# The Prevalence of Self-reported Lactose Intolerance and the Consumption of Dairy Foods Among African American Adults Are Less Than Expected

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*Objective:* To determine the self-reported incidence of lactose intolerance and its influence on dairy choices among African American adults.

*Design, Setting, and Participants:* An online survey closely matched to the 2000 US Census was administered to a nationally representative sample of African Americans (2016 adults) and a comparison sample of the general population (1084 adults). Statistical analyses performed included pairwise *t* tests for proportion conducted on percent responses at the 95% confidence level.

*Results:* African Americans were more likely to eat fewer dairy foods, experience physical discomfort after consumption, and believe they were lactose intolerant. While 49% of African Americans had ever experienced "some type of physical discomfort" after eating dairy foods, 24% believed they were lactose intolerant. Within this group, 85% of African Americans would be willing to consume more dairy products if they could avoid lactose intolerance symptoms.

*Conclusions and Implications:* Dairy food, calcium, and vitamin D intake in African Americans and the general population are below US recommendations. Deficiencies of these nutrients are associated with chronic diseases that disproportionately affect African Americans. In the United States, dairy foods are the primary source of calcium and vitamin D, and lactose intolerance can be a significant barrier to dairy food intake. However, self-described lactose intolerance is less than commonly reported in African American populations. Low dairy intake may reflect concerns about lactose intolerance, other factors such as learned food habits and cultural preferences. Nutrition recommendations for African Americans and the general population should focus on the health benefits of dairy foods, provide culturally sensitive dietary options, and strategies to increase tolerance.

**Keywords:** lactose intolerance ■ African Americans

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## INTRODUCTION

Dairy foods are an affordable and important source of many nutrients, such as calcium; magnesium; potassium; protein; and vitamins A, D, $B_{12}$, and riboflavin. The 2005 Dietary Guidelines for Americans recommend 3 servings of low-fat or fat-free milk, yogurt, or cheese daily for all Americans to improve dietary quality and protect bone health.[1] Diets with limited amounts of dairy foods are usually low in calcium, magnesium, potassium, and many other essential nutrients.[2,3] Thus, it is important to understand how real or perceived lactose intolerance may hinder dairy food consumption.

Lactose digestion is the intraluminal process of breaking down lactose into the simple sugars, glucose, and galactose. This process is regulated by the enzyme lactase and occurs in the small bowel. There is a normal, age-related decline in lactase activity, with each person having a unique, person-specific lactase activity level in adulthood. Lactose maldigestion occurs when the amount of lactose present in the small bowel exceeds the lactase activity level and excess lactose reaches the colon. In the colon, large-bowel bacteria digest the lactose and produce hydrogen, methane gas, and acids. While maldigestion is often an asymptomatic process, lactose intolerance defines the clinical syndrome associated with gastrointestinal symptoms such as flatulence and bloating.[4] It has been estimated that some degree of lactose intolerance occurs in as many as 70% to 80% of African Americans.[5,6] This estimate is an extrapolation from small population studies that utilized a high, non-physiological load of lactose, generally 25 to 50 g, or the amount in 2 to 4 cups of milk, consumed in an aqueous solution on an empty stomach,[7] and does not represent

the physiological response expected after consuming a serving of milk or other dairy food with a meal.[8] These estimates may overrepresent the prevalence of lactase nonpersistence, which is a genetically controlled limited ability to produce the enzyme lactase. Individuals with lactase nonpersistence may have an inadequate ability to digest varying quantities of lactose. Clinically, the appearance of symptoms depends upon the degree of lactase activity; the amount of lactose consumed; and the presence of other nutrients such as fat and protein, which influence lactose digestion. Therefore, the term *lactose intolerance* should only be used when referring to the clinical signs that are associated with a reproducible symptomatic response to a defined amount of lactose.[9,10]

Multiple randomized controlled studies have shown that most individuals who were lactose maldigesters (based on hydrogen breath tests) could tolerate the amount of lactose in a glass of milk (eg, approximately 12 g of lactose) without any symptoms of intolerance[11] and the amount in 2 cups of milk if consumed as divided doses with breakfast and dinner.[12] Another study found that women who maldigest lactose could tolerate a dairy-rich diet providing 1500 mg of calcium when dairy foods, including milk, yogurt, and cheese, were consumed throughout the day.[13] African American teenagers were able to improve their tolerance of lactose-containing foods by adding 3 to 4 daily servings of dairy to their diets over a period of 3 weeks.[14] These findings clearly indicate that lactase nonpersistence is not necessarily an obstacle to consuming adequate amounts of dairy foods. In addition, the incidence of lactose intolerance may be overestimated. Three weeks of consistent dairy consumption among the study participants allowed most lactose maldigesters to consume a dairy-rich diet with minimal symptoms.

