# Nutrient intake trends among African-Caribbeans in Britain: a migrant population and its second generation

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## Abstract

*Objective:* To explore British African-Caribbean (AfC) nutrient intake by migration status (place of birth), diet (traditional Caribbean or more European) and age and relate this ecologically to coronary heart disease (CHD) mortality rates.
*Design:* Cross-sectional.
*Setting:* Inner-city Manchester, UK.
*Subjects:* Two hundred and fifty-five adults of AfC origin aged 25–79 years, randomly sampled from population registers.
*Results:* Caribbean-born people (mean age 56, and mean time in Britain 30 years) had significantly lower per cent energy from total and saturated fat than younger British-born AfC people (mean age 29 years) (31.3% vs. 35%, difference in total fat 3.7%, 95%CI 2–5%; in saturated fat 10.9% vs. 12.6%, difference 1.7%, 95%CI 1–2.5%). The Caribbean-born group also ate more fruit (+84 g day$^{-1}$, 95%CI 36–132 g day$^{-1}$) and green vegetables (+26 g day$^{-1}$, 95%CI 3–49 g day$^{-1}$). Men following a traditional diet ($\geqslant$ 5 days week$^{-1}$) similarly had a lower per cent energy from fat, at 30.4%, than less traditional eaters, at 33.1% (difference 2.7%, 95%CI 0.7–4.8%). African-Caribbean women, at relatively greater CHD risk than AfC men, had higher body mass indices (BMIs) than AfC men. Compared with national data, AfC subjects consumed some 7% and 5% less energy from total fat and saturated fat, respectively, with over 9% more from carbohydrate. However, there was marked convergence towards the national average in the youngest AfC groups aged 25–34 years, whatever their place of birth.
*Conclusions:* Caribbean birthplace has an independent effect on total fat intake and percentage of energy from fat. Together with higher fruit and vegetable intake, these results are consistent with the dietary fat/antioxidant/CHD hypothesis.

**Keywords**
African-Caribbean
Nutrient intake
Coronary risk
Migration
Age
Place of birth
Food frequency questionnaire

Differing disease rates between migrant, original and local populations have supplied vital clues to aetiology but studies combined with comparative nutritional data are few[1–3]. For example, recent reports on CHD in the United States contrasted the lower CHD rates in AfC-origin migrants with the higher rates in African-Americans although nutrient intake data were not available[4]. This pattern has also long been noted between AfC migrants to Britain and the national white European-origin population[5–7]. Thus, CHD mortality in Caribbean-born men has remained persistently 50% lower than the high national rates in British-born men, both 20 years ago and in the most recent data for 1988–92[7,8], while that for AfC women has similarly been some 67–75% of national rates. However, CHD mortality in Jamaica was still less than half that of Caribbean-born people in the UK for these periods[9] again indicating that risk factors for CHD may have been acquired recently.

The AfC community in Britain has primarily developed from the young people who migrated from the English-speaking West Indies in the 1950s and 1960s, and from their descendants now born in Britain[10]. Similar migration occurred to the United States and Canada[4,10–11]. This migrant population and its descendants now form the second largest minority ethnic group in England and Wales, at least 1% of the total[11], yet virtually no information is available on its nutritional intake, nor in such communities elsewhere in Europe or North America.

This paper examines nutrient intakes by migration status (place of birth), age bands and gender, as assessed by a food frequency questionnaire (FFQ), for a population sample of adult African-Caribbeans resident in inner-city Manchester, a large postindustrial city in northwest England. We assessed how macro-nutrient intake was related to the reported CHD risk profile, testing the hypotheses that those following more traditional diets would consume less energy from fat and more from complex carbohydrate, with

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increased intakes of fruit and vegetables, and that there would be an inverse association of such intakes with age and from Caribbean to British birthplace. Results are compared with those of the only available reference data for the national British population obtained using a 7-day weighed record method[12]. An extract of our findings was published previously[13], however data on additional AfC subjects have been collected and included in the analyses presented here.

