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Barriers to Truck Drivers' Healthy Eating: Environmental Influences and Health Promotion Strategies

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This article presents an assessment of 25 trucking work settings designed to examine whether the environmental attributes of these settings influence eating patterns of truckers who are at risk for excess weight gain. Findings corroborate evidence that these work settings represent healthy food deserts. From restaurants and vending machines to the social/information environments and their surrounding communities, only meager opportunities exist for healthful eating practices. This article aims to place underserved

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truckers and warehousing-sector employees firmly within the discourse of workplace health promotion and calls for multistakeholder wellness strategies that encompass the intertwined risk factors linked with the transportation work environment.

KEYWORDS *environmental barriers, healthy food options, trucking work settings*

Eating behavior is highly complex and results from the interplay of multiple influences across different contexts. Considering that overweight/obesity have reached a combined 70% among U.S. adults (Flegal, Carroll, Ogden, & Curtin, 2010) it is important to recognize the potential of social environments such as workplaces to influence the epidemic's trajectory. With about 65% of the population in the workforce (Bureau of Labor Statistics [BLS], 2010a, 2010b), worksites have a critical bearing on employees' dietary and physical-activity patterns, all of which are important determinants of excess weight gain. Workplaces can provide employees with resources, opportunities, and exposures that can significantly influence their eating behaviors. The confluence of workplace food environments, related institutional/commercial policies, and practices involved in food production, preparation, and consumption can potentially create either barriers to or opportunities for healthful diets (Barnett et al., 2007). Over the past decade, there has been increasing recognition of factors in the social and physical environments that influence weight gain, poor nutrition, and physical inactivity—all important precursors of obesity (French, Story, & Jeffery, 2001; Richter et al., 2000). The negative health effects of these environments are particularly significant for the commercial transport sector.

Trucking comprises several diverse but intertwined subsectors with occupations ranging from truckers, dispatchers, and manual laborers to administrative support, maintenance, and management. Among millions of individuals working in the broad trucking sector, more than three million truckers operate within a multilayered transportation environment and can be categorized as full truckload (FTL), less than truckload (LTL), and parcel-carrier drivers (BLS, 2010a, 2010b). This transportation environment includes government regulations, trucking operations, corporate policies for trucking settings, and the trucking built-environment, with multicomponent trucking work settings (Apostolopoulos, Sönmez, Shattell, & Belzer, 2010). This occupational context exerts far-reaching influences on, among a multitude of others, truckers' food-purchasing choices and eating behaviors, the number of hours they sleep, the quality of air they breathe, and their opportunities for physical activity. Within a highly sedentary environment, about 80% of truckers have unhealthful eating patterns as a result of poor food choices, only 8% exercise regularly because fitness resources are few and far in between, about 85% are overweight or obese, 44% are

hypertensive, and many suffer from hypercholesterolemia, cardiovascular disease (CVD), and type-2 diabetes (Bigert et al., 2003; Krueger, Brewster, Dick, Inderbitzen, & Staplin, 2007; Mackie, 2008; Martin, Church, Bonnell, Ben-Joseph, & Borgstadt, 2009; Robinson & Burnett, 2005; Wood, Hegmann, Murtaugh, & Thiese, 2007). Not surprisingly, the life expectancy of unionized drivers is 63 years and 55.7 for members of the Owner-Operator Independent Drivers Association (Salzman & Belzer, 2007).

This article aims to include the trucking sector in the dialogue of workplace health promotion and is focused primarily on underserved truckers who consistently use several components of trucking work settings, and secondarily on the sector's other employees who work in these settings (BLS, 2010b). Within this context, this article (a) examines how trucking work settings' environmental attributes influence the food choices and eating patterns of truckers who are at high risk for excess weight gain and obesity, and (b) introduces a workplace health-promotion paradigm grounded in a multistakeholder approach that incorporates occupational safety and health with health promotion strategies.

METHOD

Instrument Development

Grounded in ecosocial models (Krieger, 1994; McMichael, 1999; Susser, 1996), and based on existing tools that assess healthy eating and active-living environments (i.e., Checklist of Health Promotion Environments at Worksites [CHEW]: Krieger, 1994; Nutrition Environment Measures Survey in Stores [NEMS-S]: McMichael, 1999; Swift Worksite Assessment and Translation/Tool for Observing Worksite Environments [SWAT/TOWE]: Susser, 1996), the Healthy Trucking Work-settings Audit Instrument (HEATWAI) was designed: (Glanz, Sallis, Saelens, & Frank, 2007). It is a 250-item instrument that uses observation to measure the presence of corporate, social, and built-environment attributes of trucking work settings that positively influence food choices/eating behaviors and physical/recreational activities of truckers and other transportation/warehousing-sector employees. The interrater reliability analysis resulted in kappa = .87 ($p < .001$), 95% Confidence Interval (CI) [0.760, 0.980] (HEATWAI development details can be found in other works) (Apostolopoulos et al., in press). The five HEATWAI components are briefly described below (Table 1), with particular elaboration on the assessment of healthy food environments.

