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The Diet of Inmates: An Analysis of a 28-Day Cycle Menu Used in a Large County Jail in the State of Georgia

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Abstract

Given the many well-documented relationships between diet and health, growing medical care expenses for those incarcerated, and limited information on foods served in correctional facilities, this study examined the nutritional adequacy of a 28-day cycle menu used in a large county jail in Georgia. When compared with Dietary Reference Intakes, provisions of energy (female inmates only), sodium, saturated fat, and cholesterol exceeded recommendations. Magnesium, potassium, and vitamins A, D, and E met less than two thirds of recommendations. Compared with MyPlate recommendations, grains were overrepresented, while vegetables, fruits, and dairy were underrepresented in the menu. Small menu changes could improve the menu's nutrient content and potentially increase inmates' health and well-being.

Keywords

jails, diet, nutrients, adequacy, correctional health care

Introduction

Local jails and federal and state prisons housed 2.2 million offenders in 2011, almost double the number detained the previous decade. State costs, including medical care expenditures, have escalated with this rise in the number of incarcerated offenders (Glaze & Parks, 2012). In 2010, it cost states US$31,296 per year on average (range $14,603 to $60,076) to incarcerate one inmate (Henrichson & Delaney, 2012). While nationally representative data on the health of American inmates are not available, reports estimated that up to two thirds of inmates in the United States suffer from at least one chronic medical condition, most commonly hypertension, diabetes mellitus,

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heart disease, cancer, and obesity (Binswanger, Kruegar, & Steiner, 2009; Wilper et al., 2009). In fact, after adjustment for age and sex, prison inmates were more likely to have several chronic medical conditions compared to the general population (Binswanger et al., 2009; Wilper et al., 2009). Medical care expenditures for correctional facilities to treat these conditions increased in nearly all states, with seven states reporting increases greater than 100% from 2001 to 2008 (Kyckelhahn, 2012). In 2010, the cost per inmate in the state of Georgia for health services was US$4,225 (Georgia Department of Public Health, 2013).

Georgia has the fourth largest prison population in the nation, with nearly 60,000 offenders incarcerated as of June 2013 (Georgia Department of Corrections, 2013). As in other states, system overcrowding is a problem in Georgia. County jails, which technically provide short-term housing for inmates awaiting trial, often become long-term housing due to guidelines that prohibit state and federal prisons, but not county jails, from exceeding maximum capacity. Jails are the responsibility of the counties in which they are located and are under the supervision of an elected sheriff. Once sentenced, offenders in Georgia must be transferred in 14 days from the county jail to a prison. If the transfer is not feasible, the prisons must pay the jail US$22 per day, the cost of housing the inmate (Georgia Department of Corrections, 2013). In 2010, incarcerations cost Georgia taxpayers more than $1 million (Georgia Department of Public Health, 2013).

The jail's costs include the expense of foods provided to inmates. Correctional facility menus are designed to serve nutritionally adequate meals that meet nutrition guidelines, while also considering the budgetary constraints of the facility. Federal prisons typically follow a national menu (Federal Bureau of Prisons, 2011; Vasilion, 2009). County jails may implement different menus, although they must be approved by a food service director and/or registered dietitian (Federal Bureau of Prisons, 2011; Wakeen, 2006).

Information on the diets and nutrient intakes of inmates in the United States is limited. Only one study published within the last decade by Collins and Thompson (2012) attempted to close this gap by analyzing a menu used in selected South Carolina prisons. The study showed that the energy content and the saturated fat, cholesterol, and sodium contents of the meals were in excess of recommendations, while the provisions of calcium, magnesium, potassium, and vitamins E and D were less than two thirds of recommendations. Offerings of vegetables, fruits, and dairy products were also inadequate (Collins & Thompson, 2012).

Foods served at mealtimes are the primary and sometimes sole source of sustenance for inmates. To reduce costs, some correctional facilities in some states, including Georgia and Tennessee, are providing two hot meals and one cold "sandwich-type" meal per day to the inmates (Martinez, 2009; Tennessee Department of Corrections, 2004). It is well established that diet impacts health; for example, high-sodium diets may exacerbate hypertension, high-fat (total fat, saturated fat, and cholesterol) diets may increase heart disease risk, and diets providing excessive energy may promote weight gain if not coupled with adequate exercise. The diet provided by correctional facilities impacts the health of the inmates, especially if the inmates are incarcerated for an extended period of time. Given the growing incarcerated population, the relationship between diet and health, and limited information on foods served in correctional facilities, the main objective of this study was to examine the nutritional adequacy of meals provided to the inmates in a large county jail in the state of Georgia.

