Using a Human Ecosystems Approach to the Obesity Epidemic

Obesity has been increasing in all age groups worldwide for the past several decades. Yet for hundreds of years before the last quarter of the 20th century, obesity was not an issue. The etiology and the cure for the obesity epidemic have been elusive. Weight reduction diets and behavior therapy have not produced the desired results. Perhaps current obesity interventions have been focused on the wrong part of the equation. Food and nutrients contained therein may not be central in the etiology of obesity. The cause of obesity is certainly multifactorial and will require a multi-disciplinary approach to cure.

Most Americans would agree that food is everywhere and portions are bigger. Portions have increased over the past few decades. The original Hershey bar in 1908 was 0.6 oz. and now they are frequently 1.6 oz. or up to 8 oz. The original Budweiser in 1936 was 7.0 oz. versus 12 oz.–22 oz. now; the original 1954 McDonalds burger weighed 1.6 oz.; today their burgers are frequently 4–8 ounces (Young & Nestle, 2003). Based on these changes in portion sizes of staple foods in the American diet, it can be concluded that the dining environment has changed and portions are bigger. The Family and Consumer Sciences Human Ecosystems Theoretical Model provides an ideal platform from which to view and examine the obesity epidemic. This paper examines the physical, human built, and social environments of the Human Ecosystem as they relate to dietary intake.

The Human-Built Physical Environment

The Effect of Package Size on Consumption

As was demonstrated with the Hershey bar, portion sizes have increased in the grocery store. The size of the package purchased in the grocery store affects the amount of food eaten at home, when eaten hours or even days later. Wansink (1996) demonstrated that more is poured or scooped from a bigger container compared to a smaller one. Furthermore, this same study concluded that purchasing a larger container of spaghetti precipitated consuming a larger portion of spaghetti at home.

James E. Painter, PhD, RDN (jimpainterphd@gmail.com) is an adjunct professor in the School of Public Health at the University of Texas–Houston, South Padre Island, TX; Rosemary Painter is an English as a Second Language Instructor in the Department of Arts & Science at Shenandoah University, Winchester, VA; Xinyue Wang is a Dietetics student at California State Polytechnic University, Pomona, CA; Margaret Schuster, RDN, is a Clinical Dietitian in the Food & Nutrition Department at Whidbey Health Medical Center, Coupeville, WA.
The Effect of Dinnerware Size on Consumption

It’s not just at the store that larger packages promote greater consumption; when eating at the dinner table, the size of the plates, bowls, cups, and dinnerware make a difference. Wansink, Ittersum, and Painter (2006) studied this principle with ice cream consumption. This ice cream study is a case in point. Customers came through a self-service line in the university student-operated cafe and were given either a small bowl and small spoon and small dipper, or a large dipper, bowl, and spoon. In this study, the customers who were provided the smaller utensils and dishes ate on average 4.5 oz. of ice cream; those in the large utensil and dish group ate on average 6.5 oz. Results showed a 30% decrease in consumption just by eating out of a smaller container with smaller utensils.

A follow up study by Horstmann et al. (2011) was conducted to determine if the bowl, the spoon, or the dipper made the most difference in the amount of food consumed. The follow up study compared 22 oz. to 10 oz. bowls, 5ml to 1ml spoons, and 4 oz. to 1 oz. scoops. Each factor was studied independently.

The most significant effect on consumption was not from the bowl or the scoop sizes, but with the spoon. The smaller spoon may have required more effort and time to consume the same amount and allowed the body’s satiety signals to function. If only one of the three changes is implemented, decreasing the utensil size seems to have the greatest effect on reducing intake.

But eating less of high-calorie food is not always the goal. Sometimes the goal is to eat more of a nutrient dense food, yet the same principle still applies. In this case, using larger containers will unknowingly increase consumption of nutrient dense foods. A study was conducted with 3- to 5-year-olds that varied glass size to encourage them to drink more milk (Smith, Barnes, Knoll, Rhodes, & Painter, 2011). Children were given a 9 oz. glass or a 16 oz. glass. Consumption was 3.5 oz. and 6 oz. from the 9 oz. and 16 oz. glass, respectively. Average consumption increased by 71% just by drinking from the larger glass.

A similar study was conducted regarding milk consumption with students and faculty (Quimby, O’Sullivan, Rhodes, & Painter, 2011). Students who received larger glasses of milk drank about 30% more than students who received smaller glasses. Faculty given large glasses drank 38% more than those given the smaller glasses.

