

## Short Communication

## Paying for convenience: comparing the cost of takeaway meals with their healthier home-cooked counterparts in New Zealand

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**Abstract**

*Objective:* Convenience and cost impact on people's meal decisions. Takeaway and pre-prepared foods save preparation time but may contribute to poorer-quality diets. Analysing the impact of time on relative cost differences between meals of varying convenience contributes to understanding the barrier of time to selecting healthy meals.

*Design:* Six popular New Zealand takeaway meals were identified from two large national surveys and compared with similar, but healthier, home-made and home-assembled meals that met nutrition targets consistent with New Zealand Eating and Activity Guidelines. The cost of each complete meal, cost per kilogram, and confidence intervals of the cost of each meal type were calculated. The time-inclusive cost was calculated by adding waiting or preparation time cost at the minimum wage.

*Setting:* A large urban area in New Zealand.

*Results:* For five of six popular meals, the mean cost of the home-made and home-assembled meals was cheaper than the takeaway meals. When the cost of time was added, all home-assembled meal options were the cheapest and half of the home-made meals were at least as expensive as the takeaway meals. The home-prepared meals were designed to provide less saturated fat and Na and more vegetables than their takeaway counterparts; however, the home-assembled meals provided more Na than the home-made meals.

*Conclusions:* Healthier home-made and home-assembled meals were, except one, cheaper options than takeaways. When the cost of time was added, either the home-made or the takeaway meal was the most expensive. This research questions whether takeaways are better value than home-prepared meals.

**Keywords**

Takeaway meals

Convenience meals

Home-cooked meals

Meal cost

Food preparation time

Cost and convenience influence meal choice<sup>(1,2)</sup>. Consumption of fast foods and use of pre-prepared items and ready meals are common, and increasing worldwide<sup>(3–6)</sup>. Takeaway meals are meals obtained quickly, without wait service, purchased in self-serve or carry-out venues. These meals tend to be energy dense, nutrient poor and high in saturated fat and Na<sup>(7,8)</sup>.

It is perceived that healthy food costs more than unhealthy food, that convenience foods are better value for money, and there is a lack of time for food preparation<sup>(9–13)</sup>. Time is an often overlooked social determinant of health<sup>(14)</sup> not usually factored into the cost

of food preparation, but is a barrier to preparing meals<sup>(15–17)</sup>. The evidence on incorporating time in meal costing studies is limited<sup>(18)</sup>.

The International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support (INFORMAS) aims to monitor key aspects of food environments, including food prices and affordability<sup>(9)</sup>. The present study focuses on the meals component of the INFORMAS food price and affordability module by comparing the cost of takeaway *v.* home-cooked and home-assembled meals. The study aimed to assess differences in cost between popular takeaway meals compared with

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similar, but healthier home-made and home-assembled meals, with and without the inclusion of time.

## Methods

Frequently consumed takeaways were identified and matched to similar, but healthier, home-made and home-assembled meals. The home-made meals used common ingredients and required basic cooking skills and standard kitchen equipment.

The methods are summarised below. The detailed protocol for the study can be found in the online supplementary material, Supplemental Material 1.

### Takeaway meals

Popular takeaway meals (Tables 1 and 2) were identified from the 2013 New Zealand (NZ) Household Expenditure Survey<sup>(19)</sup>, the 2008/09 Adult NZ Nutrition Survey<sup>(20)</sup> and a survey of a convenience sample of 144 takeaway outlets. Popular fast-food outlets in NZ were identified using Euromonitor data<sup>(21)</sup>. The nutrient compositions of the Domino's, McDonald's and KFC meals were sourced from the respective websites<sup>(22–24)</sup> and for the remaining meals from the NZ Food Composition Database<sup>(25)</sup>.

The meals from chain restaurants (Domino's, McDonald's and KFC) were value meals for four with set prices and sizes across stores; weights and prices were collected from one outlet of each chain. The remaining takeaway meals were from independent outlets, so varied in size, price and components; these outlets were randomly sampled and

selected. Seven census area units with a reasonable number of takeaway outlets in Auckland city were selected; two areas with lower, three with medium and two with higher deprivation scores as per the NZ Deprivation Index 2013<sup>(26)</sup>. All takeaway outlets in these census area units serving the identified popular takeaway meals were enumerated and two outlets of each type were selected for each popular takeaway meal (fourteen prices for each meal).