HEATWAI Summary Scales

Through a series of five subscales, the Healthy Food Environment (HEFE) measures the presence of healthful food options and resources in

TABLE 1 Healthy Trucking Work-Settings Audit Summary Scales and Subscales

Summary scales and subscales	Items
Healthy Food Environment (HEFE)	(128 items total)
● HEFE Subscale 1: Healthy Menu Items in Restaurants with Waiters/Cafeteria Style	25 items
● HEFE Subscale 2: Healthy Menu Items in Fast Food Restaurants	18 items
● HEFE Subscale 3: Healthy Items in Vending Machines	50 items
● HEFE Subscale 4: Healthy Items in Convenience Stores/Mini Marts	21 items
● HEFE Subscale 5: Healthy Diet Supportive Resources in Lunch/Break Rooms/Driver Lounges/Picnic Areas	14 items
Health Supportive Social Environment (HESSE)	(15 items total)
● HESSE Subscale 1: Supportive Social Environment for Physical and Recreational Activity	7 items
● HESSE Subscale 2: Social Support for Healthful Food Options	8 items
Health Supportive Community Environment (HESCE)	(24 items total)
● HESCE Subscale 1: Physical and Recreational Activity Amenities and Opportunities in Community	13 items
● HESCE Subscale 2: Healthful Food Options in Community	11 items
Health Information Environment (HEIE)	(11 items total)
● HEIE Subscale 1: Evidence of Physical and Recreational Activity Promotion	5 items
● HEIE Subscale 2: Evidence of Promotion of Healthful Food Choices and Eating Behaviors	6 items
Active Living Environment (ALE)	(65 items total)
● ALE Subscale 1: Support for Physical and Recreational Activity in Natural Environments and Surrounding Grounds	13 items
● ALE Subscale 2: Support for Physical and Recreational Activity in Built Environment	14 items
● ALE Subscale 3: Resources and Facilities that Encourage Physical and Recreational Activity	19 items
● ALE Subscale 4: Exercise and Fitness Facilities that Support Physical Activity	19 items

restaurants/cafeterias, vending machines, convenience stores, break rooms, drivers' lounges, and picnic areas. The presence and condition of amenities such as microwave ovens, refrigerators, and water coolers as well as the number of eating venues and food outlets are also recorded. This 128-item healthy food environment includes Subscale 1 with 25 items for restaurants with waiters, cafeteria-style, or canteen venues; Subscale 2 with 18 items for fast-food restaurants; Subscale 3 with 50 items for vending machines (nonrefrigerated snacks, refrigerated/frozen food, cold/hot drinks); Subscale 4 with 21 items for convenience stores and/or minimarts; and Subscale 5 with 14 items for lunch or break rooms or driver's lounges and picnic areas. Examples of healthful food items that can be scored include low-fat/nonfat salad dressing, fresh or dried fruits, à-la-carte items priced competitively against combo/value meals, salad dishes, and low-fat items advertised at

point-of-purchase, labels with visible nutritional values, and whole-grain crackers/pretzels. The total HEFE score represents an aggregate score of 128 items broken down into the summary subscales.

The Health-Supportive Social Environment (HESSE) scale measures the organizational, social, and policy environment related to food, physical/recreational activity, and weight management at trucking work settings. Examples of resources that support a healthy diet include appealing, low-cost, healthful food options offered at work settings, or opportunities for physical/recreational activities (e.g., basketball, table tennis). Total HESSE points of 15 include Subscale 1 with seven items for physical/recreational activities and Subscale 2 with eight items for healthful food/eating.

The Health-Supportive Community Environment (HESCE) scale measures work settings' surrounding vicinities that are critical for truckers' food and physical activity-related decisions. *Community* is defined as surrounding neighborhoods of work settings usually up to a two- to three-block radius. Two subscales are used to measure a total of 24 HESCE points: Subscale 1 with 11 items for a community that promotes healthy eating via easily accessible produce-markets, greengrocers, or food stores selling unprocessed, healthy carryout items, and Subscale 2 with 13 items for a community that promotes physical/recreational activity via fitness facilities or walking-designated areas around the immediate proximity of the work setting. Items on the area's overall safety and cleanliness, as well as its walkability are also included.

The Health Information Environment (HEIE) scale includes all visible health-related print media at trucking work settings with potential to motivate healthful eating and physical activity, to which truckers are exposed. All publicly visible bulletin boards, notices, postings, brochures, and fliers with informative messages are recorded and assigned points. Total HEIE points of 11 include Subscale 1 with six items for healthful food/eating and Subscale 2 with five items for physical/recreational activity.

The Active Living Environment (ALE) scale assesses the extent to which trucking work settings promote involvement in physical/recreational activities. ALE examines the availability of resources that support physical activity as follows: Subscale 1 with 13 items is used to assess if and how the natural environment/surrounding grounds support physical activity; Subscale 2 with 14 items is used to assess the built environment; Subscale 3 with 19 items is used to measure resources/facilities that encourage physical activity; and Subscale 4 with 19 items is used to measure the presence of exercise/fitness facilities. In addition, the number of buildings, floors, stairs, and elevators along with the condition of fitness equipment are assessed, and sedentary environments (e.g., presence of movie lounge/theater) are noted. Results of our assessment using ALE are outside the scope of this article, and therefore are not discussed, they are the subject of another article.

