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Nutrition-Labeling Regulation Impacts on Restaurant Environments

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Abstract

Background—Recent attempts to improve the healthfulness of away-from-home eating include regulations requiring restaurants to post nutrition information. The impact of such regulations on restaurant environments is unknown.

Purpose—To examine changes in restaurant environments from before to after nutrition-labeling regulation in a newly regulated county versus a nonregulated county.

Methods—Using the Nutrition Environment Measures Surveys–Restaurant version audit, environments within the same quick-service chain restaurants were evaluated in King County (regulated) before and 6 and 18 months after regulation enforcement and in Multnomah County (nonregulated) restaurants over a 6-month period. Data were collected in 2008–2010 and analyses conducted in 2011.

Results—Overall availability of healthy options and facilitation of healthy eating did not differentially increase in King County versus Multnomah County restaurants aside from the substantial increase in onsite nutrition information posting in King County restaurants required by the new regulation. Barriers to healthful eating decreased in King County relative to Multnomah County restaurants, particularly in food-oriented establishments. King County restaurants demonstrated modest increases in signage that promotes healthy eating, although the frequency of such promotion remained low, and the availability of reduced portions decreased in these restaurants. The healthfulness of children's menus improved modestly over time, but not differentially by county.

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Conclusions—A restaurant nutrition-labeling regulation was accompanied by some, but not uniform, improvements in other aspects of restaurant environments in the regulated compared to the nonregulated county. Additional opportunities exist for improving the healthfulness of awayfrom- home eating beyond menu labeling.

Background

Americans eat at restaurants and other food establishments with high and increasing frequency.[1, 2] Such away-from-home eating behavior is associated with higher caloric and fat intake, poorer overall diet quality, and weight gain.[3,4] These undesirable aspects of eating out may result in part from low availability of healthy options, lack of information about caloric and other nutrition content of foods and beverages, promotion of unhealthy eating or large portions, or misestimation by customers of portion sizes and nutritional content of choices.[5–8]

There have been attempts to try to improve the healthfulness of restaurant choices or at least customer awareness.[9] Caloric and other nutrition information is now available on restaurant menus, voluntarily and through regulation, in numerous areas throughout the U.S., and several chain restaurants are currently planning national roll-outs.[10] The impact of nutrition labeling on menus on customer purchases is inconsistent,[11–15] although such regulations are relatively new and the long-term impact of nutrition labeling on customer choices is unknown.

Other aspects of the restaurant environment likely affect customer behavior, including promotion and item availability.[16,17] However, little is known about how these other aspects of the restaurant environment might change as a result of nutrition labeling. For example, it is not clear whether nutrition labeling would encourage restaurants to better promote healthful options, decrease promotion of less-healthy choices, or change their menu offerings to reduce caloric content or change their nutrient profiles. The present study was designed to examine whether restaurant environments changed as a result of a newly implemented restaurant nutrition-labeling regulation in King County (Seattle area) WA, compared over a similar length of time to restaurants in Multnomah County (Portland area) OR, where such a labeling regulation was not implemented.

Methods

Design

This quasi-experimental design to evaluate the ‘natural experiment’ of restaurant nutritionlabeling regulation included restaurants as the unit of observation and analysis.

Menu Labeling Regulation

The King County nutrition-labeling regulation applies to restaurants in the county having at least 15 establishments within the U.S. and exceeding $1 million yearly gross sales. Regulation details are at www.kingcounty.gov/healthservices/health/nutrition/healthyeating.aspx. The regulation requires restaurants to post calorie information for food and beverage items on the menu, menu board, or otherwise at or near the point of purchase. Information on saturated fat, carbohydrate, and sodium is also required, but not necessarily on the menu or near point of purchase. Some items were excluded from required labeling, such as food items identified by food tags (e.g., in display cases), or offered for a limited time (<90 days). Most relevant to the present analyses, there were no other requirements within this regulation that restaurants needed to otherwise change the availability of healthy or unhealthy items or any other aspects of restaurant environments (with the exception of a statement about daily calories).