## Methods

This study formed part of an international comparative project using standardized methods to examine the emergence of diabetes, hypertension and other CHD risk factors in representative samples of four African-origin populations – in rural and urban Cameroon, Jamaica and inner-city Manchester[14–17]. A site-specific FFQ was developed to assess *habitual* nutrient intake during the previous 12 months and included those foods contributing at least 90% of total intakes of energy, fat, carbohydrate and protein, as described previously[14]. Nutrient intakes from the FFQ were compared in a subset of participants against results with 4-day food diaries ($n=41$) and 24-hour recalls ($n=37$). The correlations for energy intake between the FFQ and food diary was 0.55 and between the FFQ and 24-hour recall was 0.5. Altman–Bland plots showed good agreement on a group level between the methods, but wide confidence intervals (CIs) indicated less good agreement on an individual level.

All subjects participated in a blood pressure and glucose tolerance survey which in Manchester had a response of 67%[15–17]. For that health survey, subjects were randomly sampled from population registers held at four health centres in inner-city Manchester and were stratified by age decades from 25–54, and then 55–79, years. African-Caribbean ethnicity required three out of four grandparents to classify in that ethnic group and excluded people of direct African origin. Trained interviewers determined frequency of consumption and usual portion size for 108 Caribbean and European foods in the FFQ. Anthropometric measurements were made using standardized procedures on a stadiometer and balance or calibrated electronic scales. Ethical permission was granted by the Central Manchester Health District Ethical Committee.

In order to examine dietary patterns and nutrient intake in more detail, respondents were asked 'On average how many days each week would you consume traditional Caribbean foods?', from which the sample was classified into those eating a mainly traditional diet (consuming Caribbean foods 5–7 days week$^{-1}$) or a less traditional one (Caribbean foods 0–4 days week$^{-1}$) (Fig. 1). Validation that the intake frequency of such foods was as suggested by this

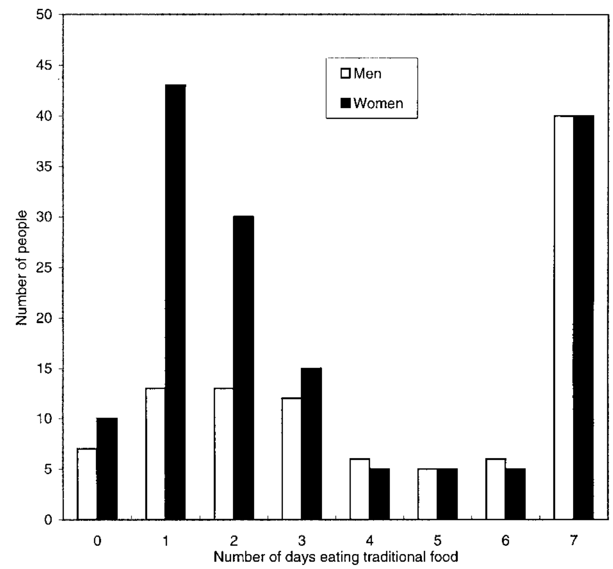


**Fig. 1** Consumption of West Indian foods by the British African-Caribbean population sample

question was examined independently, from the frequency responses for such foods in the FFQ. Those foods from the FFQ considered 'traditionally Caribbean' included a range of individual items and recipes typically consumed in the Caribbean itself, particularly Jamaica, the main island of origin. These items were: hard dough bread, cho cho (also known as christophene), sweet bun, sweet potato, rice and peas, cornmeal porridge, rice, callaloo, fried dumpling, avocado pear, yam, green banana, plantain, homemade West Indian soup, ackee and saltfish, saltfish fritters, pattie (pastry-coated meat pies), oxtail stew, traditional fried and curried chicken and curried beef, roast chicken, pork or lamb (varieties of roasts known as 'oven do'), curried lamb/goat/mutton, cassava, breadfruit, pumpkin, 'nutriment/nourishment' and punch (a non-alcoholic fruit juice drink).

The nutritional data were analysed for mean daily macronutrient intake using a specially constructed analysis program in SPSS for Windows (SPSS Inc., Chicago, USA). This contained the nutrient composition values for foods calculated either from weighed recipes collected in the African-Caribbean community in Manchester as previously described[14,18,19] or from the British food composition tables[20,21,22].

