

RESEARCH ARTICLE

Nutrition in Midwestern State Department of Corrections Prisons: A Comparison of Nutritional Offerings With Commonly Utilized Nutritional Standards

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Abstract

Improvement in nutritional care in correctional institutions may reduce the burden of related chronic health conditions. Even when nutritional standards are used, inconsistent use of standards and lacking regulations may be leading to inappropriate or inconsistent nutrition care in corrections. Midwestern state department of corrections' menus revealed excessive calorie offerings and low offerings of vegetables on male and female menus, and low fruit and dietary fiber offerings on male menus. A majority of vitamin and mineral offerings met recommendations when reported; however, they were inconsistently underreported across states. When reported, potassium and vitamin E were offered at less than recommended levels while sodium was excessively offered. Consistency in use and increased accountability in meeting nutrition standards may improve nutrition care within corrections.

Keywords: diet, nutrition, food, prison, correctional health care

Introduction

Improvements are needed in correctional health care and opportunities can be created to address identified health care needs (Rich *et al.*, 2011; Wilper *et al.*, 2009). One of these opportunities is improvement of correctional nutrition care.

There is limited research on the prevalence of non-infectious chronic medical conditions and nutrition-associated chronic diseases within U.S. prisons. What is available shows mixed findings (Harzke *et al.*, 2010). Some research has shown rates of diabetes, hypertension, and myocardial infarction comparable with or lower than noninstitutionalized populations within the United States (Binswanger *et al.*, 2009; Wilper *et al.*, 2009). Other findings have shown higher rates of hypertension and obesity, especially among women (Binswanger *et al.*, 2009; Clarke & Waring, 2012; Gates & Bradford, 2015; Herbert *et al.*, 2012; Kendig *et al.*, 2014). Bureau of Justice Statistics reports have shown 74% of prisoners

are either overweight (45.7%), obese (25.5%), or morbidly obese (2.4%), and hypertension is the most common condition reported by prisoners at a rate of 30% (Maruschak *et al.*, 2015). Obesity among inmates has been found to be significantly associated with diabetes and cardiovascular disease (Bai *et al.*, 2015). Rates of nutrition-related chronic health diseases have also shown to be higher among older incarcerated individuals (Skarupski *et al.*, 2018). As prison populations and the age of incarcerated populations continue to increase, these conditions can be expected to continue to impact correctional and community health care systems within the United States (Harzke *et al.*, 2010).

Limited information exists on foods served in correctional facilities, inmates have limited choices of what they can eat, and the variety of food itself is limited within the correctional environment (Collins & Thompson, 2012; Cook *et al.*, 2015). Cost is a primary contributor to these limitations. Typically, \$2 to \$4 are

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spent to feed an inmate three meals per day (Camplin, 2017). Other factors that limit food offerings are security risks related to the offering of whole fresh fruit, canned fruit, and fruit juice, which can be used to produce illicit alcohol (Academy of Nutrition and Dietetics, 2019).

Correctional food and nutrition services are relatively unregulated (Camplin, 2017). The American Correctional Association (ACA) is a nonprofit organization that administers the only nationally accredited program for all components of adult and juvenile corrections (American Correctional Association [ACA], 2014). Its purpose is to promote improvement in the management of correctional agencies through the administration of accreditation; however, accreditation is voluntary (ACA, 2014). According to the ACA *Standards for Adult Correctional Institutions*, “the principal function of food service is meals are nutritionally balanced, well-planned, and prepared and served in a manner that meets established governmental health and safety codes.” In addition, following dietary allowances is mandatory and ACA requires “documentation that the institution’s dietary allowances are reviewed at least annually by a qualified nutritionist or dietitian to ensure they meet the nationally recommended allowances for basic nutrition” (ACA, 2003, pp. 87–88). ACA also provides comments indicating allowances should be adjusted for age, gender, and activity and should meet or exceed the recommended dietary allowances (RDAs) published by the National Academy of Sciences (ACA, 2003). No specific identification of which RDAs or to what extent they are to be reviewed by an institution is noted. There is also no indication if additional dietary reference intakes (DRIs), to include estimated average requirements (EARs), adequate intakes (AIs), or tolerable upper intake level, are to be utilized. According to the Academy of Nutrition and Dietetics (2019), common guidelines for nutritional assessment to determine the nutritional appropriateness of foods offered within corrections that are possibly being utilized to attempt to meet ACA standards include the DRIs as well as Dietary Guidelines for Americans, MyPlate.gov, therapeutic lifestyle change diet, and dietary approaches to stop hypertension (ACA, 2014).