Meals were purchased from takeaway outlets between November 2015 and March 2016. The meal and the main components (rice/noodles/potatoes, meat and vegetables) were weighed.

### Home-prepared meals

For the purpose of the study, a meal included vegetables, a protein source and a carbohydrate component. The nutrition targets to select the home-made and home-assembled meals were guided by criteria for healthy recipes and ready meals identified in the literature<sup>(27–32)</sup> and the NZ Eating and Activity Guidelines<sup>(33)</sup>.

Meal nutrition targets for two adults and two children were:

- minimum 600 g non-starchy vegetables;
- maximum raw weight 500 g red meat, 600 g skinless poultry, 600 g seafood;
- $\geq 20$  g protein;
- $\leq 24$  g saturated fat; and
- $\leq 3600$  mg Na.

The rationale for decisions for the home-prepared meals is outlined in Table 1. Recipes from popular NZ recipe

**Table 1** Selecting meals and recipes prepared at home: decisions and rationale

	Decision	Rationale
Selected takeaway meals	KFC Colonel's Dinner McDonalds Share Pack Domino's Value Pizza Fish and chips, butter chicken, beef chow mein	The numbers of items on the packs were suitable for a family of four Value pizzas are popular Similar weight to home meals
Selected recipes for home-made meal	Excluded some recipes	Excluded recipes if similar to another recipe, if unusual ingredients, unlikely to meet targets, complex method, too many ingredients, used pre-prepared ingredients, used specialised equipment
Amount of potato, rice or noodles	Standardised amount in home meals	Similar amount in home meals and takeaway counterpart. Tested in home kitchen
Amount of fish, meat, chicken	Standardised amount in home meals Specified type of fish, meat or chicken No deep-fried items Excluded less common ingredients, or substituted for common ingredients Standardised amount and type of oil (canola)	Guided by meal targets and amount in takeaways Home meals similar to takeaway meal for type of cut Requires specialised equipment, results in high-fat item Ingredients not readily available
Vegetables	Deleted sugar and salt not essential for flavour or rising Added common seasonal vegetables to home-made meals and frozen vegetables or prepared coleslaw to home-assembled meals	Reduce salt and sugar in recipe To meet vegetable meal targets
Flavours, sauces	Specified ingredient key to flavour of meal No pre-prepared items unless difficult to prepare at home Chose lower-sodium ingredients when readily available	Differentiated home-made and home-assembled meals
Cooking meals	Cooked selected recipes for each meal	Time for common processes in recipes and assembling food and equipment standardised If similar process for a meal, could estimate preparation time

**Table 2** Description and key nutritional analysis of meals in the comparison of takeaway meals with their healthier home-cooked counterparts in New Zealand, November 2015–March 2016

Meal	Details	Weight (g)		Energy (kJ)		Saturated fat (g)		Na (mg)		Vegetables (g)
		Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Chicken meal										
Home-made	Coated chicken pieces Mashed potato	1974	1882–2156	8005	6873–9627	16	11–20	1559	596–3289	600
Home-assembled	Coleslaw with dressing Frozen crumbed chicken pieces Frozen mashed potatoes	1590	1490–1740	8228	6822–9905	28	24–34	4542	4123–4995	490
Takeaway	Coleslaw with dressing KFC family meal: Chicken – 8 pieces Coleslaw Potato & gravy Hot chips	1817		140 20		44		5507		240
Fish and chips										
Home-made	Coated fish fillets Potato wedges	1816	1741–1924	10 334	9516–11 308	9	7–20	844	354–1371	600
Home-assembled	Broccoli, carrots Frozen crumbed fish fillets Frozen potato fries	1687	1650–1705	9021	8281–9594	9	8–10	1318	949–1563	600
Takeaway	Frozen mixed vegetables Battered fish – 4 pieces Hot chips – 2 scoops	1122	700–1518	11 760		79		2671		0
Butter chicken										
Home-made	Chicken pieces Homemade sauce Broccoli, carrots	2379	2076–2828	10 277	9087–11 376	14	11–17	969	731–1097	600
Home-assembled	Brown rice Chicken pieces Pre-prepared sauce Frozen mixed vegetables	2213	2155–2250	9715	9030–10 612	22	14–32	2622	2412–3022	600
Takeaway	White rice Butter chicken White rice	1644	1424–1920	11 062		52		3513		0
Beef chow mein										
Home-made	Beef pieces Noodles Fresh vegetables	2141	2049–2311	7499	6851–8282	13	12–15	2807	2042–3644	600
Home-assembled	Herbs, spices, sauces Beef pieces Noodles Frozen stir-fry vegetables	1911	1700–2190	9628	8407–11 047	12	11–14	3946	2759–5477	600
Takeaway	Flavour sachet Beef & noodles	1542	872–2148	9638		62		5089		727
Burger										
Home-made	Beef patty – home-made Burger bun Fillings: lettuce, tomato, carrot, onion, beetroot, gherkin, cheese	1628	1528–1740	9852	9194–10 191	29	27–30	3256	2741–3713	600