Similar results were seen with yogurt (Merritt, Horstmann, Barnes, & Painter, 2011). Total consumption of yogurt with small bowls was about half as much as consumption with the larger bowls. If consuming more nutrient dense foods is the objective, then a larger container will lend to greater consumption.

Varying the container size in the dining environment can be used to increase consumption for those who are underweight; it can increase consumption of nutrient dense foods and decrease consumption if the goal is to reduce calories.

The Physical Environment

The Effect of Convenience on Consumption

Painter, Wansink, and Hieggelki (2002) studied the effect of convenience on consumption by placing 30 chocolate candy kisses on an office worker’s desk (very convenient), in a desk drawer (not visible and a bit less convenient), and a few steps away from the desk (inconvenient). On the desktop, the bowl of candy was within arm’s reach. In the desk, it was just 5 inches below the original position but out of sight. In the third condition, the candy was in a cabinet about 2 yards away, requiring the person to stand up and reach into the cabinet. When the candies were on the desk, the secretaries ate an average of 9 candies in a single work day. When candies were in the desk drawer, the average consumed was

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6 candies. Moving the candy from the desk into the drawer decreased consumption by 30% — the difference between visible and invisible. Then, just making it slightly inconvenient—to have to stand up, open a cabinet, and get it—decreased consumption by 60%.

A similar study was conducted with grapes, chocolates, carrots, and pretzels, in the desk drawer or on the desk (Painter, Snyder, Rhodes, & Deisher, 2008). When the individual foods were moved from the desk drawer to on top of the desk, consumption for grapes increased about 15%, consumption for chocolate and pretzels went up by more than 25%, and carrot consumption increased by 40%. (See Figure 1.) The greater increase in consumption seen with carrots when visible may be explained this way: carrots are not often a food that is sought out, but because they are perceived as healthy, if they’re available, they will be eaten. Chocolate or pretzels will be sought out, but not carrots.

A similar study was conducted with raisins (Gaydosh & Painter, 2010). In condition one, five boxes of raisins were placed in the desk drawer and in condition two, five boxes were placed on the desktop. Consumption increased by 20% in condition two. In condition three, 10 boxes were placed on the desktop and consumption increased another 20%. Visibility and ample supply increased consumption. The practical application of these findings is that to increase consumption of more nutrient dense foods, increase visibility and accessibility. When there is a greater supply of food, people eat more.

Visual Cues
One of the most influential aspects of the dining environment may be the visual cues that influence consumption. A study by Wansink, Painter, and North (2005) utilized soup bowls to demonstrate this effect. The design included four participants at a time eating soup at a table. Participants could ladle out more soup if they wanted more, but none ever did. Unbeknownst to them, two of the bowls were being refilled by a tube from the pot under the table, so the level of soup did not decrease as they ate. With a normal bowl, subjects ate about 150 calories. With the refilling bowls, consumption was nearly twice as much.

When asked, subjects thought they ate the same amount as the others at the table, demonstrating that consumers trust visual cues to indicate how much food they have consumed. Participants with the refillable bowl were unaware that they had eaten so much more because the visual cue of the emptying bowl was missing!

Pistachio shells were utilized in a similar study as a visible cue to consumption (Kennedy-Hagan et al., 2011). In this study, in condition one, faculty members were given a bowl of pistachios on the desk that was refilled hourly and an empty bowl for the shells. In condition two, the pistachios were again refilled every hour but the empty shells were

Figure 1. Increase in Intake When Foods are Visible (on desk) vs. Invisible (in desk).
removed so the faculty lost track of how many they had eaten. When the shells were visible to them, they ate about 200 calories of pistachios. When the shells were cleared throughout the day, they ate about 350 calories. This is more than a 50% increase when there was no evidence remaining of how much had been consumed. It is important to be mindful of the visual cues that are there.

The Social Environment

Beware of Menu and Advertising, Words Affect Consumption
What people say about food and what is written about food affects consumption. To see if the written word on a food label makes any difference on people’s perceptions about food, a study was conducted that measured consumer perceptions of the same food using different descriptions of cafeteria food (Wansink, Painter, & Ittersum, 2001). One day, the place card stated, “Red Beans and Rice.” The next day, the place card read, “Traditional Cajun Red Beans and Rice.” The first day “Baked Fish” was served; the second day “Succulent Italian Seafood Filet” was served. Customers did not know that it was the exact same foods, prepared the same way by the same cooks. There was no difference in the actual foods. Customers’ responses to questionnaires indicated that they viewed the foods with descriptive labels as tastier, better texture, and higher in calories compared to the foods with the plain labels. (See Figure 2.)

