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Dietary Consumption Practices and Cancer Risk In African Americans in the Rural South

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Abstract

This study describes the dietary consumption practices of a sample of African Americans in the rural South. A qualitative research design involving a cross-sectional food diary was utilized. Complete datasets were collected from 114 participants, 66% female, between the ages of 19 and 79 years. The consumption of a variety of fruits, non-starchy vegetables and unprocessed cereals in daily meals was low in this sample. Frequent consumption of fried foods; fast foods; sugary, carbonated beverages; processed, high-fat and high-sodium foods; and low fruit and non-starchy vegetable intake were evident. The findings are crucial to the development for culturally-specific nutrition education intervention programs for African Americans in the rural South targeted at the modification of not only diet, but food preparation methods to reduce cancer risk.

Keywords

African Americans; diet; cancer risk; food preparation methods; fruit and vegetable consumption; rural South

In the U.S., cancer incidence and mortality vary considerably among racial/ethnic groups; for example, African American males have 19% and 37% higher incidence and mortality rates, respectively, than White males.¹ On the other hand, African American women have a 6% lower incidence rate, but a 17% higher mortality rate than White women.¹ Cancer mortality rates for all sites of cancer are almost 2.5 times higher for African Americans than for Whites.² Among African American males, the incidence rates of multiple myeloma, lung, prostate, and colon cancers are 50%, 36%, 35%, and 20% higher, respectively, than among White males.³ Prostate cancer provides a clear example of the ethnic disparity in the impact of cancer in African American males. The incidence and mortality rates per 100,000

population for prostate cancer are 161.4, 255.5, and 96.5 for White, African American, and Asian American and Pacific Islander males, respectively.¹ Breast cancer data supply evidence that there are racial/ethnic disparities in cancer among women as well. Female breast cancer incidence rates for Alabama from 2002 to 2004 were 115.6 and 103.8 per 100,000 population for Whites and African Americans, respectively; however, mortality rates were 24.5 for Whites and 31.6 for African Americans.⁴ African American women with breast cancer are less likely than White women to survive five or more years after their diagnosis: 77% versus 90%, respectively.⁵

The reasons for the observed disparities in cancer incidence and mortality rates among African Americans have not been definitively determined. It is well known that diet, nutrition, and physical activity play important roles in modulating cancer risk, and it is estimated that 30% to 40% of cancer cases could be prevented by means of food, nutrition, physical activity, and other lifestyle-related factors.^{4,6,7-14} It has also been speculated that dietary consumption practices may contribute to certain cancers that disproportionately affect African Americans.^{1,5,7,10,14,15} African Americans have higher levels of physical inactivity, less healthy diets, and increased risk of chronic disease in comparison with the general American population.¹⁶ Additionally, roughly 25% of the poor in America are African Americans, many of whom reside in the South with limited access to opportunities for physical activity, fresh fruits, and vegetables, which increase cancer risk.¹⁷⁻¹⁹ It is important to note that cancer risk is influenced by other factors such as obesity, overweight, and weight gain.⁷

Older studies have estimated that 40% and 60% of cancers in males and females, respectively, are partly attributable to diet.^{14,20} Epidemiologic studies provide evidence of associations between several dietary constituents, and prostate and breast cancer risk, including increased risk with high intakes of total fat, saturated fat/animal fat, meat, and milk and dairy products, and decreased risk with vegetables, vitamin E, and selenium.^{3,21} Silvera et al. have associated high glycemic-index and/or high glycemic-load diets with an increased risk of breast cancer.²² Mattison et al. reported an inverse relationship between high fiber intake and breast cancer risk.²³ The consumption of a variety of non-starchy vegetables and fruits, unprocessed cereals (grains), and legumes daily is protective against cancers of the mouth, pharynx, larynx, esophagus, lung, and stomach.⁷ Fruits and vegetables contain dietary fiber and various micronutrients, which protect against colorectal cancer.⁷

There is a considerable gap in the knowledge base regarding cancer-related dietary habits in African Americans in general, and particularly those in the rural South in comparison with other ethnic groups in the American population. Although Agurs-Collins et al. examined dietary patterns and breast cancer risk in the Black Women's Study, they focused on Western and prudent diets, which are not specific to African Americans in general, and those in the rural South in particular.²⁴ Satia et al. used a food frequency questionnaire (FFQ), validated for the general American population to examine associations of dietary patterns with colon cancer risk in African Americans and Whites in North Carolina.²⁵ Such questionnaires effectively measure habitual intake or identify dietary patterns only if they are tailored to the target population; Satia et al.'s FFQ was not specifically targeted to, or validated in African American populations. Similarly, Williams et al. utilized the Dietary Health Questionnaire

(DHQ) to assess the relationship between food groups and dietary patterns, and rectal cancer in Whites and African Americans.²⁶ However, the DHQ is not tailored specifically to encompass the diets of African Americans. Although FFQs have been shown to provide valid and reliable estimates in a variety of populations, information regarding their sensitivity and validity in African American men and women in the rural South is scanty.

