HOUSE OF LORDS

Food, Diet and Obesity Committee

Corrected oral evidence: Food, diet and obesity

Monday 25 March 2024

3.30 pm

Watch the meeting

Members present: Baroness Walmsley (The Chair); Baroness Boycott; Baroness Browning; The Earl of Caithness; Lord Colgrain; Baroness Jenkin of Kennington; Lord Krebs; Lord McColl of Dulwich; Baroness Pitkeathley; Baroness Ritchie of Downpatrick; Baroness Suttie.

Evidence Session No. 12 | Heard in Public | Questions 154 - 164

Witnesses

I: Professor Dr Kevin Hall, Senior Investigator, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) as part of the National Institutes of Health (NIH), Federal Government of the USA; Professor Susan Jebb, Professor of Diet and Population Health, University of Oxford; Dr Mathilde Touvier, Research Director, Head of the Nutritional Epidemiology Research Team, Inserm, Principal Investigator of the NutriNet-Santé cohort.

Examination of witnesses

Professor Dr Kevin Hall, Professor Susan Jebb and Dr Mathilde Touvier.

Q154 **The Chair:** Good afternoon and welcome back to this public meeting of the House of Lords Committee on Food, Diet and Obesity. We continue our meeting with the 12th evidence session of the committee's inquiry exploring the role of foods such as ultra-processed foods and foods high in fat, salt and sugar in a healthy diet and in tackling obesity. We are about to hear now from Dr Kevin Hall of the National Institutes of Health of the Federal Government of the United States of America and Dr Mathilde Touvier, research director at Inserm, who are both joining us remotely, and Professor Susan Jebb, professor of diet and population health at the University of Oxford, who is joining us in person. You are all very welcome and we are looking forward to the evidence you are going to give us today. I will ask you to introduce yourselves before you answer the first question.

Today's meeting is being broadcast. A written transcript will be sent to witnesses to check for accuracy before publication. I refer to the list of members' interests, included my own, as published on the committee's website and as set out in the committee's first evidence session on 8 February. I repeat what I said at the beginning of the earlier evidence session: while it would be inconsistent with Lords committee procedure to compel our witnesses to do so, we will, for the sake of transparency, be giving all our witnesses the opportunity voluntarily to declare any interests that they deem relevant to the work of the inquiry the first time they speak.

Having said all that, I turn to the first question. What are the main challenges in enabling people to eat healthily and in tackling obesity, in your country and around the world?

Dr Mathilde Touvier: I am the head of the Nutritional epidemiology research team in Paris at the French national institute for health and medical research, Inserm, and the principal investigator of the NutriNet-Santé cohort. I have no conflict of interests to declare.

There are many challenges. We now have years and years of research in epidemiology, toxicology and many other types of studies showing different diet-related protective and risk factors for health. Where we are now is that we know that eating foods that are too high in sugar, salt and so on—that is, with a poor nutritional profile—and not enough vitamins, minerals and fibre is deleterious for health. We have settled some policies in France, such as the French National Nutrition and Health programme—our nutritional policy is called PNNS—tackling all these aspects. We have recommendations such as eating at least five portions of fruits and vegetables a day, fish twice a week and so on. Those are the nutritional parts of the recommendations.

However, we have now moved to another dimension. We now think there is a 3D vision to adopt when we think about the impact of our food on health. We have talked about the nutritional part. The nutritional profiles

in terms of salt, sugar, fibre and so on are very important. It is the aspect for which we have the highest level of evidence from years and years of nutritional research on the impact on cardiometabolic health, cancers and so on.

There is a second, complementary dimension. I listened with great pleasure to the intervention from Professor Monteiro. Thanks to the introduction of the NOVA classification concept by his team in 2009, our knowledge of the impact of food formulation and food processing on health has advanced.

The third dimension, when we think about the impact of food on our health, is the environment and contamination—for instance, the pesticide residue that we have in food. These may also impact health in various ways.

The challenge here in France and in other countries is to be able to tackle these three dimensions by adopting policies that reduce people's exposure to these unhealthy foods, based on those three dimensions. That is a challenge because we live in a world where, while some stakeholders from the food industry may well want to work with public health stakeholders to reduce that exposure and to increase exposure to healthy foods, many of them are pushing foods that are not nutritionally healthy, ultra-processed food or contaminated food. The challenge is to put in place monetary and other policies to reduce exposure to ultra-processed foods, foods with a poor nutritional profile and unhealthy foods more generally.

Q155 **The Chair:** Professor Hall, we have already heard today about your famous clinical trial. Are you planning to repeat it at all, perhaps in partnership with other universities or research groups?

Professor Dr Kevin Hall: I will introduce myself, according to your instructions, and then I will be happy to answer that question. I am a senior investigator in the nutritional research programme at the National institutes of health, working just outside Washington, DC, and my main research interests involve investigating how the food environment affects what we eat, and how what we eat affects our physiology and the development of obesity. I have no conflicts to report.

It is great that people are talking a lot about our studies; it is heartening to hear that. We are conducting a follow-up study as we speak. We have folks admitted here to the NIH clinical centre. They live with us 24 hours a day, seven days a week, for weeks on end, and we take control over their food environments. In this study we are reformulating different ultra-processed food environments to vary them in the extent of their so-called energy density—that is, the number of calories per gram of food on the plate—as well as the number of so-called hyperpalatable foods that are being offered.

The goal of this research project is to follow up on our previous one, which I am happy to describe later if folks are interested in hearing more

about that. We are trying to focus on some of the mechanisms. Many people have hypothesised all sorts of different mechanisms explaining the results of our first trial. Unfortunately those are just hypotheses; they are basically ideas or theories about what may have happened. As scientists, we go back and design a prospective study to test those mechanisms, and that is what we are doing now.

The Chair: We look forward to seeing the results of those trials. Can we have your take on the major challenges that we face?

Professor Dr Kevin Hall: The main challenge is that in countries like the US and the UK we have food environments that are dominated by a variety of unhealthy foods that are heavily marketed, widely available, tasty, affordable and convenient and which require very little time, skill and equipment to prepare. Food scientists have developed ingenious processing and formulation technologies to transform inexpensive agricultural inputs into a wide variety of profitable products that people love and rely on to support their busy lives. It is difficult for most people to avoid such foods, and it is actually a privilege to have the time and resources to prepare or purchase healthy meals on a regular basis. The food environment that most people are faced with is really the main challenge that countries like the US and the UK face when it comes to enabling people to eat healthily and tackle obesity.

