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# Quantifying the locality of the food supply in a large healthcare organisation

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## Abstract

**Aim:** Shocks to the food system (such as extreme weather events, wars, and pandemics) are felt by institutional food systems. For hospitals, these shocks affect the quantity, quality, and variety of foods that can be offered to patients. One strategy to buffer the hospital food supply from external threats is to prioritise ingredients produced locally. Thus, the aim of the current research is to describe the country of origin of all foods purchased by a large, metropolitan healthcare organisation and to identify opportunities for improving the locality of the food supply.

**Methods:** This study was of a cross-sectional, observational design. The country of origin for all foods procured over a 1-year period by a large, urban healthcare organisation was determined by proportion of food budget spend. State of origin was identified for fresh fruit, vegetables, and meat. The organisation was in Queensland, Australia and utilised a cook-fresh, room-service foodservice model. Descriptive analysis was used to determine the number of items and the proportion of budget spend on all foods produced in Australia, and by food category. Similar descriptive statistics were generated to determine the proportion of the budget spend on fresh fruits, vegetables and meats produced in Queensland.

**Results:** Over the 1-year period, 659 individual food items were purchased by the hospital foodservice, and 502 food items were included in the analysis. In total, 53% of the food budget was spent on Australian foods (100% Australian ingredients) and almost all fruit (73%) and vegetables (91%) were Australian grown. Procuring fresh fruit (28%), vegetables (35%), and meat (46%) from within the state was less common, and this may reflect the primary states of production across Australia, and seasonal variability of the food supply.

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**Conclusions:** Findings offer priority areas for improving the locality of the food supply. Future research to determine if procuring more foods locally has benefits to consistency of the food supply is warranted.

**KEYWORDS**

country of origin, foodservice, hospital, local food, sustainability

## 1 | INTRODUCTION

In recent years, the global food supply has been adversely affected by multiple external shocks. Events such as the COVID-19 pandemic, extreme weather events and wars have impacted the production and supply chains of foods globally and locally.<sup>1-3</sup> In recognition that these types of shocks will continue, more needs to be done to ‘future proof’ our food system. This will ensure a global food system that promotes human and environmental health, meets public expectations, and can withstand significant shocks.<sup>2</sup> These principles align with the broader shifts in nutrition science to recognise not just the health effects of foods and diets, but also the social, economic, and environmental factors related to the food system as a whole (The Environmental Nutrition Model).<sup>4,5</sup>

The local and global shocks to the food system are felt by institutional food systems, like hospitals, as well. Threats to the availability of foods potentially affect the quantity, quality, and variety of foods that can be offered to patients. In Australia, recent events such as the COVID-19 pandemic and flooding have caused significant impacts on the local food supply. Research among Australian hospital foodservice workers reported that COVID-19 presented many challenges for foodservices, driven by reductions in staffing and limited stock by suppliers.<sup>1</sup> The 2022 floods, and contributing weather events, led to a shortage of fresh fruits and vegetables in Queensland and New South Wales, as the growing conditions were poor and the warehouses of major suppliers were flooded.<sup>6</sup> Events like these present immediate and practical challenges for hospital foodservices. Changes to menus (such as substituting ingredients or whole meals) need to ensure that nutritional standards are met, while considering allergens and therapeutic needs of patients.

One strategy to buffer the hospital food supply from external threats is to prioritise ingredients produced locally.<sup>4,7</sup> Local foods (rudimentarily defined as foods grown close to where they are consumed) may offer a number of benefits to hospital foodservices. Local foods are likely to be healthier as shorter time in transit may help to keep food fresher; fruits and vegetables lose nutritional value over time.<sup>8,9</sup> Procurement through local suppliers enables ongoing relationships that may result in

better service overall. Locally procured foods may have economic benefits and personal value/recognition to the producers, suppliers, and the broader region.<sup>10</sup> To date, little research has been conducted in hospitals to quantify how ‘local’ the food supply is. Without any publicly available baseline data, it is difficult to set targets for healthcare providers, other institutions in the region, or measure the impact of any initiatives to improve the local food procurement strategies. As such, the aim of the current research was to describe the country of origin of all foods purchased by a large, metropolitan healthcare organisation and to identify opportunities for improving the locality of the food supply. For fresh fruit, vegetables and meat, the secondary aim was to determine what proportion of the budget is spent on items produced within the state.