Airhihenbuwa and Kumanyika and Kristal et al. have reported on the unequal diet-related mortality observed in the African American community, and the need for culturally relevant interventions for dietary changes.^{27,28} There is great variety in the diets of African Americans in the U.S.²⁹ This presents challenges, creating a lack of information about the cancer-related dietary habits of this group. Some studies have attempted to describe the dietary patterns of African Americans in the rural South, but most of these have treated the African American population as homogeneous, and have not articulated the subcultures within this group.^{24,25,30,31} Within the African American population, there are many subcultures based on language, dietary habits, nutrition-related knowledge, and beliefs.²⁹ These subcultures must be accurately identified in order for culturally relevant interventions for dietary changes to be designed effectively. To cite an example, Elmubarak et al. have described the perceptions of diet, nutrition, and cancer in a Sudanese American subculture.²⁹ In the present study, participants were African Americans in the rural South because experimental and anecdotal data suggest that their dietary practices differ from other groups and regions of the U.S. Greenberg et al. computed a “healthy diet” score for Southern-born and other Blacks in Central Harlem; Southern-born Blacks had higher-risk diets than other Blacks.³² Elderly Blacks in rural areas of Southern states consumed fewer servings of bread, cereals, fruits, vegetables, milk and cheese, and more meat, poultry, and fish than recommended.³³ Tucker et al. and Smith et al. concluded that regional food use patterns differed from national patterns and furthermore differed between African American and Caucasian adults in the Lower Mississippi Delta (LMD).^{34,35} As an example, Tucker and colleagues described the development of a regional FFQ based on an earlier version of the National Cancer Institute’s (NCI) DHQ for use in the Lower Mississippi Delta.³⁴ The investigators identified many regional foods not found on standard dietary questionnaires, including grits, turnip greens, okra, ham hocks, chitterlings, crawfish, catfish, cracklings, jambalaya, potato logs, chicken and dumplings, and sweet potato pie. The Black Belt of Alabama, where our study was conducted, also has dietary patterns that differ from national patterns and, which are also different in many important ways from those in the LMD. For example, traditional regional foods containing large amounts of salt, such as cured pork products including salted pork fat and lard, are consumed by African Americans in the Black Belt, while foods such as crawfish and jambalaya consumed in the Lower Mississippi Delta are generally not consumed in the Black Belt.³⁵

Recent evidence suggests that examining dietary patterns rather than specific nutrients may better allow public health professionals to translate national dietary goals into practical dietary recommendations that are culturally relevant. Researchers are becoming increasingly interested in studying dietary patterns because a single-nutrient approach may be ineffective in discerning disease processes; the effects of single nutrients are small and cannot explain the synergy between some foods. Dietary patterns have been associated with various disease risk markers and clinical endpoints, including some cancers.^{36–40} There are presently few

data about the dietary patterns of African Americans in the rural South. This study is part of a broader project of which one of the goals is to develop a validated dietary assessment instrument for use in epidemiological long-term diet and cancer studies in African Americans in the rural South.³⁰ Specifically, this study qualitatively describes the dietary consumption practices for a sample of African Americans in the rural South, using food diaries. Food diaries (FDs) involve participants using household measurements to record food intake over a defined period.⁴¹ In addition, we discuss the implications of these consumption practices for cancer risk.

Methods

Recruitment

Invitations to participate in the study were extended to African Americans in Macon County, Alabama. Invitations were posted at various locations throughout the county. Flyers were posted at local banks, churches, grocery stores, convenience stores, beauty salons, and barber shops. Verbal invitations were also extended to community members. To be included in the study, participants had to be African American, 20 to 75 years old, able to speak and write English, and willing to participate.

Institutional approval

Approval to conduct the study was obtained from the Human Participants Review Committees at Tuskegee University and the University of Alabama at Birmingham.

Training

Participants attended one session in which they received written and oral training on how to record accurately all foods and beverages consumed for three days by experienced registered dietitians. Participants were instructed to provide a detailed description of each food, including the amount consumed, and methods of preparation. Food pictures, measuring cups, and spoons were given to the participants to enhance the accuracy of the FDs. During training, interviewers asked participants to note whether any of the three-day intake was atypical of usual intake. If a day was atypical, participants were asked to give a reason for this. Responses were useful to guide follow-up probing for completeness.