Professor Susan Jebb: I am a professor of diet and population health at the University of Oxford. My research team works on public health policy to try to prevent obesity and on clinical interventions to treat it. I should note that I am also chair of the Food Standards Agency, but today I am speaking very much as an independent academic, not on behalf of the FSA.

I should note that my salary comes entirely from the university and from the FSA, and my salary has come from public sources for my whole career. I have not done any consultancy work for the food industry for 20 years or more, and even then only very little. However, some of my research studies involve products or services that are provided by industry—particularly clinical weight-loss interventions, for example, which are provided to the NHS by those companies for free, or where data is provided to us in order to evaluate interventions. So we have collaborations with industry, but the contracts for those are with the university and they do not provide any of my salary.

On the challenges, people have already set them out very well. People have a biological drive to eat, and the food industry has responded to that by providing us with cheap, convenient, and tasty food that people want to eat; Kevin set that out extremely well. Our challenge is that we need to change both the food industry and consumer preferences. Over time, there has been an assumption that change should start with consumers, and if we just got consumers to change, that would drive the market. It patently has not worked out like that, as Henry Dimbleby explained in his session.

We have to recognise that the challenge now is how to make changes in the food industry so that healthier food becomes the default, and then hope that palates will follow that, just as, when you stop taking sugar in your tea, suddenly added sugar becomes unpalatable. That tends to take you strongly down a reformulation route, and in the UK we have been pretty keen on that. It has had some benefits, for sure, but we also have to acknowledge that the reformulation of foods is in part what has led us towards some ultra-processed foods, so that is tricky.

The other big challenge is how to change consumer preferences at the same time. That is much harder, although you have heard from witnesses who have talked about the importance of starting early and the work that can be done in the early years, and of course through school food. In short, the challenge is: how do you change the food industry and consumer palates? That is sort of the easy question; the real challenge is how to do that.

The Chair: That sounds terribly easy.

Q156 **Lord Colgrain:** I thank all three witnesses for coming to give evidence to us today. What are ultra-processed foods? How useful is that term for the purposes of policy and regulation, and what is the overlap with foods high in fat, salt and sugar?

Professor Susan Jebb: Again, lots of witnesses have discussed the challenges of classifying UPF, especially for the purpose of legislation, which we know needs to be extremely precise. My key point is that ultra-processed food is a binary system, very yes or no. That means we can spend an awful lot of time arguing which side of the line a particular food falls on. Some of the research on ultra-processed food is beginning to look at specific categories of food, but to be honest we are a long way off being able to link individual foods to particular health outcomes, so that is quite challenging.

On the overlap with HFSS—essentially, I think you mean with the nutrient profiling model. There is of course a strong correlation between the two, but they are not the same. You have had lots of examples of that during this inquiry. If I make a chocolate brownie, that is HFSS but not ultra-processed, while a prepacked loaf is ultra-processed but not HFSS. So there are tricky bits around the edges. The important difference is that the nutrient profiling model gives you a continuous score, which is much more flexible. You can use it as a binary—as we do for advertising, when you say, "Here is the cut-off point"—but by having a continuous score you have the potential to demonstrate that there is a spectrum of healthiness rather than a black and white situation.

I suppose that my worry is that if we throw out the HFSS nutrient profiling model in favour of UPF as the basis for our food policy, we are going to spend another however many years trying to agree the definition. I would prefer to see the nutrient profiling model evolve if it needs to do so. At the minute, I do not think we know exactly what it is about ultra-processed food that causes harm beyond the nutritional

profile. When we do, I think we could adapt the nutrient profiling model to recognise that. Personally, I think that would put us in a stronger position than jumping to a position where the evidence, at best, is still emerging but, I suspect, will be tricky for some time.

Professor Dr Kevin Hall: Defining UPF is something that you heard a lot about in the last session, so I will not go into too much detail about that.

It is important to realise that the NOVA system, of which UPF are a part, ignores the nutrient content of foods. While there might be a good deal of overlap between ultra-processed foods and those that have poor nutritional profiles, there are cases of ultra-processed foods that actually have quite good nutritional profiles. Similarly, there are HFSS foods that are not UPF. The brownie example that Professor Jebb gave is an example of an HFSS food that is home-made but would not be considered ultra-processed.

It is important to realise that the definition of ultra-processed foods, despite the scariness of that terminology, does not necessarily imply that those foods are harmful to health. That has to be determined based on scientific evidence. We have heard a lot about the mountain of epidemiological evidence that has associated diets high in ultra-processed foods with poor health outcomes.

However, what is interesting to me in thinking about the relative weight of evidence, when you consider HFSS definitions based on nutritional profiles versus ultra-processed foods, is that, while there is a mountain of evidence linking individual nutrients such as diets high in sodium or sugar with poor health conditions, very few studies have actually linked to nutritional profiling systems such as HFSS with poor health outcomes. There are fewer than 30 in the latest count, in a paper that was published recently in the *American Journal of Clinical Nutrition*. Compare that to the number of epidemiological studies that Professor Monteiro has counted up—more than 1,000—linking diets high in ultra-processed foods with poor health outcomes. It is interesting to think about the relative weight of evidence available for HFSS nutritional profiling systems as markers of poor health outcomes versus ultra-processed foods.

Dr Mathilde Touvier: I fully agree. In fact, when you look at all the epidemiological evidence, the randomised controlled trials from Kevin Hall and colleagues, but also the many epidemiological studies on ultra-processed food and adverse health outcomes, we definitely see something here. The concept of ultra-processed food is very important, and if we want to go further in regulation on food labelling or price policies, we definitely need an operationalisation of the definition of ultra-processed food. For this, we need to define markers—you have talked about this previously—stating what is ultra-processed food and what is not. We have the NOVA classification, which is a very good basis for definition, and we need to go further to operationalise this definition.