Nutrition standards are regulated only by the facilities themselves; each state, county, or facility has its own interpretation of the standards it utilizes, leaving nutritional appropriateness fluidly interpreted (Academy of Nutrition and Dietetics, 2019; Camplin, 2017; Hardy, 2016). In addition, correctional facilities not accredited by the ACA may use no nutritional standards at all. Reportedly, only 38 states have nutritional standards for jail and detention facilities, and not all of those require mandatory implementation (Academy of Nutrition and Dietetics, 2019).

This lack of consistent regulation may be leading to inappropriate or inconsistent nutrition care within correc-

tions. In South Carolina, Collins and Thompson (2012) found excessive dietary offerings of cholesterol, sodium, and sugar along with lower than recommended levels of fiber, magnesium, potassium, vitamin D, and vitamin E. In Georgia, Cook *et al.* (2015) found macronutrient ranges were met. However, sodium offerings were 303% of recommended levels, and higher than recommended levels of cholesterol and sugar were evident. In addition, Georgia menus were shown to offer lower than recommended levels of fiber, magnesium, potassium, vitamin D, and vitamin E (Cook *et al.*, 2015). No research was found assessing food offerings in correctional facilities in the Midwest or comparing offerings across correctional programs. The purpose of this study was to compare how Midwestern state departments of corrections (DOCs) average menu offerings compared with nutritional standards identified to be commonly used within corrections including the DRIs and the 2015–2020 Dietary Guidelines for Americans (U.S. Department of Health and Human Services [USDHHS] & U.S. Department of Agriculture [USDA], 2015) to determine whether (1) standards are being met and (2) standards are being consistently utilized across Midwestern state DOCs.

Method

To examine nutritional offerings in comparison with common nutritional standards used within Midwestern state DOCs, copies of male, female, religious male, and religious female menus and corresponding nutritional analyses were requested through 12 Midwestern state DOCs’ websites, direct email, or phone calls. Two follow-up phone calls were administered to each DOC that did not respond to the initial request.

In total, six male menus and corresponding nutritional analyses were obtained from Iowa, Kansas, Minnesota, Missouri, Ohio, and Wisconsin. A male menu without nutritional analysis was obtained from Illinois. Six female menus and corresponding nutritional analyses were obtained from Illinois, Iowa, Kansas, Minnesota, Ohio, and Wisconsin. Six religious menus and corresponding analyses were obtained from Iowa, Kansas, Minnesota, Ohio, and Wisconsin. Kansas was the only state to provide a religious menu specifically identified for both males and females. There was no gender identification for religious menus provided by Iowa, Ohio, or Wisconsin.

Data Analysis

Midwestern state DOC menu cycles ranged from 1 day to 6 weeks. The DOC-provided nutritional analysis information was utilized to compare macronutrient ranges and micronutrient offerings including 12 vitamins (A, thiamine, riboflavin, niacin, pantothenic acid, B₆, folate, B₁₂, C, D, E, and K) and 11 minerals (calcium, copper, iodine, iron, magnesium, manganese, phosphorus,

potassium, selenium, sodium, and zinc) to DRI recommendations for acceptable macronutrient distribution ranges (AMDRs), RDAs, EARs, and AIs. Nutritional analysis information for protein and carbohydrates provided in grams was multiplied by 4 to calculate the total calories per day offered. This number was divided by the total daily calories to calculate the percent of calories offered from that macronutrient in the given day. The same procedure was followed for fats, except the value in grams was multiplied by 9.