The King County regulation went into effect August 1, 2008, although was not enforced until early January 2009. Multnomah County passed a similar regulation in 2008 that was never implemented because of preemption by the Oregon Menu Labeling Act of 2009 and then by the federal menu labeling law, Section 4205 of the Affordable Care Act of 2010. Thus, for present analyses, Multnomah County serves as a control comparison.

Restaurants

Quick-service restaurants from the top 10 chains were selected within each county from among chains subject to nutritional labeling regulation (or as proposed in Multnomah County). Half of the restaurants were located in lower-income and more racially/ethnically diverse areas, defined as a census tract with at least 35% of its population being low-income (i.e., below 200% of federal poverty level which was $42,400 in 2008 for a household of four) and ≥30% being people of color (www.census.gov).

The present analyses examine only quick-service establishments that were part of a larger pointof- purchase receipt evaluation.[18] King County data were collected in three waves. In Wave 1, a total of 50 King County restaurants were evaluated, but one restaurant was closed by Wave 2. By Wave 3, two additional restaurants were not evaluated due to closure or management refusal to allow the conduct of the receipt study.

To evaluate change within the same restaurants over time, the present analyses included the 49 King County restaurants (14 burger, 15 sub/sandwich, 11 Tex/Mex, and nine coffee restaurants) for Wave 1 to 2 cross-county analyses, and 47 of these restaurants (14 burger, 15 sub/sandwich, 10 Tex/Mex, and eight coffee restaurants) for Wave 1, 2, 3 within-county (King County only) analyses. In Multnomah County, similar types of restaurants, 49 in total (16 burger, 16 sub/sandwich, six Tex/Mex, and 11 coffee restaurants), were evaluated across two waves. In King County, Wave 1 (pre-regulation) was conducted in October–December, 2008, Wave 2 in April–May 2009, and Wave 3 in May–June 2010. Multnomah County restaurants were evaluated for Wave 1 in May–June 2009 and Wave 2 in November–December 2009.

Procedure

Standard protocols for Nutrition Environment Measures Surveys – Restaurant version (NEMSR) were used to conduct restaurant environment evaluations (see www.med.upenn.edu/nems/measures.shtml for audit and instructions, training, and scoring).[19,20] One rater completed all NEMS-R assessments for all time points and in both counties. NEMS-R certification for the rater included classroom training that provided background, review and implementation of NEMS-R audit, practice evaluations and menu reviews, and supervised practice field work. Prior to an onsite visit, the rater gathered menus and nutrition guides for each restaurant from their website if available. The rater visited each restaurant to complete the onsite portion of the NEMS-R audit, which took on average 35.5 minutes (SD=10.9) to complete. Permission was not sought from the restaurants to conduct the audit and restaurants were not told when the visit would occur.

Measures

The NEMS-R evaluates environments in restaurants, particularly the availability and promotion of healthy and unhealthy items and eating. Inter-rater and test–retest reliability for NEMS-R items are generally high.[20] NEMS-R items were scored and combined into four scale scores (Appendix A, available online at www.ajpmonline.org). The ‘Availability of Healthful Options’ scale assesses the availability of healthy entrées and salads, and select healthy food items. The ‘Facilitators of Healthy Eating’ scale assesses the availability of nutrition information, whether healthy options are identified and promoted, and the signage

or other encouragement to eat healthfully. The 'Barriers to Healthful Eating' scale measures the presence of signage or other encouragement to overeat, to choose large portions, or to purchase unhealthy options. The 'Kid's Menu' scale measures the availability of healthy and unhealthy items marketed to kids and the encouragement of healthy or unhealthy eating among children. For all these scales, higher scores are indicative of encouragement of more healthful eating or less overeating.

Ten individual NEMS-R items were selected a priori to be examined over time based on their particular relevance to nutrition labeling or its potential consequences. For example, provision of calorie and other nutrition information might have encouraged restaurants to highlight more-healthful options on their menus, so the individual NEMS-R item 'Healthy options identified on the menu?' was examined. In contrast, it was not expected that menu labeling would change combination pricing, so this NEMS-R item was not examined separate from its NEMS-R scale.

