

Healthier Lives through Food Insight Report

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EIT Food – Europe's leading food innovation initiative, working to make the food system more sustainable, healthy and trusted

Knowledge & Innovation Center on Food, part of the European Institute of Innovation and Technology (EIT)

www.eitfood.eu

Foreword

Some issues are so big they can only be solved if we work together. That's the thinking behind EIT Food – a community that has come together to respond to problems in the food system that affect us all. And while those problems are complex, our mission is clear and focussed – to improve outcomes for people and planet alike.

Healthier Lives Through Food

We'll give consumers access to healthier, more affordable, products which balance nutrition with environmental footprint and use a more diverse range of proteins. We will support this change with better access to practical, useful information. With better advice, we can all make better choices and improve our quality of life.

A Net Zero Food System

Our three-point plan will smooth the path to a net zero food system by:

- Enabling farmers and producers to lead the transition to regenerative agriculture.
- Creating new markets and opportunities to reduce our food waste and food loss in production.
- Empowering consumers, making their food purchasing choices count and play a crucial role in the circular food economy.

Reducing Risk for a Fair and Resilient Food System

We'll improve food security and safety for consumers everywhere by enabling and establishing resilient and dependable digitally enabled food supply chains.

We co-invest public funds alongside resources from our community partners to drive innovation, develop new business, build skills, and engage the public while we move towards system-wide change in how the food system works for all of us.

This is both a privilege and a challenge. We know we have to prioritise our investments, funding, advocacy and interventions to make a real difference.

Taking stock of the great progress we've made in the first 3-4 years of operations, we put together three teams of experts from the EIT community to look at how we can best implement our strategy.

Each team ran an open programme of research, consultation and systems thinking co-design workshops to produce detailed reports, including key mission insights and recommendations.

These reports stretch beyond the boundaries of what we, the EIT Food community, can do on our own. That's why we're publishing them as a public call to action on behalf of our community. If these reports inspire you, please get in touch – tell us how we can help you make change happen.



On behalf of the leadership team and wider EIT Food community, I would like to extend our gratitude to the teams involved, and to the many experts and members of the public who volunteered their valuable time and insights. The passion for change behind these reports is a constant inspiration for us at EIT Food as we reach for a more trusted, fair, sustainable and healthier food system for all.

Andrew Carlin

Director of Missions & Strategic Programmes,
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<https://www.eitfood.eu/missions>



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1. Executive Summary

The target of EIT Food's Mission of HEALTHIER LIVES THROUGH FOOD is to achieve a reduction in the prevalence of obesity and other diet-related Non-Communicable Diseases (NCDs) in target populations through a systemic approach and thus achieve more healthy live years for all. With its Mission Programme Area 1 "Healthier Lives Through Food", EIT Food aims at better health outcomes from our diet (impact goal). This ties in strongly with EIT Food's Strategic Objective 2 "Create consumer-value for healthier nutrition" as defined in its three-year planning cycle (2023–2025).

NCDs are associated with an unhealthy diet, smoking, physical inactivity and excessive alcohol consumption. Studies have shown that many NCD risk factors can be managed by improving diets and hence nutritional intake. While all diet-responsive NCDs are relevant, five priority NCDs were defined based on prevalence, diet responsiveness, associated costs to health and other related services:

- Heart disease
- Colorectal cancer
- Alzheimer's disease (and general dementia)
- Stroke
- Type 2 diabetes mellitus

This study also showed some concerning differences in NCD prevalence between countries with eastern and Baltic EU member states often having the highest prevalence and related mortality.

Real progress to prevent diet-related NCDs across the life cycle needs radical food systems transformation so that nutritious, safe, affordable, and sustainable diets are available to all people. This also needs to be associated with the importance of exercise. Addressing diet-related NCDs can only be achieved through dietary behaviour change, which requires a variety of stakeholders working hand in hand to set priorities for NCDs to be tackled and action points to be addressed. Important stakeholder categories as described in more detail in this report, who should be involved in this transformation, must be sought not only in the food value chain but also amongst regulation, legislations & governance bodies, within marketing or education. However, above all it requires the engagement of all populations, including disadvantaged groups who may lack the financial resources, time and/or knowledge to make major lifestyle changes.



Building on primary production, transformation, and the distribution continuum for healthy life through food

Diversification of proteins is an interesting driver to be promoted, as it will benefit several segments of the food system. At the primary production level, farmers should be incentivised to switch away from intensive productions systems, both animal but also plant – characterised by extensive use of monocultures. This will help the regeneration of soils allowing their enrichment to improve nutrient density of the raw materials and as a consequence of the transformed products. However, there is a need for strong policy and regulation support to help this difficult transition, which will be possible only if specific measures (i.e., subsidies) are put in place to facilitate this process.

The availability of certain raw materials able to diversify the protein offering for food processors, will guarantee an increase in their use in food preparation and, as a consequence, a decrease of the traditional proteins (mainly of animal origin). In turn this will result in the production of foods that are healthier, widely available, and affordable for the consumers, driving the transition to healthier diets and mitigation of NCDs. An integrated approach will be critical in the way foods are produced, transformed, and distributed to guarantee that the nutrient density is safeguarded and reaches the table of the consumers. This means the construction of a platform in which primary producers, food processors, distributors, retailers, and consumers can interact and collaborate to allow the proposed goals to be reached, not only in terms of reduction of NCDs, but also towards zero-waste objectives.

Our research process considered long-term goals and also set the scene for cooperation with important stakeholders of the food system, including big players in the food industry and big companies outside of the EIT Food network, such as FD Europe and the Joint Programming Initiative Healthier Diet for Healthier Lives (JPI HDHL). By involving these people, their awareness of the Mission was raised and their participation in a workshop in Paris in December 2022 has led to some concrete ideas that could be scaled up to European level. Our **interactive and engaging stakeholder involvement** has triggered new contacts and alignment and hopefully will lead to future cooperation. However, it must be stated that within the short timeline of the project it was not possible to reach and involve all relevant stakeholders or fully evaluate the variety of stakeholders involved and the results of the study.

Three thematic Priority Areas were suggested to achieve more healthy life years for all:

- Achieve sustainable diets for people and planet
- Diversify protein sources for food consumption
- Increase and retain the nutrient density of food



The recommendations for Mission Programme 1 resulting from these three Priority Areas focus on diet-related changes in food consumption for more healthy life years by means of:

Four key enablers which:

- advance regulation and policy frameworks to support faster development and uptake of new products and technologies,
- allow consumers to better understand and learn to prevent NCDs by way of their diets,
- provide knowledge and data to gain new and/or better and more timely insights on food production and consumption patterns as well as health impact, and
- establish new collaborations and partnerships within and beyond the food system.

Three key domains to concentrate efforts on:

- increasing input of more healthy ingredients and products into the food system,
- developing technologies to safeguard nutrient density/content,
- prioritising “Healthier Lives through Food” within the supply chain.

We observed that it is important to **stop thinking in (industry) sectors**. The aim of the mission can only be achieved following a systems-thinking logic, where referencing to segments or elements should be preferred. We propose that EIT Food can show **immediate action** in tackling the enablers:

- **Awareness & Consumer Education:** EIT Food should consider a more **regionalised approach** for delivering food-based solutions by leveraging the pre-existing EIT Regional Innovation Scheme (EIT RIS). This can be a key instrument for scaling impact through mainstreaming innovative solutions within particular geographies and (sub)populations.

- **Knowledge Infrastructure:** EIT Food could set up a task force with other relevant stakeholders to identify critical gaps regarding knowledge and data and orchestrate the necessary steps and measures.
- **Partnership:** Establishing new partnerships in all three priority areas EIT Food should adopt the role of forging partnerships.
- **Policy & Regulation:** EIT Food can take an important role in creating the right conditions to lobby at EU level to have proper policy and regulation in place and can act as a hub for knowledge generation, concentration, and processing.
- For the three key domains, the focus should be on the following issues:
- **PRODUCE:** EIT Food is recommended to focus on the whole value chain, where projects can be supported and fostered to achieve the production of healthier food products and maintaining the nutrient content throughout the value chain. EIT Food Co-Location Centres (CLCs) can also serve as information hubs for specific regions via targeted campaigns. The role EIT Food wants to take when considering primary production per se needs to be debated.
- **TRANSFORM:** EIT Food can take on the role of information hub, linking nutritional expertise with production, and also taking these aspects into consideration when launching new campaigns or funding schemes. EIT Food could orchestrate the exploration of necessary technology and knowledge transfer from industries outside the food value chain, then help to implement these within the food industry with suitable funding.
- **DISTRIBUTE:** EIT Food can raise awareness among retailers, producers and restaurants and canteens on the importance of healthier nutrition for preventing NCDs.

2. Introduction

The food system is interconnected with many worldwide challenges and megatrends, such as population growth, globalisation, urbanisation, and climate change. Agricultural, economic, trade, environmental, and international development policies create both incentives and disincentives, to produce particular types of food. Unhealthy diets, malnutrition, and certain non-communicable diseases (NCDs) are closely linked to, and the consequence of, among other aspects of, today’s food system.

Many factors influence consumers’ dietary behaviours. For instance, at the personal level there is culture, knowledge, skills, dietary preferences, and available time for food preparation. Then there are political and economic factors that can determine the cost or availability of food. Rural development, urban planning, and transport policies affect what food reaches which consumers and at what price. There is an increasing threat for low-income groups to experience food poverty and lack of access to diverse nutrient-dense foods, such as fresh fruits, vegetables, legumes, pulses, and nuts. At the same time, unhealthy foods (containing more salt, added sugars, saturated fats, and trans fats) are becoming cheaper and more widely available. Poor diet is considered one of the biggest contributors to NCDs and results in a health service-related economic burden.

Current primary production systems (both plant and especially animal) are not sustainable and are considered key factors in the serious challenges our planet is facing. Climate change, desertification, and impoverishment of nutrients from soil are among the threats. There is an urgent need to rethink how natural resources are used, primary goods produced, manufactured, distributed, and consumed; the goal should be to design a food system that is sustainable, equitable and provides nutritious foods for healthy diets. The EIT Food Missions Programme aims to address these challenges by co-designing a three-year roadmap to

shape priorities for action, identifying and responding to the areas of greatest need in three Mission areas. This report focuses on Mission Programme Area 1: “Healthier Lives through Food”.

To shape priorities for action over the next 3–5 years, an initial scoping exercise was conducted by a European research consortium in collaboration with food system stakeholders. It has taken into account the scale and consequences of unmet societal and economic needs, the scale of opportunity for EIT Food to lead changes in these areas, and whether these efforts would duplicate or be incidental to activity already in place. We also include evidence that industry supports the need for solutions and is willing to co-invest and identify and other funding opportunities from public, NGOs and charities etc.

This research exercise specifically addressed the following concrete questions:

- Which NCDs have the most significant causal relationships to dietary factors?
- Which of those NCDs/causal relationships should EIT Food prioritise and why?
- Which populations in Europe are most likely to be impacted by those causal relationships and why?
- Which products/ ingredients/ sectors involved in those causal relationships should EIT Food prioritise and why?

Within the consortium, AIT Austrian Institute of Technology, University of Reading, University of Torino, Twine and PepsiCo have extensive experience from past and current projects in engaging and bringing together stakeholder groups – to tackle complex problems and find targeted strategies and approaches to solve them:

- The **AIT Austrian Institute of Technology** is a highly specialised research and development partner for industry. The AIT Center for Innovation Systems & Policy supports national and international decision-makers to develop transformation- and mission-oriented policies, strategies, and programmes for system change, and to facilitate multi-stakeholder engagement.
- The **University of Reading** is a lead founding member of EIT Food and is internationally recognised for excellence in agriculture, food, nutrition and health.
- The **University of Torino** is a founding and core member of EIT Food and has expertise on the link between food, nutrition, and health, especially from the preventive point of view.
- **Twine** is a programme management consultancy with wide experience in managing successful multi-stakeholder projects in an uncertain world.
- **PepsiCo** has the vision to be the global leader in beverages and convenience foods. PepsiCo is a founding and core member of EIT Food, which continues to strive for the knowledge and innovation community (KIC) to deliver a massive impact. Whilst PepsiCo participated in the project design and the workshops, they are not co-authors of the final report.

First, we present our approach and methodology to address the target of Mission 1. Secondly, we present the main results related to the three different tasks that were conducted (i.e., scoping, shaping and roadmapping Priority Areas) and present a synthesis across priority areas. Finally, we derive recommendations for collaborative action for EIT Food.



3. Approach and methodology

Co-designing Priority Areas for healthy life through food

The EIT Food community and partners are targeting a step change: to provide all consumers with healthy, affordable, and tasty food. To help facilitate this evolution, we are **co-designing roadmaps** to identify **areas of impact** and to provide solutions and opportunities for the food producing and retail systems. In line with EIT Food's Mission 1, we investigated the most critical areas of intervention for dietary factors that will lead to "Healthier Lives Through Food" and a decrease in prevalence of non-communicable diseases (NCDs) – and identified interventions relevant for EIT Food.

The research covered three main phases (**see Figure 1**) described in more detail below.

- **SCOPING PRIORITY AREAS (Phase 1):** We identified the NCDs that should be prioritised by EIT Food and mapped the causal relationships between NCDs and dietary factors. **Establishing a baseline** and identifying domains delivering maximum **impact** helped to structure EIT Food's Mission 1 Programme to achieve more healthy life years for all into **three Priority Areas**. We also conducted a policy/strategy mapping exercise to identify relevant stakeholders for future collaborative actions.
- **SHAPING PRIORITY AREAS (Phase 2):** We surveyed 221 nutrition experts to understand their view on NCDs as a quantitative measure, and then interviewed 31 European and global health and nutrition experts as well as industry representatives to validate our survey findings. We also explored whether corporate and/or sector strategies are in place and were thus able to gauge the potential industry engagement in Mission 1 activities.

- **ROADMAPPING PRIORITY AREAS & RECOMMENDATIONS (Phase 3):**

In a multi-stakeholder workshop, we worked along the three identified Priority Areas to understand the mechanisms for change and how EIT Food can make positive changes to achieve Healthier Lives through Food.

The **co-design process** included **interactive stakeholder involvement** across all three phases of the roadmapping exercise and will hopefully lead to future cooperation within the EIT Food ecosystem. Major **players in the food industry** both within and **outside the EIT Food network**, were involved in this research, such as Food and Drink Europe and the Joint Programming Initiative Healthier Diet for Healthier Lives (JPI HDHL). As a result, these experts raised their awareness of the Mission, and the process facilitated their participation in the survey and interviews (Phase 2), and their pro-active engagement through the roadmapping workshop (Phase 3). Concrete ideas are already emerging which could be scaled at European level.

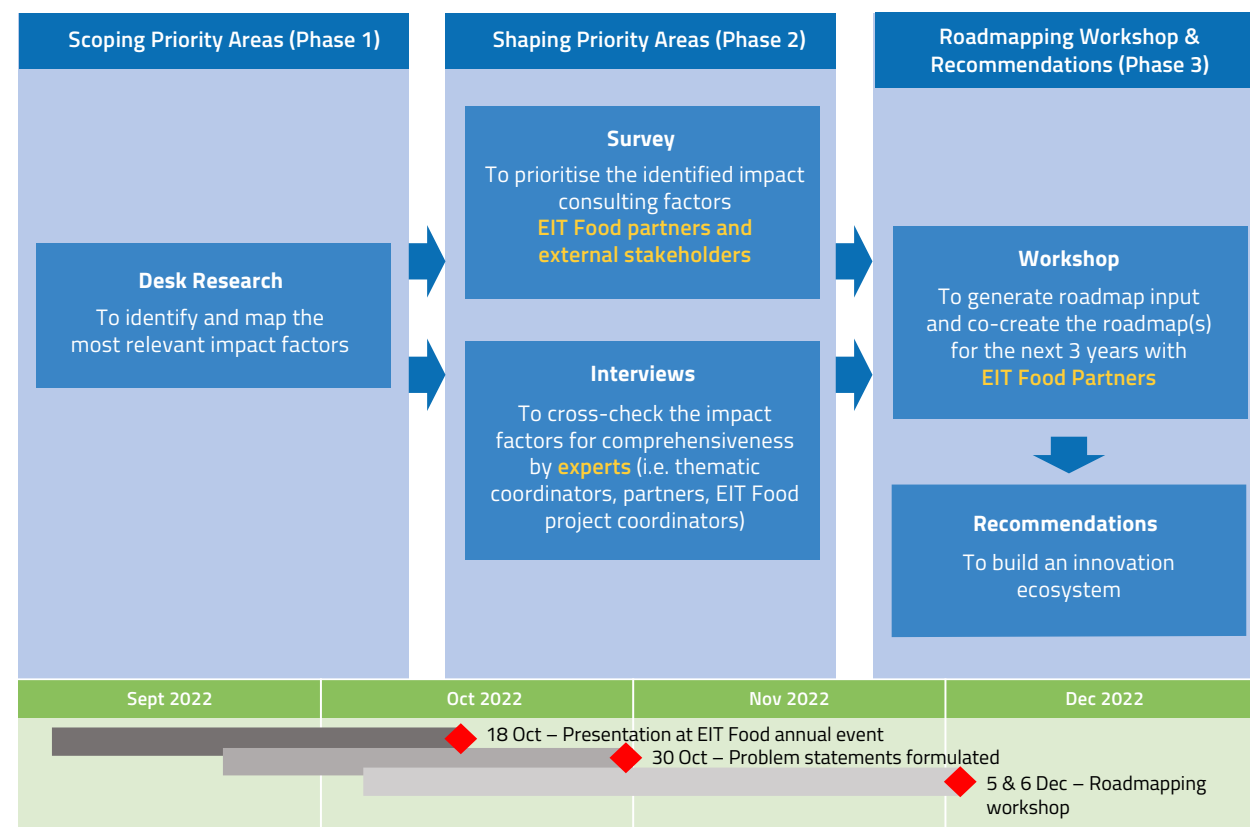


Figure 1: Roadmapping process design for Mission 1 “Healthier Lives Through Food”



3.1 Scoping Priority Areas (Phase 1)

In Phase 1, we investigated the **scale and consequences of unmet societal and economic needs** in Mission 1 by collecting scientific evidence via **desk research** on NCD prevalence as food-related health risks. We also conducted a preliminary **stakeholder strategy mapping exercise** to determine potential collaborators for future joint activity.

Based on the research question “*What are the most critical areas of intervention for dietary factors in the next 3-5 years that will lead to healthier lives through a decrease in prevalence of NCDs?*”, we identified:

- The **NCDs** with the most significant causal relationships to dietary factors
- The products, ingredients, and sectors involved in this causal relationship
- The populations in Europe most likely to be impacted by those causal relationships (and started to understand the reasons why)

We collected and summarised data on the Europe-wide prevalence, mortality rates, and (where available) the direct and indirect costs of healthcare associated with a range of diet-responsive NCDs. Key NCDs include:

- cardiovascular diseases (specifically heart disease and stroke),
- type 2 diabetes mellitus,
- colorectal cancer and
- Alzheimer’s disease (and general dementia).

Stakeholder mapping

In addition to identifying the most critical areas for interventions, we also identified and analysed stakeholders with a **distinct policy or strategic agenda** on food systems transformation, which could collaborate in EIT Food’s Mission 1 **Priority Areas** in the near future.

For each actor, we described the main policy/strategy objective and instruments in place, the target groups in the food (value) system and ultimate beneficiaries (e.g. children or students), and consequently the potential for collaboration in terms of strategic alignment with Mission 1 – and the three Priority Areas specifically.

This screening and mapping revealed numerous organisations that specifically address obesity and NCDs by improving dietary patterns. In most cases, a holistic systemic food-system approach is adopted.

We identified a total of 43 entities including (EU) project and network organisations, corporate and sector as well as academic and non-governmental organisations at various levels of governance (regional, national, international, transnational). These food-system actors have visions and missions, or advocate for major activities, which can be classified in one or more Mission 1 Priority Areas. Therefore, a collaboration could be beneficial for EIT Food. Moreover, an assessment of the funding and financing landscape was conducted to support EIT Food in paving the way for potential new services and activities. This partly overlaps with the identification of current and future stakeholders in the public/NGO/charity sectors with matching agendas and known funding.

3.2 Shaping Priority Areas (Phase 2)

In Phase 2, we investigated which of the NCDs with causal relationships – identified in Phase 1 – should be prioritised. We identified and shaped **Priority Areas** to achieve impact and established **baseline and targets**. To achieve this, we conducted a large-scale **survey** to understand different views on NCDs (with focus on industry) and in-depth **interviews** to validate survey findings and evaluate whether industry supports the need for solutions in these areas and is willing to co-invest. With the results of the survey and the interviews, we were able to validate and better shape the **three Priority Areas** as the basis for roadmapping in Phase 3.

Survey

As a first step we collected views, knowledge, and other inputs from experts in the food and medical sectors. For this purpose, we developed an online survey (see survey questionnaire in the [Appendix](#)).

Food industry, nutrition and health experts were asked for insights on how to shape healthier diets and identify Priority Areas for future investment. We wanted to identify which actions different stakeholders have taken to address NCDs and what areas of food systems need to be addressed to improve consumption of healthy foods and reduce intake of unhealthy products. Thereby, we wanted insights into the pressures and incentives faced by industries and food professionals to combat diet-related NCDs. The **expert survey** covered the following topics:

- Existing considerations of NCDs and mitigation strategies
- Experts' views on the food system sectors to mobilise for improving diets
- Influence of external factors, enablers, and technology trends



By also inviting consumers to contribute, we wanted to gather insights into which behaviours and attitudes contribute to the most burdening diet-related NCDs.

The survey was disseminated via the extensive networks of Mission 1 consortium members, EIT Food and its innovation and communication hubs such as Food Unfolded and Food Hive, and also EIT Food partners specialising in targeted communication such as the European Food Information Council (EUFIC). Extensive efforts were made to connect with relevant institutions in Europe, which included:

- Industry associations (e.g. FoodDrinkEurope, the British Nutrition Foundation and the Italian Cluster of Agrifood industry)
- Consumer associations (e.g. Altroconsumo)
- National cluster organisations (e.g. the Lower Austrian Food Cluster)
- Project consortia (e.g. MicrobiomeSupport, Fit4Food2030, or Domino)
- Information platforms (e.g. the TABLE Newsletter) which served as multipliers

Consortium partners and their respective multipliers also exploited social media, especially LinkedIn, Instagram, Telegram, and Twitter.

The online survey took 5 to 10 minutes to answer and was conducted in October 2022 in parallel to the surveys for the other two Missions. We had 221 responses from experts in different areas in the food system as well as 989 completed responses from consumers, which were analysed in terms of descriptive statistics.

Interviews

In addition to the survey, we also conducted 25 targeted interviews with 31 experts with a focus on reaching **beyond the food domain** (e.g. health experts) and **beyond the immediate EIT Food community** (e.g. retail industries) to explore their strategic alignment with the three Priority Areas put forward. In addition, selected researchers with a holistic view on food system transformation and consumer representatives were invited to provide feedback and inputs.

The interviews were semi-structured and lasted between 20 and 45 minutes, predominantly conducted online. We asked participants about enablers and barriers to reducing NCDs and requested feedback on the initial ideas for potential Priority Areas which arose from the desk research and survey results. The interview guidelines can be found in the [Appendix](#).



3.3 Roadmapping Priority Areas & Recommendations for Collaborative Action (Phase 3)

In Phase 3, we facilitated the co-creation of roadmap outlines in a **multi-stakeholder workshop** by refining the three identified Priority Areas and identifying the role(s) EIT Food could take. We synthesised the workshop results and elaborated on **opportunities** for EIT Food to lead change in these three areas and how EIT Food's impact indicators can be met consistently in the next 3–5 years. We also searched for current and future **stakeholders/collaborators** and funding sources that might be available to fund development or scaling of solutions in these areas – and might be accessible by EIT Food and partner organisations working together as consortia.

Roadmapping

The Mission 1 workshop was organised in coordination with the other two EIT Food Missions and took place in Paris on December 5 and 6, 2022. At the event 22 people participated.

The Mission 1 project team employed a structured, yet flexible and scalable **roadmapping approach**¹, which resulted in multi-phased and multi-layered roadmaps with recommendations for feasible change in each of the three Priority Areas.

With the roadmapping exercise we aimed to link the desired future (characterised by a vision statement based on the Mission objective) to the present situation (characterised by problem statements turned into "Priority Areas"). For each Priority Area we addressed the following key questions: "where do we want to go?" (i.e. vision as desired future) and "how can we get there?" based on "where are we now?" (i.e. baseline with current problem areas).



¹ For details on structure and process see <https://www.sciencedirect.com/science/article/pii/S0040162508000632>, resp. <https://engage.ifm.eng.cam.ac.uk/roadmapping>

At the beginning of the workshop, participants were asked to relate personally and professionally to the **vision statement for Mission 1 ("more healthy life years for all")**, thus sharing perspectives on healthier lives through food. Roadmap work then focused on the Priority Areas with participants splitting into three groups:

- **PRIORITY AREA A:** Achieve Sustainable Diets for People and Planet
- **PRIORITY AREA B:** Diversify Protein Sources for Food Consumption
- **PRIORITY AREA C:** Increase and Retain the Nutrient Density of Food

For each Priority Area, we first explored **WHY** the future may be different from today by prioritising relevant (mega)trends and drivers as external broad-scale factors influencing the roadmap. We then identified the future needs and the contexts in which solutions will be delivered, thus addressing the various unmet societal and economic needs identified in Phase 1 and validated in Phase 2 of our research. To better refine the opportunities relating to the Mission vision of providing more healthy life years for all, we also asked participants to specify **expected outcomes** (with time horizon and quantified if possible).

We then identified opportunities to create value (economic, social, environmental, etc.) for impact by exploring **WHAT** will be needed in the food system (products, services, etc.) to deliver the vision of Mission 1.

Finally, we identified for each opportunity **HOW** value will be delivered. On the one hand, through innovations (technological, social, etc.) and capabilities; then on the one hand, how other enablers and resources (funding, infrastructure, staff & skills, etc.) need to be established as 'enabling mechanisms' to ensure successful delivery of the roadmap. We also investigated **WHO** will need to be involved as key or initial stakeholders to take joint action.

For each opportunity, we then developed pathways towards impact by specifying concrete first steps with lead actors, and then addressed **WHEN** outcomes will be achieved with respect to three distinct time horizons: short term (2023–2025), medium term (2025–2030) and long-term (2030–2050). We also asked participants how much the suggested opportunities will contribute to the expected outcomes in each given Priority Area.

In a final step, we checked for robustness of results by looking for potential overlaps, synergies, and conflicts across the opportunities within each Priority Area and then across the three Priority Areas. The outcomes of the workshop summarise the ideation process with the participating stakeholders.