Table 2 Continued

Meal	Details	Weight (g)		Energy (kJ)		Saturated fat (g)		Na (mg)		Vegetables (g)	
		Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Home-assembled	Beef patty – frozen Burger bun Fillings: lettuce, tomato, carrot, onion, beetroot, gherkin, cheese	1500	1480–1560	9115	8688–9484	29	18–38	3927	3538–4234	600	
Takeaway	McDonald's family pack 2 Big Macs 2 cheeseburgers 4 small fries	908		10 817		37		4691		83	
Pizza											
Home-made	Home-made base Home-made sauce Vegetarian topping	1437	1227–1664	9259	8490–10 485	23	22–25	3124	2627–3950	445	
Home-assembled	Pre-prepared base Pre-prepared sauce Vegetarian toppings (pre-grated cheese)	1213	1100–1290	9603	7526–10 947	24	24–25	2655	2314–2868	445	
Takeaway	3 Domino's Value pizzas Vege Trio	1272		15 577		22		4690		216	

books, magazines and websites were used to identify key ingredients and flavours of each home-made meal so the characteristics were similar to their takeaway counterpart. The ingredients of each home recipe were entered into the nutrient analysis software FoodWorks 7 Professional (Xyris Software (Australia) Pty Ltd, 2012) with the NZ Food Composition Database and the mean nutrient content for each meal option was calculated.

For the home-assembled meals, the main ingredients of the home-made meals were replaced by pre-prepared items wherever possible. For example, fresh vegetables were replaced with frozen vegetables. Some preparation and assembling was required. Combinations of the meal components were checked against the nutrition targets.

The process is shown in online supplementary material, Supplemental Material 2.

### Cost of meals

The cheapest available item, including generic brands, for each ingredient was selected and priced at six supermarkets from major chains in similar areas to the takeaway outlets.

The time to prepare the meal was tested in a home kitchen, or estimated from a tested meal with a similar method. The time to order and to wait for each takeaway meal was recorded. The cost of time was selected using the standard market substitute approach, which values food preparation time at the amount the labour could be purchased on the market<sup>(18)</sup>. The minimum wage of \$NZ 15.25<sup>(34)</sup> was selected to cost time, as this is similar to the hourly wage of a food preparer.

The price, mean cost, SE, 95% CI ( $\pm 1.96$  SE) and range were calculated for each meal and costs compared between the different types of meal (takeaway, home-made, home-assembled). The analysis was conducted with and without including the cost of time. As the weights of meals varied, the price per kilogram was calculated.

### Results

Seven to ten distinct recipes were selected for each home-made meal. The combinations for the home-assembled meals ranged from three combinations for pizza to thirty combinations for beef chow mein.

### Healthiness of meals

The home-prepared meals were designed to be healthy so provided more vegetables (at least 600 g non-starchy vegetables except pizza) and less saturated fat and Na than their takeaway counterparts (Table 2).

The home-prepared meals did not exceed the saturated fat target, except for the burgers and home-assembled chicken meal (Table 2). All of the takeaway meals exceeded the saturated fat target, except pizza.

