Fundação Mendes Gonçalves

ENVIRONMENTS THAT NOURISH

The impact of the physical meal environment on children's eating behaviours.

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INTRODUCTION

Healthy nutrition is a public good. It not only promotes population health, but also equity and social justice, strengthens the economy and environmental sustainability. It provides the macro - and micronutrients necessary to produce energy, maintain healthy muscles and bones, and a robust immune system. It protects against disease, supports mental health and development, improves learning and productivity, and is associated with wellbeing and quality of life. It brings people together around the table, creating routines and celebrations of connection and interdependence within communities. For this reason, nutrition is a cross-cutting theme across many of the United Nations Sustainable Development Goals (SDGs), namely the eradication of hunger, health and quality education, gender equality, reduction of inequalities, sustainable production and consumption, and climate action.

Eating behaviour is not determined solely by individual choices, but also by the "food environment" that surrounds us, which includes a set of interrelated dimensions — social, physical and macro — that influence our lifestyles:

- The social environment (family, friends, peers), which includes behavioural models, support and social norms;
- The physical environment, which includes the places where we eat (home, school, workplace, restaurants) and the availability and accessibility of food;
- The macro environment, which includes government policies, food production systems and food industry marketing.

The physical environment of meals impacts our relationship with food and with others in all contexts, from prisons to hospitals, from day centres to sports training facilities. In this document, we focus on the physical environment, namely the impact of the physical space of meals in school and family contexts on children's eating behaviours and habits. Although there is limited scientific evidence and few studies that directly assess the effect and dietary impact that changes in the physical space of children's meal contexts may have — a scarcity particularly evident in Portuguese and European contexts — we seek to address the question: what is the influence of the physical meal space on children's lives?

In fact, the space where we eat impacts more than our eating habits — it shapes how we relate to others and our place in the world.
From an early age, children learn about food using all their senses: the colour of the table, the smell of food, the sound of conversations, the way adults sit around them. The physical space and environmental details in which meals take place

contribute to the construction of meanings around what it means to eat, share, care and belong.[i]

Different disciplines and fields of knowledge, such as Architecture, Nutrition and Psychology, teach us that space is not neutral. Studies show that the physical and social environment of meals influences eating behaviour, diet quality and the emotional relationship with food.[ii] Light, colour, temperature, noise and table layout, for example, can affect meal duration, quantity consumed and even the pleasure associated with eating.[iii]

In schools, the dining hall should be a learning space as relevant as the classroom — a place where, beyond nutrition, social skills, autonomy and respect for others are learned.[iv] At home, the kitchen and dining table are symbolic spaces of belonging, where families teach — through gestures and routines — the meaning of eating together.[v] Both contexts, school and home, which are highlighted here, can be powerful instruments for promoting health, wellbeing, autonomy and sustainability.

In this sense, the aim is to raise awareness of the idea that the physical environment of meals — at school and at home — can act as a "silent educator". An integrated perspective is proposed on how space teaches, welcomes and transforms the relation with food. The intention is to reflect on how spaces can be created to nourish not only the body, but also our relationships with others and our sense of responsibility towards the world.

1. Space as a Mediator of Our Relationship with Food

Our relation with food begins long before any conscious choice about what we eat. It is formed through the sensory, social and emotional experiences that surround eating, and these experiences are, in turn, shaped, among other factors, by the physical space in which meals take place. The meal environment — whether at home, school or daycare — constitutes an ecological and symbolic context that transmits values, regulates behaviours and influences how children, from a very early age, perceive and relate to food.[vivii]

The concept of the food environment has expanded beyond simple food availability, integrating physical, social, cultural and symbolic factors.[viii] For children, the family and school food environments represent their first contact with social norms around food — what is considered "appropriate food", when and with whom one eats, and the emotions and feelings associated with meals.[ix] As a result, architecture and design — traditionally considered peripheral aspects — should assume an increasingly important role in promoting healthy and sustainable eating behaviours.[x]