Processing and synthesising of workshop results involved an in-depth analysis of potential benefits and contributions to reducing NCD prevalence. This involved several online working sessions by senior project team members to draft relevant and robust recommendations for collaborative action in key domains of the food system, identifying key enabling factors and potential collaborators.



Recommendations

In this Mission, **three Priority Areas** are suggested:

PRIORITY AREA A:

Achieve Sustainable Diets for People and Planet

PRIORITY AREA B:

Diversify Protein Sources for Food Consumption

PRIORITY AREA C:

Increase and Retain the Nutrient Density of Food

These three areas together will help to achieve the target set by this mission: to reduce the prevalence of NCDs and thus reach more healthy life years for all. Specific target groups are to be considered as well as geographical differences addressing specific NCDs.

As required in the call, the scale and scope of opportunities for EIT Food to lead change in these Priority Areas and meet its impact indicators consistently in the next 3–5 years are the basis for recommendations. These primarily relate to the **current EIT portfolio** as described in the EIT Food Strategy 2021–2027 and the EIT Food Business Plan 2023–2025 and thus focus on immediate actions for the next 3–5 years. This exercise addresses among other things, whether efforts or funding by EIT Food would be duplicative of, or incidental to, current levels of activity in these areas. Such organisations with matching agendas and known **funding potential** within the public/NGO/charity sectors can help scale and develop solutions in these areas where funding is accessible by EIT Food and its partner organisations working together as consortia.

We provide recommendations for the Mission in general and for each of the three Priority Areas. Furthermore, recommendations will be characterised in terms of “**quick wins**” and “**big gains**” and along **three key domains**: PRODUCE, TRANSFORM and DISTRIBUTE

which roughly describe the food value system. There are **four major enablers** to increase more healthy food intake in the three key domains, namely KNOWLEDGE INFRASTRUCTURE, AWARENESS & EDUCATION OF CONSUMERS, PARTNERSHIPS, and POLICY & REGULATION.

We will also describe the potential role(s) and activities for EIT Food for each recommendation. As stated in the EIT Food Business Plan 2023–25, EIT Food aims at building a broad **innovation ecosystem**. Supporting ecosystem development requires **four major functions**²: leadership, direct value creation, value creation support, and entrepreneurial ecosystem. Each of the four functions includes specific roles and activities:

1. Leadership provides ecosystem governance, forging partnerships, platform management
2. Creating an ecosystem where EIT Food could act as entrepreneur, sponsor, or ‘regulator’
3. Direct value creation with EIT Food as potential supplier, assembler, or complementor
4. Value creation support with EIT Food expertise supporting primary value creators, or developing the ecosystem as a champion

For each recommendation, we aim at identifying the possible roles and activities by EIT Food and/or its community in boosting a broader innovation ecosystem for food system transformation in Europe and beyond.

Furthermore, we identify **overarching topics** of all three Priority Areas, such as availability and affordability of healthy and nutritious foods, sustainability of food production, or education and training to ensure that the necessary skills are available in the food production chain. **Cross-cutting topics** with the other EIT Food Missions (“Net-Zero Food Systems” and “Reducing Risk for a Fair and Resilient Food System”) have emerged, such as regenerative agriculture or a climate-positive carbon footprint. We will highlight those along with more general insights resulting from the co-design process regarding needs and opportunities for food system transformation.

4. Results

The findings of Phases 1 and 2 provide a baseline and targets in the form of Priority Areas and KPIs regarding the scale and consequences of unmet societal and economic needs. Specifically, we addressed the following questions:

- Which NCDs have the most significant causal relationships to dietary factors?
- Which of those NCDs/causal relationships should EIT Food prioritise and why?
- Which populations in Europe are most likely to be impacted by those causal relationships and why?
- Which products/ingredients/sectors involved in those causal relationships should EIT Food prioritise and why?



² Dedehayir, Ozgur; Mäkinen, Saku J.; Ortt, Roland (2018) “Roles during innovation ecosystem genesis: A literature review”. *Technological Forecasting & Social Change*, Vol. 136 DOI: 10.1016/j.techfore.2016.11.028.

4.1 Scoping Priority Areas

Non-communicable diseases (NCDs) are those diseases that are not transmissible directly between individuals. They include most cardiovascular diseases (CVDs), most cancers, diabetes, Alzheimer's disease, and their impact can be both chronic and acute. NCDs tend to be of long duration and are the result of a combination of genetic, physiological, environmental, and behavioural factors. The aim of Mission 1 is to achieve a reduction in the prevalence of obesity and NCDs in target populations through a systemic approach, including technological innovation, education, awareness, and collaborative initiatives of various stakeholders. Nutrition is one of the key factors contributing to more health for all and to reduce the related economic burden of preventable NCDs.



To measure the impact of NCDs to the health system and the population, different indicators are used. Broad measures of mortality such as total mortality, life expectancy, premature mortality or years of life lost have been supplemented more recently by measures of the time lived in poor health, exemplified by disability-adjusted life years (DALYs)^{3,4}. In this report we will refer to the following measures:

- **Prevalence** is the proportion of a population that has a condition or illness. Unlike incidence, it includes both new and existing cases. It can either be calculated at a specific point in time or over a specified period.
- **Mortality** refers to the number of deaths that have occurred due to a specific illness or condition, expressed in the form of mortality rate. Statistical analysis uses age-standardised mortality rate as a weighted average of the age-specific mortality rates per 100,000 people, where the weights are the proportions of people in the corresponding age groups of the standard population⁵
- **Disability-adjusted life years (DALYs)** are used because mortality does not give a complete picture of the burden of disease borne by individuals in different populations. This is a time-based measure that combines years of life lost due to premature mortality and years of life lost due to time lived in states of less than full health, or years of healthy life lost due to disability. One DALY represents the loss of the equivalent of one year of full health. Using DALYs, the burden of diseases that cause premature death but little disability (such as measles) can be compared to that of diseases that do not cause death but do cause disability (such as cataracts causing blindness).

3 Smith, P., Mossialos, E., Papanicolas, I., & Leatherman, S. (Eds.). (2010). *Performance Measurement for Health System Improvement: Experiences, Challenges and Prospects (Health Economics, Policy and Management)*. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511711800

4 World Health Organization. (n. d.). *Indicator Metadata Registry* List <https://www.who.int/data/gho/indicator-metadata-registry>

5 World Health Organization. (n. d.). *Indicator Metadata Registry Details* <https://www.who.int/data/gho/indicator-metadata-registry/imr-details/78#:~:text=Definition%3A,of%20the%20WHO%20standard%20population>

The rapidly increasing incidence of these diseases disproportionately affects poor and disadvantaged populations, contributing to widening health disparities between and within countries and is driven by factors such as ageing, rapid unplanned urbanisation, and the globalisation of unhealthy lifestyles. Hence, NCDs present a financial burden to healthcare systems⁶:

- Cardiovascular diseases: €217 billion/year (2015, EU, direct cost)
- Colorectal cancer: €19.1 billion/year (2015, EU, total cost)
- Diabetes: €177 billion/year (2021, Europe according to Statista, total cost)
- Dementia: €392 billion/year (2021, WHO European Region, total cost)

According to the World Health Organization, NCDs, such as heart disease, stroke, cancer, or diabetes are collectively responsible for 74% of all deaths worldwide. Globally, every two seconds, a person dies prematurely from an NCD. According to Global Burden of Disease database (2019), the contributions of NCDs to all-cause mortality in Western Europe 22)⁷ which gives the values for 2019 are: cardiovascular diseases (34.1%), cancers (30.8%), neurological disorders (6.7%), and diabetes and kidney diseases (4.1%).

There are policies to tackle NCDs but they remain the largest cause of deaths in Europe. Deaths at early age or living long term with NCDs and disabilities has socioeconomic consequences. If the NCD epidemic is not controlled, mortality from NCDs is predicted to increase. Fortunately, it is known that NCD mortality can be prevented by dealing with key modifiable risk factors. **Unhealthy diets, being overweight/obese are the top modifiable risk factors in Europe, which contribute to NCDs such as cardiovascular diseases, type 2 diabetes and some cancers⁸.** Following the analysis, as reported in the "Collection and summary of data on the Europe-wide impact of diet-responsive Non-Communicable Diseases" in the Appendix, the following diet-responsive NCDs will be targeted in this project:

- Ischaemic heart disease
- Stroke (ischaemic and haemorrhagic)
- Colorectal cancer
- Type 2 diabetes mellitus
- Alzheimer's disease and other dementias



6 References see the Appendix "Collection and summary of data on the Europe-wide impact of diet-responsive Non-Communicable Diseases NCDs Factsheets for Europe"

7 Institute for Health Metrics and Evaluation. (2022). *Global Burden of Disease Results*. <https://vizhub.healthdata.org/gbd-results/>

8 Institute for Health Metrics and Evaluation. (2022). *Global Burden of Disease Results* <https://vizhub.healthdata.org/gbd-results/> or see Appendix "Collection and summary of data on the Europe-wide impact of diet-responsive Non-Communicable Diseases NCDs Factsheets for Europe"

However, there are **substantial variations in diet-responsive NCDs between countries**, all data taken from Global Burden of Disease (2022)⁹ (Figure 2):

- **Cardiovascular diseases** remain the largest cause of death by far (34%), 71% of which is **ischaemic heart disease** and **stroke**.
- Cardiovascular diseases mortality is reducing somewhat together with prevalence and DALYs.
- Cardiovascular diseases are associated with the highest DALYs of all diet-responsive NCDs.
- **Ischaemic heart disease**: Estonia, Serbia and Latvia have the highest prevalence rate in Europe.
- **Stroke**: Bulgaria, Serbia and Romania have the highest prevalence rate in Europe.
- **Neurological disorders** are the third largest cause of death (6.7%) of which ~90% is **Alzheimer's disease**.
- **Alzheimer's disease**: Slovenia, Croatia, and Czechia have the highest prevalence rate in Europe.

- **Cancers** are the 2nd largest cause of death (31%) with colorectal cancer 13% of total, sixth overall.
- **Colorectal cancer**: Bulgaria, Croatia and Hungary have the highest prevalence rate in Europe.
- **Type 2 diabetes mellitus** has apparently relatively low mortality rate but there is concern that since CVD is often a secondary outcome its impact on mortality is underestimated.
- **Type 2 diabetes mellitus**: Czechia, UK, and Germany have the highest prevalence rates in Europe.
- Very substantial variations in diet-responsive NCDs between countries and sexes:
Mid and Eastern EU countries, particularly Bulgaria has highest all-cause mortality and cardiovascular diseases and colorectal cancer mortality rates.
 Women have a greater death rate from Alzheimer's disease than men, but men tend to have greater colorectal cancer mortality than women¹⁰.

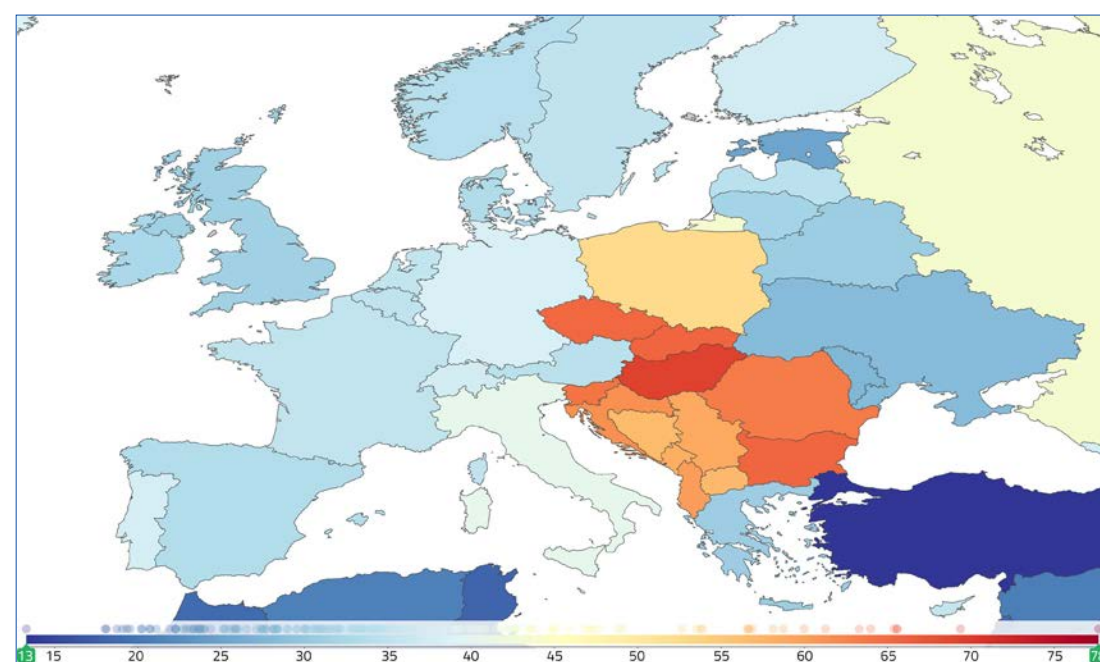


Figure 2: Exposure to health-related dietary risks in 2019 (% of population)¹¹

9. Institute for Health Metrics and Evaluation. (2022). *Global Burden of Disease Results* <https://vizhub.healthdata.org/gbd-results/>

10 Saydah, SH, Geiss, LS, Tierney E, Benjamin, SM, Engelgau, M, and Brancati, F. (2004) "Review of the performance of methods to identify diabetes cases among vital statistics, administrative, and survey data". *Ann Epidemiol* 14:507–516.

11. The figure was created using data from Institute for Health Metrics and Evaluation. (n.d.) *Global Burden of Disease Compare*. <https://vizhub.healthdata.org/gbd-compare/>

NCDs and nutrition

NCDs are associated with an unhealthy diet, smoking, physical inactivity and excessive alcohol consumption. Globally, consumption of meat, sugars, oils, and fats has been increasing during recent decades whereas the intake of fibre-rich foods such as wholegrains, pulses and roots has been declining in the past decades¹², but is seeing an upwards trend in utilisation and consumption again¹³. Simultaneously, the consumption of processed and convenience foods continues to rise rapidly. These changes affect dietary patterns and nutrient intake, which lead to key metabolic changes such as raised blood pressure, blood cholesterol and blood glucose, and increase in overweight/obesity¹⁴. Consequently, the new consumption habits increase the risk of developing NCDs.



12. Statista. (2022, 25. November) *Global meat consumption by type 1990–2021*. <https://www.statista.com/statistics/274522/global-per-capita-consumption-of-meat/>

Statista.(2022, 13 June). *Global sugar consumption 2021/22* <https://www.statista.com/statistics/249681/total-consumption-of-sugar-worldwide/>

Statista. (2023, 8. Februar). *Vegetable oils: global consumption 2022/23*. <https://www.statista.com/statistics/263937/vegetable-oils-global-consumption/>

The Whole Grains Council. (o. D.). *Whole Grain Statistics* <https://wholegrainscouncil.org/newsroom/whole-grain-statistics>

13 OECD/FAO (2021), *OECD-FAO Agricultural Outlook 2021–2030*, OECD Publishing, Paris, <https://doi.org/10.1787/19428846-en>.

14 SACN (2007) Scientific Advisory Committee on Nutrition, *Update on trans fatty acids and health. A position statement*. TSO: London. ISBN 9780112431176. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf

These behaviours can be directly influenced and addressed, through concerted and interconnected actions at different levels. Studies have shown that many NCD risk-factors can be managed by improving nutritional intake to prevent these metabolic changes¹⁵. Influencing healthy nutrition, while adopting a systemic, holistic approach can achieve a **balanced diet for people and planet**. A healthy diet and exercise are known to be the most important factors in the prevention of many NCDs. Common recommendations for preventing NCDs are diets high in vegetables and fruit, wholegrains, pulses and nuts and seeds, with a **balanced, diverse protein** intake with minimised consumption of red and particularly processed meat. **High nutrient density** in food can benefit health and prevent malnutrition such as micronutrient deficiency, which is frequent in obesity^{16,17}.



Several dietary factors are recognised risk factors for particular NCDs. Evidence is consistent for some associations, notably industrial trans fatty acids and ischaemic heart disease, high sodium intakes¹⁸ (which are associated with elevated blood pressure) and stroke, high intakes of processed meat and colorectal cancer and low intakes of calcium and dietary fibre and colorectal cancer.

One particular risk to health comes from exposure to dietary trans fatty acids of industrial origin, probably from hydrogenation of unsaturated fats for use in food manufacture¹⁹. There are also so-called natural trans fatty acids in foods of ruminant animal origin (e.g. milk) but the evidence to date suggests these are not a risk to health and in any case are consumed in very small amounts. Most Western European countries have vigorously reduced the amounts of industrial trans fatty acids in foods over the last 30 years together with having strict limits on trans fatty acid intake in dietary guidelines, typically a maximum of 1–2% of total energy intake. Whilst the impact of trans fatty acids on ischaemic heart disease has generally reduced in all European countries included in this report over the 30-year period there remains a number that appear to still have relatively high intakes. These are notably the Baltic states with Latvia having the highest values.

15 See for example US National Institutes of Health, “How dietary factors influence disease risk” [National Institutes of Health (NIH)]. <https://www.nih.gov/news-events/nih-research-matters/how-dietary-factors-influence-disease-risk>

16 See Ref 13 and for example: Troesch B, Biesalski HK, Bos R, Buskens E, Calder PC, Saris WH, Spieldenner J, Verkade HJ, Weber P, Eggersdorfer M. *Increased Intake of Foods with High Nutrient Density Can Help to Break the Intergenerational Cycle of Malnutrition and Obesity*. *Nutrients*. 2015 Jul 21;7(7):6016–37. doi: 10.3390/nu7075266. PMID: 26197337; PMCID: PMC4517043.

17. Walsh, J. S., Bowles, S., & Evans, A. L. (2017). Vitamin D in obesity. *Current Opinion in Endocrinology & Diabetes and Obesity*, 24(6), 389–394.

18 He et al. (2021). “Salt reduction to prevent hypertension: the reasons of the controversy”. *European Heart Journal* 42: 2501–2505.

19. Firdaus, M. A., & Mishra, S. (2021). Industrial Trans-Fatty Acid Intake Associated with Coronary Heart Disease Risk: A Review. *J Nutr Food Sci*, 11, 806.

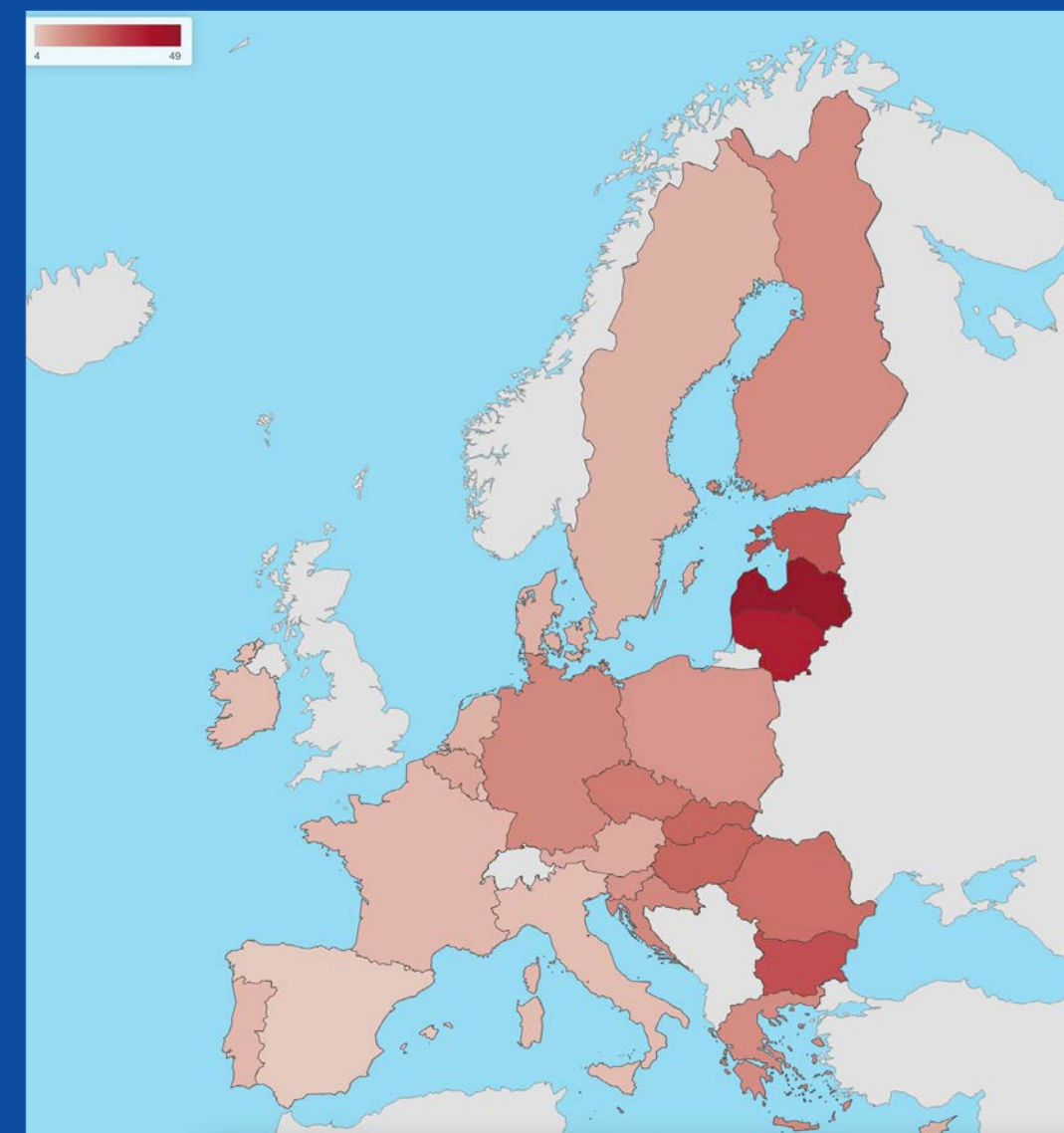


Figure 3: Mortality map: deaths/100 000 attributable to diet high in trans fatty acids in EU Member States (2019)²⁰

Figure 3 is a map published by the European Commission in 2019 and shows mortality attributable to dietary trans fatty acids. This map is in good agreement with our findings which show that the Baltic states and eastern EU member states have the highest CVD mortality rates. Given the consistent evidence of risk from industrial trans fatty acids, a key recommendation of this report is that effort is increased to reduce trans fatty acid intake in the Baltic and eastern EU member states.

20 https://knowledge4policy.ec.europa.eu/visualisation/diet-high-trans-fatty-acids-mortality-map_en

Hypertension is the major risk factor for CVD and stroke in particular, and increased sodium intake (mostly as sodium chloride) is associated with increased blood pressure. Whilst many Western European countries have been running successful campaigns over the last 30 years to reduce sodium chloride intake to typically no more than 6g/day (2.4 g sodium/day), several eastern European countries still experience substantial impacts, particularly within Bulgaria, Serbia, and Romania. Clearly there should be more effort to reduce the impact of sodium (chloride) in diets, and studies in Western Europe and elsewhere in the world suggest greatest intakes arise mainly from manufactured foods rather than from table salt²¹.

Colorectal cancer is attributed to diets low in calcium, high in processed meat and low in dietary fibre respectively²². There is large variation in impacts between countries but as noted for other conditions, the diet-related risk is substantially higher in Eastern European and Baltic states. This is perhaps particularly noticeable for diets low in calcium and dietary fibre. Low calcium intake is often linked to low milk/dairy intake foods which are themselves associated with reduced risk of colorectal cancer in the World Cancer Research Fund reviews of evidence²³. Overall, these data strongly suggest that considerable effort is needed to reduce the dietary risks seen in these parts of the EU.

21. Saiuj Bhat, S, Marklund M et al (2020) "A systematic review of the sources of dietary salt around the world". *Adv Nutr* 11:677–686.

22. World Cancer Research Fund International (2022a, 14 April). *Colorectal cancer statistics* | WCRF International. <https://www.wcrf.org/cancer-trends/colorectal-cancer-statistics/>

23. World Cancer Research Fund International (2022b, November 28). *The Third Expert Report - WCRF International*. <https://www.wcrf.org/diet-activity-and-cancer/global-cancer-update-programme/about-the-third-expert-report/>

The below box "Effects of diet on selected NCDs" gives a short overview of the risks, additional details are given in the [Appendix](#).

The risk for most non-communicable diseases (NCDs) can be reduced with a diet consisting of:

- **high intake of fruits and vegetables:** eating at least 5 servings per day, 3 of vegetables and 2 of fruit;
- **choosing wholegrains:** consuming less refined grains and foods containing simple sugars and avoiding sugary drinks;
- **healthy mono and polyunsaturated fats:** consuming less butter, cream, palm oil, fatty meat and processed meat, replacing with appropriate plant oils, avoiding food containing industrial trans fats;
- **reduced salt consumption:** consuming less foods rich in salt (cheese, cold cuts, preserved foods, sauces rich in salt, etc.) and adding only a small amount of salt while cooking;
- **healthy protein sources:** choosing fish, eggs, milk, legumes and white meat; limiting red meat to 1–2 servings per week whilst minimising processed meat consumption; eating cheese in typical amounts (hard cheese 20–35g/day).
- **low alcohol intake:** consuming not more than 2 unit/day for males and 1 unit/day for females;
- consumption of portions of foods that allow to maintain/achieve a **healthy weight**.

A diet as the one described above can be considered as a **healthy diet**.

However, eating behaviour is profoundly affected by social factors, which can impact food choice:

- **Interpersonal factors:** Family practices, rules and structure around mealtimes affect eating habits.
- **Role models:** People conform to others' eating because they consider the amount eaten by others as an indicator of how much food one can or should consume or because of affiliation motives.
- **Social facilitation of eating:** Food intake is increasing when people eat together as compared to when they eat alone. Social facilitation occurs as people who eat in groups select more food especially with friends.
- **Social media:** Engagements in social media and exposure to images has a negative impact of body mass index and food choices in young adults who are vulnerable to social media influence.

In **Alzheimer's disease** and dementia: Consumption of fruit, vegetables and wholegrains has been associated with a lower risk of developing Alzheimer's and dementia, we present key information on selected NCDs, namely colorectal cancer, stroke, heart disease, type 2 diabetes mellitus and Alzheimer's disease and dementia (a full description can be found in the [Appendix](#).) Considering individual NCDs and their specific risk factors, some differences and similarities can be recommended regarding diets:

- **Colorectal cancer:** Diets rich in fruit and vegetables, fibre, folate, calcium-rich dairy foods and fish have been associated with a decrease in the incidence of colorectal cancer. The World Cancer Research Fund/American Institute for Cancer Research also reports that processed meat causes colorectal cancer²⁴.
- **Stroke:** Diets high in fibre, phenolics and unsaturated fatty acids and low in sodium and saturated and industrial trans fatty acids are beneficial for stroke prevention.