## Results

The FFQ was completed by 102 men and 153 women (mean age 54 and 49 years, respectively), which was over 80% of those invited to do so; 18% were born in England (that is, are second generation), 60% were born in Jamaica, 6% in Barbados and 14% in other eastern Caribbean islands (Table 1). More men than

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**Table 1** Lifestyle indices of African-Caribbean adults (percentages or means and 95% confidence intervals in brackets)

| | Men | | | | | Women | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total sample (*n*=102) | Traditional* (*n*=51) | Less traditional (*n*=51) | Caribbean born (*n*=86) | British born (*n*=16) | Total sample (*n*=153) | Traditional* (*n*=50) | Less traditional (*n*=103) | Caribbean born (*n*=119) | British born (*n*=30) |
| Age (years) | 54 (51–57) | 57 (54–61) | 50 (46–55) | 58 (56–61) | 30 (28–32) | 49 (47–51) | 52 (48–55) | 47 (45–50) | 54 (52–55) | 29 (28–30) |
| Mean duration of time in UK (years) | 31 (29–32) | 30 (28–32) | 30 (28–32) | 31 (29–32) | – | 29 (28–30) | 28 (26–30) | 30 (29–31) | 29 (28–31) | – |
| Married (%) | 52 | 54 | 49 | 58 | 19 | 39 | 54 | 31 | 45 | 10 |
| Single (%) | 21 | 22 | 20 | 13 | 63 | 31 | 16 | 39 | 22 | 73 |
| Country of birth | | | | | | | | | | |
| Jamaica (%) | 68 | 75 | 61 | 80 | 0 | 55 | 58 | 53 | 71 | 0 |
| Britain (%) | 16 | 8 | 24 | 0 | 100 | 20 | 12 | 23 | 0 | 100 |
| Household annual income ≤ £10 000 (%) | 62 | 66 | 58 | 66 | 40 | 65 | 69 | 62 | 65 | 57 |
| Body mass index ($kg\,m^{-2}$) | 26.9 (26.2–27.6) | 26.6 (25.7–27.6) | 27.1 (26.1–28.1) | 27.1 (26.4–27.9) | 25.5 (23.9–27.1) | 28.8 (27.8–29.6) | 27.6 (26.1–28.9) | 29.3 (28.2–30.5) | 29.3 (28.4–30.3) | 25.9 (23.3–28.5) |
| Energy intake : basal metabolic rate | 1.39 (1.28–1.50) | 1.33 (1.16–1.50) | 1.44 (1.30–1.59) | 1.33 (1.22–1.44) | 1.68 (1.31–2.03) | 1.38 (1.29–1.45) | 1.45 (1.32–1.58) | 1.33 (1.23–1.39) | 1.31 (1.23–1.39) | 1.62 (1.39–1.85) |

* Defined as all those consuming traditional Caribbean foods ≥ 5 days $week^{-1}$.

women were married (52% vs. 39%). Sixty-four per cent had a total household income of less than £10 000 (US$15–16 000) although younger people's households tended to have slightly higher incomes. Some 71% attained secondary school, and 6% university or polytechnic, as the highest level of education. Figure 1 illustrates that only 8% of subjects did not consume 'traditional' food at least once per week. Those consuming a more traditional diet were older and had a lower household income than those reporting a more westernized diet. Similarly, those born in the Caribbean were older with lower incomes than those born in the UK. Foods chosen by the traditional group differed compared with the non-traditional group. In particular, green banana, yam, cassava, saltfish and ackee, and rice and peas were eaten more by those on a traditional diet. Semi-skimmed milk, biscuits, chips, mince dishes and pasta were eaten more by the non-traditional group.

Body mass index was similar across all male subgroups. Mean BMI was significantly higher in women than in men, among all those Caribbean-born compared with British-born and was lower but not significantly different between traditional and less traditional eating women (Table 1).

British-born (second generation) AfC men had significantly higher intakes of energy and all macronutrients compared with Caribbean-born men (Table 2), although this probably reflects age-related differences in physical activity. There were similar, smaller differences in nutrient intake between the British-born and Caribbean-born AfC women. The percentage of energy from total and saturated fat was significantly higher in those British born of both genders while the percentage of energy from carbohydrate was higher in the Caribbean-born women. Again, these may be age-related differences.

Comparing nutrient intakes between traditional and less traditional consumers (Table 3) showed that half the men reported eating a traditional diet compared with one-third of women. The percentage of energy from fat was significantly lower in those men. The trend towards higher per cent energy from carbohydrate in traditional consumers was not statistically significant by gender but was for the group as a whole with the larger sample size. In any subgroup, alcohol intake in men at some 2% of total energy was about double that in women.

