

RECIPE FOR LASTING CHANGE

Developing feedback strategies to support
the sustainable transition of Sophia Children's
Hospital's food system

Master Thesis
Strategic Product Design
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April 2025

Recipe for Lasting Change

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Master thesis

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April 2025



Disclaimer

This report reflects the findings and conclusions drawn from extensive research and stakeholder interviews. However, certain limitations must be acknowledged. The identification of project boundaries, areas of focus and key interviewees was influenced by inherent biases, including personal interpretation and the perspectives of the individuals consulted. While efforts were made to ensure a diverse and representative range of voices, the backgrounds and experiences of interviewees may have shaped the direction of the research.

Additionally, due to privacy regulations, no visual documentation of occupied patient rooms has been included. Furthermore, some details regarding the new hospital food system and ongoing pilot projects remain confidential and are therefore not disclosed in this document.

Preface

Building a more sustainable healthcare system is essential for both current and future generations. Hospitals play a key role in this transition, not only through medical care but also in their daily operations—including food provision. Nutritious and appealing meals contribute to patient recovery, while a sustainable food system reduces environmental impact and improves long-term resilience. This project explores how a structured feedback system can support these goals, helping hospitals create a more patient-centred and sustainable approach to food.

This project has been developed in collaboration with Sophia Children's Hospital and Erasmus Medical Center's food department. Working on a real-world challenge over a longer period of time allowed me to deepen my understanding of Systems Oriented Design for sustainable transitions within a complex organisation like Erasmus MC. The experience confirmed my passion for working on purpose-driven, multifaceted projects that create meaningful change.

I am incredibly grateful to everyone who contributed to this project.

Firstly I want to thank my supervisors, Lara and Jotte, for providing invaluable guidance, critical feedback and enthusiastic ideas that helped shape the direction of the project in a way that it became both impactful and achievable within the given timeframe. Next, I want to thank Sascha, the client, for his enthusiasm and commitment to sustainable transitions at Sophia. Connecting me to key stakeholders and the positivity about the way we work at IDE were essential in bringing this project to life.

Additionally, I am grateful to the stakeholders and experts who shared their perspectives and provided insights that could not have been gathered from scientific research alone. Understanding the realities of the hospital food system from their point of view was crucial in shaping practical solutions. Finally, I am very happy with the friends, roommates and family around me that were there to discuss the project, ask sharp questions, help me with visualisations and, no less important, provided the needed distractions, coffee breaks and encouragement.

I hope this work serves as both an inspiration and a practical resource for improving Sophia's food system—and perhaps even contributes to broader sustainability efforts in healthcare institutions beyond Erasmus MC.

Sophie

Summary

Hospitals play a vital role in promoting health, yet they are significant contributors to the climate crisis. In the Netherlands, the healthcare sector is responsible for 7% of national CO₂ emissions and 13% of raw material use, figures that call for urgent change. Food systems within hospitals offer a powerful but often overlooked opportunity for impact. With nearly 40% of hospital food wasted and a heavy reliance on animal-based meals, improving sustainability here means addressing not only health, but also climate goals.

Sophia Children's Hospital, part of Erasmus MC and the largest children's hospital in the Netherlands, sits at the heart of this challenge. Tasked with feeding vulnerable patients under strict dietary regulations, the hospital faces a complex balancing act: how to make meals healthier and more sustainable without compromising care or comfort? Misconceptions around plant-based diets and deeply rooted food habits add further resistance to change. Still, if sustainability can succeed in a children's hospital, where the stakes are high and the context is complicated, it sets a powerful precedent for the rest of the healthcare sector.

This project emerged from the shared ambition of a paediatrician and a sustainable design researcher, both advocating for a food system that serves the needs of patients today while protecting the well-being of future generations. While policies and research promote protein transition and food waste reduction, there remains a crucial gap between vision and implementation. That is where design can help. This project set out with a clear goal:

“Designing an intervention that increases acceptance of more sustainable food choices for patients at Sophia Children's Hospital.”

To reach this goal, the project explored the sustainability challenges hospitals face, the nuances of children's food experiences and the specific ambitions of Erasmus MC's new food system, based on the pillars of health, experience and sustainability. Along the way, systemic issues emerged: the low priority for sustainability, a lack of personalisation for children's meals, aversion to restrictions, the poor perception of hospital meals, the underutilisation of the influence of nutritional assistants and, most notably, the absence of feedback systems. Without ways to listen, measure and respond to patient input, efforts to improve the food system remain disconnected from those they aim to serve.

This insight became the turning point of the project. The focus was refined to designing a structured feedback system; a foundation for continuous learning and improvement, grounded in empathy and participation.

Through stakeholder input and iterative design, the project delivered two complementary tools to bring this idea to life:

1. **System Maps** that identify and visualise gaps in feedback flows across the key aspects taste, meal offerings, portion size and food communication, offering a framework for data-informed decision-making.
2. **The Recipe for Lasting Change Cookbook**, an engaging, hands-on guide that helps to develop and implement a structured and effective feedback system in the hospital's food operations in a way that feels doable, meaningful and even fun.

Together, these tools help turn feedback into action—not as a one-time fix, but as a continuous cycle of improvement. They provide the structure and language to support the food system's evolution at Sophia and could serve as a model for other hospitals working toward similar goals. By focusing first on the experience—on what patients need, want and enjoy—this project lays the groundwork for sustainable change that actually sticks.

Glossary

Abbreviations

| | |
|---|---------------------|
| Erasmus Medical Centre | Erasmus MC or EMC |
| Intensive Care | IC |
| Hotel Management School Maastricht | HMSM |
| Medium Care | MC |
| Nutritional Assistant (Voedingsassistent) | NA (or in Dutch VA) |
| Sophia Children’s Hospital | SCH |
| Systems Oriented Design | SOD |
| University Medical Centre | UMC |

Terminology

Admitted patients: Patients who stay overnight in the hospital for treatment and care.

Clinical patients: Patients who visit the hospital for consultations or treatments but do not stay overnight.

Erasmus Medical Centre (EMC): The overarching hospital system that includes Sophia Children’s Hospital (SCH) and other medical departments. EMC is located in Rotterdam and one of the three largest academic hospitals in the Netherlands.

Green Deal Duurzame Zorg 3.0: A Dutch initiative that encourages healthcare institutions to reduce their environmental footprint and integrate sustainability into their operations.

Main meals: structured and nutritionally balanced meals provided within the hospital food system for breakfast, lunch and dinner.

Meat-based: Foods that contain or are primarily composed of animal-derived products, such as meat, dairy products and eggs.

Paediatric: The branch of medicine focused on the health and medical care of infants, children and adolescents.

Plant-based: Foods derived from plants, including vegetables, fruits, grains, legumes, nuts and seeds, often used as alternatives to animal products.

Protein: A macronutrient essential for body function, growth and repair, found in both animal and plant-based foods.

Sophia Children’s Hospital (SCH): The paediatric hospital within Erasmus Medical Centre, specializing in child healthcare.

Sustainability: Meeting the needs of current generations without compromising the ability of future generations to meet their own needs, ensuring long-term environmental, social and economic balance (World Health Organization, 2017).

Wheel of Five (Schijf van Vijf): The Dutch dietary guideline developed by the Netherlands Nutrition Centre, promoting a balanced and sustainable diet based on five essential food groups.

Reading guide

| | |
|---------------|--------------------------------|
| Colour guide: | |
| Orange | Orientation and vision setting |
| Green | Explore |
| Purple | Reframe |
| Blue | Create |
| Light blue | Catalyse |
| Yellow | Continuing the journey |

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01

Vision setting

This part introduces the context and aim of this project and explains the overall approach.

- 1.1 Introduction to the project
- 1.2 Systems Oriented Design

1.1 Introduction to the project

1.1.1 Need for change

Hospitals play a vital role in promoting health, yet they are significant contributors to the climate crisis. In the Netherlands, the healthcare sector accounts for 7% of the national CO₂ footprint, 4% of waste production and 13% of raw material consumption (Figure 1) (NFUMC, 2023). To address these impacts, the Green Deal Duurzame Zorg 3.0 (GD DZ) and the Ministry of Health, Welfare and Sports (Min VWS) set ambitious goals, including shifting to 60% plant-based meals by 2030 and reducing food waste by 50%.

This project focuses on the food system of Sophia Children’s Hospital (SCH), part of Erasmus Medical Centre (EMC), the largest children’s hospital in the Netherlands. The EMC food system presents a critical opportunity for sustainability, with 40% of meals wasted and a similar percentage of plant-based meals provided at this moment, far below the Green Deal’s targets. This waste stems from issues such as leftover portions, misaligned delivery timing and limited acceptance of (plant-based) meals. Such inefficiencies not only hinder environmental goals but also compromise adequate nutrient intake, which is very important for patient recovery.

Sophia Children’s Hospital faces unique challenges in achieving these goals due to its strict health regulations, particularly for vulnerable children. Nutritional misconceptions about plant-based diets amplify the difficulty of changing food systems. However, extensive research confirms that well-designed plant-based meals are both nutritious and environmentally beneficial. Furthermore, if it can be achieved in the challenging environment of a children’s hospital, there is no reason why the rest of the healthcare sector should lag behind. They are encouraged to make their nutrition systems sustainable as well.



Figure 1: Healthcare sector’s impact on national emissions and usage

1.1.2 Project collaboration

This project was initiated by Dr. S.C.A.T Verbruggen, a paediatrician at Sophia Children’s Hospital and Dr. Ir. J.I.J.C. de Koning, an assistant professor in sustainable transitions at TU Delft’s Industrial Design Engineering faculty. As part of broader environmental initiatives within EMC, Sophia Children’s Hospital aims to transition towards a more sustainable food system. While extensive (medical) research exists on the protein transition and food waste reduction, concrete, actionable steps are still lacking. Verbruggen, along with other healthcare specialists, believes that currently, food is not sufficiently contributing to a more sustainable healthcare system that meets the needs of current and future generations and therefore advocates for change.

The objective of this graduation project is therefore to develop a well-researched, systemic understanding of the factors that both hinder and support this transition. By incorporating diverse perspectives, the project aims to generate an outcome that serves as a stepping stone in reducing the environmental impact of Sophia’s food system, ultimately giving momentum to the transition EMC wide.

As the designer, I was drawn to this project due to my strong interest in tackling complex sustainability challenges and a desire to bridge the gap between insight development and implementation; an area I missed in my master’s program in strategic product design.

1.1.3 Project goal

From this, the following assignment was formulated:

“Designing an intervention to increase the acceptance of more sustainable food choices for patients at Sophia Children’s Hospital.”

To guide the project’s analysis, the following research questions were formulated:

- What are the current sustainability challenges in (hospital) food systems and how are the Netherlands and healthcare institutions addressing them?
- How is the current food system at Sophia Children’s Hospital structured and what changes are expected?
- What strategies and goals do EMC and SCH have for achieving sustainability in hospital food, both now and in the near future?
- What factors are essential to create a positive and suitable eating experience for children in a hospital setting?

1.1.4 Focus

Establishing clear project boundaries is crucial to effectively addressing the hospital food system. It is important to note that a system is never fully bounded, as stakeholders and influences are widely connected. However, setting a defined scope ensures a manageable and impactful approach. The following boundaries were set for the project.

Patient meals

This project focuses on solid patient meals at Sophia Children’s Hospital (SCH), which account for approximately 33% of all food at Sophia (Figure 2) (Appendix B). While visitor and staff meals represent a larger share, they are managed separately by external providers like Albert Heijn and Appèl, making changes more complex due to contractual and cost-related constraints (Interview EMC food manager 1).

Patient meals, however, fall directly under EMC’s responsibility, allowing for more targeted improvements. Since a hospital’s primary role is patient care and recovery, ensuring meals align with health and sustainability goals is a logical priority. While shifting employee and visitor meals could also drive impact, patient meals offer a more controlled starting point. Focusing on this area not only supports sustainable transitions but also improves the patient experience, setting a foundation for broader changes in the future.

The impact of illness and low energy levels is considered in a general sense, but the specific effects of individual conditions or illnesses on a patient’s experience of meals are not included, as this falls outside my area of expertise and the project goal.

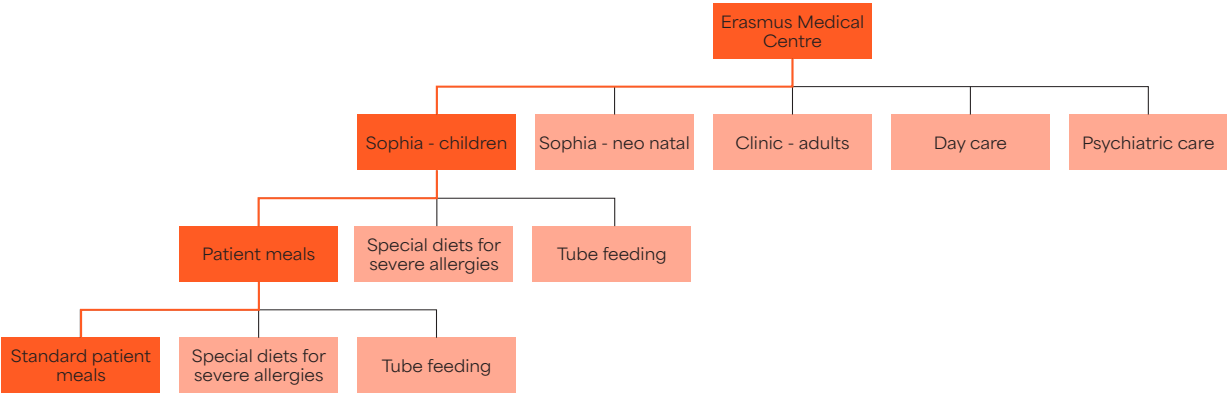


Figure 2: Focus area of the project

Protein transition

Sustainability within the hospital food system can be addressed in multiple ways, but this project primarily focuses on increasing plant-based food options, secondarily on reducing food waste and will not focus on things like sourcing local and seasonal ingredients, using organic produce and minimizing packaging. This is further explained in chapter 2.1..

While food waste remains a long-standing issue in healthcare, efforts to address it have seen limited success, partly due to a lack of emotional and operational commitment to change. However, by focusing on plant-based meals and increasing their acceptance, this project indirectly contributes to waste reduction, as more appealing and widely accepted meals lead to less uneaten food being discarded.

1.2 Systems Oriented Design

1.2.1 Design approach

This project applies a Systems Oriented Design (SOD) approach to analyse and improve the hospital food system at Sophia Children’s Hospital. SOD integrates systems thinking and design thinking to tackle complex problems by considering the interrelationships among various system components (Figure 3). This methodology is particularly suitable for SCH, as it bridges the needs and insights of multiple stakeholders and disciplines, fostering engagement across departments. Whereas studies from other fields often end with an analysis report, my role as a designer enables the development of actionable, innovative and feasible solutions. Throughout this project, I aim to identify key leverage points to drive systemic improvements that balance sustainability, nutrition and patient experience.

Integrating systems thinking and design thinking

Systems thinking provides a broad perspective by analysing relationships between elements and identifying root causes rather than treating symptoms. It highlights the need to bring marginalised voices—such as hospitalised children in this project—from the periphery to the centre of the design process. It recognizes that problems are ever-evolving, requiring adaptive and resilient solutions (Kania et al., 2018). In contrast, design thinking ensures that solutions remain user-focused, actionable and human-centred. The combination of these approaches offers a solid foundation for tackling complex issues like sustainable food systems in hospitals. Any intervention within a system sets off new interactions, meaning solutions must be flexible, iterative and capable of evolving over time (Design Council, 2021; Jones, 2014).

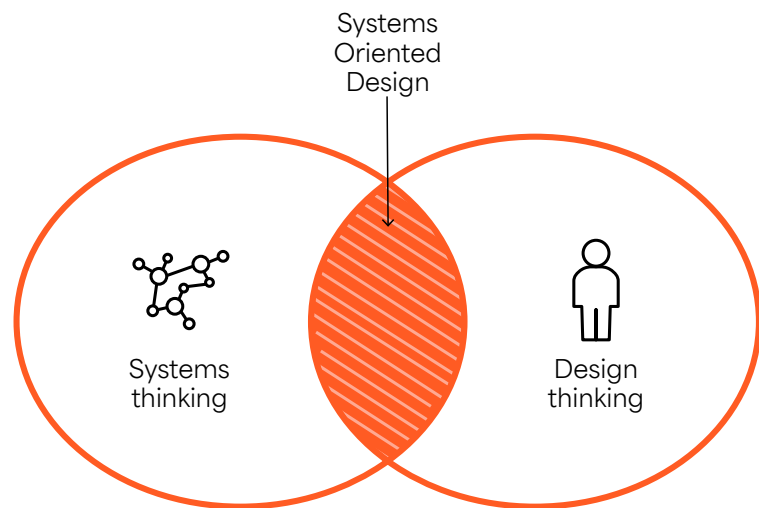


Figure 3: Systems Oriented Design

In this project, Systems Oriented Design is guided by five key principles, as identified by Van der Bijl-Brouwer and Malcolm (2020) (Figure 4):

1. **Opening up and acknowledging interrelated problems** - Addressing system-wide challenges rather than isolated issues.
2. **Developing empathy with the system** - Engaging deeply with stakeholders, especially children, to understand their needs.
3. **Strengthening human relationships** - Encouraging collaboration to foster creativity and shared learning.
4. **Influencing mental models** - Challenging existing assumptions to enable meaningful change.
5. **Adopting an evolutionary design approach** - Creating flexible, iterative solutions that adapt to changing dynamics of the system.

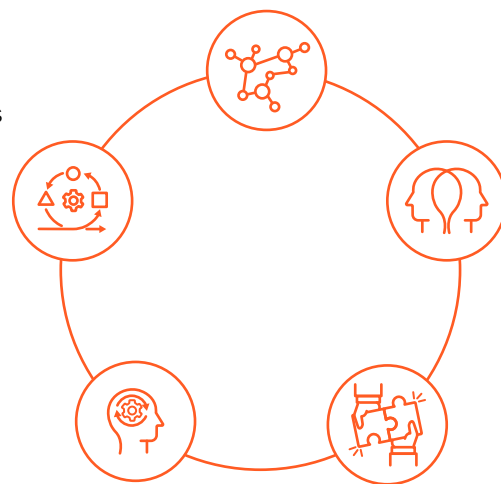


Figure 4: Five key principles of Systems Oriented Design

By applying these principles, the project aims to identify key leverage points to drive meaningful, systemic improvements in SCH's food system, ultimately contributing to a more sustainable and patient-centered healthcare environment.

1.2.2 Design process

The design process for this project was iterative and multifaceted, incorporating various methods to explore the complexities of sustainable hospital food. It is non-linear, with continuous cycles of research, analysis, ideation and refinement shaping the scope and design direction. These cycles followed the Systemic Design Framework from the Design Council (2021) (Figure 5), which alternates between divergent (exploring possibilities) and convergent (narrowing focus) phases.

The process involved constant zooming in and out—shifting between broad exploration and detailed analysis—to refine the project scope while addressing the root causes of the problem. This approach ensured a balance between a holistic perspective and targeted problem-solving. At the beginning of each section in this report, the methods used are briefly explained.

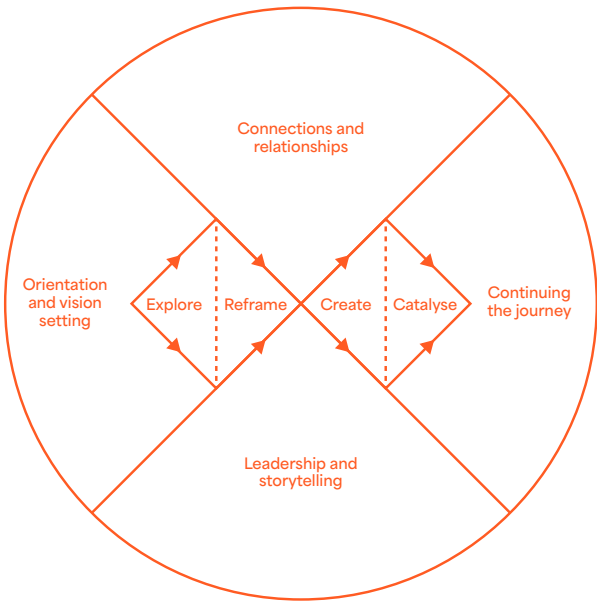


Figure 5: Design process based on the Systemic Design Framework (Design Council, 2021)

02

The intersection of sustainability, healthcare children's nutrition

This part explores literature on sustainability in food and healthcare, as well as how children interact with food.

The two research questions that will be answered by literature in this part are:

- What are the current sustainability challenges in (hospital) food systems and how are the Netherlands and healthcare institutions addressing them?
- What factors are essential to create a positive and suitable eating experience for children in a hospital setting?

2.1 Sustainable food shifts

2.2 Sustainable food shifts in the healthcare sector

2.3 Children and food

Approach

Literature research

Relevant literature was consulted throughout the project to provide a foundational understanding of hospital and sustainable food systems. Sources include scientific research, opinion pieces, hospital and governmental reports and sustainable healthcare platforms. While opinion pieces lack the rigour of academic research, they offer valuable insights into societal sentiments and trends, serving as a guide for social research.

2.1 Sustainable food shifts

2.1.1 Climate change and the role of food systems

The climate is changing and its effects are undeniable. Over the past 130 years, Earth’s average temperature has risen by 1.1°C, while sea levels have risen 20 cm due to melting ice caps. In the Netherlands, temperatures have increased even more sharply by 1.9°C. While natural factors like volcanic eruptions influence climate patterns, since the 1800s, human activities—burning fossil fuels and methane emissions from livestock—have become the dominant cause, fuelling a crisis that demands urgent action (WWF NL, n.d.-b; United Nations, n.d.).