DOC-provided menu nutritional analysis information was also utilized to compare offerings of energy, fruits, vegetables, fiber, and percent calories from saturated fat to recommended intake levels according to 2015–2020 Dietary Guidelines for Americans (USDHHS & USDA, 2015). The recommended values of energy, fruits, and vegetables were based on a sedentary lifestyle and an average age range of 25–39 years (Bronson & Carson, 2019). Specifically, male menus were compared with a 2,400-calorie diet with three servings of vegetables and two servings of fruit per day. Female menus were compared with an 1,800-calorie diet with 2.5 servings of vegetables and 1.5 servings of fruit per day. Fiber recommendations were established at 33.6 g/day for males and 25.2 g/day for females based on a recommended AI of 14 g/1,000 kcal. Nutritional analysis information for saturated fat provided in grams of fat used the same conversion to percent of total calories as total fat.

For fruit and vegetable offerings, Midwestern state DOC-provided menus and noted serving sizes were used to determine the average fruit and vegetable cup-equivalent offerings per day. Each fruit and vegetable with a serving listed in ounces or partial or whole units was converted to cup-equivalents of fruits and vegetables using MyPlate cup equivalents conversation tables (U.S. Department of Agriculture, n.d.).

Both male and female menu analyses were compared with the same saturated fat limitations, as well as the same AMDRs for percent protein, fat, and carbohydrate recommendations listed in the 2015–2020 Dietary Guidelines for Americans. Specifically, recommendations include a diet with less than 10% total calories from saturated fat, 10%–35% total calories from protein, 20%–35% total calories from fat, and 45%–65% total calories from carbohydrate (USDHHS & USDA, 2015). For all menu analyses, daily nutrition offerings were totaled and divided by the number of days within the menu to calculate average daily offerings.

Results

To assess food offerings in correctional facilities in Midwestern state DOCs and to compare offerings across multiple correctional programs, the DOCs' average menu offering was compared with DRIs and the 2015–2020 Dietary Guidelines for Americans. The target population of the study was 12 Midwestern states contacted. Seven states provided a variety of menus and nutritional analysis information including menus and analyses for men's, women's, and men's religious and women's religious diets. Kansas and Minnesota were the only states to provide a religious menu specifically identified for males. Due to the percentage of males compared with females within incarcerated populations and noted calorie levels provided as part of nongender identified menus, nongender identified menus were presented as part of male average dietary offerings (Table 1).

As reported in Table 1, daily calorie offerings for male menu offerings range from 2,500 to 2,929 calories per day, while daily percent of calories from protein ranged from 11.7% to 18.5%, percent of calories from carbohydrates ranged from 50.4% to 66.8%, percent of calories

Table 1. Average Dietary Offering Based on Male General and Religious State Department of Corrections Menus

States	Average calories	% Calories protein	% Calories carbohydrates	% Calories fat	% Calories saturated fat	Fruit cup-equivalents	Vegetable cup-equivalents	Fiber (g)
Recommended	2400	10–35	45–65	20–35	<10	2.0	3.0	33.6
IL (regular)	— ^a	—	—	—	—	1.0	2.3	—
IA (regular)	2875	14.0	55.0	33.0	—	1.2	2.9	32.7
IA (religious)	—	—	—	—	—	2.0	2.0	—
KS (regular)	2917	11.7	60.8	27.1	8.7	1.0	2.2	25.5
KS (religious)	2929	11.9	56.6	31.6	8.1	3.0	1.4	32.9
MN (regular)	2677	17.0	53.0	30.0	8.4	1.4	2.4	31.9
MN (religious)	2500	—	—	—	—	2.8	2.2	—
MO (regular)	2727	14.1	62.9	21.7	—	2.3	2.8	—
OH (regular)	2563	16.2	57.3	27.3	8.2	3.4	3.3	34.5
OH (religious)	2914	14.3	50.4	36.9	7.7	3.0	1.8	40.6
WI (regular)	2649	18.5	66.8	18.5	9.3	1.9	1.8	34.5
WI (religious)	2639	14.6	62.9	23.5	6.4	1.9	1.3	24.3

^aInformation not available.