Data collection

A qualitative research design involving cross-sectional food diary recording and collecting was utilized. Participants were given a self administered three-day FD. The FDs were recorded on a standardized form. Food diaries were collected on three consecutive days; participants were assigned a day to begin to ensure that there was proportional distribution of weekdays and weekends for the FDs. This sort of diary has been dubbed an *estimated diet record* by Nelson et al.⁴² The participants recorded all foods and beverages consumed, portion sizes, recipes for mixed dishes, meal type (breakfast, lunch, dinner, or snack) and the location of meals (at home or out). After completing the FDs, participants met with trained interviewers to review the diaries for accuracy and completeness, and to probe for foods consumed but not recorded. Interviewers made edits, corrections, and additions on standardized sheets.

Data analysis

Descriptive statistics were used to summarize the dataset and make it more manageable.

Results

Characteristics of the participants

A total of 185 volunteers participated in the study. Complete datasets were collected from 114 participants; 71 food diaries were excluded from the analysis because they were marked as unreliable by the interviewers or because of difficulty in understanding some of the information recorded and discussed. Sixty-six percent of the participants were female. Most of the males were between the ages of 19 and 30 years and 51 to 70 years (Table 1). Similar numbers of female participants were between the ages of 19 and 70 years old. Four participants (two males and two females) were older than 70 years. The FDs indicated that the income distribution did not cover a wide range. Most participants (85.4%) who answered the question had annual incomes of \$10,000 or less. Roughly 8%, 2.6%, and 4% of the sample recorded incomes ranging from \$11,000–20,000, \$21,000–30,000 and \$31,000–40,000, respectively. Incomes above \$40,000 were not reported.

Breakfast patterns

From the FDs, the major protein foods consumed at breakfast time appeared to be sausages and eggs. Forty-four participants (39%) reported having sausages for breakfast over the three-day period. More females (n=31) than males (n=13) reported consuming sausages. Various types of sausages were described including smoke links, patties, links, and turkey. For the three days, 25 and 18 females and males, respectively, reported consuming eggs prepared by boiling, scrambling, frying, and pan-frying with margarine, cooking oil, and Pam (a cooking spray with canola oil as the main ingredient; marketed in various flavors, such as butter and olive oil, and as a nominally zero-calorie alternative to other cooking oils). Overall, 38% of the sample consumed eggs at breakfast. Less than 1% and 2% of the female and male participants, respectively, reported consuming cheese over the three days. From the FDs, 35% and 38% of females and males, respectively, recorded consuming whole milk at breakfast. The males reported consuming milk primarily with cereals. While 13% of the females consumed milk substitutes, only one male participant did so. Other protein items eaten at breakfast by this sample included bologna, turkey, ham, fish, beef patties, chicken, hot dogs, sausage biscuits, and other fast foods. One participant ate low-sodium turkey.

Carbohydrate foods recorded in the FDs for breakfast were primarily grits, oatmeal, toast, and white bread. Thirty five percent and 33% of the females and males, respectively, consumed grits. Oatmeal and toast were consumed with equal frequency (16%) by the females. For the males, 8% and 10% consumed toast and oatmeal, respectively, for breakfast. Overall, 34%, 14%, 13%, and 10% of the sample consumed grits, oatmeal, toast, and white bread, respectively. A variety of other breakfast foods were recorded, including fried hash brown, various ready-to-eat cereals, French toast, fried potato tots, doughnuts, cinnamon rolls, crescent rolls, and muffins. Only nine participants (8%) reported eating whole wheat bread over the three-day period.

The main non-caffeinated beverages recorded by the participants included water and orange juice. For the females and males, 27% and 31%, respectively, recorded consuming water at breakfast. Over the three days, 21% and 20% of the female and male participants, respectively, recorded consuming orange juice. Coffee was recorded for breakfast by 23% and 15% of females and males, respectively. A number of different types of fruit juices, fruit drinks, sodas, Kool-Aid, and decaffeinated coffee were recorded as beverages consumed at breakfast time. Only 38% of the participants recorded consuming fruits and vegetables at breakfast over the three-day period. Forty percent of the females and 33% of the males recorded fruit consumption at breakfast. The most commonly consumed breakfast fruit was banana, which was eaten by 20% and 15% of females and males, respectively. Other fruits and vegetables included peach, strawberries, mango, pineapple, apple, and broccoli. In the area of high-fat food consumption at breakfast, 36% of the males and 13% of the females recorded consuming bacon; and 17% of females consumed butter as the main fat source at breakfast. For the males, 10% and 2% consumed margarine and butter, respectively, at breakfast. Butter was recorded as being used as a spread for many protein and carbohydrate food sources such as bread, muffins, grits, and pancakes.