In the Netherlands, many do not perceive climate change as an immediate threat. Compared to other nations experiencing more drastic effects, the impact feels less tangible, leading to a diminished sense of urgency (Maiella et al., 2020). However, the global food system plays a significant role in this crisis, with both environmental and health consequences.

Globally, one billion people suffer from malnutrition, while another billion face obesity and diet-related illnesses. Poor dietary habits are now the leading burden of disease worldwide (Deckers & Ermes, 2024; Lingvay et al., 2024).

In the Netherlands, over 50% of adults were overweight in 2023 and many consume diets high in animal products, contributing to both health issues and environmental strain (Figure 6) (Ministerie GWZ, 2024; Ministerie VWS, 2024). Studies show that shifting to plant-based diets can reduce environmental impact and improve health outcomes (Voedingscentrum, n.d.; Wereld Natuur Fonds, 2021).

The environmental cost of animal-based food production is enormous. Livestock farming uses 80% of agricultural land yet provides only 18% of global caloric needs (Ritchie & Roser, 2019). Soy farming, a major cause



NOS Nieuws • Maandag 25 november, 07:43 

RIVM: in 2050 heeft 64 procent overgewicht, vooral toename bij jongeren

Het aantal mensen met overgewicht in Nederland zal in 2050 zijn opgelopen tot 64 procent. Dat meldt het RIVM in zijn rapport Volksgezondheid Toekomst Verkenning. Ter vergelijking: in 2022 was het percentage van de bevolking met overgewicht 50.

Figure 6: NOS article on Obese in The Netherlands (NOS, 2024)

of deforestation, is often criticised for its environmental impact (Figure 7). However, 80% of soy is used for animal feed, highlighting the inefficiency of animal-based food systems (WWF, n.d.-a).

Additionally, 40% of food is wasted globally, with similar figures observed in Dutch hospitals (Ministerie LNV, 2023). Although households in the Netherlands have reduced food waste by 23% since 2015, more systemic action is required (Van Lieshout & Knüppe, 2023).

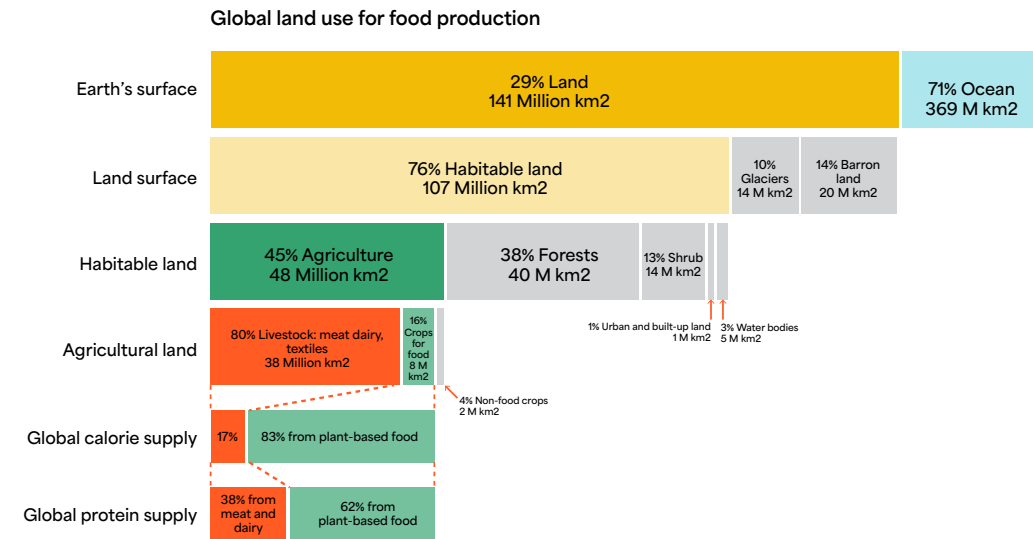


Figure 7: Land-usage of plant and animal based products ((Ritchie & Roser, 2019)

2.1.2 The protein shift

Food production accounts for about 22% of household CO₂ emissions, driven by energy-intensive farming, processing and transportation (Milieucentraal, n.d.). One of the most effective ways to lower this impact is by replacing animal-based proteins with plant-based alternatives. Porcelijn’s “Keuzeboom” (2017) shown in Figure 8, highlights plant-based diets as the most impactful step towards sustainability, forming the foundation for further improvements. While food waste reduction, local sourcing, organic farming and minimising packaging contribute to sustainability, they are secondary to shifting protein sources.

Environmental impact of protein sources

Producing 1 kg of beef requires 15,000 litres of water—equivalent to 32 hours of showering—whereas a plant-based burger requires just a fraction of that amount (Kooiman, 2015). Globally, a shift to plant-based diets could reduce agricultural land use from 4 billion to 1 billion hectares (Ritchie & Roser, 2024). Given these statistics, policymakers and hospitals are advocating for dietary changes.

The Dutch Ministry of Health, Welfare and Sports (VWS) aims to shift to a 60/40 plant-based to animal-based dietary ratio by 2030, which could lower environmental impact by 25% (Ministerie VWS, 2024).

The role of meat substitutes- meat substitutes: A hybrid approach

Peeters et al. (2024) identified eight transition design frames shaping the current plant-based food promotion in the Netherlands. One example of this is as she calls it ‘Tasty Doppelgangers’.

In recent years, meat substitutes such as plant-based burgers and sausages have gained popularity in Dutch households. While they help consumers transition away from meat, many products are highly processed and contain excess sodium and preservatives, making them unsuitable for hospital diets (Peeters, 2024). Additionally, despite increased availability, overall meat consumption has not significantly declined (Deckers & Ermes, 2024).

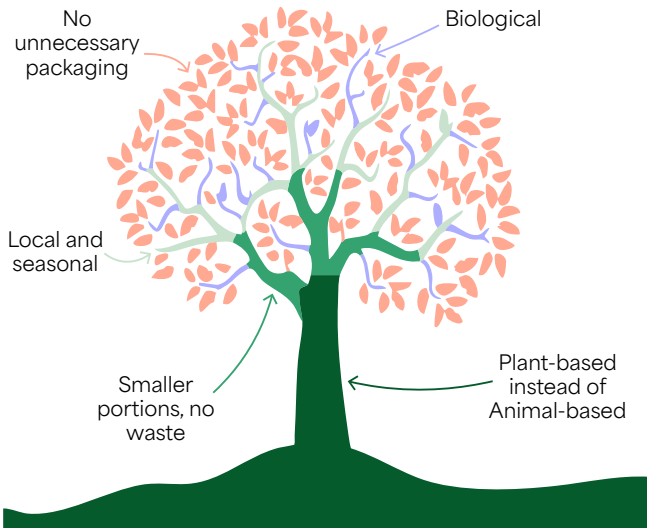


Figure 8: Keuzeboom (Porcelijn, 2017)

2.2 Sustainable food shifts in the healthcare sector

2.2.1 Healthcare’s environmental impact and the role of food?

The healthcare sector faces the dual challenge of improving health while reducing its environmental footprint. In the Netherlands, the sector contributes 7% of national CO₂ emissions, 4% of total waste and consume 13% of raw materials (NFUMC, 2023). The healthcare sector being ‘the biggest caterer of the country’, has a unique opportunity to transition to more sustainable food practices. This shift could lower emissions, reduce waste and set an example for other sectors, aligning with efforts to improve public health and sustainability (Touw et al., 2023; Deckers & Ermes, 2024).

Sustainable healthcare is defined as care that meets current needs without compromising future generations or other parts of the world (World Health Organization, 2017). A shift towards prevention—by promoting healthier diets and reducing overconsumption—could lessen the need for medical interventions, decrease medication use and further lower the sector’s environmental impact (Deckers & Ermes, 2024; Interview Academic 1). However, implementing meaningful change requires actionable frameworks and collaboration across stakeholders (Nederlandse Federatie van Universitair Medische Centra, 2023; Interview Academic 1).

The importance of protein in hospital meals

Proteins are crucial for recovery, particularly in hospital settings, where they support muscle maintenance and repair. Traditionally, hospitals rely on animal-based proteins such as meat, fish and dairy. However, plant-based sources—like nuts, legumes and tofu—can also provide sufficient protein with a lower environmental footprint.

Concerns about reducing animal protein in hospital diets often stem from fears about its impact on recovery. However, studies show that muscle mass loss in hospitalised patients is influenced more by immobility than protein deficiency (Deckers & Ermes, 2024). A shift towards plant-based diets can also offer broader health benefits, reducing the risk of cardiovascular diseases, type 2 diabetes and certain cancers, while excessive consumption of animal proteins has been linked to chronic diseases (Ministerie VWS, 2024; Patel et al. 2017).

Navigating the transition

Hospitals shifting toward plant-based meals recognize the importance of offering hybrid protein solutions, including minimally processed plant-based sources like tofu, legumes and nuts. Food industry innovation will increasingly focus on healthier, less processed plant-based options (Interview Academic 3).

Concerns about protein intake remain, but studies show that most Dutch people consume more protein than necessary. Earlier recommendations for increased protein intake in vegetarians have been revised, affirming that a fully plant-based diet can be nutritionally sufficient (Interview Academic 1; Ministerie VWS, 2024). However, vegans should still monitor their protein intake to ensure balanced nutrition (Ministerie VWS, 2024).

2.2.2 The Green Deal Duurzame Zorg 3.0

The Green Deal Duurzame Zorg 3.0 (Green Deal DZ) is a collaboration between the Netherlands’ seven University Medical Centers (UMCs) and the broader healthcare sector to promote sustainability. While fulfilling their roles in care delivery, research and education, these institutions unintentionally contribute to the climate crisis. This paradox presents a significant challenge that UMC’s aim to address through the Green Deal DZ.

The plan commits UMCs to sustainable practices across five key themes, including sustainable and healthy nutrition. By 2030, all food offerings must comply with the Netherlands Nutrition Centre’s Dietary Environments guidelines. UMCs aim for at least 50% plant-based proteins in meals for staff, visitors and patients, where medically appropriate (NFUMC, 2023).

Beyond this, the Ministry of Health, Welfare and Sports (VWS) set a national goal to reverse the current 40/60 plant-to-animal protein ratio by 2030, which could cut the environmental impact of diets by 25% (Ministerie van VWS, 2024). This is based on the guidelines from EAT-Lancet, a commission of scientists that

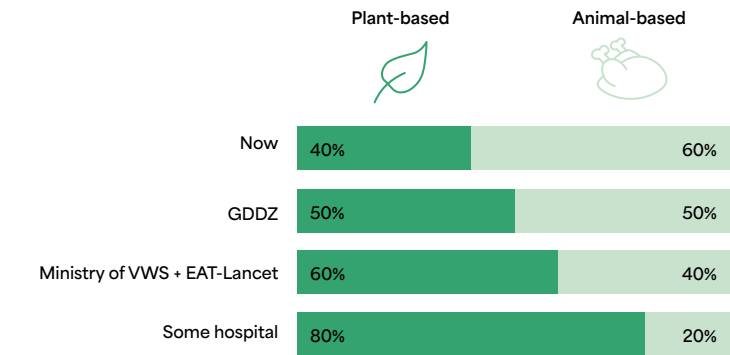


Figure 9: Wished plant-animal ratio's

developed global dietary recommendations for health and sustainability, promoting a diet rich in plant-based foods with limited animal products (EAT, 2019). Erasmus MC and other hospitals are exceeding the 50/50 target, with some even aiming for 80/20, accelerating the transition (Figure 9). Research confirms plant-based diets provide all essential amino acids, supporting feasibility (Deckers & Ermes, 2024).

Reducing food waste in hospitals

Another major focus of the Green Deal DZ is food waste reduction. Currently, approximately 40% of purchased food in healthcare facilities is wasted. From 2024, all UMCs will monitor their food waste, aiming to reduce it to a maximum of 20% by 2026 (Soethoudt, 2016).

At Erasmus MC, over 3 million kilograms of swill were collected in 2024. Although swill makes up 2.3% of the total waste, the actual amount of food waste is likely much higher. Internal data from a logistics manager at EMC indicates that besides the 2.3% of swill, no estimate could be made for food waste in the residual stream. However, research by Backx (2023) across four UMCs found that approximately 6% of residual waste consists of food waste, suggesting that a significant portion of food waste at Erasmus MC may currently go unrecorded.

Hospitals are now identifying waste hotspots and developing targeted reduction plans. In addition, the NFU aims to cut unsorted residual waste by 25% by 2030 compared to 2018 levels. These efforts ensure that UMCs not only fulfill their healthcare missions but also contribute meaningfully to climate action and sustainable food systems (NFUMC, n.d.).

In support of this commitment, UMC’s will implement actions to reduce food waste, a critical issue considering that approximately 40% of purchased food in healthcare facilities ends up discarded. From 2024, all UMC’s will monitor their food waste with the goal of reducing it to a maximum of 20% by 2026.

2.2.3 Sustainability movements within Dutch healthcare sector

Sustainability has gained traction in the healthcare sector in recent years. Hospitals are embedding environmental goals into their strategies and Green Teams have emerged to lead these efforts. Formed by enthusiastic employees, teams such as “De Groene IC,” “Green Team Infectiepreventie NL,” and “Green Team Sophia” promote sustainability through campaigns, projects and events, fostering a cultural shift towards greener healthcare.

There are currently 180 Green Teams across the Netherlands, 30 of which

involve Erasmus MC staff (Groene Zorg Alliantie, 2024).

Innovations in sustainable hospital food

Many hospitals and organizations are making strides towards more sustainable food systems (Figure 10). Table 1 highlights key platforms driving this transition in the Netherlands. Appendix C also compares Erasmus MC’s sustainability efforts with those of other healthcare institutions, showcasing how different hospitals are progressing towards plant-based meal targets and food waste reduction.



Figure 10: Own image taken at Groene Zorg Festival

| | | | | | |
|----------------------|--|---|---|--|--|
| |  |  |  |  |  |
| Goal | Provide guidelines and impact measurement tools for sustainable food policies in healthcare. | Promote sustainability in healthcare through collaboration, advocacy and events. | Transform food systems to promote plant-based nutrition. | Educate healthcare professionals and the public on evidence-based nutrition. | Help hospitals transition to sustainable and healthy food options. |
| Creators | Developed collaboratively by healthcare institutions, suppliers and patient organizations. | Founded in March 2021, the alliance comprises a collective of environmentally conscious healthcare professionals and Green Teams. | Established by a group of food awareness advocates and nutrition experts. | Founded by a coalition of physicians and nutrition scientists. | Initiated by the Stichting Alliantie Voeding in de Zorg (Nutrition in Healthcare Alliance). |
| Target group | Healthcare facilities | Healthcare professionals, policymakers | Global institutions, healthcare providers | Medical professionals, general public | Hospitals, healthcare staff, visitors |
| Operational scale | Netherlands | Netherlands | Global | Netherlands | Netherlands |
| | Net positive impact on health, society and the planet by 2030. | Cross-sector collaboration, knowledge sharing and awareness building. | Sustainable food practices, plant-based nutrition advocacy. | Nutrition-focused sustainability, training and awareness. | Implementation of sustainable hospital nutrition policies. |
| Quantitative impact | Specific numerical data on the platform's reach or success metrics is not readily available. | As of December 2024, the alliance has contributed to increasing the number of healthcare organizations committed to the Green Deal Duurzame Zorg to 475. | Recognised by the United Nations for its impact, ProVeg collaborates with various institutions, including healthcare providers, to implement sustainable food practices. | The organization has developed a range of resources and training programs, though specific metrics on reach and effectiveness are not specified. | Nearly all hospitals and an increasing number of care institutions in the Netherlands participate in this initiative. |
| Barriers encountered | Challenges include aligning diverse stakeholders, ensuring consistent implementation across various institutions and overcoming resistance to change within established food service operations. | Key challenges include coordinating efforts across a wide range of institutions, securing sufficient resources for initiatives and influencing policy changes at various governmental levels. | Challenges include overcoming cultural preferences for meat-based diets, addressing misconceptions about plant-based nutrition and ensuring the availability of plant-based options in diverse regions. | Obstacles include integrating nutrition education into medical curricula, changing established clinical practices and addressing the varying levels of nutrition knowledge among healthcare professionals. | Challenges include standardizing sustainable food practices across institutions, securing buy-in from all stakeholders and addressing budget constraints related to sourcing sustainable food options. |
| Source | (ToekomstProef, 2023) | (Groene Zorg Alliantie, 2024) | (ProVeg International, 2025) | (PAN Nederland, 2025) | (Goede zorg proef je, 2024a; Goede zorg proef je 2024b) |

Table 1: key platforms driving this transition in the Netherlands

2.3 Children and food

2.3.1 Understanding children’s needs / what children value

Table 2 illustrates what different age groups value, reject and prefer regarding treatment inside and outside the hospital. This information is based on research from the Nederlands Jeugdinstituut, a national knowledge centre on child development and Grenswijs, a Belgian initiative that helps organizations develop policies on physical, emotional and bodily integrity. These insights provide essential context for designing interventions that align with the needs of patients at Sophia Children’s Hospital (Grenswijs, n.d.; NJi, 2023; NJi; n.d.).

2.3.2 Children, food and perception

Sensory influences of food choices

Children interact with food differently than adults, relying primarily on immediate characteristics like flavour while overlooking factors like portion size or nutritional value. Their eating habits evolve through a mix of innate preferences and learned behaviours, shaped by sensory, psychological and social factors (Rigo et al., 2023).

Beyond taste, visual appearance, texture and aroma significantly impact how children evaluate food (Tokat & Yilmaz, 2022). Bright colours signal freshness and quality, while texture—such as the crunchiness of vegetables—can enhance or detract from appeal (Kot, 2024). Smell influences flavour expectations even before a bite is taken. This is particularly relevant for plant-based foods, which differ from meat-based dishes in sensory properties. Innovations in food science aim to bridge these gaps, making plant-based options more appealing (Giacalone et al., 2022).

Environmental factors like lighting and noise also influence food perception. Studies show that bright lighting can promote healthier choices, while dim lighting enhances basic flavors like sweetness. High noise levels, common in hospital settings, can reduce sensitivity to sweetness and saltiness, potentially altering how meals are experienced by patients and staff (Kot, 2024).

Psychological and social context

Branding, marketing cultural norms shape children’s food choices. Visually appealing or familiar foods are preferred promotional tactics, such as offering toys with unhealthy meals, enhance attractiveness (Kot, 2024). To counteract these influences, targeted campaigns must make nutritious foods engaging (WHO, 2021).

| | | 3-6 jaar | 7-12 jaar | 13-18 jaar |
|--------------------------------|------------|--|---|---|
| Wensen en gewoonten | Algemeen | Spel en ontdekking: Kinderen in deze leeftijdsgroep leren door spel en zijn nieuwsgierig naar hun omgeving. Vriendschappen: Eerste vriendschappen worden gevormd. Routine en structuur: Vaste routines bieden veiligheid en voorspelbaarheid. Bewegingsvrijheid: Kinderen genieten van bewegingsvrijheid. Sociale relaties: Meisjes tonen vaak meer interesse in rollenspel en activiteiten waarbij ze anderen verzorgen, zoals poppen spelen. Fysieke activiteiten: Jongens kiezen vaker voor actievare spellen, zoals bouwen of rennen. | Vriendschappen: Sociale interacties met leeftijdsgenoten worden belangrijker. Oorzaak-gevolg: Krijgen interesse indit soort relaties. Samen delen: Het delen van spullen wordt een manier van contact zoeken. Spelend leren: Worden door bouwen en sparen gemotiveerd om te leren. Vriendschappen: Meisjes hechten veel waarde aan hechte, persoonlijke vriendschappen en praten graag over hun gevoelens. Fysieke activiteiten: Jongens zoeken vaak uitdagingen en houden van spellen met winnaars en verliezers. | Identiteitsontwikkeling: Sociale interacties met leeftijdsgenoten worden belangrijker. Onafhankelijkheid en vrijheid: Sterke behoefte aan autonomie en eigen keuzes. Inhoudelijk geïnteresseerd: willen ondebouwde engeod beargumenteerde argumenten horen. Bezig met duurzaamheid: interesse in duurzamer leven. Emotionele verwerking: Meisjes praten vaak graag met vriendinnen of familie over hun ervaringen en gevoelens. Competentie: Jongens willen graag laten zien waar ze goed in zijn. |
| | Ziekenhuis | Aanwezigheid van ouders: Ouders bieden troost en veiligheid. Speelgoed en activiteiten: Beschikbaarheid van speelgoed helpt bij afleiding en comfort. Behoefte aan troost: Meisjes zoeken vaker emotionele steun bij verzorgers. Stoer doen: Ze proberen hun angst of ongemak soms te verbergen. | Contact met vrienden: Mogelijkheid om contact te houden met school en vrienden. Educatieve activiteiten: Toegang tot schoolwerk of leerzame spellen. Sociale connectie: Ze willen graag in contact blijven met vriendinnen via bijvoorbeeld brieven, telefoontjes of video's. Speelse afleiding: Jongens waarderen interactieve en competitieve spellen, zoals videogames of tafelvoetbal. | Privacy: Eigen ruimte en tijd voor zichzelf zijn cruciaal. Speelgoed en activiteiten: Contact met Buitenwereld: Mogelijkheid om vrienden te zien en online te communiceren. Privacy en comfort: Ze willen privacy, bijvoorbeeld een eigen ruimte om zich terug te trekken. Praktische benadering: Jongens willen duidelijke, feitelijke informatie over hun behandeling. |
| Afkeuren en eisen | Algemeen | Onbekende situaties: Onverwachte veranderingen kunnen angst of weerstand oproepen. Behoefte aan begeleiding: Ze hebben begeleiding nodig bij dagelijkse activiteiten en sociale interacties. | Beperkingen: Overmatige regels kunnen als belemmerend worden ervaren. Onerlijke Behandeling: Gevoelig voor rechtvaardigheid en gelijkheid. | Bemoeienis: Overmatige controle door volwassenen kan weerstand oproepen. Gebrek aan privacy: Hechten veel waarde aan persoonlijke ruimte en geheimen. |
| | Ziekenhuis | Medische procedures: Kunnen eng zijn; uitleg op niveau van het kind is cruciaal. Onbekende gezichten: Vaste zorgverleners verminderen angst. | Gebrek aan controle: Kunnen zich machteloos voelen; betrokkenheid bij beslissingen is belangrijk. Verveling: Behoefte aan activiteiten om de tijd te verdrijven. | Beperkingen van vrijheid: Strikte regels kunnen frustrerend zijn. Onvolledige informatie: Willen volledig geïnformeerd worden over hun gezondheid en behandeling. |
| Gewenste manier van behandelen | Algemeen | Positieve bekrachtiging: Aanmoediging en lof stimuleren gewenst gedrag. Eenvoudige communicatie: Gebruik van eenvoudige taal en visuele hulpmiddelen helpt bij begrip. Communicatie: Ze ontwikkelen sneller taalvaardigheden, wat helpt om emoties en wensen te uiten. Onafhankelijkheid: Ze tonen vaak minder snel hun emoties en vragen minder expliciet om hulp. | Respectvolle communicatie: Luisteren naar hun mening en gevoelens. Stimuleren van zelfstandigheid: Aanmoedigen om taken zelf uit te voeren. Netheid en esthetiek: Ze kunnen meer waarde hechten aan een mooi aangeklede tafel of georganiseerd spelmateriaal. Exploratie: Ze zijn nieuwsgierig en ontdekken graag nieuwe dingen door te doen. | Erkenning als individu: Behandeld worden als jongvolwassene met eigen meningen. Ondersteuning bij zelfstandigheid: Begeleiding zonder betutteling. Sociale netwerken: Ze besteden veel tijd aan sociale media en digitale communicatie. Fysieke activiteit: Ze hebben vaak een behoefte aan beweging en actie om stress te verlichten. |
| | Ziekenhuis | Zachte benadering: Liefdevolle en geduldige interactie is belangrijk. Vorbereiding op procedures: Gebruik van poppen of verhalen om uit te leggen wat er gaat gebeuren. Rollenspel: Activiteiten zoals doktertje spelen helpen hen de ziekenhuiservaring te verwerken. Behoefte aan afleiding: Jongens hebben meer baat bij fysieke spelletjes of interactieve activiteiten om zich bezig te houden. | Transparantie: Duidelijke uitleg over hun situatie en behandelingen. Betrokkenheid: Betrekken bij eenvoudige keuzes, zoals maaltijden of activiteiten. Creative activiteiten: Kleurboeken of creatieve opdrachten helpen hen ontspannen. Duidelijke structuur: behoefte aan extra begeleiding bij impulscontrole. | Participatie in beslissingen: Actieve rol in hun behandelplan. Respect voor autonomie: Ernstig nemen van hun wensen en grenzen. Expressie: Ze waarderen manieren om zichzelf uit te drukken, zoals een dagboek bijhouden of creatieve activiteiten. Afleiding: Ze zoeken vaak naar activiteiten die hun aandacht volledig opslokken, zoals videogames of sport gerelateerde taken. |