Data Analyses

Differences in NEMS-R scale scores between King County and Multnomah County restaurants at Wave 1 were compared with ANOVA. Wave 1 to 2 changes by county were evaluated with repeated measures ANOVA, with examination of the significance of the time by county interaction. To explore whether food or coffee chain establishments differed in restaurant environment change, chain type (food or coffee) was added to this interaction term.

For Wave 1 through 3 analyses on NEMS-R scale scores, change within King County restaurants was examined with repeated measures ANOVA, with contrasts between Wave 1 versus 2 and Wave 1 versus 3 explored. For selected individual NEMS-R items (all dichotomous *yes/no* response), change over time within county was examined separately by county using nonparametric binomial tests, with the referent test proportion being the corresponding item Wave-1 proportion for restaurants in the respective county (n=49 for both counties for Wave 2 versus Wave 1; n=47 for Wave 3 versus Wave 1 in King County).

The significance value for all analyses was $p<0.05$ (with additional significance levels provided for the individual item testing due to multiple tests). All analyses were conducted in 2011 using SPSS 17.0. Analyses were conducted in 2011.

Results

The NEMS-R scale scores are presented for Waves 1 and 2 for King and Multnomah County restaurants in Table 1. There were significant differences at Wave 1 between King and Multnomah County restaurants in facilitators of healthy eating (with and without nutritionlabeling items) and barriers to healthful eating (all $F(1,96) > 4.4$, $p<0.05$). The availability of healthful options in restaurants did not change differentially by county over time.

There was a significant improvement in facilitators of healthy eating and the healthfulness of the kid's menu in King relative to Multnomah County restaurants, although this differential change by county no longer remained once nutrition-labeling items were removed from these NEMS-R scales. King County restaurants did have decreased barriers to healthful eating compared to Multnomah County restaurants from before (Wave 1) to immediately after regulation (Wave 2). This differential improvement in reducing barriers to healthful eating was primarily driven by changes among the food-oriented rather than coffee-oriented restaurants in King County (significant three-way interaction of county X time X chain type; $F(1,94) = 17.1$, $p<0.001$; Figure 1). There were decreases in Multnomah County coffee-

oriented restaurants and increases in King County coffee-oriented restaurants in barriers to healthful eating from Wave 1 to 2. The three-way interactions for other NEMS-R scales (with nutrition-labeling items removed where applicable) were not significant.

The NEMS-R scale scores for the same 47 restaurants evaluated in King County across all three waves are provided in Table 2. Similar to the cross-county findings, there was no change in the availability of healthful options or facilitators of healthy eating (once nutrition-labeling items were removed from this scale) in King County restaurants from before to either of the two postregulation time points. In contrast, significant decreases in barriers to healthful eating were observed from before to both postregulation time points. In addition, there was a significant improvement in the healthfulness of the kid's menu, particularly from before to the most distal postregulation time point (Wave 3), even after removing nutrition-labeling items from the Kid's Menu scale.

Individual NEMS-R items (percentage of 'yes' ratings) by county over time are presented in Table 3. As expected, there was a significant increase in nutrition labeling onsite within King County restaurants, but not Multnomah County restaurants, from Wave 1 to both Waves 2 and 3. The identification of large portions and the encouragement to overeat (items on the 'Barriers to Healthful Eating' scale) were both lower at Waves 2 and 3 relative to Wave 1 in King County restaurants, but this change was not seen in Multnomah County restaurants from Wave 1 to 2.