## 2 | METHODS

This study utilised a cross-sectional, observational design to describe the country of origin of foods procured by a large healthcare organisation. The STROBE checklist for cross-sectional studies was used to ensure appropriate reporting of the current research. The Mater Research Human Ethics Committee confirmed that this study did not require a review as there were no human subjects included in this research.

The setting for this study was Mater Health, South Brisbane in Brisbane, Australia. Mater Health, South Brisbane is a large, metropolitan healthcare organisation with ~800 beds (both privately and publicly funded) and 6000 staff. The hospital foodservice operates a cook-fresh, room-service on-demand model, where patients can order meals, at a time that suits them (6.30 AM to 7 PM) and it is delivered within 45 min. The room-service menu is a static, a la carte, restaurant-style menu for all patients with privately insured patients having access to an additional Chef's Special Menu, designed to offer a higher level meal experience. The Chef's Special Menu offers an entrée, main, and dessert for the week. The menu rotates weekly over 4 weeks, with the 4-week theme changing three times per year. The room-service, on-demand model is becoming increasingly popular both within the

Queensland Health setting as well as across Australia in both state health funded, as well as private funded organisations, due to clearly demonstrated patient and organisational benefits.<sup>11,12</sup> These benefits include demonstrated food cost savings, attributed to waste reduction, and improved patient choice and selection, including when compared with a bought-in, thaw-retherm, traditional foodservice model seen in publicly funded facilities.<sup>13</sup>

At Mater Health, food procurement is coordinated centrally and through the Procurement and Supply Chain Operations Team. The organisation has a modern slavery statement and First Nations Reconciliation Action Plan which are reflected in the organisation's procurement strategy and governance policies. A full list of all food items purchased, the quantity of items, and the amount spent per item, and the supplier was supplied by the organisation's procurement team for an entire year, October 2021 to September 2022. In Australia, Country of Origin labelling is required for most foods suitable for retail sale, as directed by the Country of Origin Food Labelling Information Standard 2016.<sup>14</sup> Foods were excluded if they were foods used for special medical purposes (e.g., texture

modified foods) as these products are not required to carry Country of Origin labels. The remaining food items were then classified as priority or non-priority foods (priority foods are those required to carry the Country of Origin label) and the non-priority foods were then excluded, as identifying country of origin may not be feasible or possible. Non-priority foods include seasonings (e.g., dried herbs and spices), confectionery (e.g., chocolate products and ice cream), biscuits and snack foods, soft drinks, alcoholic drinks, tea and coffee, and bottled water.<sup>15</sup>

All included food items were assigned a food group, informed by the Australian Dietary Guidelines<sup>16</sup> and by the item's practical application in the kitchen. A description of the food groups included and exemplar items in each group is provided in Table 1.

The country of origin for each food item was identified through information on the packaging or company websites. Data on country of origin were collected between January and March 2023. The Dietetics and Foodservices department keep a database of images of all food packages procured by the hospital for use in allergy management. Those images were reviewed for country of origin labels and if those images were not sufficient or if the information was not available, researchers looked at food packages in the kitchen and on company websites. For items with no packaging, information was sought from the suppliers. Suppliers were contacted by email and responded by email or in person. If the country of origin was Australia, additional information about the proportion of Australian content was also recorded (as required by the Standard). All items were categorised as '100% Australian', '75%–99% Australian', '50%–74% Australian', '% Australian ingredients missing', 'Imported', or 'Country of origin missing'.