- **Heart disease:** Following diets rich in fruit and vegetables and wholegrains, plant proteins, fish and seafood and unprocessed and lean meat has been advised for heart disease prevention. It has been suggested that replacing dietary saturated fatty acids with mono/polyunsaturated fatty acids is beneficial for heart disease prevention.
- **Type 2 diabetes mellitus:** Carbohydrate intake should emphasise nutrient-dense sources that are slowly digested (low glycaemic index)^{25,26,27}. Diets that are high in fibre, including vegetables, fruits, legumes, wholegrains, as well as dairy products, have been associated with a decrease in its risk. Diets that are lower in carbohydrates may also be helpful under professional guidance.
- **Alzheimer's disease and dementia:** Consumption of fruit, vegetables and wholegrains has been associated with a lower risk of developing Alzheimer's and dementia.



24. World Cancer Research Fund International (2022c, April 14). *Diet, activity and cancer - WCRF International*. <https://www.wcrf.org/diet-activity-and-cancer/>

25 Brand-Miller, J., et al. (2003). "Low-Glycemic Index Diets in the Management of Diabetes: A meta-analysis of randomized controlled trials." *Diabetes Care* 26(8): 2261-2267.

26 Riccardi, G., et al. (2008). "Role of glycemic index and glycemic load in the healthy state, in prediabetes, and in diabetes." *The American Journal of Clinical Nutrition* 87(1): 269S-274S.

27. Augustin, L. S., Franceschi, S., Jenkins, D. J. A., Kendall, C. W. C., & La Vecchia, C. (2002). *Glycemic index in chronic disease: a review. European journal of clinical nutrition*, 56(11), 1049- 1071.

Table 1: Foods, Nutrients and Beverages offering benefits (P) and risks (x) for NCDs: Opportunities for Nutritional Health Improvement summarised from the factsheets in the [Appendix](#), references are listed there

Foods/Nutrients/Beverages	Alzheimer's	Stroke	Colorectal cancer	Heart disease	Type 2 Diabetes	OVERALL
Alcohol: Abstention				x		x
Alcohol: Low consumption				✓		✓
Alcohol: High consumption				x	x	x
Caffeine					✓	✓
Dairy products	✓		✓		✓	✓
Cheese			✓			✓
Milk proteins		✓				✓
Whey protein		✓				✓
Dietary fats						
Omega-3 fatty acids		✓	✓			✓
Dietary cholesterol				x		x
Saturated fats				x		x
Trans fats (industrial)				x		x
Dietary fibre			✓		✓	✓
Fish		✓	✓			✓
Fruits & Vegetables	✓	✓		✓	✓	✓
Wholegrains				✓		✓
Vitamins, Minerals & Dietary Antioxidants:		✓	✓	✓	✓	✓
Antioxidants (polyphenols/catechins/phenolic acids/anthocyanins)		✓		✓	✓	✓
Calcium			✓		✓	✓
Haem iron			x		✓	✓
Multivitamin supplements			✓			✓
Potassium		✓				✓
Vitamin C			✓		✓	✓
Vitamin D			✓			✓
Vitamin E					✓	✓
Meat: Processed	x	x	x	x	x	x
Meat: Red		x	x		x	x
Salt		x				x
Sugar/Artificial sweeteners		x			x	x
Cooking processes (e.g. high temperature)			x			x
Diets: Dietary Approaches to Stop Heart Disease (DASH)/Mediterranean	✓	✓		✓		✓

Which NCDs to tackle?

- Which NCDs have the most significant causal relationships to dietary factors?
- Which of those NCDs/causal relationships should EIT Food prioritise and why?
- Which populations in Europe are most likely to be impacted by those causal relationships and why?

If the NCD epidemic is not controlled, mortality from NCDs is predicted to increase. It is known that NCD mortality can be prevented by dealing with key modifiable risk factors. Unhealthy diets, being overweight/obese are the top modifiable risk factors in Europe, which contribute to NCDs such as CVD, type 2 diabetes and some cancers. Therefore, based on knowledge of the conditions and the evidence presented in the report, their contribution to European illness, morbidity and financial costs, the following diet-responsive NCDs will be targeted in this project:

- Ischaemic heart disease
- Stroke (ischaemic and haemorrhagic)
- Colorectal cancer
- Type 2 diabetes mellitus
- Alzheimer’s disease and other dementias

There are very substantial variations in diet-responsive NCDs between countries, especially Mid and Eastern European countries, particularly Bulgaria, showing very high mortality rates in several NCDs. Regarding gender imbalances, women have a greater death rate from Alzheimer’s disease than men, but men tend to have greater colorectal cancer mortality than women.

The impact of dietary trans fatty acids and sodium on CVD remain a concern particularly in the Baltic and Eastern EU states. Other dietary factors such as low dietary fibre and fruit and vegetable intake need more attention to reduce the rise in other NCDs, foremost colorectal cancer.

The following Tables 2 to 6 give an overview on the five selected NCDs regarding regional and gender specifics and foremost impact factors, for specific references see the factsheets in the [Appendix](#).



Table 2: Summary of facts on Colorectal Cancer

Colorectal cancer

Quick facts	Cancers are the 2nd largest cause of deaths (31%) with colorectal cancer being responsible for 13% of total cancers. Colorectal cancer prevalence is rising in most countries.
Countries	With few exceptions, the trends in prevalence of colorectal cancer rates are increasing. Deaths from colorectal cancer vary considerably among European countries. ▪ Highest death rates: Croatia & Hungary ▪ Lowest death rates: Iceland & Cyprus ▪ Austria has the most consistent decline since 1996.
Impact factors	▪ Being overweight or obese ▪ Ethnicity ▪ Excessive alcohol consumption ▪ Family history of colorectal cancer ▪ Increasing age ▪ Physical inactivity ▪ Smoking ▪ Unhealthy diet, notably low in fibre and high in processed meat.
Age groups & Sex	Colorectal cancer risk increases with age. It is more common after age of 50. Colorectal cancer, unlike some cancers, affects both females and males but overall, males seem to have higher death rates than females.

Table 3: Summary of facts on Stroke

Stroke

Quick facts	Stroke prevalence and mortality is reducing in Europe. The European Commission has estimated that strokes cost EU healthcare systems €39 billion in 2015. According to Stroke Alliance for Europe, the costs of stroke will rise by 44% between 2017 and 2040, with some countries seeing a rise of nearly 100%.
Countries	Top 5 European countries with highest stroke prevalence rates in 2019: ▪ Bulgaria ▪ Serbia ▪ Romania ▪ Hungary ▪ Latvia A 34% increase in total number of stroke events in the EU between 2015 and 2035 is predicted.
Impact factors	▪ Being overweight or obese ▪ Ethnicity ▪ Excessive alcohol consumption ▪ Family history of cardiovascular disease (genotype effects) ▪ High blood pressure ▪ High blood cholesterol levels ▪ Increasing age ▪ Sex ▪ Smoking ▪ Physical inactivity ▪ Unhealthy diet
Age groups & Sex	A steady increase in the prevalence of stroke can be observed throughout the life course/ with increasing age. Men are more likely to develop stroke at an earlier age than women.

Table 4: Summary of facts on Heart Disease

Heart disease

Quick facts	The European Commission estimated that heart disease costs healthcare systems €37bn in 2015. Indirect costs (e.g. productivity losses and costs of home care) were estimated to be €80m for heart disease in 2015.
Countries	The prevalence trends for heart disease are broadly downward but with a large variation between countries, with Estonia being consistently higher than other European countries. Top 5 European countries with highest heart disease prevalence rates in 2019: ▪ Estonia ▪ Serbia ▪ Latvia ▪ Czechia ▪ Lithuania
Impact factors	▪ Being overweight or obese ▪ Ethnicity ▪ Excessive alcohol consumption ▪ Family history ▪ High blood cholesterol levels ▪ High blood pressure ▪ Increasing age ▪ Physical inactivity ▪ Sex ▪ Smoking ▪ Unhealthy diet
Age groups & Sex	The prevalence of heart disease starts at the age of 30 and steeply increases from the age of 60. Men are more likely to develop heart disease at an earlier age than women. At EU level, death rates were higher in men compared with women, with 1,625 deaths per million men compared to 881 deaths per million women in 2016.

Table 5: Summary of facts on Type 2 Diabetes Melitus

Type 2 diabetes mellitus

Quick facts	Type 2 diabetes is largely preventable and can often be managed through exercise and diet. However, oral drugs are often needed as well as insulin in some cases. Type 2 diabetes has relatively low direct mortality rates, but it often leads to cardiovascular morbidity and mortality.
Countries	The prevalence of type 2 diabetes has increased substantially in most European countries over the last 30 years. The most rapid rate of increase and highest prevalence is in Czechia and the United Kingdom. France has the lowest prevalence, but with a slow increase.
Impact factors	▪ Ethnicity ▪ Family history of diabetes ▪ High blood pressure ▪ History of gestational diabetes ▪ Increasing age ▪ Metabolic syndrome ▪ Overweight/obesity ▪ Physical inactivity ▪ Pollution ▪ Poor nutrition during pregnancy ▪ Smoking ▪ Unhealthy diet
Age groups & Sex	Type 2 diabetes mellitus becomes very common in patients over 50 years old, due to rising levels of obesity, physical inactivity and poor diet. Although young women tend to have a higher type 2 diabetes mellitus, prevalence rates in middle-aged men are generally higher than for women.



Table 6: Summary of facts on Alzheimer Disease & Dementia

Alzheimer disease & dementia

Quick facts	Neurological disorders are the 3rd largest cause of death (6.7%) of which ~90% is Alzheimer's disease. Alzheimer's disease prevalence is fairly stable overall across Europe. However the numbers of healthy years lost due to ill-health, disability or premature death is increasing.
Countries	Top 5 European countries with highest Alzheimer's disease prevalence rates in 2019 ▪ Slovenia ▪ Croatia ▪ Czechia ▪ Poland ▪ Hungary In Switzerland, the UK, Malta, Iceland, Ireland, Poland, and Austria, the prevalence rate has not changed substantially between 1990 and 2019.
Impact factors	▪ Excess alcohol consumption ▪ Family history of Alzheimer's disease ▪ High blood pressure ▪ Physical inactivity ▪ Smoking ▪ Unhealthy diet
Age groups & Sex	The prevalence of Alzheimer's disease & other dementia steeply increases from the age of 60. Nearly two-thirds of diagnosed cases of dementia and Alzheimer's are women. 65% of total deaths due to dementia are among women.

Stakeholder mapping

To give an introductory overview of relevant actors for the mission “Healthier Lives Through Food”, we initially determined **stakeholder categories** (see Table 7), which reflect the transition opportunities for the respective Priority Areas. The selection criteria for the stakeholder mapping focus on the relevance of the actor in one of the previously introduced areas and acknowledged potential future

collaboration opportunities for EIT Food while screening. Keyword desk research was the primary process for identifying potential stakeholder categories. To assess the relevance of actors for the Mission we referred to respective position papers and websites of these actors. Additional actors and stakeholder categories were added after the participant contributions during the roadmapping workshop in Paris (in Phase 3).

Table 7: Stakeholder Categories and their relevancy for Mission 1 “Healthier Lives through Food”

Stakeholder category	Relevant stakeholders for “Healthier Lives through Food”
Regulations, legislations, governance bodies	- Local, national, European governments - Public procurement, public administration (federal & regional) - Schools, Kindergarten (School food guidelines) - Canteens (Domestic dietary guidelines) - Sponsor, financer - Provincial health centres, health professions - Food standards agencies - Consumer affairs - Central drug controller
Responsible marketing	- Industry leaders: Companies, business organisations - Informal institutions - Social media (advertisement) - Public figures, Influencers - Out of home eating: Canteens, restaurants
Product reformulation	- Scientific experts, Research and Innovation - Universities - Research institutions - Private financed R&I - Companies, business organisations - Stem cell research, fermenters, bioreactors - Evaluation of improvement - EU & National public bodies - Health institutes - NGOs - Manufacturers, retailers, processors, SMEs (Fast Food) Restaurants - Environmental agencies - Retailers: Supermarkets - Supranational & global NGOs

Education	- EU Member States Education Ministries - EU Member States Health Ministries - Research and Innovation Ministries - NGOs: FAO, WFP - Dietitians, Nutritionist (associations) - Training programmes - University professors, teachers - Chefs - Industrial leaders - Healthcare professionals - Communities - Opinion leaders, Media, social media
Nutrition information	- Formal institutions for product labelling (regulations, laws, voluntary agreements) - Retail (supermarkets: delivery services) - NGOs - Collaboration with others on nutrition literacy - Out of home eating/ Canteens/ Restaurants
Wholesome food production, Alternative proteins	- Farmer organisations, Primary producers - Companies, business organisations - Manufacturers, retailers, processors - Plant-based food associations - Environmental organisations - Collaboration with others on nutrition literacy - Stem cell research, Fermenters, Bioreactors - Modelling & stimulation - Digital partners, computational - Biology/ Chemistry - Bioinformatics
Others	- Citizen initiatives/ society/ affairs (for citizen innovations, e.g. in living labs) - Investors, sponsors, financers - Women empowerment (associations, organisations) - Food shelters - Cultural organisations

4.2 Shaping Priority Areas

The survey “Healthier Lives Through Food” collected views, knowledge, and inputs from experts involved in the food and medical sectors and from consumers. The results of the survey are described in more detail in the next chapter and structured along experts’ insights on NCDs. These insights revealed existing considerations of NCDs and mitigation strategies, expert views on the sectors of the food system to mobilise for improving healthy diets, the influence of external factors, enablers, and technology trends. Consumers’ views were discovered in a separate survey to get insight into consumers perception of the connection of NCDs and nutrition. Targeted interviews aimed to focus on experts outside the EIT Food community to help evaluate the first draft of the Priority Areas.

Survey results

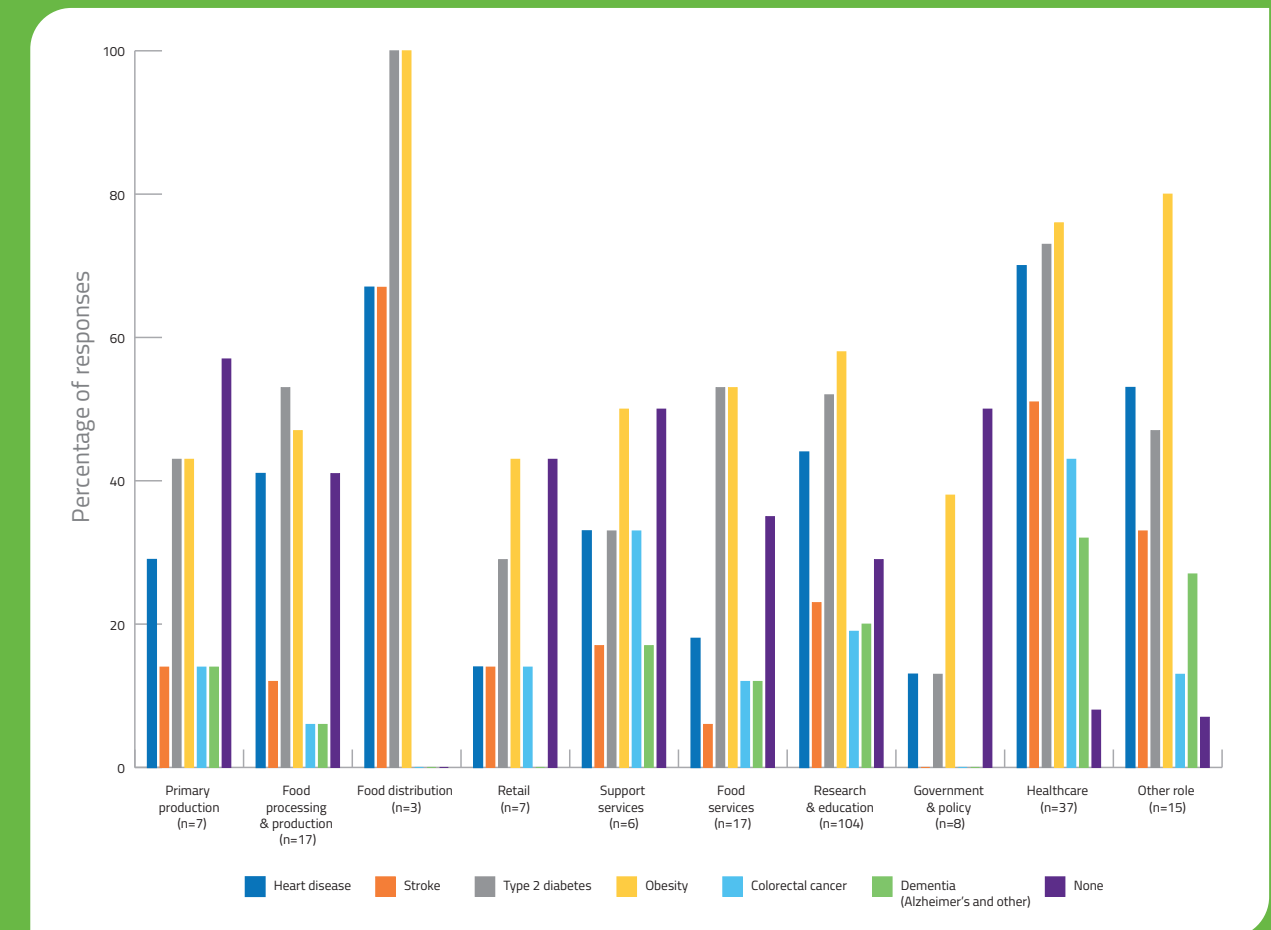
We collected 221 responses from experts in the food system. Most respondents had roles in Research & Education (n=104) and in Healthcare (n=37). Others included in the survey were Food processing & Production (n=17), Food services (n=17), Government & Policy (n=8), Primary production (n=7), Retail (n=7), Support services (n=6), Food distribution (n=3) and Others (n=15). Most survey participants were female, and experts’ ages ranged from 19–60.

Importance of experts’ field of work for combating NCDs: Experts ranked their own area of work as most important in combatting diabetes and obesity, while colorectal cancer and dementia received the lowest consideration. Furthermore, results show that obesity and type 2 diabetes are considered in different sectors of the food systems. Interestingly, in the healthcare system heart disease and stroke are considered frequently. Surprisingly, several sectors, including primary production, support systems, food processing and production, food services and even government and policy appear to not consider NCDs in their area of work.

75% of the experts responded that in their area of work there is no strategy in place to combat NCDs. The remaining 25% of experts answered that diversification of the ingredients is the most used strategy, followed by the reduction of unhealthy ingredients, implementation of education programmes and increase of healthy ingredients.

Responsibility of sectors in the food supply chain to shape a healthier diet: Experts were asked to rate different sectors of the food system for their possible role in **increasing healthy ingredients** in diets (Figure 4).

Figure 4: NCDs addressed by experts’ area of work (n= number of respondents)



Interestingly, there was only little variation in the selected ingredients: All five ingredients (dietary fibre, healthy fats, healthy protein, vitamins & minerals, and wholegrains) were almost equally selected across the different sectors.

- **Food processing and primary production** were considered as the sectors with most responsibility. Food processing is viewed as an area that can make a positive impact immediately, while the future role of primary production in increasing selected ingredients needs further investigation. Maybe respondents were referring to openness of the agrifood sector for alternative agricultural production (e.g. insects rather than beef).
- **Food distribution** was considered to be of least relevance in reducing selected ingredients.

We observe the same order of responsibilities in **reduction of unhealthy ingredients**.

- **Food processing** was the sector with the highest share of responsibility, especially in reducing salt, unhealthy fats, and animal proteins.
- **Primary production** was attributed the highest responsibility for reducing added sugars. It was also considered relevant for cutting unhealthy fats and animal protein.
- In all the other sectors, the responsibility is deemed to be fairly balanced.

Influence of STEEP (Social, Technological, Economical, Environmental and Political) factors: Experts were also asked to rate the importance of several factors, regarding their influence for adoption of an NCD-preventative diet. These encompassed selected personal, social, technological, economic, environmental, and policy domains.



There was strong agreement that each STEEP factor holds similar importance in influencing the adoption of NCD preventative diets. Experts shared the highest rate of agreement among policy factors: *regulation of offers at public services* and *price reduction for healthy foods*. A high share of experts strongly agreed or agreed that *prices* (i.e. economic factor) influence the adoption of healthy diets. Social factors, such as *diet of the family and friends*, also received quite high attention by the experts. Interestingly, technological factors were not really considered as influential in adoption an NCD preventative diet.

Enablers to reduce NCDs: Experts rated education, awareness/marketing campaigns, and policy as the three enablers with greatest potential to reduce NCD burden. Technological development, funding, partnerships beyond Europe and new markets were seen as less important enablers. Concrete ideas for enablers were:

- **Education** (knowledge, skills, etc.): Education programmes in schools, focusing on nutrition and food are key strategies in promoting healthy diets.
- **Awareness/marketing campaigns:** Increasing awareness through responsible marketing campaigns is identified as an important tool to enable healthier diets. Media outlets play a relevant role in informing consumers about healthy choices and provide them with guidance. Therefore, it is important to provide simple messages for communication by the media.
- **Political instruments:** Taxation is regarded as one of the key enablers identified within the political sphere, especially regarding salt and added sugars. Also, regulation has been considered as a key element to consider when it comes to enabling behaviour change without blocking innovation in the food system.
- **Technological developments:** Reformulation and technologies are seen as viable approaches to making consumer food healthier – by increasing the nutritional value of foods while safeguarding their tastiness.

Potentials of emerging food trends: Experts identified alternative proteins and personalised nutrition as the two most important trends which can boost the adoption of healthier diets, with food waste also ranked high. These three trends were seen to outstrip other popular trends identified within the Mission scope, namely algae, nutraceuticals, indoor farming, digital food management, cell culture food, e-commerce, restaurant digitalisation, 3D food printers, and robotics. When asked to identify additional trends, experts highlighted sustainability, availability and systems perspectives as well as regional approaches. All terms were well connected to possible solutions to improve the adoption of healthy diets to improve the number of healthy life years within the population.



In addition to our consultation with experts, we received 989 responses from **consumers**. There were more female (68%) than male (28%) participants and most were 18–30 years old. Consumers considered all selected NCDs (heart disease, stroke, diabetes, obesity, colorectal cancer, and dementia) to be problematic. When consumers were asked to express their opinion regarding the extent in which food influences the development of NCDs, 60% thought that food has an “extremely significant” influence on obesity and diabetes. The relationship between food and stroke, colorectal cancer and dementia did not appear to be particularly obvious to them.

Influence of STEEP factors: Similar to the expert survey, consumers were also asked to rate the importance of several factors regarding their influence for adoption of an NCD-preventative diet. Consumers rated environmental and policy factors as the most important ones to promote transition to healthier diets. Specifically: (1) Respect for animal welfare and respect for human working conditions were rated as the most impactful at the environmental level; and (2) Price reduction and regulation of offers in relation to public health services were considered the most important policy factors to be addressed.



Interview results

The 31 interview partners were selected from the food industry and/or representative organisations and networks from primary production, food industry or consumer health, with a focus on stakeholders outside the EIT Food network. These people were made aware of the EIT Food mission and engaged as part of the first step towards future cooperation. This was also achieved through the Paris Workshop, with some concrete ideas already emerging which could be scaled up to European level.

Perception on NCDs:

Industry representatives and representatives of organisations/networks did not differentiate between single **NCDs**. Instead, they address them in a more **holistic approach** as a **relationship between food and health** in general. If anything, obesity and CVD were viewed as the foremost issue. What emerged as a very important issue was the **consideration of nutritional needs across the life cycle**, where health and wellness are addressed in a general sense and mental health, physical activity and lifestyle are also taken into account.

Enablers to reduce NCDs:

Marketing and advertising should promote active lifestyles in general, rather than nutrition alone. It should also consider health in the workplace and must be responsible and accountable, especially when children are the target audience. The World Federation of Advertisers and EI iPLEDGE initiative were given as examples in our interviews. **Targeted promotion campaigns** were seen as strong enablers but it was stated that governments should take the lead in these – not industry. Retailers are also seen to have a direct influence on consumer behaviour through product placements, marketing strategies and pricing.

Good communication and education over the whole life course was emphasised on numerous occasions.

Coordinated nutrition and health policies are key to successful implementation of healthy nutrition. It was also felt that reducing barriers to allow faster approval of new technologies or products could be achieved through closer collaboration between industry, academia, and policy-makers and implementers.

However, **availability, affordability, and in particular the tastiness** of new products will ultimately be the primary drivers of food choice for consumers.

Opportunities:

Industry representatives stated that **product reformulation** was the primary path towards consumption of healthier foods. Some measures, such as sugar reduction in soft drinks or replacement of trans fats, have already been implemented and are being continuously improved. Furthermore, portion information was related to weight reduction and lower consumption, as were **new ingredients** e.g. soluble fibres or sugar alternatives. **Food fortification** is considered a short-term temporary solution until nutrient density can be achieved through the derivation of healthy soil and associated measures in agriculture.

Food labelling was also assigned a major role in informing consumers. However, it was recognised as being controversial: what should be included and indicated on the label is seen as a sensitive topic (e.g. ongoing discussion on implementing nutriscopes).

Impact could be achieved through **targeted taxes for unhealthy foods**, or through **subsidies or reduced taxes for healthy foods**. Again, it is important to consider that only an overall healthy lifestyle will lead to healthy lives, e.g. exercise, and it must not simply be reduced to consideration of nutritional impact (here, reference was made to the US Food and Drug Administration's action plan on sustainable food system).

Education from school or pre-school (kindergarten) level is considered to be the largest point of leverage. It was suggested that income from targeted taxes be used for funding of food consumption education. **Life-long learning** and education regarding food consumption must also include the differing nutritional needs throughout the lifespan. As the food industry is a very significant employer with respect to **training of the work force** for new technologies or innovative products, this must be kept in mind.

Creating awareness among consumers and producers should not only be about optimal health and nutrition over the life course. To increase consciousness of the true value of nutrition and appreciation for the work that goes into food production and delivery, awareness creation should also focus on the work and workforce behind food production and delivery, in addition to the all-important environmental issues.

SMEs will need support through the development of **guidelines on food/product reformulation** and application of innovation.

Barriers:

Slow regulation is considered a **barrier to the implementation of new products**.

Collaboration or partnerships between policy makers, regulatory agencies, industry and academics is considered a feasible way to speed up the time to launch new products on the market. (Especially when it comes to protein diversification.)

Another consideration when promoting **alternative proteins** is the **actual carbon footprint** of these products compared with that of established products, and the **nutritional value of such products** to avoid nutrient deficiency when consuming protein alternatives, as protein profiles in plant-based alternatives are less optimal than those found in animal sources. Nutritional labelling was also stated as a barrier, as harmonisation across the EU seems to be unlikely.