Relative to Wave 1, King County establishments at Wave 3 more often had signage highlighting healthy options and encouraging healthy eating (items on the 'Facilitators of Healthy Eating' scale). In contrast, fewer Multnomah County restaurants had such healthy eating signage at Wave 2 relative to Wave 1. Fewer King County restaurants were also encouraging unhealthy eating at Wave 2, although by Wave 3 this was no longer significantly different from Wave 1. In contrast, more Multnomah County restaurants were encouraging unhealthy eating by Wave 2. The only evidence from these individual NEMS-R items that King County restaurants were becoming less healthful from before to after nutrition labeling was the decreased availability of reduced portions at Wave 3 relative to Wave 1. There was no increase in the identification of healthy entrées on the menu within King County restaurants, although this occurred in Multnomah County from Wave 1 to 2.

Discussion

Posting of nutrition information on menus, menu boards, or otherwise near point of purchase at chain restaurants in King County WA increased from immediately before to soon after enforcement of a nutrition-labeling regulation. Restaurants in King County continued to be regulation-compliant 1.5 years later. Changes in other aspects of restaurant environments were mixed.

There was no substantive effect on the overall availability or facilitation of healthy eating or highlighting healthier options in these restaurants aside from the actual required nutrition labeling. There was evidence of a decrease in barriers to healthful eating (e.g., promotion and encouragement to overeat or engage in unhealthy eating) within these King County restaurants, a shift that was not observed across all restaurants in Multnomah County not subject to nutrition labeling regulation. This reduction in barriers to healthy eating occurred within food-oriented, rather than coffee/beverage-oriented, restaurants.

Changes in barriers to healthy eating in King County restaurants were mostly sustained 1.5 years after the regulation began, although maintenance findings should be interpreted cautiously given there was no nonlabeling comparison site at this later time point. Prior to the nutrition-labeling regulation, more than half of King County restaurants were

encouraging large portion sizes and general overeating, but less than one fourth were doing so at the last follow-up. This may not be the direct result of nutrition-labeling regulation in King County. However, in the unregulated Multnomah County restaurants, none of the NEMS-R scales and only one examined item (healthy entrées identified) improved toward fewer barriers to healthful eating from May/June 2009 to November 2009. There were decreases in Multnomah County restaurants highlighting and encouraging healthy eating and an increase in signage encouraging unhealthy eating over this period. Perhaps restaurants in King County were less likely to promote overeating and unhealthy eating when consumers were now simultaneously presented with calorie information.

Given the nutrition-labeling regulation, it might be expected that King County restaurants would promote their more healthful options. However, availability of more healthy options and encouragement to purchase and consume these options did not change and remains low. Most of the NEMS-R scale scores, even at the most distal follow-up among King County establishments, are in the lower part of their possible range, with higher scores indicating more healthfulness. This is similar to the findings of other restaurant environment evaluation studies.[5,20] There is other evidence that King County establishments have decreased caloric content of some menu items during the period following nutrition-labeling regulation.[21] There is also evidence that the regulation did not immediately reduce calories purchased, but did so 1.5 years later in regulated restaurants.[18] However, average caloric consumption at these restaurants remains high, often in the 800–1000 calories per person range for a meal.[12–14]

The differential changes across counties in food versus coffee establishments for barriers to healthful eating may be explained by the NEMS-R insensitivity to changes in promotion in coffee- and other beverage-oriented establishments. Coffee establishments also initially had fewer barriers to healthful eating in restaurants in both counties. Most food products in coffee-oriented establishments are also not subject to King County nutrition-labeling regulation because they are not on the menu board, but rather pre-packaged or displayed in counter cases with tags. Others found modest caloric reductions after nutrition labeling in coffee establishments from decreases in food and not beverage calories, with this effect demonstrated in New York City where food tags are required to include calorie information.[22] The observed decrease in barriers to healthful eating among Multnomah County coffee-oriented establishments in the present study was unexpected.

The improvement around overall healthfulness in the children's menus over time was encouraging, but this improvement did not differ between the counties. Within King County, most of this improvement in the NEMS-R Kid's menu scale resulted from required nutrition labeling. Greater healthfulness of children's menus in King County restaurants was sustained at Wave 3, but this change may have little to do with the nutrition-labeling regulation.