On average, African Americans consume calcium and dairy foods at levels well below current recommendations.[15-18] According to one study using National Health and Nutrition Examination Survey (NHANES) 1999-2000 data, mean calcium intakes for African American adults aged 31 years and older were 623 mg/day for males and 514 mg/day for females.[18] For comparison, their non-African American male and female counterparts consumed 964 and 740 mg calcium/day, respectively. Among this same group, total dairy food intake was also significantly lower with African American and non-African American males consuming 0.86 and 1.78 servings/day, respectively, and African American and non-African American females consuming 0.73 and 1.39 servings/day, respectively.[18] In a study conducted to measure dietary intake of African American and other American adults and children, the greatest difference in milk intake occurred at dinner, with milk served at only 6% to 7% of dinner meals among African Americans, compared to 25 % to 45% of dinner meals in the balance of population.[19]

The United States is facing a health crisis related to diet-preventable conditions associated with micronutrient deficiencies, notably calcium and vitamin D.[20] African Americans are at greater risk for several chronic diseases that can be reduced by meeting calcium

**Table 1.** Survey Questions and Responses on Habitual Dairy Food Intake Among a Nationally Representative Sample of African Americans and the General US Population

| Survey Questions | African Americans (n = 2016) | General Population (n = 1305) |
|---|---|---|
| Q1. In an average week, about how many times do you eat dairy foods such as milk, cheese, yogurt and ice cream? | | |
| >21 times per week (≥3 times daily) | 14% (277) | 16% (202) |
| 7-20 times a week (1-3 times per day) | 41% (820)[a] | 53% (693) |
| 1-6 times a week (<1 time per day) | 43% (859)[a] | 29% (379) |
| Never | 3% (60) | 2% (31) |
| Q2. Which of the following have you had in the past 2 weeks? | | |
| Cheese as an ingredient in a meal | 71% (1439)[a] | 81% (1055) |
| Ice cream or frozen yogurt | 65% (1311) | 67% (876) |
| A glass of milk | 50% (1011)[a] | 61% (794) |
| Hard or aged cheeses | 35% (708)[a] | 56% (728) |
| Processed cheese | 50% (1005) | 53% (685) |
| Yogurt | 24% (479)[a] | 30% (397) |
| Lactose-free or lactose-reduced milk | 6% (116)[a] | 3% (43) |
| Lactase liquid or pills | 3% (58)[a] | 2%(19) |
| Acidophilus or kefir milk | 1% (28) | 2% (19) |
| Soy milk | 7% (132) | 6% (72) |
| Rice milk | 1% (19) | 1% (13) |
| Goat's milk | <0.5% (4)[a] | 1% (10) |
| Almond milk | <0.5% (3) | <0.5% (4) |

[a] Significant difference at the 95% confidence level.

recommendations, including hypertension, stroke, colon cancer, diabetes, and obesity.[19,21] Dairy foods supply almost 75% of the calcium in the US food supply,[22] and milk provides at least 20% of the daily value of calcium, vitamin D (fortified milk), riboflavin, phosphorus, and at least 10% of the daily value of protein; potassium; and vitamins A, $B_{12}$, and niacin per serving.

The objective of this study was to determine the

**Table 2.** Survey Questions and Responses on Physical Discomfort After Consuming Dairy Foods Among a Nationally Representative Sample of African Americans and the General US Population