Methods

A copy of the 4-week cycle menu and a list of items available for purchase from the commissary were obtained from a county jail in Georgia, which houses approximately 380 inmates. The menu is strictly followed, except on major holidays, and is used for both male and female inmates. Table 1 provides an example of 1 week of menu items, including serving sizes, from the cycle menu. In

Table 1. Sample 7 Days of a 28-Day Cycle Menu Used in a County Jail In Georgia.

	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Vitamin C drink (1 cup) Cereal (8 oz) Scrambled egg (3 oz) Sliced bologna (2 oz) Biscuit (1 each) Milk (8 oz) Jelly (0.5 oz)	Vitamin C drink (1 cup) Hardboiled egg (1) Buttered grits (1 cup) Sausage links (2) Pancakes (2) Syrup (1 oz)	Vitamin C drink (1 cup) Breakfast gravy (1/2 cup) Scrambled egg (3 oz) Buttered grits (1 cup) Biscuit (1) Jelly (0.5 oz)	Vitamin C drink (1 cup) Sausage patty (1) Buttered grits (1 cup) Biscuit (1 each) Jelly (0.5 oz)	Vitamin C drink (1 cup) Breakfast gravy (1/2 cup) Hardboiled egg (1) Oatmeal (1 cup) Biscuit (1) Jelly (0.5 oz)	Vitamin C drink (1cup) Chicken patty (1) Scrambled egg (3 oz) Buttered grits (1 cup) Biscuit (1) Jelly (0.5 oz)	Vitamin C drink (1 cup) Oatmeal (1 cup) Scrambled egg (3 oz) Sausage patty (1) Biscuit (1) Jelly (0.5 oz)
Lunch	Sliced ham (3 oz) Country gravy (2 oz) Whipped potatoes (3/4 cup) Carrots (1/2 cup) Cornbread (1 square) Lemon cake (1 piece) Vitamin C drink (1 cup)	Beef chili (1cup) Buttered rice (3/4 cup) Whole kernel corn (1/2 cup) Cornbread (1 square) Chocolate cake (1 piece) Vitamin C drink (1 cup)	Peanut butter/jelly (4 tbsp) Potato chips (1/2 oz) Cookies (2) Vitamin C drink (1 cup) Sliced bread (4 slices)	Sliced ham (2 oz) Cheese slice (1 oz) Potato chips (1/2 oz) Sliced bread (2 slices) Sugar cookies (2) Vitamin C drink (1 cup) Mustard (5.5 g)	Peanut butter/jelly (4 tb) Potato chips (1/2 oz) Sliced bread (4 slices) Cookies (2 each) Vitamin C drink (1 cup)	Sliced turkey (2 oz) Cheese slice (1 oz) Potato chips (1/2 oz) Sliced bread (2 slices) Sugar cookies (2) Vitamin C drink (1 cup) Mayonnaise (14 g)	Sliced bologna (2 oz) Cheese slice (1 oz) Potato chips (1/2 oz) Sliced bread (2 slices) Cookies (2) Vitamin C drink (1 cup) Mustard (5.5 g)
Dinner	Sliced turkey (2 oz) Cheese slice (1 oz) Potato chips (1/2 oz) Sliced bread (2 slices) Sugar cookies (2) Sweet tea (8 oz) Mayonnaise (14 g)	Sliced bologna (2 oz) Cheese slice (1 oz) Potato chips (1/2 oz) Sliced bread (2 slices) Cookie (2 each) Sweet tea (8 oz) Mayonnaise (14 g)	Turkey pot pie (1 cup) Macaroni and cheese (3/4 cup) Carrots (1/2 cup) Tossed salad (1 cup) White roll (1) Coffee cake (1 piece) Sweet tea (8 oz) Salad dressing (12.4 g)	Parmesan chicken (1) Macaroni and cheese (3/4 cup) Green peas (1/2 cup) Cornbread (1 square) Yellow cake (1 piece) Sweet tea (8 oz)	Charbroiled beef (1) Country gravy (2 oz) Buttered rice (3/4 cup) Green beans (1/2 cup) Cornbread (1 square) Devil's food cake (1 piece) Sweet tea (8 oz)	Frankfurter (1 each) Potato salad (3/4 cup) Baked beans (1/2 cup) White roll (1) Lemon cake (1 piece) Sweet tea (8 oz)	Breaded fish (1) Coleslaw (1/2 cup) Cheese grits (3/4 cup) Dinner roll (1) White cake (1 piece) Sweet tea (8 oz) Tartar sauce (12.4 g)