Table 2. Average Dietary Offering Based on Female General and Religious State Department of Corrections Menus

States	Average calories	% Calories protein	% Calories carbohydrates	% Calories fat	% Calories saturated fat	Fruit cup-equivalents	Vegetable cup-equivalents	Fiber (g)
Recommended	1800	10–35	45–65	20–35	<10	1.5	2.5	25.2
IL (regular)	— ^a	—	—	—	—	1.0	2.3	—
IA (regular)	2869	14.0	55.0	33.0	—	1.2	2.9	26.5
KS (regular)	2427	13.2	61.1	25.3	7.9	1.0	2.2	25.3
KS (religious)	2405	13.3	56.0	31.7	8.0	3.0	1.4	27.6
MN (regular)	2164	19.0	52.0	29.0	8.2	1.4	2.4	26.6
OH (regular)	2152	17.0	58.7	25.5	9.7	3.2	3.0	29.7
WI (regular)	2154	17.0	69.8	14.9	9.1	1.7	2.2	30.8

^aInformation not available.

from fat ranged from 18.5% to 36.9%, and percent of calories from saturated fat ranged from 6.4% to 9.3%. Daily fruit-cup equivalents offering ranged from 1.0 to 3.4 servings per day and daily vegetable cup-equivalents offering ranged from 1.3 to 3.3 servings per day. Lastly, daily average offering of fiber ranged from 24.3 to 40.6 g/day.

Table 2 reports daily calorie offerings for female menu ranging from 2,152 to 2,869 calories per day. Daily percent calories from protein ranged from 13.2% to 19.0%, percent calories from carbohydrates ranged from 52.0% to 69.8%, percent calories from fat ranged from 14.9% to 33.0%, and percent calories from saturated fat ranged from 7.9% to 9.7%. Daily fruit cup-equivalent serving ranged from 1.0 to 3.2 servings per day and vegetable cup-equivalent offering ranged from 1.4 to 3.0 servings per day. Lastly, average offerings of fiber ranged from 25.3 to 30.8 g/day.

Table 3 shows that a majority of male menu nutrient analyses provided for vitamins met or exceeded DRI recommendations including vitamin A, thiamin, riboflavin, niacin, pantothenic acid, vitamin B₆, folate, vitamin B₁₂, vitamin C, and vitamin K. Two of four of nutrient analyses provided for vitamin D were below the recommended DRIs, and both nutrient analyses provided for vitamin E were below the DRIs.

Table 4 shows that a majority of female menu nutrient analyses provided for vitamins exceeded DRI recommen-

dations including vitamin A, thiamin, riboflavin, niacin, pantothenic acid, vitamin B₁₂, vitamin C, and vitamin K. Four of five nutrient analyses provided for folate were above the recommended DRIs. Two of three nutrient analyses provided for vitamin D were below the recommended DRIs. None of the nutrient analyses provided for vitamin E were above the DRIs.

DRI offerings for minerals were also assessed. Table 5 shows a majority of male menu nutrient analyses provided exceeded DRI recommendations including calcium, copper, iodine, iron, manganese, phosphorus, selenium, and zinc. One of two of nutrient analyses provided for magnesium were below the recommended DRIs and three of five nutrient analyses for potassium were below the DRIs. For sodium, all nutrient analyses exceeded the recommended DRIs.

As shown in Table 6, a majority of female menu nutrient analyses provided exceeded DRI recommendations including calcium, copper, iodine, iron, manganese, magnesium, phosphorus, potassium, selenium, and zinc. For sodium, five of six nutrient analyses exceeded the recommended DRIs.