HEATWAI Scoring

Environmental characteristics with presumed positive effects on food choices and eating behaviors as well as physical/recreational activities are measured by HEATWAI, and resources are recorded in terms of their number and condition. Scoring involves assigning points to each category as environmental characteristics are encountered that are considered to promote healthful food choices and physical/recreational activity. A scorecard was created to permit a total score for the entire work setting as well as scores for summary scales and subscales. Subsequently, an overall rating is developed to indicate the level of support for healthy living. When a particular work setting scores 90% to 100% of the maximum possible points, that setting is assessed as being fully supportive of healthy living; a 75% to 89.9% score is considered mostly supportive; a 50% to 74.9% is considered partially supportive; a 35% to 49.9% is considered scarcely supportive; and less than 35% is considered to be not-at-all supportive of healthy living. In other words, the higher the score a work setting receives the more health promotive it is rated.

Data Collection and Analysis

Following Institutional Review Board approval of the study, data were collected on healthful eating and physical activity opportunities at trucking work settings. Only those results from our assessment of the food environment of trucking work settings and surrounding communities are reported in this article. Data were collected in south-central North Carolina, in close proximity to interstate highways I-85 and I-40, from eight truck stops, eight trucking terminals, seven warehouses, and two highway rest areas. Informal discussions were carried out with truckers regarding the types of foods that could be found in their truck cabs. Drivers corroborated that the foods they carry along with them in their cabs, whether perishables stored in minirefrigerators or nonperishables, are purchased from truck stops, therefore we did not collect food-related data from truck cabs because these data were already directly collected from truck stops. Research sites were chosen to represent geographic (rural vs. urban/suburban) and corporate (national/regional vs. small/local) characteristics, size of work setting (primarily trucker traffic), proximity to highways, and their importance as trucking work settings—determined by the amount of time drivers spend there and opportunities for healthful eating and physical/recreational activities. Onsite observation was conducted during daylight hours and lasted an average of 75 minutes ranging from highway rest areas where they were the shortest, to truck stops where they were the longest. Not all HEATWAI dimensions were present or applicable at every type of work setting; for example there are no restaurants, convenience stores, or mini-marts at highway rest areas, trucking terminals, or warehouses. Data analysis included descriptive statistics and interrater

correlation analysis to establish key psychometric attributes of HEATWAI as an environmental measure.

RESULTS AND DISCUSSION

Trucking Work Settings

Trucking terminals, warehouses, truck stops, highway rest areas, and truck cabs constitute the broader trucking work setting (Table 2) as well as the skeleton of the transportation/warehousing sector. Although it is difficult to classify any of these components as conventional workplaces for truckers, when combined, they represent the trucking work environment. These settings are disproportionately used by truckers, depending on driver type. FTL and national LTL drivers use predominantly truck stops, rest areas, and warehouses and spend the majority of their time in their truck cabs—which represent their primary workplace. Conversely, local/regional LTL and package drivers (e.g., UPS) are heavy users of trucking terminals and do not spend nearly as much time as FTL/national LTL drivers at truck stops, rest areas, or inside their trucks, which are not equipped in the same manner as long-haul truckers' cabs are (Apostolopoulos et al., in press). When FTL and national LTL truckers are not driving, they load/unload, rest, eat, sleep, shower, do laundry, communicate with their families, fuel, shop, socialize, and complete paperwork in these settings. At truck stops, drivers stock up on food and beverage supplies that are stored in their truck cabs' until they can stop for a hot meal. In a sense, their work and personal lives are inextricably linked so that they spend nearly all of their time at one or another component of their broader work settings. The total daily number of hours that a trucker spends in such settings can range from about 30 minutes to well over 30 hours and can vary by type of work setting, phase of trip, and time of day—such as when a driver waits for a load at a truck stop or warehouse over several hours. Even when truckers are not driving (which is the essence of the job), they spend substantial amounts of their time at their work settings. Unlike employees in other occupations who are able to go home after work, truckers (e.g., FTL, national LTL) who may be away from their home base for weeks at a time find themselves spending even their leisure time at or around these settings until they are able to get back to their homes for brief periods each month. The health effects of the occupation and worksite environments are highly unique due to this distinctive aspect of trucking.

Because federal law restricts driving hours to 11 in one 24-hour period, long-haul truckers may snack all day and wait to consume one large meal at the end of their shift with the goal of maximizing their driving time. Given this, the emotional satisfaction attached to bingeing on a hot meal at the end of a long and tiring day of nonstop driving in isolation cannot be