There are correlations between the two dimensions (nutritional profile on the one hand and food (ultra)-processing on the other). In France, we

have just published a paper in which we looked at the Open Food Facts database, which included more than 130,000 products on the French market, with their Nutri-Score on the one hand, which scores the nutritional profile in terms of salt, sugar, dietary fibre, and so on, and the NOVA score on the other. We saw that 63.2% of ultra-processed foods were Nutri-Scored D or E, the lowest nutritional quality marks that you can have with a Nutri-Score. Only 5.3% of ultra-processed food had a Nutri-Score of A.

So there is definitely a correlation between the two concepts, but you can see from these figures and the very good examples given earlier of the chocolate cake that these two dimensions are not co-linear but complementary.

In terms of policy, I fully agree with Professor Jebb that the level of proof of the health impact of too much salt, sugar and fat is very high. We need to keep that in mind and have food labels, such as the Nutri-Score, saying that we should favour certain foods that have a healthy nutritional profile based on those key nutrients, but also add other dimensions, such as food ultra-processing, to the first dimension.

The more we advance in research into food additives, contaminants created during processes or coming from food packaging, the more we will be able to make the food profile evolve. That is what we proposed with the Nutri-Score in France: to upgrade it by adding a black frame to signal if the food is ultra-processed. So the two dimensions—the nutritional profile plus the ultra-processing dimension—would be within the same logo to inform the consumers about these two complementary dimensions.

Lord Colgrain: Thank you. Did I hear you right? Did you say that 130,000 products were analysed in the study?

Dr Mathilde Touvier: Not analysed in terms of laboratory assays, but the Open Food Facts database also exists in the UK and it gathers data on many foods in the market.[1] It is a crowd-sourced database, so everybody can scan the barcodes of products, and it gathers all the information on the food label: the composition, the ingredients list and so on. It also provides the Nutri-Score, based on an open-access, validated algorithm accounting for the content per 100 grams of product of salt, sugar, calories, saturated fats and conversely, proteins, fibres and proportion of fruits and vegetables. Information on the NOVA score is also provided, as well as the ingredient list, so that we can see whether there are emulsifiers, artificial sweeteners and so on, which are markers to apply the NOVA classification.

So on this extensive database, we have been able to screen for more than 130,000 products, have the NOVA and Nutri-Score information on the same products and see the correlations.

[1] Note from witness: This gathers data on more than 3 million products across the world. See https://world.openfoodfacts.org/

Lord Colgrain: Thank you for the clarification.

Q157 **Baroness Jenkin of Kennington:** What evidence is there that consuming ultra-processed foods is harmful compared with consuming foods high in fat, sugar and salt, and how should policymakers respond to that evidence? I was very taken by what you said at the beginning, Professor Jebb, about changing people's palate, particularly children's. When it is so addictive, even if we get all the right environment, how are we ever going to get people, particularly children, to move on to something healthier and better for them?

Professor Susan Jebb: On the first part of the question, there is plenty of observational evidence linking UPF to adverse health outcomes. You have heard all about that. I do not think there is much dispute there.

It is of course also true that there is lots of evidence linking so-called western dietary patterns to adverse health outcomes too. Kevin mentioned that there is less on HFSS or nutrient profiling models. That is probably just because it is more complicated to calculate it. It is not as though the studies that have been done with HFSS have had unusual or diverse outcomes; there are just fewer studies. So we need to be cautious not to interpret the difference as providing stronger evidence for UPF than HFSS.

It is also important to remember that there is lots of evidence that traditional diets are good for you, such as Mediterranean diets or Nordic diets. So when we are thinking about this, we have to think about whether the adverse health outcome associated with UPF is being driven by something that you are eating or something that you are not eating instead—the substitution effects. There are all sorts of challenges in the observational epidemiology, and people like Janet Cade and Keren Papier, my colleague in Oxford, have set those out very well for you.

How should policymakers respond to that evidence? I would say "cautiously". The UPF classification sweeps up a lot of foods in it—around half, we have heard, of the UK diet—so before we start telling people to stop eating half of what they are currently eating, we need to be pretty sure that we are right and that we are not including some things that perhaps we would not want to include in the definition, especially where some of those foods bring important nutrients to the diet—things like fibre in bread and breakfast cereals and some important micronutrients too. I just urge a note of caution.

In thinking about how policymakers should respond, there is the general question of how far you go and by what means policymakers can intervene to change diets. That is true whether you are talking about UPF or HFSS. For me, that is the key issue: how can we develop policies that will move people towards a healthier diet? What is the best way of doing that? I worry that, in arguing over the definitions, we are losing time and wasting energy when we ought to be focusing on just taking policy action based on what we already know.

On your question about changing children's palates, that is really difficult. Lucilla Poston talked a bit about this and about the importance of starting early. I was very struck by the idea that in schools it is much easier to encourage other people's children to eat vegetables than we as parents feel we are able to do at home. Those are really important messages.

You also, in a way, started touching on this notion of addiction and whether people become committed to these foods. Clearly people develop very strong preferences. Does that qualify as addiction? Maybe that is a bit of an academic debate. At one level, all food is addictive; we have very strong, powerful drivers to make us eat. If I replaced a UPF lasagne and a trifle with one I had home-made, I do not think people would still be craving the other lasagne, so it's hard to argue it is "UPF" that makes these foods "addictive".

I just think we need to be very careful when we think of phrases like "addiction", because I am not persuaded that that is true. However, people like what they get used to. That is the key issue. It is these learned preferences, and if you are bringing children up on a diet that is dominated by processed food, with all the advertising and marketing that goes with that, it is not surprising that, given the choice, that is what they prefer.

Professor Dr Kevin Hall: To follow up on many of Professor Jebb's excellent points there, given that countries like the US and the UK are already awash with ultra-processed foods and that not all ultra-processed foods by the fact of them being ultra-processed are necessarily unhealthy, we need to understand the mechanisms by which diets that are high in ultra-processed foods are leading to deleterious health outcomes. I do not think there is any dispute about those linkages being present. The question is how that is happening, and until we can understand the mechanisms by which that happens, we are at a loss as to how to address the issue.

If we do not understand the mechanisms by which ultra-processed foods lead to poor health outcomes, we cannot subcategorise ultra-processed foods into those that are neutral for health, those that are potentially healthy for you and those that are the real harmful properties. HFSS is one way of looking at that and targeting that from the outset, and we have some good mechanistic information about why diets high in sodium are poor for high blood pressure, cardiovascular disease and so on. So that is a good starting point.