Indeed, there are other initiatives attempting to improve children's food and beverage options (e.g., Let's Move campaign; action by the food industry such as changes in advertising; www.bbb.org/us/childrens-food-and-beverage-advertising-initiative) and press attention about the healthfulness of children's food options in away-from-home settings. More such efforts are needed, because as found in the present study and by others,[23] children's menus continue to lack many healthy options (e.g., healthy dessert or sides) and often promote overeating or unhealthful options (e.g., free refills on sugar-sweetened beverages). Strategies could include improvements in the choices available and the promotion of healthy items to children within restaurant (e.g., toys contingent upon choosing healthy options[24]; www.restaurant.org/foodhealthyliving/kidslivewell) and other settings.[25]

Study limitations include sample size and number of time points, limited by resources and time between study initiation and regulation enforcement. Small sample size precluded evaluating consistency across restaurants within chains or examining differences across chains with restaurants clustered by chain. Although they were 5–6 months apart, Wave 1 and Wave 2 evaluations were not done during the same calendar months in each county and there were no Multnomah County restaurant environment data collected for Wave 3. Other temporal trends in restaurant environments, independent from nutrition labeling, could have been occurring during the study period, liming the comparability of changes across counties. It is not clear why some differences existed between the counties on facilitators and barriers to healthy eating at Wave 1 when there was chain-type comparability, although not exactly the same chains across counties. Having only one NEMS-R evaluator ensures consistency but raises potential for rater drift, and blinding to the regulation was not possible.

This study is among the first to evaluate changes in restaurant environments from before to after a regulation targeting a change in these environments. Nutrition-labeling regulation was accompanied by some other changes in restaurant environments, most notably a decrease in encouragement to overeat or eat unhealthily, but no increase in identifying or providing more-healthful options. As nutrition labeling is soon to be enacted nationwide in the U.S., future efforts should evaluate longer-term impacts and implement and evaluate additional strategies to improve eating environments.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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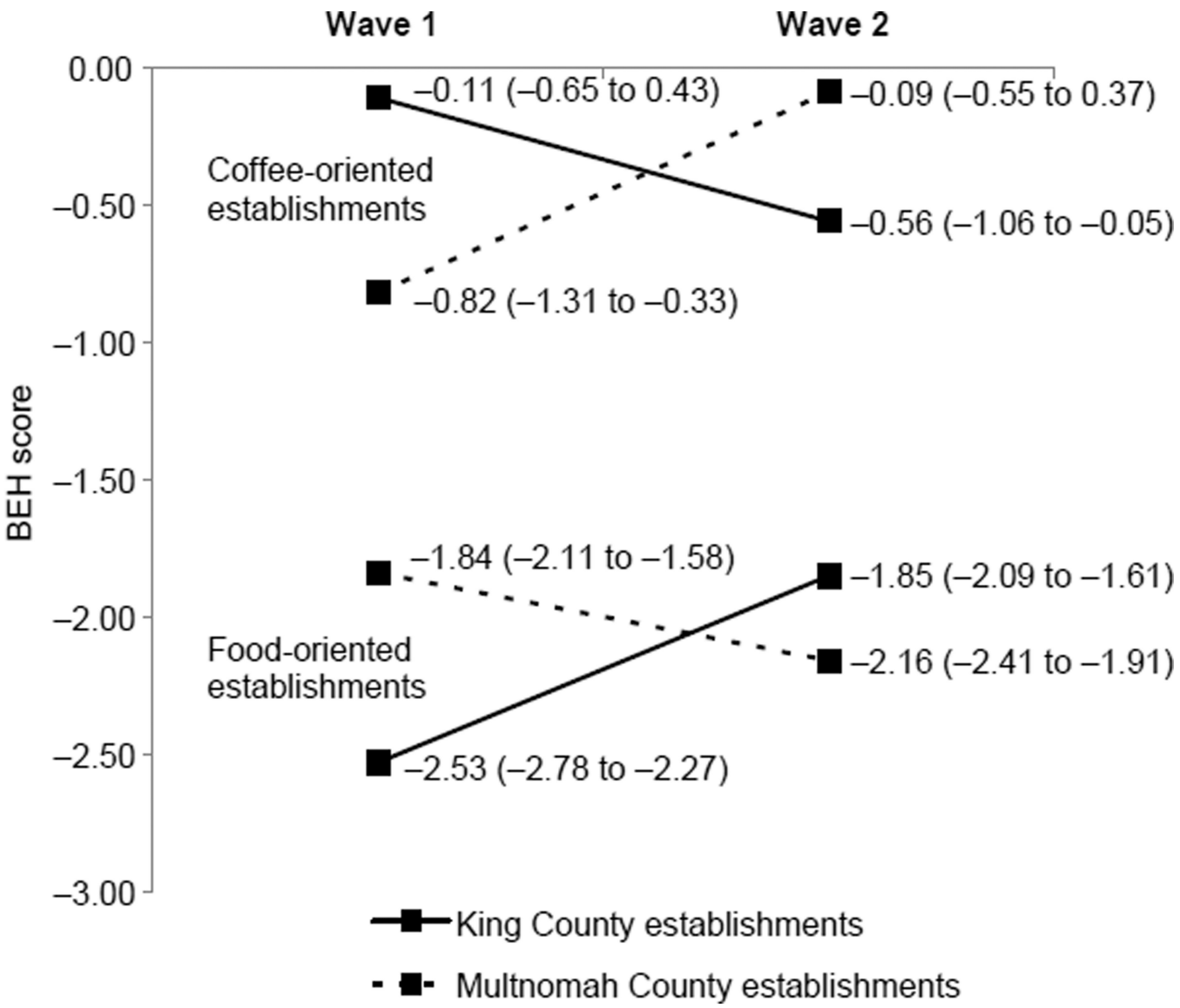

