

Measuring rural food  
environments within  
Murrumbidgee Health Network,  
NSW: **Methodology**



*Authors:*

*Sinead Boylan,*

*Christine Innes-Hughes,*

*Elizabeth Lobb, Lesley King*

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## FOREWORD

This document supplements the report on *Measuring rural food environments within Murrumbidgee Local Health Network*. Both reports are the result of a small study which tested the application of simple, specifically-designed methods for assessing food availability in small rural towns in NSW. This study has generated tools and protocols that can be disseminated and used in other locations, as well as information for the three study towns. Information about the tools and practical aspects of their application is provided in this document.

The study was conducted by PANORG in collaboration with the former Greater Southern Area Health Service (GSAHS), as part of their program of work on the topic of Food Fairness in disadvantaged towns. The mapping of food availability was considered to be one component of this action-research program.

The study suggests that simple documentation and mapping of food availability using these tools is a useful first step in exploring variations in community food environments and promoting food fairness. The study also suggests that there is scope for investigating food availability across small rural towns in other parts of NSW, both to contribute to local action and to more fully understand the extent of variation and the potential impact of variations on people's eating patterns.

Lesley King

Executive Officer

PANORG

## RATIONALE FOR METHODS USED

The **consumer food environment** describes what consumers encounter within food outlets. Due to increasing interest in the food environment, a plethora of measures to systematically assess food access and availability have been developed. Methods used to record the observed or perceived *consumer* food environment include:

- checklists (predefined list of indicator foods),
- market baskets (based on pre-defined list of foods representing total diet),
- inventories (reporting of all foods) and
- consumer interviews /questionnaires (a pre-determined list of questions regarding food availability).

Most of the studies conducted to date use interviews or questionnaires<sup>(1-3)</sup>. While this approach is useful, it relies on people's memory and responses, and reporting bias may be introduced e.g. those who frequently consume energy-dense nutrient poor foods may under-report the outlets selling healthy foods. Measurement error may also be introduced as individual's reports may be influenced by other personal factors and perceptions.

There are also different ways to assess the **community food environment**, which refers to the geographical location of food outlets. These methods involve examining geographic location of retail outlets, food sales, and menu / nutrient analyses. Studies using geographic analyses to examine the community food environment typically examine: diversity (density and type of food outlet), proximity (nearest distance of a given position such as the transport centre or population centre to retail food outlets) and variety (e.g. availability of outlets).

There is value in combining measures of the community food environment with measures of in-store food availability in a single study<sup>(4)</sup>. This approach can provide a specific assessment of the food environment and may also be sensitive to short and medium-term changes.

### Pilot study

A pilot study was undertaken to test and refine the tools, and to assess the reliability of the methods. The pilot was undertaken in urban, urban fringe and semi-rural areas of Sydney. The locations and reliability testing details are outlined in Table 1.

**Table 1:** Pilot study: locations tested for reliability

Location	Store type	Number of stores	Community food environment		Consumer food environment	
			TRT	IRR	TRT	IRR
Berowra	Major supermarket	2	-	-	-	Yes
Mt Ku-ring-gai	Major supermarket	1	-	Yes	-	Yes
Brooklyn	Convenience store	3	-	Yes	-	Yes
Camperdown	Convenience store	5	-	-	Yes	Yes
Newtown	Convenience store	2	-	-	Yes	Yes
	Major supermarket	1				
<b>Total</b>		<b>14</b>	<b>1</b>	<b>2</b>	<b>8</b>	<b>14</b>

TRR = Test re-test reliability      IRR= inter-rater reliability

## Reliability

IRR reliability of the *community* food environment instrument was undertaken by two trained researchers. The process involved using secondary data sources to independently identify food outlets in two locations, and subsequently independently identification of food outlets by visiting the same locations on the same day. There was 100% agreement between researchers.

To examine measurement reliability of the *consumer* food environment, two trained raters independently visited randomly assigned stores to complete the same checklist on the same day. As the data is continuous, intra-class correlations (ICC) was considered the most appropriate test of both IRR and TRT<sup>(5)</sup>. A two-way random model tested for absolute agreement in IBM SPSS Statistics v19.0. As variability between raters and measures were considered relevant, absolute agreement (rather than consistency) was examined. The IRR and TRR were found to be excellent (ICC: 0.99 for both tests).

The fast-food audit measures a single-item. After piloting this tool, it was decided that testing the reliability of this tool was not required.

It is acknowledged that TRR may be more variable in some settings due to other factors such as seasonality and frequency of deliveries.