Table 2: values per age group

The social environment also plays a key role in food acceptance. Parents influence eating habits by controlling food availability and setting examples that children mimic (Benton, 2004). Peer behaviour also encourages children to try unfamiliar foods. Institutions like schools and hospitals further shape dietary patterns by offering balanced meals and fostering positive eating experiences (Hursti, 1999).

2.3.3 Children and menus

Giving children freedom of choice improves hospital food acceptance. Feeling restricted can lead to resistance, making choice a crucial factor in meal satisfaction (Landau, 2023). However, if requesting alternatives is difficult, children default to the standard meal. This underscores the importance of making healthy default options, like whole-grain pasta and bread, the norm (Alliantie Voeding in de Zorg & Ministerie VWS, 2023; Loeb et al., 2017).

Children are highly visually oriented, so incorporating images into menus can improve decision-making (Figure 11). Additional nudging techniques (discussed below) can further encourage healthier choices. These strategies also help parents understand key nutrients, such as protein their role in recovery and overall health.

2.3.4 Encouraging children to choose and enjoy healthier meals

Nudging subtly guides choices without limiting freedom. It is part of choice architecture, which organizes the decision-making environment to encourage certain behaviours (Thaler et al., 2012). According to Thaler & Sunstein (2008), nudges should influence behaviour predictably while being easy to opt out of. For example, placing fruit at eye level is a nudge, while banning unhealthy food is not.

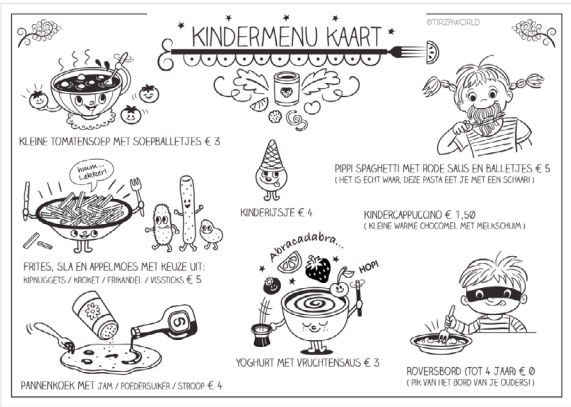


Figure 11: Example of a children's menu (Tirzaworld, n.d.)

The following nudging techniques can encourage healthy food selection at Sophia Children's Hospital (SCH):

1. Placement & positioning

- Healthier options should be most visible, placed at eye level or the start and end of food lines (WHO, 2021; ProVeg International, 2024).
- In digital and physical menus, list plant-based (PB) options first and integrate them with animal-based (AB) choices rather than separating them (Thaler et al., 2012; ProVeg International, 2024).

2. Visual & presentation strategies

- Use attractive garnishing and playful arrangements (e.g., star-shaped carrots) to enhance appeal (INFORM, 2019)
- High-quality images on menus create positive expectations, while subtle plant-based symbols (e.g., a leaf) can increase PB meal selection (ProVeg International, 2024).

3. Verbal & textual framing

- Avoid terms like "vegan" or "vegetarian", which can carry negative connotations. Instead, highlight taste, tradition nutritional values (e.g., "Classic Spiced Berlin Veggie Currywurst" instead of "meat-free sausage") (ProVeg International, 2024).
- Fun, descriptive names like "Magic Green Beans" make meals more appealing (INFORM, 2019).
- Staff should introduce meals positively and avoid emphasizing PB content to prevent bias (Obbema et al., 2024).

4. Encouraging interaction & rewards

- Let children customize their meals, such as choosing toppings, which fosters ownership and curiosity (INFORM, 2019).
- Offer small incentives (e.g., stickers or tokens) to encourage healthier choices, a method proven effective in school and hospital settings (INFORM, 2019).

5. Social influence

- Encourage communal eating or role modelling, as children are more likely to adopt positive behaviours when they see peers or trusted adults enjoying nutritious meals (WHO, 2021).

6. Pricing considerations

- While not applicable to patient meals, pricing PB options lower or equal to AB options can encourage better choices (Huang et al., 2024)

Conclusion

By strategically applying placement, visual appeal, engaging descriptions, interactive choices social influence, children can be subtly encouraged to choose and enjoy healthier meals. This supports a more sustainable and balanced hospital food system while enhancing meal acceptance.

Key takeaways

This chapter explored answers to the following two research questions:

What are the current sustainability challenges in (hospital) food systems how are the Netherlands and healthcare institutions addressing them?

The global food system significantly impacts both health and the environment, with livestock farming using 80% of agricultural land while providing only 18% of global caloric intake. Shifting to plant-based diets reduces land use, lowers emissions improves health outcomes, with a 60/40 plant-to-animal protein ratio potentially lowering environmental impact by 25%.

40% of food is wasted globally, highlighting the need for systemic solutions, especially in healthcare. While meat substitutes help transition away from animal products, they are often highly processed and unsuitable for hospital diets.

The healthcare sector contributes 7% of CO₂ emissions, 4% of total waste 13% of raw material consumption in the Netherlands, making sustainable food practices essential. As one of the largest food providers, hospitals can play a key role in transitioning to healthier, plant-based meals.

The Green Deal Duurzame Zorg 3.0 aims for 50% plant-based meals by 2030, while the Dutch Ministry of Health targets a 60/40 plant-to-animal protein ratio, with some hospitals even aiming for 80/20. Additionally, 40% of food in healthcare is wasted and there are efforts to reduce this to 20% by 2026 through better procurement and meal planning.

What factors are essential to create a positive and suitable eating experience for children in a hospital setting?

Children's food preferences differ by age and are shaped by sensory and environmental factors, such as appearance, texture, aroma social influences. Stress or illness can lead them to favour comfort foods over unfamiliar options, making the presentation and introduction of plant-based meals crucial.

While freedom of choice is important, healthy options should be the default. Nudging techniques like placement, presentation verbal framing can encourage better choices without restricting autonomy.

03

Understanding Sophia's food system: Plans, perspectives, tensions sustainability

This part explores the scope of the project through a qualitative lens, providing in-depth insights into the structure of SCH's food system, stakeholders perceptions and why a sustainable food system is not easily implemented without causing tension.

This part answers the following research questions through a qualitative lens:

- How is the current food system at Sophia Children's Hospital structured and what changes are expected?
- What strategies and goals do EMC and SCH have for achieving sustainability in hospital food, both now and in the near future?
- What factors are essential to create a positive and suitable eating experience for children in a hospital setting?

3.1 Context

3.2 Sophia's food system

3.3 Values and perceptions of hospital food

3.4 Sustainability tension

Approach

Qualitative Research

Nineteen informal, semi-structured interviews were conducted with a total of 23 individuals inside and outside Erasmus MC to gather perspectives, attitudes, frustrations and experiences (Table XX). For each interview, appropriate questions were prepared to gather meaningful insights from the interviewees’ expertise. Conversations were kept open and natural to encourage a relaxed exchange of information by doing semi-structured interviews. Notes were taken during the interviews and in some cases, audio was recorded for accuracy and transcribed later. These qualitative findings enriched the contextual understanding and often provided insights that were not explained in scientific research and pointed to additional stakeholders or resources

Fieldwork

Visits to Sophia Children’s Hospital, Erasmus MC, other hospitals and healthcare events helped to contextualise the research further, especially since both the children’s hospital and sustainable food context were new to the researcher. Observing the environment, systems and interactions in these spaces provided insights into the hospital food ecosystem and its challenges.

| Function | Company / organisation | Type of interview | When | Referring to as |
|--|------------------------------|-------------------|--------------------|--|
| Nutritionist and Senior knowledge broker | Netherlands Food Partnership | In-person | Week 0 | Interview Academic 1 |
| Dieticians (2p) | EMC | Online | Week 2 | Interview Dieticians 1 and 2 |
| PhD protein transition | IDE TU Delft | Online | Week 2 | Interview Academic 2 |
| Quartermaster? | Transitie Coalitie Voedsel | Online | Week 1 | Interview Academic 3 |
| Dietician | Radboud UMC | Online | week 3 | Interview Dietician 3 |
| Manager implementation and projects | Van Hoeckel | Online | Week 2 | Interview Supplier 1 |
| Team manager Food and Beverage | NoordWest ziekenhuizen | In-person | Week 4 | Interview NW food manager 1 |
| Manager and coordinator food and drinks (2p) | EMC | In-person | Week 5 and Week 14 | Interview EMC food manager 1 |
| Manager | Feel Good restaurant EMC | In-person | Week 5 | Interview EMC food manager 2 |
| Paediatrician | SCH | In-person | Week 5 | Interview Paediatrician 1 |
| Social designer protein transition in healthcare | Elderly care Eelde | Online | Week 5 | Interview Designer 1 |
| Nutritional assistant 1 | EMC - SCH intensive care | In-person | Week 7 | Interview Nutritional assistant 1 |
| Nutritional assistant 2 | EMC - SCH medium care | In-person | Week 7 | Interview Nutritional assistant 2 |
| Patient 1 + Parent (2p) | | In-person | Week 7 | Interview Patient 1 and Interview Parent 1 |
| Patient 2 + Parents (2p) | | In-person | Week 7 | Interview Patient 2 and Interview Parent 2 |
| Supervisor KAR | SCH | Online | Week 11 | Interview EMC expert 1 |
| Associate professor Food design | IDE TU Delft | In-person | Week 11 | Interview Academic 5 |
| Nutritional assistant 3 | EMC - SCH medium care | In-person | Week 16 | Interview Nutritional assistant 3 |
| Food quality executive | EMC | In-person | Week 16 | Interview EMC expert 2 |

3.1 Context

3.1.1 Erasmus Medical Centre

Erasmus Medical Centre, located in Rotterdam, is one of the three largest academic hospitals in the Netherlands. It employs almost 18,000 staff members, educates 4,000 students in 2023 alone, it served 670.526 clinical patients and admitted 30,666 individuals. The hospital operates 1,215 beds and specializes in treating rare and complex medical conditions, making it a leader in clinical care, research education (Erasmus MC, n.d.-a; Erasmus MC, n.d.-c).

EMC is globally renowned for research into cancer, cardiovascular diseases public health, taking a comprehensive approach to healthcare from molecular studies to societal health improvements. Its sustainability goals are integrated into its healthcare mission, reflecting its commitment to responsible practices (Boonstra, 2021; Erasmus MC, n.d.-c).

The sections of EMC can be roughly seen as in Figure 12. This project focusses on admitted child patients to SCH, leaving out the other departments.

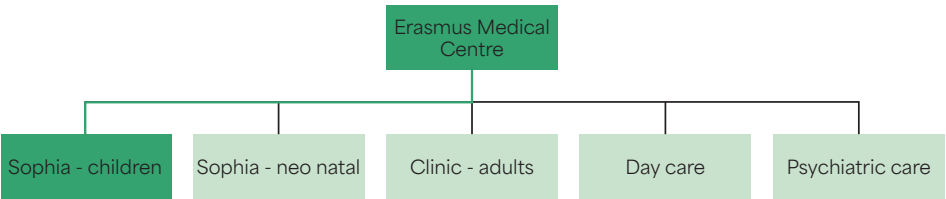


Figure 12: Sections of EMC

3.1.2 Sophia Children’s Hospital

Established in 1863, Sophia Children’s Hospital was the first children’s hospital in the Netherlands. Now part of Erasmus MC, it is one of the largest paediatric centres in the country, specializing in rare and complex conditions. It houses 150 medium-care and 63 intensive-care beds (EMC, n.d.-b, Vrienden van het Sophia Kinderziekenhuis, 2025). Its focus on family-centred care integrates emotional and physical well-being, offering support that extends beyond medical treatment (Erasmus MC, n.d.-b).

Patients at Sophia typically stay for an average of five days, with many remaining for one to three days and only a few staying for multiple weeks. While children aged 0 to 18 are hospitalised at Sophia, around 40% of ICU patients are infants

under one year old, with the majority of the remaining patients aged one to four. Medium-care patients often include slightly older children with chronic conditions who require frequent visits (Interview Paediatrician 1)

Sophia Children’s Hospital, part of Erasmus MC, spans four floors and is structured to meet the diverse needs of young patients and their families. It houses multiple departments across 34 medical specialisms, with corridors on each floor organised by treatment type.

The Medium Care units primarily feature individual rooms, designed to provide privacy and personalised care, with shared rooms available for short-stay patients. These rooms are neutral in design but can be personalised by families to create a homely atmosphere. Adjustable lighting and furniture, such as age-appropriate beds, further support patient comfort. In contrast, the Intensive Care units consist of shared rooms accommodating six to eight children, equipped with advanced medical monitoring systems to enable round-the-clock care (Figure 13). Appendix C shows more pictures of these rooms.

The hospital’s design integrates practical considerations to enhance patient experience and facilitate care delivery. Patient rooms are a key focus for this project, as these spaces are where most meals are provided.

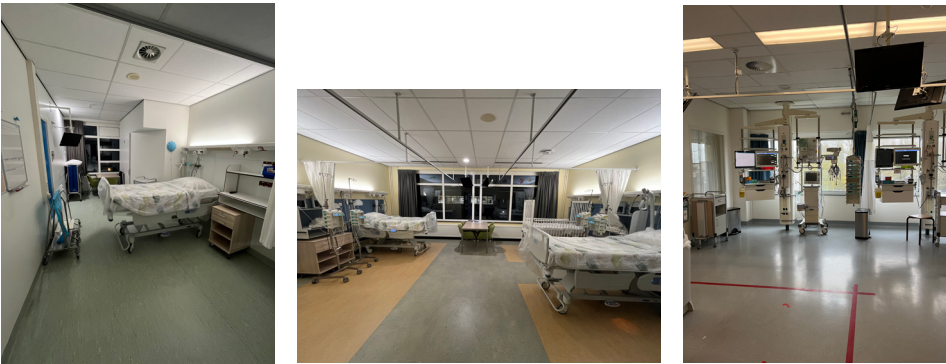


Figure 13: From left to right; individual MC-room, shared short-stay room, shared IC-room

3.2 Sophia’s food system

3.2.1 Hospital food

Hospital food plays a critical role in supporting patient recovery, ensuring that meals not only meet nutritional requirements but also contribute to overall well-being during treatment.

Different types of food

The food system at Sophia Children’s Hospital can be categorised as shown in Figure 14. This project focuses on standard patient meals—regular, solid diets for children—while excluding the following meal types:

- **Tube feeding** consists of liquid nutrition delivered directly into the stomach or intestines. These meals are produced in external laboratories and follow strict medical protocols, making them outside the project’s scope.
- **Neo-natal care** food is designed for mothers, not children therefore follows different dietary needs and preferences. Since this project focuses on meals for paediatric patients, this category is excluded.
- **Special dietary meals** for patients with severe allergies or malnutrition require personalised input from paediatricians, dieticians chefs. Their complexity makes them beyond the project’s focus.
- **Employee and visitor meals** are managed separately by external vendors like Albert Heijn and Appèl. Since these providers operate independently from the hospital’s internal patient food system, they fall outside this project’s scope.

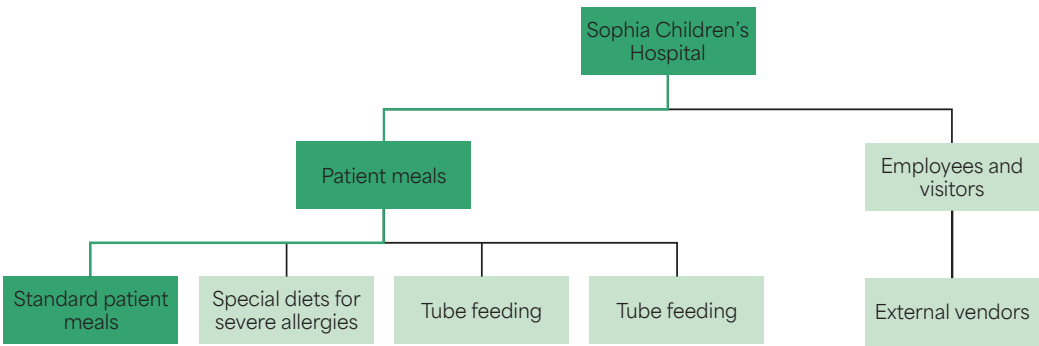


Figure 14: Types of food in Sophia Children’s Hospital

Nutritional composition of standard patient meals

Hospital meals must meet a range of medical and dietary requirements beyond being nutritious, tasty sustainable. The European Society for Clinical Nutrition and Metabolism (ESPEN) provides evidence-based guidelines, urging decision-makers to prioritize nutrition as a central aspect of patient care. The most important recommendations to take into account in this project are:

- Standard hospital diets should provide 0.8-1.0 g of protein per kg of body weight per day to support recovery.
- Sodium intake should be limited to a maximum of 6 grams per day to prevent excessive salt consumption.
- At least two meal options must be available for main meals, ensuring patient choice.
- Snacks should be systematically provided to prevent prolonged fasting periods and support energy levels.
- Protected mealtimes should be implemented to allow patients to eat without interruptions, optimizing nutritional intake and recovery. (Kruizenga, 2022; Thibault et al., 2021).

By focusing on standard patient meals, this project directly enhances the daily hospital food experience for the largest group of patients. Improving these meals ensures they meet medical guidelines while also being enjoyable, practical sustainable. A well-designed system not only increases patient satisfaction but also strengthens the hospital’s overall sustainability efforts. The insights gained can serve as a foundation for future improvements in other meal categories.

3.2.2 Key stakeholders

The diagram in Figure 15 provides a simplified overview of the stakeholder system analysed in this project, highlighting key stakeholders and their main actions. Appendix E shows a more comprehensive version. It is important to note that a system is never fully bounded, as stakeholders and influences are widely connected. This representation focuses on the most relevant stakeholders shaping the hospital food system for patients in SCH.



Patients

Patients of SCH

Children aged 3 to 18 years old receiving care for surgery, treatment, or recovery. They interact with the food system by selecting meals, consuming or rejecting hospital food influencing meal acceptance rates and food waste.



Parents and caregivers

Part of family and support network of patients

Support children emotionally and practically during their hospital stay, often acting as contact person for dietary preferences or (medical) requirements. They also influence the food system by bringing external food and ensuring their child eats meals that suit their tastes and needs.



Nutritional assistants

Part of food department SCH

Handle meal orders, deliver food to departments serve meals to patients, providing one of the few non-medical, pleasant interactions during patients' stay. In the clinic they are referred to as Facility Care Workers, while in Sophia, they are Nutritional Assistants, only focussing on food-related care.



