery to teach science, health and life skills.
- Young people are motivated to learn about the science behind these issues through games and digital storytelling, and a focus on inventive solutions.

IF YOU ARE A PARENT OR CARER OF CHILDREN

- Children and young people feel a lack of agency to change their food choices.
- Children in all three countries are very influenced by the availability and advertising of highly processed, unhealthy and unsustainable food.
- When children understand the harmful impact of these food choices, particularly harm to animals and visible impacts on environments, they can be highly motivated to change their diets, but most will only do so if they are accompanied and helped by family and peers.

2.2 ABOUT THIS REPORT

This report shares the findings from Feeding Tomorrow, an international research project exploring people's awareness of, understanding of and attitudes towards food sustainability. This qualitative research focuses on museum-going audiences in Brazil, India and the UK, specifically families, independent adults, teachers and their students. It is anticipated that the insights in this report will be useful internationally for the cultural sector, and in particular it is hoped that the findings will encourage and support museums and science centres (including the Science Museum Group) to develop engagement opportunities that support audiences to consider these issues and feel empowered to take positive action.

The following sections outline the current world context of food sustainability, offer a combined overview of differences and similarities between those consulted in Brazil, India and the UK, and present detailed insights from each country. Within each section the findings cover two main areas, broken down into four themes:

1. ATTITUDES TO FOOD SUSTAINABILITY

- Motivations: how do people think about their own food practices and their agency to create change in relation to global environmental issues?
- Awareness: what do different audience groups know about the causes of and solutions to harms in the food system?

2. METHODS OF ENGAGEMENT

- Solutions: what kinds of interventions and support would help them to reinforce beneficial – and alter deleterious – food practices, and to effect systemic change?
- Engagement: what museum and science education experiences will engage them, and what do professionals in public engagement consider the role of informal science education and museums to effectively engage people?

Changing circumstances due to COVID-19, which came about during the research planning phase, led to a need to consider the impact of the pandemic on the above questions, in particular how people perceive food sustainability and how they might best be engaged.

This is qualitative social research concerned with the texture of how people's thoughts on their own food practice relate to the bigger issues. The resulting insights and recommendations will support researchers or campaigners in food and environmental issues; public engagement professionals in museums or informal science education; teachers, parents and carers, or simply those wanting to engage others in conversation about food and the future of our planet.

2.3 ABOUT THE RESEARCH

The Science Museum Group is a cultural leader in engaging the public with the science that affects our everyday lives. Food sustainability and security are key to this. Increasing public understanding of and engagement with the key issues in the fight to feed a growing population is crucial to finding solutions to the global food crisis. To continue this work effectively, the Group wanted to undertake research to identify current levels of engagement with the subject, how we can improve that engagement and the methods through which impact can be best achieved within a museum context.

In order to get a truly global picture, the Group worked with two international museum partners – the National Council of Science Museums in India and the Museum of Tomorrow in Rio de Janeiro – who are known to have a key interest in this area and could enable the study to have a broad application across three continents.

Flow Associates are audience researchers and consultants who work across the cultural sector, with experience in science communication and engagement and supporting organisations to better understand the needs of their audiences and the public. They were selected to carry out this research for their understanding of engaging the public with sustainability and their existing partnerships in India and Brazil.

Flow formed a research team with Flow India and People's Palace Projects do Brasil to consult adults, families and schools in the UK, Brazil and India to discover their knowledge and views about food sustainability and how they could be engaged more effectively on these issues. In total 1,604 people participated, 300 of them through in-depth interviews and focus groups with families, independent adults, school groups and teachers. These groups also included 37 professionals in public engagement.

A light-touch survey shared with visitors to the three partner museums produced a response from 1,304 people.

- Flow Associates led in the research design and synthesis for this report, and in the audience research in the UK.
- Flow India is a cultural education consultancy formed out of partnership with Flow Associates. It has led in the research with audiences in India, as well as contextual analysis.
- PPP do Brasil is a not-for-profit NGO based in Rio de Janeiro, which led on research with audiences in Brazil. Its work has been facilitated by its sister organisation People's Palace Projects, based at Queen Mary University of London.

The research team were aligned with the 'science capital'⁸ approach set by the brief, respecting people's existing knowledge of science from their varied and lived experiences. They also acknowledged that people's views would be influenced by the acceleration of challenging factors such as climate impacts and COVID-19, affecting access to affordable food, stable work, community activities, museum visits and in-person education.

The methodology was the same for the UK, India and Brazil, with slight adjustments to account for differences in language, values and demographics, and the local impact of these challenging factors. For example, in Brazil the notion of 'family' is not as 'nuclear' as in the UK, so invitations to family focus groups were worded differently. As the project progressed, the situation around COVID-19 worsened considerably in Brazil and India, requiring sensitivity and flexibility with the research teams and the people consulted.

See the acknowledgments (p1) for names of all team members and stakeholders.

⁸ 'Our approach and science capital', Science Museum Group Learning, <https://learning.sciencemuseumgroup.org.uk/our-approach>

2.4 RESEARCH
FRAMEWORK

This research used Flow Associates’ Three Lenses model as an organising framework for planning and carrying out the research. Used as a tool for research or evaluation, these three lenses ensure that the full range of impacting factors on any situation are considered. The lenses are:

- Internal Character Lens – the values, feelings and actions that drive individuals.
- Relational Capacities Lens – the knowledge and understanding that arise from relationships in society and organisations that can maximise opportunity and overcome challenges.
- External Context Lens – the broadest view of drivers for change in the human and natural world (which we break down into Environment, Technology, Economy and Work, Politics and Law, Health, Society, and Culture and Ethics).

This framework enabled research teams working in the three countries to align their approach and analysis. For example, responses to the light-touch survey and insights gathered through in-depth conversations were coded into three categories, according to the focus of their concerns, as shown in the diagram below.

Flow developed this model as a tool to support organisations working in culture, science and the arts to plan and evaluate their work in areas such as public engagement. The model draws on and synthesises STEEPLE or PESTLE⁹ tools, our thinking about cultural capital and science capital, and the Inspiring Learning for All generic learning and social outcomes¹⁰. It was also a response to Maslow’s hierarchy of needs, reimagining his hierarchy as a nested ecosystem to recognise how value can flow in multiple directions with ‘self’ at the centre, the environment as the widest supporting ring and relationships connecting the other two dimensions.

The full model is available on Medium¹¹, along with an example of how the External Context Lens can be used as a tool to aid research and planning.

⁹ <https://pestleanalysis.com/what-is-pestle-analysis>
¹⁰ Inspiring Learning for All framework, <https://www.artscouncil.org.uk/measuring-outcomes/generic-learning-outcomes#section-1>
¹¹ <https://medium.com/flow-associates/whats-happening-through-3-lenses-b28baa2a9012>

VIEWS THROUGH FLOWS THREE LENSES



2.5 CONVERSATIONS
WITH AUDIENCE
REPRESENTATIVES

WHO WAS CONSULTED

Across the three countries the researchers reached 1,604 people, 300 in depth. This included:

	Brazil	India	UK
Light-touch survey	467 responses	404 responses	433 responses
Adults	Online focus groups with 13 adults Individual phone Interviews with 19 adults	Online focus groups with 9 adults Individual phone or Zoom interviews with 21 adults	Online focus groups with 12 adults Individual phone interviews with 18 adults
Teachers	Phone interviews with 10 teachers	Phone interviews with 9 teachers	Phone interviews with 7 teachers
Students	2 creative focus groups with 18 students aged 17–21	2 online focus groups with 18 students aged 11–18	In-person focus group at a London school with 12 students aged 11–12 Online focus group with 13 students aged 16–19 from different settings
Families	10 family groups were interviewed – 9 of them consisted of 3 individuals and 1 group of 2 individuals, with at least one child aged 7–12 in each	Online focus groups with 10 families, of which 9 families had 3 members each and 1 family had 2 members	Three online focus groups with 11 families, comprising 11 adults and 12 children

For more information about recruitment and demographics in Brazil see the separate appendices, section 1.2.

FORMAT OF CONVERSATIONS

Flow’s scripts for interviews and focus groups were structured to ease people into the subject by asking about food they enjoy eating, and what they would miss most if it was unavailable. This led to discussion to elicit their knowledge of the food system, its harms and future impacts, and then on to asking what solutions they practise or know about. We presented a series of nine solutions and invited them to vote and comment on them. We then asked how they prefer to learn about these issues, and what has made an impact on them. Finally, we focused on the role of museums and science communication, posing the challenge to imagine a ‘museum of future food’.

Conversations with teachers used the same format, but the questions asked teachers to speak to the needs and interests of their students.

See the separate appendices, section 1.1, for the nine solutions offered for UK participants to vote and comment on. In Brazil and India slight changes were made to respond to contextual differences.

THE LIGHT-TOUCH SURVEY

An online survey was distributed to the audiences of the partner museums, and more widely through our research team’s networks. It asked about their levels of interest in issues about food and about the state of the environment, and their reasons in both cases. It asked which topics from a list of 23 come to mind when thinking about food sustainability, and then which they prioritised, as a way to understand their framing of the issue. It asked what actions they took to help with these issues. Finally, it also asked a number of demographic questions, including about their interactions with science, museums and culture.

See section 3.1 of this report for a summary survey analysis. A more detailed analysis, along with the full category list, is in the separate appendices, section 3.

2.6 CONVERSATIONS
WITH PROFESSIONALS

A parallel strand of conversations with public engagement professionals aimed to generate more insights into methods of engagement in relation to the target audiences and issues. We wanted to know their views on the role of informal science education such as in museums, alongside economic interventions and information campaigns.

We spoke to 37 professionals working in the UK, India and Brazil, recruited by invitation through our networks in each country in social and environmental justice, museums and science education. We selected them to ensure a balance of:

- Practitioners in food sustainability, for example working in campaigns with an interest in creative methods of engagement
- Practitioners in museums, arts or science communication with an interest in food and/or environmental issues

See the appendix at the end of this report for the full list of names and roles of those we consulted.

3.

BACKGROUND RESEARCH:
CONTEXT OF FOOD
SUSTAINABILITY

The issue of food sustainability touches on a wide range of global scientific, political and cultural factors. To inform the methodology and situate the audience research, the following section establishes key factors in understanding the drivers of threats to food sustainability, their effects on people, communities and the environment, and potential solutions and technologies that seek to create a sustainable food system.

The following is not intended as an exhaustive summary of current understanding. However, it will allow you to make best use of the recommendations and findings outlined in the report. *If you are particularly interested in these contexts in either Brazil, India or the UK, please see the separate appendices, section 2.*

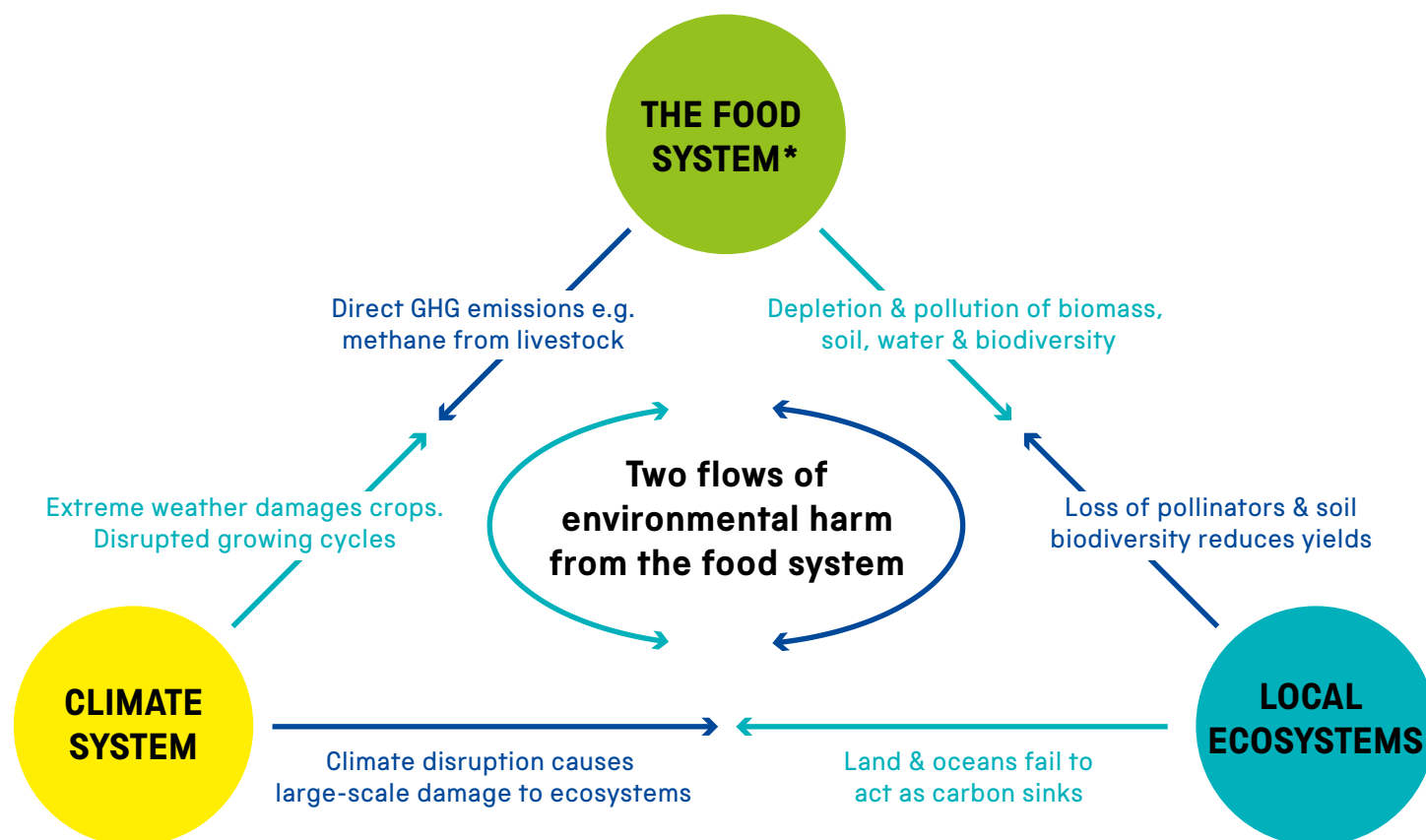
3.1 OVERVIEW: TWO FLOWS OF HARM

The first stage of our research was an in-depth review of the science, practices and public attitudes in food sustainability, worldwide and in the three countries of our study. This informed the detailed design of our survey and conversations, including the selection of solutions to discuss with participants. It also ensured that we had a shared understanding across the team of the global food system and its differences in the three countries.

There is an intimate relationship between the current environmental crisis and the production, distribution, consumption and wastage of food. Global food systems are unhealthy for the planet and there is inequality in the provision of nourishing food.

There is no aspect of life so universally shared in this respect than the consumption of food, where science is everywhere mingled with culture.

We produced the diagram above to summarise our contextual research, to spark conversations with audience groups and to draw out their knowledge of systemic harms. It shows the flow of harm to the environment from the food system in two directions, which ultimately flow back to affect food supplies. In one direction, the food system causes damage to local ecosystems, for example by pollution or deforestation, then when land and oceans fail to absorb CO₂, climate breakdown reduces yields.



*Food system: Agriculture, fishing, production, packaging, transport and waste

In the other direction, the food system is a direct producer of greenhouse gases, leading to climate disruption which damages ecosystems (eg because of drought and fire), in turn reducing biodiversity and yields.

The expansion of land in use for food production has correlated with the increase in the global population, but extractive agricultural processes are endangering the Earth systems that sustain this population. An area the size of South America is used to grow the world's crops, and an area about the size of Africa is used for pastures and grazing lands. As the population grows – and as inequality, pollution and waste in the consumption of resources continue – the less optimistic we can be that people will have their basic needs of food, water and shelter met, particularly in the Global South and conflict zones. Worldwide, 822 million people are already hungry¹². Hunger is worse in countries with food systems highly sensitive to rainfall and temperature variability, and where people depend on agriculture for livelihoods. Owing to worsening climate change, such countries are increasingly exposed to multiple types of climate extremes¹³.

Land across the Global South has been bought up by corporations for monocultural and livestock agriculture, the produce of which is exported to wealthier countries. This degrades ecosystems, reduces local people's food sovereignty and in turn worsens the impacts of climate change. A very small number of companies control the world's food supply, which is unfairly distributed.

Multiple studies published in the past year have raised the alarm that human activities are exceeding the Earth's carrying capacity¹⁴, such that the food system is a major cause of breaching these limits, and in turn food supplies are threatened¹⁵.

'No other human activity can match the geographic footprint of agriculture'

Dr Jonathan Foley

¹² United Nations website and press release, July 2019.

¹³ 'The state of food security and nutrition in the world 2021', www.fao.org/3/cb4474en/online/cb4474en.html#chapter-1-introduction

¹⁴ A key source of information in this summary is the IPCC special report 'Climate Change and Land', 2019, www.ipcc.ch/srccl

¹⁵ The ARU Global Sustainability Institute says society will collapse by 2040 owing to catastrophic food shortages. The EDGAR-FOOD study concluded that 'food systems' were responsible for 34% of all human-caused greenhouse gas emissions in 2015; 71% of these emissions were from agriculture and associated land use changes. C J A Bradshaw et al, 'Underestimating the challenges of avoiding a ghastly future', *Frontiers in Conservation Science* (January 2021), www.frontiersin.org/articles/10.3389/fcosc.2020.615419/full reports that 'Without fully appreciating and broadcasting the scale of the problems and the enormity of the solutions required, society will fail to achieve even modest sustainability goals.' The IPCC Sixth Assessment Report, 2022, shows serious negative impacts of global warming earlier than expected, and that Europe will be negatively affected. Droughts will particularly affect crops in southern Europe, and agricultural biomes will shift north.

3.2 BREAKING DOWN THE HARMS IN THE FOOD SYSTEM

3.2.1 HOW AGRICULTURE, FISHING AND AQUACULTURE AFFECT ECOSYSTEMS

- **Water:** It takes 2,000–5,000 litres of fresh water to produce a person's daily food. Agriculture is responsible for 70–85% of the world's consumption of water, leading to the collapse of rivers, lakes and inland seas across the world. In India 21 cities are running out of groundwater. In Brazil there are water shortages in the populated agricultural region of the Northeast. The UK lacks infrastructure to store water during wet winters to offset dry summers.
- **Biodiversity:** Pesticides, herbicides and fungicides are used to increase yields and enable quicker harvesting. However, their widespread use and persistence in ecosystems has been identified as a leading cause of biodiversity decline, including the collapse of pollinator populations on which many food crops depend¹⁶.
- **Soil degradation:** The global use of chemical fertilisers and pesticides, combined with regular tilling, is causing losses of fertility, biodiversity and integrity in soil. The less productive soil becomes, the more that fertilisers are used to increase yields. Today 75% of the Earth's soils are degraded, including farmland¹⁷.
- **Chemical pollution:** The use of fertilisers is so high that it has more than doubled the normal geological flows of nitrogen and phosphorus across the Earth's surface¹⁸. This has polluted waterways all over the world, causing 'dead zones' in oceans and rivers. Heavier rainfall due to climate disruption worsens this.
- **Impacts of commercial fishing:** Every year 2.7 trillion fish are taken from the oceans. Gigantic trawling nets destroy the ocean floor and remove multiple interdependent species in their bycatch, including keystone species such as whales and dolphins. Each year 1.6 billion hectares of ocean floor is decimated. Fishing nets form nearly half of the waste in the Pacific Ocean. Only 5% of the world's oceans are protected, yet marine biodiversity is vital for sustaining the climate¹⁹.
- **Impacts of aquaculture:** Farmed salmon, prawns and shrimp cause serious environmental damage. Waste from fish feed and faeces pollutes the water and seabed around intensive fish farms, leading to poor water and sediment quality. Up to half of the food produced is unfit for consumption, so is left to rot and contributes to this pollution. Chemicals and pesticides (used to control parasites and disease) can also contaminate the area and impact on surrounding marine life. Shrimp farming is causing 38% of global mangrove deforestation.