Suggestive Selling by Wait Staff
In the same way that descriptive labels alter consumer perception of foods, menu and wait staff descriptions also alter consumer perceptions. Many servers are taught to use suggestive selling. To demonstrate this, a study was conducted wherein servers were told to frequently ask the intervention group of customers if they wanted additional food (Zumwalt, Kennedy-Hagan, Honseman, Rhodes, & Painter, 2008). The control group of customers wasn’t offered a second portion and they had to ask for it if they wanted seconds. When the intervention group was given suggestions, consumption increased in the following categories: bread/rolls by 85%, pasta by 27%, and cookies by 71%, all statistically significant. Even more food can be consumed if the wait staff don’t ask, but just keep refilling with second helpings. It is hard to keep track of how much is consumed if the portion is continually being refilled. It is important to be mindful of suggestive selling and wait staff refilling food and drinks.

Social Pressure
A study was conducted in a university restaurant to determine the effect of social pressure on con-

Figure 2. What We Say About Food Affects our Perception of the Food.
sumption (Wilcox et al., 2008). Before the meal began, one person from each table was given instructions to say “Yes” or “No” to the offer for second helpings. The servers were instructed to ask that person first if they wanted seconds.

Figure 3 shows the consumption of the diners around the table after the first person said either “Yes” or “No” to second helpings. If the first person at the table said “Yes” to a second cookie, 40% of the other diners also said “Yes.” But if the first person at the table said “No” to a second cookie, only 15% of the other diners at the table took seconds.

But with bread, 60% of diners went for seconds, regardless of the first diner’s response. Maybe there was less impact from the first diner’s words for bread because there isn’t the same stigma with bread as there is with dessert. It is perfectly acceptable for Americans to have more bread. Yet on the third helpings of bread the first diner saying “No” did seem to reduce consumption. It is likely that there is no shame involved but simply the fatigue factor, “I’m so tired of chewing and this guy next to me doesn’t want more, so I don’t want any more either.”

**Portion Control When Eating Out**
A partial answer to combat the pressures from the social and physical environments could be for consumers to decide before they begin eating how much they would want to eat. A study was conducted to determine if to-go boxes could help reduce food consumption by serving 18 oz. of a spaghetti dinner with a to-go box in two different conditions (Schuster et al., 2014). The control group was given 18 oz. of spaghetti on their plate and a to-go box at the end of the meal. They ate most of what was on their plates and saved about 2 oz. in their to-go box.

With the intervention group, half of the spaghetti was apportioned on their plate and the other 9 oz. in the to-go box, with the instructions that they could take from the box during the meal if desired. Some people took a couple of ounces out of the to-go box to eat at the meal, but still, they saved about 7 oz. Simply putting part of the meal in a to-go container before the meal starts may be an effective strategy to reduce consumption when eating out.

**Conclusion**
The physical, human-made, and social environments of the Human Ecological theory have a profound effect on consumption. Being cognizant that the physical environment influences dietary intake
may provide avenues to consume less. Keeping foods that are temptations out of sight reduces consumption, and keeping more healthful, nutrient dense foods in sight increases consumption of these foods. The human-made environment may provide the most opportunities to change our dietary intake. When shopping, smaller packages decrease consumption and portion pack items are even more helpful. When eating at home, larger plates, bowls, glasses, and even flatware increase consumption when compared to smaller ones that encourage decreased consumption. When dining out, the social environment has a profound effect on consumption. It is important for consumers to be aware that what wait staff say and what is written on the menu influence consumption. What is said by fellow diners also influences the consumption of other diners at the table. By the first patron turning down second portions, everyone eats less. Putting half of the meal in a to-go box before you start eating and spreading the rest of the meal over the plate will also help to decrease consumption.

Whether eating at home or away from home, it is important for individuals to be aware of visual cues to consumption; but that is only part of the equation. A multidisciplinary approach is needed to find the etiology and cure for many major health problems such as obesity. Family and consumer sciences (FCS) may provide the perfect research structure to study the obesity epidemic. Hospitality management has the tools to study the social environmental aspect; dietetics provides the ability to study nutritional components. Family services provides the perspective to study the social interactions in the family and Interior Design provides the perspective to study human-made elements of the obesity epidemic. Although the original discipline of home economics was designed to study home environment as it relates to food, shelter, and family dynamics, FCS may just provide the perfect research platform to study some of the major health issues of our time, including obesity.

References