Manager of Food and Beverages

Part of food management EMC

Oversees patient food production and kitchen operations, ensures food safety, develops menus leads the development and implementation of the new food system.



Chefs

Part of kitchen staff SCH

Prepare and regenerate meals, ensure quality and supply completeness, manage kitchen timing collaborate with dieticians on menu composition.



Dieticians

Part of dietetics department EMC

Partner with chefs to design meals meeting patients' nutritional needs, adhering to stringent dietary standards for recovery.



Paediatricians

Part of medical staff SCH

Provide medical care and, when a child's medical condition requires specialised nutrition, collaborate with chefs and dieticians for personalised nutrition solutions.



Van Hoeckel

Part of food suppliers

Supplies meal components or pre-cooked meals under long-term contracts, working with hospital dieticians and managers to meet quality and nutritional standards.

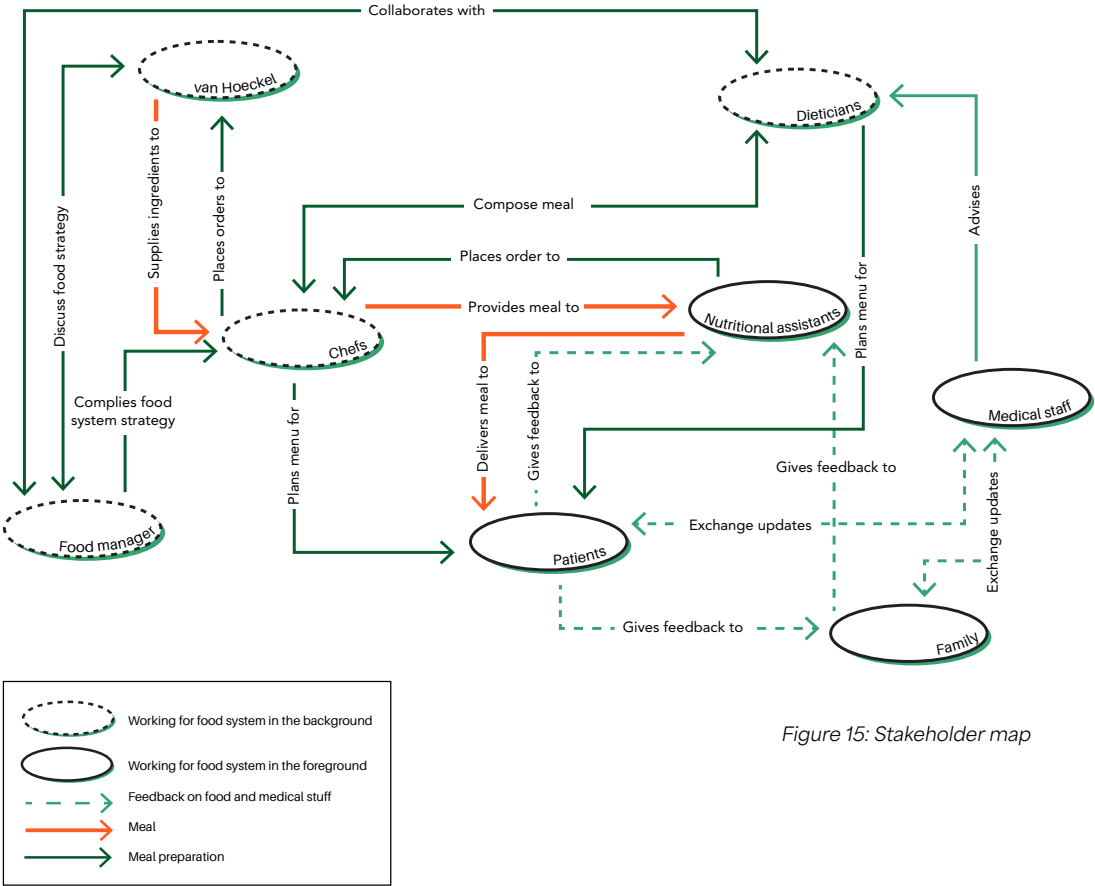


Figure 15: Stakeholder map

3.2.3 Sophia’s food system now

Understanding Sophia Children’s Hospital’s (SCH) food system requires a comparison between the current framework and the upcoming concept launching in May 2025.

Current food system

Erasmus MC serves approximately 480 warm meals and 550 breakfasts and lunches daily, including 40-50 warm meals for SCH children (Interview EMC food manager 1 and Interview NW food manager 1). Since the 2018 merger of locations, the food system has remained largely unchanged. A simplified version of this flow is shown in Figure 16. Figure 18 illustrates a patient journey that includes the meal moment.

Clinical patients

Meals for adults at the clinic are pre-cooked by supplier Van Hoeckel, delivered fresh-frozen daily, regenerated in departmental kitchens served by facility care staff. Meal ordering is available via the Culicart tablet system, but only 20-25% of patients actively use it, often leaving the choice to nutritional assistants (Interview Dieticians 1 & 2).

Child patients

For children, Van Hoeckel delivers meal components to a central kitchen beneath Sophia. Nutritional assistants estimate meal needs, chefs prepare them assistants assemble plates based on real-time requests. To prevent shortages, estimates are made for maximum meal demands, often leading to overproduction and food waste (Interview Dieticians 1 & 2; Interview Supplier 1).

Breakfast and lunch are served via a bread wagon, offering simple options like pre-packaged cheese or peanut butter (Appendix F). Food tracking is minimal the priority is ensuring children eat something rather than maintaining balanced nutrition. Families frequently bring food from home, either to comfort their child or due to concerns about hospital food quality (Interview Dieticians 1 & 2).

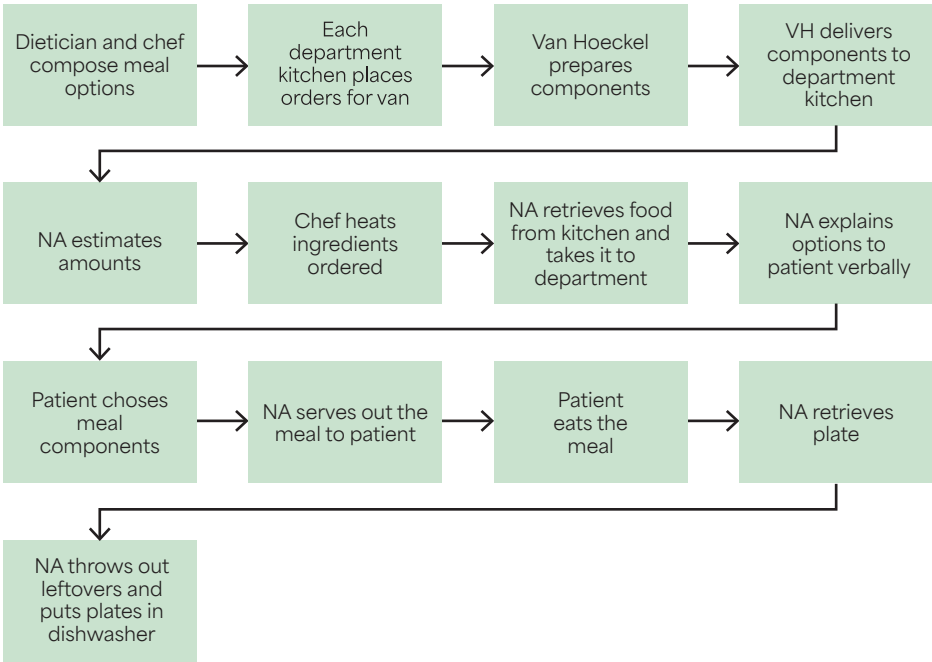


Figure 16: Simplification of the current meal flow

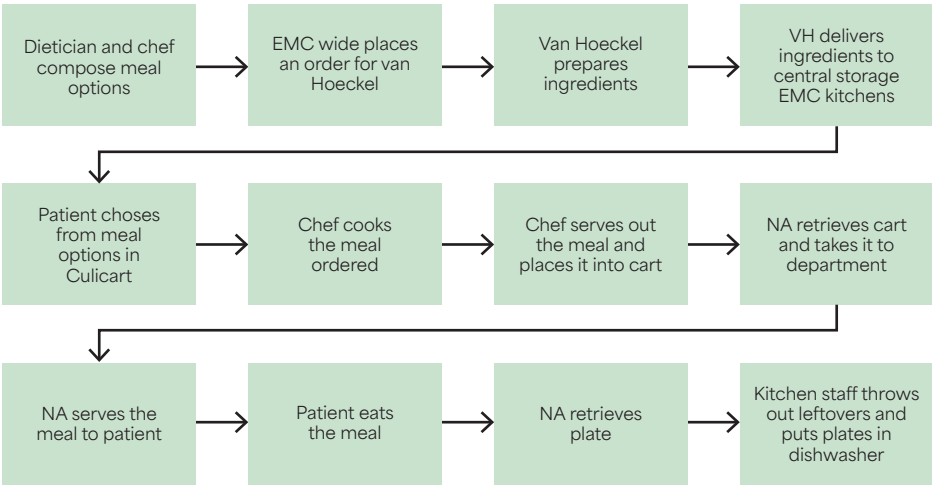


Figure 17: Simplification of the meal flow in the new system

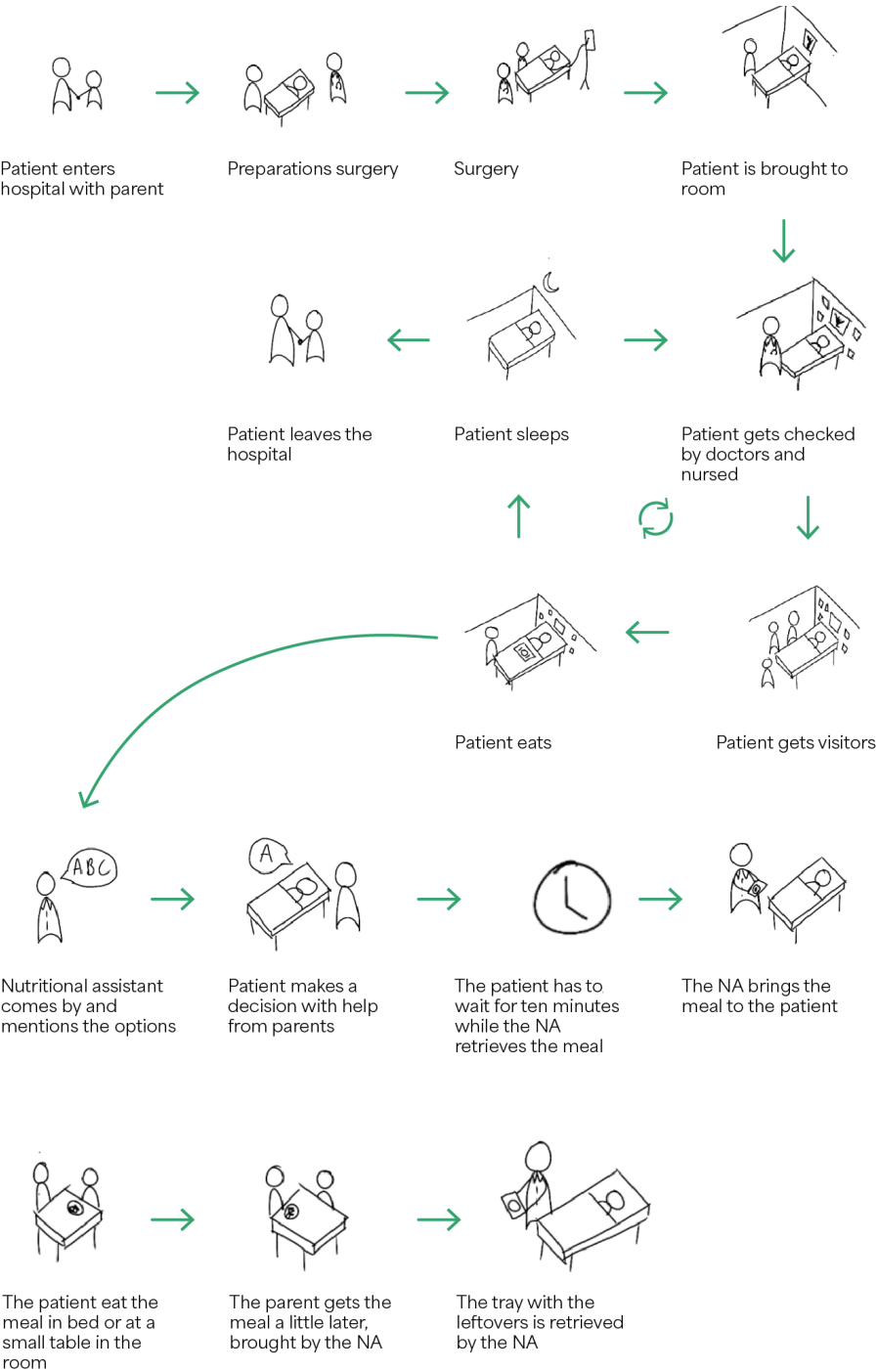


Figure 18: Patient journey including meal moment

3.2.4 The new food system

The updated food system is based on three pillars: **health, experience and sustainability**. Key changes include:

-  **Health:** Meals will align with the Dutch Wheel of Five, increasing plant-based options (50–60%) while ensuring sufficient protein intake and dietary diversity, especially for growing children (Interview Dieticians 1 & 2).
-  **Experience:** Patients will have more choice and autonomy, with meal moments increasing to five per day for children and seven for adults. Additionally, there will be a greater focus on serving style and the option to eat together with relatives, enhancing the social aspect of mealtimes (Interview EMC food manager 1).
-  **Sustainability:** The increase in plant-based meals (50–60%) is accompanied by broader sustainability efforts, such as replacing disposable packaging with reusable porcelain. Seasonal menu adjustments and ingredient cross-utilization (e.g., using leftover bread for quiche) aim to minimize waste (Interview EMC food manager 1; Interview Supplier 1).



Figure 19: Trying the new meal offerings at Nutrition Day

Operational changes

A simplification of the new meal flow can be seen in Figure 17. Meals will be freshly prepared on-site with chilled ingredients delivered daily by Van Hoeckel (Figure 19). Patients will use tablets to order lunch and dinner in advance, reducing overproduction. Breakfast and snacks, including protein-rich smoothies and plant-based crackers, will be served à la minute in patient rooms (Interview EMC food manager 1).

The central kitchen will take over cooking and distribution, allowing chefs to move beyond meal regeneration to actual cooking. This shift requires kitchen refurbishments and staff retraining (Interview Dieticians 1 & 2; Interview EMC food manager 1). Additionally, meal sizes will increase by 1.1 to 1.3 times to meet health standards, particularly for protein intake two additional snack moments will be introduced. This will significantly increase total food consumption compared to the current system.

A tracking system will be introduced to monitor patient dietary intake. This data may be collected via DigiZorg, nutritional assistants, or student helpers (Interview Dieticians 1 & 2).

Despite significant progress, several key decisions remain pending, including meal naming, tablet functionalities a structured feedback system to assess patient and staff satisfaction.

Postponed implementation

Although originally planned for March 2025, implementation has been postponed and will now occur in phases. Initially, only the new dinner menu will be introduced, keeping the meal selection process verbal rather than tablet-based. Portions will remain unchanged until further phases begin in September 2025.

NOTE
From September to February, it seemed that all changes would be implemented in March. This shaped the approach to designing an intervention, assuming it could build upon other planned system updates.

Employee and patient engagement

A key learning from previous hospital food system updates is the need for early engagement with staff and patients to avoid frustration and ensure smoother implementation (Interview EMC food manager 1). Therefore a group of about 60 people is actively involved.

Past engagement efforts

During the National Sustainability Week 2024, employees participated in a “Nutrition Day” where they sampled new meals, providing largely positive feedback on taste, presentation nutritional quality of plant-based dishes (Appendix G). Additionally, experts like Dr. Robert Graham, who is the driving force behind the switch to plant-based in the New York Hospitals, have given lectures to inspire employees about plant-based hospital food transitions.

“The amount of options offered and the quality of the meals is so much better than before” - participant nutrition day

“NA’s and kitchen personnel does not completely understand the why of the changes of the food system” - EMC food manager 1

NOTE Challenges in employee engagement
While initial engagement strategies appeared well-developed, later meetings in early 2025 revealed friction among staff, with some struggling to align with the new system’s goals. Had this been evident earlier, it might have influenced the direction of this project.

3.2.5 Current satisfaction measurements

Before planning the 2021 food system overhaul, Erasmus MC conducted a verbal survey across the hospital, including Sophia, to assess patient satisfaction with hospital meals. This was one of the first instances of actively gathering feedback. The survey included 36 children aged 4-18 and evaluated key aspects such as temperature, taste, timing service quality. Medical students and hospital staff read the questions aloud and recorded responses digitally.

Patients rated various aspects of their meals on a scale of 1 to 5, including taste, appearance, aroma, temperature, variety timing. Additionally, open-ended questions gathered suggestions for specific meals. On average, the warm meal received a score of 6.1 out of 10. The most common complaints were a lack of meal choices and differences from familiar home-cooked food. While the survey provided valuable quantitative and qualitative insights, it was not followed by further iterations or continuous feedback loops (Interview EMC expert 2).

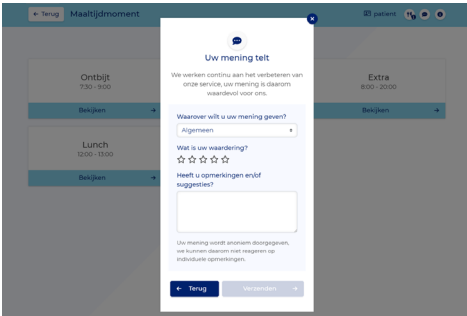


Figure 20: Culicart feedback system

The results shaped initial meal adjustments and influenced the tendering process for food suppliers. However, current feedback mechanisms remain limited:

- **Culicart feedback system:** Patients in the adult clinic receive a generic satisfaction question on their tablets after meals, but response rates are low responses lack depth, making the data ineffective. As a result, this feedback is rarely reviewed or communicated to departments (Figure 20) (Interview EMC expert 2).
- **Mid-evaluations for employees:** Conducted infrequently and mainly used to discuss urgent issues rather than systematic feedback (Interview EMC food manager 1).
- **Complaints process:** Issues such as allergy-related mistakes often stem from miscommunication by nutritional assistants rather than kitchen staff, since the kitchen personnel only regenerates food that is strictly prepared by van Hoeckel following all allergy rules. Positive feedback is welcomed but is usually shared in meetings rather than influencing decision-making.

These gaps highlight the need for structured, continuous feedback loops in the new system.

3.2.6 Children's food choices in a hospital setting

In hospitals, children's food experiences are shaped by sensory, psychological environmental factors. Stress or illness can make them resistant to unfamiliar foods, favouring comfort foods instead. To encourage acceptance of plant-based meals, they should be introduced in familiar ways, with appealing presentation and familiar flavours. Understanding these influences allows hospitals to design strategies that improve children's food experiences while promoting healthier eating habits.

Freedom of choice

Giving children freedom of choice improves hospital food acceptance. Feeling restricted can lead to resistance, making choice a crucial factor in meal satisfaction (Interview EMC food manager 2).

"Most importantly, visitors should not feel that something is imposed on them, there will only be resistance to that. Give them freedom of choice and within that you can steer." - EMC food manager 2

The role of meal presentation and selection

Currently, nutritional assistants at Sophia Children's Hospital verbally inform children of their meal options. The upcoming introduction of a digital menu via tablets presents an opportunity to enhance engagement by incorporating

playful graphics and simplified layouts tailored to younger patients. Drawing inspiration from child-friendly restaurant menus, this approach could make meal selection more appealing and intuitive.

Choosing a meal in the hospital is a critical moment that impacts a child's immediate food intake and long-term eating habits. Several factors influence this process, including parental involvement, the role of nutritional assistants the overall dining environment.

Parental influence

Parents significantly shape their child's meal choices. When they encourage balanced options aligned with the child's preferences, they can promote better eating habits. However, negative parental attitudes, such as expressing dissatisfaction with hospital food, can discourage the child from eating altogether. Creating a supportive and positive atmosphere during meal selection is essential to fostering constructive eating behaviours.

The role of the nutritional assistants

Nutritional assistants play a key role in shaping children's food choices. Unlike medical staff, they provide non-clinical interactions, making them more approachable. Their distinctive blue uniforms further separate them from doctors and nurses, reinforcing their role as caregivers focused on comfort and well-being (Nutritional Assistant 1).

"I'm actually the only one who comes by here with the kids who just comes to do something fun ... I'm either blue sir, or I'm the food sir. And I think that's kind of relaxed or nice for them." - Nutritional assistant 1

Well-trained nutritional assistants can guide children toward healthier, more sustainable food choices. Their communication style, enthusiasm approach can significantly influence whether a child is open to trying new or plant-based meals. NA's have significantly more time for children than facility care workers have for adult patients being 16 compared to 8 minutes (Interview food manager 1). When presented warmly and positively, children are more likely to accept and enjoy their food.

Emotional and environmental influences

Children's food choices are not just about the meal itself but also about how they feel at the time of selection. Anxiety before treatment, relaxation after recovery, or overall stress levels can affect their willingness to try different foods. The hospital environment, whether it feels welcoming or sterile, also plays a role in their decision-making (interview EMC food manager 1).

By recognizing these emotional and environmental factors, hospitals can create a more supportive dining experience that improves patient satisfaction and contributes to healthier eating habits. Figure 21 illustrates how these elements interact to shape meal selection.