Lunch patterns

The lunch foods recorded in the FDs are shown in Table 2. Men and women frequently ate fast foods for lunch. Overall, 35% of the sample consumed chicken at lunch cooked by frying, grilling, baking, broiling; some participants consumed their chicken with salt and onions. Black pepper, seasoning salt, sea salt, and salt were added to chicken salad. Garlic salt and condiments such as spicy mustard, mayonnaise, and ketchup were consumed by participants with sandwiches and fast foods. Turkey used in sandwiches was prepared by frying, microwaving, or baking.

The most common starchy food that women ate for lunch over the three-day period was French fries (21%), followed by wheat bread (16%), rice (8%) and potatoes (7%). Twenty eight percent of the men ate French fries; whole wheat and white bread (15%); macaroni and cheese, rice, and cornbread (12%), or chips (10%). Roughly 9% of the females consumed potato chips (plain, with salt, or with sour cream). Non-caffeinated beverages included a variety of flavored water, juices, flavored fruit drinks, and Kool Aid. Unflavored water was consumed by males and females. Sodas, including Coca Cola and Pepsi were consumed for lunch by 21% of the females, while 15% consumed tea and coffee at lunch. The most commonly consumed caffeinated beverages for the males were Coca Cola and sweet tea.

Lettuce, tomato, and onions were used mainly on sandwiches by the men. Men recorded eating smoked turkey wing with turnip greens, and olive oil and margarine for cooking squash. Fresh fruits consumed for lunch included apple, cantaloupe, strawberries, different types of melon, banana, grapes, and citrus fruits (Table 2). Men put peaches and pineapples in salads. Non-starchy vegetables included lettuce, tomatoes, onions, celery, turnip greens, green cabbage, collard greens, creamed spinach, bell peppers, broccoli, carrots, and mixed vegetables. Corn was a commonly used starchy vegetable recorded in the FDs.

Dinner patterns

The foods consumed at dinner by African Americans in the rural South over the three-day period are shown in Table 3. A high percentage of men and women (77–79%) ate chicken for dinner over the three days. Chicken was mostly fried, but was also baked, barbecued, or boiled. More men (51%) than women (27%) had beef for dinner. Similarly, 38% of the men and 31% of the women had fish for dinner. Salmon, tilapia, and catfish, prepared primarily by frying were most commonly eaten. Various types of peas and beans were consumed by participants in the study (72% and 54% of the females and males, respectively). Most FD entries indicated preparing peas and beans with smoked neck-bones, salt, ham hocks, and bacon.

A higher percentage of women (59%) than men (38%) recorded consuming fast foods such as French fries, chicken nuggets, and Big Macs for dinner. The main starchy foods eaten at dinner were potatoes prepared by creaming and as a constituent of salads. Rice, various types of bread, and some high-sodium food items such as Ramen noodles and chips were recorded for dinner (Table 3). Vegetables eaten at dinner included different types of greens cooked with ham hocks, smoked neck-bones, smoked turkey, and ham (Box 1). Only six men recorded consuming fruit over the three-day period; 21% of the women had fruit at dinner. The participants consumed water and a variety of sugary, caffeinated beverages, as shown in Table 3. A limited variety of dairy products were consumed. Entries in the FDs indicated that in meal preparation, bacon, butter, various types of oils, and margarine were frequently used.

Discussion

Traditional and processed foods

The foods of interest consumed at breakfast time over the three-day period included grits and processed-protein foods. More than one-third of the participants consumed grits over the three-day period. The preference for, and frequent consumption of grits is not unhealthy in and of itself. However, the method used to prepare the grits, such as the addition of fat and salt may be a cause for concern.⁴³ It is important to note that Soul Food represents a large part of the cultural heritage of African Americans; its characteristic high-fat, high-sodium content and frying may bear important relationships with the risk of cancer.^{30,44}

Processed foods, which are usually high in sodium, have been identified as risk factors for cancer and other chronic diseases.⁷ There is convincing evidence that processed foods are a cause of colorectal cancer.⁷ The consumption of processed foods such as various types of sausages and smoked meats recorded in the FDs could have negative health consequences. Navarro et al. have shown that cold cuts and meat products behave as colorectal cancer promoters.⁴⁵

Fast foods, red and processed meats

Consumption of fast foods at lunch and dinner was commonly recorded in the FDs (Tables 2 and 3). This pattern of the high fast food consumption practices was previously reported by Bovell-Benjamin et al.³⁰ These authors added a fast-food section to a modified food

frequency questionnaire (FFQ) that was tailored to capture the dietary intake of African Americans in the rural South.³⁰ A similar fast-food consumption pattern emerged in the FDs for lunch and dinner, where more than half the females and 38% of the males consumed fast food.