All fresh foods in the fruit, vegetable, and meat categories were then identified and categorised by the Australian state of production (where country of origin was Australia). These food groups were selected and prioritised for this secondary classification due to the resources required in their transport and storage. The suppliers of these items were contacted and asked to provide the state of origin of each item. As the state of production may vary with season, suppliers were asked to provide the state of production on the date of data collection.

All data were analysed in Microsoft Excel to determine the number of items and the proportion of budget spend on all foods produced in Australia, and by food category. Similar descriptive statistics were generated to determine the proportion of the budget spend on fresh fruits, vegetables and meats produced in Queensland.

**TABLE 1** Descriptions of food categories.

Meat	Meat (beef, lamb, pork), poultry (chicken, turkey, duck), fish, shellfish, and eggs
Vegetables	Fresh and minimally processed (frozen, tinned) vegetables and herbs
Dairy	Milks, soy milks, yoghurt, cheese, custard
Fruit	Fresh and minimally processed (frozen, tinned) fruits
Discretionary	Foods high in fat, sugar, and/or salt, including processed meats, muesli bars, meat pies, cakes, and chips
Cereal grains	Cereal grains and products predominately made from cereal grains, including oats, flour, pasta, bread, breakfast cereal, rice, quinoa
Pantry and sauces	Items typically used in the production of other foods and condiments, including baking powder, tomato paste, vegetable stock, salad dressings, tahini, mustard, vinegars, tomato sauce
Beverages	Juices, coconut water
Fats	Butter, vegetable oils
Nuts	Minimally processed nuts, including almonds, peanuts, pistachio, macadamia
Ready-made meals	Pre-prepared meals, typically for Halal or Kosher diets
Legumes	Dried and tinned beans and lentils, tofu

### 3 | RESULTS

Over the 1-year period, the hospital foodservice purchased 659 food items. Of those, 47 items were therapeutic foods and 110 items were non-priority foods, leaving 502 food items (total food budget \$AUD 3518635.9), for analysis. Of the total food budget, 71% was spent on foods produced in Australia (with >50% Australian ingredients), 13% of the food budget was spent on imported foods, and 3% of the budget was spent on foods where the country of origin was missing. Missing data was largely due to the food item being seasonal or no longer on the menu, and therefore unavailable (Figure 1).

Most of the total food budget was spent on the meat (28%), vegetable (20%), dairy (14%), fruit (9%) and discretionary (9%) categories. Approximately 10% of the food budget was spent on the grain (6%), and pantry (5%)

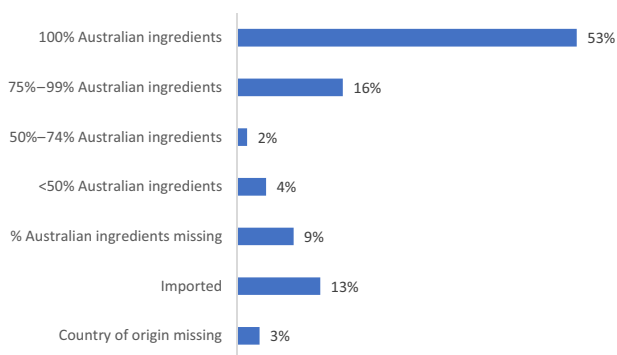


FIGURE 1 Percentage of budget spend by Australian content of foods.