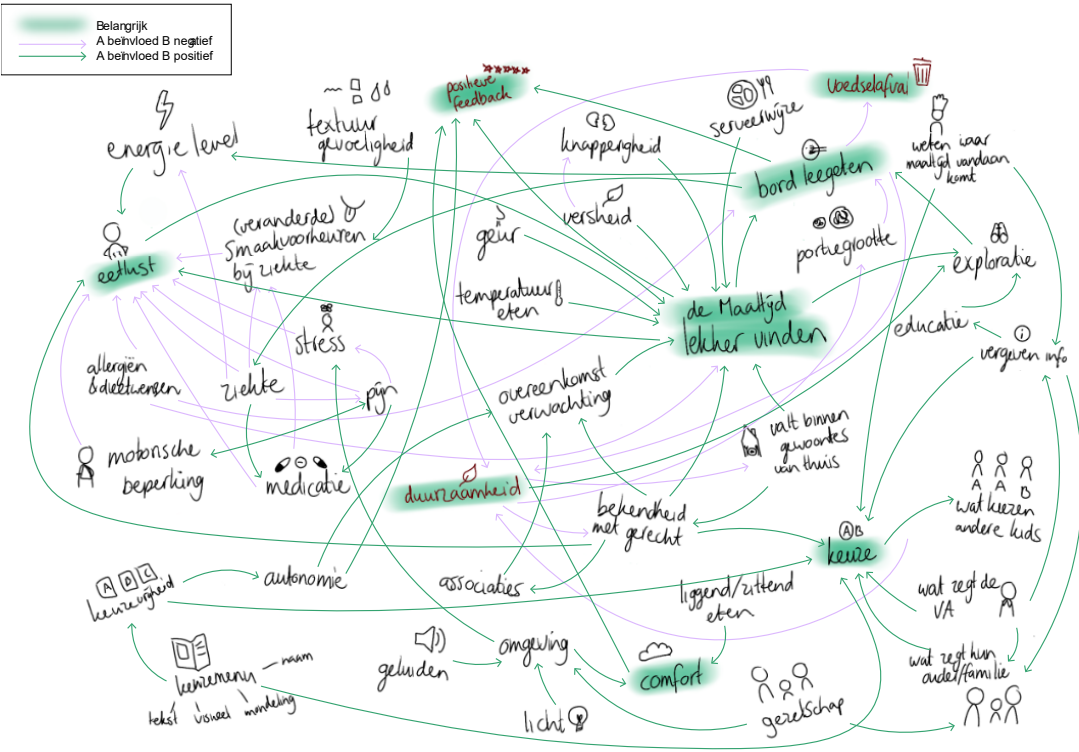


Figure 21: Causal loop diagram influences on meal perception

3.3 Values and perceptions of hospital food

Designing a hospital meal system that meets the needs of all stakeholders requires understanding how different groups perceive and prioritize food. While patient experience is central, the successful implementation of a new food system also depends on the engagement and satisfaction of hospital staff, particularly those responsible for preparing and serving meals. This chapter first explores the values and priorities of different stakeholders in the hospital food system before focusing on how children and their parents perceive hospital meals. Understanding both perspectives is crucial for creating a balanced system that is both effective and well-received.

3.3.1 Balancing values across stakeholders

Different stakeholders prioritize different aspects of hospital meals, making it crucial to find a balance between competing needs. These priorities are shaped by their professional roles, personal preferences the specific needs of the patients they serve.

While the hospital’s food department aims to integrate health, experience and sustainability each group places varying emphasis on these pillars. For instance, while the project’s client, a paediatrician at EMC, supports the transition toward plant-based meals within hospital health guidelines, plant-based eating is not the primary focus of the renewed food concept. Instead, it is one of many factors shaping the shift. Although EMC has taken significant steps in the right direction, there are still challenges in implementing a predominantly plant-based diet in a way that aligns with broader stakeholder expectations.

Interviews revealed a range of values held by key stakeholders that were frequently mentioned suggesting their importance to stakeholders (row on the left in Figure XX). To quantify these priorities, the main stakeholders were asked to rank these values from most to least important in response to the question: *“What is important to you in a children’s patient meal?”* A more detailed version of this ranking, including additional stakeholders, can be found in Appendix H.

Table 3 presents an overview of these rankings:

- ✓ (Positive values): Aspects prioritised highest
- ✗ (Negative values): Aspects seen as lower priority
- (No symbol): Attributes ranked in the middle

It is important to note that this list does not include values deemed entirely unimportant, meaning the lowest-ranked values are simply the least prioritised among those mentioned, rather than the least important overall.

| |  |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|--|---|
| | Patient | Family | Nutritional assistant | Manager Food & Drinks | Chef | Dietician | Medical staff |
| Tasty | ✓✓✓ | | | ✓✓ | ✓✓✓ | | ✓✓✓ |
| Comfortable | ✓✓ | ✓✓✓ | ✓✓✓ | | | | |
| Falls within habits | | ✓✓ | | ✓ | | ✓✓✓ | |
| Freedom of Choice | ✓ | | ✓✓ | ✓✓✓ | | | |
| Healthy | | | | | ✓✓ | | ✓✓ |
| Nicely served | ✓ | | ✓ | | ✓ | | ✗ |
| Quick recovery | | ✓ | | ✗✗ | | ✓ | |
| Protein rich | ✗✗ | ✗ | ✗✗ | ✗ | | ✓✓ | ✗✗ |
| Sustainable | ✗ | ✗✗ | ✗ | | ✗✗ | ✗✗ | ✓ |
| No extra work for staff | ✗✗✗ | ✗✗✗ | | ✗✗✗ | ✗ | ✗ | ✗✗✗ |

Table 3: Values ranked by stakeholders

3.3.2 Perceptions of hospital food by patients and parents

Hospital meals influence both patient recovery and overall experience. While institutional stakeholders set broad goals for the food system, it is ultimately the patients and their families who experience the meals first-hand. Their perspectives provide crucial insights into how well the system meets their needs and where improvements can be made. Therefore, two interviews were conducted with patients and their parents.

Children’s perspectives

Children generally accepted hospital meals but often found them lacking in flavour, variety appeal. A 17-year-old patient described the meals as “acceptable” but bland, with dishes like spaghetti lacking seasoning (Interview Patient 1). Another patient of the same age echoed this, mentioning the absence of flavourful sauces and vegetables (Patient 2). Both emphasised the importance of visual appeal, appreciating serviettes and neatly presented trays, but wished for more diverse and colourful meals.

“Since they have to cook for many children, I understand that it is not so special” - Patient 1

Access to fresh fruits and vegetables was a common concern. Many families brought their own produce because hospital offerings were limited or not always appealing. This suggests that while children may not be overly critical of hospital food at first, improvements in taste, variety nutritional content would significantly enhance their experience.

“I would have liked more vegetables, flavour and colour [in the meal]” - Patient 2

Family perspectives

Their parents were more critical, particularly regarding meals served to accompanying adults, which were often described as bland and unappetizing. However, they emphasised the prime need for kid-friendly options and better alignment with young patients’ tastes. Additionally, logistical challenges, such as limited cafeteria hours and the lack of food storage for external meals, added stress to their hospital stay (Interview Parent 1 & 2).

“They are trying to make it [the experience] better with the colourful serviettes and a weekend menu” - Parent 2

“My meal was really pathetic and tasteless, so today I brought us salads” - Parent 1

These insights highlight the need for hospital meals to balance nutritional quality with taste, variety convenience, ensuring they meet both medical guidelines and patient satisfaction.

Broader implications and challenges

Limited research exists on how Dutch children and their families perceive hospital food, but findings from this study align with global challenges. Cultural mismatches, rigid meal schedules limited choices often lead to dissatisfaction. Unfamiliarity with hospital food can further reduce nutritional intake, potentially hindering recovery.

Nutritional assistants challenged the assumption that children are particularly picky. Instead, they pointed to broader systemic issues, such as a lack of age-appropriate meal options, as greater barriers to acceptance. This underscores the importance of designing meals that better reflect the needs and expectations of paediatric patients and their families.

“But really everything [in the renewal of the food system] is about the centre locations. And then I sometimes feel that it is forgotten here [SCH]” - Nutritional assistant 1

By aligning institutional priorities with real patient experiences, the hospital can create a food system that is not only nutritionally and environmentally sound but also widely accepted and enjoyed.

3.4 Sustainability tension

3.4.1 Barriers for sustainable change

Interviews revealed multiple barriers to shifting hospitals toward plant-based meals. Despite the clear environmental and health benefits, cultural resistance, logistical challenges institutional constraints slow progress. This chapter summarizes the main challenges identified in both qualitative and literature research the dynamics shaping the transition.

Cultural and psychological barriers

Sustainability in healthcare is gaining momentum, but resistance remains. Younger generations tend to be more open to plant-based diets, while older individuals often prefer familiar, meat-based meals, especially in stressful environments like hospitals, where food provides comfort (Interview EMC food manager 2; Interview Supplier; Malmqvist, 2024). Some older adults who do choose vegetarian meals cite concerns for future generations as a motivator (Deckers & Ermes, 2024).

Cultural background also plays a role. Dutch cuisine is traditionally meat-heavy, while other cultures regularly incorporate plant-based staples like legumes and tofu. This can make plant-based meals more acceptable in culturally diverse cities like Rotterdam (Interview NW food supplier 1, Interview Supplier 1). However, labels matter; terms like “vegan” often carry negative connotations, deterring some people from trying plant-based meals. Instead, emphasizing taste and presentation can improve acceptance (Interview EMC food manager 1, Interview NW food manager 1).

Psychological resistance is another major hurdle. People prioritize convenience and routine over sustainability, making dietary shifts difficult (Landau, 2023).

“people mainly want to eat something familiar when they are sick. we do indicate what is healthy and good for the planet, but really sick people don’t really feel like it. “ - Dietician 1

Negative stereotypes about plant-based food, reinforced by poor-quality supermarket alternatives and social identity factors like the “carnivore” mindset, contribute to hesitancy (Interview NW food manager 1; Landau, 2023). Even though awareness is growing, limited knowledge, time resources, combined with taste and convenience, still dominate food choices (Peeters, 2024). Misinformation about plant-based nutrition also remains widespread, with many people conflating “vegetarian,” “vegan,” and “organic” (Interview Dietician 3). Ironically, many traditional meat-based hospital meals do not meet Dutch health guidelines either, highlighting the need for overall dietary improvements (Deckers & Ermes, 2024).

Institutional and Organizational Resistance

Resistance to plant-based meals often appears stronger than it is due to a vocal minority. Instead of convincing everyone at once, focusing on early adopters, the “20% pulling the cart”, can generate momentum for broader acceptance (Walrabenstein, 2020).

At EMC, resistance is also influenced by misalignment between leadership and staff. Vending machines with healthier, plant-based options remain underused, despite being introduced as a sustainability measure, while patients prioritize comfort foods over sustainability (Interview Dietician 1 & 2. Meanwhile, some employees are eager for change but feel slowed down by hesitant leadership. Effective change requires both top-down and bottom-up alignment, without institutional commitment, initiatives risk failure (Interview Designer 1).

Nutritional and supply chain challenges

Hospitals face difficulties in meeting patients’ nutritional needs with plant-based meals. Plant-based proteins require larger portion sizes to deliver the same protein and calorie content, which is challenging when appetite is already low due to illness (Interview Dietician 1 & 2). Supply chain constraints further slow progress, as suitable plant-based alternatives are either unavailable or fail to meet dietary standards (Interview EMC food manager 1).

Additionally, hospitals operate within rigid regulatory frameworks, requiring dietitians’ approval for menu changes. While this ensures nutritional adequacy, it also slows the transition. Large-scale menu adjustments are more efficient than gradual changes but require careful planning and institutional support (Interview EMC food manager 1). Budget constraints also pose a barrier. Although plant-based options can be more cost-effective in the long run, low demand and high upfront costs make it difficult for suppliers to invest without strong financial backing from hospitals (Interview Academic 1; Interview Dietician 1 & 2).

The role of policy in scaling change

Political support could accelerate the shift to plant-based food in healthcare. Policies such as financial incentives for plant-based procurement, mandatory sustainability targets, or revised nutritional guidelines could push the transition forward. However, progress is slow due to economic ties to the livestock industry and a lack of binding regulations. Stronger policy commitments could drive systemic change at a national level (Interview Academic 3).

Challenges in Implementing the Shift

From healthcare environmental impact 3.X
By addressing these challenges, the healthcare sector can contribute to sustainable food systems, better health outcomes and a more resilient environment (Interview Academic 1; Interview Academic 3).

3.4.2 Sustainability not top priority

While this project supports Erasmus MC’s sustainability transition, the priority of this transition is not always shared by all hospital employees or patients. Understandably, patient well-being comes first.

For healthcare staff, nutrition and recovery are the primary concerns. Patients often eat smaller portions, making it difficult to ensure they consume enough protein from plant-based sources alone. As a result, many staff members prefer animal-based options to meet dietary needs effectively (Interview Dietician 1 & 2).

For children, hospital stays can be stressful and isolating. Meals provide a comforting break from medical routines, making taste, familiarity and enjoyment more important than sustainability (Interview Patient 1; Interview Nutritional assistant 2). If plant-based meals are perceived as unfamiliar or unappealing, children may refuse to eat, creating additional challenges.

Rather than explicitly promoting sustainability, a more effective approach may be to integrate plant-based options seamlessly into meal preparation. If taste and experience become positive, children can unknowingly contribute to sustainability goals while focusing on their comfort and recovery.

Key insights

As part of Erasmus MC, one of the Netherlands’ largest children’s hospitals, Sophia can set an example for other institutions by demonstrating that a sustainable food system is feasible even for vulnerable patient groups. This chapter explored answers to the following three research questions:

What strategies and goals do EMC and SCH have for achieving sustainability in hospital food, both now and in the near future?

The food system for children has remained largely unchanged since 2018 but will now undergo major transformations based on three pillars:

- 1. **Health:** Aligning meals with the Dutch Wheel of Five, increasing plant-based options (50–60%) ensuring balanced protein intake.
- 2. **Sustainability:** Reducing food waste by replacing disposable packaging, adjusting menus seasonally reusing ingredients.
- 3. **Experience:** Enhancing meal customization, social dining increasing meal moments to five per day for children.

Operational changes, such as on-site cooking, tablet-based ordering, larger meals a dietary tracking system, are designed to support these goals and improve patient experience while reducing waste. Although the initial launch was planned for March 2025, a phased roll-out will begin in May.

Employee engagement initiatives like Nutrition Day have shown positive results, but resistance from some staff highlights the need for stronger internal communication and inclusion strategies.

How is the current food system at Sophia Children’s Hospital structured what changes are expected?

The current food system at Sophia Children’s Hospital relies on pre-prepared meals with limited flexibility lacks a structured feedback mechanism. This highlights the importance of continuous feedback loops for monitoring and continuously improving the system.

Planned changes focus on greater flexibility, on-site meal preparation the integration of digital tools for ordering and feedback. However, external constraints such as supply chain limitations, strict food safety regulations weak political support slow down large-scale innovation. Without stronger institutional backing, these systemic challenges will continue to limit progress.

What factors are essential to create a positive and suitable eating experience for children in a hospital setting?

A positive eating experience in a hospital setting is shaped by emotional, social cultural factors. Children’s meal choices are influenced by stress, parental input interactions with nutritional assistants, who play a key role in shaping the food experience and collecting patient feedback.

Different stakeholders prioritize different values, requiring a balance between health, experience and sustainability to ensure broad acceptance of the new system. Parents and children’s perspectives provide critical insights, as families tend to be more critical of hospital meals, particularly regarding kid-friendly options.

Cultural resistance, misinformation logistical barriers hinder the adoption of plant-based diets in hospitals, despite clear health and environmental benefits. Older generations are more resistant to plant-based options, while younger patients and employees show greater openness. However, sustainability is not a priority for most patients or staff, as comfort, taste familiarity matter more, particularly for children. This makes subtle integration more effective than direct promotion.

04

Synthesis

This part summarizes the key problems and opportunities identified from research conducted during the exploration phase and how this led to the refined design goal. Since these insights stem from previous chapters, this section provides a concise overview rather than an in-depth analysis.

4.1 Problems and opportunities

4.2 Ideation

4.3 Refining the design goal

Approach

Analysis

After gathering insights from various sources and interviews, a comprehensive analysis was conducted to synthesise the findings. Through an iterative process, the data was organised into clusters and repeatedly examined to identify recurring themes and patterns. Various tools, such as GIGA-mapping and thematic clustering, were used for this process. This ensured a thorough and well-integrated understanding of all collected information. This resulted in outputs such as system and stakeholder maps and the identification of leverage points.

4.1 Problems and opportunities

Through the exploration phase, 29 key challenges and problems within Sophia Children’s Hospital’s food system were identified. These issues, visualised in Figure 22, range from logistical inefficiencies to patient experience concerns, reflecting the multifaceted nature of the hospital food system. The sources behind these findings are documented in Appendix I.

To ensure feasible and impactful design interventions, six problems were prioritised based on their potential to drive systemic change towards a more sustainable food system. These challenges present clear opportunities for design intervention and align with the project’s scope, ensuring that proposed solutions remain both realistic and effective within the hospital setting.

While all identified challenges are significant, certain issues were not chosen as the foundation for design directions for the following reasons:

- **Logistical constraints**, such as supplier limitations and kitchen operations, provide important context but fall outside the primary focus of this project. They serve as boundary conditions rather than problems to solve directly.
- **Nutritional and health concerns**, including meal composition and dietary balance, require specialised expertise in dietetics and medical nutrition, making them better suited for professionals in those fields.
- Some issues are already being addressed by EMC initiatives, meaning further intervention is redundant or outside the scope of this project. Others, while relevant, have a less direct impact on the hospital’s sustainability transition and patient experience.

Although these challenges are not the primary focus, all findings will be shared with EMC to support a broader cross-departmental understanding of the food system’s obstacles.

On the following pages, the six selected problems are shortly described mentioning the observed problem, observed effects and possible opportunities.

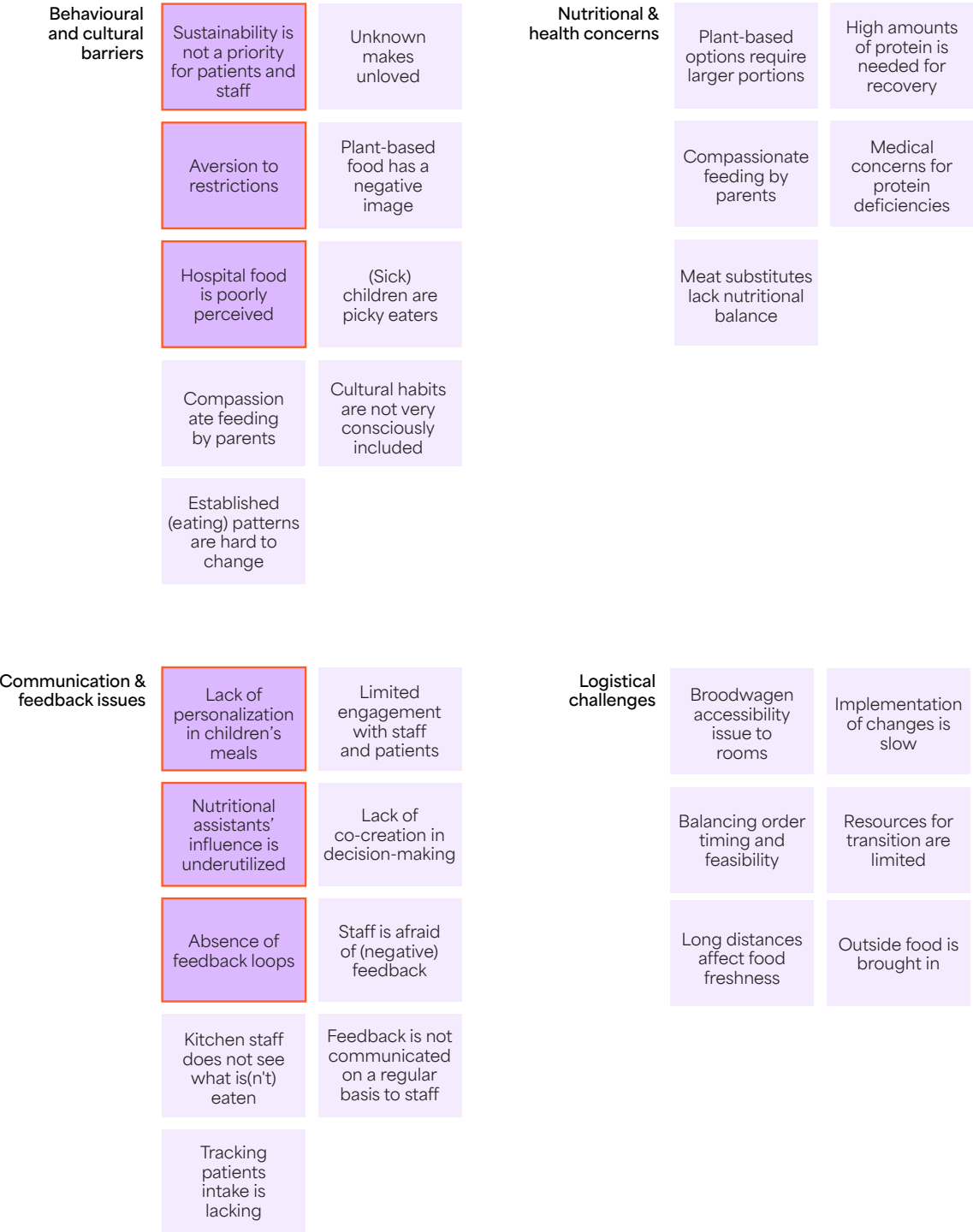


Figure 22: Problems identified clustered

1. Sustainability is not a priority for patients and staff

Observed Problem: Patients and families often prioritize concerns other than sustainability while in the hospital. Similarly, some healthcare staff favour animal-based products due to their emphasis on protein intake and recovery.

Observed Effects: Patients tend to choose familiar foods based on habit, which are often less sustainable. Labels like “vegan” or “healthy” can deter people from trying these meals.