However, we need real devotion to some research to try to figure out the main factors in our food environment that drive us to overconsume calories, gain weight and have all the downstream consequences of obesity as well as some of these other independent factors of ultra-processed foods that may lead to other deleterious health consequences, whether that be through systemic inflammation, changes in the gut microbiome et cetera. That mechanistic information is crucial. It does not mean that we cannot act now from a policy perspective, but to act most effectively one needs to understand the mechanisms as well as the

potential consequences of interventions such as what it is being replaced with. That is another aspect where we can learn from some past history of mistakes, especially in the saturated fat and trans-fat area.

Baroness Jenkin of Kennington: And the policymakers' response? Dr Touvier.

Dr Mathilde Touvier: Going back to your question about evidence that consuming ultra-processed food is harmful, the epidemiological studies investigating the potential impact of ultra-processed food on chronic disease risk are quite recent. When we started to investigate this point with the NutriNet-Santé cohort in 2018, there was no previous data on cancer risk, cardiovascular disease or type-2 diabetes.

This is why we started this work with the NutriNet-Santé cohort, which we launched in 2009. We have more than 176,000 participants now, and the interest here is that we have a very detailed characterisation of the food consumed by participants. Participants fill in validated 24-hour records repeated during follow-up, in which they also indicate industry brands' products consumed. This allowed us to retrieve the content in food additives and so on. We have been able to apply the NOVA classification to this study, and we have already seen associations with an increased risk of cancer, cardiovascular disease, type-2 diabetes, mortality, depressive symptoms, obesity and gastrointestinal disorders.

In the last few years, there has been a drastic accumulation in studies showing adverse health outcomes linked to ultra-processed food intake. There are now more than 75 prospective cohort studies, as you discussed in the previous session, and you have seen the umbrella review published this month by Lane and colleagues in the *British Medical Journal* showing all this evidence. There will also be soon the *Lancet* series, as mentioned previously, summarising this evidence.

That is the epidemiological part. The important aspect here is that most of these studies adjusted for nutrient intakes, energy intake, salt, sugar, fibre, vitamin intake—many parameters of the nutritional dimension. Despite accounting for these factors, the associations between ultra-processed food and health outcomes were observed. This pleads for other characteristics, other factors, in ultra-processed food that play a role in the association.

The other part of the evidence comes from randomised control trials, such as the one that Kevin Hall talked about. It is important to say that it would be great to have a randomised control trial, or many trials, for years and years, giving ultra-processed food to people and feeding a lucky control group with healthy foods with a good nutritional profile—not ultra-processed—and to study who dies first, who has the most cancer, and so on. That is obviously not ethically possible, so it is important for this topic—it was the same for tobacco, alcohol and etc.—to understand that the evidence does not come from randomised control trials alone. They are very important, and they provide very interesting insights into the mechanisms by which ultra-processed foods can act, but they are

complementary to observational studies, mechanistic epidemiology with biomarkers, and in vitro and in vivo experimental study.

This body of evidence in favour of causality is growing ever stronger regarding ultra-processed foods. We now know that several characteristics (other than just nutritional)—this may be the next question—such as food additives and other parameters, are likely to play a role and we are beginning to have many ideas about how they might impact health. We have many things yet to discover, but, still, it is time for action, even with what we know now.

The Chair: Thank you. We are about to move on to the issue of mechanisms with Earl Caithness's question.

Q158 **The Earl of Caithness:** Yes, thank you. This question follows on from that. What is the evidence on the mechanisms by which ultra-processed foods may cause harm, such as nutrient profile, harmful additives, palatability or convenience, and how should policymakers respond to that evidence?

Dr Mathilde Touvier: The question is very well formulated, so you have already mentioned many of the parameters that may play a role. Indeed, the nutritional profile of ultra-processed food, which is poorer on average, probably plays a role. This is an important aspect. But as I mentioned, in most of the epidemiological studies, despite the adjustment and accounting for the lower nutritional profiles of these foods, and the lower intake of fruits and vegetables and the replacement of healthy foods by these ultra-processed foods—all this was taken into account in the models—the associations between UPF and health were observed. So we thought that there were other mechanisms.

There are, for instance, changes in the food matrix and the texture of the products that may impact digestibility and the availability of nutrients, the concept of acellular nutrients, the duration of chewing. Many factors can be linked to this aspect.

Contaminants are created during the processes themselves—there may be acrylamide or acrolein, for instance—and some of them are procarcinogens and/or endocrine disruptors, thus they may also play a role. There may also be contaminants coming from packaging. That is true not only for ultra-processed foods; if you cook at home and put the food in plastic containers and put them in the microwave, you will have the same migrations. However, ultra-processed foods stay on the shelves of supermarkets for longer, so the migrations from the packaging are an ever-greater problem for this food category. There are studies in the US—for instance, on NHANES—showing higher phthalate biomarker levels in the urine of adults and children who are higher consumers of ultra-processed foods. So this is a problem.

Food additives are also likely to be part of the problem, and we have started to investigate this in my lab in an ERC—European Research Council—project, funded by Europe, on food additives. For the first time

at international level, we have been able to characterise and to measure exposure to a wide range of food additives in the NutriNet-Santé cohort. We have shown associations between a higher intake of several artificial sweeteners, several preservatives such as nitrites, some food emulsifiers, and a higher risk of different diseases—hypertension, cardiovascular diseases, type-2 diabetes, some cancers.

These are the first elements in epidemiology showing these associations. They definitely contributed to the IARC—International Agency for Research on Cancer—monograph on aspartame last year, classifying aspartame as possibly carcinogenic to humans. So they are also adding evidence, and they are complementary to randomised trials in humans and animal models showing the adverse effects of food additives on metabolism, microbiota and inflammation. These pieces of information definitely increase our understanding of the potential impact of ultra-processed food on health. Many things may remain to be discovered, but evidence is rapidly accumulating.