Discussion

This study examined how Midwestern state DOC average menu offerings compared with commonly used nutritional standards within corrections, including the DRIs

Table 3. The Quantity of Vitamins Offered in Male Menus in Midwest State Departments of Corrections

States	Vitamin A (μg)	Thiamin (μg)	Riboflavin (mg)	Niacin (mg)	Pantothenic acid (mg)	Vitamin B ₆ (mg)	Folate (μg)	Vitamin B ₁₂ (mg)	Vitamin C (mg)	Vitamin D (μg)	Vitamin E (mg)	Vitamin K (μg)
Recommended	900.0	1.2	1.3	16.0	5.0	1.3	400.0	2.4	90.0	15.0	15.0	120.0
IA (regular)	1254.6	2.2	3.0	35.6	5.7	2.0	448.8	5.6	208.6	16.4	14.1	172.8
KS (regular)	1067.2	2.9	2.2	34.8	—	1.4	648.1	5.8	185.3	—	—	—
KS (religious)	1101.7	3.1	1.8	26.5	—	1.3	834.3	7.5	237.1	—	—	—
MN (regular)	1563.3	1.8	2.2	17.0	5.5	1.5	460.1	4.3	266.2	28.4	9.3	173.4
MO (regular)	— ^a	—	—	—	—	—	—	3.6	—	—	—	—
OH (regular)	1522.8	2.7	2.7	27.0	—	2.0	719.9	4.0	153.6	—	—	—
OH (religious)	2418.3	2.8	2.9	37.3	—	3.0	597.2	5.9	170.1	—	—	—
WI (regular)	—	—	—	—	—	—	—	—	—	9.2	—	—
WI (religious)	—	—	—	—	—	—	—	—	—	12.1	—	—

^aInformation not available.

Table 4. The Quantity of Vitamins Offered in Female Menus in Midwest State Departments of Corrections

States	Vitamin A (μg)	Thiamine (μg)	Riboflavin (mg)	Niacin (mg)	Pantothenic acid (mg)	Vitamin B ₆ (mg)	Folate (μg)	Vitamin B ₁₂ (mg)	Vitamin C (mg)	Vitamin D (μg)	Vitamin E (mg)	Vitamin K (μg)
Recommended	700.0	1.1	1.1	14.0	5.0	1.3	400.0	2.4	75.0	15.0	15.0	90.0
IA (regular)	1267.0	2.0	2.9	35.5	5.7	2.0	459.2	6.5	213.0	16.4	13.7	169.6
KS (regular)	971.7	2.5	2.0	25.1	—	1.5	643.7	5.7	180.5	—	—	—
KS (religious)	939.1	2.4	1.6	21.0	—	1.1	650.4	7.3	234.5	—	—	—
MN (regular)	1525.3	1.7	2.5	21.0	5.6	1.4	388.1	5.1	278.2	30.3	8.4	169.5
MO (regular)	— ^a	—	—	—	—	—	—	—	—	—	—	—
OH (regular)	1582.0	2.4	2.8	23.9	—	2.1	612.1	5.1	146.1	—	—	—
WI (regular)	—	—	—	—	—	—	—	—	—	9.2	—	—

^aInformation not available.

and the 2015–2020 Dietary Guidelines for Americans, to determine whether (1) standards are being met and (2) whether standards are being consistently used across Midwestern state DOCs. Most calorie offerings were reported to be offered in excessive amounts, with male menus averaging 2,739 calories per day or 114% of the DRIs and women's menus averaging 2,361 calories per day or 131% of the DRIs. These excessive calorie offering may be associated with the reported 74% of prisoners who are overweight (45.7%), obese (25.5%), or morbidly obese (2.4%; Maruschak *et al.*, 2015).

Most macronutrients were reported with ranges found to be within AMDRs. These findings are in line with Cook *et al.*'s (2015) findings of macronutrient ranges in a large county jail in Georgia. Saturated fat recommendations were also found to be met. These findings are also in line with Cook *et al.*'s (2015) findings; however, they are not in line with previous findings of saturated fat offerings within a correctional setting of >10% of total calories identified by Collins and Thompson (2012).

