

**CHANGING THE FOOD ENVIRONMENT IN BALTIMORE CITY:
THE BALTIMORE HEALTHY CARRY-OUTS INTERVENTION**

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EXECUTIVE SUMMARY

Americans spend nearly half of their food dollars eating out, consuming over 33% of their total calories on food away from home. A large proportion (76.8%) of foods eaten away from home consists of prepared foods purchased at prepared food sources, such as fast food restaurants and carry-outs (non-franchised food establishments that sell ready-to-eat food and beverages for off-premise consumption). Energy-dense prepared foods, in particular, have been associated with increased BMI and weight gain. Low-income urban populations are disproportionately exposed to prepared food sources, and the most common prepared food sources in low-income urban areas are fast food restaurants and carry-outs. While a growing body of research has examined consumer behavior at franchised fast food restaurants, little attention has focused on carry-outs. The goal of this study is to develop, implement and evaluate an environmental carry-out intervention targeting both customers and carry-out owners to increase availability/accessibility of healthier menu options.

The Baltimore Healthy Carry-outs (BHC) intervention was developed using formative research consisting of 15 direct observations, 40 in-depth interviews (12 customers, 8 carry-out owners, 2 IDIs each), 48 semi-structured interviews (40 customers, 8 carry-out owners), and 6 customer focus groups (5-10 customers per group). We implemented a 7-month trial in 8 carry-outs (4 intervention and 4 comparison) in low-income neighborhoods in Baltimore, MD (February – September 2011). The BHC trial included three phases: 1) Improving menu boards and labeling to promote healthier items; 2) Promoting healthy sides and beverages and introducing new items; and 3) Introducing healthier combo meals and changing food preparation methods.

Process evaluation was conducted to assess how well the intervention was implemented using sales receipts, carry-out visit evaluation, and intervention exposure assessment. On average, we reached 36.8% more customers at intervention carry-outs compared to baseline in the intervention carry-outs. The menu boards and labels were seen by 100.0% and 84.2% of individuals (n=101), respectively. Promoted entrée availability and revised menu and poster presence all had high feasibility. Overall, the BHC intervention was well implemented as planned and demonstrated high feasibility.

For the carry-out level impact evaluation, a total of 186,640 menu orders were collected from seven carry-outs in an eight-month period. In the intervention group, the odds of healthy item sales increased significantly compared to the baseline. Total revenues in the intervention group were significantly greater in all phases relative to baseline, while they significantly declined in the comparison group.

For the customer-level impact evaluation, an intervention exposure assessment was conducted with randomly selected customers post intervention (n=180). Compared to comparison customers, intervention customers were 4.5 times more likely to purchase promoted healthy items. The intervention exposures were positively associated with the amount of healthy food purchased.

In conclusion, BHC was effectively implemented with positive impact on both the carry-out and customer levels. The Baltimore City Department of Planning is currently implementing the key BHC intervention strategies in an initiative titled, “Get Fresh Public Markets”. Moreover, findings from BHC can help develop Healthy carry-out certification, which will create a city-wide standard for identifying prepared food sources that provide and promote healthy food options.

PROBLEM STATEMENT

Between 2005 – 2011, Americans spent about half of their food dollars on food purchases eaten away from the home^{1,2} compared to a quarter of their food dollars in 1955.¹ Most (76.8%) of this money is spent on prepared foods purchased at fast food restaurants and carry-outs.³

Fast food restaurants and carry-outs (non-franchised food establishments that sell ready-to-eat food and beverages for off-premise consumption⁴) are the most common prepared food sources in low-income urban areas.⁵⁻⁸ In low-income neighborhoods in Baltimore City, more than three-quarters (78.3%, 112 out of 144) of prepared food sources are carry-out restaurants.⁸ Carry-outs sell food items very similar to franchised fast food restaurants such as hamburgers, fried chicken, and soda. Typically, carry-outs have the lowest availability of healthy options as compared to fast-food and sit-down restaurants.⁶⁻⁹ While a growing body of research has examined consumer behavior at franchised fast food restaurants,¹⁰⁻¹⁴ little attention has focused on carry-outs.

Many low-income urban areas are often defined as ‘food deserts’, where access to healthy foods is limited¹⁵ as well as ‘food swamps’, where corner stores and carry-outs, which typically carry fatty, sugary prepared foods, are abundant.¹⁶⁻¹⁸ Studies have found that increased consumption of prepared foods is related to higher intake of fat, sodium, and sugar and lower intakes of nutrient-dense foods such as fruits and vegetables.¹⁹⁻²¹ Moreover, studies have shown an association with this kind of urban food environment and health disparities including unhealthy eating, obesity and chronic disease.²²⁻²⁵ Therefore, low-income urban populations are more likely to be exposed to prepared foods and to suffer their effects on nutritional status and obesity.

In recent years, several intervention trials have been successful in promoting healthy foods in retail food sources, such as supermarkets, corner stores, and bodegas in low-income neighborhoods.^{26,27} However, fewer trials have been conducted with prepared food sources. The majority of the prepared food vendor intervention trials focused on consumer information approaches such as menu and calorie labeling, with little effort on changing the food environment by providing healthier menu options.²⁸ Moreover, most prepared food vendor interventions have not focused on low-income settings. This paper describes the development, implementation and evaluation of a carry-out environmental intervention titled “Baltimore Healthy Carry-outs,” and proposes policy implications for sustainability and dissemination¹.

Baltimore Healthy Carry-outs (BHC)

The conceptual framework for the BHC intervention is provided in Figure 1. BHC strategies were developed considering that various environmental factors such as physical, economical, and socio-cultural environment influence individuals’ behaviors, in this case, selling and purchasing healthy foods at the carry-out. We also followed “Four Ps”



(Product, Price, Place, and Promotion) from Social Marketing. BHC focused on selecting feasible and affordable healthy foods to promote at the carry-outs and incorporated a point-of-purchase promotion to improve sales.

The Baltimore Healthy Carry-outs (BHC) intervention was conducted from February - September 2011 in eight carry-outs located in low-income neighborhoods of Baltimore. All

¹This paper is a distinct piece of work prepared solely by the author that emerged from a larger project, the “Baltimore Healthy Carry-Outs” (BHC) project. This paper contains a description of the BHC project that was supervised by Dr. Joel Gittelsohn funded by (1) the Pilot and Feasibility Program from the Baltimore Diabetes Research and Training Center (DRTC), Johns Hopkins University and University of Maryland (PI: Dr. Joel Gittelsohn), and (2) the Carl Taylor Research Grant from the Center for a Livable Future (CLF), Johns Hopkins University (PI: Ms. Lee). Although the current paper draws on the analysis that Ms. Lee conducted under the BHC and/or CLF grant(s), Ms. Lee was not paid by the BHC or the CLF to produce this paper submitted to the Abell Award competition. (See the appendix for further details.)

neighborhoods were predominantly African-American ($\geq 90\%$) and the annual median household income ranged from \$20,515 - \$30,597, which was much lower than the city average (\$37,395).²⁹ In 2010, the study areas had 144 prepared food sources. Approximately 70% of them were carry-outs (Figure 2), and over 50% were owned by Korean immigrants.⁸