Professor Dr Kevin Hall: This is the main focus of my lab: to try to figure out some of these mechanisms. One of the things that has been shocking since we published our first study, which was not designed specifically to look at mechanisms but simply to understand whether, if you took two diets that varied to a huge extent in their composition of ultra-processed foods but matched for various nutrients—such as salt, sugar, fat and fibre—overall glycaemic load, overall energy density and things like that, we would see differences in how many calories people chose to eat when they were asked to eat as much or as little as they wanted.

The surprise to me was that, despite matching for the various nutrients of concern that we match for, people spontaneously chose to eat many more calories on the ultra-processed diet, gaining weight and body fat, whereas, when the same people were exposed to a food environment that had no ultra-processed foods but were matched for various nutrients of concern, they spontaneously lost weight and lost body fat. Post hoc, a lot of people have ideas about why we observed what we did. There is no shortage of hypothesised mechanisms, some of which you have heard about over the course of these evidence sessions. The problem is that, as compelling as those stories can be about explaining what the likely mechanisms were, they are just that: hypothesised explanations that need to be tested in future studies.

When we went back and tried to explain what we had observed, we came up with two factors that we think are probably most important—I am happy to be proven wrong, like I was the first time we did this trial—for driving excess calorie intake. The first is the energy density of the solid foods that were presented to people—in other words, the number of calories per gram of solid food. Our diets were overall matched for energy density when we included beverages, because we were dissolving fibre supplements in non-caloric beverages to try to match the total fibre that people were eating, but when you remove the beverages the actual

meals had higher energy density. That is something that we are testing in our current trial by creating ultra-processed diets that have lower energy density compared with our original diet, as well as matched to the minimally processed diet.

Another factor that we thought was pretty interesting was that, despite the overall diets being matched for sodium, carbs, fat and sugar, it turned out that a number of individual foods that we presented to people exceeded pairs of thresholds—sodium plus fat, or fat plus sugar, or carbs plus sodium. When pairs of thresholds are exceeded, they are so-called hyperpalatable foods. It turned out that, despite matching the overall diets for each of those nutrients individually, there were more individual foods put on the plate that exceeded these pairs of thresholds—defined as hyperpalatable foods according to Tera Fazzino at the University of Kansas.

That aspect seemed to mediate why people chose to eat more calories on the ultra-processed diet. So another aspect that we are varying in our current study is to create a diet that is ultra-processed and high in non-beverage energy density but low in hyperpalatable foods, with the goal of teasing apart the relative effects of energy density and hyperpalatable foods so that we can better understand what aspects of the ultra-processed food environment may most drive excess calorie intake.

These are the kinds of studies we need to do to target the specific mechanisms underlying certain outcomes. The particular outcome here is the overconsumption of calories, potentially leading to obesity in the downstream mechanisms. There are other mechanisms that are not related to obesity per se that can also be investigated with studies of this kind, such as looking at surrogate biomarkers that predict the risk of various different diseases, but that is a lot of work and there are relatively few facilities right now that have the ability to make these manipulations in people's food environment, keeping them away from off-study foods that can confound even these randomised trials, and really get at mechanisms. Still, that is some of the work we are trying to do.

Professor Susan Jebb: I think we are all agreed that more research needs to be done on the mechanistic aspects. We have plenty of observational epidemiology, but now we need to understand the mechanisms. For me, that is about experimental research, the kind of thing that Kevin has been describing. It is not realistic to think we will have long-term clinical trials with hard outcomes, but there is a lot that we can do in that middle space.

As Kevin said, energy density is very important, and I was interested that he pulls that out as a key hypothesis of his work. When I was working in Andrew Prentice's team in Cambridge in the Dunn Nutrition Unit 20 years ago, we showed the importance of energy density and made the point that it was about the energy density of food, because water influences energy density hugely and we really need to think about solid food. I think Kevin and I are agreed on that.

Maybe the most useful thing I can do is illustrate why understanding the mechanisms will help policy. If the effect is purely nutritional, that leads you to reformulation, which is consistent with all the policies that we have been trying to enact up to now. However, as Mathilde and some of the previous witnesses have said, there is also a suggestion that it is the additives that characterise these processed foods that are having specific effects, particularly non-nutritive sweeteners and emulsifiers. If that is the issue, it is possibly the easiest to address, because every additive is individually authorised and those authorisations can be revoked at any point if there is evidence that their use should be restricted in some way.

Before we do that, though, we need evidence that they cause harm, and we need to think about the risks of removing them, so it is not wholly straightforward. If we think of non-nutritive sweeteners, for example, we also have to remember that in the trials where people have sugary drinks or artificially sweetened drinks, in general the outcomes are better from the artificially sweetened ones because they help people to control their weight. I will not try to bottom out what you should or should not do, but there is a risk assessment process—that is what the FSA is responsible for doing, and I know you are talking to the FSA chief scientist later in this inquiry, so I will leave it to him to set that out—and, if it is the additives, we have a policy mechanism for dealing with that.

Another problem that Kevin has referred to is that these products are hyperpalatable. They are designed, through their composition, flavouring and additives, to appeal to people's innate desires and to overcome our appetite-control system. If that is the issue, that is a really tricky one for policymakers, because it is pretty hard to imagine us having laws that ban food simply because it is delicious. That puts you in quite a tricky place. However, perhaps we can do something about restricting availability, controls on portion size and so on.

Or maybe ultra-processed foods are harmful because their sale is supported by huge promotional budgets. Maybe my chocolate brownie is not a problem because I just give it to my family and friends occasionally, whereas big business promotes its chocolate brownies to everyone at all times in all places. If that is the reason why ultra-processed is particularly problematic, the answer has to be that we double down on restrictions on advertising and marketing in a far more extensive way than we have contemplated doing so far, not just on TV and online but in sports sponsorship and the whole plethora.

The point I am making is that if we understood the mechanism then our policymaking could become more sophisticated. At the moment, though, I am not sure that the ultra-processed arguments have opened up new policy options that we do not already have, based on nutritional criteria. There are reasons to be cautious before we jump to UPF as a basis for policymaking, but there is one interesting point that policymakers need to take into account that comes back to the issue of consumer palates.