Significantly more fruit (an additional $84\,g\,day^{-1}$, 95%CI $36–132\,g\,day^{-1}$) and green vegetables (an additional $26\,g\,day^{-1}$, 95%CI $3–49\,g\,day^{-1}$) were consumed by the Caribbean-born compared with the British-born groups. These differences were not seen for the traditional/less traditional comparison.

## Comparison with data for a national British population sample

Nutrient intakes for the AfC men and women are compared in Table 4 with the only available data for a

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**Table 2** Nutrient intakes by place of birth of the African-Caribbean population (means and 95% confidence intervals for mean differences in brackets)

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| Nutrients | Caribbean born (*n*=86) | British born (*n*=16) | Mean difference* (95%CI) | Caribbean born (*n*=119) | British born (*n*=30) | Mean difference* (95%CI) |
| Energy (kJ) | 9071 | 12 247 | –3176 (–5180, –1172)† | 7761 | 9335 | –1569 (–2699, –444)† |
| Carbohydrate (g) | 304 | 390 | –86 (–150, –22)† | 262 | 296 | –34 (–70, 3.0) |
| Fat (g) | 79.7 | 118.1 | –38.4 (–60.3, –16.4)† | 66.9 | 90.7 | –23.8 (–36.5, –11.0)† |
| Protein (g) | 80.8 | 104.7 | –23.9 (–49.5, 1.74) | 67.7 | 77.3 | –9.6 (–18.7, 0.5) |
| Fibre (g) | 24.9 | 29.9 | –5 (–10.4, 0.4) | 22.4 | 22.8 | –0.5 (–3.1, 2.2) |
| % total energy from carbohydrate | 51.2 | 48.4 | 2.7 (–0.9, 6.4) | 52.7 | 49.2 | 3.5 (1.2, 5.7)† |
| % total energy from fat | 31.2 | 34.8 | –3.6 (–6.4, –0.8)† | 31.5 | 35.1 | –3.7 (–5.6, –1.7)† |
| % energy from saturated fat | 10.8 | 12.6 | –1.8 (–3.1, –0.5)† | 11.1 | 12.7 | –1.6 (–2.6, –0.5)† |
| % energy from protein | 14.6 | 13.7 | 0.9 (–0.2, 2.1) | 14.7 | 13.7 | 1.0 (0.2, 1.8) |
| % energy from alcohol | 2.2 | 2.2 | –0.07 (–1.7, 1.6) | 1.0 | 1.3 | –0.3 (–0.9, 0.3) |

* Expressed in relation to the Caribbean-born group. The minus sign indicates the difference is lower in that group.
† A minus sign before *both* 95%CI indicates neither includes zero and hence is considered significant at $P < 0.05$.

national British sample of similar aged white subjects; the data were obtained by the different method of 7 days weighed intake[12]. While the composition of the diet for the AfC men and women was similar, the men in the national British population had a greater percentage of energy provided by alcohol, as did the women whose proportional intake was the same as the AfC men's intake. Compared with the national population's results, African-Caribbeans had a significantly lower proportion of energy from total fat (7%) and saturated fat (5%), with that from carbohydrate highly significantly greater by 9%.

**Table 3** Daily nutrient intakes of traditional and less traditional consumers in the African-Caribbean population (means and 95% confidence intervals for mean differences in brackets)

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| Nutrients | Traditional (*n*=51) | Less traditional (*n*=51) | Mean difference* (95%CI) | Traditional (*n*=50) | Less traditional (*n*=103) | Mean difference* (95%CI) |
| Energy (kJ) | 9063 | 10 065 | –1013 (–2527, 502) | 8330 | 7975 | 351 (–632, 1335) |
| Carbohydrate (g) | 307 | 328 | –22 (–70, 26) | 282 | 262 | 20 (–12, 51) |
| Fat (g) | 78.6 | 92.9 | –14.3 (–31.0, 2.3) | 72.2 | 71.8 | 0.4 (–10.9, 11.7) |
| Protein (g) | 80.2 | 89.0 | –8.8 (–22.2, 4.6) | 71.2 | 69.2 | 2.0 (–6.0, 10.0) |
| Fibre (g) | 25.1 | 26.3 | –1.2 (–5.1, 2.8) | 23.8 | 22.1 | 1.7 (–0.6, 4.1) |
| % total energy from carbohydrate | 51.9 | 49.6 | 2.3 (–0.4, 4.9) | 52.8 | 51.5 | 1.3 (–0.7, 3.3) |
| % total energy from fat | 30.4 | 33.1 | –2.7 (–4.8, –0.7)† | 31.6 | 32.6 | –1.0 (–2.8, 0.8) |
| % energy from saturated fat | 10.6 | 11.6 | –1.0 (–2.0, –0.1)† | 11.0 | 11.6 | –0.6 (–1.4, 0.3) |
| % energy from protein | 14.5 | 14.4 | 0.1 (–0.7, 0.9) | 14.2 | 14.6 | –0.4 (–1.1, 0.3) |
| % energy from alcohol | 2.3 | 2.1 | 0.2 (–1.0, 1.4) | 1.2 | 0.9 | 0.3 (–0.2, 0.8) |