Generally, fast foods consist of items high in saturated fats and sodium, and are mostly prepared by frying. The World Cancer Research and the American Institute for Cancer Research recommend that fast foods, energy-dense foods and sugary drinks should be consumed sparingly, if at all.⁷ Energy density measures the amount of energy (in kcal or kJ) per 100 g food. Fast foods tend to be energy-dense, and are frequently consumed in large quantities. Even though the sugary drinks, Kool Aid, and sodas consumed by the participants are less energy-dense than foods, they do not lead to satiety, resulting in overconsumption of energy and ultimately weight gain.⁷ Thirty percent to 40% of cancer cases are attributable to obesity, unhealthy diets, and lack of physical activity.⁴⁶ Obesity is a major risk factor for cancer.⁷ Fast food is a less expensive option than buying healthier foods, and previous research has shown that there are disparities in food access and availability for residents of Macon County.¹⁸

In this study, 27% and 31% of the female and male participants recorded eating fried and pan-fried red meat over the three days, and a high number consumed a variety of processed meats at breakfast, lunch and dinner. Meat is a valuable source of some key nutrients (such as the essential amino acids, bioavailable iron and zinc, vitamins B₆, B₁₂ and D, and substantial amounts of omega-3 polyunsaturated fatty acids).⁴⁷ However, the World Cancer Research Fund/American Institute for Cancer Research has indicated that red and processed meats are a likely cause of colorectal cancer.⁷ Subjective examination of the protein food sources entered in the FDs (for example, the fast foods documented, Tables 2 and 3) indicated that over the three days, participants, especially males, consumed more than the 500 g cooked red meat per week recommended by World Cancer Research Fund/American Institute for Cancer Research (given the fact that each serving of the Whopper, Big Mac, and McDonald's cheeseburger contain 29, 24, 15 g protein, respectively).^{7,48} A growing body of evidence associates high intake of red and processed meats with an increased risk of cancers, especially colorectal cancer. Sandhu et al. concluded that a 12%–17% increased risk of colorectal cancer was associated with a daily increase of 100 g of all meat or red meat, and a 49% increased risk associated with a daily increase of 25 g of processed meat.⁴⁹ Similarly, Norat et al. reported that individuals in the highest quartile of red meat consumption had a 1.35-fold increased risk of colorectal cancer, while those in the highest quartile of processed meat intake had a 1.31-fold increased risk.⁵⁰ Larsson and Wolk attributed a 1.28-fold increased colorectal cancer risk for the highest as compared with the lowest red meat intake, and 1.20-fold increased risk for processed meat.⁵¹

High-fat foods

Di Noia et al. reported a dietary pattern of excess consumption of fat in a sample of urban, African American adolescents.⁵² While the World Cancer Research Fund/American Institute for Cancer Research argue that there is only limited evidence suggesting that diets high in fats and oils are in themselves a cause of lung and breast cancer,⁷ this position is in contrast

to those found in earlier studies, which concluded that diets high in fats and oils might be a source of some cancers.^{53,54} Indisputably, fats and oils are the most energy-dense constituents of foods and therefore over-consumption could contribute to weight gain, overweight and obesity, which are risk factors for cancer.

Fruits and non-starchy vegetables

According to World Cancer Research Fund/American Institute for Cancer Research, individuals should consume at least 400 g of a variety of fruits and non-starchy vegetables daily.⁷ In general, the FDs revealed infrequent consumption of non-starchy vegetables and fresh fruits, which could not possibly meet this recommendation. In addition, the non-starchy vegetables eaten by the participants were mostly different types of greens prepared with various types of processed smoked meats, bacon, fat, and salt (Box 1). Low fruit and vegetable intake and high fat and/or sugar intake have been associated with oral cancer, with researchers arguing that 10–15% of cases are attributable to low fruit and vegetable intake.⁷ Furthermore, fruits and non-starchy vegetables are relatively low in energy density and should be the core for daily meals. A variety of peas and beans, all of which contain substantial amounts of natural dietary fiber and other nutrients were consumed by participants, but they were frequently cooked with high sodium and processed meats. Processed and salty foods are a probable cause of stomach cancer.⁷

Food preparation practices

The FDs revealed that frying, grilling, and barbecuing were common food preparation practices utilized by the participants. Food preparation methods influence the formation of mutagenic activity.⁵⁵ Older studies have reported mutagenic activities in fried patties and beef steaks.^{56,57} Hargraves and Pariza, Bjeldanes et al. and Miller and Buchanan et al. have demonstrated that frying, deep-fat frying, and broiling produce more mutagenic activity than roasting, stewing, and microwave cooking.^{58–60}