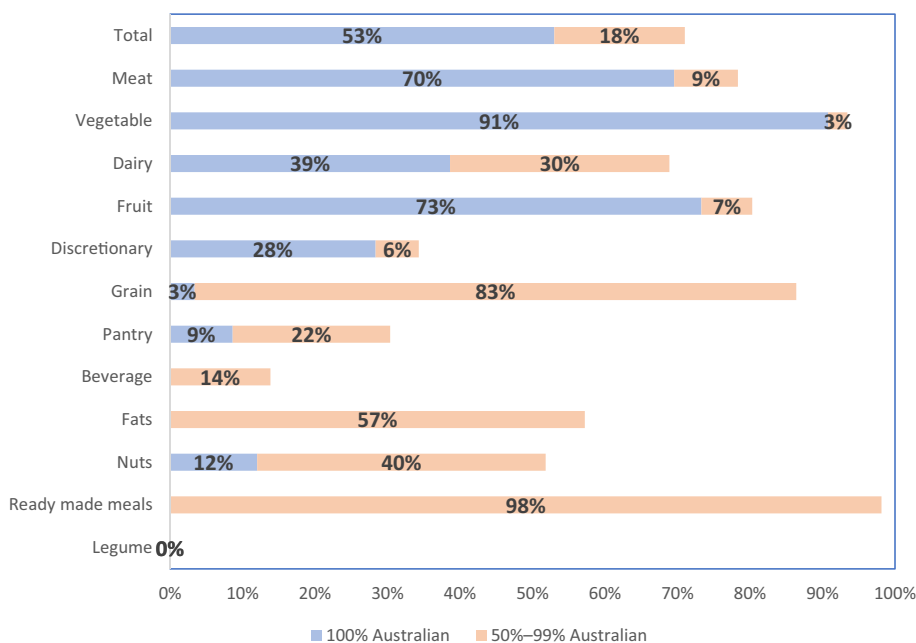


FIGURE 2 Percentage of budget spend, by food category, on items with 100% and 50%–99% Australian content.

categories. The remaining categories, beverage (4%), fats (3%), nuts (1%), ready-made meals (1%), and legumes (<1%), each represented <5% of the food budget.

Among the categories representing the greatest budget spend, the meat (70%), vegetable (91%), and fruit (73%) contained the highest proportions of 100% Australian grown foods. The dairy category contained ~40% of 100% Australian grown foods and the discretionary category contained 30%. The categories of ready-made meals (98%), grains (83%), and fats (57%) had the highest percentages of mostly Australian ingredients (50%–99%). The pantry, legume, and beverage categories were those with the lowest proportion of Australian content (Figure 2).

Among the fresh meat, vegetable and fruit categories the proportion of the food budget spent on Australian grown products was 83% for meat (representing 24/36 items), 99% for vegetables (representing 109/113 items), and 95% for fruit (representing 33/39 items) (Table 2). Of the Australian grown content in those categories, the proportion of the food budget spent on Queensland-grown foods was 46% for meat, 35% for vegetables, and 28% for fruit.

### 4 | DISCUSSION

The aim of the current research was to describe the country of origin of all foods purchased by a large, metropolitan healthcare organisation and to identify opportunities for improving the locality of the food supply. We found that more than 50% of foods procured over a 1-year

**TABLE 2** Budget spend on fresh fruit, vegetable, and meat items produced in Australia and Queensland.

	Foods produced in Australia <sup>a</sup>			Foods produced in Queensland <sup>a</sup>		
	Total number of items <sup>b</sup>	Total budget spend <sup>b</sup>	% Spend on Australian produced	Total number of items <sup>c</sup>	Total budget spend <sup>c</sup>	% Spend on Queensland produced
Minimally processed meats	36	\$900 830.25	83%	24	\$747 997.18	46%
Minimally processed fruits	39	\$227 604.33	95%	33	\$216 494.57	28%
Minimally processed vegetables	113	\$604 017.09	99%	109	\$600 657.74	35%

<sup>a</sup>Australian refers to 100% Australian ingredients. Proportion of ingredients by state was not measured.

<sup>b</sup>Total items and budget spend for all items in category. Of the total items, state of origin could not be identified for 4 of 36 fruit items, 6 of 39 meat items, and 1 of 113 vegetable items.