Environmental Psychology helps us understand how the physical environment influences eating behaviours through multiple sensory and symbolic mechanisms. Attention, appetite and social behaviour at the table can be shaped by subtle messages conveyed by factors such as wall colour, lighting, ambient noise, furniture layout or even the type of materials used in the meal space.[xi] Some studies show that welcoming, well-lit spaces organised to favour social interaction increase meal duration, acceptance of new food and satisfaction with eating. In contrast, chaotic environments with high noise levels or excessive artificial lighting tend to reduce mindful attention to meals and favour faster, less conscious consumption.[xii]

As some authors argue,[xiii] social practices (such as eating) emerge from the interaction between three elements: materials, competences and meanings. In the case of meals, "materials" include furniture, utensils and spatial configuration; "competences" refer to social and practical skills related to eating, serving and sharing; and "meanings" relate to the symbolic and emotional value attributed to the meal moment. Practices change when the links between these elements are strengthened, altered, or broken. In this way, a change of setting can alter behaviour — both because it imposes a new physical configuration and because it reconfigures the meaning of eating. For example, eating in an aesthetically pleasing environment with good acoustics and thermal comfort can transform a meal from a merely functional act into a moment of pleasure and connection.[xiv] [xv]

2. The Impacts of Space on Meals in the School Context

Nurseries, kindergartens and schools are spaces where children learn, namely to observe, wait, share and care. Observational studies in contexts of this nature show that the physical organisation of space directly influences interactions between children and educators — for example, round tables or configurations that promote visual contact foster more conversation and mutual encouragement, while linear arrangements reduce spontaneous communication.[xvi]

In this sense, the physical space of meals has also been identified as a key determinant of eating behaviour.[xvii] The arrangement of tables, the height of the furniture, the presence of windows, the visual interaction with the outdoors and even the time available to eat affect the way children perceive the mealtime moment.[xviii] A dining hall organised around large shared tables tends to reinforce socialisation and cooperation. Conversely, "an arrangement in rows or excessively large spaces may accentuate depersonalisation and dispersion, bringing the act of eating closer to a logistical process than to a relational experience."[xix] [xx]

In school contexts, dining rooms that are well lit and adequately ventilated are associated with greater satisfaction and better acceptance of food.[xxi] [xxii]In contrast, excessive noise — frequently identified in school dining halls — reduces the average meal duration and increases the rejection of certain food, especially fruits and vegetables.[xxiii]

Spaces that promote autonomy (allowing children to serve themselves, choose and participate) foster a more positive and balanced relationship with food.[xxiv] [xxv]This idea is consistent with the person-centered dining approach, which highlights the importance of a physical and social environment that respects individual preferences, rhythms and identities.[xxvi] Although this concept was initially developed for geriatric contexts, we can hypothesise about its application to childhood: a space that allows children to express preferences and feel competent will reinforce their autonomy and their perception of personal agency, which will be reflected both in food choices and in their relationship with the environment and with others.

There is a significant difference between moving along a line of trays in a queue and participating in a "pedagogical meal circuit". A flow of clear stations (for example, "choose", "serve oneself with support", "sit and share", "waste/composting", "tidy up") can facilitate understanding, make the entire process visible, give meaning to the sequence and create small opportunities for autonomy.[xxvii]

The concept of "food choice architecture", widely explored in recent decades, highlights how the physical arrangement of food and the design of meal spaces can guide choices without restricting individual freedom. [xxviii] While food literacy empowers children to make better choices, choice architecture designs the environment so that those choices become easier. In educational contexts, small changes — such as placing fruit and vegetables at eye level and at the beginning of the service line (encouraging children to fill their plates with these options first), using neutral-coloured plates, making water visible and available for children to use independently, or reducing the distance between the table and the serving area — have been shown to increase the likelihood of consuming healthy foods.[xxix] These interventions, often simple and low-cost, reveal the power of the environment as an educational and behavioural agent.

There is also evidence that "farm-to-school" programmes, including gardens and pedagogical kitchens integrated into school spaces, have a positive impact on nutrition literacy, on the choice of healthy food during school meals and on motivation to consume fruits and vegetables.[xxx] [xxxi]A garden and a school kitchen that allow students to follow the production and preparation of food can increase transparency and facilitate connection with food. The inclusion of a space where students can have practical cooking classes can equip children with essential skills to adopt healthy eating habits.