TABLE 2 Trucking Work Settings and Hours of Service

Settings	Components and relationship to truckers
Trucking terminals	<p>What they are: Commercial facilities responsible for handling and temporarily storing freight, pending transfers between distribution centers. Many are independent companies but most are operated by trucking companies themselves.</p> <p>Relation to truckers: Truckers spend time at these locales as they wait for loads to be placed on/removed from trucks ranging from less than one hour to several hours. There are limited opportunities for physical/recreational activities or healthful eating. More often used by local/regional LTL or package delivery drivers compared with FTL or national LTL drivers.</p>
Warehouses	<p>What they are: Commercial facilities responsible for keeping/storing merchandise secure and in good condition. Some warehouses provide logistical services such as labeling, inventory control management, repackaging, and transportation arrangement.</p> <p>Relation to truckers: Truckers spend time at these locales as they wait for loads to be placed on/removed from trucks ranging from less than one hour to several hours. There are limited opportunities for physical/recreational activities or healthful eating. More often used by local/regional LTL or package delivery drivers compared with FTL or national LTL drivers.</p>
Truck stops	<p>What they are: Commercial facilities that provide fuel, parking, food, mini-mart shops, laundromat, showers, truck washes and repairs, and other services. They are usually located on or near a busy road or highway. Truck stops across the country are owned/operated by a number of large corporations and standardized in design and amenities.</p> <p>Relation to truckers: Truckers utilize truck stops as a home-away-from-home. They eat, rest, do their laundry, take showers, refuel, get their trucks washed/maintained, watch TV/movies, and socialize with other truckers. Truckers can spend anywhere from 30–45 minutes, to their mandatory HoS daily break of about 10 hours, to well more than 30 hours either as per their HoS or while waiting for loads or getting their trucks repaired or maintained. Opportunities for physical/recreational activities and healthful eating are extremely limited. Truck stops offer TV/movie lounges and video arcades but no exercise rooms, they offer a variety of unhealthy options (e.g., doughnuts, fried foods) but not very many fresh and whole food choices. Used more often by FTL and national/regional LTL drivers.</p>
Highway rest areas	<p>What they are: Public facilities located next to highways where commercial drivers and passengers can park, rest, or eat without exiting on to secondary roads.</p> <p>Relation to truckers: Truckers park to rest, sleep, stretch, use restrooms, and to eat. They can spend anywhere between a 10–15 minute pit-stop break to several hours, depending on schedules and what food/beverage they have with them in their truck cabs. Most rest areas offer opportunities for walking and stretching, but few other physical/recreational activities. As for healthful eating, most offer a series of typical vending machines (with mostly unhealthy contents), while there are ample opportunities to eat outdoors at picnic tables. Used more often by FTL and national/regional LTL drivers.</p>

(Continued)

TABLE 2 Continued

Settings	Components and relationship to truckers
Truck cabs	<p>What they are: While away from their homes, the truck cab serves as truckers' home on the road and primary work space. Cabs are equipped with a sleeper berth, refrigerator, and communication equipment; they may also have entertainment technology as well as computer and Internet connection. These amenities are found in trucks used for FTL and national LTL deliveries rather than those used for local or package deliveries. What a truck cab houses has much to do with how the trucker lives and how much time he spends on the road.</p> <p>Relation to truckers: Particularly FTL and national LTL truckers eat, sleep, work, and socialize in their truck cabs. They can spend up to an astonishing 23 hours per day in their truck cab. There are clearly no opportunities for physical or recreational activity within the confines of a truck cab. As for healthful eating, it is possible only if truckers consciously stock up their refrigerators with healthy options (fresh and whole foods). The truck cab represents the primary worksite for FTL and national LTL drivers compared with local LTL or package delivery drivers.</p>

Note. LTL = less than truckload; FTL = full truckload; HoS = Hours of Service. HoS can be best explained with an example—If a driver follows the 70-hour/8-day limit and works 14 hours for 5 days in a row, she or he will have been on duty for 70 hours. She or he would not be able to drive again until she or he drops below 70 hours worked in one 8-day period. However, if his or her company allows the use of the 34-hour restart provision, she or he would have driving time available immediately after 34 consecutive hours off duty. She or he would then begin a new period of 8 consecutive days and have 70 hours available.

overlooked. In fact, a high-calorie meal may actually be the highlight of one's day or at least bring a significant level of comfort. Some cabs have refrigerators that can hold limited supplies, but perishable foods must be purchased en route. Efforts to do so, however, are thwarted by parking restrictions set for large vehicles by grocery stores where food can be purchased, and drivers often find little choice but to eat at truck stop restaurants instead. Results of our assessment of the various components of the trucking work setting are offered in Tables 3 and 4 as total scores, maximum possible scores, and health-supportive ratings.

Food Venues

Restaurants with waiters, cafeteria-style establishments, and fast-food restaurants make up the core of venues that sell food at these settings, which have an average of about 3.4 food venues per setting. Because truckers—particularly those designated as FTL or national LTL—eat the predominant percentage of their meals at truck stops, these settings acquire a critical role in truckers' nutritional intake and weight management. Our evaluation of healthful-food options was carried out at trucking terminals, warehouses,

TABLE 3 Ratings of Trucking Work Settings for Healthful-Eating Promotive Attributes