When considering the **costs of production changes for new products and technologies**, the impact **for primary production** must be considered, and this is particularly true for SMEs who may not be able to afford to implement new technologies.

Knowledge transfer may be a barrier for successful transformation of new products and technologies, bearing in mind that cross-sectoral knowledge transfer may be needed.

The biggest barrier will be to induce a **change in consumer behaviour**, as people are hesitant to accept innovations or implementation of new technologies, especially when it comes to food. The greatest attention needs to be paid to producing tasty and affordable food.



4.3 Roadmapping Priority Areas

In this section, the main results of the roadmapping workshop are presented and set in context with NCDs. A detailed description of all three Priority Areas can be found in the [Appendix](#). The outcomes of the workshop summarise the ideation process with the participating stakeholders.

Priority Area A: Achieve sustainable diets for people and planet

Priority Area A was designed to explore ways in which we can achieve a balanced diet for people and planet. This is a very broad Priority Area which aims at increasing diet quality for all in a sustainable fashion.

Priority Area A: Achieve a balanced diet for people and planet

Prevention of non-communicable diseases (NCDs) is strongly linked to healthy foods which also need to be sustainably produced to meet Sustainable Development Goal (SDG) and net zero targets. Suggested common dietary recommendations for preventing NCDs are diets high in vegetables and fruit, wholegrains, pulses and nuts and seeds, with balanced, diverse protein intake with minimised consumption of red and particularly processed meat, reduced salt, added sugars and saturated fat contents. Strong drivers behind this are industry and retailers offering and placing healthy food choices and consumers demanding and accepting the healthy food choices.

Product reformulation and new product innovation can lead to more balanced and sustainable diets. Consumers need to be encouraged to buy these products, which is seen as the responsibility of food-supply-chain actors and regulators. Accessibility, affordability, sustainability are critical aspects. Advertising and marketing to promote healthy foods is another important factor. The work environment, communities, restaurants and catering outlets need to play a role to transform the food system and provision of healthy and sustainable food for people and the planet.

Needs in Area A

1. Encourage production of healthy foods: Working with food industry, this focus area intends to encourage production of foods with reduced salt, less saturated fat and sugar content and more fibre, taking into account food processing technologies, which preserve the nutrient content and support healthy and sustainable food products for people and planet.

2. Improve dietary patterns and increase the intake of inadequately consumed foods: Working with consumers, this focus area considers consumer behaviour and education to encourage higher intake of fruit, vegetables, wholegrains, etc. Targeted nutrition, enabling nutrient deficiency compensation or covering special nutritional needs should be considered in this focus area. Consumer education on how to choose more nutrient-dense foods or achieve more protein diversity in the diet should be part of this focus area.

Impact of Area A

- Food industry and retailers prioritise the development and promotion of healthier food options
- Concerted effort of food service/restaurants and canteens
- Education and awareness to encourage consumers to make healthier choices

Expected outcomes

While improving overall diet quality will tend to reduce the risk of NCDs, overall impact will depend on initial diet quality and any co-existing factors such as degree of overweight, smoking prevalence etc. Within Pathway A six outcomes were identified to achieve this overarching outcome, to improve healthy consumption to reduce NCDs. The first outcomes concentrate on definition for health and dietary guidelines and improving knowledge of food and nutrition across the life course, which places responsibility on the food industry and policy makers. Through outcomes 5 and 6 affordable and available healthy foods should ensure an improved consumption and attitude to healthy foods following appropriate dietary guidelines.

Outcome 1: Improve knowledge of food/nutrition across life course by 2030.

To boost healthy consumption of foods, it is important to first improve knowledge and understanding of food and nutritional intakes and their impacts across the life course. The premise of this outcome is therefore to establish better education in relation to food consumption to improve the knowledge across the life course and across social groups, according to their needs, concerning nutrition, healthy food choice and cooking. This would require early education, for instance from five years of age, on how to prepare food so that when young adults leave the house, they will know how to prepare, cook, and store food. Consumers should also be educated with respect to healthy food choices, and the importance of other factors such as exercise in maintaining a healthy weight. While this is seen as a very important goal, uncertainties were expressed about how this outcome would be achieved, and it will also be important to consider the role and influence of non-nutritional knowledge areas, such as exercise and maintaining a healthy weight. Better guidance would also enable healthcare workers and other food professionals to talk more effectively about healthy eating and support the creation of healthy eating solutions.



Outcome 2: Establish one true definition for health and dietary guidelines by 2025.

To achieve Outcome 2, it is recognised that there must first be consensus on health and dietary guidance, as this is currently not the case in the EU region. For instance, the recommended optimum number of daily portions for health varies between countries and is not supported by consistent or targeted research. There is a therefore a growing need to establish a consensus on health and dietary guidelines to provide 'one true definition' to help guide the industry, and ultimately consumer messaging. However, it is also recognised that different European regions have different diet-related health priorities for tackling NCDs, according to food consumption patterns which differ across national borders. So, definitions for health and dietary guidelines will need to take national and cultural differences into consideration, which will create challenges for globalised healthy eating recommendations which also take into consideration planetary health. We also need to better understand consumer behaviour, and the barriers people face in achieving healthy diets.

Outcome 3: Restrict promotion and placement of unhealthy food, and limit unhealthy fat, sugar, and salt content in foods by 2030.

Regulation of the retail environment was identified as a key outcome area, specifically the restriction of promotions on unhealthy food, and restricting where unhealthy food can be displayed and sold in stores. Increased and stronger regulations limiting unhealthy fat/sugar/salt content within two years were also recommended. Such regulation can help healthcare professionals when talking about healthy eating with consumers, and this recommendation was seen to benefit consumers across NCD risk more generally rather than a specific NCD. However, it was noted that the definition of 'unhealthy' may be challenging since this also depends on the amount consumed²⁸.



28 For references see chapter 4.1. and the Collection and summary of data on the Europe-wide impact of diet-responsive Non-Communicable Diseases in the [Appendix](#).

Outcome 4: Improve and incentivise reformulation of healthy European food products.

Improving and incentivising reformulation of European food products was considered important and possible to achieve through increased funding opportunities. For instance, grants for healthy food production such as fruit and vegetables can be established by 2030, subsidies on sugar and other unhealthy foods decreased by 2045, and private and public sector funding increased by 25% for reformulation and innovation in food production by 2027. Examples of targets included reducing unhealthy food content by 10%, increasing availability of healthier food products by 80%, and increasing food and vegetable consumption recommendations by one more portion per day by 2030. Other specific targets included: achieving 100% reformulated recipes in canteens within two years, with 80% improvement in consumer tested preferences for healthy reformulations; a 50% increase in the introduction of reformulated

healthier products; and a reduction in added sugars in food products. This outcome is likely to impact on CVD through reformulation of foods to reduce salt, added sugars, and unhealthy fat content, type 2 diabetes in relation to added sugars and artificial sweetener content²⁹, and colorectal cancer with respect to fibre content. In relation to unhealthy fats, the type of fat targeted in reformulation strategies needs careful consideration, as the exclusion of healthy fats such as polyunsaturated, monounsaturated and omega 3 fats from the diet, or increase in trans fats, would have an adverse effect on health. Manufacturers producing healthy foods (e.g. reduction of added sugars, salt and unhealthy fats, and increase in fibre and wholegrain, etc.) would benefit greatly from establishing guidelines, subsidies and regulations^{30,31,32}.

29. Mathur, K., Agrawal, R. K., Nagpure, S., & Deshpande, D. (2020). Effect of artificial sweeteners on insulin resistance among type-2 diabetes mellitus patients. *Journal of family medicine and primary care*, 9(1), 69.

30. NESTA (2023). The future of food. https://media.nesta.org.uk/documents/The_future_of_food.pdf. and Mariani, E., & Bowes Byatt, L. B. (2023, January 20). *Modelling the Scale of the Weight Loss Challenge to Halve Obesity Prevalence in England*. Retrieved from osf.io/ewb84

31. Fagherazzi, G., Gusto, G., Affret, A., Mancini, F. R., Dow, C., Balkau, B., ... & Boutron-Ruault, M. C. (2017). Chronic consumption of artificial sweetener in packets or tablets and type 2 diabetes risk: evidence from the E3N-European prospective investigation into cancer and nutrition study. *Annals of Nutrition and Metabolism*, 70(1), 51-58.

32. Kakleas et al. (2020) "Non-alcoholic fatty liver disease, insulin resistance, and sweeteners: a literature review". *Expert Review of Endocrinology & Metabolism*, 15:2, 83-93. Indicates that artificial sweeteners are linked with NAFLD development and insulin resistance.

Outcome 5: Increase production, affordability, availability of healthy foods to enable 95% of people to follow food-based dietary guidelines every day by 2030.

This worthy but challenging outcome focuses on increasing the production of healthy foods and decreasing the amount of marketing for unhealthy food. This outcome is envisaged through increasing the number and availability of food products in supermarkets and canteens that are affordable, tasty and nutritious. Examples given included the re-arrangement of supermarket layouts to enable 80% more healthy food choices, promotion of healthier foods within five years, and commitment by 85% of food manufacturers and retailers to increasing their healthy sales by 50% by 2025. To monitor this commitment would require consistent measurement of what is sold in supermarkets, healthy food sales, and how much is being sold. Industry stakeholders expressed a wish for a change in regulation to enable retailers to promote foods with a verifiable a health claim on the basis of healthy food content (i.e. fibre, legumes, beans) rather than just restricting unhealthy content (added sugars, salt, unhealthy fats), and to allow health professionals to promote healthy products. They want to see more food meeting consumer needs (“good food is good business”). CVD is likely to be a primary target due to its prevalence and mortality rates, as increased fruit, vegetable, and oily fish consumption can reduce disease risk. While this outcome was viewed as a great aspiration, it was perceived as being unlikely to be achieved for all components. Stakeholders argued for a change in the way healthy diets are assessed to take account of products’ environmental costs. Environmental cost is normally calculated in terms of cost per kg; however, it should also include some element of cost per nutrient supplied.

Outcome 6: Improve consumption of and attitude to healthy foods so that 95% of people are following food-based dietary guidelines every day by 2030

This outcome follows on from all previous outcomes, focusing on consumer knowledge of food and healthy food choices. Consumer attitudes to food will be shaped by approaches and strategies adopted in the food supply chain by producers, manufacturers, distributors, and regulators, as well as scientific facts. It was proposed to achieve this by educating key opinion formers in academia to create new attitudes in consumers and industry through the use and development of healthy ingredients to achieve 20% higher acceptance rates of new healthy foods in five years, and to make healthy eating the norm within 10 years for 50% to 75% of consumers.

To set the identified outcomes in a broader perspective, Table 8 presents an overview of how NCDs relate to these outcomes. It should be emphasised that all diet-responsive NCDs are relevant. But priorities are needed based on prevalence, diet responsiveness, associated costs to health services etc.

- CVDs are likely to be the primary target due to prevalence and mortality
- Increased fruit and vegetable and oily fish consumption may reduce risk
- Improving overall diet quality will tend to reduce the risk of NCDs but impact will depend on initial diet quality and any co-existing factors such as degree of overweight, smoking prevalence etc.

Table 8: How NCDs relate to Priority Area A Workshop outcomes aimed at supporting NCD reduction

Outcomes	Insights	Counterbalancing issues that need to be considered
Improving knowledge of food/nutrition across life course by 2030 (Outcome 1)	Broad, very important	Improved knowledge of the importance of exercise and a healthy body weight should accompany that for food etc.
Improve and incentivise reformulation of EU food products (Outcome 2 & 3)		
Incentivise the production of healthy foods (reduction of added sugars, salt, fat, increase fibre, wholegrain etc. by 2024 (Outcome 2 & 3)	Broadly sensible and should impact on CVD (salt, added sugars, fat), type 2 diabetes (sugar), colorectal cancer (fibre)	Type of fat needs consideration
Restricting promotions on unhealthy food, restricting where unhealthy food can be displayed etc by 2030 (Outcome 4 & 6)	Generally, as above but untargeted.	Definition of unhealthy may be challenging since this also depends on amount consumed.
Establish one true definition for health and dietary guidelines (Outcome 5)	Potentially beneficial	As above
Increased production, affordability, availability, consumption of and attitude to healthy food so that 95% of people are following food-based dietary guidelines every day by 2030 (outcome 6)	Great aspiration but unlikely to be achieved for all components.	
Moderation of alcohol intake and salt reduction (Outcome 4 & 6)	Very important these two actions to be included in overall dietary guidelines. Have impacts on CVD, stroke in particular (salt) and type 2 diabetes	
Reducing trans fat consumption (Outcome 4 & 5)	A well-known risk factor for CVD with evidence that this remains a problem in Eastern European and Baltic countries.	Need to bear in mind that it is ‘industrial’ trans fats that are the problem not ‘natural’ trans which are in dairy fat.
Reduction in consumption of red and processed meat (Outcome 6)	These foods are implicated in increased risk of colorectal cancer, CVD and type 2 diabetes with one (UK) study showing an association between processed meat (but not red) with increased risk of dementia.	The weight of evidence suggests that the health risks from processed meat are much higher than for red meat. Also red meat is an important source of high bioavailable iron and zinc for many.

Opportunities

Providing context for the identification of opportunities for Priority Area A “Achieve a balanced diet for people and planet”, participants selected trends and drivers influencing this Priority Area. Selected trends and drivers focused mainly on health, economics, and technology rather than the environment. Nutrient and health regulations, policies and the health- and food-conscious consumers were considered as key drivers for this pathway. Rampant inflation and increased expenditure for the food industry were also highlighted as strong influencing factors along with poverty, inequality, and social security (social welfare system). New technologies in food production and throughout the food system were seen as important drivers of healthy food choice. Environmental drivers were seen as only indirectly affecting healthy eating, particularly with respect to the availability and quality of water, land, and soil.

Six opportunities were selected from the two focus areas, set in relation to the previously identified outcomes (see) and further described on a timeline (Figure 5). These focused on how to develop public health knowledge and create opportunities for food businesses and regulators to help combat NCDs. The community hub was seen as instrumental in delivering outcomes on education and more consistent dietary guidance nationally and internationally, whereas food system incentives were seen as important not only for achieving consistent guidance but also for health food reformulation, increased production, availability, and affordability of healthy foods to combat NCDs (see Table 10).

Focus area 1: Encourage production of healthy foods

Working with the food industry, this focus area intends to encourage production of foods with reduced salt, less saturated fat and added sugars and more fibre, taking into account food processing technologies that preserve the nutrient content and support healthy and sustainable food products for people and planet. **Key considerations:** Costs of ingredients and goods to create healthier foods, farming land capabilities, incentives to produce healthier food,

and a level playing field. Harmonised and clear evidence-based legislation is needed to enable food business organisations to produce healthier food. The following opportunities were identified for this focus area on healthy food production:

Opportunity 1: Food system incentives to produce healthy and healthier food

Stakeholder dialogue and engagement (e.g. farmers, Food Business Operator (FBO) manufacturers, retailers, food service, out of home sector). Incentives may include innovation grants and subsidies, tax reduction, communication of the actors’ efforts to produce healthy foods (with corresponding health benefits). Legislation and regulation are seen to limit innovation. For instance, Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods. Claims are only possible if added sugars are reduced to less than 30%. So it makes it easier to replace added sugars with sweeteners i.e. change the 30% rule in 1333/2008.

Opportunity 2: A level playing field in Europe

Harmonised European legislation on sustainable dietary guidelines (European definition of sustainable: health, ethics, environment, finance). As the other opportunities were ranked higher in impact by the group, this opportunity was not selected for further discussion.

Opportunity 3: Map of food production and food poverty needs

The mapping process should include land use, food production and distribution, wheat in Ukraine, rapeseed oil, land use and availability of healthy ingredients.

Opportunity 4: Technology innovation

Equipment, product development (product & process innovation), education for food scientists, teachers, chefs, food service, connecting people from different capabilities and backgrounds, e.g. niche academic research connects with food manufacturers and vice versa).

Focus area 2: Improve dietary patterns and increase the intake of inadequately consumed foods

Working with consumers, this focus area considers consumer behaviour and education to encourage higher intake of fruit, vegetables, wholegrains, etc. This focus area should include targeted nutrition, enabling nutrient deficiency compensation or covering special nutritional needs and consumer education, how to choose more nutrient-dense foods or achieve more protein diversity in the diet. **Key considerations:** availability and affordability of healthy foods, equivalence of product portion size healthy vs unhealthy foods, enabling consumers to make healthier food choices, proposing food offers with culinary advice to increase satiety of healthy food, and proposing easy and convenient solutions to enable people to change their unhealthy eating behaviours. For this area in particular, investment was considered key: “No money – no results”.

Opportunity 1: Social innovation – community hub network (funded by subsidies)

Establish places for mutual learning through regulation, network effort, subsidies (co-creation effort): how to prepare and grow foods; provision of foods and ingredients through the hub; embed in the local culture, take cooking guides home (availability of healthy food and social aspects)

Opportunity 2: Vouchers for healthy food

Basic income: provide tasty, healthy, and affordable food to people

Opportunity 3: Social policy – social prescribing for fruit and vegetables

Public health approach. Policy and financial incentives/penalties for healthy/unhealthy eating habits (not selected for further discussion due to time limits)

Opportunity 4: Restrict promotion and placement of unhealthy food

Change regulation, use social media and influencers to reach consumers (changed from: ban advertising of foods high in salt, added sugars, and saturated fats).



Table 9: Opportunities’ influence on outcomes identified for Priority Area A

Outcome	Opportunity influencing the outcome	Degree of influence
1. Improve knowledge of food/nutrition across life course by 2030	Community hub	Strong
2. Establish one true definition for health and dietary guidelines by 2025	- Food system incentives - Community hub	- Medium - Medium/ Strong
3. Restrict promotion and placement of unhealthy food, and limit unhealthy fat, added sugars and salt content in foods by 2030	Advertising of healthy food	Strong
4. Improve and incentivise reformulation of healthy European food products	- Food system incentives - Tech innovation	- Strong - Strong
5. Increase production, affordability, availability of healthy foods to enable 95% of people to follow food-based dietary guidelines every day by 2030	- Food system incentives - Tech innovation	- Strong - Strong
6. Improve consumption of and attitude to healthy foods so that 95% of people are following food-based dietary guidelines every day by 2030	- Tech innovation - Advertising of healthy food - Mapping food - Vouchers for healthy food	- Medium - Strong - Strong - Medium

Capabilities and/or technologies, as well as enablers were identified for each opportunity.

Capabilities included information sharing by healthcare professionals, co-creation, community building, networks, experience of voucher scheme operations, product development, quality assurance, data science and engineering. Technologies spanned AI, automated data collection tools, equipment/ machinery, mapping technology for food ingredients, food production and food poverty, and food miles.

Enablers included a comprehensive knowledge base (interdisciplinary knowledge and skills, research development, and pan-European guidance), social spaces for community building including physical spaces and digital platforms for wider social networks, and an impact monitoring infrastructure. They also included fair and equal legal landscapes, stronger communication of myth busting to consumers, local and central government support, and engagement of stakeholders representing all parts of the food supply chain. These would include: Primary Producers (farmers, growers), Food Industry (manufacturing and marketing – R&D scientists, technologists, marketers, strategists), Researchers, Consumers, Educators (Schools, Universities, Ministries & Administrators), Nutritionists, Dietitians and other healthcare professionals (HCP), Policy makers, EIT Food partners, UNESCO and all other

sector organisations e.g. Copa-Cogeca, Food and Drink Association Europe, WRAP, Bauhaus, Mindful Chef and other key influencers.

Conflicts were considered for technological innovation and advertising with regulation, as regulation can be a hindrance when it is adapted and re-evaluated slower than innovation is happening. Mapping of technologies needs to be constantly updated as new technologies, such as sensors, might be incompatible with database designs or operational units.

Opportunities were further linked to elements of EIT Food’s portfolio to identify synergies and conflicts. Opportunities for food system incentives were seen to drive technological innovation, whereas technological innovation could possibly conflict with opportunities to advertise healthy foods if a technological innovation is unsuccessful in meeting consumer demand. Mapping of food production and food poverty could create opportunities to identify and generate food system incentives and could also include mapping of technological innovations. However, it should be noted that mapping technologies themselves evolve and this may present challenges in keeping knowledge up to date. The proposed voucher scheme could link well with the community hub, bringing consumers together in terms of healthy food provision. Public engagement could be developed and extended within EIT food.

Table 10: Opportunities, capabilities & resources, enablers & technologies identified for Priority Area A

Opportunity	Capabilities/technologies	Enablers
Food system incentives	Machinery (air fry instead of oil), engineering, mapping of ingredients, food miles	▪ Equal rules EU wide ▪ Uptake of farmers' produce ▪ Myth busting (legislators approved, but consumers unaware) Stakeholders: UNESCO and all other sector organisations, Copa-Cogeca, Food Drink Association Europe
Tech innovation	Equipment and product development: consumer centric AI to make more informed decisions, but also food providing and new product development (reformulation) industry 5.0 – consumer focus	▪ Digital, manufacturing, ▪ Out of home industry producing healthier food solutions, ▪ Incubators, finance. ▪ Research development innovation, IPR, ▪ Interdisciplinary knowledge (disciplinary and interdisciplinary knowledge to develop curricula to bring in people with different backgrounds)
Community hub	Community builders and facilitators (connectors, who can interact, technology enablers). No need for new technology itself, build on what is already there	▪ Impact monitoring infrastructure (how many people adopt diet, how is health improving, school children facilitation – education credits); ▪ Local government for perception and engagement, ▪ Engagement of food industry Stakeholder: Bauhaus, Mindful Chef, Dark Kitchens, "Olio" app
Advertising of healthy/healthier foods	Healthcare professionals to be allowed to communicate health benefits of specific food products	▪ Pan-European guidelines, ▪ Pan-European nutrient profile. Stakeholders: Implementation of pan-European guidelines by DG Sante (department E)
Mapping food production needs	Major automated data collection tools, training, quality insurance, data scientists	▪ Buy-in for all involved, Stakeholders: health professionals (to provide context on needs and what is required)
Vouchers for healthy food	Operation of the scheme. Where basic income does not enable consumers to eat healthily, provision of healthy food vouchers would enable supplementation of diet with healthy foods. Could be accompanied by simple recipes	▪ Support for vouchers/transaction for retailers /food service, loops for evaluation of voucher design, ▪ Define needs at national level (social/ cultural/health needs), ▪ Involvement of national communities. ▪ Need for help with funding (government and potential industries) connection between agriculture, food industry, (from farm to fork vouchers), ▪ Policy reviews with public consultation

Timeline

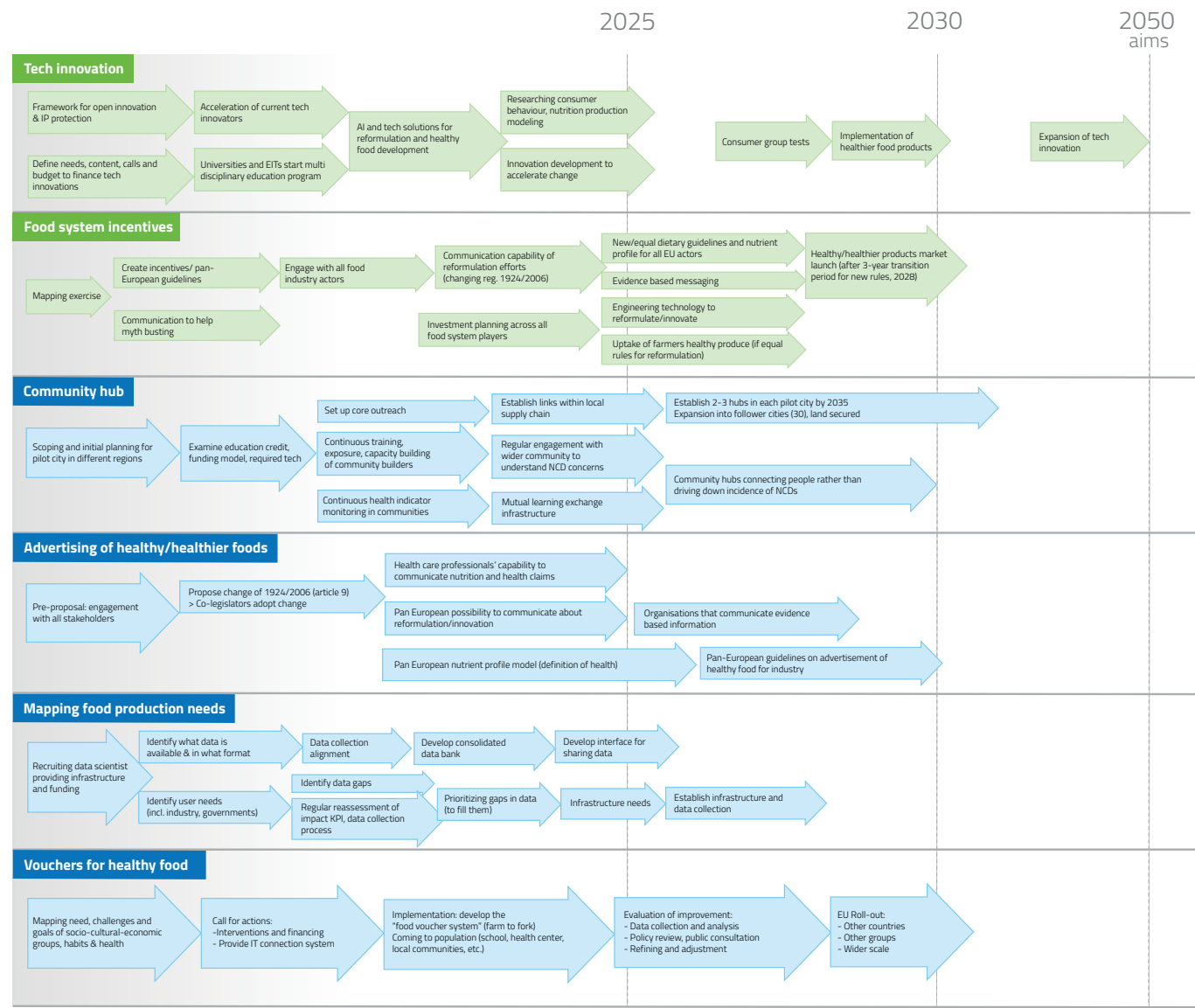


Figure 5: Timeline of suggested opportunities of Priority Area A – results from the Workshop



Priority Area B: Diversify protein sources

Proteins of animal origin are of higher quality thanks to their amino acid content and good digestibility. However, high consumption of protein-rich animal food, notably processed meat, is also associated with adverse health effects and higher risk for NCDs, partly related to other components of these foods, like saturated fatty acids. Other components have beneficial effects, such as calcium-rich dairy products reducing risk of colorectal cancer. Moreover, the current production systems of some protein-rich food is not sustainable. There is an urgent need to diversify proteins in diets, including those of plant origin (principally legumes) and of recent introduction (insects and algae), for both human and planetary health.