It is fascinating that UPF has caught the public imagination in a way that our talk of HFSS, frankly, never did. We might want to stop and consider

how to use that opportunity and this moment in time to reconnect people with the fundamentals of food. A willingness by policymakers to acknowledge the health benefits of a minimally processed diet would be very helpful and a step along the way. Rob Percival from the Soil Association talked about why we seem to find it so hard to say, "Base your diet on minimally processed foods wherever you can". On the science of it, we need to understand the mechanisms to guide the policy, but there is an opportunity to think about how we can use the ultra-processed moment to reconnect with consumers.

Q159 **The Earl of Caithness:** Thank you. I would like to follow that up with two quick questions. First, you mentioned that you can adapt the nutrient profile model. Whose responsibility is that? My second question is: okay, additives have been authorised individually, but is there any evidence that, if you combine additives, there is a cocktail effect and damage to the brain and the microbiome?

Professor Susan Jebb: The nutrient profiling model was originally developed by the Food Standards Agency when Lord Krebs was the chair; in fact, I sat on the advisory committee at the time. It is now the responsibility of the Department of Health and Social Care. They have talked about looking at it again, but there is certainly potential. It probably needs updating anyway to reflect the fact that our dietary recommendations for free sugars have been lowered considerably since the model was developed.

On the evolution point, if we decided that non-nutritive sweeteners were a problem, we could build those into the model. At the moment, a diet drink passes because it does not contain fat, sugar or salt, but if we thought that sweeteners were an issue, we could build those in. So it could be adapted, and we could do that with other additives too.

The issue of your "cocktail" of additives is a question that comes up all the time. I also hear about it in relation to pesticides. We authorise pesticides individually, but people say, "Ah, but what if you put several together?" It is not my specialist area, but I am not aware of papers showing that more than one gives you some sort of synergistic effect. Clearly, though, the "cocktail" of additives, as you put it, is partly what is driving the palatability of these foods, which are arguably hyperpalatable —I am not sure I wholly agree—with combinations of colours, flavourings and various other things. I suggest that you ask my colleagues at the FSA how they plan to approach the issue of studying combinations of additives, not just individual ones.

The Earl of Caithness: And could we control that if we needed to?

Professor Susan Jebb: If we needed to. Every one of these additives has its own authorisation, and they can be reviewed at any time if new evidence emerges that they need to be. Until we left the EU, these authorisations were all done across Europe. So far there has been very little divergence, so what is approved in the UK is basically the same as what is in Europe. Over time, of course, we will increasingly do those risk assessments for ourselves, but if another country were to identify that there was some evidence of risk then, as chair of the FSA, I would like to be confident that my scientists would be on the case and looking at it here too, but really that is an issue to discuss with the FSA.

The Chair: These additives would not be in foods if they did not have authorisation—they could not be sold in this country. The question is: at what dose? We know that people are eating more and more of these foods, and toxicity depends on dosage.

Professor Susan Jebb: Exposure is part of the risk assessment. Again, I defer to my scientific colleagues at the FSA to tell you how they keep an eye on exposure and whether that is changing over time. The risk assessment certainly looks at risk and at exposure.

Q160 **Lord Krebs:** I would like to ask Kevin about his world-famous experiment. I have two questions, both relating to what we have heard from Susan Jebb in this session. First, Susan emphasised, as have other witnesses, how one's previous experience shapes one's preference for food. In your experiments—the first version of your experiment that was published—I wondered if you knew what the background consumption was of your participants. Were they used to eating ultra-processed food as typical American citizens?

Professor Dr Kevin Hall: I think it would be difficult to find people who were not used to eating ultra-processed food. We were very conscious of making sure that people were familiar with a large fraction of all the foods, both from the minimally processed food environment and from the ultra-processed food environment. There is that neophobia that every parent experiences when they give their child a brand-new food and their initial reaction is not to eat it.

That is probably true of many adults who are not necessarily adventurous eaters either. So we excluded people who were not familiar with a large fraction of the foods in both food environments, which gives you some idea. We know that a large fraction of people's diets in the US comes from ultra-processed foods. We excluded people who were on specific dietary patterns, so if you were a vegan you could not be in the study, nor if you were on a low-carbohydrate diet in your habitual diet pattern. We excluded people on that basis.

It is also important to point out that this was a tiny study. It was not meant to represent a national group of people; it was really a physiology study to try to better understand how different aspects of the food environment influence how many calories people choose to eat.

Q161 **Lord Krebs:** Secondly, in your current study—to reflect what Susan Jebb said earlier—are you giving people, for instance, a homemade lasagne versus a shop-bought lasagne or a homemade brownie versus a shop-bought one, so the consistency and consistency of the food is similar except that one may contain an emulsifier or a stabiliser to increase shelf life and the other does not?

Professor Dr Kevin Hall: No. I would love to do that study, but the amount of work that would be required by our chefs in the NIH clinical centre to prepare those homemade versions of the store-bought versions is very difficult. It is more expensive and takes up more time, and when we proposed that idea it was basically decided that it was impractical given the current resources. This is really only a resource limitation, and we could do that study. We could do even better studies where we took ultra-processed versions of those same foods and made them better by re-engineering them along specific parameters in order to test for specific mechanisms. I think that study needs to be done.

The alternative that we proposed was, "Let's take two store-bought lasagnes, one of which is ultra-processed and the other is only processed". The problem there was that only a subset of those products are available on our food nutrition databases. If we wanted to match for nutrients, we could not do that without chemically analysing the ones that were not on the database, and that would increase the cost by a huge amount. Again, it is only a resource limitation, and we could do those studies if we had additional resources.

Baroness Boycott: Presumably the people who were eating the ultra-processed diet had a lot of stuff that would not be in the other diet. I am thinking about things that you cannot make at home, such as crisps and sweets—all those aisles of Pringles, Doritos and so on. Were they available to your cohort?

Professor Dr Kevin Hall: Yes. Again, the same people are exposed to both food environments in random order. Interestingly, the kinds of junk food snacks that you just mentioned were continuously available to people 24 hours a day in this study, but they did not choose to eat any more calories of those junk food snacks on the ultra-processed diet compared to the minimally processed diet. It was only in the three square meals of breakfast, lunch and dinner that we saw differences in calorie intake, which I think is interesting. Again, it gets at the idea that this is not just a "junk food snacking" issue; it is something else about the meals that we were giving these people that drove the main effects.