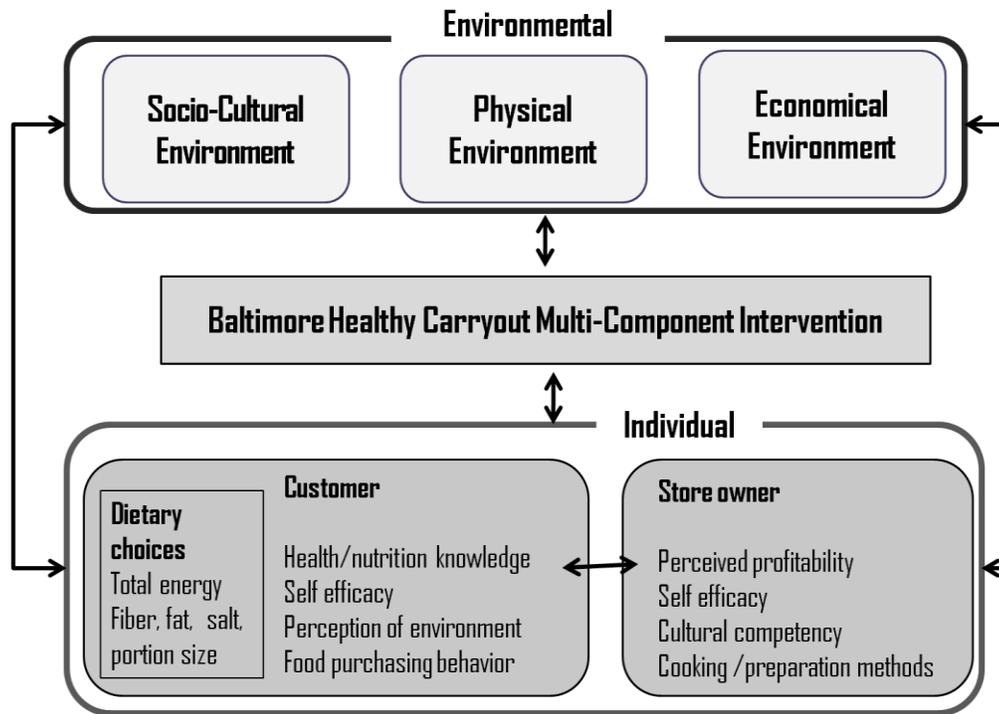


Figure 1. Baltimore Healthy Carry-out Conceptual Framework

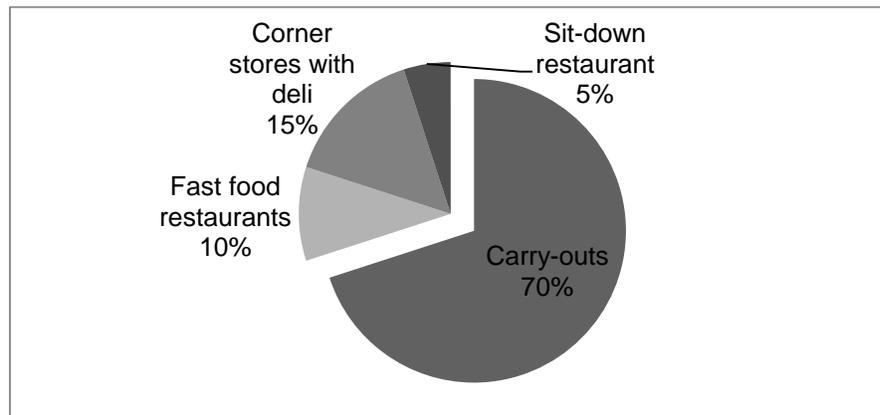


Figure 2. Prepared food sources (%) in low-income neighborhoods in Baltimore City

Carry-out sampling strategy

We selected a total of four carry-outs to receive intervention (Table 1). Two were owned by Korean-Americans as over 50% of carry-out ownership is by Korean-Americans in Baltimore. The other two were owned by African-Americans, with the predominantly African American target population, therefore, sharing similar food culture. We took this approach because we wanted to make sure that BHC works regardless of owners' race/ethnicity.

In addition four comparison carry-outs were matched for physical environment (e.g., presence of Plexiglas, lack of tables, etc.), principal types of food offered (e.g., fried chicken, sandwiches), and neighborhood characteristics (e.g., median income, % of African-American ethnicity). Comparison carry-outs located in the same neighborhood (minimum of 0.5 mile away from an intervention carry-out) were avoided since intervention strategies could impact the comparison group.

Table 1. Carry-out sampling strategy

	Intervention group (n=4)	Comparison group (n=4)
East Baltimore	1 st generation Korean-American owned carry-outs (n=2)	1 st generation Korean-American owned carry-outs (n=2)
West Baltimore	African-American owned carry-outs (n=2)	African-American owned carry-outs (n=2)

Timeline

The overall timeline of the Baltimore Healthy Carry-out trial involved four stages which include formative research, development of intervention strategies, implementation, and evaluation of BHC (Figure 3). Table 2 describes the overview of data collection for BHC, specific to each stage.

