BEYOND THE PLATE: HOSPITAL FOOD ENVIRONMENTS AS BEHAVIORAL AND EDUCATIONAL INFRASTRUCTURES IN HEALTHCARE SETTINGS

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ABSTRACT
This paper explores hospital food environments as behavioural and educational infrastructures through an interpretive case study of Khoo Teck Puat Hospital (Singapore). It examines how spatial design, food services and sustainability practices may influence food choices and support situated learning. The study highlights the educational potential of healthcare environments in promoting food literacy and well-being.

KEYWORDS
Food environments; Choice architecture; Food literacy; Health-promoting hospitals; Situated learning.

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1. Introduction

From individual responsibility to food environments

Food choices are increasingly understood as the outcome of complex interactions between individual preferences, social dynamics and environmental conditions (Johnson et al., 2012; Vecchio & Cavallo, 2019). Within contemporary food systems, everyday environments play a crucial role in shaping dietary behaviors, often in ways that undermine health and well-being (Vecchio & Cavallo, 2019). As a result, approaches to nutrition education based primarily on information provision and individual responsibility have shown limited effectiveness in producing sustained behavioral change (Mertens et al., 2022).

In response, growing attention has been directed toward the role of food environments in influencing food-related decisions (Mertens et al., 2022). The organization, accessibility and presentation of food can significantly guide choices, frequently operating below conscious awareness (Johnson et al., 2012). Behavioral frameworks such as nudging and choice architecture highlight how modifications in the decision context can promote healthier behaviors without restricting individual freedom (Thaler et al., 2013).

Food literacy and health-promoting environments

Within this perspective, the concept of food literacy has expanded beyond a purely cognitive understanding of nutrition to encompass a set of knowledge, skills and practices that enable individuals to engage with food systems in informed and sustainable ways (Mondragon Portocarrero & Miranda Lopez, 2024). This shift foregrounds the importance of situated and experiential learning processes, in which environments actively contribute to shaping both behavior and understanding.

Healthcare settings represent a particularly relevant yet still underexamined context in this regard. Traditionally conceived as spaces dedicated to diagnosis and treatment, hospitals are increasingly recognized as environments capable of promoting health and well-being (World Health Organization, n.d.). Within this framework, food service areas assume a strategic role: the quality of food, together with the organization and atmosphere of dining spaces, contributes not only to

patient satisfaction but also to broader processes of care, recovery and everyday practice (Carpman & Grant, 2016).

2. Research gap and aim of the study

Despite growing attention to food environments, existing research has primarily focused on schools, workplaces and retail settings, while healthcare environments remain relatively underexplored. In particular, limited attention has been paid to how hospital food environments may simultaneously shape food-related behaviors and foster informal learning processes. To address this gap, this paper examines the case of Khoo Teck Puat Hospital (Singapore) through an interdisciplinary lens, exploring how spatial design, food services and sustainability practices may configure hospital food environments as behavioral and educational infrastructures.

3. Theoretical framework

Food environments, choice architecture and food choices

Eating behavior is increasingly understood as the outcome of dynamic interactions between individuals and their environments, rather than as the result of purely rational decision-making (Johnson et al., 2012; Vecchio & Cavallo, 2019). Within this perspective, food environments can be conceptualized as socio-material contexts in which physical, social and economic conditions shape both access to food and consumption practices.

In such contexts, choice architecture describes how the structuring of options, through elements such as placement, variety, pricing and visual communication, can systematically influence behavior, often operating through implicit and non-conscious processes (Thaler et al., 2013; Johnson et al., 2012). Decisions thus emerge from the interaction between bounded cognitive capacities and environmental cues, positioning spatial design as a key component in shaping food-related practices.

Nudging, in this sense, refers to interventions that reconfigure choice environments without restricting individual freedom. Empirical evidence from institutional settings suggests that even minor spatial and organizational modifications can influence food choices, although their effects remain context-dependent (Kawa et al., 2021; Meeusen et al., 2023; Mertens et al., 2022).

Therapeutic landscapes and hospitals as health-promoting environments

In parallel, the literature on therapeutic landscapes highlights the role of environments as active contributors to health and well-being (Ulrich, 1984). Within healthcare settings, spatial characteristics such as access to natural elements, lighting quality, comfort and spatial organization have been associated with positive outcomes for both patients and staff (Ulrich, 1984; Wu, 2011). The environment is therefore conceptualized as an active component of care processes.