The school environment is also a space of social learning, and the way space is designed implicitly communicates values about community, respect and sustainability.[xxxii] Lalli proposes the concept of culinary capital to describe how food practices in educational institutions reflect and reinforce social values.[xxxiii] The way the meal space is planned — whether it prioritises comfort, autonomy and conviviality, or, on the contrary, efficiency and control — contributes to the type of relationship children establish with food.

In this regard, the mealtime environment is a stage for socio-regard, where skills such as self-regulation, empathy and cooperation are practiced. When space facilitates choice and interaction, children can remain at the table longer, converse more, try more food and develop social skills in a real context.[xxxiv] Huang et al. highlight the importance of using materials, colours and furniture that invite permanence and conviviality (rather than stimulating rapid turnover).[xxxv]

It should also be noted that the way adults model eating behaviours is amplified by space. An environment that facilitates visual contact, the sharing of portions and time spent at the table reinforces social learning and the internalisation of healthy habits. Predictable and aesthetically pleasing environments promote children's

emotional security — an essential condition for them to feel comfortable exploring new food, for example.

Finally, it is important that the physical space of meals does not reproduce inequalities (who can reach? who is seen? who is visible?). School dining halls should reflect equity, whether spatial, relational or temporal, facilitating and promoting inclusion: sinks and food displays should be at everyone's height; there should be no obstacles for children with reduced mobility; pictograms and colours may be used for those who do not yet read; and low-stimulation areas should be provided for those who need sensory breaks, for example.

3. The Impacts of Space on Meals in the Family Context

The family food environment is the primary source of nutritional learning and development of children's eating habits. This is an essential context in which preferences, rituals and attitudes towards food are established, and which tend to persist throughout life.[xxxvi] In addition, this food environment, characterised by regular family meals and by food availability, appears to be a protective factor that contributes to better academic and behavioural outcomes.[xxxvii] [xxxviii]

In the family context, the architecture of the kitchen and dining area also proves to be formative. Historically, kitchens have evolved from utilitarian spaces, centered on efficiency and containment, into integrative and relational spaces, where cooking and eating become shared experiences. The way the home organises the "food axis" — the spaces dedicated to food preparation, consumption and storage — reflects cultural views on the role of food in family life.[xxxix]

Small, enclosed kitchens lacking a social area tend to promote functional and individualised eating practices, while open kitchens integrated into the social area reinforce the affective and communal dimension of meals.[xl] Well-organized kitchens and dining rooms, with clearly defined spaces for preparation, eating and storage, are associated with more consistent and healthier dietary patterns.[xli]

Moreira et al.[xlii] highlight that the kitchen space in the Western urban home has undergone configurational and symbolic metamorphoses as a function of lifestyles and domestic culture. Although there are few Portuguese studies that directly examine the relationship between architectural typology (closed kitchen versus open/integrated kitchen within the social area) and children's eating habits, international research strongly suggests that domestic configuration influences family meal dynamics.

In southern European countries, such as Portugal or Spain, domestic organization has historically favoured the separation between kitchen and living room, with small kitchens, highly functionalised and often lacking a social area. In Portugal, studies on residential architecture show that the kitchen in urban multi-family housing is typically conceived as an autonomous, rational and optimised workspace, whose relationship with other areas of the home can either foster or restrict certain domestic practices, including shared meals.[xliii]

Sociological studies conducted in the Lisbon region indicate that, despite these spatial constraints, family dinner continues to be, in many households, a regular

meal, eaten at the table, especially in the kitchen, for reasons of practicality and dirt management. At the same time, it is observed that in some households with fewer resources, meals become fragmented between the kitchen and the living room, with greater use of television during meals.[xliv]

Moslehian et al. emphasise the importance of a physical space that encourages caregivers to cook and to involve children in this practice (as it is associated with eating behaviours, namely fruit and vegetable consumption), highlighting kitchens as privileged spaces for the promotion and protection of adequate nutrition.[xlv] In Portugal, recent research points to a growing need to make kitchens more flexible and integrated within the overall housing layout, which may create opportunities for greater interaction between food preparation and consumption.[xlvi]

4. The Relationship between Meal Spaces and Sustainability

The physical space of meals can also influence the construction of environmental and sustainability values. Children learn through observation and experience. In this sense, the environments in which they eat can contribute to ecological education. The way the space is organised communicates subtle messages about consumption, waste, sharing and respect for resources. When the meal environment is structured to encourage conscious choices — such as the use of reusable tableware, the visibility of natural foods or a layout that facilitates reuse — it translates, in practice, principles of sustainability.[xlvii]

For example, the physical space can facilitate or hinder efforts to reduce food waste. If meal spaces include waste collection and sorting points that are accessible to children, this will allow them to better understand the food cycle and what can be reused, recycled, composted or discarded.