Note. Sausage, ham, bologna, and frankfurters, when served, are turkey-based products. Coffee is not listed on the menu but is offered at breakfast. Salt and pepper are not added in cooking and may be purchased from the commissary.

addition to the food provided through the jail kitchen, inmates have the option of purchasing food twice a week through the commissary. Family members or friends can provide inmates with money enabling the purchase of commissary items; however, no food may be directly given to inmates.

Data Analysis

The total amount of food that an inmate could consume based on the provision of actual food over the 4-week (28 days) period was used to calculate the nutritional content of the diet. Each food item provided and its portion size were entered into NutritionCalc Plus nutrient analysis software program (McGraw-Hill Education, Version 3.5.2, 2013) for each of the 28 days. The nutrients that were examined included energy, protein, fat, carbohydrate, and fiber, as well as 10 vitamins (thiamin, riboflavin, niacin, folate, B_6, B_{12}, A, D, E, and C) and seven minerals (calcium, iron, zinc, phosphorus, magnesium, sodium, and potassium). In addition, fat, protein, and carbohydrates were calculated as their percentage contribution to total energy. These data were totaled and divided by the number of days (28) to calculate average daily energy and nutrient provisions to inmates. Daily energy and nutrient provisions were compared with Dietary Reference Intakes (DRI) recommendations, including Recommended Dietary Allowances and Adequate Intakes (AI). Percentage of energy derived from the macronutrients was compared with DRI Accepted Macronutrient Distribution Ranges (AMDR).

For comparisons of energy and protein provisions with recommendations, which are dependent on weight and height, the standard reference male (69.3″, 195.5 lbs., sedentary) and standard reference female (63.8″, 166.2 lbs., sedentary) based on average heights and weights of adults living in the United States were used (Fryar, Gu, & Ogden, 2012). The selected reference age of 35 years was based on the mode age for all inmates in jails and prisons in Georgia at the time of the study. Average standard reference weight data were used instead of ideal body weights because the standard reference weights were thought to be more representative of the inmate population than ideal body weights (155 lbs for males and 120 lbs for females).

Comparisons of provided foods with MyPlate food group recommendations (i.e., grains, protein foods, dairy, vegetables, and fruits) were also made (U.S. Department of Agriculture, 2011). Specifically, the amount and types of foods provided on the menus were compared to the MyPlate 2,600 calorie pattern for males and the 2,000 calorie pattern for females. These energy levels were chosen based on recommended needs of males and females having the body weights of the standard reference man and woman, respectively. In addition, the nutritional content of the five most requested food items purchased from the commissary was evaluated.

Results

Energy and Macronutrient Provisions

In comparison with DRI AMDR recommendations, macronutrients were provided within suggested ranges; specifically, carbohydrates provided 55% of energy (recommended range 45% to 65%), protein 12% (recommended range 10% to 35%), and fat 34% (recommended range 20% to 35%). Of the 94 g of total fat per day provided by the menu, 29 g (31%) was in the form of saturated fat; saturated fat contributed 10% of the total energy (recommended intake of saturated fat < 10%). The main sources of dietary total fat and saturated fat were coleslaw, meatloaf, and meats with gravy. The average daily cholesterol provision of 467 mg was 156% of the recommended < 300 mg of cholesterol per day. In contrast, recommended fiber intakes (38 g males and 25 g females) were not met, with the menu providing an average of 13 g of fiber per day.