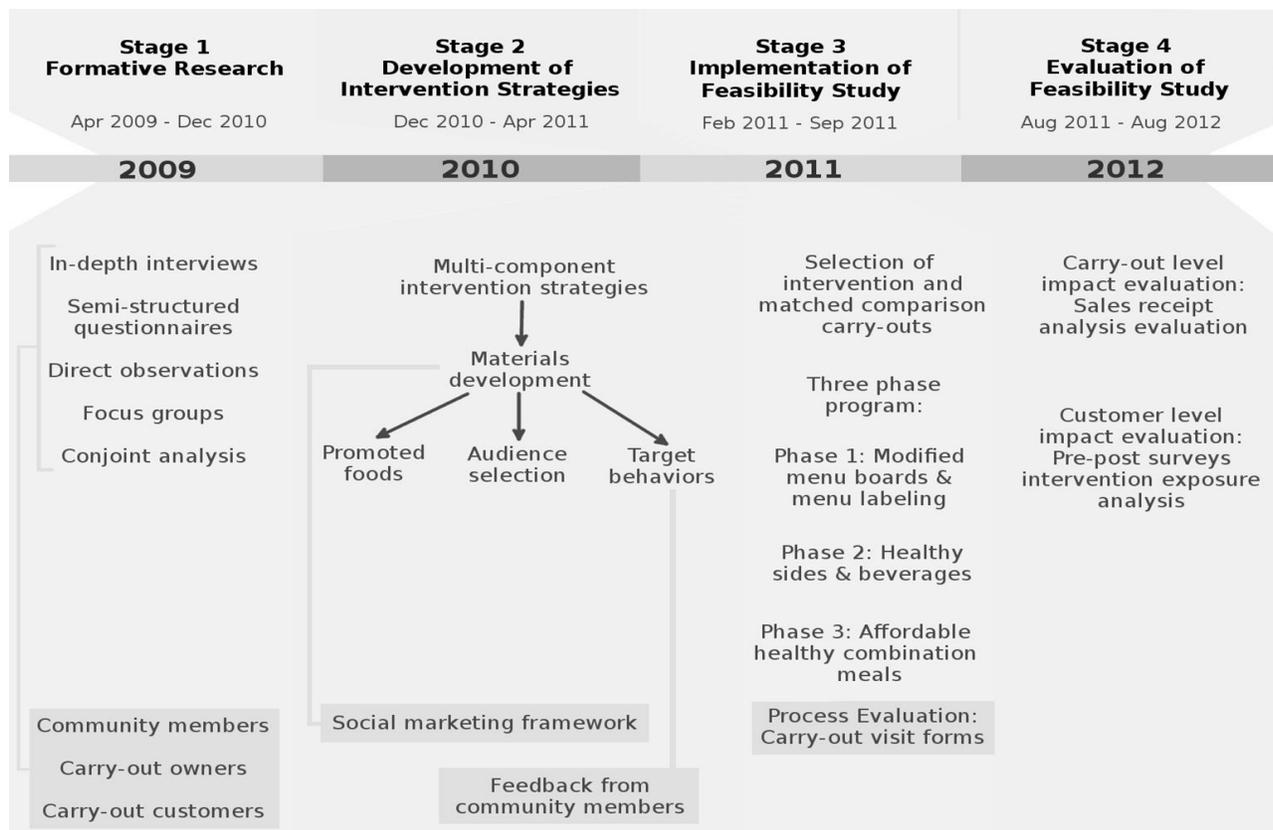


Figure 3. Baltimore Healthy Carry-outs timeline

Carry-out Descriptions

We found that each of the participating intervention carry-outs had unique characteristics, and therefore each interventionist needed to tailor the intervention activities to fit with the organizational layout and space of their assigned store, as well as the foods available. The general layout of a carry-out is a Plexiglas window separating the employees and cooking area from the customer. There is usually a door with a lock separating these areas. Some of the carry-outs also contain a small grocery section in a side room. Images of the carry-outs are below (Figure 4).

Table 2. Overview of data collection for Baltimore Healthy Carry-outs

Stage 1 & 2.		
Formative Research & Intervention Development		
Focus	Methods & Sample Size	Primary goals
Carry-outs	Environmental assessments (n=144)	Identify available food options in carry-outs Investigate ordering practices and interactions between carry-out owners and customers
	Direct observations (n=15)	
Carry-out owners	In-depth interviews (n=16)	Identify facilitators and barriers regarding selling healthy foods in carry-out
	Semi-structured interviews (n=8)	Find ways to improve carry-outs' healthy food availability
Customers	In-depth interviews (n=24)	Identify facilitators and barriers regarding purchasing healthy foods in carry-outs
	Semi-structured interviews (n=40)	Brainstorm specific intervention strategy ideas
	Focus groups (n=6)	
Stage 3.		
BHC Process Evaluation		
Carry-out	Carry-out visit evaluation (n=80, 10 per carry-out)	Identify how well the intervention was implemented through process evaluation measures (reach, dose, fidelity) ⁱⁱ
Stage 4.		
BHC Impact Evaluation		
Carry-out	Sales receipt (n=186,640, 32 wks, 7 carry-outs)	Assess changes in unit sales and revenue on healthy and less-healthy sides, beverages, and entrees
Customer	Customer impact Questionnaire	Assess changes in healthy food purchasing behaviors
	Intervention exposure Survey (n=200, 25 per carry-out)	Quantify the exposure of the intervention

Formative research to develop intervention strategies

Formative research was conducted to understand carry-out owners' perceived and real barriers to serving healthy foods, community members' rationale for current prepared food

ⁱⁱReach indicated the number of customers served at intervention relative to baseline; dose indicated the customers' amount of exposure to intervention components; and fidelity indicated how well components of the intervention were delivered according to plan (Gittelsohn et al., 2010).



Figure 4. Example of a carry-out

intervention materials. The research focused on (1) African-American customers (n=50) aged ≥ 18 years who made purchases at prepared food sources, and (2) carry-out owners (n=16) managing food preparation, pricing and sales. Customers provided information on factors governing their ordering practices and which healthier options were most appealing to them, while owners discussed their business practices and perceptions of customer tastes and priorities.

Focus groups (n=6, 6-8/group) were conducted to help develop and review intervention materials (e.g., poster design) and strategies (e.g., specific healthy sides). Participants responded most positively to catchy and informative slogans that were not ‘wordy’. Participants disliked the word ‘healthy’, as it invoked feelings of ‘disgusting’, ‘not tasty’ or ‘bland’. Instead, the word ‘fresh’ was positively associated with terms like ‘homemade’,



‘delicious’ or ‘vegetables.’ Participants were highly responsive to orange and purple materials, which correspond to two major sports teams of Baltimore.

Carry-out owners were primarily concerned about the sales of healthier items, the short shelf life and high price of fruits and vegetables, and customers’ preferred tastes for less healthy foods. Some facilitating factors for selling healthier foods included monetary incentives for owners, point-of-purchasing materials and expert input.

A forced-choice questionnaire was administered to customers (n=50) to identify consumer preferences towards favorable combinations of entrées (turkey club sandwich, grilled chicken sandwich), side dishes (fruit, side salad) and beverage options (diet soda, bottled water). Findings suggested that carry-out customers significantly preferred water to diet soda and favored a turkey club sandwich to a grilled chicken sandwich.³¹

Two dietitians reviewed menu recipes and cooking methods at each of the study carry-outs to calculate total calories (kcal) and fat (g), using the USDA National Nutrient Database (db.nal.usda.gov). Criteria for healthy entrées and sides were modified from previously conducted healthy restaurant studies^{32–34}. One serving of a healthier entrée was measured to be as less than 600 kcal and 20 g of fat; and one serving of healthier side dishes was less than 200 kcal and 7 g of fat. For example, a grilled chicken sandwich, containing 350 kcal with 15 g of fat, would be classified as a healthier option compared to a 4 piece chicken wing meal with 780 kcal and 52 g of fat. Based on the foods offered in the carry-outs, 47 healthier items and 119 less healthy items were identified.

Development and implementation of intervention phases

Phase 1: Modified menu boards & menu labeling

Development: Carry-out menus were redesigned to highlight healthier items at intervention carry-outs. All carry-outs offered at least twice the number of less healthy items compared to healthier items³⁵ and all existing promotional materials around the premises emphasized fried food combo meals. Mock-ups of intervention menus were tested in focus groups, with healthier items identified using numbered color photographs.

Focus group participants recommended using a symbol that exemplified ‘green leafy vegetables’ to indicate healthier foods, which was developed by a local designer/artist. Carry-out owners and customers agreed that this symbol was appealing, acceptable and effectively conveyed the concept of freshness.

The leaf symbol was added adjacent to the identified healthier items on the intervention store menus. The goal was to enhance the appeal for these items from a health perspective, and ultimately increase sales. Carry-out owners selected three specific healthier options to be promoted using photos and a slogan, “Try these fresh options!” Menu boards were approved by storeowners after several rounds of revisions (Figure 5).