3.2.2 HOW THE FOOD SYSTEM CAUSES CLIMATE DISRUPTION

DIRECT CAUSES

- Farming contributes directly to global heating and climate disruption by the emissions of greenhouse gases (GHGs) from **livestock**, especially by cattle. There are also direct emissions from manure and pasture management, as well as from the use of fuel by fishing boats.
- The **burning of savannas** to make space for animal feed crops and grazing is a direct cause of emissions.
- The overuse of **fertilisers** and manure releases nitrous oxide (N₂O) from agricultural soils. Agriculture directly releases 24% of the world's GHGs.
- Add to this the direct emissions from the **supply chain of agriculture**: the production, packaging, transport, refrigeration, cooking and waste of food. These make up 18% of the emissions from the food system.
- Taken together, direct emissions from the food system are responsible for **as much as one-third of the world's GHGs**²⁰. A new study in June 2021 found that these are much higher in developed countries and that their emissions are often hidden by offsets²¹.

INDIRECT CAUSES

- Changes in land use tend to be harmful. Clearance techniques such as burning release CO₂. Losses of mature trees and biodiverse ecosystems reduce the ability of land to act as a **carbon sink**.
- Deforestation for feed crops, peat harvesting for compost, soil degradation from extractive farming techniques and overgrazing of grasslands (eg by sheep) all reduce the **carbon sequestration** capacity of land.
- In **marine environments** seagrasses, mangroves and salt marshes also play a significant role in carbon sequestration. But these ecosystems are being destroyed at a faster rate than any other ecosystem on the planet (although not entirely because of agriculture).

3.2.3 HOW CLIMATE DISRUPTION IMPACTS ON THE FOOD SYSTEM

- The impacts of climate change increase **damage to ecosystems**. For example, pests such as locusts thrive in warmer climes, devastating crops (eg in India), and in turn pesticides to control locusts damage biodiversity.
- Although increased land use and technologies have increased crop yields, climate disruption – in particular drought – has **reduced yields by 21%** since the 1960s²². As climate breakdown ramps up, yields will be affected even more by storms and floods.
- In turn, climate disruption itself further **increases GHGs in the atmosphere**, for example as larger forest fires burn for longer, emitting more carbon rather than absorbing it.

¹⁶ www.beyondpesticides.org/programs/bee-protective-pollinators-and-pesticides/what-the-science-shows

¹⁷ S Leahy, '75% of Earth's land areas are degraded', *National Geographic* (26 March 2018), www.nationalgeographic.com/science/article/ipbes-land-degradation-environmental-damage-report-spd states that 23 billion tons of fertile soil are lost every year.

¹⁸ J Foley, 'Food, farming, and the fate of the planet Earth', <https://globalecoguy.org/food-farming-and-the-fate-of-planet-earth-dd934324e7a7>

¹⁹ '13 facts from "Seaspiracy"', 12 April 2021, <https://earth.org/facts-from-seaspiracy>

²⁰ F N Tubiello et al, 'Greenhouse gas emissions from food systems: building the evidence base', *Environment Research Letters*, 16/6 (2021), <https://iopscience.iop.org/article/10.1088/1748-9326/ac018e#erlac018es5> features a new calculation of food system impacts.

²¹ M Crippa, E Solazzo, D Guizzardi, F Monforti-Ferrario, F N Tubiello and A Leip, 'Food systems are responsible for a third of global anthropogenic GHG emissions', *Nature Food*, 2 (2021), www.nature.com/articles/s43016-021-00225-9

²² A Ortiz-Bobea, T R Ault, C M Carrillo, R G Chambers and D B Lobell, 'Anthropogenic climate change has slowed global agricultural productivity growth', *Nature Climate Change*, 11 (2021), www.nature.com/articles/s41558-021-01000-1

3.2.4 OTHER HARMFUL FEATURES OF THE FOOD SYSTEM

INEQUALITIES

- Worldwide 822 million people are hungry.
- One in three people suffer from some form of malnutrition.
- The diets of 2 billion people lack key micronutrients, but at the same time 2 billion adults are overweight or obese.

By 2050 the population of the world may have increased by 2 billion to nearly 10 billion people, requiring 40% more water, 50% more energy and 60% more food. Inequality is a major problem, such that the wealthiest 10% are responsible for consuming nearly half the world's resources, including food and water²³. There is overconsumption in wealthy countries, while poor countries are forced to export most of their produce in order to pay their debts, leading to famine and malnutrition.

The **lack of food sovereignty** is a result of the present food system, in which corporations and market institutions dominate. Food sovereignty is a system in which the people who produce, distribute and consume food also control the mechanisms and policies of food production and distribution.

Food insecurity is becoming a major concern. The UN Committee on World Food Security defines food security as the ability of all people, at all times, to have physical, social and economic access to sufficient safe and nutritious food that meets their food preferences and dietary needs for an active and healthy life, irrespective of gender, class or region. Climate breakdown is a major driver of food insecurity due to crop failures²⁴.

IMPACTS ON HUMAN HEALTH

Humans are an integral part of the global ecosystem, and are often dependent on local ecosystem health. There are impacts on humans from agribusiness and its partner, high-energy and low-nutrition processed food. For wealthier populations and where only processed food is affordable, these health impacts include cancer, obesity and heart disease. For more impoverished populations, impacts include malnutrition and lower immunity to disease. In addition, the food system is a major factor in zoonotic pandemics such as COVID-19.

ACCELERATION AND GLOBALISATION

The food system is based on **'just in time' supply**, with food – often refrigerated – being transported long distances by plane or ship for affordable processing then on to its market regions. Unpredictable events, such as COVID-19, can interrupt the process and lead to wastage of large amounts of food that do not reach markets or consumers in time.

The food system has become characterised by an **expansion of scale**, with larger fields of monocrops and more mechanisation. As prices drop with these efficiencies and the demands of just-in-time supply increase, the cost of infrastructure grows, so yields must increase to pay for it. This continued expansion leads to overuse of fertilisers and pesticides, overproduction and waste.

ANIMAL EXPLOITATION AND SUFFERING

- The **cruelties of animal exploitation** are a major area of harm or ethical consideration that cannot be fully explored in this background research, given its focus on ecosystem and climate impacts.
- There is currently increased awareness of **live animal exports** owing to the *Evergiven* ship blockage of the Suez Canal, with 250,000 animals trapped at sea.
- In terms of **aquaculture**, research indicates that farmed fish, especially salmon and trout, suffer pain and stress²⁵.
- More people are choosing **cruelty-free diets** and lifestyles. In the UK the number of vegans rose by 40% in 2020²⁷.

3.3 SOME SOLUTIONS IN RESPONSE

3.3.1 FOOD TECHNOLOGY SOLUTIONS

High-tech controlled environments for food production. The Netherlands is a model in highly efficient food production, committed to producing twice as much food with half the resources²⁸. Its farmers use greenhouses with controlled climates, hydroponics and advanced technologies such as UV lights or drones to control pests.

Vertical farming²⁹ is an approach to produce green crops indoors without soil or sunlight, instead using LEDs for photosynthesis. Sensors monitor air flow, temperature, humidity and CO₂, maximising plant growth in a short time to deliver 30 harvests per year compared with two or three in conventional fields. It uses 95% less water than traditional farming and just 0.25% of the land. Vertical farms can be located in cities, reducing transportation.

Aquaponics³⁰ mimics a natural resilient ecosystem, combining aquaculture (fish farming) and hydroponics (growing plants in water), to provide a continuous hyper-local supply of both protein and vegetables. It uses 16% of the water to grow eight times more food per hectare than traditional farming. The nutrient-rich water from the fish provides a fertiliser for the plants, while the plants purify the water for the fish. The plants are free of pesticides and herbicides, and the fish are free of growth hormones and antibiotics.

Biotechnology. GMOs³¹ can offer more nutritious foods using less soil and water, but they do raise a number of challenges, for example that some corporations might use them to dominate the food industry to control every aspect of production.

'GM crops can be engineered to require less water to grow or to resist diseases or pests. More ambitious projects are underway to engineer crops that make their own fertiliser. This type of technology could be key in making some of our most important food crops more resilient in the face of climate change, and it could decrease the chemicals and energy needed to grow them'

Jay Sullivan, Natural History Museum, April 2021³²

'Cramming animals into factory farms and clearing land for more feed crops has increased the likelihood of outbreaks of zoonotic diseases such as swine flu, avian influenza or Covid-19'

Jan Dutkiewicz and Gabriel N Rosenberg²⁵

²³ 'Carbon emissions of richest 1 percent more than double the emissions of the poorest half of humanity', Oxfam, 21 September 2020. www.oxfam.org/en/press-releases/carbon-emissions-richest-1-percent-more-double-emissions-poorest-half-humanity

²⁴ A Marks and H Murphy Winter, '11 foods that are already being impacted by the climate crisis', Rolling Stone (19 April 2021). www.rollingstone.com/culture/culture-pictures/foods-most-affected-by-climate-change-1144590/gettyimages-1178064966

²⁵ J Dutkiewicz and G N Rosenberg, 'Man v food: is lab-grown meat really going to solve our nasty agriculture problem', The Guardian (29 July 2021). www.theguardian.com/news/2021/jul/29/lab-grown-meat-factory-farms-industrial-agriculture-animals

²⁶ B Franks, C Ewell and J Jacquet, 'Animal welfare risks of global aquaculture', Science Advances, 7/14 (2021). www.science.org/doi/10.1126/sciadv.abg0677

²⁷ M Chiorando, 'Number of vegans in Britain skyrocketed by 40% in 2020, claims survey', Plant Based News (8 January 2021). <https://plantbasednews.org/culture/ethics/vegans-in-britain-skyrocketed>

²⁸ www.youtube.com/watch?v=KfB2sx9uCkl&ab_channel=Freethink

²⁹ www.youtube.com/watch?v=QT4TWbPLrN8&ab_channel=TheB1M

³⁰ www.youtube.com/watch?v=Phek1qpqoGo&ab_channel=TheCanadianPress

³¹ www.youtube.com/watch?v=BalxcRtP-m4

³² J Sullivan, 'The future of eating: how genetically modified food will withstand climate change', Natural History Museum, 22 April 2021. www.nhm.ac.uk/discover/the-future-of-eating-gm-crops.html

3.3.2 OTHER FUTURE FOODS

A number of scientists and businesses are developing processes and testing appetites for foods that can be produced locally, using waste products and less energy, to provide optimum nutrition and generate value beyond the consumption of food.

- **Entomophagy** – eating insects, arachnids and centipedes – is one route being explored³³. This is an ancient practice and 2 billion people already eat 1,900 species. They are nutritious, high in protein and low in fat, and require less space, feed and emissions to breed than larger livestock³⁴. The environmental crisis is increasing insect pests while increasing the need for beneficial insects (eg for pollination), so there is a role for innovations that optimise and use insect populations³⁵. This offers a promising source for pet foods.

- **Mycology** is the study of fungi, enriching innovations in the food system, including sustainable packaging and soil enrichment, as well as food³⁶. Mycoprotein has been used in meat imitation products such as Quorn since the mid-1980s, but recently there has been a 'mushrooming' in new products and practices, particularly in the Brazilian economy.

- **Cultured meat or lab-grown meat** is produced in bioreactors, using a combination of animal cells and plant-based materials, without the slaughter of animals³⁷. The product is cleaner, drug-free and cruelty-free meat that can be healthier than some types of meat, although it is not strictly vegetarian. It is also currently energy-hungry but could be more efficient if scaled up.

- **Algae** are a group of aquatic plants, including seaweed and chlorella, that are highly promising for fuel, food and feed³⁸. They grow fast and consume CO₂, making them efficient and climate friendly. As they can be grown in salt water, they do not compete with agriculture or use up fresh water. They clean water and create no waste. As well as protein and vitamins, algae provide omega-3 fatty acids normally assumed only to be obtained from fish, so they could help reduce commercial fishing.

- **Fermentation** is an increasingly popular process to create more nutritious plant-based foods, and to make food more digestible and improve gut health (understood now to be essential for wellbeing). New ventures are drawing on centuries-old practices that have allowed food to be stored beyond harvest and deliver maximum benefits.

'Food production will shift from a model of extraction, where we grow plants and animals to break them down into the things we need, to a model of creation, where foods are built up from precisely-designed molecules and cells'

James Arbib and Tony Seba³⁹

3.3.3 POLICY AND LEGAL SOLUTIONS

There are many ways that policies can leverage change in agriculture, food production and transport to contribute to national and local plans for decarbonisation and food security. These include:

- Incentives for farmers to switch to more efficient climate-friendly technologies, for example not to use nitrogen fertilisers.
- Combined public procurement of food rather than encouraging competition between farms.
- Taxes on ultra-processed food, red meat, sugar or palm oil.
- Consumer-facing policies such as eco-labels.
- Equity policies such as a universal basic income and increasing availability of the most nutrient-rich, energy-efficient foods at the point of need.
- Legal interventions such as a law against ecocide⁴⁰.

COVID-19 could have the impact of positioning measures for population health as a key lever for change. Guidance from the medical profession could influence policy changes. The EAT–Lancet Commission called for a planetary health diet in 2019, asking how food production can increase to sustain a growing population within the planetary boundaries⁴¹. This was followed up with the EAT–C40 food network⁴², supporting the world's largest cities to apply a 'Great Food Transformation'.

International cooperation on food systems is increasing. The UN Framework Convention on Climate Change has elevated food systems in the climate agenda, which can also be seen from the 2020 impact report on the EAT–Lancet work⁴³. In September 2021 the UN hosts a Food Systems Summit⁴⁴ aiming to raise awareness and public discussion about how reforming our food systems can help to achieve the Sustainable Development Goals.

³³ S Hopkinson, 'Eat insects, save the world', Natural History Museum, www.nhm.ac.uk/discover/eat-insects-save-the-world.html

³⁴ T Bernard and H M Womeni, *Entomophagy: Insects as Food*, IntechOpen Book Series (2017), www.intechopen.com/books/insect-physiology-and-ecology/entomophagy-insects-as-food

³⁵ Locust plagues are currently being converted into fertilisers by Kenyan farmers, for example. In the UK companies such as Eat Grub encourage the public to choose insects through fun products and branding. www.eatgrub.co.uk

³⁶ K D Hyde et al, 'The amazing potential of fungi: 50 ways we can exploit fungi industrially', *Fungal Diversity*, 97 (2019), <https://link.springer.com/article/10.1007/s13225-019-00430-9>

³⁷ Cells are typically extracted from fetal bovine serum, or cow's blood, see D Carrington, 'No-kill, lab-grown meat to go on sale for first time', *The Guardian* (2 December 2020), www.theguardian.com/environment/2020/dec/02/no-kill-lab-grown-meat-to-go-on-sale-for-first-time

³⁸ A Beall, 'The green sludge that could transform our diets', BBC, www.bbc.com/future/bspoke/follow-the-food/the-green-sludge-that-could-transform-our-diets.html

³⁹ J Arbib and T Seba, *Rethinking Humanity* (RethinkX, 2020), www.rethinkx.com/humanity

⁴⁰ <https://www.stopecocide.earth>

⁴¹ www.pik-potsdam.de/en/news/latest-news/lancet-report-healthy-lives-and-a-liveable-planet-for-all-require-major-changes-in-what-we-eat-and-how-we-produce-it and the full text of this research, W Willett et al, 'Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems', *The Lancet*, 393/10170 (2019), pp447–92, [www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)31788-4/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31788-4/fulltext); www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html

⁴² <https://eatforum.org/initiatives/cities/eat-c40>

⁴³ 'Can a scientific commission change the world', <https://eatforum.org/learn-and-discover/can-a-scientific-commission-change-the-world>

⁴⁴ www.un.org/en/food-systems-summit/about

3.3.4 COMMUNITY JUSTICE SOLUTIONS

Food sovereignty is made possible by changes at policy level, such as property laws and financing. However, many initiatives are emerging from local community action despite a lack of such policies and in resistance to large agricultural business. Some arise from the Global South, including the formation of agroecological communities⁴⁵ in rural areas, and multi-stakeholder community planning⁴⁶ of urban agriculture⁴⁷.

Community food sovereignty rests on the concept of food as commons⁴⁸, such that land should be collectively owned and democratically managed, or food provided to all who need it. Current global trade treaties and agricultural policies disregard subsidiarity and people's right to food sovereignty.

Climate breakdown impacts can make land less productive (eg owing to drought), which can lead to people being displaced, needing emergency food and having longer-term needs to regain their food sovereignty. One solution is enabling refugees to learn permaculture skills, with small amounts of land to practise them in⁴⁹. Agroforestry is also a means towards more nutritional yields for less effort, making land more resilient to climate impacts. See notes below for more⁵⁰.

3.3.5 REGENERATIVE AGRICULTURE SOLUTIONS

There is an overlap with community justice solutions, in that regenerative agriculture tends to be practised by smaller farmers and community-owned projects. However, regenerative farming is an ethos and set of practices, such as no tilling, that can be applied by farms and food businesses of any size, with an overt goal of reducing climate emissions (and increasing biodiversity) while being climate resilient⁵¹.

Regenerative farming does not always obtain quickly profitable yields, but as soil health improves and certain plants are sown, yields can be larger and more resilient than with conventional farming, and higher prices can be obtained for more organic, diverse and nutritious products.

⁴⁵ R Forsetto, 'Brazil's landless workers persist through agroecology', 30 September 2020, <https://civileats.com/2020/09/30/brazils-landless-workers-persist-through-agroecology>

⁴⁶ M Dubbell, H De Zeeuw and R van Veenhuizen, 'Cities, poverty and food: multi-stakeholder planning on urban agriculture', *Environment & Urbanization* (2010), www.environmentandurbanization.org/cities-poverty-and-food-multi-stakeholder-planning-urban-agriculture

⁴⁷ J P Sarmiento Barletti, A M Larson, C Hewlett and D Delgado, 'Designing for engagement: a realist synthesis review of how context affects the outcomes of multi-stakeholder forums on land use and/or land-use change', *World Development*, 127 (2020), www.sciencedirect.com/science/article/pii/S0305750X19304024

⁴⁸ 'Are food commons the next innovation pathway for urban food policies?', <https://urbanfoodfutures.com/2020/11/27/commons>

⁴⁹ www.permacultureforrefugees.org

⁵⁰ La Via Campesina is an international organisation supporting peasant and indigenous farmers, <https://viacampesina.org/en>. The Slow Food movement is a global grassroots organisation, founded in 1989 to prevent the disappearance of local food cultures and traditions, counteract the rise of 'fast life', and combat people's dwindling interest in the food they eat, where it comes from and how our food choices affect the world around us, www.slowfood.com. Terra Madre is a network and festival, <https://terramadresalonedelgusto.com/en>. Local Futures is an initiative led by Helena Norberg Hodge, linking food, cultures and sustainability, <https://www.localfutures.org>. Navdanya is a seed bank and learning network of 650,000 farmers across India, led by Vandana Shiva, that has helped 200,000 farmers convert to organic agriculture, www.navdanya.org/site.