Menu provisions of energy (kcal) and protein versus needs based on standard reference males and females showed that provided energy (2,481 kcal) was 92% of recommendations for males

(2,690 kcal) and 121% of recommendations for females (2,042 kcal). Provided protein (73 g) represented 102% of recommendations for males (71 g recommended based on 0.8 g protein/kg reference body weight) and 121% of recommendations for females (60 g recommended based on 0.8 g protein/kg reference body weight).

Micronutrient Provisions

Vitamins and minerals were provided in amounts of at least two thirds of DRI recommendations with the exceptions of magnesium, potassium, and vitamins A, D, and E, and for males also zinc (Table 2). For these underprovided nutrients, the menu met between 6% (vitamin D) and 56% (vitamin A) of recommendations. The only nutrient provided in considerable excess of recommendations was sodium, which was present at 4,542 mg, representing 303% of the recommended 1,500 mg, and well above the tolerable upper intake level of 2,300 mg.

Food Group Provisions

Table 3 compares recommended MyPlate food group guidelines with food groups provided by the menu used by the jail. Based on MyPlate guidelines, provision of grains for male inmates was overrepresented (132%), while vegetables, fruits, and dairy were underrepresented. Vegetable and dairy provisions met less than half of recommendations (30% and 35%, respectively). Protein provided by the menu was comparable to recommendations. Similarly, using the MyPlate guidelines, the grains were also overrepresented in the diet of the female inmates. Grains provided nearly twice the recommended amounts, while vegetables, fruits, and dairy were not provided in amounts meeting recommendations. Vegetables and dairy met only about one third of recommendations. Protein was provided in amounts (6.7 ounce equivalents) slightly higher than the 5.5 ounce equivalents recommendation for females.

Contribution of Commissary Items

Each of the five analyzed top-selling commissary foods (Ramen Chili noodle, Hot Cheese Curls snack food, Ramen Picante Chicken noodles, Ramen Creamy Chicken noodles, and Honey Buns) was high in fat, and the noodle mixes were also high in sodium. The energy content (per serving) of the 5 items ranged from 160 to 440 kcal, and the protein content ranged from 1 to 5 g. The fiber content was $\leq$ 1 g in each of the products. The percentage of energy contributed by fat ranged from 33.2% to 61.9%, and of the total fat, saturated fat ranged from 13.6% to 56%. One serving (1/2 package) of the noodle items provided 620 to 770 mg of sodium, and if the entire package was consumed, it alone would provide more than the daily recommendation of 1,500 mg of sodium in some cases. It is important to also note that these commissary items were poor sources of other minerals and vitamins, and thus would not improve the nutritional quality of a day's intake.

Discussion

This investigation, examining the nutritional content of meals served in a large county jail in the state of Georgia, documents strengths, but also several weaknesses, in the foods provided to inmates. The menu was generally adequate in its provisions of several vitamins and minerals including thiamin, riboflavin, niacin, vitamin B_6, B_{12}, folate, vitamin C, phosphorus, and iron, and met recommended percentages of energy from each of the three macronutrients. However, the menu provided high amounts of energy for females, and for all inmates, high amounts of cholesterol, saturated fat, and sodium, and less than recommended amounts of fiber and some vitamins and minerals.

Table 2. Micronutrient Content of Menu Compared With Dietary Reference Intake (DRI) Recommendations.

Nutrient	Menu Provisions	DRI Recommendations for Males	Percentage of DRI for Males	DRI Recommendations for Females	Percentage of DRI for Females
Thiamin (mg)	1.3	1.2	106	1.1	115
Riboflavin (mg)	1.4	1.3	108	1.1	128
Niacin (mg)	16	16	100	14	115
Vitamin B_6 (mg)	1.1	1.3	81	1.3	81
Vitamin B_{12} (μg)	2.2	2.4	90	2.4	90
Folate (μg)	350	400	88	400	88
Vitamin C (mg)	104	90	116	75	139
Vitamin A (μg)	390	900	43	700	56
Vitamin D (μg)	0.8	15	6	15	6
Vitamin E (mg)	4	15	27	15	27
Calcium (mg)	698	1000	70	1000	70
Phosphorus (mg)	892	700	127	700	127
Magnesium (mg)	149	420	35	320	47
Potassium (mg)	1,081	4700	23	4700	23
Iron (mg)	21	8	261	18	116
Zinc (mg)	6	11	51	8	69
Sodium (mg)	4,542	1,500	303	1500	303

Table 3. Food Group Comparisons of the Menu With Recommendations of MyPlate.