Frying foods give them a golden brown, crispy crust with good flavor, which is induced by the Maillard reaction or non-enzymatic browning. African Americans of all ages described frying as essential to Soul Food and deeply rooted in their history.³⁰ Dirks and Duran reported that frying was a fundamental dietary practice for early African American families in Tuskegee (in Macon County).⁶¹ Dacosta and Wilson also reported that Black women generally liked fried foods more than White women, and there was a significantly ($p = .05$) greater preference for fried meat at dinner by Black versus White women.⁶² Popkin et al. revealed that African Americans obtained a large portion of their total fat from mainly fried poultry, processed luncheon meat, and bacon.⁶³

Heterocyclic amines (HAs), which are associated with increased cancer risk in humans, are formed when meat, chicken and fish are cooked at high temperatures (as in frying).^{7,64–69} HAs are formed through reactions of naturally occurring substances present in meat (amino acids, sugars, nucleic acids, and creatinine).⁴⁹ Navarro et al. concluded that meat cooking practices are associated with the risk of colorectal cancer in Argentina.⁶⁶

Diet-related cancer risk reduction practices

Ferguson has suggested that the cancer risk associated with meat may not be a function of meat *per se*, but may reflect high-fat intake, and/or carcinogens generated through various cooking and processing methods.⁴⁷ Cooking methods, which would minimize or prevent the formation of food mutagens, are important. For example, cancers associated with high meat consumption may be reduced by the addition of anti-carcinogens in the diet, especially at the same time as meat preparation or meat consumption, or modification of food preparation methods. Potential anti-carcinogens include omega-3 polyunsaturated fatty acids and conjugated linoleic acid (CLA). Adjusting the balance between meat and other dietary components may be critical to protecting against potential cancer risks.

Study limitations and strengths

Ideally, when FDs are utilized, the participants complete the instrument and the trained interviewer probes and clarify details face-to-face.⁷⁰ Our interviewers were trained and certified, but it appears from the large number of unreliable diaries that the probing and clarification were inadequate. It is also possible that there was some misreporting, leading to under- or over-reporting and measurement errors.⁷¹ Although participants were trained prior to initiating the FDs to address this issue, underreporting of dietary intakes is a commonly recognized problem.⁷¹ Additionally, the data are cross-sectional for a three-day period, therefore, we cannot rule out bias or misinterpretation of the results.

The findings cannot be generalized to all African Americans. However, in this type of study, the focus is on the transferability of the findings rather than providing information that generalizes to other settings or individuals. The study has added to the limited information about the dietary practices of a particular subculture within the African American population; those in the rural South.

Conclusion

The current types of foods and food preparation methods recorded in the FDs were similar to those reported for slaves in the southern U.S. in the 1600s. The frequent consumption of fried foods; fast foods; sugary, carbonated beverages; processed, high-fat and high-sodium foods; and low fruit and non-starchy vegetable intake put African Americans in the rural South at high risk for cancer. The consumption of a variety of fruits, non-starchy vegetables (prepared without the addition of processed, high sodium meats), and unprocessed cereals in daily meals was low in this sample. Many of the foods reported by participants as commonly eaten are rich in nutrients, but if over-consumed, not properly balanced with total dietary consumption, and/or prepared in certain ways, may pose high risk for some cancers. Members of the population group studied must limit their intake of fried, high-fat, high-sodium and fast foods to reduce cancer risk. African Americans should minimize cancer risk by adopting food preparation methods that are less carcinogenic such as boiling or stewing meat instead of frying, which has been shown to markedly decrease mutagen formation in meat. Dietary practices are important contributory factors to cancer risk; however, it would be possible to reduce this risk in African Americans if such practices are researched within

the various subcultures, and appropriate modifications in eating habits and food preparation methods are initiated.

Policy implications

The findings are crucial to the development for culturally-specific nutrition education intervention programs for African Americans in the rural South targeted at the modification of not only foods, but food preparation methods to reduce cancer risk. Additionally, the findings could be used to inform future epidemiologic studies investigating diet, nutrition, and cancer risk in African Americans about the importance of food preparation methods and cultural heritage when assessing dietary patterns. Environmental and community factors, and changes to encourage people to make healthy food and physical activity choices are also important factors in cancer risk reduction; details of these factors are described by Bovell-Benjamin et al.¹⁸

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Box 1. LIST OF FOOD ITEMS USUALLY ADDED TO VEGETABLES WHEN COOKING DINNER AS RECORDED IN THE FOOD DIARIES