<sup>c</sup>Total items and budget spend for all items produced in Australia.

period were products of Australia (100% Australian ingredients) and an additional 18% were mostly Australian (50%–99% Australian ingredients). The food categories with the highest proportion of 100% Australian ingredients were the fresh and minimally processed fruits and vegetables. Our findings are consistent with the fresh food supply of Australia more broadly, where 95% of fresh fruit and 98% of fresh vegetables are produced in Australia.<sup>17</sup> For the fresh meat, vegetable, and fruit categories, approximately one third of fruit and vegetables and one-half of meat were produced within state. These findings are somewhat consistent with the national food supply; Queensland is Australia's major producer of beef, but not chicken or lamb.<sup>18,19</sup> There were significant opportunities for improvement in some food categories, such as fruit juices and legumes. Given there are industries producing and processing these products, alternative procurement options should be possible.

To date, foodservice sustainability research has predominantly focused on the systems and methods of food preparation and service, and less so on procurement.<sup>20</sup> Available research that has examined sustainability issues in procurement has largely focused on barriers to incorporating a more local food supply, such as limited availability of a local food supply and inadequate ability to identify food origins.<sup>7</sup> We are aware of only two studies that attempt to quantify the locality of foods procured in a hospital setting. One study of a 350-bed hospital in Victoria (Australia), utilising a cook-fresh foodservice model on a 8-day cycle, reported that 85% of the food budget spent over a 2-week period was spent on products of Australia (>50% Australian ingredients).<sup>21</sup> A smaller audit of supplemental foods purchased (not meals) in two hospitals in Victoria (Australia) found that 68% of items were products of Australia, though the proportion of Australian ingredients was not specified.<sup>22</sup> Methodological differences between these two previous studies and

this study mean that direct benchmarking is not possible, but suggests that our findings are consistent with previous studies. Moreover, given the long time period of data collection in this study and that we only included foods requiring country of origin labels, suggests that findings in this study are likely to be robust.

In this study, we attempted to measure state of origin of fresh fruit, vegetables, and meat as proxy for a more local food supply. This is consistent with two previous studies conducted in another state in Australia.<sup>21,22</sup> On reflection, this definition of 'local' may not have been the most appropriate in the context of the current research. Queensland is a state covering 1.8 million km<sup>2</sup> and nearly half of its population lives in the southeast corner of the state. It is likely that food produced in the next state would travel shorter distances than food produced further north or west within Queensland. Future researchers and those interested in foodservice procurement may consider other measures of 'locality' (such as distance from farm to hospital) to better understand the environmental impact of the distance food travels. This study did not include sufficient detail to measure this.

Strengths of the current research include the 1-year time frame for data collection and use of the country of origin labelling requirements for the inclusion criteria for the study. That said, there are a few limitations to consider in interpreting the findings of this research. First, the Country of Origin Food Labelling Information Standard 2016<sup>14</sup> identifies non-priority foods and excludes them from requiring country of origin labelling. This includes seasonings (e.g., dried herbs and spices), confectionery (e.g., chocolate products and ice cream), biscuits and snack foods, soft drinks, alcoholic drinks, tea and coffee, and bottled water. In this study, non-priority foods comprised 18% of the food items purchased over the year and their exclusion may have an impact on the overall findings. Second, country and state of origin were

identified as where they were procured on the day of data collection, not the date of purchase. As our foodservice team prioritises seasonality of the menu, our overall findings may have been more local had we been able to identify country and state of production on the date of procurement.

In a large, urban healthcare organisation, we identified that more than half of the food budget (53%) was spent on Australian foods (with 100% Australian ingredients) and almost all fruit and vegetables were Australian grown. Procuring fresh fruit, vegetables, and meat from within the state appeared to be less common, and this may reflect the primary states of production and seasonal variability of the food supply. Findings from the current research offer priority areas for improving the locality of the food supply (e.g., legumes). Future research may consider alternate definitions of 'local' depending on the broader context, as state of origin or physical distance may or may not be the most appropriate metric.

#### AUTHOR CONTRIBUTIONS

JU and SM designed the study, FM and HJ collected and analysed data and contributed to article writing, JU and SM supervised all aspects of the study, JU drafted the final article and all authors critically reviewed and approved the final submission.

#### CONFLICT OF INTEREST STATEMENT

All authors declare that they have no competing interests to disclose.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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