Food Group	MyPlate Recommendations for Males	Menu Provisions (Percentage of MyPlate Recommendations)	MyPlate Recommendations for Females	Menu Provisions (Percentage of MyPlate Recommendations)
Grains	9 oz equivalents[a]	11 oz equivalents (132%)	6 oz equivalents	11 oz equivalents (198%)
Vegetables	3.5 cup equivalents	1.0 cup equivalents (30%)	2.5 cup equivalents	1.0 cup equivalents (42%)
Fruits	2.0 cup equivalents	1.2 cup equivalents (61%)	2.0 cup equivalents	1.2 cup equivalents (61%)
Dairy	3.0 cup equivalents	1.0 cup equivalents (35%)	3.0 cup equivalents	1.0 cup equivalents (35%)
Protein	6.5 oz equivalents[a]	6.7 oz equivalents (103%)	5.5 oz equivalents	6.7 oz equivalents (122%)

[a]oz equivalent is a 1 ounce estimate, rounded to consumer friendly units. For example, a 1 oz equivalent of grains is 1 slice of bread and a 1 oz equivalent of protein is 1 oz of meat, 1 egg, or ¼ cup of cooked beans.

While this investigation found that the average energy content of the menu was relatively close to the energy recommendations for males, it exceeded recommendations for females by 444 kcal per day, if all foods were consumed. Moreover, if females were of ideal body weight, this excess increases to 672 kcal per day. This study's findings are similar to those reported by Collins and Thompson (2012) and to studies conducted in the United Kingdom and Australia, which showed that female inmates received greater energy content than recommended, while male inmates received close to or only slightly above recommended energy needs (Edwards, Hartwell, Reeve, & Schafheitle, 2007; Williams, Walton, & Hannan-Jones, 2009). The data suggest that the menus may be designed to meet the energy needs of average males, but not females. Long-term consumption of excess energy can lead to weight gain and contribute to the risk for several chronic diseases, including heart disease, diabetes, and hypertension. In 2013, close to 30% of adults in the state of Georgia were obese, more than 30% had hypertension, more than 35% had high blood cholesterol concentrations, and almost 10% had diabetes (Centers for Disease Control and Prevention [CDC], 2013; Trust for America's Health, 2013).

The cycle menu met DRI AMDR recommendations; however, the cholesterol and saturated fat contents were in excess of recommendations. These findings are similar to those of Collins and Thompson (2012) who, analyzing menus used in South Carolina prisons, reported acceptable percentages of energy from the macronutrients, but higher than recommended amounts of cholesterol and percentage of energy from saturated fat. However, neither this study nor the Collins and Thompson study included purchased foods in the analyses of the prison menus. Foods that were commonly purchased from the commissary in this study were high in fat, especially saturated fat. An Australian study (Williams et al., 2009) also documented that foods commonly purchased from prison shops were high in fat. Regular consumption of these high-fat commissary food items, along with the prison foods, would likely considerably increase total fat intake to an amount exceeding dietary recommendations.

The menu analyzed in this study also provided inadequate fiber, with carbohydrates derived mostly from daily provisions of highly refined, processed foods such as white bread, cake, cookies, and sugar-sweetened beverages. The provided grains contributed substantially to extra calories for females, who received nearly double (198% or 11 ounces instead of the recommended 6 ounce equivalents) the recommended amount of grains. In contrast, whole grains were not provided in accordance with MyPlate guidelines, nor were fruits, vegetables, and dairy products, a finding also reported by Collins and Thompson (2012) for prisons in South Carolina. Inadequate provisions of fruits and vegetables also have been documented in studies of menus used in correctional facilities in the United Kingdom and Australia (Edwards et al., 2007; Williams et al., 2009).