Implementation: We replaced existing menu boards in the intervention carry-outs with new boards. We also provided owners with paper menus (~2000 per carry-out) using the same labeling strategy as the wall-mounted boards, plus a variety of wall posters to promote healthier items.

Three owners (out of 4) were initially resistant to the idea of replacing their existing menu boards, and insisted that original boards remained in place next to the new ones. However, after

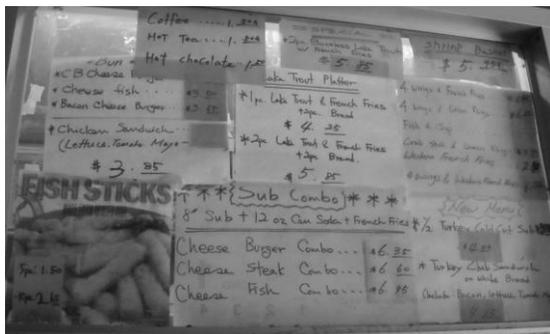


Figure 5. Sample intervention carry-out menu board (left: before; right: after)

seeing the visual appeal of the new menu boards, two owners opted to use them in place of the old boards. The remaining owner retained the old board, but moved it to a less visible area of the store, and placed the new menu board in its place. Almost all owners stated their strong approval of the food photographs, which was likely an important factor for abandoning the old menus. Prices were originally typed onto the new menu boards, however due to frequent changes in food prices we began printing laminated menus with a dry-erase option for prices.

Phase 2: Healthy sides and beverages

Development: We noticed that only a few healthy sides and beverages were available in carry-outs. Some carry-out owners mentioned a lack of demand for these items, while others mentioned having limited storage space. Existing healthier sides were identified (e.g., collard greens, broth-based vegetable soups and watermelon), as well as new sides requested by community members (e.g., fruit cups, yogurt, bananas, baked potato chips and pretzels).

Implementation: Existing side dishes that met our healthier criteria were promoted in addition to new sides. Carry-outs were given monetary incentives in the form of an initial stock

(i.e., couple dozens of yogurt, a box of baked chips) for new promoted foods and point-of-purchasing poster materials were given to owners. At some carry-outs, owners were resistant to adding new side dishes. For example, one owner did not believe customers would purchase yogurt. As a solution, the owner agreed to temporarily hang a poster promoting yogurt to see if any customers requested it. A few days later the owner requested that yogurt be added as a side dish to his menu offerings. After a few weeks, the owner began stocking the yogurt himself due to high demand. By providing the initial stock, we reduced the potential risk for financial loss on a new product. This strategy was used with bananas, watermelon, fruit cups and baked chips. The stock of some items was better maintained than others, and new items that promised greater shelf-life were encouraged. Moreover, the point-of-purchasing posters were laminated to ensure longevity and quality.

All of the carry-outs already offered bottled water and diet soda. We did not experience any resistance to promoting water. However, owners were doubtful that there would be an increase in sales of diet soda, despite promotion. Owners explained that they sold less than 2-3 cans/bottles per week, and only to customers with diabetes or other health conditions.

Phase 3: Healthy Affordable Combination Meals and Cooking Methods

Development: Combination meals were offered in all study carry-outs, and usually included fried chicken wings, French fries and a 32oz soda. All combo meals included a reduced price promotion. Our baseline findings showed that over 65% of carry-out customers purchased combo meals.³⁶ In this phase, new combo meals were tailored to each carry-out. For example, one carry-out's only healthy option was a grilled chicken sandwich, so this item was promoted in a combo meal. Another carry-out owner was concerned that customers did not prefer healthier foods, taste-tests were conducted with customers (n=25) to assess the acceptance of a new entree.

Subsidies were promised to carry-out owners to account for any decrease in profit they may have experienced from selling healthy combo meals for 2 months of Phase 3. For example, if a carry-out reduced the price of a healthy combo meal by \$1.00 and sold 20 units, we were to compensate the owners \$20.

Healthier food preparation methods were introduced in this phase. For example, one carry-out's only cooking equipment was a deep-fryer. This carry-out was provided with an indoor grill and a demonstration for carry-out owners and staff members on grilling chicken using their current products. Storeowner guidelines were also developed regarding cost-neutral healthy alternatives to cooking (e.g., low-fat mayonnaise) and preparation methods (e.g., smaller portion sizes and healthy side items).

Implementation: We promoted 'fresh combo meals' that were equal or lower in price than the original combination meal using wall posters. The types of combo meals and prices were specific to each carry-out. For example, one carry-out priced a combination meal including a veggie wrap (\$10) and water (\$1) at \$8 total. Another priced a turkey sandwich (\$4.50), water (\$1) and baked chips (\$0.50) at \$5 total. All price reductions were voluntarily done without compensation, despite our initial offer to subsidize the difference between the original and promoted price (Table 3).

Table 3. Description of Baltimore Healthy Carry-outs Intervention Phases^a

Phase	Name	Description
1	Menu board and labeling	<ul style="list-style-type: none"> ♦ Replaced existing menu boards with new boards which emphasized healthy foods^b with full-color photographs and menu labeling which indicated more-healthy items using leaf logo. ♦ Provided carry-out with paper menus (replicating new board) for distribution ♦ POP^c posters indicating menu changes
2	Increased healthy sides & healthy beverages	<ul style="list-style-type: none"> ♦ Promoted already-existing healthy sides^d using posters next to menu boards ♦ Introduced cost-neutral, culturally-appropriate healthy sides^e and beverages ♦ Provided initial stocks of healthy sides to encourage future stocking ♦ POP posters indicating healthy sides & beverages
3	Affordable healthy combination meals & new preparation methods	<ul style="list-style-type: none"> ♦ Promoted healthy combination meals^f of equal or lesser price than original combination meals^g ♦ Added menu entrées using healthy food preparations (e.g., grilled chicken instead of fried chicken) ♦ POP posters indicating affordable healthy combo meals

^a Each phases lasted for 8 weeks.

^b Definition of a healthy entrée <600kcal and <20g of fat, a healthy side <200kcal and <7g of fat, and water and diet sodas for beverages.

^c POP: Point-of-Purchase refers to the area surrounding the counter where customer makes payment

^d Existing healthy sides & beverages included collard greens, corn, salad, soup, bottled water, diet soda.

^e Newly introduced healthy sides included baked chips, yogurt, fruit cup, bananas, watermelon. These were defined by community members at the formative research stage.

^f Example of a healthy combination meal : A grilled chicken sandwich, a bag of baked chips and a bottled water. Example of a less-healthy combination meal: Fried chicken wings (n=4), a large French fries, and a jumbo soda.

^g Carry-out owners determined the amount of price reduction ranging from \$0.35 - \$2.50 per combo meal, which is approximately 10-30% of the total cost.

FINDINGS

Process Evaluation

Process evaluation data were collected to assess whether the intervention strategies were implemented according to protocol.^{37,38} We used sales receipt collection, carry-out visit evaluation form, and intervention exposure surveyⁱⁱⁱ to assess the following: number of customers at intervention relative to baseline; the customers' amount of exposure to intervention components; and how well components of the intervention were delivered according to plan.³⁹

BHC reached more customers during the intervention period compared to the baseline at intervention carry-outs, as compared to comparison carry-outs (36.8% increase (n=3552) at intervention carry-outs vs. 1.2% increase (n=175) comparison carry-outs).