	Trucking terminals (TRT) (n = 8)	Warehouses (WAR) (n = 7)	Truck stops (TRS) (n = 8)	Highway rest areas (HRA) (n = 2)	Total score out of maximum possible score	Rating of healthful eating support ^d
Section 1	40 ^c	27	37	N/A	104 out of 575	18.1% not at all supportive
Healthy Food Environment, HEFE Subscale 1 ^b						
Section 2	N/A	N/A	22	N/A	22 out of 144	15.3% not at all supportive
Healthy Menu Items in Restaurants with Waiters/Cafeteria Style (25 items; 0 for HRA)						
Healthy Food Environment, HEFE Subscale 2 ^c						
Section 3	65	52	77	31	225 out of 1,250	18% not at all supportive
Healthy Menu Items in Fast Food Restaurants (18 items; 0 for TRT, WAR, and HRA)						
Healthy Food Environment, HEFE Subscale 3						
Section 4	N/A	N/A	20	N/A	20 out of 168	11.9% not at all supportive
Healthy Items in Vending Machines (50 items)						
Healthy Food Environment, HEFE Subscale 4						
Section 5	24	19	18	8	69 out of 334	20.7% not at all supportive
Healthy Items in Convenience Stores/Mini-Marts (21 items; 0 for TRT, WAR, and HRA)						
Healthy Food Environment, HEFE Subscale 5						

(Continued)

TABLE 3 Continued

HEATWAI Scales and Subscales	Trucking terminals (TRT) (n=8)	Warehouses (WAR) (n=7)	Truck stops (TRS) (n=8)	Highway rest areas (HRA) (n=2)	Total score out of maximum possible score	Rating of healthful eating support ^d
Healthy Diet Supportive Resources in Lunch/Break Rooms/Driver Lounges/Picnic Areas (14 items; 6 for HRA)						
Section 6	13	15	13	N/A	41 out of 207	19.8% not at all supportive
Health Supportive Social Environment, HESSE Subscale 1						
Healthy Diet Supportive Resources (8 items; 0 for HRA)						
Section 7	15	10	18	1	44 out of 175	25.2% not at all supportive
Health Information Environment, HEIE Subscale 1						
Healthy Diet Promotive Media (6 items)						
Section 8	9	8	11	6	34 out of 275	12.4% not at all supportive
Health Supportive Community Environment, HESCE Subscale 1						
Healthy Diet Promotive Amenities (11 items)						

Note. HEATWAI = Healthy Trucking Work-settings Audit Instrument.

^a90% to 100% of max possible score (*fully supportive of healthful eating*); 75% to 89.9% (*mostly supportive*); 50% to 74.9% (*partially supportive*); 35% to 49.9% (*scarcely supportive*); < 35% (*not at all supportive*).

^bSubscales 1 and 2 comprise the total index for food venues (with 11.7% support rating for healthful eating).

^cScores have been rounded to closest integer.

TABLE 4 Aggregate Healthful-Eating Score by Type of Trucking Work Setting

Aggregate HEATWAI scores	Total score out of maximum possible score	Rating of healthful-eating support ^b
Trucking terminals	166 ^a out of 928	17.9%
Warehouses	131 out of 812	16.2%
Truck stops	216 out of 1,240	17.5%
Highway rest areas	46 out of 148	31.1%
All work settings	559 out of 3,128	18.9%

Note. HEATWAI = Healthy Trucking Work-settings Audit Instrument.

^aScores have been rounded to closest integer.

^b90% to 100% of max possible score (*fully supportive of active living*); 75% to 89.9% (*mostly supportive*); 50% to 74.9% (*partially supportive*); 35% to 49.9% (*scarcely supportive*); < 35% (*not at all supportive*).

and truck stops only, because highway rest areas do not have restaurants, and truck cabs mainly contain food that drivers purchase from truck stops. The assessment of restaurants with waiters or cafeteria-style eateries resulted in a rating of 104 points for the presence of healthy items out of a maximum of 575 possible points; which represents only 18.1% of total support for healthful eating. Out of 23 trucking work environments with this type of food venue that were evaluated, few healthful food options (i.e., vegetarian dishes, 100% natural juice, reduced portions at prices lower than those charged for full portions) and prompts (i.e., visible nutritional information on menus, visible signs featuring or encouraging healthy menu items, sum price of à-la-carte items comparable to cheaper combination “value” meals) were recorded. When assessing fast-food restaurants, which are only present at truck stops, the presence of healthy items received only 22 points out of a maximum of 144 possible points. In other words, fast-food restaurants received a very low rating of 15.3% in terms of their support for healthful eating. The evaluation of fast-food restaurants at eight truck stops revealed very few healthful food options (i.e., salads, vegetable-based soups, reduced calorie/fat-free condiments) or prompts (i.e., point-of-purchase advertisements for combo meals with vegetables and nonsoda beverages, healthy substitutes for fries offered at no extra cost). The overall index for food venues resulted in a disheartening rating of 11.7% (not-at-all supportive of healthful eating) (Table 3, Sections 1 and 2).

Vending Machines

Vending machines are convenient, located in various settings, and can contribute significantly to truckers’ nutritional intake. Their offerings include a variety of snacks that drivers can use to tide them over their long work-days—sometimes reaching 14 hours—until they can stop for a hot meal, be it at home, a truck stop restaurant, or fast-food restaurant. Especially in

those settings where restaurants are unavailable, vending machines are very important. Our evaluation yielded an average number of 3.1 vending machines at truck stops, 5.2 at trucking terminals, 4.7 at warehouses, and 7.5 at highway rest areas, where they offer the only source of food and beverage. From a total of 50 healthful options available in vending machines representing a maximum of 1,250 possible points, the actual availability of healthful options was rated only 225 points, or a rating of 18% (not-at-all supportive of healthful eating) (Table 3, Section 3). Examples of healthful food items included 100% fresh juice, fruit smoothies, low-fat milk and yogurt, nuts/seeds, trail mix, whole fruits or fruit salads, ready to eat vegetables, and signs featuring healthy items. Sodas comprised more than 75% of all cold drinks whereas only 23% of nonrefrigerated snacks could be considered healthful.