While the menu met recommendations for the majority of vitamins and minerals, notable exceptions included vitamins A, D, and E, as well as magnesium and potassium, all of which were provided in quantities of less than two thirds of recommendations. In addition, calcium and zinc were provided in amounts greater than two thirds but less than 80% of recommendations. These findings compare almost identically to those of Collin and Thompson (2012), who reported that provisions of calcium, magnesium, potassium, and vitamins E and D were less than two thirds of recommendations. This study's finding that the menu provided an excessive amount of sodium was also like that of Collins and Thompson's study of selected South Carolina prisons and of correctional facilities in the United Kingdom (Edwards et al, 2007; Eves & Gesch, 2003) and in Australia (Williams et al., 2009). When foods purchased from the commissary are considered, the provided sodium content further increases.

Recommendations

According to The Pew Charitable Trusts, 42 of 50 states in the United States have increased their spending on prisoner health care, from $4.2 billion in 2001 to $6.5 billion in 2008 (Pew Charitable Trusts, 2013). Given that inmates experience a higher prevalence of several chronic diet-related health conditions as compared to the general population (Binswanger et al., 2009), ensuring good nutrition to inmates through the provision of well-planned menus might be beneficial to alter this trend. Health is at possible risk with excessive provision of energy, as well as dietary cholesterol, saturated fat, and sodium, while long-term consumption of essential nutrients below recommendations can lead to deficiencies and health problems.

Several approaches may be offered to improve the nutritional content of the menus and may, in turn, help to improve the health of those who are incarcerated. The portion sizes for the female inmates could be downsized to reduce the energy content and perhaps help lessen the likelihood of unhealthy gains in body weight, which can increase the risk of many chronic health problems.

To increase the amount of dietary fiber in the menu, whole grain products could be substituted for some refined grains. Additionally, incorporating legumes, beans, and peas in the form of southern comfort food such as red beans and rice and baked beans could encourage fiber intake. Fiber also

would be provided in more adequate amounts with the addition of fruits and vegetables. Inmate labor could be used to grow prison food, such as through prison farms and in-prison gardening programs. This food could then perhaps be provided to the jails at a reduced price. This approach is cost saving, and if in-house gardens could be established directly in the jails, the supply of fresh fruits and vegetables should increase and weight control may improve by keeping the inmates more active. These changes also would help the menu meet MyPlate food group recommendations as well as contribute needed magnesium, potassium, zinc, vitamin E, beta carotene, and vitamin A. Vitamin A contributes to immune system protection of the body and, along with fiber, vitamin E, and phytochemicals found in vitamin-rich fruits and vegetables, may help to decrease the risk for cancer and heart disease. Adequate intakes of both potassium and magnesium, which would be enhanced with the addition of whole grains, fruits, and vegetables to the menu, are important for the regulation of blood pressure (Houston & Harper, 2008). Hypertension is a common health problem in correctional facilities and has its highest prevalence in the southeastern United States (Binswanger et al., 2009; Health Intelligence, 2013). Poor magnesium intakes also have been associated with an increased risk for developing diabetes, another chronic condition that is highly prevalent in this part of the country and in those who are incarcerated (Binswanger et al., 2009; Lopez-Ridaura et al., 2004).

Diets high in saturated fat and cholesterol may increase heart disease risk; one in four deaths in the state of Georgia can be attributed to heart disease (CDC, 2013). To decrease saturated fat and cholesterol in the menu, it is suggested that sauces, gravies, eggs, sausage, and some lunch meats be served less frequently or in smaller amounts. "Meatless" or vegetarian options, such as bean dishes, may be an economical, lower fat substitute for sausage and other processed meats. Additionally, replacing chicken and beef with less expensive protein-rich items (e.g., tuna packed in water or plant proteins), if available, a few days per week may help reduce dollars the jails spend on meats and enable monies to be used to purchase fruits, vegetables, whole grains, and dairy products.

Serving fortified low-fat or nonfat milk and/or yogurt in place of the eggs, even a few times a week, is also a plausible strategy to add more calcium and vitamins A and D without adding excessive amounts of saturated fat and cholesterol to the current diet. The addition of fortified cereals may improve the menu's vitamin D content, which was provided in amounts that met only 6% of recommendations in this study. Vitamin D insufficiency is more prevalent among African Americans, which comprised the largest portion of inmates in Georgia custody (Georgia Department of Corrections, 2013; Harris, 2006). Inadequate vitamin D status has been linked with increased risk for heart disease and diabetes, among other conditions (Mitri, Dawson-Hughes, Hu, & Pittas, 2011; Sun, Shi, & Rimm, 2011).