Architectural integration of gardens visible from the dining area — or even within it (for example, through mini-greenhouses and vertical gardens) — can also transform the meal space into a continuous educational setting for sustainability and for a healthy relationship with food.[xlviii]

5. Strategic Recommendations for Action

The creation of healthy food environments, namely meal spaces, is a shared responsibility that requires coordinated actions, with a view to recognising their pedagogical and relational role, thus also turning them into spaces of care, education and transformation.

Policy-makers, Parents, Caregivers, Educators, Teachers and School Administrators each have a fundamental role to play in building an ecosystem that fosters children's healthy development and facilitates the adoption of healthy eating habits — as a core component of a healthy lifestyle and child well-being.

The following recommendations are aligned with the goals of PNPAS 2030 and the National Strategy for the Prevention of Food Waste, reinforcing the need to consider meal spaces as concrete instruments of food literacy and sustainability.

Recommendations for Local Policy-Makers

1. Integrate spatial quality criteria into municipal school food policies. Ensure that public procurement procedures and school refurbishment projects include minimum requirements for thermal, acoustic and lighting comfort in cafeterias, as well as layouts that foster social interaction and children's autonomy, including children aged 0 to 3 years.

2. Involve multidisciplinary teams in the planning of food-related spaces. Architects, nutritionists, educators and psychologists should be involved from the design phase of cafeterias, pedagogical kitchens and school gardens, ensuring that the space reflects educational and public health values.

3. Upgrade cafeterias as "eco-food learning spaces." Promote pilot projects that transform cafeterias into living laboratories for food education and sustainability (for example, by integrating composting systems, visible gardens, pedagogical kitchens and sensory experimentation areas), enabling the study and systematisation of good practices that can be disseminated to other contexts.

4. Create incentives for cohesion and equity programmes. Provide financial support to schools and institutions that adapt meal spaces for children with specific needs (reduced mobility, sensory sensitivities, different age groups).

5. Promote synergies with the local community. Encourage partnerships between schools, local producers and municipal services to reduce food waste and strengthen short supply chains, including visits and activities within the school environment. For example, support "farm-to-school" programmes that connect school food services with local farmers, improving access to fresh and seasonal foods, stimulating the local economy and contributing to more sustainable food choices.

6. Include architectural criteria and guidelines that promote integrated and functional meal spaces (for example, kitchens with visual and physical connections to dining areas), capable of fostering family conviviality and children's involvement in food practices, within social housing programmes and urban rehabilitation incentives.

Recommendations for Educators, Teachers and School Administrators

1. Ensure the existence of a dedicated space for meals, integrated into the overall set of educational spaces. Ensure that there is an adequate, welcoming and functional dining space, designed as an integral part of the educational environment.

2. Understand the cafeteria as an educational space. Integrate mealtime into the school's pedagogical project, recognising it as a context for social, emotional and nutritional learning. For example, begin by creating an action group to improve the cafeteria experience, involving students, teachers, kitchen staff and parents.

3. Care for the atmosphere of the space. Ensure adequate levels of natural light, ventilation and noise control; use soft colours and materials that convey comfort and cleanliness; organise the space in a way that encourages conversation and sharing. Use the cafeteria to display students' artwork, making the space more welcoming and personalised.

4. Reorganise table layouts to foster interaction. Consider creating distinct areas for different age groups, as well as providing diverse seating options. Avoid rigid lines and long queues, opting instead for "islands of conviviality" that stimulate peer communication and mutual support.

5. Optimise flow and reduce waiting time. Implement strategies to speed up service (for example, creating multiple food collection points) and streamline the process.