Food Stores and Mini-Marts

The presence of food stores and more importantly the availability of healthful food options in these stores are important contributors to patterns of healthy eating and overall health for communities (Glanz & Yaroch, 2004). Convenience stores or mini-marts selling food products were located only at truck stops, with an average of 1.7 stores per truck stop. From the eight truck stops that were assessed, more than 85% of the items carried in the mini-marts were deemed extremely unhealthy options (i.e., sodas, hot dogs, nachos/cheese, candies, and donuts). The cumulative score of healthful items (i.e., fresh fruit, nuts, wheat crackers, 100% fresh juice) available for purchase was only 20 out of a possible score of 168 points. This performance provided the lowest support rating among all eight assessment categories, of 11.9% or not-at-all supportive of healthful eating (Table 3, Section 4).

Lunch-Break Rooms and Driver Lounges

The food environment in lunch-break rooms, driver lounges, and picnic areas was captured with 18 items. Examples of items promoting healthful eating included the presence of microwave ovens, refrigerators, filtered water coolers, seating areas, and dietary information notices. The presence of items promoting healthy eating achieved 69 points out of a maximum of 334 possible points; in other words a rating of 20.7% (not-at-all supportive of healthful eating). These amenities were found to be more readily available at trucking terminals and warehouses, but much less often at truck stops. Although the availability of such amenities does contribute positively to maintaining healthful dietary patterns in general, truckers are restricted for logistic reasons from carrying home-cooked food with them or preparing food on the road (Apostolopoulos & Sönmez, 2006). As a result, these

amenities are used at best to keep or heat frozen dinners or other processed food items (Table 3, Section 5).

Social Environment and Media Promoting Healthy Eating

If healthy foods can be made available, the workplace can be an ideal setting to provide direct support for healthful-eating habits. The workplace can also serve as an ideal setting in which to develop a friendly and supportive environment for health promotion and for fostering a culture of health. The perceived and actual support for healthful eating, from the social dimension of the workplace, remains among the strongest independent predictors for eating healthfully (French, Harnack, Toomey, & Hannan, 2007). Workplace policies, colleagues, friends at work, and other supportive social networks are critical in defining health behaviors (Barnett et al., 2007) as well as affecting negative eating behaviors (Barabási, 2007). Our assessment of trucking work settings revealed the complete absence of organized onsite health-promotion activities for nutrition, wellness committees, committees to oversee healthy eating programs, free preventive/wellness screenings, free or discounted health screenings, and health risk appraisals from all 23 evaluated trucking contexts (excluding highway rest areas). The health supportive social environment for truckers and other employees received a rating of 41 out of a maximum possible 207 points, or 19.8% which is considered not-at-all supportive of healthful eating (Table 3, Section 6).

The presence of print and other forms of health promotion and information media is important to healthful eating because they have the potential to educate and influence eating-related behaviors. Therefore, trucking settings were evaluated in terms of their health information environment and all bulletin boards, notices, postings, posters, brochures, and fliers with educational messages on nutrition/diet and weight management were recorded. Health information environments of work settings evaluated received a total score of 44 out of a maximum possible 175 points, or only 25.5% which is considered not-at-all supportive of healthful eating (Table 3, Section 7).

Surrounding Communities Promoting Healthy Eating

The presence of food stores carrying affordable healthful products is a fundamental contributor to the overall health of neighborhood residents (Glanz & Yaroch, 2004); however, lower-income/minority neighborhoods often have comparatively fewer supermarkets that sell foods needed to maintain a healthy diet, but many more fast-food chain restaurants than their higher-income counterparts (Macintyre, 2007), which has prompted the term *food deserts*. This situation is unfortunately mirrored in broader trucking work settings. Although healthful food choices available within the

boundaries of trucking work settings can significantly influence truckers' nutritional intake, the broader neighborhoods that surround such work settings can offer vital complementary resources and opportunities. Quite the reverse, communities immediately surrounding trucking warehouses and terminals, or truck stops offer exceedingly limited opportunities as a result of their location in either heavily commercial areas or depressed urban areas with closed down businesses, abandoned buildings, vacant lots, and visible evidence of vandalism and crime. Similarly, highway rest areas, which are more often than not geographically and socially isolated, offer next to nothing. None of the trucking settings provided easy access to healthful food options (i.e., easily accessible healthy carry-out items). Furthermore, the lack of perceived safety linked to overt signs of crime and homelessness at several locales made any attempt to seek out food stores in the surrounding communities highly unattractive and unfeasible. The total score for this dimension of HEATWAI was 34 out of a maximum of 275 possible points. Overall community support was rated only 12.4%, a not-at-all supportive environment for healthful eating (Table 3, Section 8).