| Survey Questions | African Americans (n = 2016) | General Population (n = 1305) |
|---|---|---|
| Q3. Have you ever experienced some type of physical discomfort after eating dairy foods (such as milk, cheese, yogurt or ice cream)? | | |
| Yes | 49% (991)[a] | 31% (405) |
| No | 51% (1025)[a] | 69% (900) |
| Q4. Thinking about when you have experienced some type of physical discomfort after consuming dairy foods, specifically which foods have affected you? | | |
| Milk | 87% (866/991)[a] | 72% (291/405) |
| Ice cream or frozen yogurt | 55% (549/991) | 55% (223/405) |
| Cheese | 25% (248/991)[a] | 34% (138/405) |
| Yogurt | 12% (121/991)[a] | 17% (69/405) |
| Cottage cheese | 7% (72/991)[a] | 15% (61/405) |
| Other dairy foods | 4% (35/991)[a] | 7% (29/405) |
| Q5. How often do you experience some type of physical discomfort after consuming dairy products? | | |
| Every time | 27% (269/991)[a] | 17% (69/405) |
| Most of the time | 34% (337/991) | 33% (132/405) |
| Occasionally | 31% (304/991)[a] | 37% (149/405) |
| Rarely | 8% (81/991)[a] | 14% (55/405) |
| Q6. Specifically what kinds of physical symptoms do you experience after eating dairy foods? | | |
| Gas or flatulence | 69% (687/991)[a] | 58% (234/405) |
| Cramps, stomachache or abdominal pain | 46% (458/991)[a] | 53% (215/405) |
| Indigestion or upset stomach | 34% (333/991)[a] | 44% (177/405) |
| Diarrhea or loose stools | 53% (521/991)[a] | 43% (175/405) |
| Bloating | 31% (310/991) | 33% (133/405) |
| Constipation or hard stools | 9% (91/991) | 10% (39/405) |
| Vomiting | 3% (33/991) | 5% (21/405) |
| Rashes or hives | 1% (8/991) | 2% (6/405) |
| Canker sores | – | 1% (4/405) |
| Yeast infections | 1% (13/991) | 1% (3/405) |
| Other symptoms | 3% (32/991)[a] | 7% (28/405) |
| Q7. What, if any, changes have you made to your diet to address the physical discomfort you have experienced after consuming dairy foods? | | |
| Significantly reduced dairy foods in my diet but I still consume dairy foods occasionally | 40% (392/991) | 37% (150/405) |
| Slightly reduced the amount of dairy foods in my diet but I still consume dairy foods regularly | 31% (310/991) | 28% (115/405) |
| Completely eliminated dairy foods from my diet | 8% (79/991) | 9% (35/405) |
| I have made no changes to my diet | 21% (210/991) | 26% (105/405) |
| Q8. Other than dietary changes, what, if anything have you done to address the physical discomfort you have experienced after consuming dairy foods? | | |
| Began drinking/eating lactose-free dairy products | 21% (204/991) | 17% (68/405) |
| Began taking a digestive aid | 18% (181/991) | 14% (57/405) |
| Sought medical advice | 10% (98/991) | 10% (40/405) |
| Other | 9% (90/991) | 12% (47/405) |
| Done nothing to address the physical discomfort | 54% (532/991) | 57% (232/405) |

[a] Significant difference at the 95% confidence level.

self-reported prevalence of lactose intolerance among African American adults, its symptoms, and its influence on food choices related to dairy foods. This study was conducted by the National Medical Association, the largest organization of physicians of African American descent in the United States, and the National Dairy Council as part of a broader effort to understand barriers to dairy consumption and to identify potential solutions for improving nutritional behaviors and overall health in African Americans. This effort resulted in the National Medical Association's published consensus report entitled *The Role of Dairy and Dairy Nutrients in the Diet of African Americans.*[19] The consensus report recommends all Americans, including African Americans, consume at least 3 servings of low-fat dairy foods per day to meet calcium and other nutrient needs to help fight chronic disease.

## METHODS

An online survey was administered to 2016 African American adults and a comparison sample of 1084 adults that comprised the general population grouping, April to May 2003 by the NPD Group, Rosemont, Illinois, a marketing information company. The demographic composition of both groups was closely matched to the 2000 US Census for age, gender, income, education, geography, and household composition (presence of children).[23] The general population group was also matched to the 2000 Census for ethnicity and therefore was 11% African American. Participants in both groups were selected from NPD's existing online consumer panel, and online survey results of the African American and general population respondents were collected and analyzed using a separate, deidentified database. The NPD online panel has more than 600 000 registered US individuals who have agreed to participate in Internet surveys, and it is actively managed to reflect the US Census.

The online survey consisted of the 12 questions listed in Tables 1 to 3. The questions were designed to examine attitudes about and consumption of dairy foods, unpleasant gastrointestinal symptoms, and their incidence after eating dairy foods, and management of symptoms associated with lactose intolerance. Pairwise *t* tests for proportion were conducted on percent responses at the 95% confidence level to determine if significant differences existed between demographic groups.

**Table 3.** Survey Questions and Responses on Lactose Intolerance Among a Nationally Representative Sample of African Americans and the General US Population

| Survey Questions | African Americans (n = 2016) | General Population (n = 1305) |
|---|---|---|
| Q9. Do you believe yourself to be lactose intolerant? | | |
| Yes | 24% (486)[a] | 11% (143) |
| No | 58% (1166)[a] | 73% (948) |
| Don't know | 18% (364) | 16% (214) |
| Q10. Why do you believe yourself to be lactose intolerant? (Among those who self-identified as being lactose intolerant, Q9) | | |
| I experience physical discomfort after eating dairy foods | 75% (365/486) | 70% (100/143) |
| I was diagnosed by a medical professional or specialist | 19% (92/486)[a] | 29% (42/143) |
| Based on information from the news media or other source | 24% (116/486) | 27% (29/143) |
| Based on family history | 24% (114/486) | 20% (29/143) |
| Word of mouth, talking with friends | 19% (90/486) | 16% (23/143) |
| Other reasons | 4% (21/486) | 5% (7/143) |
| Don't know | 2% (8/486)[a] | 5% (7/143) |
| Q11. What type of medical professional or specialist diagnosed you as being lactose intolerant? (Among those who stated diagnosis by a professional, Q10) | | |
| Medical doctor | 87% (80/92) | 93% (39/42) |
| Dietitian or nutritionist | 9% (8/92) | 5% (2/42) |
| Other | 3% (3/92) | 2% (1/42) |
| Don't know | 1% (1/92) | – |
| Q12. If you could avoid the symptoms of lactose intolerance, would you be willing to add more milk and dairy products into your diet in the future? (Among those who self-identified as being lactose intolerant, Q9) | | |
| Yes | 85% (415/486)[a] | 75% (107/143) |
| No | 15% (71/486)[a] | 25% (36/143) |

[a] Significant difference at the 95% confidence level.