Average fruit offerings exceed intake recommendations for regular females at 1.6 servings per day, religious males at 2.5 servings per day, and religious females at 3.0 servings per day; however, regular male menus offered below the recommended value at 1.7 servings per day. These findings are in line with previous low fruit offerings in male correctional settings identified by Collins

and Thompson (2012) and Cook *et al.* (2015). These findings also partially support the perception that fruit offerings may be limited due to security concerns related to fruit being used to produce illicit alcohol, especially in male correctional facilities (Academy of Nutrition and Dietetics, 2019).

Average vegetable offerings were below intake recommendations at 2.6 servings per day for males and 2.3 servings per day for females. Both religious and regular male menu average offerings were below recommended levels, with religious menus offering 1.7 servings per day and regular menus offering 2.5 servings per day. These findings are in line with previously identified low vegetable offerings in correctional settings (Collins & Thompson, 2012; Cook *et al.*, 2015).

Most Midwestern state DOC average fiber offerings were reported. Male menus fell below recommended intakes, while average fiber offerings on all female menus were above recommended intakes. For males, these findings were consistent with past findings showing lower than recommended levels of fiber offerings on prison menus (Collins & Thompson, 2012; Cook *et al.*, 2015).

For both males and females, a majority of vitamins met or exceeded DRI levels; however, there was inconsistent reporting across states. In addition, only 55% of the vitamins reviewed as part of this research were reported by states for males and only 78% were reported by states

Table 5. The Quantity of Elements and Minerals Offered in Male Menus in Midwest State Departments of Corrections

States	Ca (mg)	Cu (μg)	I (mg)	Fe (mg)	Mg (mg)	Mn (μg)	P (mg)	K (mg)	Se (μg)	Na (mg)	Zn (μg)
Recommended	1000.0	900.0	150.0	8.0	420.0	2.3	700.0	3400.0	55.0	2300.0	11.0
IA (regular)	1564.0	1141.2	183.3	21.4	563.6	4.7	1727.6	3327.6	125.3	4788.0	24.3
KS (regular)	1441.5	—	—	21.1	—	—	1664.5	—	—	3681.6	—
KS (religious)	1460.4	—	—	24.9	—	—	1304.8	—	—	2430.1	—
MN (regular)	1388.5	1110.0	—	11.6	308.7	4.0	1425.5	3237.2	—	3579.9	21.4
MO (regular)	— ^a	—	—	—	—	—	1710.9	4441.9	—	4242.0	—
OH (regular)	1506.6	—	—	22.7	—	—	1615.1	—	—	3504.8	—
OH (religious)	1374.9	—	—	39.4	—	—	1184.0	—	—	3666.0	—
WI (regular)	1818.0	—	—	21.9	—	—	—	4433.0	—	3093.0	—
WI (religious)	2123.0	—	—	24.3	—	—	—	2678.0	—	3640.0	—

^aInformation not available.

Table 6. The Quantity of Elements and Minerals Offered in Female Menus in Midwest State Departments of Corrections

States	Ca (mg)	Cu (μ g)	I (mg)	Fe (mg)	Mg (mg)	Mn (μ g)	P (mg)	K (mg)	Se (μ g)	Na (mg)	Zn (μ g)
Recommended	1000.0	900.0	150.0	18.0	310.0	2.3	700.0	2600.0	55.0	2300.0	8.0
IA (regular)	1564.0	1128.6	182.7	21.7	350.9	4.7	1716.4	3261.8	124.9	4761.0	24.2
KS (regular)	1370.3	—	—	20.4	—	—	1645.0	—	—	3363.4	—
KS (religious)	1371.2	—	—	19.9	—	—	1115.9	—	—	2195.6	—
MN (regular)	1594.5	930.0	—	19.4	292.1	3.2	1489.6	3202.2	—	3091.0	21.5
MO (regular)	— ^a	—	—	—	—	—	—	—	—	—	—
OH (regular)	1655.5	—	—	18.7	—	—	1681.0	—	—	2472.0	—
WI (general)	1805.0	—	—	18.4	—	—	—	4019.0	—	2472.0	—