⁵¹ These holistic management technologies include: no tilling, or low-tillage seeding, and use of perennial crops (50% of Brazil's agricultural land is 'no till', a method widespread in South America), https://en.wikipedia.org/wiki/No-till_farming; rotational grazing – moving grazing livestock between pastures, using a range of systems, so that the animals fertilise land, regenerating the grasses and retaining water, https://en.wikipedia.org/wiki/Rotational_grazing; agroforestry – combining diverse kinds of trees with agricultural crops on the same land, www.agroforestry.co.uk/about-agroforestry; regenerative irrigation systems, www.irrigationlab.com/regenerative-irrigation; circular use of mineral waste resources (eg mining tailings) for fertilisers that store carbon; paludiculture – rewetting dried-out peatlands and looking to alternative plants that grow well there, including forestry and medicinal plants such as sphagnum moss, and allowing animals to graze, <https://europe.wetlands.org/news/paludiculture-presents-the-necessary-paradigm-shift-towards-sustainable-peatland-use-with-global-climate-benefits>

3.4 PREVIOUS SURVEYS OF PUBLIC ATTITUDES TO FOOD AND SUSTAINABILITY

According to research by Pew⁵², 70% of people surveyed across 14 countries say climate change is a major threat to their country. In many countries, climate concern has risen since 2012–16. This particularly impacts on children, 75% of whom are frightened of a future with climate change according to a worldwide survey by Avaaz published in September 2021⁵³. For all questions, children in Brazil and India expressed more concern than those in the UK.

Drawing on several sources of research, to compare these three countries:

- Brazilians lead in concern about environmental issues, with about 80% saying they are very concerned about the environment and global warming, according to IBOPE–YPCCC research (June 2021)⁵⁴ – at least 20% more than the international average. There is little climate denial among Brazilians – 92% agree that global warming is a reality, and 77% believe human activities are the main cause of it. Only 14% of electricity in Brazil is from fossil fuels.
- In India 71% agree that climate change is anthropogenic⁵⁵, 70% say climate change is affecting where they live and a median of 61% prioritise environmental protection⁵⁶. Political responses to these concerns are slow. For example, 71% of electricity in India is from fossil fuels.

- For the UK the Pew research shows 71% see climate change as a serious threat. According to Climate Outreach research (March 2021), at least 60% in each of Pew's public segments agree that the climate situation demands a global response. Rural communities in the UK are more concerned and active about climate change than urban communities. The UK has made recent efforts to reduce fossil fuel emissions domestically, such that 41% of its electricity is from fossil fuels.

An Ipsos MORI survey⁵⁷ of 21,011 people in 30 countries shows that people in most countries are least aware of the actions that are most able to reduce emissions, such as eating a plant-based diet. They ranked the most effective actions lower than actions such as recycling or not using tumble dryers.

The gap between the public valuing the environment and taking action to protect it, eg through food choices, is evidenced in research all over the world. For example, research across the EU, Brazil and China into attitudes towards food sustainability (focused on pork) found that what the large majority of respondents think about pork production as citizens did not significantly influence pork consumption choices. However, voicing their attitudes might influence public policy, suggesting the value of education⁵⁸.

⁵² M Fagan and C Huang, 'Many globally are as concerned about climate change as about the spread of infectious diseases', Pew Research Center, 16 October 2020, www.pewresearch.org/fact-tank/2020/10/16/many-globally-are-as-concerned-about-climate-change-as-about-the-spread-of-infectious-diseases

⁵³ https://secure.avaaz.org/campaign/en/climate_anxiety_panel

⁵⁴ www.oeco.org.br/analises/como-nos-brasileiros-percebemos-as-mudancas-climaticas

⁵⁵ S Goshi, '71% Indians think that humans are responsible for climate change: YouGov survey', *The Times of India* (16 September 2019), <https://timesofindia.indiatimes.com/india/71-indians-think-that-humans-are-responsible-for-climate-change-yougov-survey/articleshow/71154200.cms>

⁵⁶ 'Public views about science in India', Pew Research Center, 29 September 2020, www.pewresearch.org/science/fact-sheet/public-views-about-science-in-india

⁵⁷ Ipsos MORI survey, April 2021, analysed in S Bernard and C Bruce-Lockhart, 'Clothes dryer vs the car: carbon footprint misconceptions', *Financial Times* (2021), www.ft.com/content/c5e0cdf2-aaef-4812-9d8e-f47dbcded55c

⁵⁸ A Krystallis, K G Grunert, M Dutra de Barcellos, T Perrea and W Verbeke, 'Consumer attitudes towards sustainability aspects of food production: insights from three continents', *Journal of Marketing Management*, 28/3 (2012), pp334–72, www.researchgate.net/publication/254316185_Consumer_attitudes_towards_sustainability_aspects_of_food_production_Insights_from_three_continents

3.5 CONTEXT OF FOOD SUSTAINABILITY AND COVID-19

3.5.1 AN INCREASE IN FOOD INSECURITY

A key impact of the pandemic, combined with extreme weather and conflict, is food shortages and rising food prices. Internationally, food prices⁵⁹ rose 47% in the first half of 2021, with climate change an additional factor. The pandemic restricts the timely flow of labour and goods. Loss of work for many, in turn, makes rising food prices more unaffordable. Food prices are known to be a trigger for social unrest. The UN has warned that acute hunger is likely to soar in the next few months in 20 countries, including in Yemen and South Sudan as the planting season is disrupted⁶⁰.

- As Brazil's COVID-19 crisis worsened in spring 2021, hunger and food insecurity followed. A survey in April⁶¹ showed that hunger hit 19 million Brazilians in 2020. Some degree of food insecurity affected 116.8 million people (55.2% of all households). The pandemic has thrown many of Brazil's 38 million informal workers into unemployment, and basic food prices have rocketed, which has had a disproportionate effect on poorer citizens. In one year, the price of rice shot up by 70% and soya bean oil by 87%.
- In India infection rates rose sharply in April, so that health care and other services were on the brink of collapse. Food prices rose over 5% in May 2021. Delhi was particularly badly affected, having also been troubled by farmers' protests. The 'delta variant' that arose in India spread to affect other countries.

- In the UK a three-month lockdown ended at the end of March 2021, but restrictive measures continued. Infection rates dropped from a spike in the winter, but have since been affected by the spread of the delta variant. Background inequality and food insecurity is among the worst in Europe, and this has been exacerbated by COVID-19 (eg owing to worker shortages) as well as increased customs checks and transport hold-ups caused by 'Brexit'⁶².

3.5.2 AN INCREASE IN AWARENESS AND ACTION

An impact of the pandemic is that it has triggered a large number of initiatives to avoid returning to a 'new normal'. Campaigners such as Sustain and the UN are communicating that the food system is probably the single biggest threat to the health of our planet, considering the impacts of emissions, land use changes and pollution. There is also slowly increasing awareness of the threat of zoonotic transfer⁶³ which causes diseases such as COVID-19 and arises from destructive land use changes. COVID-19 is a zoonotic disease – a result of deforestation and consumption of wild animals, exacerbated by global trade and tourism. It is also more severe for people exposed to air pollution and poor diets. There is a growing risk of more zoonotic diseases arising from impacts of climate change and the acceleration of deforestation⁶⁴.

See the appendices, section 2.4, for details on the impact of COVID-19 on access to culture and education.

4.

ANALYSIS OF FINDINGS ACROSS THE THREE COUNTRIES

4.1 ANALYSIS OF LIGHT-TOUCH SURVEY

Our survey was primarily intended to recruit participants in conversation, so it was deliberately light touch. However, it has yielded some interesting data that could be analysed further by interested researchers. *A more detailed analysis can be found in the appendices, section 3.*

The 1,304 respondents to our survey across the three countries showed a very high level of interest in food, and even greater concern about the environment, with the majority across all three countries scoring themselves at 7 or above on a scale of 1 to 10:

- Score of interest in food 7+ – UK 87% of respondents, India 76%, Brazil 92%
- Score of concern about the environment 7+ – UK 92%, India 81%, Brazil 94%

While those choosing to respond may already be invested, this finding is consistent with evidence of growing public concern about these issues. See notes below for evidence of rising concern in the UK⁶⁵, Brazil⁶⁶, India⁶⁷ and worldwide.

We have coded their open responses about interest in food in three main categories, with a fourth for those whose responses were unclear or incomplete. Respondents in Brazil and India were most interested in food as a basic need and in terms of healthy lifestyle choices (showing a focus on Self and Family). Those surveyed in the UK were more interested in the origins of their food and how their choices affect others and the planet (focus on ecosystems and the planet)⁶⁸.

⁵⁹ B Walsh, 'Rising global food prices could presage social unrest', 10 March 2021, www.axios.com/global-food-prices-coronavirus-protests-9d81f4c6-7665-4aa5-9250-a5b670efdb30.html

⁶⁰ K McVeigh, 'Over 30 million people "one step away from starvation", UN warns', *The Guardian* (24 March 2021), www.theguardian.com/global-development/2021/mar/24/over-30-million-people-one-step-away-from-starvation-un-warns

⁶¹ Conducted by the Brazilian Network for Research in Sovereignty and Food and Nutritional Security.

⁶² B Melo Araujo, 'Brexit trade problems: what's gone wrong and can it be fixed?', *The Conversation* (14 January 2021), <https://theconversation.com/brexit-trade-problems-whats-gone-wrong-and-can-it-be-fixed-153270>

⁶³ Zoonotic transfer is the transmission of a disease from an animal host to a human. Some diseases originate in wild animals (eg bats or monkeys) and transfer to livestock before transferring to human populations. Deforestation and capture for sale of wild animals can trigger outbreaks of zoonotic disease. See K Berger, 'The man who saw the pandemic coming', *Nautilus*, 83 (12 March 2020), <https://nautilus.us/issue/83/intelligence/the-man-who-saw-the-pandemic-coming>

⁶⁴ 'To protect people from zoonotic disease, we must address the key, human-led drivers that put us at risk. Increased forest loss, land conversion, and illegally-traded, live wildlife are all contributing to dangerous environments that lead to new spillovers. As people encroach on wild habitats and exploit the natural world for their own gain, the risk of spillovers increases.' WWF, 2021, www.worldwildlife.org/stories/a-call-to-stop-the-next-pandemic

⁶⁵ Climate Outreach research, published in March 2021, breaks down the UK public into seven segments, finding that all segments are concerned to a greater or lesser extent, that the majority agree climate change is caused by human activities, and that impacts are being felt in the UK. At least 60% in each segment agree that the situation demands a global response. <https://climateoutreach.org/britain-talks-climate/seven-segments-big-picture/common-ground-differences>

⁶⁶ Research by PPP do Brasil showed that Brazilians lead in concern about environmental issues, with over 90% perceiving air pollution, climate change, biodiversity loss or water availability as very serious problems – at least 30 percentage points more than the international average. High awareness translates into a majority that put a premium on environmental protection over economic growth and enthusiasm to engage in domestic recycling if given the chance. Awareness also drives a record level of interest in corporate sustainability, well over 70% since we began tracking it in 2002. Equally relevant, 1 in 2 adults admit to being willing to pay more for an ethical product.

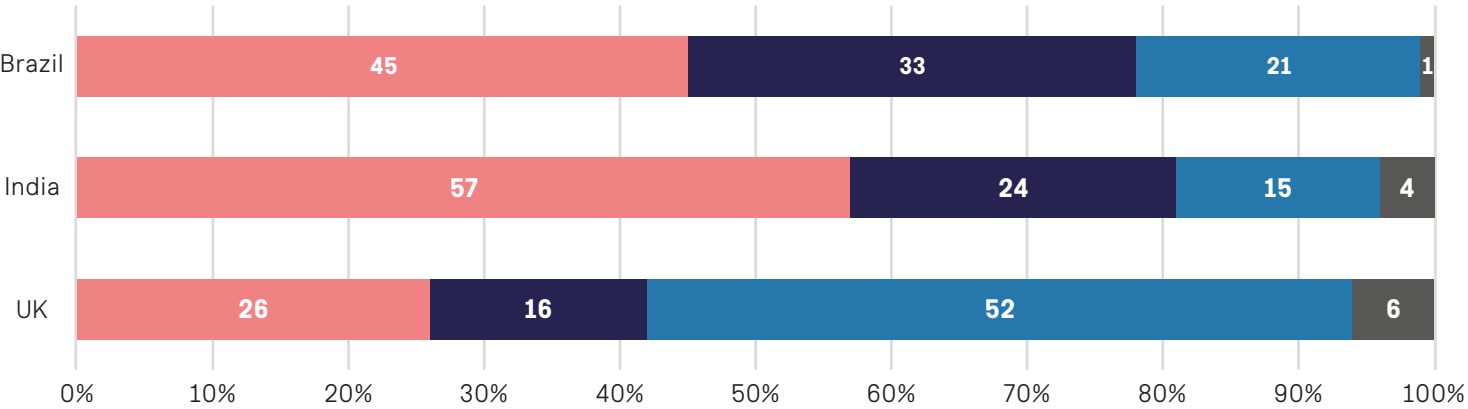
⁶⁷ The UN Peoples' Climate Vote, January 2021, in which 1.2 million people in 170 countries were surveyed. Concern and awareness about climate and food sustainability are lower in India than in the UK or Brazil, but as impacts are directly affecting India, concern has risen. www.undp.org/publications/peoples-climate-vote

⁶⁸ This focus on Ecosystems and Climate in UK surveyed audiences was not matched by those we interviewed, who tended to focus more on issues of Self and Family in conversations.

'I never go on foreign holidays ... I have no children, I am poor in health and wealth and I don't see why I should do without'

UK

REASONS FOR A HIGH INTEREST IN FOOD ISSUES



KEY

- Self and family
- Society and community
- Ecosystems and climate
- Ambiguous or incomplete

'I'm not completely uninterested, but I know I don't take much action to find more sustainable food, especially when it means leaving my comfort zone'

Brazil

Indian respondents had the widest range of concerns about the climate, with 34% mentioning specific issues such as climate refugees, Delhi pollution and food waste. In Brazil the top category was 'Politics and industry', with 28% of comments about the role of these sectors in environmental harm. UK respondents' top category was 'Nature and the more-than-human world' at 29%. Their comments indicated a wide awareness of issues and their cumulative impacts.

People in all countries who express low levels of interest in food or in environmental concerns tend to recognise the issues, but feel that it is out of their hands or not a priority.

To gauge the main factors that shape respondents' views about food and the environment they were asked to choose the five categories that first came to mind from a list of 22, covering factors relating to Self and Family, Society and Community, and Ecosystems and Climate. The top four choices in each country indicate the factors that they are most aware of in relation to food and the environment, which in turn reflects the current situation that these populations are facing, such as hunger in Brazil's context:

Brazil (437 responses) – main focus on Ecosystems and Climate, with a leaning towards Society and Community:

- Pesticides, deforestation, hunger and malnutrition, food waste

India (329 responses) – main focus on Society and Community:

- Food waste, pollution affecting health, hunger and malnutrition, population

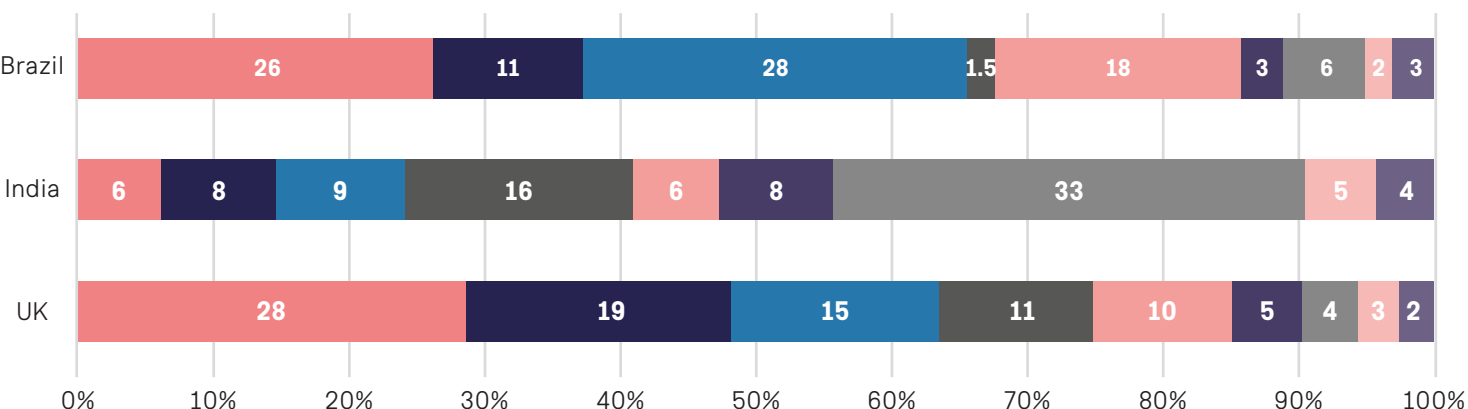
UK (421 responses) – divided between Self and Family, and Ecosystems and Climate:

- Packaging and plastic, deforestation, food waste, loss of biodiversity

'I alone can't do anything'

India

REASONS FOR CONCERN ABOUT THE ENVIRONMENT



KEY

- NATURE: and planet being concerned mainly for the sake of the more-than-human world
- FUTURE: being anticipatory of future catastrophes and pressures, impacting negatively on future generations ('my grandchildren')
- POLITICS AND INDUSTRY: being concerned that there is a lack of action by corporations and governments, and that people need to take political action into their own hands
- GENERAL: brief expressions of despair or concern
- UNSUSTAINABLE LIFESTYLE: Anger or concern about lack of action or understanding on a citizen / consumer level
- AMBIGUOUS: unclear, skeptical or incomplete e.g. 'see previous'
- SINGLE ISSUES: more limited concerns about issues such as plastic or waste
- POPULATION / LIMITS: concerns about population, the planet having reached its carrying capacity, and this being at a tipping point
- INEQUALITY: concern about greed and inequality ('we're killing the planet to feed a few')

Respondents were then asked to select the one issue from their original five which they feel is most important:

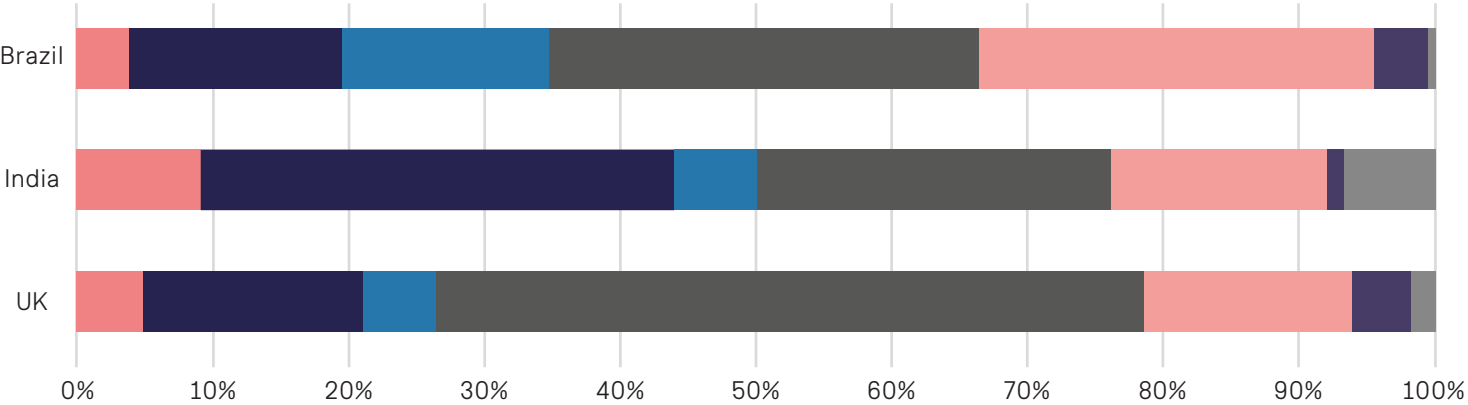
- Brazil** – healthy and ethical choices, pesticides, hunger and malnutrition, deforestation
- India** – food waste, pollution affecting health, hunger and malnutrition, population
- UK** – food waste, climate change affecting food, loss of biodiversity, hunger and malnutrition

Our analysis of this prioritisation suggests that despite there being a wide range of concerns, the highest priorities are the more practical and achievable areas for action, across the whole sample.