Another point that I would like to highlight is hyperpalatability, as Professor Jebb mentioned. Will it end up that we have to make foods less tasty in order to get the effect we want? I do not think that is the case; people rated their meals as equally pleasant on both the ultra-processed diet and the minimally processed diet. That might get at the idea—again, this is a mechanistic hypothesis at this point—of the difference between liking and wanting, which I believe Barry Smith gave you evidence on,

based on some work that Kent Berridge has pioneered over many decades.

The subconscious mechanisms by which we want, seek out and have a desire to consume food are often quite different from the subjective pleasantness of those meals. I do not think you can necessarily take off the table the idea that you can have equally pleasant meals and yet not have the drive to overconsume calories.

Baroness Boycott: That is so interesting.

Baroness Jenkin of Kennington: Is the content of those meal programmes publicly available? Could you share them with us?

Professor Dr Kevin Hall: Yes, we took photos of all the different meals and snacks that were available in the diets, and you can download those. I am happy to provide them as evidence.

Q162 **Baroness Suttie:** I shall move on to the role of the food industry. On what terms should government and the scientific community engage with the food industry in enabling people to eat a healthy diet? To what degree do you believe there is a conflict of interest in that relationship?

Professor Susan Jebb: Look, we will not change what people eat until we change the food that is offered to them. Neither policymakers nor scientists can solve the problem of diet-related disease in a complete vacuum by not engaging with the food industry. However, I am clear that policymaking needs to be protected from vested interests. That is not just vested interests in the food industry; there are a lot of other vested interests around.

Having said that, once policy has been developed and the goals are clear, implementation can sometimes be improved if it is done in discussion and with a degree of co-production. For policy, I find it relatively easy to define the principles, but for the academic community that is much more complicated, and I sit right in the midst of that. I want academics to be honest brokers in the system, I want us to generate new science that answers policy questions, and I want us to offer independent appraisals of policy options, which is what I try to do personally. That means having really strong governance arrangements in place and being very open to scrutiny by colleagues and by the public. That is crucial if we are going to uphold trust and confidence in science.

At the minute, that is a tricky line for many academics to draw. They are expected to make those decisions individually on multiple occasions. That is hard when there are a lot of incentives in the system, including from the Government, for academics to do more research in partnership with industry. We have specific government schemes that encourage that. So that needs some careful thought. I could talk for a long time about it, but I would also say that it needs an inquiry of its own to think about it, because the system would definitely benefit from much clearer principles that people could follow.

Some of the criticism has gone a bit too far. That worries me because it erodes public trust. It should not be the case that anyone who has ever had any association with an organisation—say, they chaired a committee—for an organisation who happens to get some of their money from the food industry, gets their views discounted. I do not think that is helpful. We need to look for evidence as to whether what they say is biased or is genuinely evidence-based. This has become a very tricky area and is much harder for academics than for policymakers.

Baroness Suttie: Thank you. That is very clear.

Dr Mathilde Touvier: I definitely think that we need the food industry to produce, on a large scale, safe, nutritious, palatable and sustainable products. "Industrial foods" is not synonymous to "ultra-processed foods" and not all "industrial foods" should be considered as "bad for health". It is important to say here that we are not the enemy of the food industry. Having said that, it is important to understand that the current business operating models and financial incentives driving many of today's largest food corporations are strongly pushing sugary, fatty and salty products and ultra-processed food on to the consumer with intensive marketing strategies.

Thus, it is important that all the decisions in policymaking are made without the food industry. Of course they can be consulted—it is important to have their opinion on the practical feasibility of the measures and so on—but the final decisions must be guided by public health, not economic interests. It is the same with research. There are many papers in well-known journals that show bias depending on the source of funding for those papers. Take the reviews of the association between sugary drinks and weight gain. The risk is five times greater of a conclusion about no such association in the studies funded by the industry compared to studies with no financial conflict of interest. That is important.

It may seem obvious, but we see more and more financing tools in France, and in Europe generally, that make it mandatory to have a private partner in the call to obtain funding. This might be tricky. There are domains where a private-public partnership is important, but here, when we are dealing with food labelling or the impact of food on health, it is very important that research is publicly funded.

A good example is the Nutri-Score, a food label that we have created. The algorithm behind it is based on the FSA nutrient profiling system. There are now more than 130 papers, not only from our team but from many teams around the world, showing the importance and relevance of this front-of-pack label to characterise the nutritional profile of the food at a glance. The algorithm has been validated by the fact that eating foods with better grades—a Nutri-Score of A or B—is associated with a lower risk of cardiovascular disease, cancers and many poor healthcare outcomes in many cohorts around the world. The evidence is there, along with evidence that this front-of-pack positively affects the quality of the food baskets. We have had real-life experiments in virtual

supermarkets—many types of experiments with randomised trials—showing the public health interest of this logo, while the European JRC states that it has all the qualities to positively impact the choices of consumers. Still, this logo is not mandatory in Europe because there is intensive lobbying by the food industry.

It is always the same: Coca-Cola, Pepsi, Mondelez and so on—those that make ultra-processed foods and foods with a poor nutritional profile—do not want transparency for the consumer. If we wait for decisions to be taken together with the food industry, we will never get a decision. This must be mandatory, and these decisions must be taken by public health stakeholders independent from the food industry.

Baroness Suttie: Dr Hall, do you agree with that?

Professor Dr Kevin Hall: I will not speak too much about policy as a federal Government employee here in the US, but I will talk about the research. Professor Jebb has spoken about the importance of having the right safeguards in place and how complicated that can be. I believe, maybe naively, that partnerships between government, industry and the scientific community could substantially advance the research required to discover what combinations of ingredients, additives, processing techniques or features of ultra-processed food affect health and physiology. By advancing those kinds of experiments, much as I described before—re-engineering foods along specific mechanisms that are hypothesized to play a role in poor health—you could use that information to sub-categorise ultra-processed foods based on those mechanisms and learn how to re-engineer harmful ultra-processed foods so that they do not have the harms that we were discussing.

That knowledge could further be used by government agencies and policymakers to implement effective policies to reduce the consumption of unhealthy ultra-processed foods and to promote widely available, convenient, tasty, affordable healthy alternatives that may or may not be ultra-processed. When we think about policies and whatnot, we need to support not just policies that will inhibit the consumption of unhealthy foods but those that will promote the consumption of equally tasty, affordable and convenient healthy alternatives. Without that research and having all the key players together to play a role in giving us the knowledge of how to do that, we are setting ourselves at a disadvantage. So I would promote that sort of engagement.