## Validity

The measurement of the *Community Food Environment* by direct observation of food outlets, (as undertaken in the current study), has excellent face and content validity, and criterion validity as it is considered the ultimate reference point or 'gold standard'. The use of other measures, such as yellow pages or retail food outlet websites to determine the geographical location of food outlets, is a less valid measure of a local food environment and requires field validation.

Similarly, measuring the *Consumer Food Environment* through auditing indicator foods (both healthy and unhealthy) has excellent face validity. Content validity will depend on the purpose and how well the detail obtained meets the purpose of the audit. Construct validity is consistent with the conceptual framework which suggests food availability and access are important predictors of food choice. Again, given that direct observation is considered the most valid measure of a food environment, this instrument is considered to have excellent criterion validity. All depends on the choice of indicator foods actually.

## Utility

The utility or extent to which existing measures of both the *Community Food Environment* and *Consumer Food Environment* are adaptable to our setting has been considered. The NEMS tool was the most relevant existing measure; however, in order to be meaningful for the purpose of this study, modifications were required. The measures used were adapted from NEMS<sup>(6)</sup>.

## Limitations

It is acknowledged that the food environment is only one determinant of food choice and eating habits, however, in the target setting of rural towns, this environment may present a modifiable risk factor in the causal pathway to chronic disease and other determinants of health such as food insecurity.

## Summary

The instruments to be applied in this study have good inherent validity and excellent reliability. Existing instruments have been modified to ensure relevance to the Australian rural context and the generation of relevant and meaningful data in the context of this study.

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## Appendix 1: Tools used

### Community food environment: Operational definitions

Categories	Code	Operational Definition	Example
Major supermarket	MaS	Mainly engaged in the sale of groceries (fresh foods, canned and packaged foods, dry goods) of non-specialised (conventional) food lines. May contain a butcher or baker. The store has five or more registers.	Woolworths Coles Bi-Low Aldi Franklins (no frills)
Minor supermarket	MiS	Mainly engaged in the sale of groceries (fresh food, canned and packaged foods, dry good) of non-specialised (conventional food lines). The store has between two and four registers.	727 Food works Independent grocers
Convenience store	CS	Mainly engaged in the sale of a limited line of groceries that generally includes milk, bread and canned and packaged foods. The store has one register and <u>does not provide fuel</u> .	Local corner store Seven eleven Night owl
Service station with convenience store	SSCS	Mainly engaged in retailing automotive fuels (e.g., petrol, diesel, gas) in combination with convenience store or food mart items.	Shell Coles express Caltex Safeway/Woolworths BP connect Independent service station selling takeaway food or other food items

Butcher	B	Mainly engaged in the sale of fresh meat. Including wholesale stores with direct to public sales.	Conventional butchers, shops that exclusively stock meat and fresh poultry.
Fish shop	FS	Mainly engaged in the sale of fresh seafood. Including wholesale stores with direct to public sales and takeaway stores also providing a range of fresh seafood.	Fishmongers, takeaway stores selling fresh seafood. Stores that exclusively stock fresh seafood. Wholesale fishmongers with direct to public sales.
Chicken shop	CHS	Mainly engaged in the sale of fresh poultry. Including wholesale stores with direct to public sales.	Shops that exclusively stock fresh poultry. Wholesale poultry stores with direct to public sales.
Fruiterer and Greengrocer	GG	Mainly engaged in the sale of fresh fruit and vegetables. Including wholesale stores with direct to public sales.	
Bakery and/or cake shop	BCS	Mainly engaged in the sale of bread biscuits, cakes, pastries or other flour products with or without packaging.	Bakeries (eg. Brumbys, Bakers Delight) and shops that are mostly oriented towards the sale of cakes and pastries.
Sandwich shop or Sandwich Bar – Local independent	SS	Mainly engaged in the preparation of filled bread products like sandwiches or rolls.	Sandwich bar
Takeaway– Franchise store	TAF	Mainly engaged in the preparation and sale of <u>meals</u> (excludes donuts drinks, ice-cream etc.) and light refreshments that are ready for immediate consumption. Table service is not provided and the meal can be eaten on site, taken away or delivered. The food is prepared and sold from a standard menu and payment is required before the food is consumed. The food shop is a franchise/chain store with food being sold in specialised packaging	McDonalds, Hungry Jacks, KFC, Red Rooster, Domino's Pizza, Pizza Hut, Subway, noodle box,
Takeaway – Local independent store.	LTAI	Mainly engaged in the preparation and sale of <u>meals</u> (excludes donuts, drinks, ice-cream etc.) and light refreshments that are ready for immediate consumption. Table service is not provided and the meal can be eaten on site or taken away or delivered. This includes din-in restaurants with a takeaway service. The food is prepared and sold from a standard menu and payment is required before the food is consumed. The shop is not a franchise store and food is not sold in specialised packaging.	Noodles, kebab, fish and chips, burgers, pizza. Fried chicken shops.
Takeaway & Dine-in – Local independent store.	LTAID	Mainly engaged in the preparation and sale of <u>meals</u> (excludes donuts, drinks, ice-cream etc.) and light refreshments that are ready for immediate consumption. Table service is provided and the meal can be eaten on site or taken away or delivered. This includes dine-in restaurants with a takeaway service. The shop is not a franchise store and food is not sold in specialised packaging.	Chinese, Thai, kebab, fish and chips, burgers, pizza