Opportunities: Rather than explicitly promoting sustainability, a more effective approach is to integrate sustainability seamlessly into meals and the food experiences by for example subtle nudging. Transitioning towards positive taste and overall experience, children can unknowingly contribute to sustainability goals while focusing on their comfort and recovery.

2. Aversion to restrictions

Observed Problem: Patients dislike feeling restricted in their food choices, perceiving it as a loss of autonomy.

Observed Effects: Limited options lead to reduced food ordering and intake or an increased reliance on outside food.

Opportunities: Expanding meal choices while incorporating gentle nudges toward more sustainable or hospital-preferred options can improve acceptance without compromising patients’ sense of control.

3. Hospital food is poorly perceived

Observed Problem: Patients generally find the hospital food acceptable but not enjoyable citing a lack of taste and variation. Parents, who must pay for their own meal, are particularly dissatisfied, although they prioritize suitable meals for their children. They also emphasize the need for kid-friendly options, which might differ across age groups.

Observed Effects: Families frequently bring their own food, often without informing hospital staff. This results in incorrect food estimates by nutritional assistants, resulting in excess food orders and increased waste from uneaten meals. Apart from that the meals that are ordered are partly unfinished, resulting in food waste as well.

Opportunities: Improving the perception of hospital food can encourage patients to give it a fair chance. Greater acceptance of the new, more plant-based menu could contribute to sustainability and reduce the need for external food, thereby reducing waste caused by ordering errors or dissatisfaction.

4. Absence of feedback loops

Observed problem: Despite upcoming changes in meal composition, ordering processes and service, there is no structured plan to gather feedback from patients on these transitions.

Observed effect: Without direct patient and employee input, the system may fail to evolve optimally, missing opportunities for functional, experiential and sustainability improvements.

Opportunities: Implementing a feedback system could enhance the system’s effectiveness and build trust among patients, staff and food service providers.

5. Lack of personalization in children’s meals

Observed problem: Both the current and upcoming food system have minimal differentiation between adult and child meal options or service methods. The system is designed with adults in mind, with only minor adjustments for children at SCH.

Observed effects: Meals may not align with children’s preferences, such as their tendency to prefer separate ingredients or specific flavours. This can lead to reduced meal acceptance.

Opportunities: Addressing these differences by tailoring meals and service approaches to children’s needs could significantly improve satisfaction. This issue requires attention, as implementing a suitable intervention could result in a more effective and appropriate approach leading to an improved experience.

6. Nutritional assistants’ influence is underutilised

Observed Problem: Nutritional assistants at SCH receive limited formal training or guidelines. Most of their knowledge is passed informally between colleagues, leading to inconsistent patient interactions.

Observed Effects: Inconsistent patient interactions can create confusion and negatively influence perceptions of hospital food. If assistants lack enthusiasm or confidence in the new food options, this can discourage patients from trying them.

Opportunities: Training nutritional assistants to align their communication with sustainability goals and child-friendly engagement strategies could enhance patient trust and meal satisfaction.

4.2 Ideation

During the ideation phase, three possible design directions were developed based on the six key problems identified (Figure 23). To make an informed decision and explore potential solutions, various ideation methods were employed, including a one-hour co-creation session with three design students (Figure 24) (Appendix J), individual brainstorming and group discussions with other students, supervisors and the client. After evaluating the options, the decision was made to focus on the direction of gathering feedback (explained in Chapter 4.3.1). Although some sessions initially explored other design directions, the insights gained also contributed to the development of a structured feedback framework.

For the focus on gathering feedback from children and creating a feedback loop, ideation and research evolved together. Key considerations included what information to collect, how to gather it effectively, age-appropriate feedback methods, potential reward systems and how to ensure insights reach all relevant staff. Various collages and thematic lists were created to visualise and refine these ideas, shaping the foundation for the feedback system (Appendix K).



Figure 23: Three design directions considered and chosen direction circled



Figure 24: Co-creation session

4.3 Refining the design goal

4.3.1 From identified problems to the design direction

Throughout the reframing phase, multiple design directions (detailed in Appendix L) were explored to address the challenges of creating a more sustainable hospital food system. While various opportunities emerged, the most impactful and feasible intervention was strengthening feedback systems within SCH’s meal system.

Identifying the most effective intervention

Among the key challenges identified, the absence of structured feedback loops stood out as a critical yet addressable issue—one with the potential to significantly enhance patient experience, drive continuous meal system improvements and support broader sustainability and health goals. Other issues, while important, either fell outside the project’s scope or were better suited as supporting considerations rather than direct design interventions. A well-integrated feedback loop enables patients and employees to voice their experiences, ensuring that meal offerings evolve in response to real needs and preferences. By embedding feedback systems, the hospital can continuously refine its meal concept, moving away from static, top-down solutions toward a more adaptive and responsive system.

Leveraging feedback as a systemic intervention

Reinforcing feedback loops aligns with Donella Meadows’ sixth leverage point for system change: “Strengthening information flows.” (Figure 25) By improving how feedback about hospital food is collected, interpreted and acted upon, this intervention enhances the system’s ability to self-correct, adapt and evolve over time (Meadows, 2012). Rather than relying on limited one-time adjustments, an effective feedback system ensures that both patients and staff become active participants in shaping a more sustainable and patient-centred meal experience.

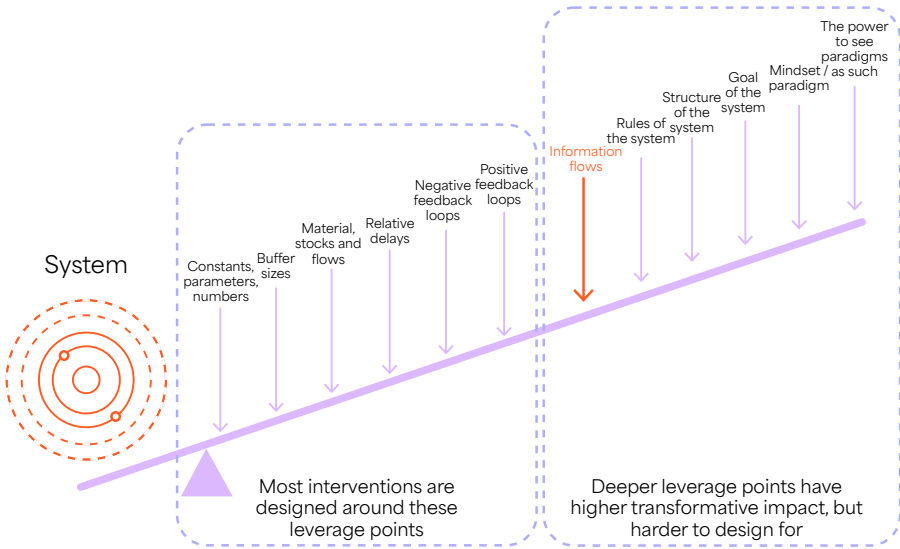


Figure X25 The twelve leverage points from Meadows (2012)

4.3.2 Design statement & direction

This understanding led to the following design statement:

“Develop a structured framework of insights and action points to guide Erasmus MC in designing a practical and adaptable feedback system that helps refine the new hospital meal concept for Sophia Children’s Hospital, while supporting patient experience, health and sustainability goals. This system should create a structured feedback loop that empowers both patients and employees to continuously improve meal offerings, making informed adjustments that enhance the hospital food experience over time in a more sustainable way.”

Who What Where Why How

By reinforcing feedback loops as a strategic intervention point, this project aims to bridge patient experience, hospital operations and sustainability goals, ensuring that the hospital food system remains dynamic, responsive and future-proof.

4.3.3 Design criteria

With the creation of the framework, it is important to take along the following design criteria, grouped per SOD principle:

Linked to Principle 1: Opening up and acknowledging interrelated problems

- The tool must address interconnected issues across health, experience and sustainability, rather than focusing on a single domain.
- The tool should help identify and prioritise challenges across departments and stakeholders.

Linked to Principle 2: Developing empathy with the system

- The design must incorporate insights from both patients, parents and hospital staff to reflect real needs and experiences.

Linked to Principle 3: Strengthening human relationships

- The tool should foster collaboration between departments, staff roles and patients, strengthening trust and shared ownership.
- It should be easy to use in team settings, facilitating communication and shared learning.

Linked to Principle 4: Influencing mental models

- The design must challenge existing assumptions about hospital food and sustainability.
- It should make feedback visible in a way that shifts perceptions and attitudes, encouraging openness to change.

Linked to Principle 5: Adopting an evolutionary design approach

- The system should be flexible and modular—allowing for gradual implementation and refinement.
- It must support ongoing feedback collection, analysis and iteration over time.
- The tool should be low-threshold and practical to apply, even during periods of transition or resource constraints.

Key insights

From a broad range of identified issues, six were prioritised based on their potential to enable systemic change toward a more sustainable hospital food system. Each of these problems was briefly analysed for its impact and possible solutions:

- 1. **Sustainability is not a priority for patients and staff:** Most patients and employees are more focused on taste, comfort and familiarity than on environmental concerns. This presents a challenge for integrating sustainable practices into hospital meals without compromising the overall experience.
- 2. **Aversion to restrictions:** Both patients and staff tend to resist dietary limitations, making it important to frame sustainable and healthy changes as added value rather than imposed rules.
- 3. **Hospital food is poorly perceived:** The negative image of hospital food—often seen as bland, unappealing, or unhealthy—undermines acceptance of new initiatives and makes improvements harder to implement.
- 4. **Absence of feedback loops:** Without a structured system for collecting and responding to patient input, it’s difficult to evaluate the success of meal changes or make data-informed improvements over time.
- 5. **Lack of personalisation in children’s meals:** Current meal options don’t account for children’s diverse preferences, medical conditions, or cultural backgrounds, leading to lower satisfaction and a larger amount of waste.
- 6. **Nutritional assistants’ influence is underutilised:** Nutritional assistants are in close contact with patients but are not yet fully empowered or equipped to shape food experiences or gather valuable feedback.

Through various ideation methods, including brainstorming and a co-creation session, three design directions were explored. Based on stakeholder feedback and project goals, the concept of a structured feedback system was chosen. With different ideation techniques like a co-creation session and brainstorming three design directions where explored after which the direction of feedback systems was chosen. This led to the following design statement:

“Develop a structured framework of insights and action points to guide Erasmus MC in designing a practical and adaptable feedback system that helps refine the new hospital meal concept for Sophia Children’s Hospital, while supporting patient experience, health and sustainability goals. This system should create a structured feedback loop that empowers both patients and employees to continuously improve meal offerings, making informed adjustments that enhance the hospital food experience over time in a more sustainable way.”

05

Establishing the foundation for a feedback system

This part explores the foundation for designing an effective feedback system by examining why feedback is crucial and how feedback loops function within systemic design.

5.1 The need for feedback before nudging towards sustainability

5.2 Feedback loops in systemic design

Approach

Literature research

To lay a solid foundation for developing a feedback system at Sophia Children's Hospital, both desk research and expert consultations were conducted. Scientific literature highlights the essential role of feedback in enabling systemic change. By exploring these insights and discussing them with professionals in the field, a clear understanding was formed to inform and guide the upcoming design phase.

5.1 The need for feedback before nudging towards sustainability

The transition to a 55-60% plant-based hospital meal system means some meals will be entirely plant-based, while others will include fewer animal-based ingredients. Patient reactions will vary. Some will welcome the change, some won't notice, others may be hesitant but open to trying and some will consistently prefer animal-based meals. However, how these preferences will manifest among children remains unknown.

Beyond plant-based shifts, meal portions will increase by up to 30% and additional snack moments will be introduced. These broader changes make it even more challenging to predict how children and parents will respond, reinforcing the need for structured feedback. Since the first group of patients will experience the transition's "teething problems," their feedback is crucial for refining the system early on—while also ensuring that their experience is not negatively impacted. Providing feedback should feel like something that enhances their stay or helps future patients, rather than being seen as merely a tool for hospital efficiency.

Children's food preferences are often shaped by familiarity and taste rather than strong beliefs about eating meat. In a hospital setting, stress influences food choices, with both children and parents understandably gravitating toward familiar options. To increase acceptance of new meals, children must feel their needs are being considered. If changes are introduced without regard for their experience, resistance may increase rather than decrease. Feedback should be embedded in a way that makes the experience more engaging and enjoyable for patients.

5.1.1 Developing a child-friendly feedback system

Currently, there is no structured feedback system tailored to children's food preferences. While this research has identified some key interests, little data exists on what this specific group expects from hospital meals. Children's eating experiences should be central to both the content of the feedback and the methods used to gather it. This gap underlines the need for a well-structured feedback system.

Before increasing the proportion of plant-based meals, it is essential to ensure that children's needs are met. Creating an engaging and accessible way for

them to provide input will allow the hospital to better understand unmet needs and make necessary adjustments. A well-designed system can improve the overall patient experience, increase response rates and accelerate refinements. By effectively mapping feedback, the hospital can identify overlooked priorities and refine the meal system to better support both patient well-being and sustainability goals.

Conclusion

Structured feedback is a requirement for increasing plant-based food acceptance. Rather than focusing solely on plant-based transitions, the first step must be to develop an engaging, accessible feedback system tailored to children in SCH. By prioritizing patient input, the hospital can ensure the new meal system aligns with children's needs and expectations, improving their experience while laying the groundwork for more sustainable eating habits in the future.

5.2 Feedback loops in systemic design

A crucial principle in feedback-driven improvement is:

“If you can't measure it, you can't improve it.” – Lord Kelvin (1824–1907)

In systemic change, feedback is not just valuable—it is essential. Without clear insights into what is working, what is being accepted and where resistance exists, decision-makers cannot make informed adjustments. A well-designed feedback system accelerates transformation, ensuring that interventions align with their intended objectives while allowing for continuous improvement (Zelenska, 2021).

5.2.1 The power of feedback loops in systemic change

In systemic change, feedback is not just valuable—it is essential. Without clear insights into what is working, what is being accepted and where resistance exists, decision-makers cannot make informed adjustments. A well-designed feedback system accelerates transformation, ensuring that interventions align with their intended objectives while allowing for continuous improvement (Zelenska, 2021).

5.2.2 Key factors for effective feedback

For feedback to drive meaningful and lasting change, it must be:

- **Fast:** Timely feedback strengthens the feedback loop by ensuring that necessary adjustments can be made quickly. The sooner insights are gathered—whether from real-world outcomes or well-grounded simulations—the more effectively they can influence decision-making.
- **Measurable:** Feedback must be quantifiable and easily comparable to previous results. Clear, data-driven insights make improvements tangible and actionable. Visual comparisons—such as side-by-side displays of carbon footprint reductions from different meal choices—can make abstract progress more concrete and engaging.
- **Contextualised:** To be meaningful, feedback must be presented within the broader system goals. For example, demonstrating how individual food choices contribute to hospital-wide sustainability targets enhances motivation and reinforces the importance of the transition.
- **Motivating:** For feedback to inspire action, it must align with what users care about. If stakeholders see a direct connection between their choices and positive outcomes, they are more likely to embrace and sustain change. Closing the feedback loop—by showing real-world impact—ensures continued engagement and participation (Baxter, 2013).

5.2.3 Feedback as a driver for a sustainable food system

In the shift towards a more sustainable hospital food system, continuous feedback ensures that progress is measured, communicated and refined. By tracking food adoption rates and stakeholder engagement before, during and after the transition, decision-makers can adjust strategies to maximize impact and long-term acceptance.

Over time, an effective feedback loop transforms short-term interventions into lasting, systemic improvements, reinforcing sustainability goals and creating a resilient, adaptable food system that meets both nutritional and environmental targets.

Key insights

Children’s responses to the new, more plant-based meal offer remain uncertain. While some may welcome the change, others may resist or prefer familiar foods—especially in the stressful context of hospitalization. Additionally, broader changes like increased portion sizes and added snack moments make reactions even harder to predict. This uncertainty highlights the need for structured, empathetic feedback collection to guide refinements.

Currently, no structured feedback system exists to capture children’s food preferences at Sophia Children’s Hospital. This gap limits the ability to evaluate how well the new system meets their needs or how to improve it. Early patient experiences will be key for shaping the transition, so their feedback must be easy, engaging and feel meaningful—enhancing their own stay or helping future patients.

Child-friendly feedback tools are essential not only to gather reliable insights but also to make children feel heard and involved. Understanding their preferences is a prerequisite for nudging them toward more sustainable eating habits. Without that foundation, efforts may backfire.

Feedback loops play a crucial role in systemic change. Rather than making one-time adjustments, continuous feedback allows the hospital to evolve meals based on lived experiences, improving satisfaction, reducing waste and increasing acceptance over time.

For feedback to drive meaningful change, it must be fast, measurable, contextualised and motivating. Quick insights enable responsive improvements. Clear, visual data connects actions to outcomes and framing feedback within broader health and sustainability goals helps children and staff feel their input matters.

Over time, effective feedback loops create a virtuous cycle: better meals lead to greater engagement, which drives further improvements, supporting both patient well-being and long-term sustainability goals.

06

Recipe for Lasting Change: The design

This part describes the outcomes that will be the stepping stones towards a more sustainable food system in Sophia Children's Hospital.

6.1 Designing a feedback system for lasting change

6.2 Mapping the feedback landscape

6.3 Recipe for Lasting Change - The feedback loop cookbook

Approach

Iterative development

The format of the cookbook and maps evolved through an iterative development process, shaped by collaborative brainstorming and individual sessions. Feedback from the supervisory team, design students and HMSM students helped refine the concepts, ensuring the final outcomes were aligned with project goals and practical needs.

6.1 Designing a feedback system for lasting change

The following two key tools were developed to support the process of creating strong feedback loops:

- **System maps framework:** These maps visualise the current and desired feedback flows within the food system, highlighting where improvements are needed. These are supported by a framework with explanations on the flows proposed.
- **The Recipe for Lasting Change cookbook:** A practical guide designed to help develop and implement a structured and effective feedback system in the hospital’s food operations (Figure 26).

The following chapters will detail how each of these components contributes to building a feedback system that enhances sustainability. For whom these tools are made for is explained in Chapter 7.2 ‘Implementation’.



Figure 26: Mock-ups of Recipe for Lasting Change Cookbook and system maps poster

6.2 Mapping the feedback landscape

Identifying where feedback is missing is a crucial first step in optimizing the new food system. This section presents system maps that analyse four key areas where feedback is currently lacking: taste, portion size, meal choices and food communication. The current flow of feedback is illustrated in Figure 27. Here it shows that information given by the patient and parent is not transferred beyond the nutritional assistant. These areas significantly influence meal acceptance, patient satisfaction and overall system efficiency.

The maps serve as a tool to:

- Visualise the flow of information between different stakeholders.
- Distinguish between current (black lines) and desired (coloured lines) feedback flows.
- Highlight key decision-makers (indicated by stars) who must incorporate feedback into their work (Figure 28).

The maps are supported by the guide accessible through [this link](#). For each topic, the guide includes an overall explanation, a system map and an analysis of how stakeholder groups currently interact and how they should ideally interact. These outcomes are based on interview insights, complemented by theoretical knowledge on feedback loops and the researcher’s analytical reasoning and design intuition.

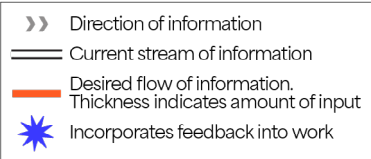


Figure 28: Legend for maps

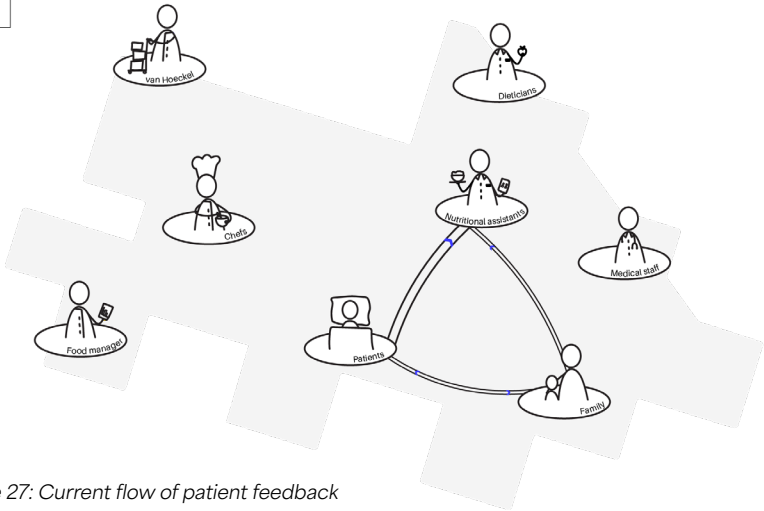


Figure 27: Current flow of patient feedback

Collecting patient feedback to improve meal taste

With the transition to a new food system, chefs at EMC will shift from primarily reheating pre-prepared meals to actively cooking fresh dishes. This change brings increased responsibility but also greater opportunity for creativity and improvement. Taste will become an essential factor in meal acceptance and feedback will be crucial in refining recipes and preparation methods. If patients enjoy their meals, they are more likely to eat them, reducing food waste and increasing acceptance of plant-based options. While positive feedback can motivate chefs, constructive criticism will allow them to make improvements that enhance overall meal satisfaction.

Currently, no structured feedback is collected on how patients perceive the taste of their meals. Since meals are mainly prepared by van Hoeckel and regenerated by in-house chefs, there is no direct link between patient responses and the chef preparing it. Therefore, the sense of responsibility for flavours and textures is missing.

In the desired situation, a continuous feedback loop would allow patients to express their opinions on taste, enabling kitchen staff and suppliers to adjust recipes accordingly. This could be achieved through simple, structured feedback collection at mealtime, ensuring that meals evolve based on patient preferences rather than remaining static (Figure 29).