Meat, Poultry, Meat-Related	Spices and Seasonings	Fats, Oils, Oil-Related	Miscellaneous
Salt pork	Spices—cinnamon	Cheese	Sour cream
Pig's feet	Peppers—black, bell	Oil	Okra
Ham hocks	Sauce	Bacon	Lemon
Meat	Herbs	Butter	Sugar
Fatback	Seasonings—smoked, Mrs. Dash	Shortening	Vegetable broth
Neck bones			
Turkey—smoked, parts, neck	Celery		
	Thyme		
	Seasoning salt		
	Salt—sea, Kosher light, low sodium		
	Onions		
	Garlic		
	Curry powder		

Table 1AGE RANGE OF THE STUDY PARTICIPANTS (N=114)^a

Life stage group (years)	Females (n=75)	Males (n=39)
19–30	23 (30.7)	22 (56.4)
31–50	23 (30.7)	5 (12.8)
51–70	27 (36.0)	10 (25.6)
70	2 (2.7)	2 (5.1)

^aThe number outside and in the parentheses represents the number and percentage of respondents, respectively.

Table 2

FOODS CONSUMED AT LUNCH BY AFRICAN AMERICANS IN THE RURAL SOUTH OVER A THREE-DAY PERIOD (N=114)

	Food consumed	Females (n=75)	Males (n=39)	Method of Preparation
Protein and protein mixes	Pork: roast, ribs, chops, pig tails, neck bones	3	8	Baked, fried, barbecued, boiled
	Chicken: parts, thighs, wings, breasts, strips, honey boneless wings, hot dogs	34	20	Fried, baked, barbequed, grilled, broiled, baked w/onion and salt, fried nuggets, used in salads
	Beef: stew, Brunswick stew, beef pasta and mixed greens, meatballs, steak, roast	2	7	Commercial
	McDonald's snack wrap, Double cheeseburger, Big Mac, cheeseburger, hamburger	12	0	Commercial
	Burger King: Whopper, Whopper Jr.	2	7	Commercial
	Subway: sandwich	2	1	Commercial
	Crispy Snacker	1	0	Commercial
	Eggs	4	2	Boiled, in salads
	Turkey: franks, sandwich, burger, deli, ground, bacon, wings	20	9	Heat in microwave, pan-fried, fried, baked, commercial
	Ham	10	7	Heat in microwave, in sandwiches
	Sausage: Bologna, beef smoked, sausage hoagie, salami, spam	10	4	Heat in microwave, in sandwiches, fried
	Tuna	3	1	In water, in salad
	Beans: black-eyed peas, pinto, butter, baked, peas	8	4	Boiled, baked, commercial
	Corn dogs	0	1	Stove, boil, commercial
	Fish: Tilapia, Whiting, Salmon, crab legs, Calamari, shrimp	3	5	Baked, covered in gravy, deep fried, fried with commercial fish fry, stir-fried
	Hamburger helper	0	1	Commercial
	Peanut: butter, peanuts	3	2	In sandwiches, with jelly
	Sloppy Joe meat	1	0	Commercial
	Clear chicken broth	1	0	Commercial
	Beef-O-roni (Chef Boyardee)	1	0	Commercial
Carbohydrates	Potato	16	18	Mashed, creamed, wedged, chips, salad, fried
	Pasta: macaroni & cheese, Rigatori stuffed w/Rigotto cheese, noodle, lasagna	2	6	
	Pizza	2	3	
	Chicken Alfredo	1	0	Commercial baked in oven
	Fettuccini	1	0	Steamed
	Rice: brown, Spanish	1	5	Commercial
	Dumplings	1	0	Commercial
	Jello	1	0	Commercial
	Popcorn	1	0	Commercial, microwave

	Food consumed	Females (n=75)	Males (n=39)	Method of Preparation
Fruits and Vegetables and Products	Breads: Whole grain, whole wheat, honey wheat, white, rolls, Pumpernickel, butter, hamburger buns, bagels, flour tortillas, biscuits, corn bread, crackers, dinner rolls, garlic and buttered mini bread loaf, taco shell, waffles, toast, peanut butter crackers	43	26	Commercial
	Sweets: cookies, vanilla cake mix, vanilla pudding, chocolate chips, lemon cake, pound cake, sweet potato pie, cup cake	10	6	Commercial, cake mix
	Greens: cabbage, collard, pickles, lettuce, tomato, onions, turnip, cauliflower, okra, corn, mixed, orange, Jalapeno peppers, carrots, string beans, squash, peaches, pineapples, cucumbers, apples, spinach, cantaloupe, strawberries, applesauce, fruit cocktail, salad, peach preserve, celery, sweet peas, grapes, melons, broccoli, grapefruit	75	38	In sandwiches, steamed, boiled, commercial, micro-waved, canned, in salads, on stove, in water, used fresh
Non-caffeinated Beverages	Water, mineral water, a variety of caffeine sodas, high sugar fruit-flavored drinks, fruit juice	69	41	Store, commercial, premade, pouch
Caffeinated Beverages	Iced tea (sweet), sodas, beer, gin, martini, daiquiri	27	17	Store
Dairy	Ice cream, cheese, milk, buttermilk, yogurt, sherbet	10	12	Store, commercial
High fat	Bacon, butter, oils, margarine	38	11	Store, commercial