Figure 1.

Barriers to healthful eating before and soon after nutrition-labeling regulation and in King County WA

Note: Data are for coffee- versus food-oriented King County WA and Multnomah County OR restaurants. Wave-1 data are before regulation; Wave-2 data are soon after regulation. Lessnegative (higher) BEH scores indicate fewer barriers to healthful eating (e.g., no signage/promotion of unhealthy or overeating. Appendix A (available online at www.ajpmonline.org) provides a complete list of NEMS-R BEH items); n=9 and n=11 for King and Multnomah County coffee establishments and n=40 and n=38 for King County and Multnomah County food establishments, respectively.

BEH, NEMS-R Barriers to Healthful Eating scale; NEMS-R, Nutrition Environment Measures Surveys, restaurant version

Table 1

King County and Multnomah County restaurant environments before and soon after King County labeling regulation

		Wave 1		Wave 2		
						Time by County interaction
NEMS-R scale	**County**	**M**	**95% CI**	**M**	**95% CI**	***p*-value**
Availability of Healthful Options	King	5.82	4.73, 6.90	6.16	5.08, 7.25	NS
	Multnomah	5.69	4.61, 6.78	5.80	4.71, 6.88	
Facilitators of Healthy Eating	King	2.55	2.14, 2.96	3.76	3.42, 4.09	<0.001
	Multnomah	1.86	1.45, 2.27	2.27	1.93, 2.60	
Facilitators of Healthy Eating	King	1.47	1.11, 1.83	1.49	1.15, 1.83	NS
(without nutrition-labeling items)	Multnomah	0.76	0.40, 1.11	1.08	0.74, 1.42	
Barriers to	King	−2.08	−2.39, −1.77	−1.61	−1.91, −1.32	0.016
Healthful Eating	Multnomah	−1.61	−1.92, −1.30	−1.69	−2.00, −1.40	
	King	0.90	0.33, 1.46	2.00	1.39, 2.61	0.001
Kid's Menu	Multnomah	1.25	0.70, 1.80	1.53	0.93, 2.14	
Kid's Menu	King	0.90	0.34, 1.45	1.35	0.78, 1.93	NS
(without nutrition-labeling items)	Multnomah	1.20	0.66, 1.75	1.53	0.97, 2.10	