When asked what they feel they can do to help, overall, respondents in Brazil were the least empowered, with 29% feeling that changes must be made by those in power⁶⁹. Those in India were most likely to mention initiatives to educate people, and those in the UK were the most likely to make small changes as consumers.

⁶⁹ In Brazil there have been mass protests against President Jair Bolsonaro, who has licensed Amazon deforestation and is seen to have badly mishandled the COVID-19 pandemic.

IF YOU COULD DO ANYTHING ABOUT THIS
ISSUE WHAT WOULD YOU DO TO HELP?



KEY

- Taking action themselves towards changing the situation (e.g. writing to politicians, working for a scheme or charity, activism)
- Raising awareness of the issue (e.g. with friends, at work)
- Support others who are actively addressing it (e.g. donating, signing petitions)
- Make considered choices as a consumer/citizen
- Feel or identify change should be addressed by those in power (e.g. through law)
- Feel they have no power or unsure how to help
- Ambiguous – people who’s responses aren’t clear or they haven’t quite understood the question

‘Because if we don’t urgently start making ethical and healthy choices, seven years from now environmental losses will be irreversible’

Brazil

4.2 COMMONALITIES
ACROSS THE THREE
COUNTRIES

4.2.1 MOTIVATIONS AND ATTITUDES

- There was a very high level of interest in food issues, and even greater concern about the environment, among all 1,304 survey respondents, with the majority self-scoring 7 or above on a scale of 1 to 10 (85% for interest in food, 89% for concern about the environment).
- A theme common in all our conversations was the ‘value–action gap’, expressed as a tension between *knowing* about some food sustainability issues, and yet not *feeling able*, informed or motivated enough to take effective action. In the three countries, once people learn about how the food system causes harm, they want to see change. However, at the same time many feel disempowered to effect change themselves.
- Family groups in the three countries talked more about this tension than other audience groups. They described *consuming* cheap, palatable and energy-dense food while *knowing* that it can be unhealthy, unethical and unsustainable.
- Compared with adults, when children understand some harms of the food system they make more direct and emotional statements of concern, feeling powerless to change the system or their own diets. Adults, especially parents and teachers, give voice to children’s moral concerns or future anxieties, yet paradoxically parents are likely to justify unhealthy and unsustainable dietary choices owing to children’s desires.

4.2.2 AWARENESS OF FOOD
SUSTAINABILITY

Across the three countries awareness of food sustainability is influenced by two somewhat conflicting factors:

- Key facts or specific issues about the harms of the food system that are most visible in campaigns, public messaging or regional cultures.
- The need for their own families, communities or hungry people worldwide to access affordable nutrition, which many acknowledge requires an efficient but unsustainable farming system and convenient but sometimes unhealthy produce.

Awareness is most lacking in understanding global impacts of local food systems, knowing the links between ecosystem damage and climate breakdown, and anticipating future impacts of harm, particularly in causing food insecurity. Some groups, such as young people, were unaware that the availability of certain types of food is affected by climate change.

Topic knowledge varies across audience groups and countries, but people we spoke to and surveyed in all countries tended to reflect confusions in public discourse and a lack of available information about food systems and environmental sustainability in their countries.

People in all countries struggle to know what they can do to effect change on a larger scale, or whether changes in their personal consumption will make enough difference. The more confused people are, the less motivated they feel to change their own food practices, and the less agency they feel they have to effect change to global food systems. Below are some examples of confusions or challenging conundrums that arose across our research, reflected in popular discourse:

- **Nature-friendly versus high-tech.** Approaches such as regenerative farming were seen as working *with* nature, whereas high-tech approaches were less favoured as being 'against nature' or incompatible with their country. However, some food technologies can be nature-friendly and beneficial.
- **Status quo versus disruption.** For example, processed plant-based alternatives to meat and dairy products can be seen as perpetuating norms of highly commodified and ultra-processed food. On the other hand, plant-based diets can be popularised with well-marketed, convenient and affordable products.

- **Affordability versus ethics.** Planet-friendly produce was seen as expensive, and unachievable for poor families without subsidies. However, there is UK research that vegans spend 40% less than omnivores, although organic produce can certainly be more expensive⁷⁰.
- Reducing harm v feeding populations. Some approaches are seen to address one need but not the other. For instance, regenerative farming is seen as nature-friendly but low yield. However, some kinds of regenerative farming can produce similar or higher yields⁷¹.

4.2.3 AWARENESS OF AND PREFERENCES FOR SOLUTIONS

- Food waste and plastic waste were problems at the top of many minds in the three countries⁷². Food waste was selected by 51% of all survey respondents as one of their top five issues, and plastic and packaging by 43%⁷³. Ending waste is perceived to offer multiple routes to engage with and solve the wider problems for all audiences. There was often a conflation between tackling food waste and plastic waste as if they were the same problem. For example, in the UK focus groups, when they were asked what they did to tackle food system harm, the most common actions noted were 'reducing waste' and 'recycling'.
- In all countries, in focus groups and interviews, there was relatively low scientific awareness of the environmental benefits of reducing meat and dairy consumption. Also, animal welfare, religious ethics or health were expressed as stronger causes for concern about an animal-based diet. After solutions were discussed, awareness about climate impacts was increased, but initially these were not raised by many. This could be related to psychological tendencies to avoid or minimise climate change, and to perceive its impacts as distant in time and geography⁷⁴.

- Regenerative farming, community-supported farming and greener aquaculture were popular solutions out of those we suggested, although people wanted to know more about their benefits and how they might support them.
- Eating insects, lab-grown meat and GMO food were the least popular solutions across the three countries, as they raised more challenges about uncertain benefits, costs and ethics.

4.2.4 PREFERENCES FOR ENGAGEMENT AND THE ROLE OF MUSEUMS

- All audience groups in all countries are strongly influenced in these subjects by audiovisual media, mostly shared in social media and in news. The same films and TV programmes (eg *Cowspiracy* and *Blue Planet*) were cited, showing the international currency of documentary films on global issues. People understand the significance of these issues and want more powerful, simple and visual communication showing systemic effects, to reach more widely across society.

- There were common challenges to traditional narrative exhibits in museums, with interviewees wanting to see visitors activated to create social change through hands-on and 'tongues-on' experiences that might reach out into communities and connect people in radical ways. There were many creative suggestions that museums be transformed into greenhouses, laboratories or restaurants. For some, particularly in the UK and India, museums were seen as having potential to become more sensory and less static, sufficiently to engage visitors on food sustainability. For some professionals in all countries, and for more adults in Brazil, outreach beyond museums in places where food is produced and consumed was seen as more essential.

⁷⁰ The average cost of a vegan meal is 40% less than a meat/fish-based meal, from a sample of 11,000 households recording their meals over a year in 2020, according to <https://veganuary.com/vegan-meals-cost-40-percent-less-than-meat-fish>

⁷¹ In some cases regenerative and organic methods can lead to similar yields, and even yield increase. See C Vasilikiotis, 'Can organic farming "feed the world"?', 2000, www.researchgate.net/publication/228599516_Can_organic_farming_Feed_the_World

⁷² This fits with the UN Peoples' Climate Vote, January 2021, in which 1.2 million people in 170 countries were surveyed. It found that wasting less food was more popular than wasting less energy, www.undp.org/publications/peoples-climate-vote

⁷³ Other top choices were less easy to address – deforestation was selected by 51% and hunger and malnutrition by 42%.

⁷⁴ R Maiella et al, 'The psychological distance and climate change: a systematic review on the mitigation and adaptation behaviors', *Frontiers in Psychology* (19 November 2020), <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.568899/full>

4.3 DIFFERENCES BETWEEN THE THREE COUNTRIES

4.3.1 MOTIVATIONS AND ATTITUDES

- Survey respondents in Brazil feel the least empowered to make changes on a personal level, with 29% feeling that changes must be made by those in power. Those in India were most likely to mention initiatives to educate people. Those in the UK were the most likely to make small changes as consumers.
- We used a 'Three Lenses'⁷⁵ coding model to group responses to some questions in terms of mindsets and focus of concerns. These lenses were Self and Family, Society and Community, and Ecosystems and Climate. In conversations, more people in India and Brazil reflected values that focus on Society and Community compared with the UK, where the focus was more often divided between Self and Family, and Ecosystems and Climate. This was reflected in our survey data when people were asked to choose the top five issues that came to mind from a list spanning these categories.
- In Brazil, and somewhat in India, people talked of needing to reconnect to family roots, culinary traditions and ancestry of native peoples, with respect for cultural diversity and political sensitivity. All audiences in both Brazil and India expressed empathy for those living in poverty, and concern for the human right to access nutritious food. We coded these themes as Society and Community.
- In the UK these themes came up less, mainly with one group of older adults. Themes such as household budgets and children's needs (coded in relation to Self and Family), or nature disconnection, animal welfare and global food transportation (coded as Ecosystems and Climate) were raised more often. Conversations in the UK revealed a yearning desire for a greater sense of community and local society-based solutions, but these were not top of participants' minds or mentioned early on in conversations.

4.3.2 AWARENESS OF FOOD SUSTAINABILITY

- Our conversations revealed more than the survey did about people's knowledge and awareness and differences across the three countries.
- Knowledge of the food system:
 - Brazilians expressed the strongest awareness that the *food system has negative impacts on ecosystems and climate*, referencing changes close to home including deforestation for feedstock. However, some, particularly young people, were surprised by statistics about potential threats to food security.
 - Indians, particularly engaged adults, showed the strongest awareness that *climate change can impact on food security*, referring to drought and impacts of storms, although they talked with less detail of other environmental impacts of agriculture.
 - UK audiences expressed comparatively *low awareness* of harmful flows in the food system and of environmental causes of food insecurity, although some were very well informed about particular issues such as overfishing.

- Awareness of political issues and the role of the state:
 - Brazilian audiences spoke with sharper awareness of the role of the state in either causing or tackling environmental harms in a context of rising social inequalities, suggesting subsidies, investments, education and controls on deforestation.
 - This was echoed somewhat in India, albeit with a stronger emphasis on public information and messaging compared with the financial or legal measures that Brazilians talked about.
 - In the UK the role of the state was rarely mentioned, with the exception of some interviewed adults who talked of the lack of government action, which made them feel food sustainability (or climate impacting on food supplies) is not a major problem. A few parents and young people mentioned the power of corporations and advertisers to manipulate consumers.

4.3.3 AWARENESS OF AND PREFERENCES FOR SOLUTIONS

- In Brazil all audiences were more likely than in the other countries to favour, and know about, solutions that provide alternatives to industrial land-grabbing, particularly deforestation, and that support communities to grow food fairly and sustainably.
- In India all audiences were more likely than those in Brazil and the UK to focus on household choices and practices that reduce waste, provide good nutrition, and that increase demand and supply of a diversity of unprocessed plant-based foods.
- In the UK all audience groups, but particularly adults, included people that challenged solutions that might be unpopular with consumers (such as eco-labels), or that might need too much state intervention (such as limits on livestock farming) or investment (such as lab-grown meat).

4.3.4 PREFERENCES FOR ENGAGEMENT AND THE ROLE OF MUSEUMS

- In Brazil all audiences made more suggestions for engagement that brings communities together, draws on cultural traditions and tackles inequalities.
- In India engagement ideas focused more on reaching into households with public messaging and education.
- In the UK engagement ideas tended to emphasise the importance of fun and interactivity, many having had positive experiences of museums and science centres.

⁷⁵ The coding is based on Flow Associates' Three Lenses framework. See section 2 for more information.

IN DEPTH: KEY FINDINGS FROM EACH COUNTRY

The following pages explore and summarise conversations and insights from participants in each country.

Although people in Brazil, India and the UK had distinct attitudes towards food sustainability, there were common themes which can support global approaches to communicating the scale of the issue.

Each section sets out the current context of food sustainability, including impacts of COVID-19, as background to understanding people’s attitudes towards and awareness of food sustainability and its solutions. This is followed by an overview of the types of engagement methods that work well in each country, as shared by both audiences and professionals. This report uses the concept of a museum as a key example of a cultural agent for change, but these insights will support the work of engagement professionals and policymakers from a broad range of sectors.

5. KEY FINDINGS IN BRAZIL

BRAZIL

5.1 SUMMARY FINDINGS IN BRAZIL

MOTIVATIONS AND CONTEXT

- Brazil ranks very low for food sustainability. Food insecurity has intensified with COVID-19.
- Brazilian respondents’ interest in food is notably higher than those from the other countries, and their concern about the environment a little higher than in the UK⁷⁶.
- People in Brazil are very motivated by connecting with family roots and native peoples. They have empathy for those living in poverty and teachers are motivated by reducing structural inequalities for children.

AWARENESS OF FOOD SUSTAINABILITY

- A lack of time, fast-paced lifestyles, food prices and access to information are key barriers to change, particularly for low-income families. When households grow food or cook at home, they express more knowledge of environmental impacts of the food system.
- Adults’ awareness is strongly influenced by ideas of global responsibility and human rights, and knowledge of the regional link between deforestation and livestock. Teachers and students are critical of extractive capitalism.
- Secondary students were unaware of the idea of food sustainability, and some had never heard about food insecurity issues. Food sustainability is not discussed in families but some knowledge of the issues comes through experience.

AWARENESS OF AND PREFERENCES FOR SOLUTIONS

- All audiences were aware of or are practising reduction of waste, the only example of a solution given by some families. Some engaged adults are eating less red meat and consuming organic food.
- Urban community gardens were mentioned as important. Teachers appreciated educational gardens, and a group of students involved in local gardens developed skills and were sensitised to community needs through this practical experience.
- Most audiences were less aware of technological solutions and more aware of community-organised solutions. Of the solutions we invited views on, agroforestry and regenerative agriculture were well received, opinions were split about high-tech greenhouses, lab-grown meat was thought ineffective owing to artificiality and cost, eco-labels were seen as expensive, and there was uncertainty about GMOs. Some families associated eating insects with memories of hunger.
- State intervention is seen as necessary in the face of inequality: subsidies, investments, education, and laws to limit deforestation and pesticides. Teachers want public policies for schools to educate about food sustainability, and to buy food from small producers. Students discussed the need for legislation to regulate consumer dynamics.

ENGAGEMENT AND THE ROLE OF MUSEUMS

- Those consulted want people to be more aware of the scale of harm from food systems and want this to be shown incisively and graphically, referring to human health and inequality.
- Internet and social media were the most cited sources of information, connected with awareness campaigns. Audiovisual experiences were also valued as effective.
- Teachers feel that graphic AV media work particularly well with students, especially when fronted by influencers. They also want cross-disciplinary active learning, focusing on transforming scenarios and changing habits.
- All audiences desire to learn more about and practise solutions, through sensory experiences involving taste and smell, and in expanding knowledge about food varieties, land and ancestral cultural approaches. They want museums to create interactive and playful experiences for students and children, giving contact with food, nature and practical experiments.

- Outreach is important: activities should take place outside museums, occupying public spaces with seed banks, food markets and debates. Teachers wanted museums to connect more with educational institutions.
- Professionals in food engagement consider it ineffective to think about sustainable practices without tackling structural issues, including high rates of food waste. That said, they support democratisation of access to museums and education for transformative practices in collective health, if done in culturally sensitive ways⁷⁷. Gardens and kitchens can be spaces for exchange, linking local and global, and food and environment.

⁷⁶ Survey score of interest in food at 7+ – UK 87% of respondents, India 76%, Brazil 92%. Score of concern about the environment 7+ – UK 92%, India 81%, Brazil 94%.

⁷⁷ For example, reviving Afro-Amerindian knowledge taking a sacred, systemic and cyclical perspective, supporting autonomy of marginalised women, or promoting meetings between diverse activists and food producers.

5.2 CONTEXT OF FOOD SUSTAINABILITY IN BRAZIL

- Brazil ranks 40th out of the 67 countries included in the Food Sustainability Index (managed by the Food Ethics Council), and 15th out of the G20 in July 2021. Brazil is part of the worst-performing quartile in food loss and waste, much of which is due to the long distances between producers and consumers and inadequate packing for transportation by road⁷⁸.
 - Despite being home to 13% of the planet's surface fresh water, Brazil suffers from water scarcity, lack of supply in several regions, and water pollution and contamination, in addition to significant loss and waste.
 - The country is the largest buyer of pesticides classified as 'highly hazardous' (HHPs) because of Brazil's extremely lax laws⁷⁹. President Bolsonaro's government has loosened environmental and agricultural regulations, especially with regard to GMO foods and pesticides, and the number of approved chemicals has been increasing every year.
 - Brazil is the world's fourth largest food producer: largest crop producer (corn and soya), and second-largest commercial beef and poultry producer. Brazil's agribusiness companies are viewed with suspicion by the international community because of the sector's historical links to deforestation and land conflicts: about 90% of deforestation is associated with agribusiness, 80% of which is for creating pasture⁸⁰. In 2020 the country hit a 12-year deforestation high.
 - Brazil is one of the countries with the greatest income inequality and lowest distribution in the world.
- There is a burgeoning middle class whose consumption is driving both the economy and changing diets, although average income per capita sits around US\$10,000, making it difficult for many to afford the premium prices of sustainable goods or lifestyles.
- This situation has worsened with the COVID-19 pandemic. Unemployment hit 14.7% (14.8 million people), inflation reached its highest rate since 2016, 19 million Brazilians went hungry and 55.2% of households faced some degree of food insecurity (116.8 million people).
 - There is a high awareness of sustainability issues as problems – 80% perceiving air pollution, climate change, biodiversity loss or water availability as very serious problems, but long-term barriers in governance overshadow attentiveness and positive attitudes. Within the population little action around boycotting or making conscious decisions to buy sustainably is taken.
 - When asked who is responsible for socio-environmental degradation, Brazilians blame the government; when asked who should lead, they point to the government once again⁸¹.
 - Since 2009 the national school feeding programme has required schools to offer meals to students. This has had the positive effect of improving the long-term quality of the diets of young people⁸² but also encouraged public procurement to work with local smallholders to provide goods⁸³. The pandemic left millions of children and young people without access to school meals, posing yet another food challenge for the most vulnerable families.

⁷⁸ <https://foodsustainability.eiu.com/country-tool>

⁷⁹ Ministry of Agriculture, Livestock and Food Supply (MAPA), 2020.

⁸⁰ <https://commodity.com/data/brazil>

⁸¹ F Echegaray, 'Sustainability in Brazil: a mixed conundrum', *The Guardian* (13 March 2013), www.theguardian.com/sustainable-business/sustainability-brazil-mixed-conundrum

⁸² H Ventura Barbosa Gonçalves, D S Canella and D H Bandoni, 'Temporal variation in food consumption of Brazilian adolescents (2009–2015)', *PLoS One*, 15/9 (2020),

<https://doi.org/10.1371/journal.pone.0239217>

⁸³ N Tarossi Locatelli Master, D S Canella and D H Bandoni, 'Positive influence of school meals on food consumption in Brazil', *Nutrition*, 53 (September 2018), pp140–4, www.sciencedirect.com/science/article/abs/pii/S0899900718300893

5.3 IMPACTS OF COVID-19 ON ENGAGING PEOPLE WITH FOOD SUSTAINABILITY

- Some people and families were unaware of and shocked by data about rising hunger and food insecurity in Brazil during the pandemic – in the last few months of 2020, 19 million Brazilians went hungry and 55.2% of households faced some degree of food insecurity.
- Many adults report that their food habits are affected by the pandemic, for better or worse. Two main trends are noticed: going for practical, cheaper and lower-quality food (high consumption of processed foods, carbohydrates and food deliveries); or improving diet by spending more time at home, better planning, shopping more carefully and cooking more.
- Economic crisis and the increase in food prices have impacted the lives of many families. Access to quality food became more challenging for lower-income families in urban centres, and more vulnerable families reported having sought help from institutions that distribute donated food in local communities.
- Many women in charge of keeping up tasks involving food in their families reported feeling overburdened by household tasks during the pandemic and ended up choosing easy and practical food solutions.
- Support from local projects/associations and NGOs, and community solidarity, are seen as essential to combating the increasing levels of food insecurity in the country.
- School closures caused by the pandemic brought significant changes to the eating habits of young people, who were left without access to school meals. Students who study and work remotely reported that they were used to having many meals away from home and emphasised the financial obstacles to eating better-quality food.