Alternative proteins are an interesting landscape to explore. However, they need to be properly investigated to fill gaps in the understanding of their impact on the taste of food, carbon footprint at scale production, availability and affordability and specifically for 'new' sources, their impact on human health when consumed for long periods. Importantly, consumer acceptability will also need to be evaluated. White meat is also an excellent source of protein with neutral effects on NCD risk. Dairy foods are also key sources of a range of micronutrients such as iodine and vitamin B12 as are fish and eggs. Replacing animal protein with plant protein may increase the risk of micronutrient deficiencies which must be accounted for in the whole diet.

Needs in Area B

1. Encourage diversification to include a wider range of sustainable protein sources: There is an urgent need to increase the diversification of proteins in diets, including those of plant origin (pulse/legume/grain), while recognising the importance of animal protein sources as micronutrient source and in the whole food value chain.

2. Encourage and explore 'unusual' protein sources: the production, acceptance and education to increase acceptance of complementary or alternative proteins is within this focus area.

Impact of Area B

- Increase in the sustainability of current protein production systems alleviating their burden due to the current high demand of land, water, and energy.
- More diversified proteins for human consumption and promotion of health benefits based on well accepted scientific principles (e.g. Mediterranean diet).
- Increase the acceptance of alternative proteins by consumers through proper education and effective communication.

Priority Area B: Diversify protein sources for food consumption

Area B deals with the increase in protein diversification to address the challenges related to both human health and sustainable production (strong link to EIT Food Mission 2 "Net-Zero Food System"). This Priority Area is articulated in two sub-areas: the first one aiming at increasing the awareness of known alternative proteins (such as those coming from pulses) by different stakeholders in the food system, while the second focuses on the exploration of new protein sources. It is well accepted that current primary production systems, especially animal, but also plant, need to be redesigned to achieve sustainability goals for the planet and for the health of citizens ("good for people, good for the planet").

By increasing the availability of diverse sources of proteins, it can be expected that the production of animal proteins will decrease, thereby reducing their presence in human diets. This will mitigate the burden related to NCDs, where, at least for some of them, links are clearly established with consumption of foods containing specific ingredients, mainly of animal origin. To increase the consumption of non-animal origin proteins (e.g. legumes) and to promote new protein sources (algae, fungi, and insects) the diversification of proteins must follow defined implementation actions, which address several challenges. For this reason, it is necessary to use a systemic approach which should consider technological, social, government/policy and legal challenges.

Expected outcomes

Five outcomes were identified after analysing the contributions of the panel. Outcome 1 can be considered as the overarching, ultimate goal of the Area, while the others focus on one specific domain (outcome 2, consumer education and awareness; outcome 3, farmers; outcome 4, technologies; outcome 5, policy).



Outcome 1: Increase protein diversification in food consumption so that an increase of 40% of non-animal proteins in human diets is reached by 2035.

There is an urgent need to diversify proteins in human diets and consequently increase the diversification of the sources for food production and consumption. It is foreseen to switch from the “Big Five” (pork, beef, chicken/poultry, sheep, fish) to the “Big Ten”, where also legumes/pulses, algae, insects, new crops and fungi are considered, and giving consumers an overview or map of available protein sources. While increasing the consumption of plant-based protein, the consumption of red/processed meat should decrease, through a push of plant-based alternatives and elimination of processed meat snacks. Production methods for protein-rich food with reduced carbon footprint should be encouraged, which can also include precision fermentation or cultivated meat, further reducing production costs for these and other “unusual” protein sources. Particular attention should be given to ensure availability, accessibility and affordability of all (alternative) protein sources, also in small local grocery stores.

Outcome 2: Increased consumer/citizen awareness through targeted education to reach at least 40% more people being aware of protein diversity by 2030

Consumer awareness and acceptance towards diverse proteins and of healthy eating patterns must be increased through targeted education. The existence of well-known protein sources, foremost plant-based such as legumes, has to be promoted via different strategies based on the target audience, to induce bottom-up changes and a cultural shift to accommodate alternative proteins. It is important to create curricula at universities and teaching activities in secondary schools to promote the adoption of proteins different from the traditional ones. Investments in elementary schools for courses focusing on healthy diets, including the importance of diversification of proteins, are foreseen. By 2035, 20 course curricula on alternative proteins at education level (primary, secondary and university levels) should be

implemented already, aiming at a better understanding of connecting health benefits, sustainability and – not to be neglected – cooking skills. Educating people to increase acceptance of diverse and sustainable protein sources will result in increased sales of good proteins and decreased sales of bad proteins by 10%. This goes hand-in-hand with sustained communication and appropriate marketing and product development without compromising on taste and flavour.

Outcome 3: Helping farmers into diversification (subsidies, policy) aiming for an increase of 20% more farmers growing/breeding alternative protein sources

Primary systems devoted to the production of animal proteins need to be reconverted and helped to diversify their outcomes. This is also valid for plant-based primary systems, which must switch from extensive monoculture, mainly used for animal feeding, to the cultivation of plants rich in proteins for human consumption. This transition must be supported by the Member States and the EU, through the establishment of subsidies for those farmers who agree to initiate this transition. A 30% increase in harvests from complementary protein sources while reaching a decrease in production of the “big five” should be achieved (pork, beef, chicken/poultry, fish, sheep). This will lead to a wider range of high-quality plant proteins being produced in a soil-friendly way, including new crops and protein sources with good yield, and a decrease in animal farming. Routes to compensate or subsidise farmers’ transition from red meat production must be explored to incentivise farmers to differentiate. Also, research is needed to breed or grow plants with all essential amino acids.

Outcome 4: Technologies and production methods in place for scalable, cost-effective, sustainable diverse protein (products) – to increase companies producing products with complementary proteins by 50%

There is a need for new technologies and the adaptation of existing ones to properly treat proteins for human consumption. Key aspects to address are taste, rheological characteristics, and nutritional profiles. It is imperative to have those technologies established at industrial levels and be able to scale them up. As a first step, we need to identify key enabling technologies for different sustainable proteins and challenges for scaling up the process. Appropriate industry standards need to be established (i.e. to compare conventional proteins to alternative proteins).

Outcome 5: New policies in place related to use of diverse protein sources in food formulation (without falling into “novel food regulation”)

It is essential to facilitate the use of different sources of proteins in food production without increasing the burden for their commercialisation. The European legal framework is complex and does not really allow for a prompt exploitation of new sources of proteins, if they are not “traditionally” used. The novel-food regulation hinders innovation in the formulation of food products, especially where new sources of proteins are considered. A new regulatory framework separate from the novel food regulation must allow a proper and prompt exploitation of the opportunities linked to the use

of new protein sources. There is a strong need for simplification of the regulation, promoting an efficient transition of food companies towards an improved use of alternative and new proteins.

For this outcome to be successful, outcomes 3 and 4 must be implemented as well. Proper primary production is essential for the food industry to engage with new transformation technologies to produce food products containing improved quantities of diverse proteins.

To set the identified outcomes in a broader perspective, Table 11 presents an overview of how NCDs relate to these outcomes. Different animal-derived foods have different associations with NCDs:

- **Colorectal cancer:** Reduction in red and especially processed meat consumption. Plant proteins may be accompanied by dietary fibre.
- **Type 2 diabetes:** Reduction in red and especially processed meat consumption.
- **Alzheimer’s disease/dementia:** Limited evidence that processed meat is associated with increased risk.
- **CVD:** This is generally because many animal-derived foods (especially dairy, red meat) are major suppliers of saturated fats historically believed to increase CVD risk. Whilst generally true for saturated fats from meat it is not the case for dairy for a range of reasons.



Table 11: How NCDs relate to outcomes of Priority Area B –
Workshop outcomes aimed at supporting NCD reduction

Outcome	Insights	Counterbalancing issues that need to be considered
Increase protein diversification in food consumption (Outcome 1)	Unclear unless this leads to reduced red/ processed meat consumption.	Need to consider how to replace nutrients and functionality of animal products. Notably the need to replace iron and zinc supplied by red meat. Replacement of dairy proteins needs serious consideration as they also provide calcium, magnesium, iodine, vitamin B12 and other nutrients. Of particular concern are adolescent females who may already have suboptimal levels of these nutrients. Risk of chronic bone weakness as already seen in vegans/vegetarians ³³
Increased consumer/citizens awareness through targeted education (Outcome 2)	Always important	Must be evidence-based and not beliefs.
Increase in sales of good proteins and decrease of sales of bad proteins by 10% (Outcome 4)		Dependent on what is defined as good or bad.
Having technologies & production methods in place for scalable cost-effective, sustainable diverse protein (products) (Outcome 4)	Benefit or not would depend on what was produced	Novel technologies would need to include knowledge of protein quality, not just amount.
Helping farmers into diversification (subsidies, policy) (Outcome 3)	A long way from NCD consideration.	

33 Iguacel et al. (2018) "Veganism, vegetarianism, bone mineral denfasity, and fracture risk: a systematic review and meta-analysis". *Nutrition Reviews* 77:1–18.
Tong et al (2020) "Fracture risks associated with four dietary patterns in the prospective EPIC-Oxford study". *BMC Medicine* 18:353.

Opportunities

To provide some context behind these Priority Area B opportunities, the following trends were classified by the participants as highly relevant for diversifying protein sources in human diets:

- Societal trends such as social media and influencers
- Consumer engagement
- Health- and food-conscious consumers

This is strongly connected to the trend for alternative protein sources, which was rated high in the technology factors. Other trends such as farm structure, cultured / in vitro meat and availability of raw materials also received attention.

Several opportunities have been identified to create value in delivering this Priority Area. They were basically clustered in four overarching areas, and some ideas for steps to be considered for each of the opportunities were collected in the workshop and are summarised in Figure 6.

Opportunity 1: Technology developments

This opportunity focuses on the need to develop new technologies or adapt technologies from other disciplines, such as the pharmaceutical or biotech industry, to reduce production costs for new products with higher protein diversity. It is seen as a big task to correctly process new protein sources without impairing their nutritional content and at the same time reaching appropriate organoleptic standards. It is necessary to properly demonstrate that the new ingredients obtained from new proteins are not harmful to human health in terms of allergens and presence of foodborne pathogens, which can be different from those found in current foods. Also, industry standards need to be established to compare conventional proteins to alternative proteins.

To increase the acceptability of new proteins, consumers can co-create innovations, and market tests can help to understand the perception of stakeholders along the value chain. Training and development of professionals is needed to develop knowledge for the production of new foods containing different protein sources, and courses for industry are required. Quick wins can be achieved as existing programmes might be available to push for technology transfer from research centres to industry, so to simplify the implementation of new ingredients and new processes in the food industry and achieve peer to peer knowledge transfer.



Opportunity 2: Consumer education

This opportunity is consumer oriented and aims to achieve bottom-up changes of individual choices and practices. A collaborative approach with consumers is needed, to gain information and establish transparency about sustainability in consumer choice relating to diets. Consumer education is seen as quick win to deliver correct and science-based information regarding the benefits of diversification of proteins in the diet. Transparent, comprehensible communication of new developments must be aimed at delivering truthful information to consumers who choose to engage with concepts related to sustainability and healthy diets. New protein sources need to be included in the food pyramid and other infographic material. Research is needed to properly address the needs and perceptions of consumers regarding new products containing ingredients which are new and create food products with new characteristics in terms of taste and consistency.



Opportunity 3: Primary production diversification:

Adapting and redirecting primary production towards more protein diversification was regarded as a big project. To diversify intensive monocrop cultures and animal production systems with more sustainable cultivations will be good for the planet, but also good for people when introduced in their diets. This task will need to go along with a mapping of most profitable crops with high yield, new agricultural practices and techniques, such as vertical farming, precision farming, aquaculture, algae or insect farming in combination with research on mycoprotein technologies or soil microbiology. This opportunity must also consider the incentives for primary producers to produce “unusual” proteins.

Opportunity 4: Appropriate policy and regulatory framework

Facilitating the adoption of new/diverse protein sources in food production in the future without cumbersome legal or regulatory procedures, will require appropriate and clear policy and regulatory framework. New regulations should also facilitate cross-function collaboration (e.g. food/biotech/pharma/policy makers) to create alternative protein products that are functional and affordable.

For each of the opportunities described above, capabilities and enablers were identified. Moreover, a pathway was constructed to be followed by implementing the opportunity by 2050. For each of the opportunities described above, capabilities and enablers were identified. Moreover, a pathway was constructed to be followed by implementing the opportunity by 2050 (Table 12).

Table 12: Opportunities, capabilities & resources, enablers & technologies identified for Priority Area B

Opportunity	Capabilities/technologies	Enablers
Technology Development	- Waste valorisation - Ideation workshop - Analytical science labs / research facilities - Modelling & simulation - Sensory labs - Technical forums for academy & industry – streamlined platform - Academic papers & patents - Sustainable / safe / alternative packaging solutions - Fermenters / bioreactors (technology & capability) - Stem cell research / fermentation - Fully personalised proteins - Protein extraction & processing technology - Apps to identify info on new products (QR code) - Bioinformatics (AI) - Metaverse - Novel processing technologies	✓ Environmental scientists & the energy sector ✓ Venture capital/investors ✓ Industry leaders ✓ NGOs ✓ Start-ups / spin offs ✓ Ingredient evaluation ✓ Toxicology / risk assessment ✓ Precision agriculture ✓ Cross-disciplinary collaboration (transfer of skills& knowledge e.g., food to pharma) ✓ Biotechnology ✓ Regulatory framework ✓ Waste utilisation (production of protein from waste) – circular economy ✓ Targeted funding
Consumer Education	- Chapter in GSCE /A-level (secondary school equivalent), curriculum/syllabus - Science fairs - Online topical courses for targeted audiences (e.g. consumers) - Protein diversification forum /consortium - Experience sharing (peer to peer transfer, hear from early adopters) - Work with chefs & nutritionists => helps adaption - Coherent, streamlined marketing strategies to reach different age & social groups - Communication / dialogue between various stakeholders along the value chain - Specialised university courses & professional development programs - B2B, B2C “cooking” courses how to use alternative protein products - Co-creation tools: focus groups; qualitative & quantitative test; online questionnaire - Co-creation methodology (or methodologies) - Market test (shopper experience) - Gamification - Experimental learning - VR / AR for immersive learning - Neuroscience - Learning management system (online infrastructure) - Infographics e.g. inclusive food pyramid (elaborating other protein sources)	✓ Media coverage ✓ Chefs & nutritionists ✓ Healthcare professionals ✓ Nutritionists & dieticians ✓ Regulators ✓ University professors & industry leaders ✓ Schools ✓ Cookbooks ✓ Food services (canteens, catering, restaurants) ✓ Educators (parents, teachers, caregivers) ✓ Health insurance companies ✓ Social media ✓ Funding ✓ Opinion leaders ✓ Data ✓ Knowledge ✓ Communities ✓ Culture/tradition / values

Adapt and Redirect Primary Production, Farming	- Peer-to-peer knowledge transfer - Mentoring & reverse mentoring - Workshops to share best practices - Mapping of most profitable plant-based crops (high yield) - Vertical farming - Soil microbiome - Aquaculture technique - Precision farming (sensors, drones etc.) - Algae technology - Insect farming - Mycoprotein technologies production	✓ Funding mechanisms / incentive to adopt practices. Procurement of goods and “supply chain” ✓ Mentors ✓ Governments, policy makers, regulators ✓ Influencers ✓ Communities / culture / local knowledge / traditions / values ✓ Subsidies for farmers drivers for changing primary production
Appropriate Regulatory / Policy Framework	- Body of knowledge & whitepapers - Communication skills - Low tech	✓ EC DGs Agri & Sante ✓ Environmental agencies ✓ ETP European Technology Platforms (e.g. Food for Life) ✓ Lobbyists & think tanks ✓ EU Member States ✓ Networks / connections ✓ EIT food communities as a multistakeholder platform / group

Synergies between the pathways could occur through the **formation of forums**, where subgroups for technologists, regulators or primary production could be founded. Also, **sensory labs**, especially addressing consumers, are a good connection point between the identified opportunities. For **training and education**, we need to develop ways of tailoring content to different audiences, depending on the purpose of knowledge transfer (level of school education, training, upskilling, etc.). Connection points were also seen between supply chain logistics, retailers and manufacturers, as well as between manufacturing and consumers.

Thematic overlaps between the identified opportunities include issues of **food safety and security**, as well as **regulation** for technology, farming and manufacturing practices. **Environmental scientists** should be involved in approaches to achieve more protein diversity. Also, special attention must be paid to **crossover technologies**, with a focus on technologies from pharmaceutical production. Overlaps were also seen with Mission 2 “Net-Zero Food System” and Mission 3 “Reducing Risk for a Fair and Resilient Food System”, when it comes to **adaption and assessment of farming practices**.

Cultural resistance to change was perceived as the biggest barrier to adoption of new proteins. The biggest issue for new products is taste, flavour, and texture to win consumers over. **Data science** is seen as an enabler but bears a lot of conflict potential when it comes to ethical discussions and GDPR issues. The **political landscape and regulation** hindering the swift approval of new products and technologies was considered a barrier for implementing new protein sources. **Implementing (theoretical) projects into practice** was also mentioned as a conflict, for example for existing **farming structures and implementation of new farming models**.

Barriers are (lack of) **accessibility to large or adequate funding** and **patents** linked to new technology or production methods.

How do the opportunities fit with the EIT Food portfolio?

One of the challenges for EIT Food is the “new proteins”, in terms of the new technology and the processes in development, as well as the funding mechanisms. EIT Food already has a focus area on protein diversification and a whitepaper on this topic was published on December 15th 2022³⁴. At the workshop, the contribution of EIT was seen as crucial but limited, with a need for thematic lobbying at central EU government and regional level. Innovation in this area is also being supported by The Prize-Based Challenges, which

were open for applications until September 2022 on Personalised Nutrition for All and Cultivated Meat Innovation Challenge.

Furthermore, start-ups were discussed as playing a central role in achieving high impact and mapping of start-ups worldwide was suggested, including the food industry and connected sectors. This could reveal clusters and trends within protein diversification, and identify which infrastructure, human capital and other resources are missing.

Timeline

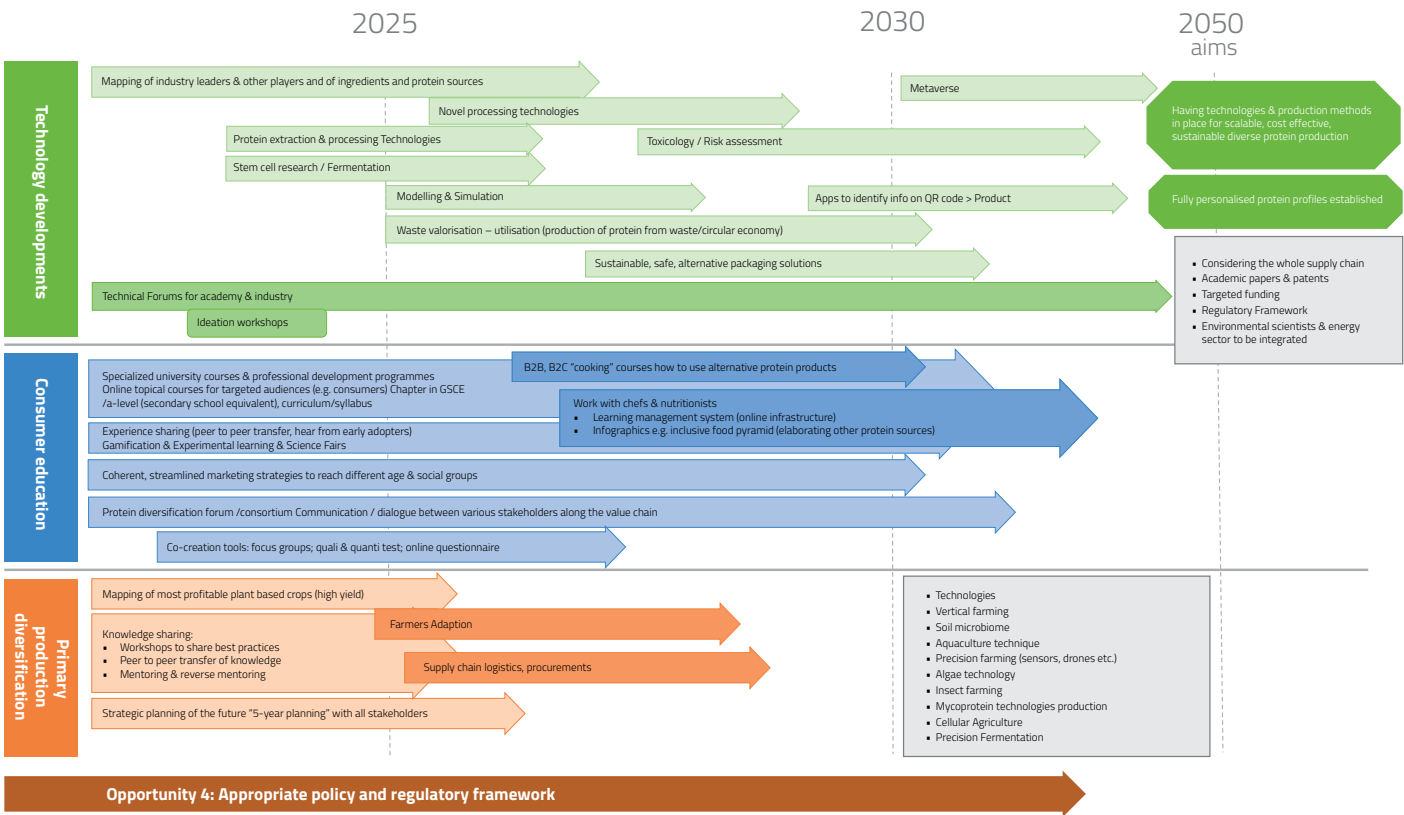


Figure 6: Timeline of suggested opportunities of Priority Area B – results from the Workshop

34. EIT Food (2022) Protein Diversification [An EIT Food White Paper]. <https://www.eitfood.eu/reports/whitepaper-on-protein-diversification>

Priority Area C: Increase and retain the nutrient density of food

Priority Area C was designed to explore ways in which we can increase and retain the nutrient density of foods throughout the entire food value

chain. The attraction of high nutrient density is that more nutrients can be provided with less associated energy than with low nutrient density foods. Potentially this has benefit for **managing energy intake and bodyweight**.

Priority Area C: Increase and retain the nutrient density of food

Nutrient-dense foods contain vitamins, minerals, complex carbohydrates, essential amino acids, and healthy fats. They are high in nutrients in proportion to energy content and include fruit, vegetables, seafood, lean meat, legumes, wholegrains, dairy products and nuts. They contrast with energy-dense foods (also called “empty calorie” foods), such as alcohol and foods high in added sugar. The consumption of nutrient-dense foods is beneficial for health and essential in a healthy diet. Maintaining nutrient density is very important during food handling and preparation. Furthermore, consuming foods enriched in micronutrients is beneficial for preventing deficiencies, especially in populations at risk.

The production and consumption of sustainable and affordable nutrient-dense foods represents an industrial and economic challenge for all those involved. But it is essential that these healthy, nutrient-dense foods become the main-stay of a healthy diet.

Needs in Area C

- **Improve nutrient content (and bioavailability) of foods from soil to product.** Increasing the nutrient content in food must be a collaborative action between primary production, research, nutritionists, and the food industry. Appropriate environmental and economic strategies lead to improved food.
- **Preserve nutrient contents throughout the food value chain (production, processing, retail, etc.).** Through short value chains, innovative delivery services, packaging or appropriate processing methods high nutrient contents in food can be maintained.
- **Consumer education** on how to identify and manage nutrient-dense foods is a point to be considered in both focus areas.

Impact of Area C

- Increase the nutrient density of foods through novel techniques in agriculture and aquaculture, but also gene technology and food fortification until adequate nutrient density is reached.
- Respect natural production ecosystems (i.e. soil and water), favouring seasonal products, which may have a naturally better nutritional profile.
- Create novel beneficial foods to promote healthy diets based on scientific principles (food combination and preparation, limitation of energy-dense foods).

Expected outcomes

Five outcomes were identified: Outcome 1 is overarching the whole mission but in the context of this Priority Area focuses on the role of industry. The other four outcomes focus more on the consumer. Outcomes 2 and 3 concentrate on consumption change in general (in adults and children) while consumer education and awareness received more specific attention in Outcomes 4 and 5.

Outcome 1: 10% reduction of deaths related to NCD in high prevalence countries by 2030

This outcome aims to substantially reduce NCD-related deaths in countries with high prevalence. A substantially higher CVD mortality and prevalence is noticeable in Baltic and Eastern European countries. This is assumed to be primarily due to the higher intake of trans fatty acids of industrial origin³⁵, which was reduced in Western European countries by targeted campaigns and a vigorous reduction of industrial trans fatty acids in foods over the last 30 years. High sodium intake in several Eastern European countries, foremost Bulgaria, has substantial impact on the high stroke rate³⁶, while diets low in calcium and dietary fibre, and high in processed meat are attributed to high rates of colorectal cancer in these countries. All this evidence provides an important target for reducing NCDs in these countries, where there is a need for manufacturers of relevant foods to alter ingredients to reduce trans fats in foods.

Outcome 2: 50% of EU population meeting minimum daily recommended vegetable & fruit consumption by 2030

Globally, consumption of meat, sugars, oils, and fats has been increasing during recent decades, whereas the intake of fibre-rich foods such as wholegrains, pulses and roots has been declining in the last decades, but with an upwards trend again in recent years³⁷. Suggested common

dietary recommendations for preventing NCDs are diets high in vegetables and fruits, wholegrains, pulses and nuts and seeds, with balanced, diverse protein intake and minimised consumption of red and particularly processed meat. Foremost dietary recommendations for the prevention of Alzheimer’s disease and type 2 diabetes mellitus stress a high intake of fruits and vegetables, where the risk for most NCDs can be reduced with a diet consisting of high intake of fruits and vegetables: eating at least five servings per day, three of vegetables and two of fruit.

Outcome 3: 100% of EU children increase their consumption of vegetables & fruit by 10% by 2027

Healthy eating is essential for a child’s good health, growth, and development. Healthy eating in childhood means they will have less chance of developing chronic diseases like heart disease, type 2 diabetes, obesity, and some cancers. It is vital, as for many, that healthy eating behaviour is trained at an early age, as less healthy eating habits established early on can create a pattern of lifelong obesity and increased risk of CVD, type 2 diabetes etc.