An important consideration is that while taste preferences vary widely, patterns will emerge over time, guiding chefs towards more universally accepted flavours. Additionally, feedback must be delivered in a constructive way, ensuring chefs remain motivated rather than discouraged by criticism.

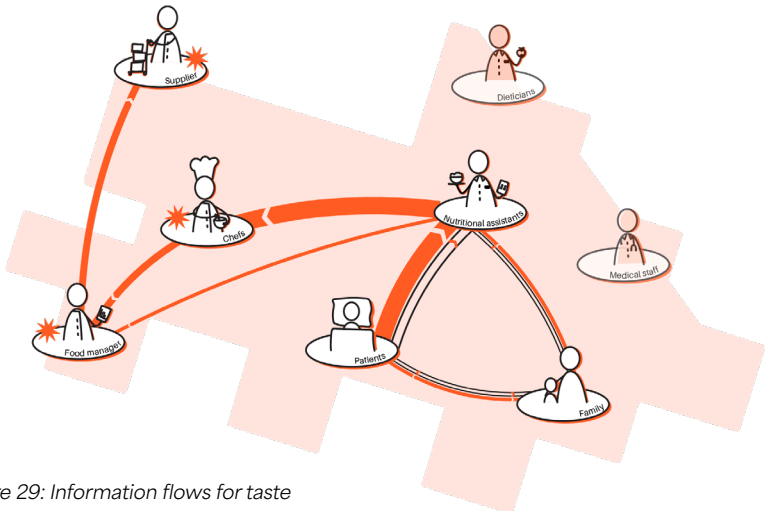


Figure 29: Information flows for taste

Optimising menu offerings to improve decision making

Understanding which meals are chosen most frequently—and why—will help shape future meal offerings and encourage a gradual shift towards more sustainable options. The choices children make depend on factors such as familiarity, visual appeal and how the options are presented. By gathering structured feedback, the hospital can better anticipate demand and adjust the menu accordingly.

Currently, meal choices are taken verbally by nutritional assistants but are not recorded for future reference. This means the hospital has no data on which options are most popular, making inventory planning more difficult and reducing the ability to guide patients towards healthier, more sustainable choices.

In the desired situation, meal selection trends should be tracked and analysed. If certain dishes are consistently preferred, their qualities can be replicated in other meals to encourage broader acceptance. Additionally, understanding why meals are chosen—or avoided—will provide valuable insights into how subtle nudging techniques could make plant-based options more appealing (Figure 30).

A key consideration is the role of presentation and naming in meal selection. If plant-based meals are positioned as equally desirable alternatives rather than niche options, children may be more open to trying them. This aligns with the importance of food communication, which is explored in the next section.

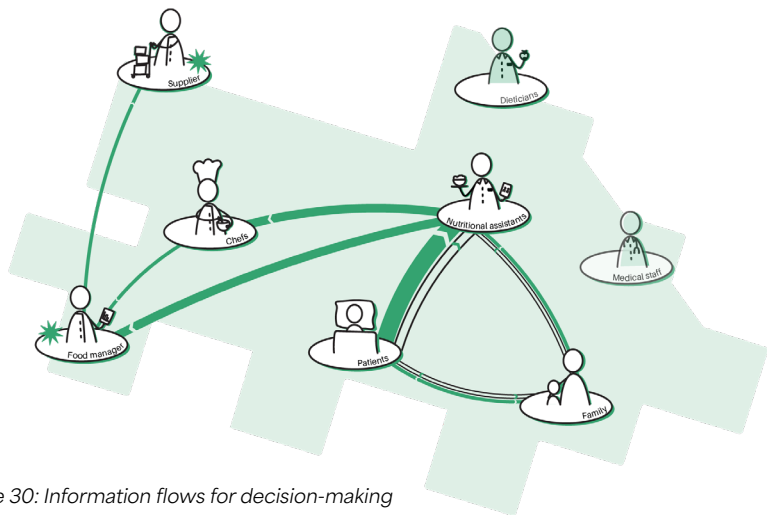


Figure 30: Information flows for decision-making

Optimizing portion sizes to reduce waste and improve nutrition

As part of the new food system, portion sizes are increasing to meet nutritional goals and standardised snack options will be introduced. However, if portions are too large, meals may be left unfinished, leading to increased food waste and nutritional deficiencies. Tracking what is eaten—and more importantly, why food is left uneaten—will be essential for refining portion sizes and ensuring that meals are both satisfying and consumed in full.

Currently, no formal process exists to track how much food is eaten or discarded. Nutritional assistants dispose uneaten food without recording it, meaning kitchen staff and management have no insight into whether portion sizes are appropriate.

In the desired system, the amount of food eaten should be monitored and communicated back to the kitchen and management. If certain meals are consistently left unfinished, portion sizes or ingredients may need to be adjusted. Dietitians should also have access to this information to assess whether nutritional targets are being met or if certain patients require alternative meal strategies (Figure 31).

An additional consideration is the connection between portion sizes and meal satisfaction. If meals are visually overwhelming, patients may be less inclined to eat them, even if the taste is good. Understanding the balance between nutritional goals and patient preferences will be key in optimizing portion sizes.

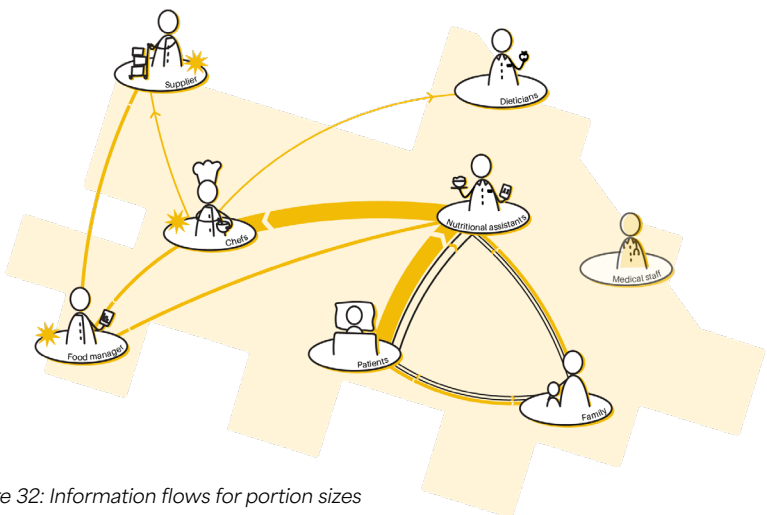


Figure 32: Information flows for portion sizes

Enhancing meal presentation to boost engagement and enjoyment

The way food is presented, described and served plays a major role in how it is perceived by patients. The new system introduces changes in meal presentation, yet there is no plan in place to assess whether these changes improve or hinder meal acceptance. Additionally, the hospital currently does not differentiate between adult and child menus, despite clear differences in food preferences between these groups.

At present, nutritional assistants provide verbal descriptions of food options, but there is no structured way to evaluate whether their approach is effective. Similarly, the Culicart digital menu system does not currently incorporate child-friendly visual elements, which could enhance engagement.

In the desired system, the hospital should experiment with different ways of presenting and describing meals to see which are most effective for children. NAs should receive training on how to make meals sound appealing and visual menu elements should be introduced to help children make more informed decisions (Figure 33).

An important consideration is that hospitalised children may have reduced appetites or heightened sensitivities. Ensuring food is introduced in a gentle and inviting way could make a significant difference in meal acceptance.

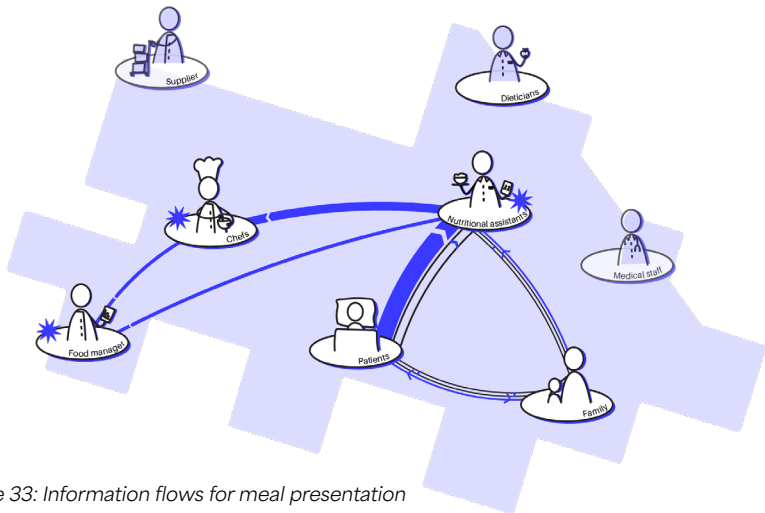


Figure 33: Information flows for meal presentation

Conclusion

By structuring feedback in a clear and actionable way, these maps support decision-makers in making informed improvements to hospital meals, ensuring alignment between sustainability goals and patient needs. Figure 34 combines all four flows, highlighting both their similarities and differences. The information is compiled into a poster featuring the four maps (see Appendix M) and a corresponding framework in an Excel file, which has been shared with the Erasmus MC Food Department for ongoing use. The digital version can be accessed by clicking or scanning the QR code in Figure 35.

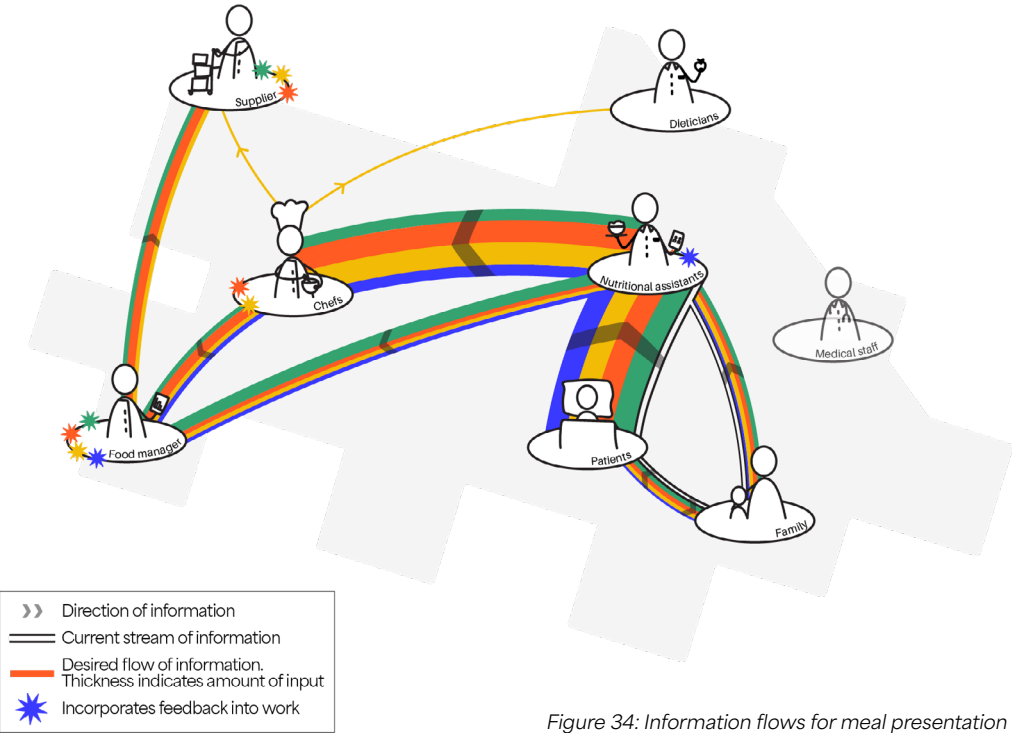


Figure 34: Information flows for meal presentation

6.3 Recipe for Lasting Change - The feedback loop cookbook

To translate these insights into practical action, the Recipe for Lasting Change (or Recept voor Blijvende Verandering) cookbook was developed. This guide provides a step-by-step approach to designing an effective feedback system, using the familiar format of a cookbook to present complex information in an engaging and accessible way.

Purpose of the Cookbook

The cookbook is designed to help EMC’s Food Department and other stakeholders establish a feedback system that provides valuable insights into how patients experience their meals. This will ensure that meal improvements align with three key pillars, mainly focused on sustainability:

- **Health:** Ensuring meals meet nutritional needs.
- **Experience:** Enhancing meal enjoyment and acceptance.
- **Sustainability:** Encouraging plant-based choices and reducing food waste.

Together with the system maps, the cookbook offers a structured approach to refining the food system towards one in which sustainability plays an important role and becomes more accepted. Since the intended users of this guide are Dutch-speaking, the cookbook is written in Dutch.

Structure of the Cookbook

Figure 36 to 38 show mock-ups from the different parts of the booklet.

Introduction

Before diving into the recipes, the introduction pages provide essential background information, including:

- The development process and intended use of the guide.
- EMC’s food vision and its long-term goals.
- The importance of feedback as a driver for change.
- The challenges of balancing sustainability with patient preferences.
- Key stakeholders involved in the food system.

Recipes

The steps for developing a structured feedback system are presented as individual “recipes,” which together form “the meal.” Each recipe offers clear, concise guidance (see Figure 35) and is complemented by supporting overviews. The recipes mentioned are:

- Setting the table: Identifying key stakeholders and their roles.
(De tafel dekken: wie neemt plaats en met welk doel?)
- From Tiny Tastes to Big Appetites: Knowing Your Audience
(Van kleine hapjes tot grote trek: ken je doelgroep)
- The right mix: Choosing the best way to present questions.
(De juiste mix: hoe presenteert je de vragen?)
- Taking Orders: Collecting Patient Insights
(Bestellingen opnemen: inzichten verzamelen bij patiënten en medewerkers)
- From raw data to refined insights: Processing, evaluating and implementing feedback.
(Van feedback naar verbetering: verwerken, evalueren en bijsturen)
- Serving the results: Presenting findings and refining the system.
(De resultaten serveren en het systeem verfijnen)

While the recipes follow a logical sequence, they are flexible and can be adapted to suit the project’s needs, so they are not numbered.

Supporting overviews

The final section of the cookbook includes supporting overviews based on insights and maps developed during this project, such as the causal loop diagram and the table of stakeholder-ranked values. These are referenced throughout the recipes. One key addition is a list of 40 considerations for refining the feedback system, drawn from ideation sessions and choice architecture literature (Thaler, 2012). While these considerations offer guidance for structuring the system effectively, they still require discussion and validation with stakeholders to ensure a well-rounded and practical implementation.

Bestellingen opnemen: inzichten verzamelen bij patiënten en medewerkers

Waarom deze stap belangrijk is

Een goed ontworpen onderzoek is alleen nuttig als het consequent wordt uitgevoerd. Dit recept helpt in het opzetten van een duidelijk proces voor het verzamelen van feedback dat zorgt voor een gestage stroom van inzichten zonder patiënten of medewerkers te belasten.

| Ingrediënten | Bereidingswijze |
|---|---|
| <ul style="list-style-type: none">• Toestemming om reacties te verzamelen (ethische en wettelijke goedkeuring indien nodig)• Een plan voor wie, wanneer en hoe feedback verzamelt• Getraind personeel dat weet hoe ze feedback op de juiste manier verzamelen | <ol style="list-style-type: none">1. Beslis over de frequentie van de feedbackverzameling (bijv. dagelijks, wekelijks, per maaltijd).2. Wijs verantwoordelijkheden toe aan specifieke teamleden.3. Train het personeel in het benaderen van kinderen of medewerkers en het stimuleren van hun deelname aan het feedbackproces.4. Zorg voor consistentie in de feedbackverzameling. |

Figure 35: Example of one of the recipes



Figure 36: Cover of the booklet

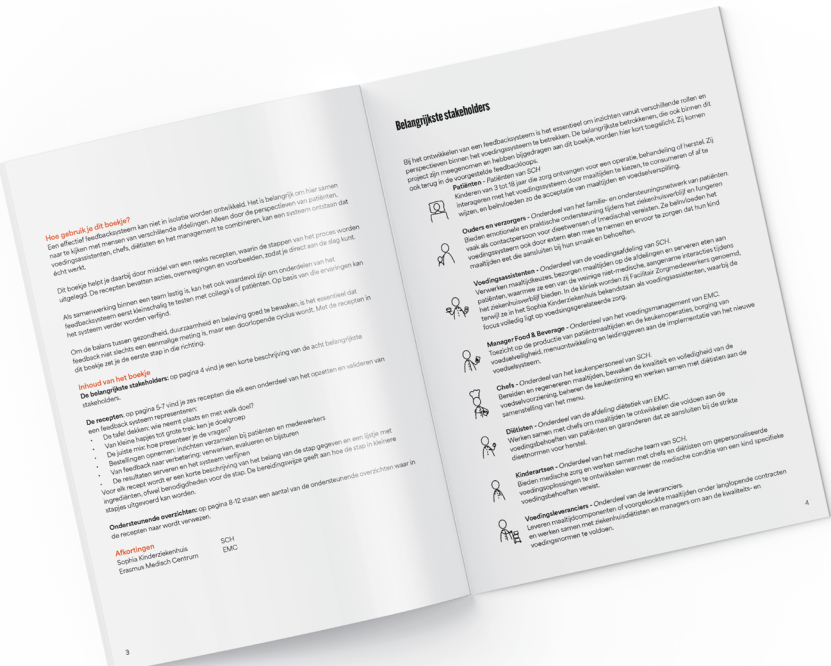


Figure 37: Introduction page and stakeholders explained

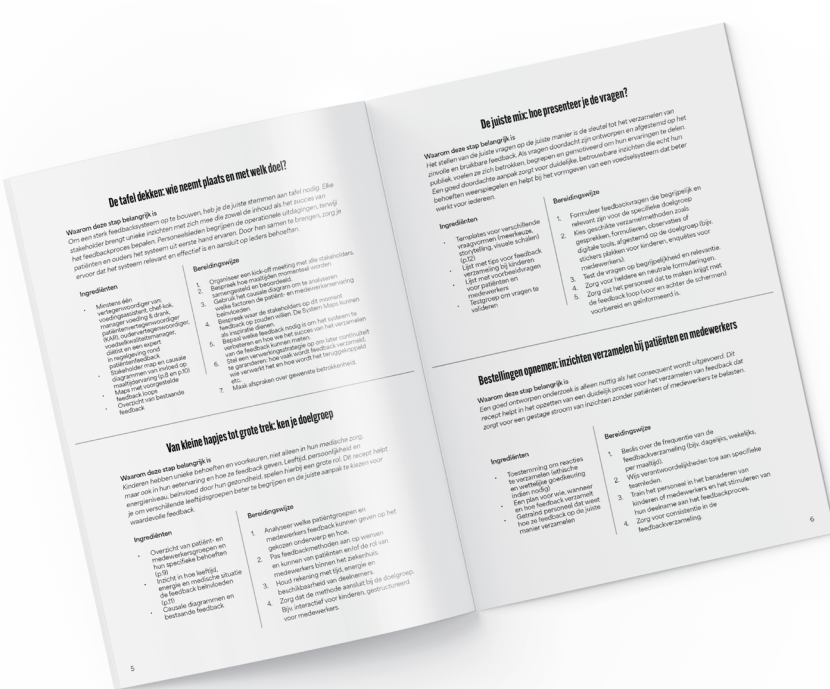


Figure 38: Recipes



Figure 36: Supporting overviews

Key insights

This part introduces two key tools developed to support this process of creating strong feedback loops:

The maps focus on four key areas where feedback is currently lacking: taste, portion size, meal choices and food communication—factors that significantly influence meal acceptance, patient satisfaction and overall system performance. They are supported by a framework that explains how the proposed feedback flows can inform decision-making. The materials are compiled in a poster and a supporting framework, both of which have been shared with the Erasmus MC Food department for continued use.

The second tool, the Recipe for Lasting Change Cookbook, is a practical and engaging guide designed to help staff develop and implement feedback systems across the identified focus areas and beyond. Rather than overwhelming users with abstract objectives, the cookbook breaks down the process into clear, manageable steps. By making the system feel achievable and relevant, it aims to integrate feedback as a dynamic and enjoyable part of daily practice and ensure that sustainability goals remain aligned with patient needs and experiences.

07

Bringing the design to life

To ensure the system maps and Recipe for Lasting Change Cookbook are both practical and implementable within the new food system at Sophia Children's Hospital, validation sessions were conducted. This part lines out the outcomes of these sessions and provides guidance on how and by whom, the tools can be carried forward. It concludes with a final reflection on the overall project outcomes.

7.1 Validation

7.2 Implementation

7.3 Conclusion

Approach

Setting up the validation sessions

To structure the validation sessions, the Desirability, Viability & Feasibility (DVF) framework was used to ensure the design was assessed from multiple critical perspectives. This helped evaluate whether the tools could realistically succeed in practice. Between sessions, the tools were iteratively refined based on feedback, allowing for testing of increasingly developed concepts. Additionally, insights on potential implementation were gathered during these sessions, which informed the direction outlined in Chapter 7.2.

7.1 Validation

7.1.1 Validating the Systems Oriented Design approach

To validate the approach of the project, this section demonstrates how it aligns with the five principles of systemic design from van der Bijl-Brouwer and Malcolm (2020). It provides a theoretical foundation for the methodology used and reinforces the rationale behind the feedback system’s design choices.