'Things are very expensive in the pandemic. With 100 reais, you can only fill a small bag that doesn't last a week'

A, 35–44, aunt

'With the pandemic we had more time to think about and prepare the family's food. We eat together and have strengthened our family ties'

P, 45–55, mother

5.4 ATTITUDES TO AND AWARENESS OF FOOD SUSTAINABILITY AND ITS SOLUTIONS

‘Since Bolsonaro was elected, we cut out red meat and soya here at home because we’re against deforestation’

I, female, 16–24, student

‘For me, the biggest cause is bad public management of resources. For me this is the worst of all evils. Second is the population’s lack of information about their rights. And this political situation where public social policies are being scrapped. This is a political proposal, which is necropolitics, the politics of death, represented by those currently in charge’

MJ, male, 55–64, educator

5.4.1 MOTIVATIONS AND INTERESTS

INDEPENDENT ADULTS

- Independent adult participants demonstrated their interest by making reference to affective memories and the need to reconnect to family roots and the ancestry of native peoples.
- They emphasised aspects of self-care and physical health. In addition to the pursuit of healthy habits, the positive connection with food is associated with experiences of wellbeing and pleasure in the sensory activation of taste, smell and touch.
- They also demonstrated respect for cultural diversity and political sensitivity, as well as empathy for those living in poverty.
- Some showed greater awareness of what food production does to the environment and greater concern about the origin of the food.
- The subjects of hunger, inequality and food waste are the ones which most mobilise people. They feel uncomfortable, saddened and indignant about the reality of concurrent hunger and waste.
- Some people were unaware of and shocked by data about rising hunger and food insecurity in Brazil during the pandemic. There is broad interest in issues related to reducing inequality.
- Other elements that prompt the people interviewed to worry about the subject are ethical dilemmas and daily tensions in their choices and decisions to change or maintain habits. Issues related to the availability of time, the affordability of quality food and also access to information pervade adults’ and families’ comments.

- Among people who say that they often eat processed foods, there is awareness of the negative impact on food quality, although the difficulty of changing habits owing to a real lack of time is a recurrent theme.
- In addition to time, the cost and accessibility of food are decisive factors in the interviewees’ eating habits.
- Many reported that their personal and family diet changed with the pandemic, for better or worse. Many also reported choosing practical solutions and poorer food quality, while others were able to eat at home and saw their diet improve.

TEACHERS

- Teachers stressed the importance of addressing the issue of food sustainability in the classroom, not only from an environmental point of view but also with regard to the dignity and security of human beings.
- In all the conversations the importance of reducing structural inequalities to guarantee access to dignified and sustainable food was mentioned.
- Many showed concerns about the rates of youth obesity, weight gain and malnutrition, as a result of eating foods with poor nutritional value, especially among the most vulnerable students.

‘Handling food is also ancestral, another relationship with nature. Another perspective of consumption’

L, female, 25–34, educator

STUDENTS

- Students demonstrated concern about the origin and quality of food, and the consequences for personal health, especially family health.
- Students emphasised the financial obstacles to eating better-quality food. In particular, those who study and work full time reported that they eat many meals away from home and find it difficult to follow a healthy diet.
- Some young people spoke about the ethical dilemmas and environmental harm related to consuming animal-based food, and animal-tested products emerged as a motivation to change consumer and eating habits.

FAMILIES

- Family customs involve cultural, regional and ancestral traditions, and influence the formation of positive or negative eating habits. When there is a personal bond with preparing food, this process is also incorporated into the interviewees’ affective memories of food.
- Most expressed concern about health and access to nutritious food. Families who were more involved in preparing their own meals showed a greater level of concern with healthy and conscious choices.
- These same families also showed greater knowledge and engagement with environmental causes. For them, being in contact with nature and knowing the origin of food are essential factors in the practice of sustainable habits.
- Social and economic conditions influence healthier and more sustainable habits. However, interest in having access to more information was mentioned in all the interviews.
- Eating habits are affected by often fast-paced lifestyles and by families’ financial and geographical circumstances.
- Among those interviewed, one family that produce food in a rural settlement were more concerned with healthier eating compared with low-income families in cities. In the case of another family, access to quality food happened when they left the urban centre.
- For food-secure families living in urban spaces, time (or lack of it) was raised as an essential element in decisions and habit formation.
- Many women reported feeling overburdened and even those who said they do not like cooking are in charge of keeping up tasks involving food in their families. Many mothers feel they have no time not only to prepare the food itself but also to select products, organise shopping or think of a more varied menu.
- In the most socially vulnerable families, in urban centres, it seems that more industrialised and ultra-processed foods are eaten than in families with better economic conditions. Frozen and processed foods are the most available and affordable in shops used by low-income families in favelas, for example. Use of delivery services offering unhealthy food has increased during the pandemic.
- Many children showed discomfort knowing that the meat they eat comes from animals. Others said they did not know where the food came from or had not thought about it.

5.4.2 WHAT DO AUDIENCES UNDERSTAND ABOUT FOOD SYSTEMS?

INDEPENDENT ADULTS

- Among the adults interviewed, their understanding of food sustainability was revealed by a combination of reducing impacts on the environment and guaranteeing quality food for everyone.
- They mentioned global responsibility and the need to rethink food systems in relation to their impacts on the environment and health. They reinforced the need to think not only about environmental sustainability, but also the dignity of human beings.
- The main issues for the adults are hunger and inequality, food waste, production, access to healthy food and environmental damage:
- Reduction of inequalities and guarantees of food security are key issues for most of the interviewees, an understanding that appears to be strengthened by the increase in people experiencing food insecurity in Brazil during the pandemic.
- The large amount of waste, and the contradictory relation with the number of people living in food insecurity.
- There is a general understanding that the agricultural system for export in Brazil is associated with the degradation of natural resources, and there is a strong concern about the monoculture system practices, the use of pesticides and the effects of climate change. The culture of meat consumption in the country was also put forward by the more engaged adults as an obstacle to sustainability.

‘It’s a very serious problem. It affects the environment, with forest fires, it also affects water courses, animals. What burns becomes pasture. This impacts rivers, with silting. The impact is not only in the regions, it also affects cities’

R, female, 65+

- Some adults, in particular older adults, have deep knowledge from direct experience of change over time.
- Younger adults voiced more ethical dilemmas, for example about the meat industry.

TEACHERS

- When asked about food sustainability and their experience in the classroom, educators brought up social, racial or gender inequality in accessing food and in its distribution as central issues to students.
- There is a general perception that the debate on healthy eating is a privilege of those who do not live with food insecurity.
- There is a general criticism of Brazil’s food systems, with most mentions of monoculture and commodities for export, misuse of land, deforestation and CO₂ emissions.

STUDENTS

- The concept of food sustainability was not well known among students, but they pointed out the relationship between access, cost and quality of healthy food: *Healthy produce is more expensive.* (E, female, 16–21)
- They highlighted the lack of information on the issue in mainstream media (especially around GMOs) and were surprised by the more recent data on food insecurity in Brazil.
- They were very aware of food waste, highlighting the losses associated with the inadequate transport system and the long distances between production and consumption centres: *We aren’t going hungry because we don’t produce food but because we waste it.* (W, male, 16–21)
- They gave a critical view of capitalism and greed which, for them, upholds a system of exploitation and raw material extraction, in addition to economic interests that influence means of production and food supply.
- Some have never heard about the possible disappearance of types of food, although in one group students discussed bees becoming extinct and some types of fruit hardly available.

FAMILIES

- The subject appears to be little discussed in the family environment. However, most families reported practices of separating recyclable materials from waste and demonstrated good knowledge about environmental challenges and climate change.
- Some families highlighted their concern about the use of pesticides affecting their children’s health. This was a bigger issue in middle- and upper-class families, although they said this is not necessarily reflected in their habits.
- In low-income families issues related to water pollution and the price of healthy food appear as more frequent concerns. Ultra-processed foods and those with low nutritional value are more readily available and affordable in their communities.

‘I don’t want to eat food that came from suffering, from an unhealthy force-feeding process, from growing and enriching meat through development that isn’t right. It’s an abusive process for animals that are living beings. This is very questionable’

T, male, 20, student

‘In higher social classes, as in the case of my school students, I notice a better-quality diet with a healthy variety of foods. Children who are vulnerable in terms of diet eat more processed foods, while I notice that my students eat very well’

C, female, 35–44, educator

‘Recycling is fundamental. Through recycling we can create jobs and decrease the large proportion of dumping in nature; recycling is the real way of disposal for people ... selective collection is fundamental’

R, male, 32

- Parents reported resistance to healthier food from children who prefer processed foods. Even families showing greater engagement with the topic expressed difficulty in changing habits, mostly because of lack of time and income.
- The tasks of shopping for and preparing food are, for the most part, carried out by the mother, and many reported a lack of time to select products, organise shopping or think of a more varied menu. In the single-parent families interviewed (headed by women) this was reported even more strongly.
- The lack of information about the environment and health was frequently mentioned among families that have a fast-paced routine and among the socially vulnerable ones. For the latter, the biggest concern is having something to eat and being able to feed their children.

5.4.3 WHAT DO AUDIENCES THINK ARE THE EFFECTIVE AND RELEVANT SOLUTIONS?

INDEPENDENT ADULTS

- Consumer habits of the more engaged adults are mainly influenced by the issue of waste: avoiding plastic waste, with some producing organic compost in their homes. Many reported a lack of knowledge but demonstrated interest in learning about practices and projects that improve issues of waste and inequality.
- The more engaged individuals reported partially or completely giving up eating red meat, a choice which is usually related to environmental impact, but also for health reasons.
- Many reported trusting family farming producers and consuming organic food.
- Community gardens in urban spaces are seen as an important action to generate income for vulnerable communities in urban centres.
- The agroforestry cultivation system was well received by most interviewees. Most had little knowledge of the system and some showed reservations about its reach as a larger-scale solution.
- In general, regenerative agriculture is a system well received by the participants, who see it as an important alternative to monoculture and pesticide use.
- Opinions were split about high-tech greenhouses. They are seen as a good solution for bringing production closer to the city and for occupying unoccupied spaces. Among the unfavourable reactions, their lack of practical applicability to Brazil was mentioned, owing to the high cost, accessibility issues and the country’s continental size.

- Lab-grown meat was viewed with surprise – many were not aware of this innovation, but it was not seen as an effective alternative to the country’s food sustainability problem owing to its artificiality and high cost.
- Towards GMOs, the feeling is, by and large, one of insecurity regarding their benefits, both in terms of environmental impacts (extinction of primitive seeds) and human health (fear, doubts about nutritional content, studies that point to carcinogenesis).
- The role of the state in the face of inequalities was raised as a necessary element to face the challenges: subsidies for small farmers, educational programmes, bringing deforestation under control, investment in research for sustainable technologies, control of the use of pesticides and GMOs, and certification transparency.

‘We need to rethink more local initiatives, particularly in urban spaces, such as vegetable gardens and agroforests; these are initiatives that bring the urban population closer to food production. The distance between the city and countryside produces crazy logistics, with high-carbon gas consumption and energy expenditure’

C, male, 65+, educator

TEACHERS

- Practices such as recycling, composting and educational vegetable gardens arouse great interest among educators.
- Some engaged in food activism brought up the use of nonconventional food plants (PANCs) as an alternative linked to food sovereignty.
- Educators addressed issues about public policies for schools, highlighting the need to increase knowledge about food and sustainability, especially in marginalised regions.
- Incentives to buy essential food items for school meals from small producers and the support of local authorities for family farming and feeding children are considered essential to guarantee access to fair, nutritious and sustainable food for children and young people.
- Among educators and engagement professionals, opposition to GMOs is stronger, and the subject of seed monopoly was also pointed out as a negative factor.

‘GMOs cause allergies, are resistant to antibiotics and have a lot of pesticide residues. They’re a health risk’

T, female, 16–19, student

SECONDARY STUDENTS

- The group of secondary students involved in a socio-environmental project demonstrated a lot of knowledge about the impact of individual attitudes in reducing waste, such as rubbish disposal and reducing the use of disposable items.
- These students are highly mobilised and sensitised by the practical experience of cultivating local gardens, both in sharing solutions and planting techniques, as well as in the possibility of helping poorer, unemployed people in their communities.
- They showed greater enthusiasm for urban vegetable gardens and agroforestry farming systems as solutions for maintaining soil diversity and health.
- The students discussed the need for legislation to regulate consumer dynamics, using the law requiring supermarkets to charge for the use of disposable bags as an example. They believe that public policies can cause changes in consumer habits and, consequently, in the environment, using financial and not just ideological means.
- Most were unaware of technological solutions and of GMO foods, often linking this issue to the use of pesticides.
- They demonstrated concerns about lab-grown meat: the possible high cost of this type of food, making it accessible only to a minority.
- Some more engaged and older students criticised GMOs because of the impacts of production on environmental systems and risks to human health.

‘The label that I know of and buy is Orgânicos Brasil. I believe they work, but I imagine there must be those that work and those that are fake news as well. I recently watched the documentary Seaspiracy that discusses a label that was super fake. So it’s good, but you need to keep an eye out to see if it’s actually a real certification’

J, female, 38, mother

FAMILIES

- The practice of separating rubbish for recycling is understood by most families as their main contribution to the issues and, in many cases, is the only example of sustainable action implemented as an everyday habit.
- Eating food from local producers, supporting market traders, cooperatives and alternatives that encourage regenerative crops, and family production are evaluated to be the best alternatives.

‘Information doesn’t reach marginalised neighbourhoods, favelas, where it would greatly transform the relationship with food’

L, female, 25–34, educator

- Some reported memories of eating insects associated with situations of hunger. Even though insects are eaten in some parts of the country, this is seen as an extreme solution.
- The high cost of eco-labelled products influences consumer decisions. Even among those interested in purchasing certified products, there is the problem of economic access and the worry and distrust associated with the industry.
- Many families are very concerned about eating foods with pesticides. GMO foods were also mentioned.

‘What works is integrating children into the process. Gather everyone to cook together and lend a hand. See what fruits are like, what seeds are like, where the juice they drink comes from. Culinary and permaculture activities to plant and germinate encourage participation in food production’

T, female, 35–44, educator

5.5 ENGAGEMENT AND THE ROLE OF MUSEUMS IN BRAZIL

5.5.1 AUDIENCE VIEWS: WHAT ENGAGES PEOPLE?

The following strategies emerged as interventions and ways to engage people: environmental and food education in schools, social projects to awaken a sense of the collective and connection with the community, and educational and awareness-raising campaigns. The most-cited sources of information among participants were those accessed via the internet and audiovisual resources, such as films and documentaries.

INDEPENDENT ADULTS AND FAMILIES

- Internet and social media are the most-cited sources of information among participants. Among adults, the internet has a complementary role in the search for information. Many commented on the challenges of accessibility and dissemination of information, as various media outlets and online courses are paid or niche.
- After the internet, audiovisual experiences are those most thought of as a means of becoming informed, especially documentary films and podcasts. Links to personalities with large audiences (influencers, artists) can help people engage and connect with the subject.
- Participants believe that the population is unaware of the real scale of the problems associated with food systems and that this needs to be shown incisively: visualising the reality of waste, the production chain, the time to cultivate food, the relationship between the body and the collapsing environmental system. Health was mentioned as an important topic to be addressed.

- People demonstrated the desire to get to know and engage in solutions. There is interest in participating in and having practical experiences of handling food and the land, through sensory experiences involving taste and smell, and in expanding knowledge about food varieties, PANCs⁸⁴, seed banks, and practices from different geographical areas, including rituals and stories.
- Occupation of public spaces and other urban interventions: it is important that activities take place outside museums. Greater integration with society and existing activities was suggested, including collaboration with local agents (debates in rural communities, organisation of markets, creation of seed banks, involvement in research).

TEACHERS

- Educators highlighted the potential cross-curricular use of content, engaging teachers from various disciplines to address subjects of health, food, nature, sustainability, equal rights and science. In all the groups the interviewees spoke of the importance of ongoing education in schools (from preschool to higher education) to raise awareness about food and the environment.
- The presence of environmental education in schools plays a social role of informing marginalised communities and raising awareness about practices that guarantee food security for residents.
- Many indicated the government's lack of support and funds, and the need for incentives for projects in this field.

'I researched the subjects, watching films and documentaries. That helped to reconfirm my choice, on account of the awareness of the harm of the meat industry, violence towards animals and my health'

J, 38, mother

'The coolest thing about the Museum of Tomorrow is that in addition to learning new things, you also interact – with the equipment, the employees there, between you and the environment'

L, male, 20, student

- Educators stated that to work with young people it is important to explore action, focusing on transforming scenarios and changing habits. Experiences with food and nature (playing in nature, culinary activities) for students are seen as fundamental in transforming awareness and eating habits.
- In schools they reported using audiovisual resources (such as documentaries) as an effective way of engaging students. Such resources help show the impacts of food systems and eating habits on the environment, inequality and people's health in a striking (and even shocking) way.
- Using the internet has become a space for exchange with students, bringing the classroom closer to the students' lives. Through the pages of digital influencers, NGOs and social movements engaged with the subject of sustainable food, young people have been learning and using this virtual space for debates and to share experiences.
- Museums need to connect with schools and colleges, to strengthen bonds between students and teachers linked to the subject and make space for exchanging knowledge and encouraging research.
- Regarding experiences in museums, they reported that students are most engaged when there is interactivity and playful experiences:
 - Touching physical objects creates connection and engages young children. Educators suggested practical scientific experiments and approaches, like 'a laboratory museum'.
- Experiences of real contact with food and nature, stimulating the senses, such as contact with a range of foods and their colours, smells and flavours in the kitchen, and recipes and preparation methods that explore the full use of food.
- A comprehensive experience of cultivation, which is an opportunity for young people to experience all plant stages and cycles – from planting and contact with the soil, seeds and seedlings, to harvest, observing the cycles and following the stages of growth/development.
- Collective creation and maintenance of something that puts projects and solutions into practice, involving the constant participation of visitors.
- Ancestral knowledge about traditional foods, myths, forms of cultivation and eating habits in traditional communities – indigenous and riverine peoples, residents of *quilombos* (settlements founded by people who escaped slavery) and others.
- The relationship between food and natural elements such as the Sun and fire from the perspective of native peoples.
- Experiences involving empathy such as debates, videos and interviews about food and the environment with representatives of different cultures, peoples and social realities – a tool to inform and sensitise people, and make them reflect.
- Gamification – games, challenges and playful activities in general have high engagement among children and young people.

⁸⁴ More than 10,000 edible plants have been identified that grow wild and that can be cultivated, providing uses for food, medicine and crafts. www.wwf.org.br/?74882/Have-you-heard-of-PANC-Non-Conventional-Food-Plants

STUDENTS

- Young people involved in environmental education projects showed greater engagement in research, and pride and self-esteem in sharing their experiences during the focus group.
- On social media young people said they follow experts and digital influencers, as well as using platforms such as YouTube and Google to access videos and other content. They also mentioned apps such as Instagram, TikTok and WhatsApp, in addition to participating in forums, lectures and online courses.
- Presentations and performances – plays and musicals, workshops and experiences involving sustainable practices, visits to the countryside and interaction with nature were highlighted as ways young people would like to learn.
- They showed interest in a revival of the past, storytelling and ancestry – knowing how things used to be and how technology has changed our relationship with the world.
- Practical and fun activities such as games, gymkhanas and get-togethers were mentioned.
- They highlighted learning through interactive experiences with other people, environments and equipment.