^aInformation not available.

for females. Vitamins, including pantothenic acid and vitamins D, E, and K, were more commonly underreported. When reported, a majority of values for both vitamins D and E were below recommended levels. These findings were again consistent with previous findings of lower than recommended levels of vitamin D and E offerings on prison menus (Collins & Thompson, 2012; Cook *et al.*, 2015).

There was also inconsistent and underreporting of minerals. Only 47% of the minerals reviewed were reported on both male and female menus. Specifically, most minerals except calcium, iron, phosphorus, and sodium were underreported across states. When they were reported, a majority of male potassium offerings were at less than recommended levels. Sodium was offered in excess across 14 of the 15 menus reviewed. The average daily offering was 3,625 mg or 158% of the recommended level for males and 3,059 mg or 133% of recommended levels for females. These findings are also in line with previously reported below-recommended offerings of potassium with exceedingly high offerings of sodium (Collins & Thompson, 2012; Cook *et al.*, 2015).

Recommendations

As commonly used nutritional standards are not consistently being used or met, regulations should be established to require correctional institutions to specifically identify which nutrition standards they are utilizing as well as requirements to meet them, whether they are accredited or not. Accrediting organizations, such as the ACA, should adopt more specific standardized definitions on which DRIs should be assessed and to what extent they should be implemented. These changes could help correctional programs to provide enhanced nutritional care and continuity of nutritional care across DOCs.

Internally, DOCs should voluntarily increase accountability to meet common nutritional standards and guidelines to include the DRIs and Dietary Guidelines for Americans. Specifically, calories and sodium levels should be reduced to recommended levels as excessive offerings could be associated with higher rates of hypertension, overweight, and obesity in corrections (Binswanger *et al.*,

2009; Clarke & Waring, 2012; Gates & Bradford, 2015; Herbert *et al.*, 2012; Kendig *et al.*, 2014; Maruschak *et al.*, 2015). In addition, as vitamin D, potassium, and dietary fiber are nutrients of public health concern, DOCs could benefit from increasing offerings to recommended levels to reduce the risk of associated chronic health conditions (USDHHS & USDA, 2015).

Conclusion

Improving the nutritional adequacy of food is an opportunity for improvement in correctional health care as research has shown there are potentially higher rates of nutrition-related chronic health conditions among incarcerated populations. A lack of or ambiguous regulations may be leading to inappropriate or inconsistent nutrition care within corrections. This may be resulting in no nutritional standards being utilized or commonly utilized nutritional standards not being met. Correctional health care may be improved if all correctional institutions enforced nutritional standards, and if correctional accreditation agencies developed and enforced more specific nutritional standards. In addition, correctional health care may be improved if correctional institutions voluntarily increased their accountability to meeting nutrition recommendations, especially for calorie levels and nutrients of public health concern.

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References

- Academy of Nutrition and Dietetics. (2019). *ADA nutrition care manual*. <https://www.nutritioncaremanual.org>
- American Correctional Association. (2003). *Standards for adult correctional institutions*. Baltimore, MD; Victor Graphics, Inc.
- American Correctional Association. (2014). *Standards supplement*. Mayfield, PA: The P.A. Hutchinson Company.
- Bai, J. R., Befus, M., Mukherjee, D. V., Lowy, F. D., & Larson, E. L. (2015). Prevalence and predictors of chronic health conditions of inmates newly admitted to maximum security prisons. *Journal of Correctional Health Care*, 21(3), 255–264. <https://doi.org/10.1177/1078345815587510>