This perspective aligns with the paradigm of health-promoting hospitals, which frames healthcare institutions as environments capable of fostering health through organizational, environmental and educational strategies (World Health Organization, n.d.). Within this framework, food-related spaces and services become particularly relevant, as they represent everyday points of interaction among patients, staff and visitors.

Hospital dining environments can therefore be understood as spaces where therapeutic, behavioral and social dimensions intersect. The quality of space, accessibility and service organization may contribute to shaping everyday food practices as part of broader experiences of care and well-being (Carpman & Grant, 2016).

Food literacy as a situated and environmental process

Within this integrated perspective, food literacy emerges as a key conceptual lens. It extends beyond knowledge of nutritional properties to include skills, practices and critical capacities that enable individuals to navigate food systems in informed and sustainable ways (Mondragon Portocarrero & Miranda Lopez, 2024).

Importantly, food literacy can be understood as a situated process, in which learning is embedded in everyday practices and shaped through interaction with specific environments (Hernandez et al., 2021; Classens & Sytsma, 2020). From this perspective, food environments may function as spaces of implicit learning, where behaviors, meanings and routines are shaped through experience.

In this study, hospital food environments are conceptualized as educational infrastructures insofar as they create recurring opportunities for informal and situated learning through everyday interaction with food-related spaces, practices and environmental cues. Rather than relying on formal educational interventions, these environments may support food literacy through participation, observation and routine engagement with food systems.

This perspective allows hospital food environments to be interpreted as settings where behavioural design, learning processes and sustainability practices may converge.

4. Aim and research questions

This paper aims to examine the role of hospital food environments as behavioral and educational infrastructures, focusing on how spatial design, behavioral principles and sustainability-oriented practices interact to guide food-related practices.

To address this aim, the study analyzes the case of Khoo Teck Puat Hospital (Singapore) and is guided by the following research questions:

- **RQ1:** How can hospital food environments be interpreted as behavioural and educational infrastructures shaping food-related practices?

- **RQ2:** In what ways do spatial design and sustainability-oriented practices contribute to shaping food-related practices in healthcare settings?

5. Methodology

Research design and case selection

This study adopts a qualitative research design based on an interpretive case study approach, aimed at examining how hospital food environments can be conceptualized as behavioral and educational infrastructures. Rather than aiming for empirical generalization or causal inference, the case study is used as an interpretive framework to explore how environmental configurations may shape food-related practices and learning processes within a paradigmatic context.

The selected case is Khoo Teck Puat Hospital (Singapore), widely recognized for its integration of environmental design, health promotion and sustainability-oriented practices. The hospital's emphasis on biophilic design, user well-being, and community engagement makes it a particularly suitable case for exploring how spatial and organizational configurations can influence food-related practices. Its distinctive combination of therapeutic landscapes, accessible public spaces and food-related initiatives provides a rich context for examining the interplay between environmental, behavioral and educational dimensions.

Data sources and analytical approach

The analysis draws on a heterogeneous set of secondary sources, including academic literature, institutional reports, design documentation and publicly available materials related to Khoo Teck Puat Hospital. These sources were purposively selected to capture the spatial, organizational and sustainability-related dimensions of the hospital environment, with particular attention to food-related spaces, services and practices.

The study adopts an interpretive approach aimed at examining how documented environmental configurations may be theoretically associated with food-related behaviors and informal learning processes.

The analytical process follows a theory-driven framework analysis informed by four complementary perspectives: food environment research, choice architecture, therapeutic landscapes and food literacy studies. These perspectives guide the identification of key analytical dimensions through which hospital food environments can be interpreted.

More specifically, the analysis focuses on spatial organization, accessibility, visibility and arrangement of food options and sustainability-oriented practices. These dimensions support a systematic reading of the materials and help identify recurring patterns linking spatial configurations, everyday practices and learning opportunities.

The study offers a theoretically informed interpretation of how hospital food environments may function as behavioral and educational infrastructures.

To enhance analytical transparency, these dimensions are summarized in Table 1.