FAMILIES

- Most of the findings for adults are true for families, as parents were the most vocal contributors.
- For families, education and the internet are interconnected as sources for learning.
- One family suggested an exhibition with technology where the public could experience the reality of hunger and the differences in food between different social classes in an impactful way: *Show what the poor have and what the rich have – to somehow experience the feeling of hunger.* (L, 24, mother)
- Families from the most vulnerable classes pointed out it is important that entry should be free so they can participate and visit museums and cultural spaces.
- Children showed great interest in interactive experiences: with games and virtual reality in museums, and exploring nature in school environments or on field visits.

5.5.2 PROFESSIONAL VIEWS: THE ROLE OF SCIENCE EDUCATION AND MUSEUMS

- Major challenges to achieving food security and sustainability are social inequality and a need to educate Brazilian people in politics and culture.

SOCIAL INEQUALITY

- Engagement professionals consider it ineffective to think about sustainable changes and practices without tackling fundamental issues: hunger, poverty and a lack of basic infrastructure.
- Most emphasised that there is no need for scarcity of nutritious food. Rather, there is a lack of projects and incentives to promote the right flow of production and distribution to avoid high rates of loss, waste and unequal access to food.
- They consider it necessary to support community and agroecological solutions, such as small biodiverse farms, with subsidy policies for small rural producers. These policies must also ensure food security for residents of marginalised communities, for example by involving people in networks for sharing of food, resources and skills.
- They emphasised the importance of thinking about the role of women and gender equality, especially for marginalised women, and the possibilities for strengthening autonomy.

‘In the last exhibition we held a ritual meeting where guests brought a dish. One of the guests spoke about the history and use of dendê [palm oil] and highlighted the relationship between food and spirituality. It was fantastic. I also remember the story of an indigenous healer who, when asked what God was, replied: ‘God is the cassava plant.’ This is beautiful; food is what keeps us alive!’

Ernesto Neto, visual artist

INFORMATIVE EDUCATION

- There is a lack of access to education and information in Brazil. The professionals defended the democratisation of access to information and widening the public debate on new alternatives in food systems (such as GMOs). Massive investment in education and public campaigns is seen as a way to reach and sensitise the population.
- Access to information through public campaigns and broadcasts was mentioned by many as a way to reach and sensitise more people to the issues.
- In order to have a cultural transformation of values about food and nature, it is necessary to change everyday habits, using methods that respect people’s willingness to change and the time it takes to overcome barriers to change.

CULTURAL EDUCATION

- In general, cultural programming that reflects both traditional cultures and emerging innovations is seen as powerful for change, whether through the agency of museums or not.
- A change of perspective in the relationship and integration between man and nature is seen as fundamental to achieving effective and transformative practices in the environment and collective health.
- Food has a sacred dimension, including ancestral technologies and local cultures’ rituals for cultivation and preparation, in addition to the relationship of food and plants with spirituality and medicine. This means emphasis on the revival of Afro-Amerindian knowledge and the need to stimulate a new relationship between food and the environment from a sacred, systemic and cyclical perspective.
- Programmes could describe or honour the stories and memories of territories that have changed or been lost, and help forge relationships with traditional food in different cultures and peoples. They could also develop empathy and appreciation of diversity through educational experiences, especially in a continental and multivarious country such as Brazil.
- Cultural spaces need to provide channels for dialogue, offering a contextualised and integrated experience, with the local sphere connected to the global one, encouraging an active stance among visitors and participants.

‘Think about how we can create a human experience of empathy and solidarity using technology. Maybe that’s what I want to see in a museum. My dream is that everyone sits at the same table, regardless of social class or race. What would this table be where everyone could sit and have access to food with dignity? If we can put this table there, so that when people leave the museum they understand that food is only good when it can feed everyone on Earth, then I think it will be worth it’

David Hertz, Social Gastronomy Movement

‘The key word is interactivity. A space where it’s possible to discuss the differences in diets and hunger. I would like a museum that fulfils its social role – perhaps with popular restaurants that encourage sustainable, healthy eating – connecting people and good projects in this field through interaction, exchange and knowledge sharing. Exhibitions that raise awareness, doing away with the idea that economising is something for the poor’

G, female, 55–64, educator

THE ROLE OF MUSEUMS

All conversations used the idea of a ‘museum of future food’ as a talking point.

- The museum’s physical structure should be coherent with the importance of the issue, being an example of sustainability in different dimensions, from construction materials to energy and electricity sources, and waste and sanitation systems.
- Participants envisage the food museum as a space for dissemination of scientific knowledge, but in ways that are very integrated with active experiments in farming and food.
- They believe that museums and cultural spaces should work in partnership with members of civil society, promoting interaction between the public and food sustainability activists, small producers, chefs, community leaders and groups to engage on the challenges and solutions to combat hunger and food waste.

6.

KEY FINDINGS IN INDIA

- The museum should be accessible for young people, putting emphasis on children’s involvement and engagement through playfulness, storytelling and interactivity, inviting them to participate in games and virtual reality experiences.
- To sensitise children and adolescents there must be incentives for school projects where they can get involved in the practice of growing and preparing food, strengthening the relationship with nature, with cycles and with time.

INDIA

6.1 SUMMARY OF FINDINGS IN INDIA

MOTIVATIONS AND CONTEXT

- India ranked bottom of 25 countries in a 2016 food sustainability audit. Agriculture has boomed in India, but nutritious food is still unaffordable for too many.⁸⁵ COVID-19 has had a significant impact on food supplies and the economy, particularly in 2021.
- In our survey 76% of Indian audiences scored 7 or higher for interest in food, and 81% scored 7+ for concern about the environment, lower than in Brazil and the UK.
- Health and cost, as well as taste and nostalgic memories, are key factors in food choices.
- Adults tend to be more motivated by the environment than other audience groups, open to reducing footprints and experimenting with food. Parents are motivated by ensuring their children’s health. Teachers are motivated by children’s rights to a balanced diet, and are concerned about the power of food manufacturers and media.
- Children said they are compelled by fast-food advertising, although their food choices are determined by others. Conversely, parents said their food choices are influenced by (older) children.

AWARENESS OF FOOD SUSTAINABILITY

- Food sustainability was mainly defined by all audiences as being less wasteful, especially in light of the vast economic disparities creating ‘nutrition insecurity’.
- Engaged adults perceive land use change as necessary to feed and house a rising population, rather than criticising practices that have converted forests to fields. Their awareness of climate breakdown focuses on impacts on poor communities. Endemic poverty and migration is seen as a major risk to nutrition security, and the future supply of fish is a key concern (among non-vegetarians).
- Only the professionals referred to soil degradation, to systems for distributing seeds for local nutrition security or to integrated small farms. There is perceived to be a lack of regulation (eg food certification or limits on carcinogenic chemicals), infrastructure (eg storage) or crop insurance.
- Teachers think that students need to be sensitised from a younger age on topics such as food security and wastage.
- Many students are aware of climate science, eutrophication⁸⁶ and water use of certain crops. Despite this knowledge they could not identify solutions and were keen to learn more.
- Families understand food sustainability in relation to cost and health, particularly relating to processed and adulterated food⁸⁷. They did not identify environmental implications, and recognised they did not know about global and climate impacts of the food system.

⁸⁵ Nearly one-third of India’s population cannot access enough nutrition.
⁸⁶ As the residue of chemicals from agricultural farms enters the sea through surface run-off, it creates a thick film over the water, decreasing the oxygen level inside the seawater, thereby affecting aquatic life and depleting fish and seafood.
⁸⁷ Parents talked about food being adulterated with colour, preservatives, sugar and other spurious substances.

AWARENESS OF AND PREFERENCES FOR SOLUTIONS

- Solutions adults proposed were limited to the level of personal lifestyle or externalised to responsibility of government (eg spreading knowledge, policy change).
- With waste such a key issue, preserving food and composting stood out as viable solutions for all audiences. Eating insects was the most unacceptable idea as it is not part of food culture.
- Both school students and teachers are keen on practical experiences to grow and make food, so they can learn while reducing waste and pollution.
- Families see home cooking as solving multiple issues, because food is rarely wasted at home and children would eat less junk food.
- Reinstating the diversity of traditional grains was also seen as an important solution to improve diets as well as enrich the soil.

ENGAGEMENT AND THE ROLE OF MUSEUMS

- Social media have had great penetration recently in India and are an accessible tool for disseminating information. Adults learn most through documentaries and news films, and they felt audiovisual and sensory methods were essential for a country where literacy and education are not pervasive.
- A ‘museum of food’ is seen as very relevant because agriculture is so much a part of Indian work and culture⁸⁸. Most adults and teachers see this potential museum as a hub for information and transformation. Given the diversity of Indian ecosystems, it could be a hub for several regional food museums.
- Where adults and parents were keen on looking back to culinary traditions and hardships of farmers, teachers wanted students to access recent science and new technologies. Students confirmed this by suggesting methods such as augmented reality, as well as hands-on activities such as food labs, demo farms and processing units.
- The professionals all talked about changing mindsets through various means, engaging communities at all levels through public, private and NGO participation to reach across urban and rural populations.

They wanted to see strong public service messaging on TV or in social media, as well as practical workshops and performances as effective outreach.

⁸⁸ Adults and professionals noted that half the Indian workforce is employed in agriculture.

6.2 CONTEXT OF FOOD SUSTAINABILITY IN INDIA

- The 2016 Food Sustainability Index scored India last out of 25 countries, largely because of challenges regarding nutrition and agricultural sustainability. The country's approach to food loss and waste is, however, more positive.
- The Green Revolution-era food security policies have enabled India to move from a food deficit to being a food-secure and food-surplus nation. However, some of its practices are now threatening production sustainability, as well as ecological and economic viability, with diminishing marginal returns on inputs.
- Greater integration with the global economy and the rise of a corresponding aspirational 'middle class' have played a role in bringing about a marked change in the way people across a wide socioeconomic spectrum engage with food. Indian diets are now becoming more westernised, with greater consumption of non-cereal food products and processed food, and more eating out. Newer forms of food value chains have affected how food travels from farm to plate. Large modern mega-markets have gradually started replacing small convenience stores in many urban centres⁸⁹.
- In such a scenario, the most pressing challenge lies in the access to and affordability of a nutritious diet. Food inflation is one of the top concerns for India's food policy as higher levels of inflation have been a feature of the economy over the last decade, resulting in an increase in the risk of child malnutrition⁹⁰.
- These challenges are now further exacerbated by the uncertainties due to the COVID-19 pandemic that have led to serious concerns on reduced access to nutritious foods for the vulnerable sections of society. It is to be noted that consumer focus is now likely to be on diets that can boost immune systems. Upcoming policy initiatives are working towards awareness of the need for micronutrient-rich diets while curbing the high and fluctuating prices for these foods.
- Meanwhile, India is witnessing some agri-tech initiatives making inroads in addressing key challenges and gaps in the current agriculture food systems⁹¹, from farm productivity to the agricultural, dairy and horticulture supply chains.

6.3 IMPACTS OF COVID-19 ON ENGAGING PEOPLE WITH FOOD SUSTAINABILITY

- The pandemic was viewed as an ominous outcome of long-term ecological imbalance, with the fear of similar recurrences in the future.
- There was general awareness of the lack of access to food for vulnerable sections of society. Independent adult respondents spoke about how the pandemic has grossly expanded the socioeconomic divide in access to resources.
- Some spoke positively about how traditional recipes and ayurvedic approaches to diet have been widely circulated to build health and immunity during the pandemic.
- Educators mentioned how school closures caused by the pandemic hampered the nationwide distribution of the government's midday meal scheme. This has had a serious impact on children's nutrition, health and wellbeing.
- Families spoke of the positive and negative disruptions caused by the pandemic. While people in general have become more conscious about making healthier food choices, the loss of jobs, economic instability and rising prices have made access to good-quality food more difficult, especially for the working class.
- Parents were concerned that the lack of peer learning during their children's growing years has compromised the vital exposure that helps them develop an awareness about food and climate issues.

⁸⁹ P Pingali, A Aiyar, M Abraham and A Rahman, Transforming Food Systems for a Rising India (Cham: Palgrave Macmillan, 2019), <https://library.oapen.org/bitstream/id/789d4d1e-252a-48e3-9a72-dddebd16c1c4/1007333.pdf>

⁹⁰ A Rahman and K Crowley, 'Food, agriculture, and nutrition in India 2020: leveraging agriculture to achieve zero hunger', Tata-Cornell Institute, 14 July 2020, <https://tci.cornell.edu/news/publications/food-agriculture-and-nutrition-in-india-2020-leveraging-agriculture-to-achieve-zero-hunger>

⁹¹ '6 ideas to transform food systems in a post-COVID-19 India', ICRISAT, www.icrisat.org/6-ideas-to-transform-food-systems-in-a-post-covid-19-india

6.4 ATTITUDES TO AND AWARENESS OF FOOD SUSTAINABILITY AND ITS SOLUTIONS

6.4.1 MOTIVATIONS AND INTERESTS

INDEPENDENT ADULTS

- Independent adults were one of the more motivated groups, who believe that making changes in their lifestyles is the need of the hour.
- They are open to experimenting with food, trying different cuisines, cooking a variety of recipes and changing diet patterns.
- Adults were very clear in their choices as to what brings them closer to food. Though taste topped their choices, health is also an important consideration for them.
- Many adults spoke about cost as one of the main factors for choosing their food. They have a fair understanding of the benefits of organic food but the price range discourages them.
- They favour local and fresh produce over packaged and processed foods but are unsure of how to find safe and reliable sources.
- Memories and nostalgia around food figured prominently in their conversations.

TEACHERS

- Teachers outlined that a balanced diet should be the right of every child, considering its importance in their growing years.
- They mentioned that students usually opt for taste and easy-to-grab food when making choices.
- The media and how they influence people’s choices is something that the educators identified as playing an important role in popularising any particular foods by highlighting their merits and health benefits, or by identifying the latest food trends and fads.
- Those teaching children from marginalised communities mentioned availability of food as the biggest priority for them.

‘I teach in a government school and the students there come from underprivileged homes. A few times students have fainted in the morning assembly because they had not had breakfast. So, for these children or for this society, food means not going hungry; bothering about nutrition is secondary’

DM

‘For me, taste is an important factor, but a lot of my food choices are also governed by whether something comes in plastic packaging or if it has travelled a long distance to come to my plate’

JM

SECONDARY STUDENTS

- The younger students have their food choices determined by their parents.
- The older students are open to experimentation and willing to try new ingredients.
- But at the same time they emphasised habits and cultural backgrounds as vital determinants when it came to food.
- Children spoke about enjoying junk food even when they knew it was not healthy and said they felt compelled by the extensive advertising around it.
- For children studying in government schools, access to food through midday meals is an important consideration.

‘As children we like junk food, but our parents eat more vegetables and fruits, they are more health conscious. I would like to change my habits and eat like them so that when I grow old I continue to remain fit’

S

FAMILIES

- There is a change in priorities when we compare individual concerns with those of family units. Parents were more concerned about the health of the children and therefore opted for nutrition/health as their primary interest in food.
- Some parents with grown-up children mentioned that their food choices were determined by what their children wanted to have.
- The cultural and regional practices within a family influence their choices and consumption patterns of food.
- Affordability and cost are important considerations for this group. They felt that if cost was not a consideration, they would be buying better-quality food items or perhaps be able to afford more organic food.

‘I prefer home-cooked food instead of ordering it from outside. I have been cooking a lot in the lockdown. I have also taken up a challenge of exploring India through food, so every week I pick up food from a different region and cook it up at home’

AS

‘People seem to be leaning more towards plant-based foods than being dependent on animal sources. Thinking about the source of food is now key’

RD

6.4.2 WHAT DO AUDIENCES UNDERSTAND ABOUT FOOD SYSTEMS?

INDEPENDENT ADULTS

- Sustainability in food was primarily defined as the practice of being less wasteful, whether it was in quantity, packaging or the transportation of food.
- A rapidly rising population in the Indian context was considered the reason behind losing forest cover to agriculture as well as urbanisation over the years, and this has had adverse consequences for the environment.
- The disparity in living standards within the country was actively spoken about by many individuals. When asked, most of them said that poor, marginalised and vulnerable communities would be the most affected by climate change.
- There is general distrust about the quality of food items available in the markets. People feel there is not enough regulation and too much corruption in certification in the food industry.

‘A large number of grains that were previously available have disappeared from the markets because farmers choose to produce cash crops. Unless other grains are incentivised, the situation is unlikely to change’

AB

- Absence of food infrastructure: apart from the lack of storage facilities and a reliable cold supply chain, the uncertainty around agricultural yield and its dependence on the weather have made crop insurance a difficult issue to address. This makes agriculture a less popular profession for the current generation.
- Overfishing was a major concern among the non-vegetarians. They enjoyed eating seafood and were worried about it running out, considering the high levels of consumption.
- Commercial considerations and profit maximisation were also highlighted as reasons for compromised food quality and a lack of traditional diversity in crops.

TEACHERS

- Migration was identified by the teachers surveyed as one of the factors putting families at risk. Compelled to earn a living, families who migrate to cities from rural areas are often unable to meet the nutritional needs of their children because of endemic poverty.
- Educators find that children need to be sensitised more about topics such as food wastage and food security.
- According to teachers, children need awareness right from their early years so they can make more informed and conscious choices as they grow up.
- Another factor identified by the group was that food is laden with chemicals that are affecting the immunity of all those who consume it – and this is evident in how areas that were once booming with the Green Revolution are now facing health consequences such as a spike in cases of cancer.

‘Recently, some honey was collected from the forest that was near a farming area, and it was found that many of the larvae, pupae were dead as they contained DDT and urea. That was because we have used chemicals in these farms. We have to work towards food sustainability aggressively and understand these interconnections’

AS

STUDENTS

- Many students are aware of the science behind the issues regarding climate change.
- Students have been taught about eutrophication as a factor affecting food sustainability.
- The choice of crops cultivated also affects food sustainability. One of the examples cited by the group was rice, traditionally grown in coastal areas, where there is access to ample water sources. Cultivating rice in semiarid regions depletes the water table, making it unsustainable.
- They have knowledge about the problems but lack understanding about identifying and applying solutions to them.
- After the discussion, children were keen on knowing more about effective ways to curb these problems.

‘I am aware that consuming too much meat is an environmental threat, as increasing livestock farming has increased the amount of carbon dioxide and other greenhouse gases that have worsened climate change’

A

FAMILIES

- Food sustainability in the family groups was defined by the parameters of availability, health and cost of the food for people in general.
- It was not easy for many of the families to identify the link between their food choices and the implications for the environment.
- At a general level, people acknowledged that, beyond the issues of food waste and sourcing chemical- and pesticide-free food, they were not aware of the global effects of unsustainable food practices and their connection with climate change. The survey had spurred them to think about these issues more deeply.
- Adulteration of food with colorants, preservatives, sugar and salt is a major concern among the parents in the families.
- Pollutants and contaminants in air, water and soil are a cause of worry for family groups looking at the future. They feel food quality has suffered because of excessive use of chemicals and that the associated depletion in soil quality has compromised nutrition today.
- Families are generally wary of industrialisation of agriculture that emphasises commerce over health. They believe that unsafe methods are being used to increase production and profits, which is hazardous for the environment and the health of consumers.
- Many parents compared the present time with that of their own childhood and mentioned that the quality and taste of food has changed for the worse.