Outcome 4: All EU early years curricula to include food education by 2027

People need balanced and proper nutrition at every age, but children especially require the right nutrients to grow healthy and strong. When children truly learn about nutrition and the importance of physical activity, this sets a foundation for future eating habits and knowledge that they can apply for themselves as they grow up. Related to this is the importance of physical activity at all ages, which not only reduces NCD risk but can also enhance mental health. The importance of diet and exercise should be taught together. Consequently, this outcome was defined to include food education in early years curricula.

35 Firdaus & Sunita (2021) “Industrial trans fatty acid intake associated with coronary heart disease risk: A review”. *J Nutr Food Sci*, 11: 806.

36 He & MacGregor (2015) “Salt and sugar: their effects on blood pressure”. *Pflugers Arch – Eur J Physiol* 467:577–58.

37. Global and regional food consumption patterns and trends. (n. d.). <https://www.fao.org/3/ac911e/ac911e05.htm> and references in chapter 4.

Outcome 5: 50% increase from current baseline of healthy food awareness in EU citizens by 2032

It is essential to promote an awareness of the nutrients contained in foods in relation to their roles in body maintenance, growth, reproduction, health, and disease prevention in humans. The message should be that eating a healthy diet is not all about counting calories and carbohydrates, but about eating the proper foods to support the body’s natural functions and maintaining an active lifestyle. Appropriate nutrition is important for a variety of reasons, including optimal cardiovascular function, muscle strength, respiratory ventilation, protection from infection, wound healing, and psychological well-being.

Outcome 6: Increase of regenerative agriculture in the EU by 2030 with a specific target to increase the nutrient content of crop harvest by 10%

Through a transition to regenerative farming and other measures, awareness must be raised to achieve nutrient-sensitive agriculture and increase the nutrient content of crop harvest by 10%. Metrics must be established to measure macronutrient content and bioavailability in finished food and to promote crops that are nutrient-dense from farm to fork. This includes measures and technologies along the entire food supply chain as well as through education and training to reduce knowledge gaps.

To set the identified outcomes in a broader perspective, Table 13 presents an overview of how NCDs relate to these outcomes. Considering the connection of Pathway C to specific NCDs the following observations should be considered:

- **Colorectal cancer:** Risk would be reduced if density of fibre and calcium were increased. Milk has been shown to be associated with reduced risk in good part mediated by its high calcium supply. Milk is a nutrient-dense food but despite that it remains a protein replacement target³⁸.
- **Alzheimer’s disease/dementias:** Diets which provide more long chain n-3 fatty acids (DHA in particular) as found in oily fish maybe helpful, particularly in females.³⁹
- **Type 2 diabetes:** Potential benefit via moderation of BMI/adiposity which is a major risk factor. Also, protein-rich diets shown to reduce appetite with benefit for BMI control⁴⁰.

38. World Cancer Research Fund International (2022b, November 28). *The Third Expert Report - WCRF International*. <https://www.wcrf.org/diet-activity-and-cancer/global-cancer-update-programme/about-the-third-expert-report/>

39 Liu et al. (2022) "Association of fish oil supplementation with risk of incident dementia: A prospective study of 215,083 older adults". *Clinical Nutrition* 41: 589-598.

40 Leidy et al. (2015) "The role of protein in weight loss and maintenance". *Am J Clin Nutr* 101(Suppl):1320S-95.

Table 13: How NCDs relate to outcomes of Priority Area C – Workshop outcomes aimed at supporting NCD reduction

Outcome	Insights	Counterbalancing issues that need to be considered.
Improving knowledge of food/nutrition in the public and among farmers (Outcome 4)	This would make consumers more selective when purchasing food and would encourage farmers to increase regenerative agriculture.	Influence on costs of food production and subsequently retail
10% reduction of deaths related to NCDs in high prevalence countries (Outcome 1)	A good target but will depend on obtaining data on causation. It is likely that the trans fat issue would have a substantial impact.	
Increase nutrient content of crops at harvest (Outcome 1)	A good ambition but how achievable is it?	Impact at the whole diet level would need scrutiny.
50% increase in food awareness in EU by 2032 (Outcome 5)	A valuable target	Means of achieving this would need a lot of thought
Increase education programs throughout EU so all curricula include food education within early education in 5 years (Outcome 4)	This is seen in the other pathways and is important	
100% of EU children increase their consumption of vegetables & fruit by 10% by 2027 (Outcome 3)	Reduce childhood obesity – We are now seeing reduced insulin sensitivity in overweight children which is part of type 2 diabetes development. There should be more emphasis on vegetables as they provide more fibre than fruit, helpful for colorectal cancer reduction.	Emphasis should be on diet and exercise. As above, the means of achieving this needs a lot of thought
Application of wholegrains – not losing nutrients along processing chain (Outcome 1&2)	This was part of several issues connected to plant breeding, regenerative agriculture etc. No doubt the creation of cereal-based foods more suited to dealing with type 2 diabetes and possibly CVD.	The impact will depend on how much influence these foods will have on the total diet. Examples now often indicate a very small effect, but this could change.
EU-wide dietary guidance (Outcome 2)	A consistent message is needed to reduce the prevalence of all diet-responsive NCDs	Some specific guidance may be needed for high prevalence MS.

Opportunities

Opportunities for Priority Area C focus largely on agriculture, consumer behaviour, policy and labelling. Key drivers for increasing nutrient density of foods were seen in agricultural developments, encouraged by agricultural policy, increasing the proportion of organic farming to standard agriculture, permaculture, and ensuring the availability of resources through novel techniques in agriculture and aquaculture. The trend towards alternative protein sources noted here links with Priority B. Consumers were also seen as strong drivers for Priority C: being more environmentally and health conscious, taking their shopping behaviour into account and their tendency to make changes in their diets for more globally sourced foods and vegan or vegetarian diets. Transparent labelling, adequate nutrition and health policies, responsible advertising and comprehensible messaging, and targeted food taxes were perceived as influencing factors. Social innovations and reduction of social inequality were seen as positive drivers. Also, adequate sustainable financing models were added as a positive trend.

Many opportunities have been identified, for which it should be stressed that **all the opportunities were conditional on education as a transversal activity**. Education at all levels, to train the trainer, for primary education, higher education, addressed at the agricultural sector as well as following up through the whole food system. We elaborate on six opportunities in more detail and summarise steps to consider in Figure 7.

Opportunity 1: School meals

School meals were considered a quick win opportunity to reduce NCDs. The idea was that providing children with healthy breakfast, lunch, (and dinner) and offering options for healthy eating during holidays. They receive an adequate diet for their age and become familiar with what good/healthy food looks like. This may also reduce geographical variation in NCD prevalence.

Opportunity 2: Help transition to regenerative farming for better soil

This opportunity focuses on promoting crops that are nutrient-dense from farm to fork. It is considered a big project to facilitate the transition to regenerative farming and hence to more nutritious food. Incentives to shift to sustainable production (production/farmers) and green & affordable energy are needed for this change. Measuring the (macro)nutrient content and bioavailability in finished food should be implemented to monitor the effect of appropriate farming methods.

Opportunity 3: Fundamental nutritional content through the supply chain

Adding to Opportunity 2, nutritional content of crops must be sustained over time through the supply chain. Incentives are needed in the production system for appropriate packaging or short retail systems where nutrients are retained are necessary. Enhancements through the supply chain are also to be considered, where delivery costs and affordability for the end consumer to follow their different dietary patterns and resources.

Opportunity 4: Promote wholegrain and nutrient-dense crops from farm to fork

Promoting wholegrains appears like a quick win but it is not easy to implement. Dietary habits, shopping behaviour, low food awareness, but also food prices are topics that influence the uptake of wholegrain and nutrient-dense crops by the consumer. It is important to consider that “one size doesn’t fit all” and to make consumers knowledgeable.

Opportunity 5: Regulation and communication

Regulation and communication focus on policies and marketing. Regulations are needed on an EU-wide scale to guide diets and protect the environment (incl. natural resources, water, and land). This can be done through packaging and labelling e.g. through combined nutrition & ecolabels for food packaging to increase transparency of nutrient content (especially for products aimed at children). Another option is to enable producer networks for economies of scale to promote vegetable and fruit advertising.

Opportunity 6: EU-wide food big data platform

This opportunity foresees the development of an EU-wide platform for all food-related data. Real time data about consumption habits, food demand and production data were considered a big project but with a quick win. A platform can

create synergies through identifying short(er) supply chains and promoting bottom-up local, sustainable practices. Economies of scale can help suppliers, producers, big industry and ultimately the consumers.

Furthermore, the issue of *taxation* was heavily discussed, the option of reducing or erasing all taxes on fruits and vegetables was welcomed by all. However, increasing taxes on sugar was seen as highly controversial.

Based on these six opportunities, capabilities & resources and enablers & technologies were identified.

How do the opportunities fit with the EIT Food portfolio?

Identified opportunities align in several aspects with the EIT Food portfolio. The opportunity “School meals” can be addressed through Public Engagement, Innovation (tool development), and Public Affairs. “Transition to regenerative framing” requires the sections Education, Innovation, Business Creation, and Public Engagement (Communication). Public Engagement, Innovation (new products), and potentially also Business Creation can promote wholegrain & nutrient-dense crops. The opportunity “food data” requires Innovation and Public Affairs from the EIT Food portfolio.



Table 14: Opportunities, capabilities & resources, enablers & technologies identified for Priority Area C

Opportunity	Capabilities & Resources	Enablers & Technologies
School meals	Knowledge about nutrition for children, school and local school environment, coordination. <i>Resources:</i> money to fund, food partnerships to reduce costs, local producers, charitable organisations	Pilot geographies; <i>Technologies:</i> Measuring & monitoring baseline
Help transition to regenerative farming for better soil	Coordination; best knowledge about nutrition; farming; target groups of benefits it provides. <i>Resources:</i> Marketing & communications expertise; trainers; Web interface IT,	Required curriculum (health); <i>Technologies:</i> (Online) courses
Fundamental nutritional content through supply chain	Expertise/knowledge about regenerative/ organic/sustainable practices; <i>Resources:</i> Expertise in practices; training support	Tax breaks/incentives for producers/ farmers; <i>Technologies:</i> Plant breeding techs and knowledge of what has been lost in development process 40 years ago
Promote wholegrain and nutrient-dense crops	Education about wholegrain diet and for producers the application of wholegrains (links with technologies); <i>Resources:</i> Ensuring sufficient raw materials; education; Marketing & communications	Breeding technologies; enhancing value of grain (fibre); reduce waste in grain processing/formulation/change processing technologies; increase natural sustainable shelf life. <i>Technologies:</i> Application of wholegrains – not losing nutrients along processing chain
Regulation and communication	Political willingness; Marketing & communications expertise; scientific data on nutrients; convening ability	Education; policy; <i>Technologies:</i> science behind nutrients
EU-wide food big data platform	Data analytical expertise; management; systems thinking; <i>Resources:</i> Funding; wide adoption (usage widely)	Consistent reporting metrics; expertise on measurement; <i>Technologies:</i> Measuring & monitoring mechanisms/tech

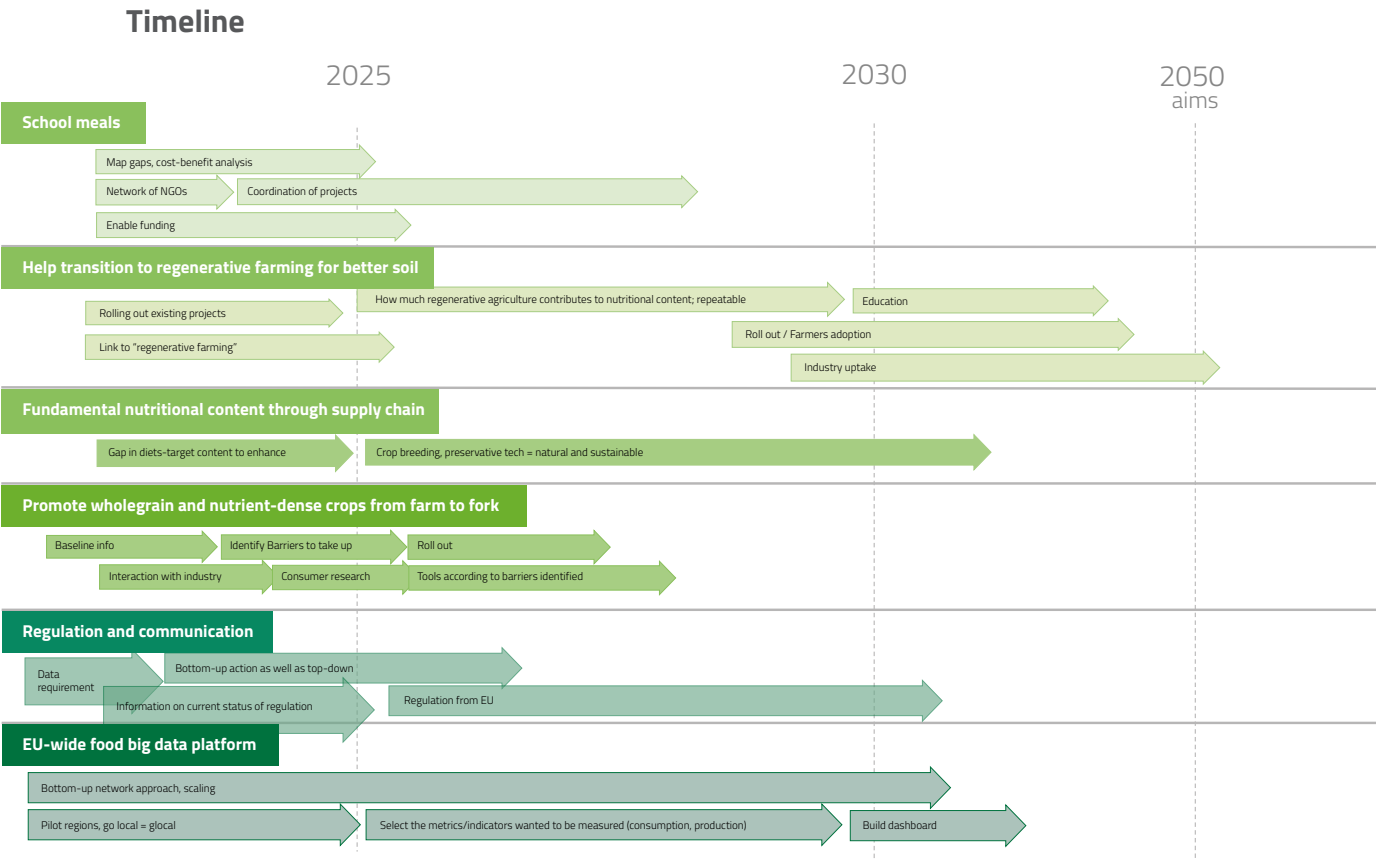


Figure 7: Timeline of suggested opportunities of Priority Area C – results from the Workshop

4.4 Synthesis across Priority Areas

The **aim of Mission 1 “Healthier Lives Through Food”** is to achieve a reduction in the prevalence of obesity and NCDs in target populations through a systemic approach, including technological innovation, education, awareness, and collaborative initiatives of various stakeholders. The **goal** is to **increase the healthy years of life**. Nutrition is one of the key factors contributing to more health for all and to reduce the related economic burden of preventable NCDs. Thus, the vision for this Mission 1 can be described as **“More healthy life years for all”**, expressed as **increase in health-adjusted life years (HALYs)** or **decrease in disability-adjusted life years (DALYs)**.

Maximising people’s health and minimising the burden of NCDs are critical to mitigating the effects of any health crisis. Costs of NCDs in terms of lives and livelihoods lost is coupled with a staggering economic impact, both in healthcare expenditure as well as the negative impact on human capital and productivity. Direct financial costs are the expenses directly connected to patient diagnosis, treatment and hospital care, whereas indirect financial costs include the value of decreased or lost productivity and income.

During the acute phase of the COVID-19 pandemic, people with chronic conditions were more vulnerable to complications and more likely to die from COVID-19, while they also experienced disruptions in ongoing care. In June 2022, the European Commission presented the Healthier Together initiative to address other major NCDs in the EU, such as cardiovascular diseases, diabetes and respiratory diseases, as well as mental health and neurological disorders. Tackling these conditions requires both greater prevention and improved disease management.⁴¹

While all diet-responsive NCDs are relevant here, priorities are needed based on prevalence, diet responsiveness, associated costs to health and other related services. An initial scoping of the most prevalent NCDs therefore identified five main NCDs to focus on for this Mission: heart disease, colorectal cancer, Alzheimer’s disease, stroke, and type 2 diabetes mellitus.

In this Mission, **three Priority Areas**, defined as problem statements, were suggested to achieve more healthy life years for all as a result of the scoping exercise in Phase 1.

- **Priority Area A: Achieve a balanced diet for people and planet:** Preventing NCDs is strongly linked to healthy foods which also needs to be sustainably produced to meet SDG and net zero targets⁴². Suggested common dietary recommendations for preventing NCDs are diets high in vegetables and fruit, wholegrains, pulses and nuts and seeds, with balanced, diverse protein intake with minimised consumption of red and particularly processed meat, reduced salt, added sugars and saturated fat contents. Strong drivers behind this are industry and retailers offering and placing healthy food choices in their shops and consumers demanding and accepting the healthy food choices.

- **Priority Area B: Diversify protein sources:** Proteins of animal origin are a high quality source of amino acids and tend to have good digestibility thanks to their amino acid content. However, high consumption of protein-rich animal food, notably processed meat, is also associated with adverse health effects and higher risk for NCDs, partly related to other components of these foods, like saturated fatty acids. Other components have beneficial effects, such as calcium-rich dairy product reducing risk of colorectal cancer. Moreover, the current production systems of some protein-rich food is not sustainable with an urgent need to increase the diversification of proteins in diets, including those of plant origin (principally legumes) and of recent introduction (insects and algae), for both human & plant health.
- **Priority Area C: Increase and retain the nutrient density of foods:** Nutrient-dense foods contain vitamins, minerals, complex carbohydrates, essential amino acids, and healthy fats. They are high in nutrients in proportion to energy content and include fruit, vegetables, seafood, lean meat, legumes, wholegrains, dairy products and nuts, which are the opposite of energy-dense foods (also called “empty calorie” foods), such as alcohol and foods high in added sugar. The consumption of nutrient-dense foods is beneficial for health and essential in a healthy diet. Maintaining nutrient density is very important during food handling and preparation, furthermore consuming foods enriched in micronutrients is beneficial for preventing deficiencies, especially in populations at risk.

These three Areas together will help to achieve the target set by this mission: to reduce the prevalence of NCDs and thus reach more healthy life years for all. Specific target groups will need to be considered, as well as geographical differences addressing specific NCDs.

Overarching topics of all three Areas are:

- Availability and affordability of healthy and nutritious foods
- Sustainability of food production and a positive carbon footprint
- Collaboration between various stakeholders specific to opportunities identified
- Education and training to ensure that the necessary skills are available in the food production chain

The **roadmaps** are intended as starting points and guidance tools for stakeholders in the food supply network on the way to make the food system more sustainable.



⁴¹ OECD/European Union (2022), *Health at a Glance: Europe 2022: State of Health in the EU Cycle*, OECD Publishing, Paris, <https://doi.org/10.1787/507433b0-en>.

Expert Perspectives

The perspectives of industrial organisations and healthcare representatives – mainly from outside the EIT FOOD network – were collected via interviews and an extensive survey.

Even though industry is on board to tackle NCDs, its representatives do not differentiate between single NCDs but rather address healthy diet and healthy consumers as a unified issue. Healthcare stakeholders are more aware of NCDs than food system actors. A minority of industrial actors have strategies to tackle NCDs and say that they can improve ingredients without differentiating which ingredients should be tackled, though a majority (75%) claimed to have no such strategy at hand. Therefore, one of the first steps to achieve this mission is awareness-raising of actors along the whole value chain, plus public information and promotion campaigns. The bigger picture is to foster education on healthy lifestyles and nutrition throughout the whole life course resulting in lifelong learning at all levels and training of the workforce to get familiar with new technologies and raise awareness for nutritional values.

The responsibilities to tackle NCDs must be equally shared in value chain segments, and address primary production, linking over to Mission 2 and Mission 3. Besides availability and affordability, nutritious food also needs to be tasty if it is to be widely accepted by consumers.

The development of adequate policy framework and regulations was seen as a big leverage point and conditional for industry to develop new products or reformulate existing products. Changes in production, from primary producers throughout the whole value chain, need to be subsidised and funded from the start, considering not only big industrial players. The needs of SMEs specifically as well as sector differences also need to be considered. Product reformulation as an instrument was perceived as already ongoing without too much need to further push in this direction.

It was also stressed that alongside all the nutritional change necessary to tackle NCDs, the carbon footprint of nutrition must also be considered alongside the nutritional value – to bring sustainability also into focus.

Mapping and Analysis of Stakeholders

Mapping of stakeholders resulted in the diagram below (Figure 8) which aims to give a preliminary overview rather than an exhaustive list of the whole range of potential actors or collaboration partners. Stakeholders were assigned to the three Priority Areas or, where the circles overlap, to more than one of the Priority Areas based on their mission, actions areas or projects (see also the table on Stakeholder Mapping in the [Appendix](#)). The pink circles represent projects from relevant actors, which were included in the diagram to outline potential collaboration opportunities.

The stakeholder analysis below displays actors of relevance for the EIT Food Mission “Healthier Lives through Food”. The actors either state visions and missions or advocate for certain activities which can be classified in one or more Priority Areas, respectively. Since the actors pursue approaches matching the Mission, a collaboration could be beneficial for EIT Food. The section spotlights actors noteworthy for future collaborations. As there are numerous organisations, which particularly address obesity and NCDs by improving dietary patterns, this represents an exemplary description of potential partners and does not represent a systematic analysis.

The stakeholders can be categorised into five groups:

- Scientific-based policy advisory agents
- Education and training programs
- Social and cultural movements

- Innovation and entrepreneurship actors
- Alternative protein organisations and networks

The recommendations aim to illustrate a potential collaboration and partnership approach towards a healthier diet.



Figure 8: Overview of stakeholder mapping

Note: the map is only an excerpt of the stakeholders and does not claim to be exhaustive.

Collaborating with stakeholders at the **science–policy interface** offers multiple opportunities. Establishing or partnering with a network to increase awareness and facilitate dialogue across economic, social, environmental, and scientific realms is one such possibility.

By leveraging resources and expertise, EIT Food can establish an information hub with a comprehensive scientific knowledge base that links nutritional expertise with production and determines science-based gaps and policy options on the national and European level.

Based on this, new campaigns and funding schemes can be launched and advocated. For instance, the **Barilla Foundation**, with its headquarter in Parma, Italy, researches nutritional challenges and the social, economic and environmental dimensions that have to be addressed to transition towards a sustainable agri-food system and a healthy diet. The research and outreach efforts aim to encourage sustainable practices and healthier food choices, leading to concrete change in society and scientific policy recommendations. For instance, the “Food Sustainability Index” analyses the performance of food systems in 78 countries in a comparable manner with the aim to display possible best practice policies to accelerate the transition. It encompasses policies regarding sustainable agricultural transition as well as the effect of food on people’s health.

In addition, the **Joint Programming Initiative ‘A Healthy Diet for Healthy Life’ (JPI HDHL)**⁴² is a collaboration of 20 countries working to integrate research in the areas of food, nutrition, health and physical activity to prevent or minimise lifestyle-related chronic diseases. It coordinates research in regard of NCDs and the respective diet related strategic prevention strategies. Therefore, they financially support R&D and help to build up the appropriate food-health-research infrastructure, stimulate national alignment and inter-ministerial exchange as well as investing in policy science and stakeholder dialogues. Thus, JPI HDHL encompass an expertise scientific-based knowledge regarding nutritional challenges, policy evaluation and recommendation programmes (science-policy interface) as well as contributing to a research infrastructure which foster a cross-national innovation promoting environment.

The **European Public Health Association (EUPHA)** works to improve health and well-being and to reduce health inequalities in Europe by engaging the European public health community in processes related to sustainable healthy nutrition, advocating for the integration of healthy diets into public food services, and sharing lessons learned about food and nutrition policies. EUPHA may be an important partner to access the European public health community to communicate the linkages of population health, healthy nutrition, and sustainability as well as to promote their engagement in this topic.

The **European Public Health Alliance (EPHA)** is a non-profit organisation that brings together public health organisations, health professionals, and civil society organisations to promote better health and health systems in Europe. EPHA advocates for evidence-based public health policies and works to increase access to health information, services, and products. The organisation plays an important role in promoting healthier diets and lifestyles through its work on food policy and nutrition⁴³.



42 About JPI HDHL (healthydietforhealthylife.eu)

43 <https://eupha.org/who-we-are>

Leveraging the knowledge and resources of experts in nutrition, as well as data on food production and consumption, can provide a deeper understanding of the impact of food on health and the respective required policies. Collaboration with initiatives like **NOPA**, which tracks policies on nutrition, physical activity, and obesity in Europe as well as **GINA**, which stores information on nutrition policies, programmes, and outcomes, can improve these efforts. Additional policy insights are provided by **INFORMAS**, which aims to enhance the healthiness of food environments through monitoring and evaluating government policies. They focus on reducing diet-related non-communicable diseases and promoting healthy diets through evidence-based food policy research and monitoring, through assessing the strength of country specific policies and infrastructure support (**EPI-Food**). **INFORMAS** collaborates with stakeholders to advance understanding of food systems, address critical knowledge gaps and support the implementation of effective food policies for promoting healthy diets.

EIT Food has the potential to facilitate social innovation towards healthier diets by forming strategic partnerships with existing organisations and programmes. One possibility is to connect with established nutritionist networks and training programs. Two organisations are to be highlighted: The **Barilla Foundation** is actively working to promote healthy eating habits by collaborating with multiple international institutions on various projects, such as training programs for teachers, students, chefs, and children. These programmes aim to educate the adoption of healthy diets and to leverage the role of chefs and teachers to more sustainable eating habits. Similarly, the **European Federation of the Association of Dietitians (EFAD)**, which represents 35,000 dietitians in 28 European countries, aims to improve nutritional health by promoting sustainable diets.

Furthermore, existing online learning formats, such as those provided by the Barilla Foundation, can be utilised to increase outreach and provide greater flexibility in delivery. This can also be taken as an approach to create social spaces for community building on digital platforms to get wider social reach. By collaborating with various **food service providers** such as restaurants, dietitians, canteens, and chefs, EIT Food can raise awareness and educate them on the importance of diversifying protein sources, for example in B2B or B2C formats.

The **Demand Generation Alliance (DGA)** attempts to drive societal preferences towards nutritious and sustainable food by leveraging social and cultural strategies. They work collaboratively to build connections across sectors, create new opportunities for cross sectoral work and to convene dialogues in countries and regions. Based on this, tools and concepts that address consumer food preferences are developed. This partnership could also aid the development of tools and concepts that address consumer food preferences, enhance awareness and consumer education through coherent and streamlined marketing strategies to reach different age and social groups, and promoting alternative proteins, as well as social prescribing for fruit and vegetables.