Table 1. Analytical framework linking spatial, behavioural and educational dimensions in hospital food environments

Dimension	Observed element	Evidence from the case	Underlying mechanism	Potential implications	Context sensitivity
Spatial design	Layout and sequencing of food options	Self-service layout with healthier options	Choice architecture (nudging)	May encourage healthier food selections	High

Dimension	Observed element	Evidence from the case	Underlying mechanism	Potential implications	Context sensitivity
		positioned at the beginning			
Spatial design	Accessibility and openness of spaces	Dining areas accessible to patients, staff and visitors	Environmental affordances	May integrate food practices into everyday routines	High
Ecological integration	Rooftop gardens and productive green areas	Participation in cultivation activities	Therapeutic landscapes; experiential engagement	May foster environmental awareness and well-being	Medium
Educational dimension	Visibility of food production processes	Integration of production and consumption spaces	Situated learning	May support informal food literacy processes	High
Social dimension	Community-oriented spaces	Open and inclusive environment encouraging interaction	Community engagement	May foster social interaction and participation	Medium
Sustainability practices	Local production and circular practices	Connection between cultivation, food services and resource use	Sustainability-oriented food systems	May increase awareness of sustainable food practices	Medium
Informational environment	Use of visual cues and food-related information	Presence of nutritional cues embedded in the environment	Behavioral cues; cognitive scaffolding	May support more informed food choices	High

6. Case study: Khoo Teck Puat Hospital

Hospital design, biophilia and community orientation

Khoo Teck Puat Hospital (Singapore) is frequently cited as an example of the integration between environmental design, health promotion and urban engagement (Wu, 2011). From its inception, the hospital was conceived as a therapeutic environment in which spatial configuration was designed to support users' well-being (Ulrich, 1984; Carpman & Grant, 2016).

A key feature of the project is the adoption of biophilic design principles, reflected in the integration of vegetation, gardens and continuity between indoor and outdoor environments (Wu, 2011). In this context, nature represents a structural component of the hospital experience. Existing literature has associated these environmental characteristics with stress reduction and improved well-being in healthcare settings (Ulrich, 1984). The hospital can therefore be interpreted as a therapeutic landscape in which spatial quality plays a relevant role in care experiences.

Alongside its biophilic dimension, the hospital is characterized by strong openness to the local community. Spaces are designed to be accessible also to residents and visitors, potentially encouraging social interaction and everyday use (Wu, 2011). Rest areas, pedestrian paths and informal gathering spaces contribute to positioning the hospital as an environment integrated into the urban fabric.

This configuration suggests a broader understanding of the hospital as a socio-spatial environment where health-related everyday practices may emerge. Within this perspective, environmental sustainability initiatives further reinforce the relationship between space, community and lifestyles. The integration of natural elements and ecological strategies reflects an understanding of health as shaped by the interaction between environments, behaviors and everyday practices (Wu, 2011).

Food environment and food-related practices

Within this setting, food services can be understood as environments embedded in broader social and experiential dynamics (Carpman & Grant, 2016). Dining areas are designed to be accessible and welcoming for patients, staff and visitors. They also support everyday food-related practices.

The organization of dining spaces, the diversity of food offerings and the spatial configuration of services may shape food choices as part of a situated experience (Carpman & Grant, 2016). In this sense, food practices are embedded within the broader rhythms of daily life in the hospital environment.

A distinctive feature of the case is the integration of food production and consumption. Rooftop gardens and productive green areas involve patients, residents and volunteers in cultivation activities, creating opportunities for participation that connect food practices to environmental and social dimensions (Wu, 2011). This proximity between production and consumption may increase the visibility of food systems and create opportunities for experiential learning and greater awareness of food-related practices (Hernandez et al., 2021).

These initiatives may also foster interaction among different user groups while reinforcing connections between local production, resource use and sustainability-oriented practices (Geissdoerfer et al., 2017). The active involvement of users in cultivation activities and the visibility of food production suggest a food environment in which material, relational and educational dimensions are closely intertwined.

The spatial organization of dining areas also suggests the presence of mechanisms associated with choice architecture (Thaler & Sunstein, 2009). The visibility and accessibility of food options, together with the configuration of choice pathways, may influence decisions without imposing explicit constraints. In this sense, the food environment can be interpreted as a subtle behavioral infrastructure shaped through spatial and organizational arrangements.

Overall, the food environment at Khoo Teck Puat Hospital can be interpreted as a setting in which spatial design, sustainability practices and everyday interactions converge, potentially shaping food-related practices within the hospital experience.

Interpreting the case: behavioural, educational and sustainable dimensions

In line with the theoretical framework, the case of Khoo Teck Puat Hospital suggests how hospital food environments may operate as integrated systems where behavioral, educational and sustainability dimensions intersect.