None of the home-made meal recipes exceeded the Na target (Table 2). Three of the home-assembled meals (chicken meal, beef chow mein, burger) exceeded the Na target due to the high Na content of specific components. All but one takeaway meal (fish and chips) exceeded the Na target.

### **Cost of meals**

#### *Time exclusive*

The cost of the home-made meals was significantly cheaper than the takeaway counterparts for all but one meal option (fish and chips; Table 3). The cost of the home-assembled meals was significantly cheaper than the takeaway counterparts. Three home-made meals (chicken meal, beef chow mein, pizza) were the cheapest options. Both home-prepared butter chicken meals were the cheapest options.

#### *Time inclusive*

When the cost of time was added (Table 3) all home-assembled meals were significantly cheaper than other options, except pizza. The takeaway meal was the most expensive option for the chicken meal, burger and pizza (32, 27 and 19% more than the home-made meal, respectively). The home-made meal was the most expensive option for the fish and chip meal (14% more than the takeaway meal). Including the cost of time reduced the relative difference between the cost of takeaway and home-made meals; the takeaway meals cost from 14% less to 32% more than the home-made meals (11–100% more without time). There was little change in the relative difference in cost between takeaways and home-assembled meals.

### **Discussion**

In general, healthier home-cooked and home-assembled meals were cheaper than their takeaway counterparts, when either the cost of the complete meal, or the cost standardised for weight, was calculated. As the home-made meals required at least 45% more preparation time than the other meals, adding the cost of relevant preparation (home meals) and waiting time (takeaway meals) made the home-assembled meals the cheapest option and either the home-made or takeaway meals the most expensive.

Home-assembled meals are potentially a better option than takeaway meals, as they are 15–48% cheaper, have similar preparation/waiting time, and can provide a healthy meal if pre-prepared ingredients lower in saturated fat and Na are chosen.

Although the difference between the cost of home-made, home-assembled and takeaway meals was checked for statistical significance, what is important is the meaningful difference in cost between the meals that would influence

the consumer's decision to choose one meal type over another. This is challenging to quantify, as meal preparation is a trade-off between the cost of purchasing food and time available<sup>(35)</sup> with influences such as taste and culture<sup>(36)</sup>. Households differ on the value placed on nutrition, providing a home-made meal, the priority of food in the budget, available time, and whether meal preparation is experienced as a pleasure or a chore<sup>(37–42)</sup>. Some are motivated to purchase takeaway meals, paying for the cost of service to save time, but may trade off healthiness, quality and taste<sup>(43–46)</sup>. A study using two US survey data sets estimated the price elasticity of demand for different types of food purchased away from home and concluded that an increase in the price of fast food may shift consumption to meals prepared at home<sup>(47)</sup>.

### **Time**

Similar to the methodology in another study<sup>(36)</sup>, hands-on preparation time was used rather than the full cooking time as the meal preparer could conduct other activities during cooking time. The time to shop for ingredients and transport time to food stores or takeaway outlets were not calculated; this time will vary between households, and it was assumed purchase of ingredients would be part of regular household shopping. Cooking fuel was not included; the cost of electricity to cook meals was estimated at \$NZ 0.26 per meal<sup>(48)</sup>.

A US study<sup>(36)</sup> reported pre-prepared items (e.g. apple sauce) and meals (e.g. lasagne) cost less than the home recipe when the cost of time was included. The cost to prepare the US Thrifty Food Plan was met by 62% of low-income households, but when time costs were included only 13% could afford the required foods<sup>(17)</sup>.

### **Strengths and limitations**

To account for possible variations in price, weight and composition of takeaway meals from independent outlets, the takeaway outlets were selected from a range of census area units.

It was challenging to determine the appropriate meal size. There is no consensus on what is considered a meal<sup>(49,50)</sup>, so the home-prepared meals were matched to their takeaway counterparts for the amount of rice, noodles or potatoes. The meal cost was also standardised for weight (1 kg) and the pattern of results was similar to results for the total meal cost. When the cost per kilogram was calculated without vegetables, the pattern of results was similar to the price per kilogram with vegetables, but the relative differences were smaller.