The role of **social movements** in promoting alternative food and consumption patterns is particularly to advocate sustainable food consumption through addressing the social and cultural dimension. By engaging with these movements, EIT Food can indirectly address local challenges and develop region-specific solutions for food and health-related issues. Slow Food represents a food culture with a focus on a sustainable, healthy diet aiming to address the health of humans and the environment by adopting the **One Health approach**. The **Slow Food movement** promotes shorter supply chains, the production of legumes and other alternative proteins, the reduction of animal livestock in connection with promotion of meat-alternative consumption patterns, and healthy soil and biodiversity in the field. Slow Food advocates active participation in the political discourse and agenda setting to shape the transformation along the organisation's internal values. Supporting social movements can also be an effective way to transition to regenerative farming practices through a bottom-up approach. This includes, for instance, knowledge transfer about sustainable farming practices, as well as encouraging production of alternative proteins and nutrient-dense crops.

Technology and innovation platforms play a crucial role in supporting start-ups and technologies in the agrifood sector. They provide resources, access to funding, mentorship, and network opportunities for these entities to help them bring their innovative solutions to market, scale their operations and impact, and connect with relevant stakeholders in the industry. The **European Technology Platform (ETP) "Food for Life"**⁴⁴ provides a platform to exchange best practices, leveraging fundings and develop effective consumer-oriented innovations. "Food for Life" aims to deliver a research strategy to prevent NCDs through sustainable food processing, new technologies, consumer acceptance and nutrition change. Collaborating with the "Food for Life" platform enables collaboration with many different actors along the food chain.

A similar approach results from a strategic alignment with the **European Innovation Council (EIC) Accelerator** which is a funding programme supporting disruptive start-ups through investments, expertise, and business acceleration services to scale up innovation to improve the resilience and sustainability of the food system. Through knowledge sharing and targeted collaboration, start-ups can be provided with better services and can result in focused scale ups⁴⁵.



44 <https://etp.fooddrinkeurope.eu/about-us/about.html>

45 https://eic.ec.europa.eu/eic-funding-opportunities/eic-accelerator-0_en

On the global scale, the **World Business Council for Sustainable Development (WBCSD)** drives innovation and entrepreneurship in the agrifood ecosystem. The WBCSD's "Food and Agriculture Roadmap" covers topics like shifting dietary patterns to tackle NCDs, food affordability and accessibility of healthy food, the nutritional quality and sustainability impact, and a responsible meat production within the planetary boundary in combination with the promotion of alternative protein production. The **project "Food Reform for Sustainability and Health" (FReSH)** reflects on these areas and aims for food system transformation and industry change. Therefore, they apply a "Farm to Fork" approach and engage with companies to develop business cases and new opportunities led by science-based targets. Based on this, new business models are developed jointly with their partners. Additional innovation platforms with the aim of achieving healthier diets through knowledge and innovation scaling are **Food Innovation Hub** (launched by the World Economic Forum), **Innovation Campus Food** and the **Future Food Institute**.

EIT Food can also make a step towards supporting the preservation of fundamental nutritional content throughout the supply chain. The following networks represent opportunities in this realm. The **"International Food Beverage Alliance" (ifba)** is an umbrella organisation of leading companies in the food and drink industry. The ifba works to improve the formulation of products to support healthier diets, while working together with the major players in food manufacturing industry. Collaborative efforts could focus on easy-to-implement options to reformulate food, while covering a broad impact. A similar approach is covered by **"EU platform for action on diet, physical activity and health"**, which addresses the need for joint action on a national as well as supra-national level on food production by multi-national enterprises. The platform is a forum for organisations across Europe, from the food industry to consumer protection NGOs, to come together and tackle unhealthy diets.

"Food and Drink Europe" commits to achieve a sustainable food system, by promoting innovations and policies that enable the industry to produce healthier products. Therefore, they coordinate 700 experts through its committees and consultates on all issues affecting Europe's food and drink industry. A collaboration could be beneficial to communicate for example market trends and innovation policies and jointly contribute to the European agenda setting.



Collaborations and strategic alliances are essential to boost the promotion of alternative proteins and discover new alternative proteins. The “**European Alliance for Plant-based Food (EAPF)**”, “**bridge2food**” and the “**Good Food Institute (GFI)**” all work to promote plant-based food and alternative protein solutions. EAPF actively promotes research and innovation towards food solutions, supports food labelling, and promotes policies for sustainable farming and food processing practices. **Bridge2food** is a network and ecosystem building organization that promotes innovation in plant-based food and alternative protein. **GFI**, on the other hand, is a think tank and community of organisations working to accelerate alternative protein innovation by designing industry roadmaps, identifying research ideas, investing in science, and supporting start-ups and partners in the industry.

BEUC The European Consumer Organisation

works to promote the availability of healthy, safe and nutritious food products, and to raise awareness of issues related to diet and health, particularly in the area of food safety and health. By representing the voices of consumers, BEUC helps to drive change towards a more health-conscious food system, and to ensure that consumers have access to the information they need to make informed choices about the food they eat⁴⁶.

Funding Landscape

Funding and financing mechanisms of the European Commission related to Mission Programme Area 1.

Horizon Europe is the EU’s key funding programme for research and innovation with a budget of €95.5 billion for 2021-2027. It is built on three pillars offering different funding opportunities for frontier and collaborative research (see Innovative Europe: Innovative Europe is a new pillar that aims to make Europe a front runner in market-creating innovation. A new funding body, the European Innovation Council offers a one-stop-shop for high potential and breakthrough technologies and innovative companies. The pillar includes the activities of European Innovation Ecosystems and the European Institute of Innovation and Technology):

- **Excellent Science:** This pillar supports researchers through fellowships, exchanges, and funding of the projects defined and driven by researchers themselves. The pillar contains the European Research Council, Marie-Skłodowska-Curie Actions, and Research Infrastructures.
- **Global Challenges & Industrial Competitiveness:** This pillar supports research relating to societal challenges and reinforces technological and industrial capacities through clusters. It sets EU missions with ambitious goals tackling some of our biggest problems, such as health, climate change, clean energy, mobility, security, culture, inclusive societies, food, bioeconomy and natural resources. It also includes activities pursued by the Joint Research Centre which supports EU and national policymakers with independent scientific evidence and technical support.

THREE PILLARS FOR IMPLEMENTATION



Figure 9: Overview of pillars for implementation in Horizon Europe

Innovative Europe: Innovative Europe is a new pillar that aims to make Europe a front runner in market-creating innovation. A new funding body, the European Innovation Council offers a one-stop-shop for high potential and breakthrough technologies and innovative companies. The pillar includes the activities of European Innovation Ecosystems and the European Institute of Innovation and Technology.

One of the main novelties in Horizon Europe is the mission-orientation – a set of certain objectives connected with the key societal challenges aimed to be achieved with project portfolios. The missions relevant to a broad range of stakeholders and to citizens should be completed using a bottom-up approach.

There are five Horizon Europe mission areas aimed to address some of the world’s biggest challenges, potential linking points for EIT Food Mission Area 1 could be sought especially for Missions 1 and 5:

1. Conquering Cancer – “By 2030, more than 3 million lives saved, living longer and better”
2. Accelerating the transition to a climate-ready and climate-resilient Europe – “By 2030, the Mission will prepare Europe to deal with climate disruptions”
3. Regenerating our oceans and waters – to reach “full recovery and regeneration of European marine and freshwater ecosystems by 2030”
4. 100 Climate Neutral Cities by 2030 – by and for citizens – to “support, promote and showcase 100 European cities in their systemic transformation towards climate neutrality by 2030”
5. Caring for the soil is caring for life – to “ensure that 75% of soils are healthy by 2030 and are able to provide essential ecosystem services”

46 <https://www.beuc.eu/priorities/food>

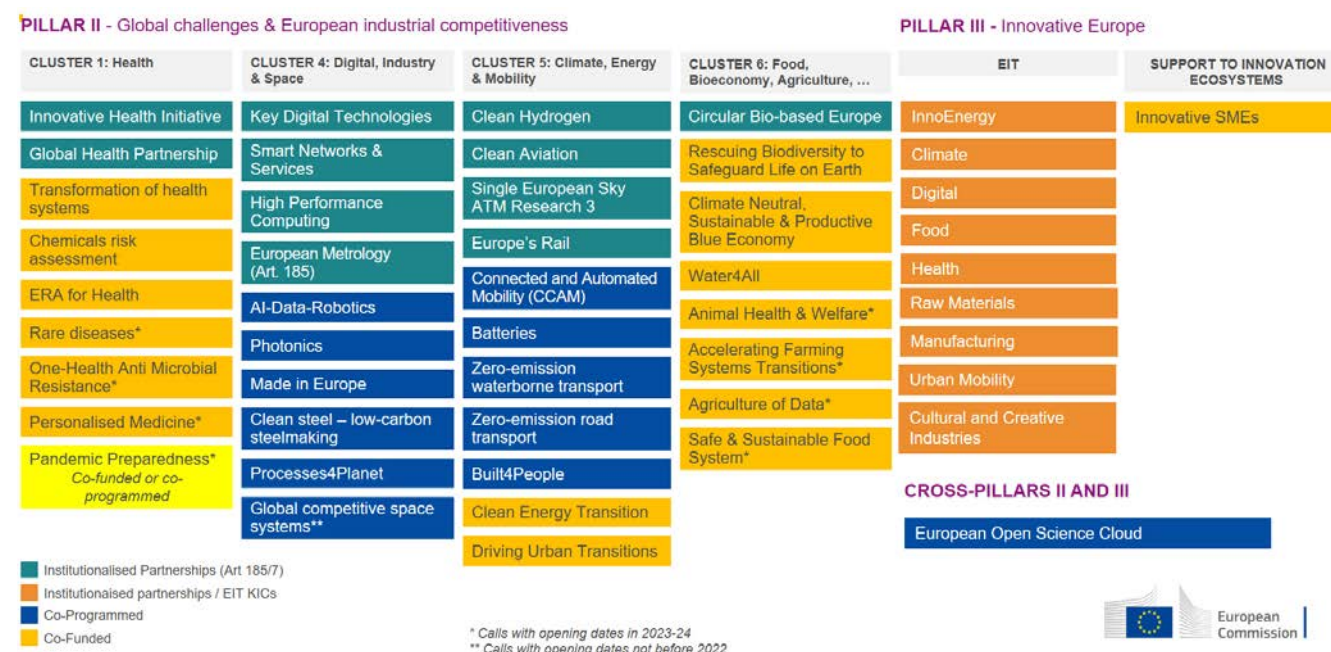
Further programmes, which are of interest in the context of EIT Food Mission 1:

- Programme for Environment and Climate Action (LIFE)– Supports climate and environmental actions. LIFE programme supports research and development from SMEs or research organisation that target specific calls for actions.
- European Cooperation in Science and Technology (COST)– provides international research funding for researchers and innovators to set up interdisciplinary research networks in Europe and beyond, this can include all fields of science and technology.
- EU4Health– Supporting research, development, and implementation of disease prevention, crisis preparedness, health systems, and digital solutions.
- Eureka– International network to foster European competitiveness and integration and to encourage R&D cooperation.
- European Innovation Partnerships (EIPs)- European Partnerships bring the

European Commission and private and/or public partners together to address some of Europe's most pressing challenges through concerted research and innovation initiatives. EIPs are a new approach to research and innovation and focus on societal benefits and fast modernisation. They support the cooperation between research and innovation partners so that they are able to achieve better and faster results compared to existing approaches. An overview of planned partnerships is given in Erasmus+ is the EU's programme to support education, training, youth and sport in Europe with an estimated budget of €26.2 billion. The 2021–2027 programme places a strong focus on social inclusion, the green and digital transitions, and promoting young people's participation in democratic life.

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Figure 10: Overview of 49 candidate European Partnerships⁴⁷



47 <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/bb4f7575-0ebc-11ec-b771-01aa75ed71a1>

The **European Partnership for Safe and Sustainable Food Systems** defines four thematic research and innovation activities, where “Change the way we eat, process and supply food, connect with our food systems and govern our food systems” shall be addressed⁴⁸. It is also recommended to discuss connection points with EIT Climate KIC⁴⁹, where a “deep demonstration on climate-friendly food systems and diets is envisaged. The **Sustainable Blue Economy Partnership (SBEP)** could be a discussion partner to explore alternative proteins stemming from algae production⁵⁰. The agricultural **European Innovation Partnership (EIP-AGRI)** works to foster competitive and sustainable farming and forestry that ‘achieves more and better from less’. It contributes to ensuring a steady supply of food, feed, and biomaterials, developing its work in harmony with the essential natural resources on which farming depends⁵¹.

Funding and financing possibilities beyond the European Commission

Funding opportunities beyond the European Commission must can be found on national and or even regional levels. A detailed search for funding & financing was beyond the scope of this project. However, as a starting point we refer to previous investigation of JPI HDHL. JPI HDHL has compiled an overview of national R&I structures and priorities of 25 countries in 2015, which also lists national and regional funding organisations.⁵²

In several countries, large charity organisations and foundations support targeted research that meet their missions. Especially in the UK a large number of charities fund research that addresses the issues of Mission Programme Area 1 “Healthier Lives through Food”. These charities and foundations may be interesting partners for EIT Food to tackle the challenges of this Mission, as they also operate worldwide. The list of these charities and foundations is not exhaustive but should serve as a source of inspiration.

48 https://knowledge4policy.ec.europa.eu/publication/food-2030-pathways-action-partnership-safe-sustainable-food-systems-people-planet_en

49 <https://www.climate-kic.org/programmes/deep-demonstrations/climate-friendly-food-systems-and-diets/publications/>
<https://www.climate-kic.org/programmes/deep-demonstrations/climate-friendly-food-systems-and-diets/publications/>

50 <https://www.jpi-oceans.eu/en/sustainable-blue-economy-partnership><https://www.jpi-oceans.eu/en/sustainable-blue-economy-partnership> or <http://bluepartnership.eu/>

51 <https://ec.europa.eu/eip/agriculture/en/about>

52 <https://www.healthydietforhealthylife.eu/index.php/news-publications/products-for-r-i-policy-makers>

Examples of global charities and foundations relevant to EIT Food's Mission "Healthier Lives through Food":

- Immana
- Nestle Nutrition Institute
- Nestlé Foundation
- Bill & Melinda Gates Foundation
- The Templeton World Charity Foundation
- Rockefeller Foundation
- The Howard G. Buffet foundation

Health-related foundations and charities in the UK:

- British Heart Foundation
- Diabetes UK
- Wellcome
- The Power of Nutrition
- National Lottery Fund
- The AgriFood Charities Partnership
- The Douglas Bomford Trust
- Gatsby
- Perry Foundation
- Innocent Foundation
- Esmée Fairbairn Foundation
- Wolfson Foundation



Priority Areas, NCDs and Health

Critical diet-related health priorities have been identified to tackle NCDs which often link across Priority Areas, and which achieve different regional levels of priority. Effective population-based interventions include:

- Raising the **accessibility and affordability** of fresh fruits and vegetables through **pricing and targeted subsidies** for low-income families.
- Decreasing the sodium content of packaged and prepared foods and staples like bread by influencing **food reformulation and regulatory and voluntary mechanisms**.
- Increasing the **accessibility and availability** of dietary salt substitutes.

In other words, creating a health-enabling environment is one of the ways to tackle NCDs. In an obesogenic environment, the frequent outcome is overweight/obesity whereas a **physical activity-friendly environment enhances physical activity**. In addition, creating food environments where healthy food is available and affordable is important. Collaboration between global, regional, national, and local governments, several government agencies, and professionals in health promotion and disease prevention is essential for the success of these efforts. Further investigation is required to determine which interventions and techniques at the individual and population levels are most effective and sustainable in each environment, as well as any unintended consequences. Studies in low- and middle-income nations are particularly needed to find and assess efficient population-level interventions in environments with constrained resources for individuals, families, and governments, with poor infrastructure, and in various social contexts.

Opportunities that should be addressed within the Priority Areas were identified in a workshop with stakeholders from throughout the food value chain. Some of these opportunities were seen as overlapping between the Priority Areas, as is depicted in Figure 11, which summarises opportunities/expected outcomes and their relevance

to achieving the Mission's overall goal: to improve healthy life years for all.

A conditional starting base needs to be the establishment of one true definition for health and dietary guidelines by 2025, potentially with some regional variation.

For all three Priority Areas, **regulatory and policy frameworks** were named to be conditional to induce transformative change of the food system and healthy nutrition. This also induced a discussion on **targeted taxes** for unhealthy food or tax reduction for healthy foods in some Priority Areas. Regulations, or at least the establishment of **voluntary rules for communication and advertisements** were further stated as overlapping opportunities and needs between Priority Areas. For several contexts the issue of **mapping distinctive aspects was mentioned**. For example, food mapping needs to increase understanding of production land use availability and healthy foods, while also mapping stakeholders amongst industry, SMEs and research, as well as technologies and ingredients and their potential replacements.

Also overlapping was the understanding **that transformation needs incentives and may require subsidies** at different levels. **Primary production** needs to be redirected towards more **protein diversification and sustainable agriculture for better soil and more nutritious food**. In this domain production companies may need support when applying **new technologies** that may stem from other disciplines. Likewise, **schools or canteens** may need support to filter the changes towards **healthier cooking or even vouchers for healthy eating** down to consumers as direct support tools. **Education for consumers** on all levels and throughout the life course as well as **training for work force** was also seen as necessary in all three pathways.

In terms of incentivising the production of healthy foods (Priority Area A), the **food production, processing and retail industries** need to acknowledge they have a vital role to play in reducing NCDs and they must grasp that **responsibility**, also using responsible marketing and advertisement based on

scientifically sound information. For instance, it is vital to reduce childhood obesity (Priority Area C), as for many this is the beginning of lifelong obesity and increased risk of CVD, type 2 diabetes, etc, and food providers have a strong role to play here. In addition, the importance of **diet and exercise** should be taught together along with the importance of exercise **at all ages**, which not only reduces NCD risk but can also enhance mental health.

The biggest priority and threat to health is trans fat. There is evidence that **trans fat intake** is indeed higher in **Baltic and Eastern European countries** (Priority Area C) and this may help to explain the higher CVD in that region. The **reduction of trans**

fats in foods would therefore serve as a key primary target and follow an evidence-based pathway. Of course, there will be other factors involved which would need to be combined with dietary change for most impact. CVD in other countries is still the major cause of death and morbidity and several outcomes from all pathways which focus on improving knowledge of food and nutrition across the life course will be vital for public uptake. For instance, in the **drive towards increased protein diversification** (Priority Area B), **greater consumer awareness** is needed that processed meat is a greater risk factor for several NCDs than red meat and therefore red meat needs separate dietary guidelines.



Figure 11: Overview of opportunities and their connection to the three Priority Areas (the colours represent the input that came up within the discussion groups of the respective Priority Area, the purple boxes were added when compiling this overview within the project consortium after the workshop)

Close links were seen between the Priority Areas and the other two Missions. In relation to Mission 2 “Net Zero Food System” there should be consideration of how the environmental cost of foods should be assessed. For Mission 3 “Reducing Risk for A Fair & Resilient Food System” accessibility and affordability issues are taken into consideration. Links to both missions were discussed in all three Priority Areas when the focus came to primary production and healthy soils.

Top 6 findings across Priority Areas

1. Evidence that trans fat intake is indeed higher in Baltic and Eastern European countries (Priority Area C). This may well help explain the higher prevalence of CVDs and its reduction would follow an evidence-based pathway. Of course, there will be other factors involved which would need to be combined with dietary change for most impact.
2. CVD in other countries is still the major cause of death and morbidity and several of the outcomes from Priority Areas A, B and C for improving knowledge of food/ nutrition across life course will be vital for public uptake.
3. In relation to increased protein diversification (Priority Area B), the recognition that processed meat is a risk factor for several NCDs. This needs greater public awareness and separate dietary guidelines from red meat.
4. Incentivise the production of healthy foods (Priority Area A). The food production, processing and retail industries have a vital role to play in reducing NCDs and must grasp that responsibility. This also comprises responsible marketing and advertisement based on scientifically sound information.
5. Reduce childhood obesity (Priority Area C). This is vital as it can be the beginning of lifelong obesity and increased risk of CVD, type 2 diabetes etc. The importance of diet and exercise should be taught together. Related to this is the importance of exercise at all ages, which not only reduces NCD risk but can also enhance mental health.
6. Alzheimer’s disease/dementia is now a major cause of mortality and morbidity especially in women. There is good evidence that those with the ApoE4 genotype (E4/E4 especially) have a substantially increased risk which may interact with diet. The ApoE4 genotype also has relevance for CVD⁵³.

53 Sienski G, Narayan P, Bonner JM, Kory N, Boland S, Arczewska AA, Ralvenius WT, Akay L, Lockshin E, He L, Milo B, Graziosi A, Baru V, Lewis CA, Kellis M, Sabatini DM, Tsai LH, Lindquist S. (2021). “APOE4 disrupts intracellular lipid homeostasis in human iPSC-derived glia”. *Sci Transl Med*. 3;13(583). doi: 10.1126/scitranslmed.aaz4564.

Table 15: Linkages between Opportunities in Priority Areas and expected outcome and their respective contribution towards EIT Impact Goal

Priority Area	Opportunity	Expected Outcome	Relevance & contribution in terms of Impact Goal
A: Achieve a balanced diet for people and planet	- Food system incentives to produce healthy and healthier food - A level playing field in Europe - Map of food production and food poverty needs - Technology innovation: equipment and products - Social Innovation – community hub network (funded by subsidies) - Vouchers for healthy food - Social prescribing for fruit and vegetables - Restrict promotion and placement (advertising) of unhealthy food	- Improve knowledge of food/nutrition across life course by 2030. Establish education to improve knowledge across the life course (social groups) according to needs concerning nutrition, healthy food choice and cooking (by 2030) - Establish one true definition for health and dietary guidelines (for the EU) to help guide industry and consumer messaging - Restrict promotion and placement of unhealthy food, and limit unhealthy fat, added sugars, and salt content in foods by 2030. Increase regulation in retail environment by restricting (a) promotions on unhealthy food (b) where unhealthy food can be displayed and sold in stores by 2030. Increase regulation on food (a) marketing by banning food advertising that doesn't present a balanced diet and (b) mandating nutritional content promoted by only health care professional by 2030 - Improve and incentivise reformulation of EU food products through increased funding opportunities by 2024–2025 to: reduce unhealthy content by 10%, increase availability of healthier food products by 80% and increased food and vegetable consumption recommendations (one more/day) by 2030 - Improve and incentivise the production of healthy European food products (reduce added sugars, salt, fat; increase fibre, wholegrain etc.) by establishing guidelines, subsidies, and regulation in 2024 - Increase production, affordability, availability, consumption of and attitude to healthy food to enable 95% of people to follow food-based dietary guidelines every day by 2030	- Improve overall diet quality to reduce the risk of NCDs but impact will depend on initial diet quality and any co-existing factors (i.e. degree of overweight, smoking etc.) - Should influence CVD (salt, sugar, fat), type 2 diabetes (sugar), colorectal cancer (fibre)

Priority Area	Opportunity	Expected Outcome	Relevance & contribution in terms of Impact Goal
B: Diversify protein sources	- Develop new technologies and products (taste, texture, protein yield): - Mapping industry leaders & players - Technical forums for academia & industry - Modelling & stimulation - Mapping ingredients & protein sources - Consumer education & training (consumers, professionals/industry) - Primary production diversification: Adopt & redirect primary production - Appropriate policy and regulatory framework	- Increase Protein Diversification in Food Consumption so that an increase of 40% of non-animal proteins in human diets is reached by 2035. - Increased consumer/citizen awareness through targeted education to reach at least 40% more people being aware of protein diversity by 2030 - Helping farmers into diversification (subsidies, policy) aiming for an increase of 20% more farmers growing/breeding alternative protein sources - Technologies and production methods in place for scalable cost-effective, sustainable diverse protein (products) to increase companies producing products with complementary proteins by 50% - New policies in place related to use of diverse protein sources in food formulation (without falling into "novel food regulation")	- Reduction in red and especially processed meat consumption. - Plant proteins may be accompanied by dietary fibre. - Many animal-derived foods (especially dairy, red meat) are major suppliers of saturated fats and are historically believed to increase CVD risk. Whilst generally true for saturated fats from meat it is not the case for dairy for a range of reasons - However, mostly unclear direct benefits of outcome on NCDs
C: Increase and retain the nutrient density of food	- Free/subsidised school meals (incl. holidays) - Help transition to regenerative farming for better soil and more nutritious food - Fundamental nutritional content throughout supply chain - Promote wholegrain and nutrient-dense crops from farm to fork - Regulation and communication (e.g. no tax on veg & fruit, marketing, packaging & labelling) - EU-wide food big data platform (on consumption habits, needs and demand, production)	10% reduction of deaths related to NCD in high prevalence countries by 2030 50% of EU population meeting minimum daily recommended vegetable & fruit consumption by 2030 100% of EU children increase their consumption of vegetables & fruit by 10% by 2027 – reducing childhood obesity (particularly in target groups) - All EU early years curricula to include food education by 2027 50% increase from current baseline of healthy food awareness in EU citizens by 2032 - Increase of regenerative agriculture in the EU by 2030 and the nutrient content of crop harvest by 10%	- Reduced NCD risk if density of fibre and calcium were increased. - Diets which provide more long chain n-3 fatty acids (DHA in particular) as found in oily fish maybe helpful. - Potential benefit via moderation of BMI/overweight. Protein-rich diets shown to reduce appetite with benefit for BMI control. - Reducing CVD cases by reducing trans fat intake - Reduced insulin sensitivity in overweight children (part of type 2 diabetes development).

5. Recommendations for Collaborative Action

With its Mission 1 programme “Healthier Lives Through Food”, EIT Food aims at better health outcomes for our diet (as an impact goal), which is strongly aligned particularly with the organisation’s Strategic Objective 2 “Create consumer-value for healthier nutrition” as defined in its three-year planning cycle (2023–2025). While all diet-responsive non-communicable diseases (NCDs) are relevant, five main NCDs are prioritised defined based on prevalence, diet responsiveness, associated costs to health and other related services. These include heart disease, colorectal cancer, Alzheimer’s disease, stroke, and type 2 diabetes mellitus. Within Mission 1 three thematic Priority Areas were suggested to achieve more healthy life years for all:

- A. Achieve sustainable diets for people and planet
- B. Diversify protein sources for food consumption
- C. Increase and retain the nutrient density of food

- **three key domains** to concentrate efforts on:
 - i) increasing input of more healthy ingredients and products into the food system;
 - ii) developing technologies to safeguard nutrient density/content; and
 - iii) prioritising “Healthier Lives through Food” within the supply chain.