‘I have read that growing more cocoa trees to meet the demand for chocolate has led to deforestation as tropical forests are cleared for this in some countries’

S

6.4.3 WHAT DO AUDIENCES THINK ARE THE EFFECTIVE AND RELEVANT SOLUTIONS?

INDEPENDENT ADULTS

- Composting stood out as a viable solution for most independent adults as it can be adopted easily with little investment of time and resources.
- Eating insects was considered the most unacceptable solution as it evokes disgust and respondents felt it was not part of local food culture. A few did mention that they would like to try it once, or maybe would be more willing to incorporate insects if they were available as a food supplement.
- Lab-grown meat was responded to with caution, with concerns about its safety and the large amount of energy required for production. Some feel that it would be better to eat vegetable-based alternatives rather than eating fake meat.
- GMOs are viewed negatively because of previous bad press. Participants did see potential for GMOs to address food sustainability issues – GMOs being used for the ‘right reasons’ – but did not know enough about them, with some concerned about unknown long-term effects.
- Though people outlined issues at all stages of the food cycle, the solutions they proposed were limited to either a personal or policy level, highlighting the fact that they are mindful of their own lifestyles.
- Participants pointed out that spreading knowledge and awareness about these issues among the public is the responsibility of the government.

TEACHERS

- Teachers emphasised solutions that involved educating people to change habits, seeing children as key to influencing their families. They suggested the following activities to inculcate learning about food production and make students more conscious in their consumption and waste of resources:
- Build knowledge and mobilise action through field visits to farms, dairies, nurseries or forests.
- Conduct audits with children of resources in food, such as the amount of water used.
- By reducing the use of plastic and reusing objects such as plastic bottles to grow plants and build a garden, it is possible to minimise the number of these products that end up in landfill. This is a hands-on approach that educators feel could be a solution at an individual level that would engage children and help generate conversation and consciousness about waste. In addition, centres for collecting e-waste should be set up and popularised.

‘Farmers, the people who are working in the field, should be provided with good knowledge about cultivation and farming practices and new technologies that are available, so that they do not rely on old technologies and do not produce those foods which are not healthy or which can harm the population’

HK

‘Self-sustainable growth is important. Children must know that in case of any disaster, if they are on their own, how will they survive? What type of skills do they require? These skills must be developed right from school’

KM

STUDENTS

- For students, composting is the most accessible and known method among the solutions: I have seen my mother composting the waste from fruits and vegetables to make manure for our plants. (Y)
- Preserving food by turning to traditional practices: home-based traditional methods of preserving food have long served as ways in which to minimise food waste.
- The group felt that returning to these practices, such as using lemons to make syrups or using pickling techniques, can be an effective approach to avoid food wastage.
- Having engaged in home gardening during the pandemic lockdown, students wanted to try indoor farming at a small scale and felt it was a way to grow their own food.
- Children showed interest in knowing more about different and innovative solutions.

‘Nowadays climatic conditions are not favourable everywhere, so to address this I feel indoor farming is a good alternative, as conditions can be controlled to achieve optimum yield’

S

FAMILIES

- The solutions selected by the families were more limited to their own reach rather than going to a grassroots community level or beyond.
- Taking steps to curb food wastage is the universal approach for all the families.
- They feel, in the Indian context, that people do not waste food at home because food is culturally considered sacred. However, wastage happens at events and large gatherings such as weddings or parties and in the hospitality sector, at buffets, restaurants and hotels.
- For children, eating home-cooked food as opposed to junk food was a solution in itself.
- As a consequence of the Green Revolution and commercial concerns, a lot of nutritional grains other than staples of rice and wheat, such as millet and amaranth, are no longer in demand and hence have stopped being cultivated. Reinstating this diversity is an important solution to improve diets as well as enrich the soil.
- They want to see more public education about the range of solutions and future foods.

‘There needs to be more accessible scientific literature on whether non-soil-grown food such as in the case of hydroponics has the same nutritional value and composition as regular soil-grown produce’

SB

6.5 ENGAGEMENT AND THE ROLE OF MUSEUMS IN INDIA

6.5.1 AUDIENCE VIEWS: WHAT ENGAGES PEOPLE?

INDEPENDENT ADULTS

- Most of the adults expressed interest in the concept of a museum of food and found it very relevant for a country such as India where more than half the workforce is employed in agriculture.
- For many audience members, learning about the history of culinary traditions across regions, both within India and globally, through a museum seemed to be an exciting idea.
- They also felt that the museum could be a resource centre to access accurate information about food sustainability, nutrition and other food-related issues.
- Other popular choices for effecting change in mindsets and behaviours were documentaries, films and the news.
- In a country where literacy and education are not pervasive, and given the barriers of language, use of audiovisual and sensory experiences such as augmented reality came up as viable options.

‘One of the installations can have a story in which we compare the diets and development of two children, one who eats a nutritious diet and another who loves junk food’

S, adult

‘If there is a museum of food, I would like to see a big human statue made up of various types of food like seeds, fruits, vegetables and leaves’

Y, student

TEACHERS

- Many teachers said that besides health and nutrition, concepts about food sustainability need to be introduced from childhood through curriculums and textbooks. Role playing in the classroom with stories and fictional characters can be a good way to do this.
- Recent scientific discoveries in food need to be highlighted in the museum so students can have access to the latest research in a learning environment.

- Colourful displays were considered attractive and engaging for young children as opposed to the typical white-cube displays in a museum.

SECONDARY STUDENTS

- Augmented reality and games were the most popular forms of displays suggested by students.
- They want to see creative ways of displaying stories.
- Hands-on-activities such as small food labs, demo farms and processing units are also preferred for better engagement.

FAMILIES

- Parents of children across age groups recognised the significant role museums play in engaging them and helping them learn in a meaningful and fun way.
- A museum of food was found to be an entertaining refuge, not only for children but for parents too.
- Parents want children to learn about their own times through such a museum by seeing displays of recipes, utensils and food varieties used by the previous generation.
- Many want their children to understand, value and have gratitude for food through this museum by being acquainted with the hardships of the lives of farmers in India.
- Families suggested competitions and cooking demonstrations as weekend activities at the museum.

‘I want to see the food cycle right from the seed to the consumption on my plate, maybe a simple diorama showing that’

AS, parent

6.5.2 PROFESSIONAL VIEWS: THE ROLE OF SCIENCE EDUCATION AND MUSEUMS

6.5.2.1 What are the issues audiences need to engage with?

- Professionals in food sustainability and public engagement highlighted issues such as the lack of food diversity, heritage and awareness.
- The absence of crop rotation has limited the soil’s ability to replenish itself, and if the soil base is not nutritious the food grown on it would lack those nutrients too.
- Professionals also outlined the issues faced by farmers. Farmers in India are considered labourers rather than professionals engaged in the food industry. Usually, middlemen and distributors further up the food chain tend to benefit, but people who work the hardest benefit the least.
- Malnutrition and overnutrition are seen as two ends of the economic disparity that exists in the country.
- Loopholes in regulation and certification in the food industry are another matter they feel strongly about.

‘The current generation is not interested in carrying traditional recipes forward. That means in 15–20 years all those recipes will be lost for ever. We would have a very homogenous way of eating’

Thomas Zacharias

6.5.2.2 What solutions should be communicated?

- As individuals in positions of power, professionals are focused on changing existing mindsets and influencing policy by engaging the public through mass media.
- To bring that change, they defined the role and responsibility of every stakeholder in the food system.
- At the production level, they proposed that farmers need to be made aware about the appropriate usage and quantities of pesticides, as well as trained for better and more technologically advanced farming methods that are more resource efficient.
- Integrated farming systems: models where grains, fruit, poultry and fish can be grown together within a smallholding of roughly half a hectare should be made popular, given the problem of fragmentation of land holdings.
- Nutrition banks: households below the poverty line can be supplied with seeds of food plants that can grow inexpensively in and around their houses. This fulfils multiple goals of addressing hunger, nutrition, income generation and greening.
- Corporate social responsibility: there needs to be a greater sense of responsibility on the part of large food corporations and they should be mandated by the government to divert funds towards creating awareness and outreach. They should also be more accountable for their own unsustainable practices.

‘Health and nutrition concepts should be introduced from childhood through school curriculums and textbooks. Perhaps a playful intervention through stories and fictional characters can be deployed, especially within rural areas’

Aarti Srivastava

6.5.2.3 What are the ways to engage them?

- The professionals all talked about working towards changing the mindset of people through various means of spreading awareness.
- They mentioned engaging the community/nation at all levels through public, private and NGO participation to have a wide reach across urban and rural populations.
- Government campaigns should focus not just on image-building but on strong messaging and policies implemented through local panchayats (village councils), and emphasise transparency.
- Social media have had great penetration in the last few years in India and are a useful tool for disseminating information in accessible ways.
- It was proposed that TV programmes need to be interspersed with messaging about these issues, just as there are public service announcements for vaccination.
- At the same time, some experts suggested that there may be distrust about public messaging among audiences because of advertising, so practical activities and provocations for people to think about would be more effective engagement strategies.
- Practical workshops could attract non-traditional audiences into the museum space, and street performances could be effective methods of outreach for Indian communities.

‘A museum is a space that activates all our senses, so why do we only talk about visual perception? We have almost forgotten about the senses of smell, taste and touch. Food is also about memories. Those memories become your history, identity and your culture’

Sujata Parsai

7.

KEY FINDINGS IN THE UK

UNWITTED KINGDOM

7.1 SUMMARY OF FINDINGS IN THE UK

MOTIVATIONS AND CONTEXT

- The UK has a middle ranking for food sustainability, noted particularly for easy availability of fast food and ultra-processed food.
- Although climate breakdown was a major reason for high levels of environmental concern in survey responses, in conversations it was somewhat avoided, either because it was 'taken as read' or seen as distant.
- A common theme in our conversations was that people are thinking more about the environmental and health impacts of the food system more since COVID-19.
- Older adults are building on long-standing concerns on issues such as global inequality or fair trade, and younger adults tended to mention animal welfare and climate impacts as rising concerns.
- After exploring the problems and solutions, there was a greater sense of motivation among all audience groups to take steps to improve their food practices or organise for change. However, the adult audiences, particularly parents, acknowledged that it will be hard to change if sustainable choices are not made convenient, attractive or affordable.
- There is a psychological weight to this subject for UK adults because they feel disconnected from sources of food and aware that their choices are governed or manipulated by companies. Some, particularly parents, feel the weight of personal responsibility and guilt at their choices. Others, particularly younger adults and students, expressed views that corporations should lead the change.
- Teachers are motivated to fill gaps in knowledge that will empower young people to lead sustainable, healthy lives and change the food system. However, they feel hampered by challenges in the education system.
- Children and young people have the least agency about their food choices and, while many expressed concern about animal welfare and climate breakdown, they do not feel it is easy to change their food habits. They are motivated by imagining and learning about solutions.
- Overall, audiences in the UK experience a tension between wanting to see an improved food system and not feeling empowered to bring it about. They need intellectual and emotional support to activate them to change the food system for environmental benefits.

AWARENESS OF FOOD SUSTAINABILITY

- In all audience groups there are gaps in knowledge, particularly around links between the food system, climate change and biodiversity loss. Specific issues such as plastic waste, air miles, ultra-processed food, fair trade or overfishing are top of mind for some individuals, often owing to recent documentaries or online campaigns. However, issues such as soil health or food insecurity due to climate impacts were rarely raised.
- When time was spent in one-to-one interviews, people drew on reserves of knowledge or realised that they knew more than they thought. When they were informed about flows of environmental harm in the food system, their thinking about solutions widened.
- Families (parents and children) were the most variable in their understanding, with around half of parents conflating issues or being unaware of a range of solutions. Some children were strongly aware of environmental issues in general, using simple terms such as 'saving the planet', or of particular emotive issues such as plastic waste affecting marine life.

AWARENESS OF AND PREFERENCES FOR SOLUTIONS

- Solutions that adults and parents already know or practise themselves are mostly at the level of domestic choices rather than activism, advocacy or community organising. When they learn more about the problems, and consider the views of young people, they are more motivated to take action (such as organising local food schemes) and to find more information.
- Younger people are less likely to see solutions in terms of personal choice and more likely to generate ambitious ideas about large-scale interventions.
- The most popular solutions were regenerative agriculture, community-supported farms, greener aquaculture and schemes to end food waste, as these are 'win-wins' for environmental and social wellbeing.
- All groups posed challenges to the more technological solutions, such as high-tech greenhouses. The least popular were lab-grown meat and eating insects, although many recognised that more hands-on education about innovative foods could change their habits.

ENGAGEMENT AND THE ROLE OF MUSEUMS

- Although most people we consulted were museum visitors, they are still most likely to be informed on these issues by powerful broadcast programmes, viral media and news. Children expressed preferences for games, anime cartoons or active challenges. In different ways all audiences pointed to a lack of information⁹² that makes links between food and environmental issues.
- UK audiences have good experiences of the country's museums and science centres. All the audiences and professionals see a large and growing role for informal science education, although not necessarily museums working in traditional ways. They want active, hands-on experiences that involve tasting and growing, both outdoors and indoors, in places where they shop, eat and socialise. They weighed up the benefits of museums as fun places to learn alongside other methods of engagement that could reach more people or change systems directly.
- When imagining a museum of future food, their ideas included 'Earth-kind' cafés taking over the museum, food-growing experiments or food psychology labs. They also described visualisations of the global impacts of different food system interventions or choices.
- Children and young people made the most exciting and ambitious suggestions, breaking open notions of what a museum could be, and were willing to consider that fresh ideas might solve big problems. For example, a school group decided to design an Earth-friendly fast-food chain ('VcDonalds'), and another defined a scheme to feed cows in ways that reduce methane, rather than envisaging a museum.

⁹² For example in professional training, the school curriculum, broadcast media or supermarket information.

7.2 CONTEXT OF FOOD SUSTAINABILITY IN THE UK

- The UK ranks 24th out of the 67 countries included in the Food Sustainability Index and 16th out of 28 European countries. Its worst ranking relates to availability and high consumption of junk food. Only around 1% of the population currently eat a diet that reflects the government's Eatwell Guide recommendations. A study of 9,000 children showed an average of 60% of calories obtained from ultra-processed food⁹³.
- UK culture is very individualistic and people are encouraged to think of themselves as consumers rather than citizens. Food is the largest manufacturing sector in the UK, which correlates to its processed diet.
- Multiple research projects show that public concern for sustainability is not matched by behaviours. However, concern about climate change is growing, with at least 60% agreeing that the situation demands a global response (Climate Outreach, March 2021).
- The UK is facing threats to its food security, partly owing to a labour shortage post-Brexit and (eg) current drought. Rising food prices, combined with the economic effects of COVID-19, will worsen an already negative background level of food insecurity. In terms of food insecurity and inequality, the UK ranks among the worst in Europe and is the eighth worst performing of 41 more economically developed nations⁹⁴.
- The National Food Strategy was published on 15 July 2021⁹⁵. It deals with two big challenges: the 'junk food cycle' and the 'invisibility of nature'. It has involved consultation, including with over 400 young people who called for more education about the food system, decision-makers to transform the food system to be 'planet-kind', and affordable healthy, sustainable diets.
- Around the time of this launch there were other publications, such as Prince Charles's call for support for small farms. One paper offered nine principles and tests for an ecologically integrated food system that builds resilience to climate change⁹⁶.

⁹³ 'Urgent action needed to reduce harm of ultra-processed foods to British children', NIHR School for Public Health Research, <https://sphr.nihr.ac.uk/news-and-events/news/urgent-action-needed-to-reduce-harm-of-ultra-processed-foods-to-british-children>

⁹⁴ <https://foodfoundation.org.uk/new-evidence-of-child-food-insecurity-in-the-uk>

⁹⁵ www.nationalfoodstrategy.org

⁹⁶ T Lang, E Millstone and T Marsden, 'Testing times for UK food policy: nine principles and tests', <https://foodresearch.org.uk/publications/testing-times-for-uk-food-policy-nine-principles-and-tests>

7.3 IMPACTS OF COVID-19 ON ENGAGING PEOPLE WITH FOOD SUSTAINABILITY

- There was some awareness among adults that COVID-19 had affected food supplies, but only at the start in spring 2020. Children were more prescient or concerned: *I think food in the future will stop coming if pandemics keep on coming.* (School student, 12)
- Some people we spoke to were involved in community support projects, including food aid, to help people affected by the pandemic, and they wanted to continue this work to build social connection and justice. They would value support on how to increase food sustainability through these projects.
- The pandemic has increased pressures for families particularly, making convenient and cheap food more important, but also highlighting the possibilities of connecting more with nature, growing food locally and aiming for diets that boost immunity.
- Educators are under pressure to catch up on missed learning due to school closures, reducing scope to enrich learning around climate and food sustainability issues.

7.4 ATTITUDES TO AND AWARENESS OF FOOD SUSTAINABILITY AND ITS SOLUTIONS

‘We’re in more of a global society and all these interlinked trade routes and I can’t get my head round why it’s cheaper to buy New Zealand than Welsh lamb. I don’t know enough to know why’

B, male, 25–34, focus group

‘I just think about what’s on the science curriculum at the moment and don’t branch out. There used to be a lot of cross-curricular things and subjects you connected together’

K, science teacher

7.4.1 MOTIVATIONS AND INTERESTS

INDEPENDENT ADULTS

- Some of the adult audience were more concerned and motivated than others. One focus group of older adults (all but one were 55+) tend to make beneficial choices, motivated by long-held concerns about animal welfare, fair trade and global justice. A group with more middle-aged adults, and some younger adults interviewed, were motivated more by particular ecological issues and some by climate change.
- Climate change and related food insecurity are perceived as distant threats both geographically and temporally, which will not affect them personally. This is particularly the case with older adults, despite them often making ethical food choices.
- Adults talked more than other audience groups about the lack of clear short cuts and incentives, such as taxes or limitations on advertising, to ease and enforce planet-kind food habits. In the COVID-19 context, where the government is setting out emergency measures, food insecurity and environmental harm seem to be comparatively less serious because such measures are lacking.
- On the whole, adult audiences feel anxiety, confusion and a weight of ineffectual personal responsibility over big issues they cannot entirely grasp or control.

TEACHERS

- Teachers saw the potential of young people being agents of change, as illustrated by their role in climate protests.
- They see young people as more flexible in thinking than adults, and believe that changes in their behaviour can influence parents’ behaviour.
- However, to be more effective agents for change, young people need to learn to evaluate information sources.
- They believe young people need relevant environmental education integrated across the curriculum, which is made difficult by reforms to the formal education system and by COVID-19. This indicates the value of increasing such provision within informal science education and museums.

YOUNGER SECONDARY STUDENTS

- Younger students are less likely to make their own choices, or to pursue planet-kind food choices, compared with some of the older students. The younger group fit the national pattern of diets heavy in ultra-processed food, consisting of meat, dairy, wheat and sugar.
- They showed curiosity to learn – particularly about the impact of animal agriculture – rather than a sense of agency or need to make change in their own lives.
- When asked to explore solutions and ideas for creative communication about food sustainability, they became more excited, showing potential to activate behaviour change. At ages 11–14 they are becoming concerned by global problems but are unable to process them without more knowledge and a positive focus for tasks.

‘I have to say I’m not worried about it, no ... I don’t think things will change enough for it to have any implications for the food I buy’

I, male, 55–64, interview

OLDER STUDENTS

- In the focus group of 13 young people (16–19 years), all their most recent ‘delicious meals’ were based on meat or dairy products. Some are motivated to change their diets but would miss food like this, and are still somewhat governed by parental decisions.
- Concerns about animal welfare, cost, health or taste are more top of mind than environmental impacts.
- This said, a proportion of the group are fairly well informed about the causes and impacts of harm in the food system.
- Others were less able to confidently discuss or judge the solutions, suggesting that they would appreciate learning much more about these topics.