Diets high in sodium can increase the risk of hypertension and cardiovascular disease, conditions prevalent among those who are incarcerated (Kyckelhahn, 2012; Wilper et al., 2009). To reduce the sodium content of the menu, which provided more than 4,500 mg of sodium per day, in excess of the recommended upper limit of 2,300 mg and the average daily sodium intake for Americans of 3,436 mg (CDC, 2011), the use of prepackaged convenience food items and processed sandwich meats could be decreased. Use of lower sodium versions of the sandwich meats would provide for some reductions in the menu's sodium content. In addition, because several of the popular commissary items were sodium laden, replacing, for example, some of the noodle mixes with reduced sodium flavors may be beneficial. Moreover, while salt and pepper, which are not used during cooking in the jail kitchens, are sold by the commissary, perhaps some of the condiments, such as butter and mayonnaise, also could be sold by the commissary. This change would reduce costs to the jails and may decrease the use of high-sodium and high-fat condiments by the inmates, who would have to purchase such items from the commissary.

This study has both strengths and limitations. Many of the foods appearing on the 28-day cycle menu that was analyzed in this study are typical of items found on other correctional facility menus.

Thus, this study's findings serve as a suggestion that other correctional facilities may want to conduct a nutrient analysis of their menus or, based on this study's findings, incorporate more dairy products, fruits, and vegetables into the menu. The similarities between this study's findings and those from the South Carolina study of prisons also suggest that the identified weaknesses in the menu examined in this study are likely to be seen in other menus used in correctional facilities. The possible impact of these findings is more dramatic considering that the nutrient analyses were conducted on the assumption that all foods served on the menu were consumed; it is more probable that all provided foods are not totally consumed on every occasion. Consequently, some nutrient deficits documented in this study may be even greater than the analyses showed, and some nutrients that were reported as overconsumed may not have exceeded recommendation guidelines. However, the inclusion of foods purchased from the commissary along with the prison diet would further elevate already high sodium and saturated fat contents of the diet such that it would likely continue to be in excess of that recommended for health.

Conclusion

When altering menus, sensitivity must be respected to budget constraints and to the important role that foods play among the inmates in correctional facilities; however, small changes are thought to be possible to improve the menu's nutritional adequacy. Moreover, such changes may potentially not only increase the health and well-being of the inmates but also reduce the rate of chronic illness and, consequently, long-term medical costs. Future studies should construct a cost analysis to determine the costs associated with providing alternatives food choices to the inmates. Cost–benefit analysis could also be performed to justify the benefits of providing healthier foods and medical expenses or other health indicators of inmates.

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References

Binswanger, I. A., Krueger, P. M., & Steiner, J. F. (2009). Prevalence of chronic medical conditions among jail and prison inmates in the USA compared with the general population. *Journal of Epidemiology and Community Health*, *63*, 912–919.

Centers for Disease Control and Prevention. (2011). *Americans consume too much sodium (salt)*. Retrieved from http://www.cdc.gov/features/dssodium/

Centers for Disease Control and Prevention. (2013). *Behavioral risk factor surveillance system. Prevalence and trends data*. Retrieved from http://www.cdc.gov/brfss

Collins, S. A., & Thompson, S. H. (2012). What are we feeding our inmates? *Journal of Correctional Health Care*, *18*, 210–218.

Edwards, J. S. A., Hartwell, H. L., Reeve, W. G., & Schafheitle, J. (2007). The diet of prisoners in England. *British Food Journal*, *109*, 216–232.

Eves, A., & Gesch, B. (2003). Food provisions and the nutritional implications of food choices made by young adult males, in a young offenders' institution. *Journal of Human Nutrition and Dietetics*, *16*, 167–179.

Federal Bureau of Prisons. (2011). *Food service manual* (P4700.06). Retrieved from http://www.acfsa.org/documents/stateRegulations/Fed_Food_Manual_PS_4700-006.pdf

Fryar, C. D., Gu, Q., & Ogden, C. L. (2012). *Anthropometric reference data for children and adults: United States, 2007–2010* (DHHS Publication No. [PHS] 2013–1602, Series 11, No. 252). Hyattsville, MD: National Center for Health Statistics.