Table 3

FOODS CONSUMED AT DINNER BY AFRICAN AMERICANS IN THE RURAL SOUTH OVER A THREE-DAY PERIOD (N=114)

	Food consumed	Females (n=75)	Males (n=39)	Method of Preparation
Protein	Pork: roast, ribs, chops	19	2	Oven baked, in sandwich,
	Chicken: liver, broth, salad	58	31	Fried, baked, barbequed, boiled; baked w/onion and seasoned salt, grilled, grilled w/lemon pepper
	Beef: steak, patties, liver Salisbury steak, ravioli, meatballs, ground, corn, oxtail, neck-bones	20	12	Braised, cooked w/mushrooms, stew, oven-baked, fried and smothered, pan-fried
	Sausage, Bologna	2	1	Fried
	Hot dog w/ketchup	4	3	Boiled
	Chili cheese dog	1	2	Broiled
	Eggs	2	1	Boiled, in sweet potato pie
	Fish: salmon, tilapia, cat, shrimp, crab legs, tuna	23	15	Fried, fried with Crisco, grilled, broiled with lemon pepper, steamed, Jamaican style, tuna casserole
	Turkey: neck bones, wings, ground	10	4	Boiled w/turnip greens, collard greens, boiled with onions, salt, in taco
	Ham hocks: ham	4	1	Cooked w/lima beans and salt
	Peas and beans: black-eye, field, snap, lima, baked, pinto, black, sweet, green, early, red English, string	54	21	Boiled, in smoked neck bones, boiled w/salt and ham hocks, canned, boiled w/water, salt and bacon, cooked in rice
	Nuts: Walnuts	1	0	In salad
	Peanut butter	1	0	In sandwich
	Fast food: Big Mac Double Cheeseburger, Hamburger, McDonald chicken nugget, Mac and Cheese, French fries, burrito	44	15	
	White bean chicken Chili soup, Chili	7	0	Canned, stovetop
Carbohydrates	Potato, pasta, sweet potato	31	17	Mashed, wedged, boiled, baked, microwave, salad
	Corn	14	4	Fried, in soup, stewed with okra, creamed
	Grits	2	0	Boiled
	Rice: white, brown, yellow, dirty	46	22	Fried, mixed with red bean, steamed, boiled, steamed w/butter, Spanish
	Breads: Dinner rolls, rye, honey wheat, wheat, white, biscuits, corn bread (27), pancake, hush puppies, tortillas, crackers	43	32	Store, cornbread cooked in vegetable or canola oil, fried
	Sweets: pound cake, banana pudding, birthday cake, white chocolate cake, sweet potato pie, brown sugar, oatmeal cookies	7	4	Store, brown sugar used in cooking mustard and turnip greens
	Pizza	4	4	
	High sodium: chips, Ramen noodles, Jambalaya mix	16	6	
Fruits and Vegetables	Greens: cabbage, mustard, collard	24	8	Boiled w/ham hocks/smoked neck- bone; cooked in distilled white vinegar;

	Food consumed	Females (n=75)	Males (n=39)	Method of Preparation
				cooked w smoked turkey necks and salt; boiled w/turkey neck; boiled w/ small ham
	Broccoli, cauliflower, pepper, spinach, mixed mushroom, carrots	26	12	Steam, boil, simmer with gravy
	Onions	16	2	Simmered, used for cooking turnip and mustard greens, fish-tilapia and chicken
	Squash, okra	5	3	Baked, steam, boil, in soup, in stew, cream
	Tomatoes	9	3	In soup, stewed with okra and corn
	Lettuce, cucumber, garden salad, coleslaw	8	12	Shredded, sliced
	Pineapple, strawberries, grapes, pear, peach, cherry, apple, melons, banana, apple	25	6	Canned, fresh
Non-caffeinated Beverages	Water, mineral water, a variety of caffeine sodas, high sugar fruit-flavored drinks, fruit juice	75	35	Store
Caffeinated Beverages	Iced tea (sweet), sodas, beer, gin, martini, daiquiri	37	21	Store
Dairy	Ice cream, cheese, milk, buttermilk, yogurt, sherbet	24	15	
High fat	Bacon, butter, oils, margarine	38	11	