# RESULTS

## Self-Reported Dairy Food Consumption

The survey questions and responses for self-reported dairy food consumption are found in Table 1. Compared to the general population, African American adults were significantly less likely to consume dairy foods 1 to 3 times per day (41% vs 53%) and significantly more likely to consume dairy foods less than once per day (43% vs 29%), as shown in Figure 1. When asked about dairy food consumption over the previous 2 weeks, significantly fewer African Americans reported consumption of the following dairy foods compared to the general population: cheese as an ingredient (71% vs 81%), a glass of milk (50% vs 61%), hard/aged cheese (35% vs 56%), and yogurt (24% vs 30%).

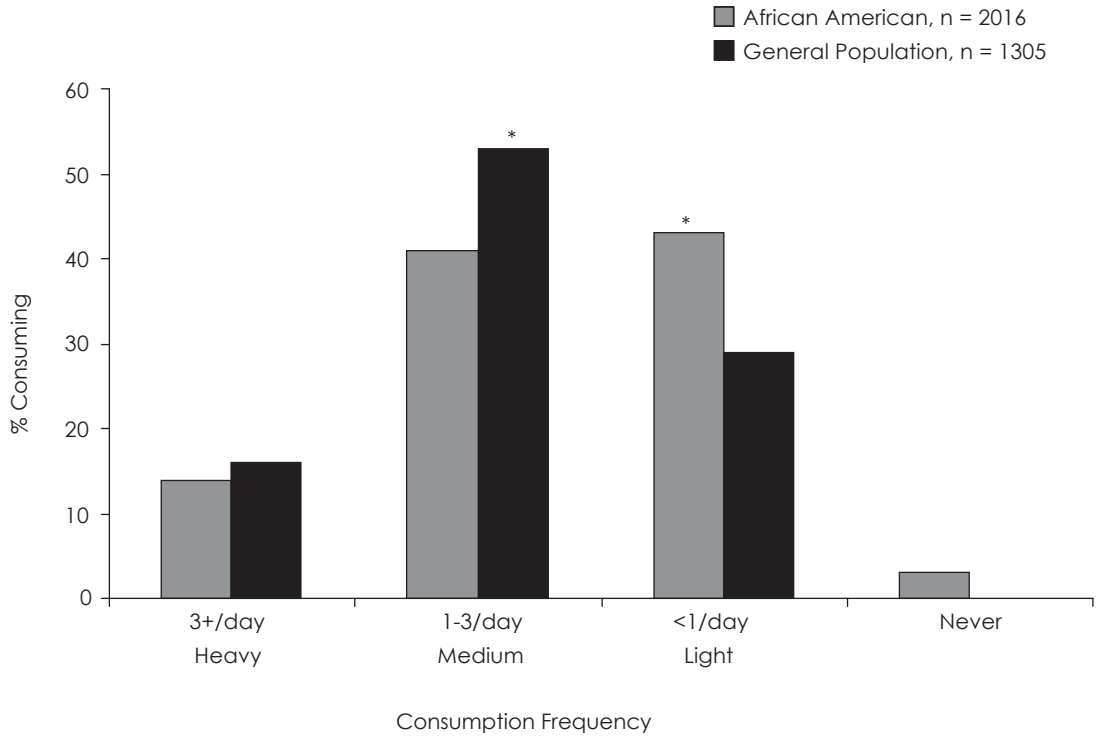
## Physical Discomfort Linked With Dairy Food Consumption

Significantly more African Americans (49%) claimed to have ever experienced "some type of physical discomfort after eating dairy foods such as milk, cheese, yogurt or ice cream" compared to 31% of the general population, as noted in Table 2.

Among those who had ever experienced discomfort (African Americans, n = 991; general population, n = 405), most associated the discomfort with milk, with significantly more African Americans in this group linking the physical discomfort to consuming milk (87%), compared to 72% in the general population. Compared to African Americans, more of the general population who had ever experienced discomfort linked physical discomfort with cheese (34%), yogurt (17%), and cottage cheese (15%). Among African American respondents who had ever experienced physical discomfort, significantly more experienced physical discomfort "every time" after consuming dairy compared to the general population. More of the general population experienced discomfort "occasionally" or "rarely." Among African Americans who experienced discomfort after eating dairy foods, significantly more experienced gas (69%) and/or diarrhea (53%), while more of the general population experienced cramps/stomach ache (53%), and/or indigestion (44%).