Georgia Department of Corrections. (2013). *Fact sheets—Offender facts*. Retrieved from http://www.dcor.state.ga.us/Research/fact_sheets.html

Georgia Department of Public Health. (2013). *Georgia annual health status measures 2013*. Retrieved from http://dph.georgia.gov/sites/dph.georgia.gov/files/related_files/site_page/DPH%20Health%20Status%20Measures.pdf

Glaze, L. E., & Parks, E. (2012). *Correctional populations in the United States, 2011* (NJC 239972). Washington, DC: Bureau of Justice Statistics.

Harris, S. S. (2006). Vitamin D and African Americans. *Journal of Nutrition*, *136*, 1126–1129.

Health Intelligence. (2013, September 5). *Highest prevalence of hypertension located to southeastern United States, 2001–2009*. Retrieved from http://healthintelligence.drupalgardens.com/content/highest-prevalence-hypertension-located-southeastern-united-states-2001-2009

Henrichson, C., & Delaney, R. (2012). *The price of prisons: What incarceration costs taxpayers*. New York, NY: Vera Institute of Justice. Retrieved from http://www.vera.org/sites/default/files/resources/downloads/Price_of_Prisons_updated_version_072512.pdf

Houston, M. C., & Harper, K. J. (2008). Potassium, magnesium, and calcium: Their role in both the cause and treatment of hypertension. *Journal of Clinical Hypertension*, *10*, 3–11.

Kyckelhahn, T. (2012). *State corrections expenditure, FY 1982-2010* (NCJ 239672). Washington, DC: Bureau of Justice Statistics.

Lopez-Ridaura, R., Willett, W. C., Rimm, E. B., Liu, S., Stampfer, M. J., Manson, J. E., & Hu, F. B. (2004). Magnesium intake and risk of type 2 diabetes in men and women. *Diabetes Care*, *27*, 134–140.

Martinez, E. (2009, June 5). *Jail house brunch: Mimosa or Bloody Mary?* Retrieved from http://www.cbsnews.com/news/jail-house-brunch-mimosa-or-bloody-mary/

McGraw-Hill Education NutritionCalc Plus (Version 3.5.2, 2013). New York, NY: McGraw-Hill Education.

Mitri, J., Dawson-Hughes, B., Hu, F. B., & Pittas, A. G. (2011). Effect of vitamin D and calcium supplementation on pancreatic B-cell function, insulin sensitivity, and glycemia in adults at high risk of diabetes: The calcium and vitamin D for diabetes mellitus randomized controlled trial. *American Journal of Clinical Nutrition*, *94*, 486–494.

Pew Charitable Trusts. (2013). *Managing prison health care spending*. Retrieved from http://www.pewtrusts.org/en/research-and-analysis/reports/2014/05/15/managing-prison-health-care-spending

Sun, Q., Shi, L., & Rimm, E. B. (2011). Vitamin D intake and risk of cardiovascular disease in U.S. men and women. *American Journal of Clinical Nutrition*, *94*, 534–542.

Tennessee Corrections Institute. (2004). *Minimum standards for local adult correctional facilities*. Retrieved from www.tn.gov/correction/

Trust for America's Health. (2013). *Key health data about Georgia*. Retrieved from http://healthyamericans.org/states/?stateid=GA

U.S. Department of Agriculture. (2011). *Choose MyPlate*. Retrieved from http://www.choosemyplate.gov

Vasilion, L. (2009, November–December). Beyond the wall: Working in correctional food service. *Dietary Manager*, 25–27.

Wakeen, B. (2006). Food service and nutrition standards—What jail administrators need to know. *American Jails*, *19*, 49–51.

Williams, P., Walton, K., & Hannan-Jones, M. (2009). Prison foodservice in Australia—Systems, menus and inmate attitudes. *Journal of Foodservice*, *20*, 167–180.

Wilper, A. P., Woolhandler, S., Boyd, W., Lasser, K. E., McCormick, D., Bor, D. H., & Himmelstein, L. (2009). The health and health care of U.S. prisoners: Results of a nationwide survey. *Research and Practice*, *99*, 666–672.