Opportunities for Healthful Eating: Trucking Versus Other Occupations

Although environmental supports for healthful eating were found to be extremely poor, differences across various types of trucking work settings are critical for the design and prioritization of future interventions, especially in light of implications for potential health promotion at such work contexts. Even from the small sample of highway rest areas assessed in the current study, it is evident that this trucking work setting provides the most supportive environment to truckers for healthful eating, especially when viewed in comparative terms. Given that none of the four contexts evaluated provided any substantive support for healthful eating, rest areas earned a healthful-eating support rating of 31.1% (in some cases more than twice as high as other settings), whereas trucking terminals received a 17.9%, truck stops 17.5%, and warehouses only 16.2% (Table 4). Collectively, these 25 trucking work settings, with an overall rating of 18.9% (not-at-all supportive), do not emerge as work contexts that encourage healthful eating.

These findings further corroborate our hypothesis that the trucking sector remains an overall underserved workplace, which can be linked to the blue-collar nature of its employees (Centers for Disease Control and Prevention [CDC], 2005). Although this explanation remains nothing more than a working assumption, it is indirectly supported by ample empirical evidence documenting that minority/working-class occupational segments generally remain underserved in terms of access to health care and healthful resources (e.g., grocery stores), and consequently linked to a higher burden of disease (Krieger, 2010; Larson, Story, & Nelson, 2009; Macintyre, 2007).

Truckers are classified as one of the highest-risk occupational segments due to their elevated occupational hazards; however, as our findings support, they are also deprived of those organizational/institutional supports critical to personal health (e.g., lack of healthful food choices and obesity risk) and public safety (e.g., links between elevated body mass index (BMI), stress, sleep apnea, and increased accidents/crashes) (Taylor & Dorn, 2006; Wiegand, Hanowski, & McDonald, 2009). As such, trucking work settings should be identified as healthy food deserts, particularly because these ratings provide additional explanation in terms of truckers' exceedingly high morbidity/mortality rates. Although this article does not suggest causal links between trucking settings' poor level of environmental supports for healthful behaviors (e.g., few health-promotive resources) and adverse health outcomes (e.g., elevated morbidities), our findings do offer further evidence that the trucking sector and its various settings where truckers work or spend large segments of their days are not conducive to healthful behaviors. Although direct support for healthy food options might be logistically restrictive or even cost prohibitive for small-scale work settings, larger firms and national truck stop chains privy to greater resources are definitely missing a significant social marketing opportunity by not providing them.

Results from assessments at other blue-collar worksites have been equally revealing. One national health-promotion survey of worksites recorded the presence of nutrition/weight management programs in 23% of the cases and of healthy-food choices labeled in cafeterias 38% of the cases (Linnan et al., 2008; Whitfield-Jacobson, Prawitz, & Lukaszuk, 2007). An assessment of four bus garages in Minnesota determined the presence of few foodstores/restaurants within sight of each garage and further noted that only 15% of foods and 26% of beverages available from vending machines met criteria for healthful choices (Shimotsu, French, Gerlach, & Hannan, 2007). Thirty hotels were assessed to determine associations between employee obesity and the presence of weight management resources, however, none of the environmental variables (e.g., availability of low-fat food choices) were found to be related to BMI (Nigg, Albright, Williams, & Nichos, 2010). Studies from diverse worksites have indicated that the majority of foods and beverages in vending machines are low in nutritional value but high in calories, fat, and sugar, and that their presence in these environments may lead to excessive energy intake and weight gain (French et al., 2001; Samuels and Associates, 2005; Wiecha, Finkelstein, Troped, Fragala, & Peterson, 2006). Comparative assessments of other trucking work settings do not exist; however, foregoing studies indicate that though policies and resources of many workplaces do not fully support healthy eating, there are disparities among different work environments, with trucking work environments ranking particularly very low. With Americans eating out more frequently and consuming more calories than ever before at away-from-home establishments, and the number of food establishments

nearly doubling over the past three decades (Keystone Center, 2006), truckers' available food choices are important, mainly in the context of alarming shifts in nutrition-related morbidities.

An Integrative Paradigm for Healthier Trucking Work Settings

Given truckers' high morbidity rates, the low performance of trucking work settings in terms of their support for healthful eating is hardly surprising. Truckers work about 14 hours a day under stringent conditions and often find meager resources at various work settings, but particularly at truck stops, where long-haul and regional truckers are confined for much of their down-times. In these environments, truckers find mostly unhealthy food items (Lawrence, Boyle, Craypo, & Samuels, 2009), scant opportunities for physical activity (Wood et al., 2007), absence of wellness programs (Samuels and Associates, 2005), and no access to healthcare (Wiecha et al., 2006). This is oftentimes because these work settings are located in isolated places with little to no access to public transit systems, or in socioeconomically depressed areas with limited health-supportive choices and numerous risk-laden opportunities (Glanz & Yaroch, 2004). Because individual factors alone are insufficient to explain increases in obesity rates, and environmental factors that encourage increased energy intake and decreased energy expenditures play a growing role in the epidemic (Apostolopoulos & Sönmez, 2006), the urgent need for environmental-level interventions at trucking work settings is incontrovertible.