The prevalence of physical discomfort and related symptoms differed between the groups, but their responses for addressing the discomfort did not. Among those in both groups who experienced discomfort, there were no significant differences in those who "significantly reduced" or "slightly reduced" their intake to reduce physical discomfort (Figure 2). Less than 10% of both groups reported completely eliminating dairy foods from their diet. Other than dietary changes, the majority

**Figure 1.** Average Frequency of Dairy Food Consumption




Data are from responses to question 1: In an average week, about how many times do you eat dairy foods such as milk, cheese, yogurt and ice cream? Asterisk indicates significant difference at the 95% confidence level.

of both groups made no other changes ("did nothing") to address their discomfort.

## Are You Lactose Intolerant?

When asked if they believed they were lactose intolerant, only 24% of African Americans answered yes, compared to 11% of the general population (Figure 3). The majority of both groups believed they were lactose intolerant because they experienced physical discomfort after eating dairy foods. In the general population, the percentage that believed they were lactose intolerant because a medical professional diagnosed them was significantly higher than in African Americans (29% vs 19%). The news media, family history, and word of mouth also influenced self-reported lactose intolerance to a similar extent in both groups (Table 3).

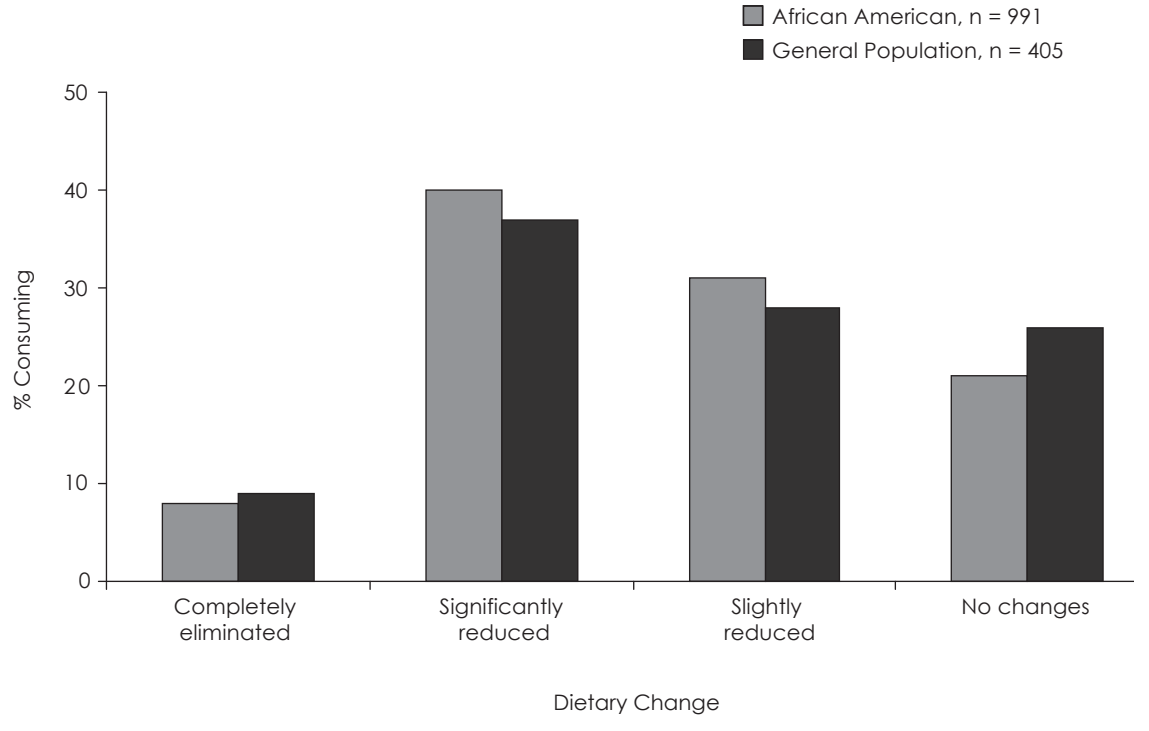
African Americans who did not believe they were lactose intolerant were more likely to consume 1 to 3 servings of dairy foods each day compared to those who reported that they were lactose intolerant (45% vs 32%) (Table 4). African Americans who believed that they were lactose intolerant were more likely to report that they consume dairy foods "less than once per day" than those who did not believe they were lactose intolerant (48% vs 39%) (Table 4). In African Americans and the general population, those who self-reported lactose intolerance were more likely to be lighter consumers of dairy foods (ie, "less than once per day" or "never") (Table 4).