The recommendations for Mission Programme 1 resulting from these three Priority Areas focus on diet-related changes in food consumption for more healthy life years by means of:

- **four key enablers** which:
 - i) advance regulation and policy frameworks to support faster development and uptake of new products and technologies;
 - ii) allow consumers to better understand and learn to prevent NCDs by way of their diets;
 - iii) provide knowledge and data to gain new and/or better and more timely insights on food production and consumption patterns as well as health impact; and
 - iv) establish new collaborations and partnerships within and beyond the food system.

Moreover, it is necessary to promote a **system integration** approach where actions are strategically **orchestrated**, avoiding silos and segregation of strategies.

We will focus our recommendations on alignment with EIT Food strategy and follow EIT’s portfolio approach. However, some recommendations will go beyond this remit if considered relevant for the overall food system transformation. Thus, there may be **new potential roles and capacities emerging** – for EIT Food, its community and beyond.

5.1 Key Domains and Enablers and the Role of EIT Food

The overall aim of Mission Area 1 on “Healthier Lives Through Food” must be to achieve higher consumption of healthier foods, that is especially beneficial in the fight against NCDs with focus points in regions with higher needs, such as Bulgaria or Romania. Moreover, it must be considered that food is only one of the impact factors related to the increase in prevalence of NCDs. A holistic approach must be taken, thinking beyond food and taking factors such as physical activity or environmental issues into account. The focus for this Mission for EIT Food should be on improving the quality and quantity of healthy food so that consumers, who will be aware of the importance of healthy diet, will consume more of those. Consequently, food items can reduce the prevalence of NCDs will decrease– so they enjoy more healthier life years.

In Figure 12, we propose a holistic approach EIT Food should take to achieve the objectives of Mission 1. It is built on a central “backbone” with three key domains we have identified that summarise the food system: **Produce, Transform** and **Distribute**. Overarching these are four key enablers: **Consumer Awareness & Education, Knowledge Infrastructure, Partnerships** and **Policy & Regulation**. It is important that enablers are implemented transversally, with an adaptive approach within each domain. In this way, successful actions for one enabler will help the whole approach to be more impactful and drive changes (e.g. the establishment of partnerships will build the foundations for policy and regulation lobbying actions at EU level). The three domains summarised in Figure 12 have been identified as leverage points to improving injection of healthy foods in the food system. With “Distribute” we refer to the whole supply chain right through to consumer tables, also including canteens, restaurants and consumer kitchens.

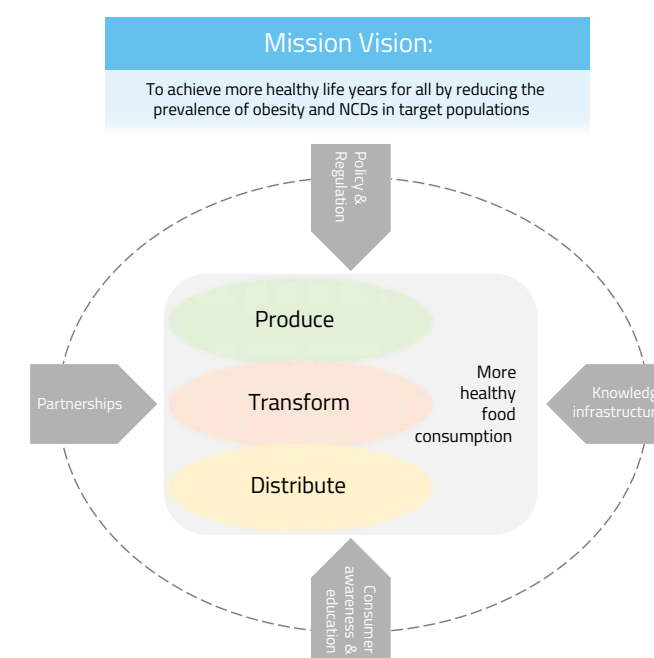


Figure 12: The Mission 1 innovation ecosystem: linking key domains with key enablers to achieve long-term impact

5.2 Key Enablers for Food Systems leading towards Healthier Lives

We have identified four key enablers supporting food system transformation for “Healthier Lives Through Food”. These enablers are expected to enhance availability and affordability of more healthy food in the food system, namely:

- AWARENESS RAISING & CONSUMER EDUCATION
- KNOWLEDGE INFRASTRUCTURE
- PARTNERSHIPS
- POLICY & REGULATION



Key Enabler: Awareness Raising & Consumer Education

- When it comes to introducing new diet-related solutions for preventing NCDs, there is a need to **provide incentives** for the diversification of protein consumption (beyond production as described in the key domains below). For mainstreaming (EIT-funded) diet-related solutions for preventing NCDs, educational measures and awareness of consumers must be considered:
- Awareness raising: targeted campaigns are needed, which run over the life course, are designed for different population groups (women/senior citizens/children) and account for regional and cultural differences in changing dietary habits (e.g. promoting new cooking practices through community hubs).
- Include nutrition topics and practical application in curricula of primary and secondary education.
- Establishing social policy measures, e.g. vouchers for healthy food.⁵⁴
- Initiating new or extending existing social innovations related to food (e.g. urban farming initiatives, community kitchen through community hubs)
- Regionalising Mission 1 interventions to better account for socio-cultural differences in food consumption (leveraging the potential of existing grass-roots work in peri-urban areas).

Education to increase food and thus health literacy is a common topic in all three Priority Areas. The common challenge is to find ways to encourage consumers to improve dietary patterns and increase the intake of health-

⁵⁴ It has to be stated that the suggestions derived from the workshop and the survey are not exhaustive. Other social policy measures must be considered and discussed in the future.

promoting and supporting foods. EIT Food can enable awareness and education of consumers by acting as an **assembler** for providing services for direct value creation.

An opportunity lies in allowing healthcare professionals to provide guidance for consumers and the development of **tools to support personalised nutrition**. Social innovations, such as a community hub, can offer possibilities for co-creating (e.g., growing food, mutual cooking, healthy cooking guides) and impact monitoring. Also, by providing targeted, and scientifically sound information, that can be used by food industry to disseminate and increase consumer awareness for their (re-formulated or new) products.

EIT Food should consider a more **regionalised approach** for delivering food-based solutions by leveraging EIT RIS as a key instrument for scaling impact through mainstreaming innovative solutions within particular geographies and (sub)populations. The **EIT RIS Implementation Framework 2022–2027** is designed to contribute to the innovation capacity of the modest and moderate innovator countries by widening participation in KICs’ activities and sharing its ‘know-how’. For Mission 1, EIT RIS should primarily be implemented in the geographical areas where there is limited or no KIC presence and could thus target regions and countries identified as most at risk of disability-related reduction of healthy life years. This should happen via collaboration with local entities and expertise because actions in local languages are more effective; instruments such as Living Labs could be used as these provide easier reach to vulnerable groups.

Key Enabler: Knowledge Infrastructure

EIT Food should promote the analysis of the available databases on nutrition and food and map the existing knowledge gaps, which can enable new elaboration, interpretation and modelling. For instance, the link between the human microbiome and diet has been addressed intensively in the last 20 years but rather little has been established in terms of strategies on how to modulate the human microbiome to prevent NCDs. This is a field where EIT Food should promote integration of data and generation of the missing links to ultimately design interventions able to protect the population from NCDs. In particular, there is a need to better understand the root causes of some key NCDs so that targeted remedial action can be derived:

- What are the food sources of industrial trans fats in Baltic and Eastern European countries? Their identification and removal/reformulation would lead to major improvements in diet and health.
- Despite the prevalence of CVD reduction in most countries, there remains a large difference in prevalence between the highest- and lowest-incidence countries. What are the reasons for this?
- The prevalence of type 2 diabetes is rising in most countries but there are substantial differences in the rate of increase between countries. What are the reasons for this? It is unlikely that this can be explained solely by diet.
- The prevalence of colorectal cancer is rising in most countries but with extremely large differences between countries. Knowing the reasons for this is vital if the present rise is to be reduced. Diets high in processed meat and low in dietary fibre appear to be key targets but there may be others.
- The contribution of overweight and associated lack of exercise to NCD development and risk is very substantial, and habits may begin in childhood. Emphasis on reducing childhood obesity and increasing education on life-long diet and exercise should be strongly promoted.

- Although the prevalence of Alzheimer’s disease does not appear to have changed substantially over recent times, the resulting disability-adjusted life years have increased, and mortality is markedly higher in women. The role of diets and their interaction with genotype-related risks for reducing the risk of Alzheimer’s disease and dementias in general, is much less well understood than for other NCDs. This should be a priority for the future.
- Establish one true definition for health and dietary guidelines (for the EU) to help guide industry and consumer messaging.



Improving the knowledge infrastructure for informed decision-making was considered very important in all Priority Areas. This knowledge infrastructure should address the following needs:

- Mapping industry leaders and key players (Priority Area B)
- Mapping ingredients and protein sources (Priority Area B)
- Mapping food production and food poverty needs (Priority Area A)
- Modelling and simulation as tools for assessing sustainability of alternative protein sources (Priority Area B)
- Exploring the opportunity of an EU-wide food ‘Big Data’ platform on consumption habits, needs and demand, production (Priority Area C)
- Providing technical fora for mutual exchange between academia and industry on alternative proteins and other ingredients (Priority Area B)

EIT Food could set up a task force with other relevant stakeholders including the Joint Research Center (JRC)⁵⁵ to identify critical gaps regarding knowledge and data and orchestrate the necessary steps and measures. Adhering to the FAIR Guiding Principles for scientific data management and stewardship⁵⁶ should support discovery through good data management.

55 JRC Food Systems LCA, <https://eplca.jrc.ec.europa.eu/FoodSystem.html>

56 The FAIR Guiding Principles for scientific data management and stewardship | Scientific Data (nature.com)

Key Enabler: Partnerships

The aim is to enter and promote new collaborations for fostering key actions – and forging partnerships with new stakeholders – across the food value chain, crossing key domains and linking with primary production as well as consumption. EIT Food should initiate the dialogue with relevant initiatives and key actors in the food system and explore the best governance model to apply to be fully effective (e.g. public–public partnership, private–public partnership, or others).

EIT Food’s strategy is to transform how food is produced, transformed, distributed, and consumed and aims to achieve this through trusted industry, education and research partners working together with informed and engaged citizens (source: EIT Food Strategy 2021–2027, p. 6). To achieve such ambitious objectives, there is a need to create partnerships with relevant key actors and initiatives to reinforce efforts for the health-related impacts within and beyond the food system. Establishing new partnerships is needed in all three Priority Areas and EIT Food is required to fulfil the role of **forging strategic partnerships**. EIT Food can become a network of networks and a leader in Europe to put pressure on policy and regulation. This should include lobbying activities with relevant key players (see below). There is a need for a thorough mapping of the initiatives active in the context of food, health, and nutrition to prioritise those that are relevant for EIT Food to collaborate with. **European Technology Platforms** (Food for Life, Plants for the Future, TP Organics, Farm Animal Breeding and Reproduction TP, European Aquaculture TP, etc.) and **Joint Programming Initiatives** (Healthy Diet for a Healthy Living, HDHL; Standing Committee on Agricultural Research, SCAR; etc.) have the advantage of covering several domains within the food system. Accordingly, they seem to be the most relevant actors with whom to initiate such a strategic activity. Going beyond “Healthier Lives Through Food” and to include other aspects such as physical activity,

could be achieved through partnerships outside the food community, namely with insurances, health ministries and the like. Establishing ambassadors to emerging and existing networks and exploring the benefits of COST Actions can also be a way forward to extend EIT Food’s network activities and be a possibility to explore **(joint) funding options**. Some European Innovation Partnerships may be of interest in the context of nutrition and health, as well as the connection to existing COST actions. The candidate Partnership “Fostering a European Research Area for Health” (ERA4Health) has defined nutrition- and lifestyle related diseases as one of the 4 high priority research areas⁵⁷.

Partnerships are needed in the three domains and beyond. In the primary production domain, EIT Food can collaborate with farmers’ organisations, such as Copa-Cogeca. Furthermore, **strategic collaborations with industry** are required for achieving a common goal also in the domains “Transform” and “Distribute”. For transformation, EIT Food can connect with e.g. FoodDrinkEurope, Nesta, Future Food institute but also new actors in fields such as pharma and precision fermentation. In the domain “Distribute”, EIT Food consortia is weak in covering the supply chain and there is a need to increase the number of the partners from retailing, logistics and distribution management. Partnerships are also essential when it comes to mainstreaming food-related innovations for the consumption in society. Established players in the field such as NCD Alliance, NGOs such as Slow Food and consumer associations can be instrumental in delivering awareness and engaging programmes for consumers. Other aspects such as physical activity can be addressed through partnerships outside the food community, especially insurances, health ministries and the like (e.g., EU platform for diet, physical activity, and health).

57 https://research-and-innovation.ec.europa.eu/system/files/2022-03/ec_rtd_he-partnerships-era-for-health.pdf

COST actions addressing food and nutritional issues can be seen as potential network nodes, e.g. the COST actions PIMENTO, DEAWHEAT, burden-eu or SOURDOMICS. Furthermore, it is recommended to explore connections to charities (e.g. Nestle Foundation⁵⁸, Bill and Melinda Gates Foundation⁵⁹, The Templeton World Charity Foundation⁶⁰, the Rockefeller Foundation⁶¹, or the Howard G. Buffet Foundation⁶²) and global research organizations (e.g. immana⁶³, the Nestle Nutrition Institute⁶⁴, Barilla Center for food & nutrition⁶⁵) to explore funding opportunities. National charities need to be considered by CLCs as optional partners. Some examples are Ekha Foundation⁶⁶, where a Swedish partner needs to be on board, or the British Heart Foundation⁶⁷, more examples for British charities were included in the [Appendix](#).

Key Enabler: Policy & Regulation

There is a need for a legislative system that allows a faster approval process of new ingredients and technologies. Furthermore, there is a need for regulation of marketing and advertisement and a possibility to steer healthy nutrition through targeted taxation and substitutions. Also, for this enabler EIT Food should push for concerted actions at EU level, taking advantage of the partnerships mentioned above and expanding the network to include Member States (also via its Colocation Centres) which often play an imperative role in terms of policy and regulations to be passed.

When it comes to food regulation there is often a lack of alignment between the needs of the food system and the policies and legislation. While it is taken for granted that the overall goal of food law is to safeguard and protect public health, in reality legislation often hinders innovation and does not allow for fast reformulation and new production developments addressing food system challenges such as the reduction of NCDs, because the legislation is developing at a slower pace. This is even more relevant nowadays considering that explorations are needed into new raw materials and new ingredients which lack the necessary history of use. Solutions are required to prevent safe new food being classified under the “new food regulation” which requires additional effort in terms of investments for experimental data production and more especially time, since the overall process can take up to five years to bring new products on the market. Especially for small businesses long and arduous application

and approval processes are not affordable. In addition, the legislative requirements for using certain ingredients with the aim to reformulate addressing food system challenges such as NCDs and communication of the reformulation to the consumer are limited.

Along these lines, the political decision-making process (formal and informal) has emerged as a transversal topic across Priority Areas. The challenge is to overcome lacks in the EU regulations to create an appropriate regulatory/policy framework and level playing field in Europe by:

- pushing towards appropriate regulatory/policy framework (to develop innovation-friendly innovation ecosystem).
- creating a regulatory/policy framework which does not hinder innovation in the field of reformulation and in the field of new products coming from novel raw materials and containing novel ingredients, which have been demonstrated to be healthier for humans and able to prevent NCDs.
- changing regulation for advertising of healthy/healthier foods.
- enhancing regulations on marketing, packaging, and labelling – in collaboration with EFSA on risk and safety)
- creating pan-European dietary guidelines needs considering that processed meat is a highly variable product. There is growing evidence that processed meat is associated with greater NCD risk than red meat.

In the context of this enabler EIT Food can take an important role in promoting conditions for lobbying at EU level to have adequate policy and regulation in place. It can assume the role of a think-tank and open discussion forums as a seedbed for new ideas, for instance by establishing neutral “regulatory sandbox” as testing environment to subsequently make robust suggestions for profound changes and actionable measures. Furthermore, EIT Food can act as a hub for knowledge generation, concentration, and processing (see also this key enabler). To reach that status EIT Food needs to take advantage of the partnerships described above, considering the need to involve the actors in the decision process such as Member States and Associated Countries. In this respect, it is imperative for EIT Food to increase and reinforce constant contacts with key persons at EU level or act as ambassadors to partnerships.

To potentially influence public food-health policies with advocacy input, collaborations can be considered with non-governmental organisations such as BEUC The European Consumer Organisation and EUPHA the European Public Health Association (see also stakeholder mapping above).

58 <https://www.nestlefoundation.org/>

59 <https://gcgh.grandchallenges.org/about>

60 <https://www.templetonworldcharity.org/>

61 <https://www.rockefellerfoundation.org/>

62 <https://www.thehowardgbuffettfoundation.org/>

63 <https://www.anh-academy.org/immana>

64 <https://www.nestlenutrition-institute.org/>

65 <https://www.fondazionebarilla.com/en/>

66 <https://www.ekhagastiftelsen.se/eng/stiftelsen.shtml>

67 <https://www.bhf.org.uk/for-professionals/information-for-researchers/what-we-fund>

5.3

Key Domains in the Food Value Chain

PRODUCE:

focusing on primary production

TRANSFORM:

food industry and the production of healthy food products

DISTRIBUTE:

comprising retail, out of home eating and consumption

Key Domain: Produce

Intense primary production systems have to be replaced because they are no longer suitable due to their low sustainability in terms of resource use. Sustainable intensification is necessary to differentiate monocultures such as soy or maize (also through regenerative agriculture) and promote and introduce new plant varieties which will guarantee yield and income for farmers, and at the same time inject healthier ingredients into the food processing industry. Within this transition animal primary production will decrease, thereby becoming more sustainable.

The challenge is to adapt and redirect primary production (agriculture, aquaculture) to provide more nutritious foods with a strong focus to reduce NCDs by:

- encouraging the production of healthy foods (Priority Area A)
- improving the bioavailability of nutrients of food (Priority Area C)
- encouraging the diversification protein sources taking dietary needs into account (Priority Area B)
- supporting the transition to regenerative agriculture for better soil (overlap between Priority Area A, B and C)
- promoting crops that are nutrient-dense from farm to fork, e.g. wholegrain (Priority Area C).

All three identified Priority Areas A, B, and C influence the domain **Produce**. Furthermore, this domain presents links to Mission 2 and Mission 3, which need to be further investigated. For example Mission 2 “Net-Zero Food System” addresses diversification of crops and their sustainable intensified use, which will result in a better exploitation of natural resources allowing for enrichment of nutrients in the raw materials produced. The increased use of arable land for plant primary production will result in turn in the reduction of animal primary production, which will in turn become an integral part of the sustainable primary production systems where animals play an essential role in maintaining a balanced ecosystem and help the regeneration of soils.



EIT Food role

In this domain, EIT Food already has many well-established actors and programmes at hand when it comes to the creation of food end products. What needs to be discussed is the role EIT Food wants to take when considering primary production per se. Farmers were not direct addressees of EIT Food measures in the past, but they could be brought in with the aid of new initiatives and strong partners such as EIP Agri or DG Agri. That said, the recommendations focus on the value chain after primary production where projects can be supported and fostered to achieve the production of healthier food products and maintain the nutrient content throughout the value chain. In the nexus of agro-food policies the European Network for Rural Development (ENRD) is relevant for promoting healthy food and healthier life by supporting sustainable agriculture and rural development practices that contribute to improved food systems, increased food security, and improved health outcomes. It aims to facilitate collaboration and knowledge-sharing among stakeholders to support the transition towards sustainable food systems that prioritise the health and well-being of consumers and the environment.⁶⁸

EIT Food CLCs can also take on a role as information hub to foster specific regions with targeted campaigns. There is a need to target the issue of trans fats especially in Eastern European countries where information campaigns can be aimed at food production companies followed by targeted product development support, also with special focus on SMEs or the support of start-ups.

Key Domain: Transform

With the expected increased influx of healthier raw materials the food industry must be equipped with innovative technologies able to retain the nutrient content during processing. Efforts should be dedicated to overcoming current limitations in the use of plant-based (or other new and beneficial) ingredients, such as e.g. lack of essential amino acids or other nutrients and sensory impacts. These objectives will be reached also by the means of professional education and reskilling and upskilling of the workforce.

The challenge is to properly apply processing technologies and invent new ones with the objectives of i) retaining nutrient content of the raw materials; ii) overcoming low acceptability from the consumers due to taste being strongly impacted by new or different ingredients (e.g. plant-based); iii) correcting the nutritional profile linked to the lack of certain essential amino acids or other nutrients in reformulated foods, for example through fermentation; iv) reducing the cost of healthy products to overcome the affordability barrier for market entry. These challenges can be overcome by:

- encouraging the production of healthy foods with the aim to reduce NCDs (Priority Area A)
- encouraging the diversification of protein sources (Priority Area B)
- exploring unusual protein sources for industrial application (Priority Area B)
- promoting technological innovation: process technologies and equipment (Priority Area B) & production development to retain nutrient density (Priority Area C)
- professional reskilling and upskilling of the food industry workforce (production, technology, machinery and services) (Priority Area B)
- providing targeted information for consumers with special attention on NCD-affected regions/countries and population groups

⁶⁸ https://enrd.ec.europa.eu/about/brief_en

- signalling to policymakers the need to facilitate the introduction of new and safe products/ingredients (link to key enabler Policy & Regulation)

The domain **Transform** is primarily influenced by Priority Areas A and B. In terms of sustainable transformation processes and food safety, this domain links to Mission 2 “Net-Zero Food System” and Mission 3 “Reducing Risk for a Fair and Resilient Food System”. Specifically, it is imperative that the processing technologies used in the transformation of new and different raw materials are sustainable and do not demand too much water and energy or they will contribute to GHG emissions. An interesting opportunity that has been recently reconsidered, not only for its low environmental impact but also for its nutritional supplementation capability, is fermentation. On the one hand, this can be used as a traditional fermentation in which ad hoc microbial consortia (starter cultures) are inoculated in the raw materials that are transformed and the resulting microbial activity transforms the substances into a final product. The final products possess new organoleptic characteristics and are also nutritionally enriched in nutrients thanks to the ability of the microorganisms to produce specific amino acids. On the other hand, precision fermentation is a process utilising microorganisms as metabolic factories to produce specific compounds that can be then used in the sustainable production of foods e.g. production of myoglobin by precision fermentation for the elaboration of meat alternatives through 3D printing. Moreover, taking into consideration new and different raw materials, it should be emphasised that food safety must always be respected as it is a prerequisite for the commercialisation of food products. In this context the new processing technologies must be able to eliminate food safety risks associated with the new and diverse ingredients.

EIT Food role

Consumer perspectives are very important regarding mainstreaming. EIT Food’s role cannot focus only on consumer information and education but must also target industry and workforce and support to achieve a wider market access, especially in highly NCD-affected countries and regions such as Bulgaria and the Baltic states. Education is an enabler and its role is described in the respective section of this report.

Product development for alternative protein products or reformulated products must consider nutritional aspects where some plant-based proteins may come along with higher dietary fibre content but may lack other beneficial nutrients from animal-based products, such as lower calcium contents or different amino acid profiles. EIT Food can take on the role of information hub linking nutritional expertise with production and also taking these aspects into consideration when launching new campaigns or funding schemes. Requests were expressed for establishing guidelines for reformulation aimed at SMEs in general and targeted countries for healthier food products leading towards a lower prevalence of NCDs.

EIT Food could orchestrate the exploration of necessary technology and knowledge transfer from industries outside the food value chain and support the implementation of these within the food industry with suitable funding.

Key Domain: Distribute

The current supply chain in the food system is fragmented and there is lack of coordination and integration. There is a strong need to involve the different actors – including consumers – in the creation of an organised supply chain where specific demands in healthy products are addressed properly by producers, the food processing industry, distributors, retailers, and also out of home eating (restaurants, canteens) and even by consumers in their own kitchens.

A major challenge is to increase the availability and ensure the affordability of healthy products in different channels, while at the same time retain the nutrient density of food by:

- preserving nutrient contents throughout the food value/supply chain (Priority Area C)
- improving retail and logistics, particularly by shortening and integrating the supply chain (Priority Area C)
- ensuring product quality and nutritional values through adequate packaging technologies (Priority Areas B and C)
- ensuring healthy nutrition in out-of-home eating, including school meals (Priority Area C)
- elaborating and lobbying for adequate regulation for easy market entry (link to enabler Policy & Regulation)

Primarily, Priority Area C influences the domain **Distribute**. This domain also presents links to Mission 2 “Net-Zero Food System” regarding reduction of carbon emissions through changes in supply chains for instance by improved logistics and packaging.

EIT Food role

EIT Food can take on the role of awareness raising for retailers, producers and restaurants and canteens for healthier nutrition aiming at preventing NCDs. Ensuring the nutritional values throughout the supply chain is dependent on maintaining the quality of the food through adequate packaging, short supply chains and appropriate storage. Furthermore, an important first step for raising awareness for the importance of food preparation with respect to healthy meals is to establish one true definition for health and dietary guidelines to help guide industry, retailers, restaurants, and consumers.

The **role** of EIT Food is to mobilise key players from the retail and logistics sectors to the EIT Food community which will extend the food innovation ecosystem to make sure all the necessary actors of the food system are represented and actively contributing to relevant actions. Partners to be brought onboard for this domain should come from retail, nutritionists and dietitians, but can also be sought from well-established networks and institutions in the field such as Slow Food, the Barilla Foundation, the European Association of Dietitians or JPI HDHL, aiming at short food supply chains and the maintenance of nutritional value. Closer cooperation with food and health cluster organisations such as The European Federation of Food Science and Technology (EFFoST) could be a fruitful avenue to explore further. Engaging with strong influencers can play a vital role when it comes to addressing chefs and through them addressing consumers. EIT Food can also act as champion in ecosystem development by building connections and alliances between actors to promote innovation and to mainstream relevant food-related solutions for more healthy life years.

6. Appendices

All appendices can be downloaded from
<https://www.eitfood.eu/download-reports/healthier-lives>

1. Collection and summary of data on the Europe-wide impact of diet-responsive Non-Communicable Diseases NCDs Factsheets for Europe
2. Factsheet of NCDs in Europe
3. EIT Food Survey content
4. AIT Consent form for interviews
5. EIT Food Survey report of results
6. Interview Guidelines
7. List of Interview partners and Workshop participants
8. Priority Areas for Workshop
9. Minutes of Workshop in Paris, Dec. 5&6
10. Stakeholder Mapping
11. Funding sources from foundations and charities

For more information, please visit:
<https://www.eitfood.eu/missions>



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