Menu boards and menu labeling were seen by 98.0% and 84.2% of customers, respectively. Posters for each of the three phases were seen 55.4%, 34.7%, and 55.4% of the time. A total of 65.3% of customers purchased a food because they saw the photo on the menu board. Additionally, 42.6% purchased a food due to the presence of the leaf logo.

Availability of promoted entrées (e.g., entrée salads, grilled chicken sandwiches) and new healthy sides (e.g., bananas and baked chips) were measured in the four intervention carry-outs to assess fidelity. Promoted entrees were available 92.5% of the time on average (ranging from 91.0 - 96.1%). Promoted healthy sides were available on average 53.8% on average (ranging from 50.0 - 57.4%). Beverages were not measured because they were stocked directly by the beverage vendors rather than by carry-out owners.

Menu boards were appropriately placed with 100% fidelity throughout all phases in the four intervention carry-outs. However, we found that one carry-out did not place posters

ⁱⁱⁱIntervention Exposure Assessment (IEA) assessed intervention specific knowledge and purchasing behaviors (i.e., have you seen this poster (photo provided)?; have you purchased watermelon at this carry-out?).

immediately after the initiation of Phase 1. Interventionists helped owners to place the posters the following week and posters remained visible throughout the intervention. Overall, posters were visibly posted 97.5% of the time.

Carry-out Level Impact

A total of 186,654 unit sales (menu orders) were collected over the study period (Figure 6).

Change in unit sales from baseline

In the intervention group, the odds of healthy entrée sales significantly increased by 27% just after Phase 1 and the odds of selling healthy sides and beverages significantly increased by 49% after Phase 2, compared to baseline. Moreover, in the intervention group, the odds of total healthy item sales significantly increased by 26% at Phase 1, 44% at Phase 2, and 53% at Phase 3, while no changes were found in the comparison group.

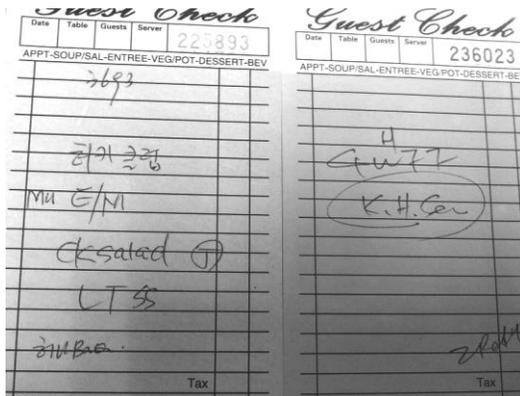


Figure 6. Examples of hand-written menu orders^{iv}

Change in revenue from baseline

In the intervention group, the odds of revenue from healthy entrées significantly increased by 16% in Phase 1, 32% in Phase 2, and 36% in Phase 3, relative to baseline. The odds revenue from healthy sides & beverages was 1.62 times greater at Phase 2. The total

^{iv}Left: Turkey club (in Korean), mustard, everything without mayonnaise, Chicken Salad sandwich, toasted, lettuce, tomatoes, season salt, honey barbeque sauce. Right: Four wings and French fries, ketchup, hot sauce and season salt

revenue significantly increased by 24% in Phase 1 and maintained its increase across Phase 2 and 3. However, in the comparison group, total revenue significantly decreased relative to baseline.

Customer Level Impact

BHC intervention and purchasing of healthy items

Nearly 80% responded that they purchased at least one healthy item at the carry-out, while only 17.9% comparison carry-out customers responded doing so. The intervention carry-out customers purchased 4.5 types of healthy items while comparison carry-out customers purchased less than 1 healthy item. All of the customer intervention exposure scores^v were significantly higher in the intervention carry-outs relative to comparison carry-outs. The mean total exposure scores^{vi} were 8.8 and 1.2 in intervention and comparison carry-out customers, respectively. We also found that higher total intervention exposure was associated with higher number of healthy items purchased. For example, those with a total exposure score of 10 purchased 3.8 healthy items, at least once at carry-outs, during the intervention period.

SUMMARY OF THE MAIN FINDINGS

The goal of this study was to develop, implement and evaluate an environmental carry-out intervention in low-income settings in Baltimore City. Evaluation was done by analyzing healthy item sales at the carry-out level as well as healthy item purchasing behaviors at the customer level.

The four core intervention strategies included: 1) revising menu boards, 2) emphasizing healthy menu options using menu labeling which indicates fresh choices, 3) increasing the

^vIntervention Exposure Score (0-24) was calculated as a combined score from 3 different components customers responding that they have seen menu boards & menu labeling (0-3), healthy side dishes and beverages posters (0-13) and healthy combo meal posters (0-8). We created intervention exposure scores using previously fielded approach by counting each intervention item as 1 (Gittelsohn, Song, et al., 2010).

^{vi} The mean total exposure score is an average of the Intervention Exposure Scores, which ranges from 0-24.

availability of healthy menu items through stocking and changing food preparation methods, and 4) increasing access to healthy combo meals by providing price incentives. On the whole, revising menu boards with menu labeling was the most cost-effective and efficient mode of intervention. One reason for this effectiveness is that once a high quality menu board with labeling is placed in the carry-out, it is not likely that the carry-out owner will take it down upon completion of BHC. Therefore, the length of time to which customers are exposed to this labeling is potentially indefinite. The promotion of healthy sides and beverages as well as affordable healthy combination meals may be sustainable when coupled with increase in the revenue. Identifying intervention strategies that are feasible with high fidelity deserves attention in terms of a sustained long-term effect.

The process evaluation findings revealed that the promoted entrées were highly available and the revised menu and poster had near perfect presence suggesting high fidelity. We believe that BHC intervention strategies were feasible to implement and achieved high exposure.⁴⁰

The intervention carry-outs significantly increased sales of healthy items compared to baseline while comparison group did not compare to baseline. Total revenue in the intervention group significantly increased in all phases relative to baseline while it significantly declined in the comparison group. This unexpected finding is relevant for future studies, especially when recruiting for carry-outs and other prepared food sources. Introducing and promoting healthy items in carry-outs not only increased the total revenue but also were protective against sales decline.³⁵ It is possible that the intervention attracted new customers to shop at the intervention carry-outs which led to an increase in total revenue.

As expected, customers from the intervention group were exposed to aspects of the intervention significantly more than customers from the comparison group. Customers who were more exposed to the intervention purchased more variety of healthy foods.

Overall, BHC was a successful intervention that provides evidences for policy development and potential dissemination across the Baltimore City.

RECOMMENDATIONS FOR POLICY LINKAGES

Collaboration with Local Food Policy Initiatives & Government Involvement

From the very start of the Baltimore Healthy Carry-outs project, we shared BHC's progress and findings with the Baltimore Food Policy Initiative and Department of Planning. This partnership was essential to our ability to generate policy briefs when communicating with policy makers and when emphasizing to them the need to disseminate such carry-out interventions. Moreover, the collaboration was crucial to demonstrate the cost-effectiveness, short and long-term success, and potential sustainability of the BHC intervention.