‘Ruining the environment isn’t an option. I’ve heard some people say there isn’t a Planet B, there’s nothing better than Earth now, that there’s a chance that humans – or the next generation of what we evolve into – could go to Mars if climate change becomes too bad. I don’t know whether that’s true, but that might be the reason why people think we can ruin this planet’

E, child, London

FAMILIES

- The parents are motivated by concern for their children’s futures and wanting to model ethical practices with their children.
- Their concerns are balanced across saving money, encouraging healthier habits, and wanting to learn why and how to take positive action.
- While parents do tend to influence their children’s views, most children we consulted strongly expressed their preferences, future anxieties and ethical challenges to adults, as well as creative ideas for engagement on these topics.
- Family groups most represented the large gap between wanting and buying cheap, palatable and energy-dense food yet knowing that these preferences are part of a harmful system.

‘It’s slightly different from environmental reasons on paper. It’s more of an ethical concern, but those go hand in hand ... hundreds of animals stuffed into a small space, that’s sick’

L, non-binary

7.4.2 AWARENESS OF FOOD SUSTAINABILITY

INDEPENDENT ADULTS

- Some adults in interviews and focus groups did not clearly distinguish between climate change in general (eg as caused primarily by fossil fuel emissions) and the more complex issues of harm and disruption to both ecosystems and climate systems caused by the food system. The complexity was difficult for many to hold in conversation, even for those who are active or concerned about environmental issues.
- They tended not to frame food security as a current or urgent issue for the UK, only that it might affect access to luxury foods.
- Changes by corporations were considered more effective than relying on individual actions. There was a lack of confidence and clarity about what policy changes the government would enforce with regard to food sustainability issues and no sense that the general public had any influence on government policy.
- They showed varied understanding of the links between:
 - Changing climates abroad and availability of food in the UK – which imports 50% of its food.
 - UK food production and its impacts on the local and global environment.
- There was a lack of precision in language about the food system. For example, rather than ‘food miles’, many spoke of the ‘air miles of bananas’ or other foods that are transported by refrigerated freight ships.

‘I also think it is important to educate young people about where their food comes from, how it is produced, what it contains and how this might affect the human body, how it is distributed, packaged and sold, and how waste is disposed of. This all in turn has an impact on the environment and it is important for young people to be aware of how’

G

‘Cows produce a lot of methane, so cheese might be one of the first looked at to cut down on’

A, female

TEACHERS

Teachers think that secondary students lack understanding in:

- How human behaviour influences environmental change, which can be learned through topics such as chemical pollution, global warming, origins of food and social inequality. They feel these topics are too limited and ‘silo-ised’ in the English curriculum.
- Links between planetary and human health, which would encourage improvements in diets by appealing to both environmental and health concerns.
- Teachers’ perceptions of which solutions young people needed to know about were led by which topics they would be likely to engage with, or those which were particularly novel or relevant.
- Veganism and environmental costs of beef were raised as an issue of increasing interest to young people that they should also be more informed about.
- They also feel that young people need to understand the multiple costs of ultra-processed food.

YOUNGER SECONDARY STUDENTS

- The focus of 11- to 12-year-olds’ food choices is based on family habit, availability and typical preferences for meat, wheat and dairy. Some believe that meat protein is essential for human survival, and are concerned that the supply of livestock for meat will run out.
- They were not afraid to be speculative, including anticipating the continuation of pandemics, but responses suggested that they need more reassurance and information: *Plague could kill all animals, and as humans aren’t used to no meat, we might go extinct from huge change of food.*
- There was a huge amount of curiosity about the topic overall, in particular about animals, alternatives to livestock farming and the ethics of lab-grown meat. In exploring the food system and solutions, they were most aware already of harm done to animals (eg live exports) and the harm done by livestock and their feedstuffs (eg deforestation, methane).
- They were excited by potential solutions, particularly high-tech vertical farms, regenerative farming and greener aquaculture. They were interested in the role of alternative choices and technologies, and would benefit from more education to change their own habits.

OLDER STUDENTS

- The group of 16- to 19-year-olds included a few who were well informed about some issues, such as overfishing, owing to recent media coverage or peer knowledge.
- Some assumed that food (eg meat) would not be available in future because curbs would be placed on it, and only two mentioned that food supplies are impacted by climate change.

FAMILIES

- Very similar to independent adults, families showed gaps in understanding about food systems and farming that could be addressed through informal education: *I don’t know enough about crops to know which ones need lots of water.* (S, parent, Yorkshire)
- Parents, and particularly children, have picked up strong messages from the media about particular problems such as plastic packaging or air miles, or about particular solutions such as ‘meatless Mondays’.
- Although adults could identify causes of food insecurity, they did not show detailed understanding of environmental factors or the potential of climate change affecting staples coming into the UK.
- All families described ways they make efforts to be less harmful in their practices, for example searching out locally grown food. However, only a few individuals avoided meat and dairy products.

7.4.3 AWARENESS OF AND PREFERENCES FOR SOLUTIONS

INDEPENDENT ADULTS

With the adults interviewed individually, across a range of ages:

- The solutions they already practised included reducing food waste and reading eco-labels, and they had some knowledge of regenerative agriculture, eating insects, high-tech greenhouses and GMOs.
- When voting on nine proposed solutions, they favoured high-tech greenhouses, regenerative agriculture, eco-labels, ending food waste and community-supported agriculture.
- The most preferred solutions, such as regenerative agriculture or green aquaculture, appealed as they seemed to be common sense, proved by tradition and working with nature. This audience group were not willing to accept novel technologies or overreaching claims for emerging solutions. For example, comments such as this were made about GMO food and lab-grown meat: *It feels so high-tech that it’s anti-nature and it’s just interference and it’s not going to be helpful in the long term.* (E, female, 45–54, interview)
- Many participants were concerned about the impact of beef farming on the environment and were trying to reduce their red meat intake because of this. However, adopting a plant-based diet was not posed as a solution.
- Education is needed to grow the skills required to avoid creating food waste. Cooking from scratch and using up leftovers were seen as missing in the UK.

In the two focus groups, there were more older adults.

- In terms of solutions they already know of or practise, around half of the members of these groups are eating less or no meat. Several talked of supporting fair trade or ethical farm schemes in the UK or Global South. Some were interested in doing more gardening or communal growing, but barriers include a lack of space, resources, support or skills.
- Their top preferences were community-supported agriculture and schemes to end food waste, as these were the least problematic for them. They raised a range of challenges about the social acceptance of solutions, energy consumption and uncertainties of innovative science.

‘From Aldi the other day I got some chillies and on the package was the message ‘Use all of me – these have come all the way from Argentina’. When I read it, I’d never considered it before, the energy used. So yeah, maybe more understanding of that might be good for me’

J, female, 25–34

EDUCATORS

Educators are most interested in how they can communicate solutions to young people, to enable them to influence parents and be agents for change. They want to see an emphasis on:

- Solutions that seem novel and strange to young people, such as eating insects.
- Solutions that connect with existing interests that are already topics of social conversation, such as veganism and environmental costs of beef farming.

YOUNGER SECONDARY STUDENTS

- Unlike the other groups, younger secondary students did not refer to their own or their families’ domestic choices, suggesting that they do not see a link with their own diets. Some solutions they generated themselves were far-reaching, such as ‘stop giving cows feed that makes methane’.
- Their favourites from our suggested solutions were high-tech greenhouses, regenerative farming and greener aquaculture. Some were keen on schemes to end food waste and eco-labels. The least popular, although fascinating to them, were eating insects and lab-grown meat.
- This group, more than any other, were fresh to these solutions and found them extremely stimulating for thinking. Their responses ranged from disgust to philosophical fascination, showing that a focus on solutions works very well for younger audiences.

OLDER STUDENTS

- Older students strongly favoured regenerative agriculture, community-supported farms and schemes to end food waste, with greener aquaculture also of interest. They were unsure about the other solutions, raising plenty of challenges, especially to high-tech greenhouses, eating insects and GMO foods. They were the most negative about lab-grown meat.
- Compared with older adults and families, young people are the most questioning about technological solutions.
- Like the younger secondary students, they were very stimulated by the solutions and talked about them for some time, battling ideas between each other.
- Some were quite informed about the pros and cons of solutions, but most felt they lacked information to be able to judge.

‘One of our young people started working for a food delivery company with no plastic. This is a 16-year-old, and so that conversation was actually fantastic because he was just learning and he was able to feel quite empowered by telling us and we were quite inspired in that way too’

E, female, 45–54, interview

FAMILIES

- The solutions that parents already know of or practise are very much on a domestic scale, such as buying local or eating less meat. Most have been learning about environmental issues fairly recently, and slowly or partially changing their practices.
- There was near universal support for regenerative farming, schemes to end food waste and greener aquaculture. They also like community-supported agriculture, but with some doubts about how it would help on a global scale. They asked a few neutral questions because these solutions were new to most. These solutions appealed because they also ticked boxes of social justice, which are important to this audience.
- High-tech greenhouses, GMO foods and eco-labels were the next most popular solutions, in that order. GMO raised the most concerns, although these were often unspecific, eg ‘I know it’s controversial.’ Eating insects and lab-grown meat were the least favoured, although some wanted to know more about them, or to taste them.
- After hearing about the problem and a range of solutions, the families, compared with other audiences, were most likely to want to increase the scale of their actions to involve more community organising or activism. This was often stimulated by expressions from children about environmental harms that upset them.
- Overall, all the adult groups saw young people as a source of inspiration and as voices of conscience. Teachers, parents and grandparents wanted young people to be supported and educated to change mindsets and normal practices:

7.5 ENGAGEMENT AND THE ROLE OF MUSEUMS IN THE UK

7.5.1 AUDIENCE VIEWS: WHAT ENGAGES PEOPLE?

INDEPENDENT ADULTS

Adults’ reflections on sources of information on climate and food sustainability are summarised below.

- The key sources of information participants identified were inspiring schemes and initiatives, documentaries and television programmes, the BBC, social media and newspapers, and books.
- As well as watching documentaries and programmes on a specific climate-related issue, participants were exposed to climate and food issues through a crossover with an area of interest, eg learning about regenerative agriculture through watching a programme on cooking, indicating the potential of using hobbies and interests as a route to engaging people in climate change and food sustainability issues.
- Getting involved in inspiring schemes relating to climate and food sustainability seemed especially valuable and impactful to participants. Learning through action, participants may have felt a sense of empowerment to make change as well as feeling closer to the issues, which helps to break down the conceptualisation of climate change as being something distant and abstract.
- There were some concerns about ensuring information is credible. Perhaps related to this, there was little use of social media to seek out climate and food sustainability information, with participants leaning towards mainstream documentaries and the BBC, which was framed as a neutral source.

- People felt the museum needed to revisit the relationship people in the UK have with food, making it relevant to a national audience and balancing the abundance of American content about food sustainability found in the media.
- There was the emphasis that when covering such big and serious issues, the museum needs to give visitors some message of hope. By sharing stories of change where there have been improvements, however small, along with ideas on what people can do to live a more sustainable life, the museum has the potential to bring empowerment and change.

EDUCATORS

Educators told us that in teaching topical issues around food sustainability:

- Government education reforms and the pressure to catch up on missed learning due to school closures during the pandemic are reducing scope to enrich learning around climate and food sustainability issues.
- Teachers use a range of resources to deliver learning on topical issues including documentaries and news articles, with the internet an invaluable source for accessing up-to-date information.
- Sharing audiovisual materials followed by discussion, and project-based work, were identified as the most effective approaches to teaching topical issues. Some teachers used more creative approaches to cater for different learning styles.

‘I used to watch a YouTube cooking channel called Bon Appetit and they have a chef who is very much into kind-of natural things, lots of fermentation and wild things’

L, male, 35–44

‘Seeing the journey of food, like you’re holding the cocoa beans and the children in the Ivory Coast showing, for example, how cocoa becomes chocolate, why it would be such hard work for children to do that, or, you know, why it’s hard work for adults to do as well’

R, female, 55–64

‘Perhaps the biggest challenge is the slow pace of change ... Young people need to be able to see results in the short term’

H, teacher

Educators suggested young people would engage with informal science education experiences that:

- Are interactive and hands-on, for example allowing them to taste insects or lab-grown meat.
- Involve decision-making and learning about the consequences of different decisions, empowering them to change their lives and the world for good.

YOUNGER SECONDARY STUDENTS

- Younger students referred to learning from peers and from creative media, with messages embedded in games. They are also strongly influenced by what they learn, or do not learn, at school (the school we visited was very strong in geography).
- They generated brilliant ideas for systemic change such as setting up a vegan fast-food chain (‘VcDonalds’), showing that they understood how availability of harmful food was a major problem. By dismissing the task to imagine a museum of food, they showed that this age group are concerned problem-solvers who may not see museums as the best places for change to happen.

‘It annoys me a lot of the time when the focus is largely on this cool new tech innovation that is going to save us and not on farmers and the people who are actually making the changes’

L, non-binary, 16–19, focus group

OLDER STUDENTS

- Older students referred to messaging reaching them via TikTok, peer-to-peer conversation, and short and powerful films and documentaries (eg about microplastics and overfishing).
- Like the other audiences, they wanted museum experiences to include food tasting and explanatory visualisations (eg freshwater use compared for different foods).
- However, they had distinctive ideas about effective stories of ordinary people succeeding in challenging environments, or about vocational routes that people can take (eg how to get into community farming), rather than high-tech futuristic solutions that require extraordinary resources.

‘A greenhouse that grows food, and they make meals and you can eat it, with information about it while you wait’

M, child, London

FAMILIES

- Parents see that informal education such as museums, games and TV have an impact on children, and want its positive impacts to increase. Some parents want to see forms of engagement that build social connection, such as community gardening, as opposed to indoor and screen-based activities.
- Of all the audiences, families (especially children) were the most inspiring in their ideas for museum engagement. They wanted experiences about future impacts and solutions more than ones about past histories, compared with adults.
- Some want museums to focus on educating about solutions: a ‘grub bar’ selling delicious insects, a greenhouse where visitors can fly drones, a food waste exchange, demos of balcony food gardens, or challenge games with points to spend on the most eco-friendly basket. Others emphasised immersive visualisations that show future potentials, for example of biodiverse farming or the impact of different food systems on the planet over time.

‘Museums sell a lot of rubbish in the shops, little plasticky annoying things. They need an overhaul of what they sell. Improve not just what people come to see but what they take away’

K, child, explained by parent

‘Part of the National Food Strategy youth consultation we did, the young people said nobody ever told us that food impacts the environment’

Florence Pardoe, Food Foundation

7.5.2 PROFESSIONAL VIEWS: THE ROLE OF SCIENCE EDUCATION AND MUSEUMS

- The UK professionals agreed in two focus groups that there was a profound lack of knowledge in the UK public about food, farming and food systems. This lack of awareness in young people lies in gaps in the education system, for example the separation of geography from food science and health education, combined with the power of messaging by the food industry.
- We are all food consumers, so it is not an entirely abstract subject. Learning can be constructed from our personal experiences, habits and cultural knowledge. The relevance of food sustainability to people’s lives and future thriving is a route to growing science capital, cultural capital and environmental action.
- Stephen Foulger made the important point that food is a way to broaden audiences for museums, as well as to engage people with sustainability issues.

‘A museum of food would not be a museum, it would be a living place, where different cultures come together to explore relationships to place’

Maddie and Cherry, Custom Food Lab

- Each professional had a different focus on what the UK public need to know about, but overall they feel that informal education can engage people with both the complexities of food and ecology and easy facts and actions for change. For example, 70% of food waste in the UK is in households, so this is a big lever that can be pulled by small actions. People need to be part of revolutions for soil-based, ecological food production – and be educated about global issues such as climate justice, water or deforestation – but ultimately they will be motivated by challenges that help their pockets and their health, and that increase social connection.
- The professionals were aware of the spectrum of solutions from personal domestic choices to the big levers that can only be pulled at a political or legal level. Between these two ends of the spectrum lie solutions that bring communities and sectors together, and that harness culture (eg museums, arts, science education) to create shifts in culture. Cultural programming can draw together the personal, political and scientific aspects of this issue. It can overcome arguments between the effectiveness of either domestic or system change.
- They had deep and wide knowledge of the food system, but shared the views of audiences that the best ways to learn about it are practical and sensory. The complexities can only be explored by making connections, whether through conversations, clever interactives, outdoor experiences and most especially getting hands-on (and ‘tongues-on’) with food.
- The planetary emergency requires rethinking what museums and science centres can do, to shift from exhibiting things to activating people. Their ideas included museums as participatory research labs, a restaurant modelling planet-kind food (‘an ace food system café with museum attached’), or experiential spaces such as two food-growing tents in Cornell Botanic Gardens where one is heated to 2°C warmer.
- Some were more challenging, echoing the secondary school group, proposing that this learning needs to take place in supermarkets, farms and high streets.

‘I’m interested in reaching audiences with low science capital and little engagement with museums and critical media. The universality but specific and deep cultural resonances of food make it a great way to interest more people in science, technology, critical thinking, culture and museums’

Stephen Foulger, science interpretation consultant

APPENDIX: CONVERSATIONS WITH PROFESSIONALS

We spoke to 37 professionals working in the UK, India and Brazil, recruited through our networks in social and environmental justice, cultural education and science communication. Some were very focused on food campaigning, with an interest in creative methods of engagement, and others were more expert in museums or culture, with an interest in food and/or environment.

THEY WERE:

IN BRAZIL

Mariana Aleixo, chef and food activist, Maré de Sabores, Complexo da Maré

Gringo Cardia, designer, architect and museum specialist

Eduardo Carvalho, curator and museum consultant

Italo Guedes, agronomist, Embrapa (Brazilian Agricultural Research Organisation)

David Hertz, founder of Gastromotiva and cocreator of the Social Gastronomy Movement

Bia Lessa, theatre director, set designer and curator

Ernesto Neto, visual artist

Marcelo Paz, chef and food activist, Caliel Bakery, Morro do Vidigal

Lorena Portela, food sovereignty and environmental educator

Alessandra Roque, local activist, Naturalê project, Morro da Providência

Vera Saboya, culture and education specialist, and founder of Ateliê Culinário

IN INDIA

Shri Dhruv Prasad Soni, Nirbhaya Science Museum, New Delhi

Shipra Gupta, Assistant Professor (Food and Nutrition), Institute of Home Economics, University of Delhi

Sk E Islam, former Director, Birla Industrial and Technological Museum, Kolkata

Dr Shweta Khandelwal, Head, Nutrition Research, Public Health Foundation of India

Niranjan Khatri, founder of iSambhav

Dr Ashok Kumar Singh, Deputy Director, General Agriculture, Indian Council of Agricultural Research

Dr B Mohan Kumar, Vice-Chancellor, Arunachal University of Studies, Namsai

Sujata Parsai, Director, Lalbhai Dalpatbhai Museum, Ahmedabad

Dr Jahnavi Phalkey, Director, Science Gallery Bengaluru

Vintee Sain, Deputy Curator, Nehru Memorial Museum & Library, New Delhi

Aarti Srivastava, consultant, IQVIA

Thomas Zacharias, celebrity chef

IN THE UK

Ollie Baker, sustainable chef and educator

Clare Brass, sustainable designer

Madeleine Collie and Cherry Truluck, Custom Food Lab

Paige Dansiger, Better World Museum

Ben Fletcher, Sustainability Officer, City of Bradford Metropolitan District Council

Stephen Foulger, science interpretation consultant

Rita Marcalo, dancer and eco-village resident

Rene Meijer, Food Works, Sheffield

Florence Pardoe, The Food Foundation

Christian Reynolds, academic in food and climate

Domenico Sergi, Curating London project, Museum of London

Steve Slack, freelance museum consultant

Duncan Williamson, food sustainability campaigner

See section 7 of the separate appendices for resources and inspirational examples shared by these professionals.

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