In terms of specific products, African Americans who reported they were lactose intolerant, compared to African Americans who did not, were less likely to consume cheese as an ingredient (64% vs 75%), aged cheese (34% vs 37%), processed cheese (41% vs 54%), ice cream or frozen yogurt (57% vs 68%), and milk consumed as a glass of milk (28% vs 61%) (Table 4). A majority of those who believed they were lactose intolerant in both the African American and general population samples would be willing to add more milk and other dairy products to their diet if they could avoid the symptoms of lactose intolerance, but significantly more African Americans would be willing (85% vs 75%) (Table 3). Women from both groups would be more willing than men to add more dairy foods if they could avoid the symptoms (data not shown).

## DISCUSSION

African Americans are at greater risk for several chronic diseases that can be prevented or reduced by meeting dairy/calcium intake recommendations, including hypertension, stroke, colon cancer, diabetes, and bone disease.[19] Avoidance of dairy foods, especially if it is due to misperceptions about lactose intolerance and dairy food's health benefits that apply to African Americans, may lead African Americans to miss the

**Figure 2.** Change in Dairy Food Consumption to Minimize Symptoms, Among Those Who Experience Discomfort




Data from responses to question 7: What, if any, changes have you made to your diet to address the physical discomfort you have experienced after consuming dairy foods? Asterisk indicates significant difference at the 95% confidence level.

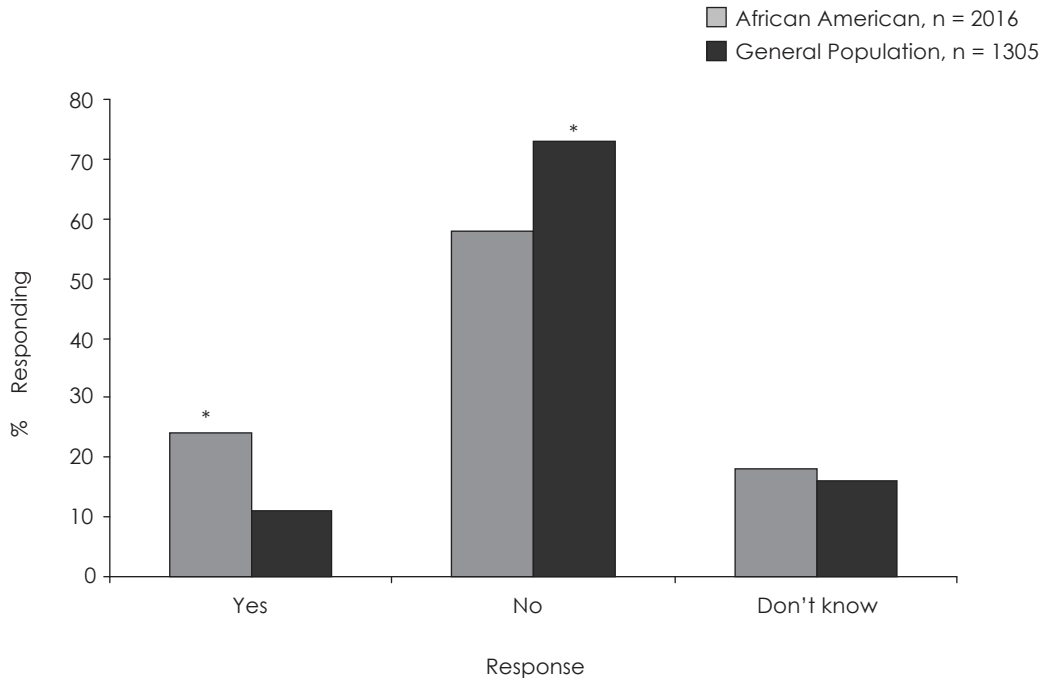
benefits of a simple dietary approach for improving health. Calcium is well known to increase bone density during peak bone deposition years and to prevent age-related fractures and osteoporosis. Compared to other ethnicities, African Americans are less prone to osteoporosis and may require less calcium to meet bone health needs, yet nearly 5% of African American women and 4% of African American males aged over 50 years have osteoporosis.[24,25] The physiological adaptations in African Americans that protect bone may also contribute to their particularly high risk for hypertension, and it has been suggested that the calcium requirements for African Americans should be based on healthy blood pressure rather than bone health.[24] The Dietary Approaches to Stop Hypertension (DASH) clinical trial showed that an eating plan containing 2 to 3 servings of low-fat dairy foods and 5 to 9 servings of fruits and vegetables per day can help lower high blood pressure.[26] The DASH eating plan was especially effective for lowering high blood pressure in African Americans and was well tolerated by African American study participants.[27,28]