6. Foster children's autonomy and engagement. Allow children to serve themselves (with supervised support), choose food and participate in tidying up and composting. Create pedagogical meal circuits, where each station represents a learning opportunity (choosing, serving, sharing, recycling). Additionally, involve students in menu creation, organise tasting sessions for new foods and use the cafeteria space to share messages about nutrition, sustainability and food culture.

7. Use the space to teach sustainability. Integrate gardens, vertical gardens or visual access to composters (for example, through windows) into the dining environment, promoting the connection between production and consumption. Use pictograms and educational signage that encourage waste reduction.

8. Ensure inclusion and spatial equity. Adapt the height of counters, food displays and sinks; provide quieter areas for children sensitive to noise; use visual elements accessible to all. Additionally, allow students who bring lunch from home to sit together with those who eat school meals, strengthening social bonds and reducing social segregation during lunchtime.

9. Model positive eating behaviours. Adults who accompany meals should be attentive to how the space facilitates role modelling — sitting at the table, maintaining eye contact and sharing the same foods conveys security and confidence to children.

10. Value mealtime as a space for celebration, dialogue and the promotion of prosocial behaviours. Mealtime at the table can be used to encourage dialogue about food, sustainability and social justice. Children can participate in constructive conversations that reflect the value of living together in society. Furthermore, integrating moments of celebration related to food — seasonal festivities, shared recipes or conversations about different traditions — can reinforce the educational and cultural value of meals.

Recommendations for Mothers, Fathers and Caregivers

1. Value the mealtime space as a time for relationships. Whenever possible, have meals together, without digital distractions, with appropriate lighting and a layout

that facilitates eye contact and conversation. Remember that adults serve as role models for healthy eating behaviours and beyond. At the table, children learn about respect, empathy, cooperation and conscious choices — prosocial values and behaviours. Mealtime can also be a moment of celebration — of special occasions or everyday life (for example, expressing gratitude or sharing something positive that happened that day).

2. Create a predictable, calm and aesthetically pleasant environment. Avoid noise and haste at the table; use neutral colours, simple tableware and natural elements (flowers, fruit) to associate meals with a positive sensory experience. Even when the available space is not ideal, it is possible to cultivate habits and an environment of well-being through small adaptations: setting aside a corner or a table to eat together, or using simple elements that mark the moment (for example, a tablecloth, music or a ritual). More than material conditions, the sense of presence and sharing is what matters most.

3. Involve children in preparing and organising the space. Allowing them to choose or prepare small details (setting the table, choosing plates, decorating, tidying up) reinforces their sense of competence and belonging.

4. Promote autonomy and awareness. Make food accessible (for example, keeping fruit within easy reach of children and ready to eat), use age-appropriate utensils and involve children in simple decisions (quantity, food combinations), encouraging responsible choices.

5. Involve children in food preparation. Organise the kitchen space in a way that includes children in planning and preparing meals. This practice can increase their confidence, develop culinary skills and encourage acceptance of new foods.

6. Make the family space a model of sustainability. Adopting visible and consistent practices — separating waste, using reusable tableware, making use of leftovers and cooking with seasonal foods — reinforces ecological and sustainable values through example.

7. Observe the dining space when choosing a nursery, kindergarten or school. Pay attention to the environment where children eat during the visit that precedes the choice of an educational establishment. It is important to check whether the space is bright, welcoming and organised in a way that promotes conviviality; whether children have sufficient time to eat and autonomy to serve themselves and

interact; whether educators or teachers are present during mealtime; whether experimentation is encouraged and whether sustainable behaviours (such as reuse and waste separation) are valued. Remember that the way a school cares for the space and time of meals is also a reflection of how it cares for children and their education.

CONCLUSION

Meal spaces constitute an ecological system of learning — simultaneously sensory, emotional, social and moral — in which children build their relationship with food, with others and with the environment around them. Understanding and intervening in this space is therefore a concrete way of promoting health, well-being and sustainability, not only through what is eaten, but also through how the act of eating is experienced. At home and in the school context, meal spaces constitute an educational infrastructure that can promote autonomy, ecological awareness and citizenship, among other prosocial behaviours — the way we eat together reflects the kind of society we are building and the legacy we wish to leave.

Rethinking meal spaces is an investment in public health and in the future. It is recognising that each meal can be an educational and regenerative experience — a daily act of citizenship in community.

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