Coupled with strong leadership from the initiatives and support from the Baltimore mayor's office, we were able to implement the BHC intervention strategies in public markets in Baltimore, an initiative titled "Get Fresh Public Markets".⁴¹ There are a total of six public markets in Baltimore City, and in total there are 100 carry-outs (70% of all food vendors) in these markets.⁴¹ Get Fresh Public Markets has four strategies, two of which are direct implementations of BHC: (1) Healthy carry-outs; (2) increased demand among customers; (3) local farmer day stalls; and (4) healthy food and fitness strategy. To date, a total of 36 carry-outs in three public markets have received some/all of the intervention components, and by 2015 all carry-outs in all public markets will have received the BHC intervention strategy.

Healthy Carry-out Certification

Many intervention studies focusing on small food stores and prepared food sources recommend that effective strategies should be disseminated through policy.^{26,27,42} Healthy carry-out certification will create a city-wide standard for identifying prepared food sources that provide and promote healthy food options. Certification of healthy carry-outs could benefit customers looking for healthful foods when eating out. We could incorporate intervention strategies used in the BHC to serve as core qualifications to be eligible for certification. For example, menu analysis could be applied to identify more-healthy food options and to use menu labeling for items that qualify as “healthy”. In order to be certified as a Healthy carry-out, one must serve more than two types of healthy side dishes, two varieties of healthy beverages and two different types of healthy entrées.

Certification will assist in promoting, incentivizing and increasing healthy food retailing in food deserts across Baltimore City. The Department of Health currently conducts Food Service Facility Inspection Reports two-three times annually. We can include a few questions in such reports to assess healthy carry-out certification compliance.

LESSONS LEARNED FOR FUTURE PRACTICE AND INTERVENTION

IMPLEMENTATION

Mix and Match: Standardized and customized intervention strategies

It is important to implement a standardized main intervention strategy (i.e., menu labeling) to assess its effectiveness at various types of prepared food sources. However, non-franchised prepared food sources have many idiosyncratic characteristics (e.g., interior design, types of food sold, language capability, and varying numbers of employees). Therefore, along with the standardized strategy (in this case, menu labeling), implementing customized

intervention materials/strategies for each type of individual prepared food vendor may be an effective approach. One example is using different color schemes and poster designs that represent the cuisine. Especially if prepared food sources are located close to one another, since business owners would prefer to differentiate their business from others. This approach will allow the characteristics of each individual prepared food vendor to complement the overall effectiveness of the common intervention elements.

Conduct menu analysis when defining healthy items

We analyzed observed recipe information using the publically accessible USDA National Nutrient Database to assess the calorie and fat information on carry-out menu items. It is possible that we may not have accurately assessed the calorie and fat information compared to laboratory analysis of calorie and nutrient content information. We believe that our methodology was the most feasible way to assess nutrient information for the more-healthy items with limited resources. Decisions on whether to only look at calorie content of the menu or to include other macro- and micronutrients should be decided based on the research question and appropriate menu analysis should be used. In this study, our main focus was on total calories and fat content, as our study population had a particularly high percent of energy coming from fat.

Designate interventionists for rapport building

BHC employed several student research assistants as interventionists. Despite concerns regarding limited time commitment from student research assistants, BHC was successfully implemented because we assigned designated interventionists to visit the same carry-outs throughout the intervention implementation. Doing so developed rapport and strengthened the relationship between the owners and the interventionists. When employing student interventionists, it is important to assign them a manageable number of carry-outs for which to

deliver and implement intervention strategies. Also, when the interventionists could not make their regular visits, we sent someone else who would be familiar to the owners (i.e., the program coordinator) along with a new interventionist to ensure proper intervention delivery and acceptability from carry-out owners.

Incorporate culture in the intervention

Half of the BHC participating carry-out owners were 1st generation Korean-Americans. Having Korean speaking staff was essential in intervention implementation with Korean owners, mainly to eliminate language barriers. Moreover, cultural sensitivity training was delivered to all interventionists, research assistants, and process evaluator to ensure positive interaction between staffs and Korean owners. This training session included Korean core cultural values, basic Korean greetings, and manners expected in Korean culture.

Initiate with low burden strategies

Placing little obligation on already busy carry-out owners was crucial to initiate a successful intervention in these settings. We strategically developed intervention strategies that required little to no involvement of the owners in Phase 1. We did not ask owners to add healthier items to their menu in the first phase; instead we used their existing menu list when creating the new board. Carry-out owners were extremely pleased with the new materials, which enhanced the aesthetics of their establishments and captured customers' attention.

Identify healthier menu options using simple-logo type menu labeling

We decided on using a symbol to identify healthier menu options rather than posting calories because caloric labeling may cause unintended consequences. For example, customers might choose to purchase foods with higher calories, thinking that they are a better deal for the money. Findings from the formative research suggested that carry-out owners were strongly

opposed to traffic light symbols because they were afraid that red symbols would decrease the sales of unhealthy items like fried chicken. Therefore, we decided to create a symbol that emphasized healthy items by using a green color. The symbol originated from a collard leaf, which almost all participants identified as a healthful food, into a simple green leaf designed logo. Menu labels were placed in front of the menu item name. Carry-out owners were happy with the idea because menu labels were attractive and did not interfere with their current practices.

Introduce new healthy sides and beverages that are easy to stock

Carry-outs' baseline healthy side sales varied, but for the most part only a few healthy sides and beverages were available. BHC successfully increased the variety of healthy sides offered at intervention carry-outs. We demonstrated that promoted healthy side dishes were moderately available. Some limitations were due to the structural barriers (i.e., no refrigeration) that limited the capacity to sell perishable items (i.e., yogurt and fresh fruits). In order to encourage owners to sell more fresh fruits, we conducted smoothie taste-testing with customers to encourage owners to use ripe bananas and overstocked fresh fruits. Despite the popularity of the taste tests, owners did not actively sell fruit smoothies. Perhaps, the owners perceived making smoothies as burdensome (e.g., cutting fruits, blending, washing blender). On the other hand, baked chips were very popular among customers and carry-out owners wanted to sell them. However, local wholesalers did not offer baked chips in large bulk, which limited the owners' ability to actively stock and sell this food.

Provide high-quality revised menu boards

Most carry-out owners expressed the concern that our attempts to increase healthy menu items would interfere with their current practices. Providing free high-quality revised menu

boards based on their original menus helped us to build trust and rapport with them. In particular, discussing the design and color of revised menu boards with the owners allowed them to fully engage in the process and opened opportunities for them to ask questions related to the project more comfortably. When interventionists provided a mock-up menu board for the owners' review, owners were extremely satisfied.