Q163 **Baroness Pitkeathley:** Could we move away from research to strategies and ask you to give us any specific examples of strategies to promote healthy eating and reduce obesity that have been introduced and have been effective? We will leave the UK till last and start with Dr Touvier.

Dr Mathilde Touvier: As has already been said, we have to combine measures at the consumer level with measures at the macroscopic / societal level. At the consumer level, here in France we have recommendations of the PNNS programme, as well as the Nutri-Score food labelling. But we cannot put all the burden on consumers; it is very

important also to have measures that deeply transform the food systems and the offer to which they have access. This is really about a combination of measures.

In terms of what worked in France, we already have a very good resource with the Nutri-Score, for instance. There are numerous publications, one of which came out just last week by US researchers.[2] It shows a positive impact on the markets since the introduction of the Nutri-Score, and shows how it relates directly to its introduction. Market scan panels also showed increases in the sales of products ranked A and B—6.3% for A products and 4.5% for B products—and a decrease in the sales of D (-1.7%) and E (-6.9%) products in the French market. We also have examples from the Spanish market and others. So this measure is really impactful.

I want to reply to your previous question to Professor Jebb. The Nutri-Score is already introduced , in its current form. But the algorithm is supposed to evolve with an international committee of all seven countries that officially adopted the Nutri-Score, and it evolves along with the research and the new scientific elements. Artificial sweeteners, for instance, have already been included in the Nutri-Score, and now products with artificial sweeteners, such as artificially sweetened beverages, are penalised in the Nutri-Score system. So it is definitely possible to introduce new elements linked to this ultra-processed food dimension, and maybe also later evolve when we have a higher level of evidence on other elements such as pesticides or food contact materials. But for now it seems to be already efficient with regard to sales.

We also have a soda tax, and there have been publications showing that it would be all the more efficient if we extended this tax to the whole nutritional profile, based, for instance, on the Nutri-Score.

We have many measures, but I will let you have them in written evidence.

Professor Dr Kevin Hall: I am unaware of any country that has effectively reversed population obesity trends. That is the major challenge. However, it is also important to point out to individual people that there are many people who have had success changing their diets for the better, and they have done so using a wide variety of dietary approaches. There are people who do well on low-carb diets. There are people who do well on wholefood plant-based diets. Others do well on Mediterranean diets and several others.

Whatever healthy dietary approach is adopted, its benefits last only as long as people adhere to their diet. So ongoing support is required from their family, their friends, their physicians, their healthcare providers. Unfortunately, the problem people face is that the current food environments in places like the US and the UK make it really difficult for

[2] Note from witness: See Bauner et al, *European Review of Agricultural Economics*, 2024

most people to adhere to those diets over the long term. That is a major challenge.

However, although we face those perms of the food environment, it is not true that nobody can make those changes sustainably. There are many people who can, and we should support those folks as well.

Professor Susan Jebb: As you indicated, many members of this committee are well aware of the UK situation, and lots of you have sat on previous inquiries that have come up with really important recommendations. I would say that all the things that we have done have been helpful. The soft drink industry levy and the advertising restrictions on children's television, for example, are all good, but they are all quite small: they address one little bit of the system.

Of course, we have a long shopping list of other things that we could do. Some of them are on the blocks. In part, the failure to tackle obesity effectively is a failure of implementation. Previous witnesses, today and before that, have all had pet policies, and by and large I agree with most of those. Labelling is a bit trickier than perhaps we are making out. Good labelling is really important, but all the research evidence shows that it is a bit less effective than we would like to believe it is, so that needs some thought.

I guess the key point that I want to leave you with is that a long list of individual policies will take so much political capital to make them happen that I just do not see any Government being able to get through this on the basis of individual initiatives. So I want to go back to something that Henry Dimbleby talked about: the need to step up a level and try to initiate system-level change. When I did the Foresight report back in 2007, we talked about having initiatives, enablers and amplifiers.

I think we have got stuck in initiatives. The enabler that we need is a new way of engaging with the food industry. We have heard that throughout the afternoon. We have to change the way the food industry operates. Nesta talked about this quite recently in its report, with an emphasis on reformulation and on mandatory targets.

I think much more broadly than that. I think policymakers and government need to set out the sort of food system that we want and then hold industry to account for delivering that, ensuring that we have sufficient data flows that will be able to give you a very rapid assessment of what is going on, what is working and what is not, and using the whole power of government—all the incentives and disincentives—in working with the food industry to mobilise that change.

Government needs to set out a new concordat with the food industry and the licence by which it operates, and we will need a strong independent regulator to oversee that and to report on progress. We have got to the point where we have to see regulation as necessary to enable us to achieve the societal goals that we have for the food system. Regulation is not a threat to businesses; it is a vital support for responsible businesses.

I think that is why more and more business leaders, even, are calling on the Government to take that leadership position and to frame the environment in which they operate so that they can start to deliver the outcomes that we so badly need.

We have not talked about this today, but I know that this committee is well aware of the urgency of taking action on this.

Q164 **The Chair:** It is interesting what you say about a regulator. Are any of the existing regulators capable of doing what you envision?

Professor Susan Jebb: I sort of have a vested interest in that I am chair of the FSA, but that is a fixed-term appointment. I just want the food system to be better. I am not worrying at the moment about who would do that. We need to work out the principles for any regulator to deliver what we would want in the system.

I guess the parallel in my mind is the Committee on Climate Change. Government has been very clear about what the goal is, and the Committee on Climate Change provides some support along the way to get there. It has a lot of technical expertise, but it also reports on progress; it has a statutory responsibility to do that. So everybody sees what happens and you get some transparency in the system.

If we saw that for food, as I say I think it would take us up a level to a system rather than relying on initiative-itis. Even an energetic Government will struggle to do enough things all over the food system to add up to make that step-change difference that we need.

The Chair: Indeed, and implementation, monitoring and constant review are also important, as you rightly say. I thank all three of your for your evidence today. It has been a very interesting session, and I am most grateful to you for giving up your time.