African Americans, especially women, are also at higher risk for overweight and obesity. Clinical studies demonstrate that consuming at least 3 servings of dairy foods a day as part of a reduced-calorie diet can help modulate body composition and aid in weight and fat loss.[29-32] Specific to African American adults, the results of 2 randomized trials assessing weight maintenance and weight loss among obese participants demonstrated that substituting dairy foods in isocaloric diets improved metabolic profiles during weight maintenance and augmented fat and weight loss during reduced energy intake.[32] In addition to metabolic improvements related to weight status and obesity, dietary patterns containing low-fat dairy foods have been associated with a decreased risk for diabetes in a multiethnic study that included African Americans,[33] particularly among African American women.[34]

In this study, there was a high level of interest expressed among self-reported lactose intolerant African Americans and members of the general population in consuming dairy foods if the symptoms of lactose intolerance could be avoided. However, few self-reported lactose intolerant African Americans and members of the general population took advantage of potential solutions such as lactose-free milk or lactase enzyme tablets. In addition to such products, simple dietary strategies such as gradually adding dairy foods to the diet, drinking milk with meals, and choosing lower-lactose dairy foods such as hard cheeses and yogurt with live cultures can increase tolerance to lactose in dairy foods (Box).[10]

Importantly, some members of both groups in this study who believed they were lactose intolerant completely eliminated or significantly cut dairy foods from their diets and did not choose other solutions for managing symptoms. Because African Americans generally drink less milk,[18,19,35] reducing milk consumption to relieve symptoms is a "solution" with potentially serious

**Figure 3.** Self-reported Lactose Intolerance




Data are from responses to question 9: Do you believe yourself to be lactose intolerant? Asterisk indicates significant difference at the 95% confidence level.

long-term consequences. Beyond the prevention of certain chronic disease states, adequate consumption of dairy foods and dairy food nutrients has been shown to be important in meeting key dietary deficiencies common in the US diet.[36]

The results of this study and previous work[10-13,37] clearly demonstrate that the current estimate of the number of African Americans and other population groups that are lactose intolerant is excessively high. The self-reported incidence of lactose intolerance among African American adults in this study was 24%, far lower than the 80% population estimates commonly reported in the literature. A recent study assessing self-reported lactose intolerance among a multiethnic sample of adults that included African Americans, Hispanic Americans, and European Americans also found lower rates of self-reported lactose intolerance.[37] In this study, age-adjusted, self-reported lactose intolerance prevalence rates among African Americans, Hispanic Americans, and European Americans were approximately 20%, 10%, and 8%, respectively. Though lactose maldigestion appears to be more likely in African Americans than in the general population, the increased likelihood does not always translate into lactose intolerance symptoms after dairy consumption. Our findings indicate that for some African Americans and the general population, the

**Table 4.** Subanalysis of Survey Questions and Responses Among Self-identifying Lactose Intolerants on Dairy Food Consumption Habits

| | African Americans | | General Population | |
|---|---|---|---|---|
| | Lactose Intolerant | Non–Lactose Intolerant | Lactose Intolerant | Non–Lactose Intolerant |
| **Survey Question** | **(n = 486)** | **(n = 1166)** | **(n = 143)** | **(n = 948)** |
| Q1. In an average week, about how many times do you eat dairy foods such as milk, cheese, yogurt, and ice cream? | | | | |
| >21 times per week (≥3 times daily) | 13% (64) | 14% (164) | 11% (16) | 17% (159) |
| 7-20 times a week (1-3 times per day) | 32% (156)[a] | 45% (529) | 34% (48)[a] | 57% (542) |
| 1-6 times a week (<1 time per day) | 48% (232)[a] | 39% (456) | 43% (61)[a] | 25% (238) |
| Never | 7% (34)[a] | 2% (17) | 13% (18)[a] | 1% (9) |
| Q2. Which of the following have you had in the past 2 weeks? | | | | |
| Cheese as an ingredient in a meal | 64% (310)[a] | 75% (878) | 64% (92)[a] | 86% (812) |
| Ice cream or frozen yogurt | 57% (279)[a] | 68% (795) | 52% (74)[a] | 70% (664) |
| A glass of milk | 28% (138)[a] | 61% (712) | 32% (46)[a] | 67% (630) |
| Hard or aged cheeses | 34% (163)[a] | 37% (435) | 43% (61)[a] | 60% (572) |
| Processed cheese | 41% (200)[a] | 54% (633) | 38% (54)[a] | 56% (532) |
| Yogurt | 22% (106) | 25% (293) | 27% (39)[a] | 33% (310) |
| Lactose-free or lactose-reduced milk | 18% (86)[a] | 1% (16) | 18% (26)[a] | 1% (5) |
| Lactase liquid or pills | 11% (52)[a] | <0.5% (2) | 11%(15)[a] – | |
| Acidophilus or kefir milk | 3% (14)[a] | 1% (8) | 5% (7)[a] | 1% (8) |
| Soy milk | 53% (11)[a] | 5% (58) | 13% (19)[a] | 4 % (40) |
| Rice milk | 2% (11)[a] | 1% (6) | 4% (6)[a] | 1% (7) |
| Goat's milk | <0.5% (1) | <0.5% (1) | 2% (3) | 1% (6) |
| Almond milk | <0.5% (1) | <0.5% (1) | 3% (4)[a] | – |

[a] Significant difference at the 95% confidence level from individuals not self-identifying themselves as lactose intolerant within the same population group.