Delicatessen	D	Mainly engaged in the sale of specialty packaged or fresh products such as cured meats and sausage, pickled vegetables, dips, breads and olives. May also provide dine in meals	Delicatessen
Specialty Food Store	SF	Mainly engaged in the sale of a limited line of groceries (fresh foods, canned and packaged foods, dry goods) or mixed specialised food line. This definition does not include convenience stores, fish shops, butchers, chicken shops, greengrocer/fruiterers and bakeries.	Gourmet food shop.
Farmers Market	FM	A predominantly fresh food market that operates regularly within a community, at a focal public location that provides a suitable environment for farmers and food producers to sell farm-origin and associated value-added processed food products directly to customers. ( <a href="http://www.farmersmarkets.org.au/about.jsp">http://www.farmersmarkets.org.au/about.jsp</a> )	A weekend market
Local produce stall	LPS	A stall selling locally grown fruit and vegetables	Roadside stall or 'barrow' within shopping precinct
Food Co-operative	FCP	A group organised to buy directly from a wholesaler and save substantially on groceries. Group members order in bulk and divide their order among themselves. ( <a href="http://www.ncba.coop">www.ncba.coop</a> )	
Restaurant/Cafe	R/C	Mainly engaged in the table service of meals and snacks(includes bars, pubs, clubs and casual dining such as cafes	Restaurant in a golf club  Indian restaurant (not predominantly take-away)  Cafe

## Consumer food environment tools

### Food availability: Rapid assessment tool



#### Food Availability Rapid Assessment Tool

This tool is designed to provide a rapid assessment of healthy and non-healthy indicator foods in retail food outlets.

	Available	Not available	Count (number of varieties)
<b>Core foods - healthier options</b>			
Wholegrain low sugar cereal eg Oats, wheat flake biscuits			
Wholemeal or Wholegrain bread			
Low fat or fat reduced milk			
Low or reduced fat cheese			
Lean meat or skinless chicken			
Fresh fruit (n=)			
Canned or frozen fruit			
Fresh vegetables (n=)			
Canned or frozen vegetables			
Poly or mono unsaturated oil			
Poly or mono unsaturated margarine			
<b>Energy Dense nutrient poor foods</b>			
Soft drink/cordial/sports drink			
Confectionary eg lollies, chocolates			
Ice cream or ice confections			
Salty snacks eg crisps, corn chips			

Date: \_\_\_\_\_

Food outlet name: \_\_\_\_\_

Food outlet address: \_\_\_\_\_

\_\_\_\_\_

#### Instructions to surveyors

Please indicate the availability of each item by placing a tick in the 'Available' or 'Not Available' column.

The number of fruit and vegetable varieties available<sup>†</sup> should be entered in the 'Count' column. Note each variety or type of fruit or vegetable should be counted as one. For example three varieties of apple (Granny Smith, Jonathan and Delicious) should be counted as 3 in the 'Count' column.

<sup>†</sup>For this study fruit and vegetable varieties are to be counted due to stakeholder concern regarding availability. Counts of other indicator foods are not included.

Permission is given to use this Rapid Assessment Tool with acknowledgment to the Prevention Research Collaboration, Sydney University. (January, 2011)

## Take-away food outlets: rapid assessment tool



### Take-away food outlet: Rapid assessment tool

Date: \_\_\_\_\_

Location: \_\_\_\_\_

#### Instructions to surveyors

Please indicate the availability of each item by placing a tick in the 'Available' or 'Not Available' column.

Definition of healthy options:

- Additional fresh salad (excluding single topping items i.e. lettuce/tomato/cucumber)
- High fibre alternatives e.g. wholemeal burger bun
- Vegetables (not deep-fried e.g. fries) or vegetable based salad
- Fresh fruit

Name of fast food outlet	Address	Healthy option		Comments
		Available	Not available	

Permission is given to use this Take-away food outlet: Rapid assessment tool with acknowledgment to the Prevention Research Collaboration, Sydney University. (January, 2011)

## **Appendix 2: Food mapping in rural communities: reflections on methods and process**

This study involved the practical application, mapping and reporting of food availability in three small rural towns in Murrumbidgee Local Health Network. There are a number of considerations and lessons relating to the methods that are useful for future studies.