Select foods that are culturally acceptable

Among a variety of promoted healthy foods (selection based on findings from the formative research), some were more acceptable to both carry-out owners and customers, showing increased sales at intervention carry-outs. These foods could be described as “culturally acceptable.” For instance, fruit cups were preferred to bananas, baked chips to pretzels, and turkey sandwiches to grilled cheese sandwiches. Inclusion of these culturally acceptable foods at an early stage of an intervention may motivate carry-out owners to sell and promote healthy foods in general.³¹

Implement price reduction for healthy combination meals

Despite carry-out owners' initial concerns regarding selling healthy foods, the affordable healthy combination meal was successfully implemented in all four intervention carry-outs. As interventionists developed rapport with the owners, they felt comfortable allowing us to implement price reductions for a few healthy combination meals without any compensation (we originally planned to subsidize the discrepancy between the original price and discounted price). Two carry-outs offered dollar amount reductions ranging from \$1 to \$2.50 per combination meal. Two other carry-outs were not comfortable reducing the dollar amount, but offered free baked chips and bottled water as a form of price reduction, which was equivalent to a \$0.50 to \$1.50 reduction. Even after taking account for the price reduction of these combination meals,

intervention carry-outs experienced increase in their total revenue. Moreover, owners were pleasantly surprised by positive responses from the community members for providing healthful foods at reduced prices. One year after completion of BHC, three out of four carry-outs are continuing to provide reduced prices for healthy combination meals while one carry-out^{vii} discontinued the reduced pricing strategy for healthy combination meals. Price is one of the most important deciding factors when people chose food away from home⁴³, especially among those with limited budget.⁴⁴ Future studies should consider implementing price manipulation (i.e., increase price of less-healthy foods and reduce price of healthy foods) in the prepared food vendor interventions.

Identify role model carry-outs

Carry-out owners' support varied in the different stages of the intervention. Some carry-outs were more likely to adapt and commit to the program, while others were suspicious and concerned. Sharing successful stories of role model carry-outs may convince those who are less likely to commit. Moreover, successful stories of specific intervention strategies will likely spread to nearby carry-outs. An idea for future intervention is to invite role model carry-out owners to food safety annual training sessions to disseminate intervention strategies. Furthermore, collaborations with local organizations, such as the Korean American Grocers Association, to share successful stories via newsletters and websites could provide a strategic means of dissemination of good practices.

^{vii}This carry-out owner was cooperative while the BHC intervention was on-going. While this paper did not explore further on why the owner stopped providing the reduced price for healthy foods, one can assume that the owner felt the sales benefit of healthy foods were not greater than the burden of stocking new food items. Future studies should explore the sustainability of intervention strategies to fully understand their feasibility.

REFERENCES

1. Riehle, H., Grindy, B. & Altman, M. (2011). Restaurant Industry Forecast. Accessed at dealer.rmpos.com/downloads/industryforecast2011.pdf on December 3, 2012.
2. Stewart, H., Blisard, N. & Jolliffe, D. (2006). "Let's eat out: Americans weigh taste, convenience, and nutrition." *EIB-19*. Economic Research Service. United States Department of Agriculture. Accessed at www.ers.usda.gov/media/860870/eib19.pdf on January 28, 2013.
3. United States Department of Agriculture. (2011). Food Expenditures: Table 15. Sales of meals and snacks away from home by type of outlet. *Economic Research Service*. Accessed at www.ers.usda.gov/Briefing/CPIFoodAndExpenditures/Data/Expenditures_tables/table15.htm on February 18, 2013.
4. Zoning Code of Baltimore City. (2010). *1-123.1 Carry-out Food shop*. Accessed at www.griaonline.org/wp-content/uploads/Baltimore-City-Zoning-Code-9-20091.pdf on February 18, 2013.
5. Azuma, A. M., Gilliland, S., Vallianatos, M. & Gottlieb, R. (2010). Food access, availability, and affordability in 3 Los Angeles communities, Project CAFE, 2004-2006. *Prev.Chronic Dis.* 7, A27.
6. Cannuscio, C. C., Weiss, E. E. & Asch, D. A. (2010). The contribution of urban foodways to health disparities. *Journal of Urban Health* 87, 381-393.
7. Gittelsohn, J. *et al.* (2007). Understanding the food environment in a low-income urban settings: Implications for food store interventions. *J Hunger Environ Nutr.* 2, 33-50.
8. Lee, S. H. *et al.* (2010). Characteristics of prepared food sources in low-income neighborhoods of Baltimore City. *Ecol Food Nutr.* 49, 409-430.
9. Sharma, S. *et al.* (2009). Assessment of dietary intake in an inner-city African American population and development of a quantitative food frequency questionnaire to highlight foods and nutrients for a nutritional invention. *Int.J.Food Sci.Nutr.* 60, 155-67.
10. Bassett, M. T. *et al.* (2008). Purchasing behavior and calorie information at fast-food chains in New York City, 2007. *Am J Public Health.* 98, 1457-1459.
11. Bowman, S. A. & Vinyard, B. T. (2004). Fast food consumption of US adults: impact on energy and nutrient intakes and overweight status. *J.Am.Coll.Nutr.* 23, 163-168.
12. Duffey, K. J., Gordon-Larsen, P., Jacobs, D. R., Williams, O. D. & Popkin, B. M. (2007). Differential associations of fast food and restaurant food consumption with 3-y change in Body Mass Index: the Coronary Artery Risk Development in Young Adults Study. *Am J Clin Nutr.* 85, 201-208.

13. Paeratakul, S., Ferdinand, D. P., Champagne, C. M., Ryan, D. H. & Bray, G. A. (2003). Fast-food consumption among US adults and children: dietary and nutrient intake profile. *J Am Diet Assoc.* 103, 1332–1338.
14. Richardson, A. S., Boone-Heinonen, J., Popkin, B. M. & Gordon-Larsen, P. (2011). Neighborhood fast food restaurants and fast food consumption: A national study. *BMC Public Health.* 11, 543.
15. Cummins, S. & Macintyre, S. (2002). ‘ Food deserts’- evidence and assumption in health policy making. *Br Med J.* 325, 436.
16. Fielding, J. E. & Simon, P. A. (2011). Food deserts or food swamps?: comment on ‘Fast food restaurants and food stores’. *Arch Intern Med.* 171, 1171–1172.
17. Rose, D. *et al.* (2009) “Deserts in New Orleans? Illustrations of Urban Food Access and Implications for Policy.” *USDA Economic Research Service Research.*
18. Woodham, C. L. (2011). Food desert or food swamp? An in-depth exploration of neighbourhood food environments in Eastern Porirua and Whitby. Accessed at otago.ourarchive.ac.nz/handle/10523/1655 on February 18, 2013.
19. Beydoun, M. A., Powell, L. M. & Wang, Y. (2009). Reduced away-from-home food expenditure and better nutrition knowledge and belief can improve quality of dietary intake among US adults. *Public Health Nutr.* 12, 369–381.
20. Kant, A. K. & Graubard, B. I. (2004). Eating out in America, 1987–2000: trends and nutritional correlates. *Prev Med.* 38, 243–249.
21. McCrory, M. A. *et al.* (1999). Overeating in America: association between restaurant food consumption and body fatness in healthy adult men and women ages 19 to 80. *Obes Res.* 7, 564–571.
22. Gordon-Larsen, P., Nelson, M. C., Page, P. & Popkin, B. M. (2006). Inequality in the built environment underlies key health disparities in physical activity and obesity. *Pediatrics.* 117, 417–424.
23. Kumanyika, S. (2005). Obesity, health disparities, and prevention paradigms: hard questions and hard choices. *Prev Chronic Dis* 2, A02.
24. Larson, N. I., Story, M. T. & Nelson, M. C. (2009). Neighborhood environments: disparities in access to healthy foods in the U.S. *Am J Prev Med.* 36, 74–81.
25. Neff, R. A., Palmer, A. M., McKenzie, S. E. & Lawrence, R. S. (2009). Food systems and public health disparities. *J Hunger Environ Nutr.* 4, 282–314.
26. Seymour, J. D., Lazarus Yaroch, A., Serdula, M., Blanck, H. M. & Khan, L. K. (2004). Impact of nutrition environmental interventions on point-of-purchase behavior in adults: a review. *Prev Med.* 39, Suppl 2, 108–136.