- 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(11), 912–919. <https://doi.org/10.1136/jech.2009.090662>
- Bronson, J., & Carson E. A. (2019). *Prisoners in 2017* (NCJ 252156). Bureau of Justice Statistics. <https://www.bjs.gov/content/pub/pdf/p17.pdf>
- Camplin, E. (2017). *Prison food in America*. Rowman & Littlefield.
- Clarke, J. G., & Waring, M. E. (2012). Overweight, obesity, and weight change among incarcerated women. *Journal of Correctional Health Care*, 18(4), 285–292. <https://doi.org/10.1177/1078345812456010>
- Collins, S. A., & Thompson, S. H. (2012). What are we feeding our inmates? *Journal of Correctional Health Care*, 18(3), 210–218. <https://doi.org/10.1177/1078345812444875>
- Cook, E. A., Lee, Y. M., White, B. D., & Gropper, S. S. (2015). The diet of inmates: An analysis of the 28-day cycle menu used in a large county jail in the state of Georgia. *Journal of Correctional Health Care*, 21(4), 390–399. <https://doi.org/10.1177/1078345815600160>
- Gates, M. L., & Bradford, R. K. (2015). The impact of incarceration on obesity: Are prisoners with chronic diseases becoming overweight and obese during their confinement? *Journal of Obesity*, 2015, 532468. <https://doi.org/10.1155/2015/532468>
- Hardy, K. (2016). Nutrition services in correctional facilities. *Today's Dietitian*, 18(6), 32. <https://www.todaysdietitian.com/newarchives/0616p32.shtml>
- Harzke, A. J., Baillargeon, J. G., Pruitt, S. L., Pulvino, J. S., Paar, D. P., & Kelley, M. F. (2010). Prevalence of chronic medical conditions among inmates in the Texas prison system. *Journal of Urban Health*, 87(3), 486–503. <https://doi.org/10.1007/s11524-010-9448-2>
- Herbert, K., Plugge, E., Foster, C., & Doll, H. (2012). Prevalence of risk factors for non-communicable diseases in prison populations worldwide: A systematic review. *Lancet*, 379(9830), 1975–1982. [https://doi.org/10.1016/S0140-6736\(12\)60319-5](https://doi.org/10.1016/S0140-6736(12)60319-5)
- Kendig, N., Brown, B., & Dretsch, D. (2014, March 20–21). *An examination of the health history and clinical findings of newly incarcerated federal inmates* [Conference session]. Academic Consortium on Criminal Justice Health 7th Academic & Health Policy Conference on Correctional Health, Houston, TX.
- Maruschak, L. M., Berzofsky, M., & Unangst, J. (2015). *Medical problems of state and federal prisoners and jail inmates, 2011–2012* (NCJ 248491). Bureau of Justice Statistics. www.bjs.gov/content/pub/pdf/mpsfpi1112.pdf
- Rich, J. D., Wakeman, S. E., & Dickman, S. L. (2011). Medicine and the epidemic of incarceration in the United States. *New England Journal of Medicine*, 364(22), 2081–2083. <https://doi.org/10.1056/NEJMp1102385>
- Skarupski, K. A., Gross, A., Schrack, J. A., Deal, J. A., Eber, G. B. (2018). The health of America's aging prison population. *Epidemiologic Reviews*, 40(1), 157–165. <https://doi.org/10.1093/epirev/mxx020>
- U.S. Department of Agriculture. (n.d.). *What is MyPlate?* <https://www.choosemyplate.gov/WhatsMyPlate>
- U.S. Department of Health and Human Services & U.S. Department of Agriculture. (2015). *Dietary guidelines for Americans 2015–2020* (8th ed.). <https://health.gov/dietaryguidelines/2015/guidelines>
- Wilper, A. P., Woolhandler, S., Boyd, J. W., Lasser, K. E., McCormick, D., Bor, D. H., & Himmelstein, D. U. (2009). The health and health care of US prisoners: Results of a nationwide survey. *American Journal of Public Health*, 99(4), 666–672. <https://doi.org/10.2105/AJPH.2008.144279>