### **Methods/Tools**

#### **Community food environment operational definitions**

The operational definitions of different types of food stores were found to cover all outlets encountered. Some outlets had two operations (e.g. service station with convenience store and also a takeaway food outlet), and were therefore coded as two outlets.

#### **Community food environment data collection**

Prior to the fieldwork, the names and locations of food outlets in each town were collected from the Yellow Pages Online. This was useful; however, it was evident that this secondary data source was not accurate, as observation showed that many listed outlets had closed or changed. We consider direct observation to be the only valid method for mapping the community food environment.

#### **Consumer food environment tools**

The rapid assessment tools for identifying indicator foods were found to be quick and easy to use. The inclusion of additional energy-dense nutrient poor items as indicator foods may add to the tools' capacity to discriminate between stores.

### **Fieldwork**

#### **Community food environment assessment**

The field observation process was conducted as follows:

- Locations of food outlets were obtained prior to the field trip from the Yellow Pages Online by searching by town and food outlet category. This information was recorded on the data collection sheet for each town.
- This list of outlets was verified and amended by direct observation by fieldworkers. The mapping by direct observation was undertaken by walking each side of the main shopping street of the town. One fieldworker identified the outlet name, category and street address and the other recorded on the data collection sheet. GPS readings were only taken when a street address was not available. This was common, particularly for outlets on the outskirts of towns such as roadhouses.

- Adjacent streets known to contain food outlets were then visited on foot and mapped as described above.
- Finally the fieldworkers drove every street within the township boundary to locate and describe any additional outlets.
- This process took 4 to 5 hours with the task shared by 2 fieldworkers.

### **Consumer food environment rapid assessments**

- Assessment of a large supermarket including the count of fruit and vegetable varieties took around 20 minutes for 2 fieldworkers sharing the assessment task.
- A smaller supermarket or convenience store took around 10 to 15 minutes, again with 2 fieldworkers sharing the task.
- Counting the varieties of fruit and vegetables was most time consuming task. In our case one fieldworker chose to use a tally system (e.g. by writing a tally of varieties on her iPhone or hand), while the other did a count in her head and recorded the count after leaving the store. The rapid assessment of take-away food outlets generally took less than 5 minutes per store. Issues included the ability to see a menu board or paper menu and being conspicuous as a non-local when assessing the outlet and not purchasing. It was easier to peruse and assess the menu when purchases were made, but this was not always possible or appropriate. In some outlets the fieldworkers bought drinks and sat at table inside to further assess menu boards or paper menus. Some outlets were closed on the day or at the time of the visit; however, a menu or menu board was generally visible from the store window.

While this work was undertaken with the permission and knowledge of the local council in each town, retail outlet operators were not aware that the mapping was being undertaken. Both field workers at times felt conspicuous and felt the need to purchase items such as newspapers or bottles of water from the smaller convenience stores.

### **Informal conversations with local community members**

When fieldworkers were asked by food outlet operators or community members what they were doing, they explained that they were from The University of Sydney and were working with the local council and health service to look at food availability in their town. This was in each case well received and often led to conversations around local food availability. It was found that some local community members were keen advocates for locally produced high quality food and in some cases these people directed fieldworkers to outlets such as community gardens.

### **Meetings with stakeholders**

There was value in meeting with key local stakeholders after having completed the food mapping observations, as the stakeholders were keen to have preliminary feedback on their town. In addition it allowed fieldworkers to clarify some observations and information provided by local community members, for example the case of council regulations around the fruit and vegetable stall in the main street of Temora. It also gave stakeholders an opportunity to request further mapping such as Arian Park which was requested by Temora Council.

## Reporting

The software used to generate the output maps and proximity data has a number of limitations. The software requires latitude and longitude to four decimal places, which is one more decimal place than the hand-held GPS provided. The latitude and longitude had to be regenerated from Google Maps for each observation.

It was difficult to generate accurate maps to a scale which included a distinguishable data point for each individual observation as well as the township boundary. To allow for this, some data points had to be entered manually, decreasing the accuracy, although still of sufficient accuracy for reporting. The manual plotting of data points on a schematic map is likely to provide sufficient quality data for the purpose of mapping food outlets in small rural towns; hence the use of sophisticated geocoding software may not be indicated. Proximity data reported as distance by road, however, could not be so easily generated manually.