**Box.** Strategies for Improving Tolerance to Dairy Foods

- Adjust the amount of lactose consumed. Start with less than one cup of milk with food and gradually increase the amount until the symptoms begin to develop.
- Drink milk with a meal or snack. This slows gastric emptying and delivery of lactose to the colon.
- Choose wisely. Some dairy foods like yogurt, aged cheeses or chocolate may be better tolerated than others based on lactose content or other components found in the food.
- Try lactose-reduced and lactose-free milk. Lactose-reduced or lactose-free milk and other dairy foods contain the same nutrients, including calcium, as their regular counterparts.
- Train for tolerance to lactose. Gradually increasing intake of lactose-containing foods improves tolerance to lactose

Adapted from Miller GD, Jarvis JK, McBean LD. *Handbook of Dairy Foods and Nutrition*, 3nd ed. Boca Raton, FL: CRC Press; 2007.

symptoms associated with lactose intolerance represent an important barrier to consumption of dairy foods. It also appears that lower dairy food intake among African Americans is not fully explained by lactose intolerance. It is interesting to note that fully 26% of African Americans reported that they: (1) consumed less than 1 serving per day of dairy foods on average, (2) are not lactose intolerant, and (3) do not experience discomfort every/most of the time after consuming a dairy food. For some African Americans, factors in addition to physiological symptoms, such as learned food habits/aversions or cultural influences, may also contribute to lower dairy food consumption. It is notable that the data were obtained electronically, raising the potential concern that computer access may alter the findings; however, the risk is minimal, as the findings are supported by similar studies and the 2 sample populations were closely matched to the 2000 US Census for income, education, geography, and household composition (number of children). More research is warranted, as understanding these factors can help to equip health professionals with appropriate strategies for improving dietary habits of African American clients.

The especially low milk and dairy food intake in African American children, particularly during preadolescence and adolescence,[18,19,35] highlights the need to communicate with parents about the health benefits of increasing intake of dairy foods and establishing healthy habits. A study by Fisher et al[38] shows that mothers who regularly drink milk and make it available at family mealtimes help ensure their daughters meet calcium recommendations as they enter adolescence. Strategies for improving family and cultural habits that otherwise diminish adequate dairy food intake should be a part of nutrition counseling for African Americans.

## Research and Practice Implications

Dairy foods are the major source of calcium in the US diet, and they also contribute substantial amounts of other essential nutrients, including protein, vitamin A, vitamin D, riboflavin, vitamin $B_{12}$, potassium, and magnesium. Clearly, if dairy foods are not consumed in recommended amounts, calcium and other nutrients usually supplied by dairy foods are likely to be consumed in inadequate amounts.

Nutrition educators can help all clients, especially African American clients, increase their dairy food intake to recommended levels by acknowledging the barriers to consumption inherent in the experience of lactose intolerance while recognizing that those with a genetic predisposition for lactase nonpersistence can use strategies to consume dairy foods and experience few or no symptoms. To develop dietary strategies that can increase dairy food consumption and tolerance to dairy foods, it is essential to be aware of cultural food preferences and dietary patterns.

Health care professionals must first understand the process of lactose digestion and the clinical syndrome of lactose intolerance. Educating patients about the process will help allay fears and minimize myths regarding lactose intolerance. Providers can also help African Americans and the general population increase dairy food consumption by educating them about the nutrient content of dairy foods; health benefits of dairy, such as hypertension and obesity; and strategies for including dairy in the diet, including culturally sensitive dietary options. Since the data here clearly show that all consumers—including African Americans—are more likely to reduce or eliminate dairy foods from their diets to reduce lactose intolerance symptoms than to seek alternative solutions, education regarding the variety of solutions available for addressing symptoms and the health benefits of dairy foods is needed.

McCarron and Heaney estimated that a noteworthy health care cost savings could result from reduction of major chronic diseases in the United States that includes obesity, hypertension, type 2 diabetes, osteoporosis, and cardiovascular disease if Americans increased their intake of dairy foods to 3 to 4 servings each day.[39] To build nutrition and health educational campaigns for African Americans targeted at reducing chronic disease risk through increased consumption of dairy foods with culturally appropriate education channels and partnerships among health professionals, educators, researchers, and industry will be necessary. Practical solutions for managing lactose intolerance, including strategies to avoid symptoms and increase dairy food intake, will be required to successfully achieve behavior change and enhance the nutritional quality of African American diets.

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