Note: n= 49 of restaurants in each county, same within each county over time

NEMS-R, Nutrition Environment Measures Survey – restaurant version; NS, not significant

Table 2

King County restaurant environments before nutrition-labeling regulation to soon after and 1.5 years later

	Wave 1		Wave 2		Wave 3			
NEMS-R scale	**M**	**95% CI**	**M**	**95% CI**	**M**	**95% CI**	**Time *p*-value**	**Contrasts**
Availability of Healthful Options	5.96	4.80, 7.12	6.3	5.14, 7.46	5.85	4.82, 6.89	NS	
Facilitators of Healthy Eating	2.62	2.10, 3.14	3.79	3.40, 4.18	3.98	3.73, 4.23	<0.001	Wave 2, Wave 3 > Wave 1, both $p<0.001$
Facilitators of Healthy Eating (without nutrition-labeling items)	1.51	1.06, 1.96	1.53	1.10, 1.96	1.57	1.30, 1.85	NS	
Barriers to Healthful Eating	−2.11	−2.48, −1.74	−1.68	−1.97, −1.39	−1.53	−1.81 to −1.26	0.003	Wave 2 < Wave 1, $p=0.018$; Wave 3 < Wave 1, $p=0.001$
Kid's menu	0.92	0.53, 1.30	2.04	1.43, 2.65	2.49	1.84, 3.14	<0.001	Wave 2, Wave 3 > Wave 1, both $p<0.001$
Kid's Menu (without nutrition-labeling items)	0.92	0.53, 1.30	1.38	0.86, 1.90	1.66	1.06, 2.26	0.016	Wave 2 > Wave 1, $p=0.023$; Wave 3 > Wave 1, $p=0.004$

Note. *n*= the same 47 restaurants across all waves

NS, not significant

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Table 3

Specific aspects of restaurant environment changes among King County WA and Multnomah County OR restaurants

NEMS-R scale	NEMS-R Items	County	Wave 1 (%)	Wave 2 (%)	Wave 3 (%)
Facilitators of Healthy Eating	Nutrition labeling available on website	King	91.5 / 93.3[a]	100 *	100 *
		Multnomah	100	100	
	Nutrition labeling on the menu	King	6.1 / 6.4	98 ***	100 ***
		Multnomah	0	0	
	Nutrition labeling posted near point-of-purchase	King	18.4 / 19.1	71.4 ***	83.0 ***
		Multnomah	10.2	18.4	
	Healthy entrées identified on menu	King	49.0 / 51.1	44.9	42.6
		Multnomah	8.2	36.7 ***	
	Reduced portions available	King	32.7 / 31.9	32.7	19.1 ***
		Multnomah	4.1	4.1	
	Signage highlights healthy options	King	8.2 / 8.5	6.1	21.3 **
		Multnomah	20.4	4.1 **	
	Signage encourages healthy eating	King	0 / 0	4.1 ***	8.5 ***
		Multnomah	20.4	2.0 ***	
Barriers to Healthful Eating	Large-portion descriptors on menu	King	61.2 / 61.7	32.7 ***	19.1 ***
		Multnomah	30.6	28.6	
	Signage encourages unhealthy eating	King	30.6 / 31.9	16.3 *	23.9
		Multnomah	26.5	42.9 *	
	Signage encourages overeating	King	53.1 / 53.2	34.7 **	17.0 ***
		Multnomah	20.4	20.4	

Note. Values are the percentages of restaurants with *yes* responses for that item; n= 49 restaurants in Waves 1 and 2; n= 47 restaurants in King County in Wave 3.

[a]Percentage at Wave 1 for 49 restaurants available at Wave 2 / percentage at Wave 1 for 47 restaurants available at Wave 3; significantly different from the Wave 1 within-county value

*p<0.05,

**p<0.01,

*** $p<0.001$