From a behavioral perspective, the organization of dining spaces reflects principles associated with choice architecture (Thaler et al., 2013). The visibility, accessibility and sequencing of food options may increase the salience of healthier choices without restricting individual autonomy (Thaler et al., 2013; Johnson et al., 2012). The presence of visual information and nutritional cues may further reinforce these dynamics by embedding subtle forms of guidance within everyday routines (Yishun Health, n.d.).

From an educational perspective, the integration of cultivation practices and food services may create opportunities for situated learning. The visibility of production processes and the involvement of users in gardening activities suggest forms of

experiential learning in which food-related knowledge can emerge through participation and observation rather than formal instruction (Hernandez et al., 2021; Classens & Sytsma, 2020).
The sustainability dimension further reinforces this configuration by connecting local production, resource use and everyday food practices. Productive gardens and sustainability-oriented initiatives make food systems more visible and may contribute to greater awareness of environmental interdependencies.
More broadly, the hospital can be interpreted as a hybrid environment where clinical, social and educational dimensions overlap. The diversity of users and the multiplicity of activities taking place within its spaces create a context in which food-related practices are embedded within broader experiences of care and everyday life.
Overall, the case suggests that hospital food environments may function as behavioral and educational infrastructures where spatial design, everyday practices and sustainability strategies converge.

7. Discussion and conclusions

The findings suggest that hospital food environments can be understood as settings that actively influence both food-related behaviours and learning processes. In the case of Khoo Teck Puat Hospital, spatial design, food services and sustainability-oriented practices operate in a coordinated way, structuring the conditions of choice while embedding these conditions within everyday experience.
From this perspective, food environments emerge not only as contexts of consumption, but as infrastructures of practice and situated learning, where behavioral guidance and meaning-making processes are intertwined. This interpretation contributes to the literature by extending the concept of food environments beyond availability and accessibility, emphasizing their role as environments that simultaneously orient action and support the development of food literacy.

More broadly, the case suggests that healthcare settings can be reconceptualized as hybrid socio-spatial environments, where care, everyday practices and community engagement intersect. Within such environments, food-related spaces may support forms of informal learning, participation and social interaction, contributing to broader health-promoting processes.
However, these dynamics are closely tied to specific contextual conditions. Rather than being directly transferable, the case highlights how the principles underpinning the integration of spatial design, behavioral mechanisms and sustainability practices may be selectively translated into other settings. Evidence from other contexts suggests that such translation often occurs through partial or

modular interventions. For instance, projects such as the *Sky Garden* and the *Greenhaven* indoor environment at Chelsea and Westminster Hospital in London (2021) illustrate how elements such as therapeutic green spaces can be integrated into healthcare settings, supporting well-being and engagement without reproducing the full systemic configuration observed in the Singapore case (Chelsea and Westminster Hospital in London, 2021). Overall, the study repositions hospital food environments as active components of health promotion, where space, behavior and learning converge. While not intended as a prescriptive model, the analysis provides a conceptual lens that can inform future research and support the development of more context-sensitive approaches to food, health and education across healthcare environments.

8. Limitations

This study presents several limitations that should be acknowledged. First, the analysis is based on a synthesis of scientific literature and secondary sources related to the case study, including institutional materials and descriptive documentation. While these sources provide valuable insights into the characteristics of the context, they do not allow for direct observation of user behavior or for an empirical assessment of the effects of the environmental configurations described.

Second, the study adopts an interpretive approach in which concepts such as choice architecture and circular food practices are used as analytical lenses rather than examined as explicitly implemented strategies within the case. While this perspective enables a theoretically informed reading of the environment, it requires caution in attributing causal relationships.

Third, the findings are derived from a single case study selected for its exemplary characteristics. As such, the results are not intended to be generalizable, but rather to offer conceptual insights that may inform further research. Furthermore, the selected case is embedded in a highly specific socio-spatial and institutional context. The integration of environmental design, sustainability practices and health promotion strategies observed in the Singapore setting reflects conditions that may not be easily replicable in other healthcare systems. Rather than being directly transferable, such configurations are more likely to be translated through partial or modular adaptations, depending on local resources, governance structures and design capacities.

Despite these limitations, the study provides an in-depth conceptual exploration of the relationships between environmental design, behavior and learning within a complex real-world setting. Future research could build on these findings through

empirical investigations, comparative case studies and the development of context-sensitive evaluation frameworks.

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