The preparation time may not be an accurate indication for an average household or those with low cooking skills. It was assumed waiting times would be similar across different outlets of a fast-food chain. Ideally, a sensitivity analysis should have been conducted to

**Table 3** The average cost of meals, with and without including time cost, in the comparison of takeaway meals with their healthier home-cooked counterparts in New Zealand, November 2015–March 2016

	Home-made meals			Home-assembled meals			Takeaway meals					
	<i>n</i> *	Mean time (min)†	Mean cost (\$NZ)	95 % CI (\$NZ)	<i>n</i>	Mean time (min)	Mean cost (\$NZ)	95 % CI‡ (\$NZ)	<i>n</i>	Mean time (min)	Mean cost (\$NZ)	95 % CI‡ (\$NZ)
Chicken meal	80				9				1			
No time costs			15.26	14.49–16.03			17.80	16.44–19.16			28.40	
1 kg§			7.69	7.33–8.05			11.17	10.74–11.60			15.63	
With time costs		25	21.69	20.89–22.49		5	19.07	17.71–20.43		1	28.65	
Fish and chips	9				6				14			
No time costs			15.13	14.68–15.58			10.95	9.92–11.98			16.90	14.94–18.86
1 kg			8.32	8.17–8.47			6.48	5.92–7.04			15.68	13.19–18.17
With time costs		28	22.22	21.39–23.05		5	12.22	11.19–13.25		9	19.11	17.06–21.16
Butter chicken	8				10				14			
No time costs			18.10	17.43–18.77			17.37	16.73–18.01			21.71	19.91–23.51
1 kg			7.72	7.27–8.17			7.85	7.62–8.08			13.25	12.21–14.29
With time costs		28	24.99	24.18–25.80		8	19.40	18.76–20.04		9	24.00	21.93–26.07
Beef chow mein	36				30				14			
No time costs			16.94	16.63–17.25			18.63	18.01–19.25			22.02	20.63–23.43
1 kg			7.93	7.72–8.14			9.50	9.07–9.93			15.15	12.84–17.46
With time costs		23	23.13	22.47–23.09		7	20.30	19.71–20.89		9	24.21	22.52–25.90
Burger	9				4				1			
No time costs			12.68	12.25–13.11			10.48	9.00–11.96			20.00	
1 kg			7.79	7.65–7.93			6.98	6.12–7.84			22.03	
With time costs		17	16.89	16.04–17.74		9	12.77	11.29–14.25		6	21.53	
Pizza	21				3				1			
No time costs			6.76	6.55–6.97			11.40	10.57–12.23			14.97	
1 kg			4.60	4.49–4.71			9.44	7.82–11.06			11.77	
With time costs		36	15.55	14.88–16.22		12	14.45	13.62–15.28		14	18.53	

\*Number of recipes, meal combinations or takeaway outlets with a price.

†Time in minutes; preparation time for home-made and home-assembled meals and waiting time for takeaway meals.

‡When the meal was a fixed price in different outlets, there are no confidence intervals.

§Cost per kilogram does not include the cost of time.

account for other time factors such as grocery shopping and transportation time.

### Implications

Monitoring whether the cost to the consumer of home-cooked meals increases at a faster rate than the cost of takeaway meals is important, as changing relative costs is one factor that could affect the consumption of takeaways. This research provides a method to compare the cost of meals across the spectrum of preparation from home-made to home-assembled to takeaway meals. The cost differential between each meal option can be compared at one point, monitored over time and compared with cost differentials between types of meals in other countries. These results can be utilised for education purposes to encourage households to prepare home-made meals and to address the barrier of time.

### Conclusion

Healthier options of home-prepared meals were generally cheaper than their takeaway counterparts, for the cost of the complete meal and the cost standardised for weight. Adding the cost of preparation and waiting time made the home-assembled meals the cheapest and either the home-made or takeaway meal the most expensive option. Home-made meals can be healthy and cheap but do require time. Home-assembled meals are quicker to prepare and can be cheaper and healthier than takeaways, so is a recommended option if time is limited. This research adds to the sparse research reported in the literature comparing the cost of meals with varying degrees of convenience, accounting for time. Further research on the price elasticity of healthy meals and takeaways is required.

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### Supplementary material

To view supplementary material for this article, please visit <https://doi.org/10.1017/S1368980017000805>

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