Although the workplace has been identified as a promising setting for implementing health promotion programs, no more than one in five worksites with a minimum of 50 employees across the United States offers a health-promotion program that combines physical activity, healthy eating, and weight management (Shimotsu et al., 2007). Worksite health promotion (WHP) programs focusing on physical activity and nutrition have consistently brought about positive effects on fitness levels, lipids, anthropometric measures, work attendance, and stress (French et al., 2007; Whitfield-Jacobson et al., 2007). There is evidence to support that significant employer expenditures on healthcare can be lowered as a result of WHP programs (Davis et al., 2007). Numerous benefits of investing in WHP programs include enhanced worker productivity, improved workplace morale, positive changes to workplace culture, reduced absenteeism, improved staff retention, and reduced work-related injuries and medical costs (Apostolopoulos & Sönmez, 2007; Hill & Peters, 1998; Perry & Garratt, 2010; Solomon, Doucette, Garland, & McGinn, 2004).

A review of wellness programs in the trucking sector yields only a few that have been implemented over the past two decades, which are relatively small scale, oddly compartmentalized, inefficiently run, and mostly underfunded (French et al., 2001). In the 1990s, a number of trucking companies

had initiated various forms of wellness programs for their employees and achieved relatively good results in improving individual health while reducing health care costs and increasing productivity; however, some have since inexplicably discontinued these programs (Linnan et al., 2008). The rationale behind these decisions might be rooted in the fact that driver turnover rates can reach over 130% and drivers may work for a particular trucking company for a few months only (Suzuki, Crum, & Pautsch, 2009), bringing into question the value of WHP; however, these efforts combined with others have the potential to be used to actually combat high turnover rates by creating better work conditions for drivers. In light of truckers' costly fatal crashes and speculations on underlying causes, the Federal Motor Carrier Safety Administration—in its efforts to provide supporting evidence for the preventive function of wellness programs—cosponsored the “Gettin’ in Gear” program to address risks associated with commercial driving (U.S. Department of Health and Human Services, 2000). Along these lines, the National Institute for Occupational Safety and Health (NIOSH) has recently planned a national baseline assessment on whether and how occupational exposures can explain truckers' elevated morbid conditions and crashes (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009).

The foregoing discussion and the current study's findings support the need for comprehensive WHP programs focusing not only on minimizing food deserts and improving the active-living environment of trucking settings, but on promoting an overall healthier work environment for the trucking sector. The current paradigm (Conn et al., 2009; Pratt et al., 2007), which entails mostly an occupational safety approach with a primary focus on accidents and crashes or small-scale, individual-focused wellness programs (Linnan et al., 2008), has become obsolete. There is strong evidence to support that WHP programs could be significantly more effective if they integrate occupational safety with health promotion, thereby collectively enhancing the health and safety of working people (Hunnicuttt, 2009). In the case of the trucking sector, this paradigm would have a comprehensive scope that integrates occupational health and health promotion, with multiple levels of influence, including the individual, the interpersonal, and the organizational/institutional/ecological levels. This holistic and multicomponent approach to promoting healthier living would target a wide range of risk factors (i.e., unhealthy hours of service, total work hours and needed mandatory breaks, limited access to healthful foods at truck stops, smoking, lack of fitness facilities at truck stops) at several intertwined levels: the individual trucker's lifestyle practices, federal government regulations, trucking-sector operations, corporate policies affecting trucking work contexts, the trucking built-environment (including ergonomic truck cab design), and the full spectrum of the trucking work environment (Mackie, 2008). As per this approach, trucking stakeholders, such as union leaders, CEOs of trucking companies and truck stops, health insurance firms, NIOSH, and the Federal Motor

Carrier Safety Administration (FMCSA) would be made coresponsible for comprehensive and evolving worksite health promotions with integrated monitoring and evaluation components. The main thrust of this rationale incorporates the fact that WHP and occupational safety and health provide two parallel pathways for promoting trucker health, which will be significantly strengthened when they are coordinated and integrated rather than separate and independent (Hunnicut, 2009).

CONCLUSIONS

This first assessment of the trucking sector's environmental barriers for healthful eating has corroborated accumulating evidence that supports that trucking work settings remain not only healthful food/eating deserts but overall highly unhealthy places. An assessment of the physical, social, and information environments of trucking work settings and surrounding communities revealed very limited opportunities for healthy food and eating choices. It is especially surprising that truck stops in particular remain completely detached from the vital needs of their primary customer base and blatantly miss opportunities to not only increase their competitive edge and revenues but to vastly improve their customers' satisfaction.

These findings should not surprise those immersed in the trucking sector, particularly because the alarmingly high morbidities of truckers lend credence to results. This occupational segment along with several million people employed by the commercial transport sector have been inexplicably neglected by the federal government, business leaders, and public-health professionals. The time is ripe for comprehensive multistakeholder health-promotion interventions that simultaneously target the plethora of intertwined risk factors that are associated with trucking occupational milieu. A multistakeholder, multilevel approach that incorporates WHP and OSH, and goes beyond individual trucker lifestyles is an imperative public-health need in the context of severe occupational health disparities.

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