27. Gittelsohn, J., Rowan, M. & Gadhoke, P. (2012). Interventions in Small Food Stores to Change the Food Environment, Improve Diet, and Reduce Risk of Chronic Disease. *Prev Chronic Dis* 9, 110015.
28. Gittelsohn, J., Lee, S. H. & Batorsky, B. (Under Review). A systematic review of community-based prepared food source interventions. *Prev Chronic Dis*.
29. Ames, A. *et al.* (2011). "Neighborhood Healthy Profiles." *Baltimore City Health Department*. Accessed at www.baltimorehealth.org/neighborhoodmap.html on November 15, 2012.
30. Noormohamed, A. *et al.* (2012). Factors Influencing Ordering Practices at Baltimore City Carryouts: Qualitative Research to Inform an Obesity Prevention Intervention. *Ecol Food Nutr.* 51, 481–491.
31. Jeffries, J., Lee, S. H., Frick, K. & Gittelsohn, J. (Epub ahead of print) Preferences for Carry-Out Meals in Low-Income Neighborhoods of Baltimore City. *Health Promot Pract.*
32. Healthy Howard. (2012) "Look for certified Healthy Restaurants." Accessed at www.healthyhowardmd.org/healthy-howard/healthy-restaurants on January 7, 2013.
33. Shovelin K, Molloy M, Yum D, Shirah K, Andersen K, Ezzell J, et al. (2002). "Changing the environment in which consumers dine: The Winner's Circle Healthy Dining Program." *The 131st Annual Meeting (November 15-19, 2003) of American Public Health Association*. Accessed at apha.confex.com/apha/131am/techprogram/paper_62943.htm on Jan 12, 2013.
34. Molloy, M. Practice Notes: Strategies in health education. Winner's Circle Healthy Dining program. *Health Educ Behav* 29, 406–408 (2002).
35. Lee, S. H., Kim, H., Bleich, S. N. & Gittelsohn, J. (Under Review). Environmental intervention in carryout restaurants increases sales of healthy menu items in a low-income urban setting. *Public Health Nutr.*
36. Hoffman, V., Lee, S. H., Bleich, S. N., Goedkoop, S. & Gittelsohn, J. (Forth coming). Relationship between BMI and food purchases in low-income, urban adult carry-out customers. *J Hunger Environ Nutr.*
37. Linnan, L. & Steckler, A. (2002). "Process evaluation for public health interventions and research." *Process Evaluation for Public Health Interventions and Research: An Overview*. Josey-Bass, San Francisco.
38. Saunders, R. P., Evans, M. H. & Joshi, P. (2005). Developing a Process-Evaluation Plan for Assessing Health Promotion Program Implementation: A How-To Guide. *Health Promot Pract.* 6, 134–147.
39. Gittelsohn, J. *et al.* (2010). Process evaluation of Baltimore Healthy Stores: a pilot health intervention program with supermarkets and corner stores in Baltimore City. *Health Promot Pract.* 11, 723–732.
40. Lee, S. H. *et al.* (Under Review). Improving prepared food sources in a low income urban setting: Development and implementation of the Baltimore Healthy Carryouts study. *BMC Public Health*.

41. Freishtat, H. (2012). Baltimore Food Policy Initiative/ Public Markets/ Get Fresh Lexington. *Baltimore City Government*. Accessed at www.baltimorecity.gov/Government/AgenciesDepartments/Planning/BaltimoreFoodPolicyI/Baltimore/PublicMarkets/GetFreshLexington.aspx on November 13, 2012.
42. Story, M., Kaphingst, K. M., Robinson-O'Brien, R. & Glanz, K. (2008). Creating healthy food and eating environments: policy and environmental approaches. *Annu Rev Public Health*. 29, 253–272.
43. Glanz, K., Basil, M., Maibach, E., Goldberg, J. & Snyder, D. (1998). Why Americans eat what they do: taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *J Am Diet Assoc*. 98, 1118–1126.
44. Loewenstein, G. (2011). Confronting reality: pitfalls of calorie posting. *Am J Clin Nutr*. 93, 679–680.

APPENDIX: DISCLAIMER

This paper is a distinct piece of work prepared solely by the author that emerged from a larger project, the “Baltimore Healthy Carry-Outs” (BHC) project. The Baltimore Healthy Carry-outs project was funded by two sources: (1) the Pilot and Feasibility Program from the Baltimore Diabetes Research and Training Center (DRTC), Johns Hopkins University and University of Maryland (PI: Dr. Joel Gittelsohn), and (2) the Carl Taylor Research Grant from the Center for a Livable Future (CLF), Johns Hopkins University (PI: Ms. Lee). The overall objective of the DRTC proposal (PI: Dr. Gittelsohn) was to collect preliminary data and develop a pilot intervention to improve prepared food sources for low income African Americans at high-risk of diabetes in Baltimore City. The BHC experience is now being used as a reference for a city-wide randomized control trial “B’more Healthy: Communities for Kids.” Ms. Lee’s proposal to the CLF was to conduct a pricing manipulation intervention at the carry-outs.

The funds were allocated to the following: (1) in-depth interview & focus group compensation to the participants (DRTC & CLF); (2) monetary compensation to the carryout owners for providing sales receipts every week (DRTC & CLF); (3) compensation for the data collectors and interventionists (DRTC); (4) purchasing intervention materials such as menu boards, paper receipts, initial stock of healthy food items (DRTC & CLF); (5) hiring a community artist to design intervention materials such as promotional posters and logos (DRTC); (6) partial salary for the Principal Investigator, Dr. Gittelsohn (DRTC & CLF); (7) Ms. Lee's research assistantship for the coordination of the project, data collection, data quality control, training of other research assistants (DRTC); (8) partial tuition support for Ms. Lee (CLF).

This paper contains a description of the BHC project that was supervised by Dr. Joel Gittelsohn. Although the current paper draws on the analysis that Ms. Lee conducted under the

BHC and/or CLF grant(s), she was not paid by the BHC or the CLF to produce this paper submitted to the Abell Award competition.