Validation through systemic design principles

- 
 - 1. Opening up and acknowledging interrelated problems**

The project recognised that transitioning to a plant-based hospital meal system extends beyond food choices, affecting patient experience, stress levels, familiarity and sustainability. By addressing both meal composition and the overall dining experience, the approach ensured that structured feedback drives continuous improvement rather than only reacting to initial resistance.
- 
 - 2. Developing empathy with the system**

Direct engagement with children, parents and hospital staff through interviews and observations ensured a deep understanding of their perspectives. The feedback collection methods were specifically tailored to be child-friendly, acknowledging that different age groups require distinct approaches to expressing their preferences.
- 
 - 3. Strengthening human relationships**

Stakeholder engagement was a core element of the project, ensuring that patients, parents and hospital staff actively contributed to shaping the feedback system. The design fosters ongoing dialogue between all parties involved, promoting collaboration rather than a top-down implementation.
- 
 - 4. Influencing mental models**

The project acknowledged that children’s food preferences are shaped by familiarity rather than sustainability beliefs. This understanding guided the approach of first gathering feedback before introducing behavioural nudges toward plant-based meals. By centring patient experience, the transition is framed as an enhancement rather than a restriction, reducing potential resistance.
- 
 - 5. Adopting an evolutionary design approach**

A continuous feedback loop was established to ensure the system remains adaptive and iterative, rather than a static one-time intervention. The design embraces iteration, allowing adjustments based on real-time patient responses and hospital needs.

7.1.2 Validating the outcomes

To ensure that the project outcomes align with Sophia's food system needs and feasibility, three validation sessions were conducted with different stakeholders. These sessions assessed the desirability, viability and feasibility of the system maps and Recipe for Lasting Change Cookbook booklet. Discussions took place with a group of students from Hotel Management School Maastricht, the client and the Food and Drinks Manager of EMC.

Held online via Microsoft Teams, each session lasted 30–45 minutes. Participants received the materials at the start of the sessions to make scrolling through it possible, but the researcher guided them through the booklet step by step, which was leading in the sessions. The client's session focused on validating the maps, while the other two covered both the maps and the booklet. The sessions were held in this order, making it possible to slightly adjust the maps and the cookbook in between based on their feedback.

Each participant played a key role in the validation process:

- **HMSM students** are developing a feedback system for EMC's food system, making their insights crucial in assessing its practicality.
- **The client**, a paediatrician involved in Green Teams and sustainability efforts, can advocate for change and mobilize support.
- **The Food and Drinks Manager** oversees food system planning and implementation, ensuring alignment with operational realities.

Validation of the system maps

The HMSM students found the maps useful in visualising information flow but noted that the lines could be clearer.

“The accompanying text is very clear; it would resonate with many stakeholders.”

The maps helped them recognize system flows they had not previously considered in depth. There was some discussion on an interactive version, where users could click for more details. While this could spark curiosity, they preferred a static overview for clarity and practicality.

“The accompanying information for the stakeholders would be interactive and trigger curiosity with the clicking, but for us, an overview with all information in one place is actually more convenient.”

The client appreciated that the maps emphasised the central role of the nutritional assistant and chef, aligning with hospital efforts to highlight these positions. He thought it is very clear that the nutritional assistant and the chef

are very central in these flows and that their role must become more prominent and important. However, he noted that the maps did not indicate they were based on data over time rather than single instances. He also suggested that chefs should not handle logistics with suppliers—this should go through food management. Additionally, he questioned whether medical staff should be included since their involvement appeared minimal.

A concern was raised about the similarity of the four maps, which made distinguishing them difficult.

“The four maps were quite alike and by viewing them one by one, the differences were not so clear.”

The Food and Drinks Manager found the legend helpful in understanding the maps and liked the visual representation of the desired flows:

“It is clearly framed and segmented into four groups.”

Initially, he thought some connections were missing, but after reviewing all four maps, he realised that certain stakeholders were involved only in specific areas, which made sense. For example, dieticians dictate nutritional guidelines but should maybe not be involved in taste decisions—those should be left to the kitchen.

“Since the map about taste does not include dieticians according to me should stay like this, it shows that the taste of the meal should be based more on the actual taste that is influenced by the kitchen.”

He noted that the ‘sustainability program manager’ was missing in the maps, despite their role in food quality discussions. This person plays a role in food quality discussions alongside the food manager, dieticians, medical staff and suppliers. While the current food quality committee does not yet address meal effects, he believed this should be added to their agenda in the new system. Additionally, he suggested renaming Van Hoeckel to ‘Supplier’ for broader applicability and questioned whether feedback flowing back was missing.

Validation of the Recipe for Lasting Change Cookbook booklet

The HMSM students immediately saw its relevance to their project and appreciated the clarity and creativity of the cookbook format compared to traditional reports.

“This is what we are doing as well; we will literally continue on your project.”

“It is so much better than all the rigid and long reports that we have to look through at the moment.”

They also found it a useful communication tool:

“We can use this right away for ourselves, but also hand it over to the people we are talking with, to convince them and give them a brief explanation of the reason we are doing it. If we give this, they will understand.”

A key strength was its practical step-by-step approach, which ensured usability. However, they suggested adding estimated time requirements to make the steps feel more manageable.

“On a silver platter how to fix it. You do it in a way that it will actually be used.”

The list of considerations in the booklet was particularly helpful in refining their own questionnaire for hospital staff.

Regarding the maps in the booklet, they noted that hospital staff would likely glance at them briefly, so they needed to be easily digestible. Page 9 had too much text and required enlargement. However, the order of the boxes made sense.

The Food and Drinks Manager praised the booklet’s presentation and originality:

“I wanted to honestly say that I think the way it has been presented is very cool. I have not received a report this way before.”

He liked the illustrations and was eager to explore the content further. However, he suggested making a clearer distinction between the introduction, recipes (steps) and maps. He also recommended adding stakeholder explanations for each step, potentially through a decision tree or checklist, to clarify who should be involved at each stage. This could aid both the HMSM students and EMC’s management in forming working groups for implementation.

Potential Users of the Booklet

The Food and Drinks Manager saw practical applications within EMC, planning to distribute it among 25 key stakeholders, including food management, dieticians and the Sustainability Program Manager. However, he also saw potential beyond EMC, provided the booklet was modified to remove EMC-specific terms.

This was also mentioned by the HMSM students, saying that other hospitals are also interested in tracking patient satisfaction through a national program and suggested that the booklet could be valuable beyond EMC.

Final thoughts on validation

The validation confirmed that the maps and cookbook booklet are valuable tools for improving EMC’s food system. The feedback provided concrete refinements to enhance clarity, usability and applicability.

Key takeaways include:

- Adjust maps for better readability and clearer differentiation.
- Modify information flows to reflect responsibilities accurately.
- Improve booklet structure, distinguishing between introduction, recipes and maps.
- Add stakeholder guidance for each step via a decision tree or checklist.
- Explore broader applications beyond EMC, as other hospitals may benefit from similar insights.

With these refinements, the project’s outcomes will be even more impactful, practical and actionable for Sophia’s food system and beyond.

7.2 Implementation

This Implementation chapter outlines how the findings of this project will transition into future research and practice, ensuring that the feedback system is not just a theoretical framework but a tangible, evolving tool for change.

To ensure that the Visualised Feedback Framework and the Recipe for Lasting Change Cookbook contribute to the development of a structured and adaptable feedback system, it is crucial that the outcomes of this project reach the right stakeholders. By securing ongoing engagement, the project can help EMC achieve its goal of offering 60% plant-based meals by 2027 while reducing food waste from 40% to 20%, all while maintaining nutritional quality and improving patient experience.

7.2.1 Potential pathways for further development

There are four main pathways through which the development of the feedback system can continue:

1. Hotel Management School Maastricht (HMSM) students

From February until the end of June 2025, a group of five students from HMSM will work on a thesis project focused on patient satisfaction in the adult care unit of EMC. This project was initiated by the EMC Food & Drinks Manager, in part due to challenges identified in this study. The HMSM students have already confirmed that the insights from this project will be of great value to their research (see chapter XX). By integrating these findings, they can further refine their approach and contribute to the development of a sustainable feedback system.

2. Master's thesis from Industrial Design Engineering (IDE)

One of the supervisors of this project has suggested the possibility of launching a new master's thesis within IDE that could focus specifically on the implementation and validation of a feedback system for the sustainable transition of Sophia Children's Hospital's food offering. A thesis dedicated to this topic would allow for a deeper exploration of how feedback systems can be effectively integrated into hospital food services, ensuring that patient experience remains central to sustainability efforts.

3. EMC Food department

By distributing the cookbook and feedback framework within EMC, awareness of the need for a structured feedback system for SCH as well as EMC will increase. This could lead to the formation of a dedicated working group within the food department, responsible for further developing and refining the system. This group could also build upon the findings of the HMSM project, ensuring that insights from both initiatives contribute to meaningful progress.

4. Scaling beyond EMC

During validation sessions, it was suggested that the cookbook and feedback framework could be adapted for use beyond EMC—either across other university medical centres (UMCs) or even at a national level for the healthcare sector. For this to happen, certain SCH- and EMC-specific elements would need to be adjusted. Exploring how this broader implementation could be achieved would be an important area for future research. A sector wide and joined forces approach could also give sustainability a boost

7.2.2 Engagement and Knowledge Transfer

To facilitate adoption and ensure the findings are effectively used, two handover sessions have been planned.

The first session will be held within the EMC Food department to present the project outcomes, highlight the identified challenges and discuss the next steps. This session will ensure that key decision-makers understand the

importance of a structured feedback system and are equipped to support its development. Attendees are discussed with the manager and will include:

- Two pediatricians from Green Team Sophia, actively working on sustainable food transitions in SCH
- Two dietitians involved in the transformation of the food system
- The coordinator of the nutritional assistants at SCH
- The manager of the facility care team for adult care
- Two EMC sustainability program managers
- The EMC Food & Drinks manager

In this session, printed copies of the cookbook will be distributed to encourage further discussion and application of the findings. By making these materials accessible and engaging, they can serve as a tool to inspire action and ensure that the feedback system remains a priority.

A second session will be held with the HMSM research team to transfer insights from this project. This handover will allow the students to directly integrate these findings into their research and ensure continuity between both projects.

7.2.3 Ensuring continued stakeholder involvement

For the feedback system to be effective, it is crucial that non-management staff remain actively engaged throughout its development and implementation. Nutritional assistants and chefs, in particular, play a key role in relaying patient feedback and making small, iterative adjustments to enhance both meals and the overall patient experience. By fostering their involvement and ensuring they feel valued, the system can facilitate continuous, meaningful improvements, ultimately creating a more sustainable and patient-centered hospital food system. This can be achieved by making mid-evaluation sessions more frequent and ensuring that feedback flows in both directions. Organising this will be the responsibility of the management.

7.3 Conclusion

This project set out to create an intervention to increase the acceptance of more sustainable food choices for patients at Sophia Children's Hospital. Through a combination of literature review, qualitative research, synthesis and design, the focus evolved into developing a structured feedback system, one that supports the ongoing adaptation of the hospital's food offering based on in-house experiences.

While the outcomes may not deliver immediate behavioural shifts or directly measurable environmental impact, they provide a strong foundation for change: tools and insights that help Sophia shape its food system around what truly matters to patients and staff. By prioritising the experience, what children want, how they respond and how staff can support them, the project sets the stage for meaningful, lasting progress.

The tools designed for the development of the feedback system serve as a critical stepping stone. They shift the conversation from abstract goals to tangible, actionable improvements rooted in empathy, data and participation. Over time, this approach can foster greater engagement, reduce resistance and make sustainability a more integrated part of the hospital's food culture.

Ultimately, the project demonstrates that in complex systems like hospital food, meaningful change doesn't begin with top-down mandates, but with inclusive, feedback-driven development, where patient needs and long-term goals are advanced hand in hand.

08

Continuing the journey

To support the continued development of a strong feedback system at Sophia Children's Hospital, this part presents key recommendations and highlights the limitations encountered throughout the project. It concludes with a personal reflection on the process and learnings gained along the way.

- 8.1 Recommendations
- 8.2 Limitations
- 8.3 Personal reflection

8.1 Recommendations

To ensure that the feedback system effectively supports the transition toward a more sustainable hospital food system, further refinement and validation are necessary.

Ensuring inclusivity and reliability in feedback collection

In designing a feedback system, this project primarily focused on age differences in meal preferences. Future research should also consider cultural, illness-related and departmental differences. Understanding whether these factors influence patient feedback and how they should be accounted for in decision-making is essential.

Additionally, the values assigned to meals by children and parents require further validation. Due to time constraints, only two interviews were conducted, providing limited insight. A broader study involving more patients, parents and kitchen staff would strengthen understanding of meal preferences and improve feedback accuracy. This could be integrated into the first feedback cycle during implementation.

Another crucial aspect is defining a representative number of responses per feedback loop. Without a clear benchmark, it is difficult to determine whether the collected data is sufficient for making informed decisions. Establishing response targets will ensure that decisions are based on a reliable sample of patient and staff input.

Finally, the visualised feedback framework should be further validated with additional stakeholders. While discussions with the client and the manager of food and drinks provided initial insights, it is important to consult other key figures, including those represented in the framework and their team managers. This will help determine whether the proposed flows align with real-world processes and whether stakeholders can identify with the scenarios outlined. If differences arise, these could provide valuable learning opportunities.

Measuring and tracking impact

A major challenge in implementing the feedback system is quantifying its impact. Since behavioural change is difficult to measure, it remains unclear how much the system will contribute to CO₂ reduction and food waste minimization. However, decision-makers often rely on numerical data to support change, so it is recommended to start tracking key sustainability metrics. This could include monitoring the percentage of plant-based meals chosen over time or

measuring reductions in food waste. Currently, waste tracking is incomplete. Only a small portion is recorded in the swill bins, while an unknown amount is discarded as residual waste. This makes it difficult to assess actual waste levels and track improvements. A more precise tracking system is needed to establish a baseline and measure reductions effectively.

Ensuring feasibility and resource allocation

For the feedback system to be successfully implemented, practical considerations regarding time, cost and resources need to be explored further. This project did not focus on financial or logistical feasibility, but it is clear that, beyond relatively low material costs, staff time will be required for development, conducting questionnaires and processing feedback. While nutritional assistants have a few spare minutes per patient to collect feedback, a more detailed analysis of the time investment and budget needed should be conducted to ensure smooth implementation.

Similarly, the preparation times for the “recipes” in the cookbook have not yet been estimated. Since these time indications are important for planning working sessions and assembling the appropriate teams, further research and testing will be needed to determine realistic durations..

Strengthening knowledge-sharing and collaboration

Within EMC and the broader healthcare sector, many teams and initiatives are working toward sustainability. However, a lack of knowledge exchange often leads to unknowingly reinventing the wheel and the development of similar solutions. Although platforms like ‘Groene Zorg Alliantie’ aim to centralise these initiatives, communication gaps still slow down progress.

To accelerate the transition, tools like the Recipe for Lasting Change Cookbook should be made widely available and integrated into national sustainability efforts. The purpose-driven rather than commercially driven nature of the project highlights the desire for the development of a structured plan to share knowledge more effectively between hospitals and other institutions.

Further developing the tools

For the visualised feedback framework and the cookbook to be truly effective, their relationship and usability should be clarified. Currently, the plan is to explain their use during handover sessions and through a slide deck. However, after this transition, the long-term clarity and accessibility of these tools will depend on the motivation of those continuing the project. A structured manual or guide could help ensure that future teams understand how and when to use these tools together.

Additionally, while the recipes outlined in the cookbook have been reviewed in validation sessions, they have not been fully tested in real-world scenarios. More extensive testing is needed to ensure that each step is practical and effective in improving patient meals and the feedback process.

Improving visual clarity of maps

The maps and visual tools used in this project play a critical role in communicating the feedback process. To enhance their usability, it is recommended to have professionals review these visuals and refine them for clarity. Clearer, more intuitive visuals will help ensure that stakeholders can easily understand and engage with the framework.

Conclusion

By addressing these recommendations, the impact of this project can be significantly enhanced, ensuring a smoother transition toward a more sustainable and patient-centred hospital food system.

8.2 Limitations

While this project provided valuable insights into the transition toward a more sustainable hospital food system, several constraints affected the depth of the results and to what extent it is elaborated and ready for implementation.

Understanding the complexity of the hospital food system

The hospital food system is highly complex and as an outsider, gaining a comprehensive understanding took a lot of time. This foundational work was essential for identifying leverage points for the transition, but it extended the exploration phase significantly. During the reframing and creation phases, it was necessary to return to analysis and information gathering more than expected. As a result, less time was available for conceptualizing and refining the intervention. Additionally, the project began with a broad scope, which, while valuable for exploration, made it challenging to narrow down a clear direction early on. The decision to focus on developing a framework for a feedback system emerged relatively late, which meant that by the project's conclusion, there was no opportunity to test the system with patients and a wider range of stakeholders beyond the manager and the HMSM group.

Limited access to patients for testing and co-creation

Engaging with hospital patients, especially children, requires strict ethical approvals. Testing unfinished work directly with patients was therefore not

feasible within the project's timeframe. Children are a particularly vulnerable group, making data collection and co-creation even more challenging. Additionally, collaboration with the Children's Advisory Council (KAR) was not possible due to logistical constraints. The KAR only participates in projects with confirmed implementation plans, which could not be guaranteed at this stage. An alternative approach—co-creation and testing with children outside the hospital setting—was considered. However, no comparable environment was found that sufficiently replicated the conditions of a hospital setting. This limited the ability to test and discuss insights, ideas and the feedback system in a realistic context.

Availability of key stakeholders

This project took place during the final development phase of the hospital's new food concept that was being developed since 2021 and implementation preparations were in full swing. Consequently, personnel involved in the transition were often occupied, making them less available for consultation on short notice. Additionally, while it initially seemed that hospital staff were well-informed about the new food system, it became evident in February that this was still a challenge. This unexpected discovery impacted the assumed phases of implementation, further influencing the project timeline.

Lack of concrete data for goal-setting

Quantifying the impact of the food system posed another challenge. Exact numbers on the hospital food system's CO₂ footprint, food waste and patient satisfaction were not readily available. Some patient satisfaction data only became accessible at the project's conclusion, limiting its integration into earlier phases. In the absence of clear metrics, the 60% plant-based meal target became the primary measurable goal. However, systemic change, particularly in behaviour and perception, is always difficult to quantify. This made it challenging to define and validate the project's direct impact.

Despite these limitations, the enthusiasm of key stakeholders and the recognition of the need for a structured feedback system provide a strong foundation for further development and implementation.

8.3 Personal reflection

Looking back on the past months of working on this project, I can confidently say it was a challenging yet rewarding experience.

When searching for a graduation project, after some talks with Lara, I decided that I wanted to explore systemic design for sustainable transitions. Initially, I looked for a project on overconsumption, but after connecting with Jotte, an expert in the field of sustainable transitions, I started the project for Sophia Children's Hospital's food system. This context was completely new to me, as was working within the protein shift in sustainable food transitions. However, I was eager to take on the challenge and diving into transitioning the food system of a large children's hospital towards a more sustainable version proved to be an incredibly enriching experience.

One of my takeaways was discovering how much I enjoyed engaging with diverse stakeholders through various channels, such as interviews and events like the 'Groene Zorg Festival'. Collecting insights and linking information came naturally to me, but I sometimes struggled with synthesizing all the input into a focused outcome. At times, my scope became too broad, as I aimed for a systemic solution to a systemic problem, rather than narrowing it down to a more specific and actionable intervention. This was partly due to the open-ended nature of the project, which required me to define many boundaries myself. Since I tend to find decision-making difficult, especially without concrete data, this initially slowed down the process. However, in hindsight, this challenge helped me grow. I learned to trust my instincts as a designer and towards the end became more confident in making informed choices.

Another difficulty was the intangible nature of measuring impact. Increasing acceptance of plant-based food is not something that can be quantified within 100 working days. While I was aware of this from the start, I still found it frustrating to not be able to assess the direct results of my work. Over time, I began to see the value in small but meaningful interventions (such as gathering feedback on meals) which, in the long term, could contribute to the broader systemic shift towards more plant-based food and less food waste.

Although systemic design was relatively new to me, I enjoyed its way of thinking, especially in discussions with my supervisors and peers. I gained valuable insights into different methods and approaches, which broadened my perspective as a designer.

Regular coaching sessions and discussions with fellow students and stakeholders were extremely helpful. The different viewpoints and critical questions challenged my assumptions and strengthened my ideas. I realised that for ideation and decision-making, I work best when thinking out loud and building on others' thoughts, whereas during the exploration phase, I liked being in control and ensuring that all information flowed through me.

Overall, this project has been a transformative journey—not just in learning about food systems and systemic design, but also in understanding my own strengths, values and growth areas as a designer. It reinforced my passion for complex, purpose-driven challenges and showed me that, in fact, small steps can contribute to big changes.

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AI Statement

AI-assisted tools like NotebookLM, Whisper and ChatGPT were used throughout the project to streamline research, transcription and writing processes. While these tools provided valuable support, careful oversight was essential to ensure accuracy and originality. NotebookLM was particularly useful for synthesizing scientific papers. It generated podcasts based on research articles, making it easier to absorb complex information and identify connections between different studies. Listening to these summaries first and then reading or scanning the papers, helped speed comprehension and allowed for deeper insights.

Whisper was used to transcribe interview recordings efficiently. This saved significant time and ensured accurate documentation of conversations, allowing for more thorough analysis.

ChatGPT played multiple roles in the project. It was especially helpful for refining own-written text, making content more concise and ensuring clarity—particularly when restructuring sections to reduce repetition. All AI-generated text was carefully reviewed against the original to maintain accuracy and preserve sources. ChatGPT also assisted in brainstorming, especially for naming concepts, structuring interview questions into a logical flow and suggesting additional questions to maximize the expertise of interviewees. However, while it provided a solid starting point for idea generation, it struggled with true creativity; human brainstorming remained more effective for original and innovative thinking. Conceptualizing ideas with ChatGPT was useful but required extensive input to align with the project’s specific goals. Additionally, while it was sometimes helpful in finding sources or approaches, fact-checking was always necessary, as some suggested references were inaccurate or non-existent.

While AI tools greatly supported efficiency, their use required critical oversight to ensure quality, accuracy and meaningful contributions to the project.

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