* Expressed in relation to the Caribbean-born group. The minus sign indicates the difference is lower in that group.
† A minus sign before *both* 95%CI indicates neither includes zero and hence is considered significant at $P < 0.05$.

**Table 4** Nutrient intakes of the African-Caribbean (AfC) population: the total sample with national British data for comparison (means and 95% confidence intervals in brackets) (adapted from Gregory *et al.*[12])

| Nutrients | AfC men ($n=102$) | NDNS white men ($n=273$) | AfC women ($n=153$) | NDNS white women ($n=283$) |
|---|---|---|---|---|
| Energy (kJ) | 9569 (8807–10330) | 9958 (9703–10213) | 8092 (7632–8552) | 6736 (6544–6929) |
| Carbohydrate (g) | 318 (294–341) | 263 (255–271) | 269 (254–284) | 182 (176–188) |
| Fat (g) | 85.7 (77.3–94.1) | 99.4 (96–102) | 71.9 (66.7–77.2) | 70.9 (69–73) |
| Protein (g) | 84.6 (77.8–91.3) | 86.0 (84–88) | 69.8 (66.1–73.6) | 63.4 (62–65) |
| Fibre (g) | 25.7 (23.7–27.7) | 24.8 (24–26) | 22.6 (21.5–23.7) | 19.3 (19–20) |
| % energy from carbohydrate | 50.7 (49.4–52.1) | 41.4 (40.6–42.2) | 51.9 (51.0–52.8) | 42.3 (41.9–42.7) |
| % total energy from fat | 31.7 (30.7–32.8) | 37.6 (37.0–38.2) | 32.3 (31.5–33.1) | 39.5 (38.9–40.1) |
| % energy from saturated fat | 11.1 (10.6–11.6) | 16.1 (15.7–16.5) | 11.4 (11.0–11.8) | 17.1 (17.3–17.5) |
| % energy from protein | 14.4 (14.0–14.8) | 14.7 (14.4–15.0) | 14.5 (14.2–14.8) | 16.1 (15.7–16.5) |
| % energy from alcohol | 2.2 (1.6–2.8) | 6.4 (5.5–7.3) | 1.0 (0.8–1.3) | 2.2 (1.8–2.6) |

NDNS, National Diet and Nutrition Survey.

The impact of age in relation to place of birth is shown in Table 5. Almost all British-born AfC subjects fell into the 25–34-year age group ($n=43$, 15 men, 28 women; the remaining three aged 35–44 years) and had higher energy intakes than all the other Caribbean-born age groups including the small number of same-aged Caribbean-born subjects ($n=10$, 2 men, 8 women) (Table 5). While there was no difference in intakes of energy by age group for subjects born in the Caribbean, the percentage of energy from fat was highest, and highly significantly greater, in the youngest age group (35%, 95%CI 31–38%), and was at similar levels to subjects born in Britain. In the national British population, total energy intakes were similar to those of the African-Caribbeans reported here, but with per cent energy from fat stable and higher at over 38% across all age decades.

Finally, a multiple linear regression model was created to examine whether age or time lived in UK (not both together as they are co-linear), sex, birthplace and number of days per week eating traditional foods independently influenced either total or per cent energy from fat. Only birth place and gender had such independent effects for total fat, with $\beta$-coefficient values of 29.0 g (Caribbean vs. UK born) and 15.3 g (female vs. male) (both $P<0.001$). Birthplace ($P=0.001$), but not gender, remained an independent predictor of percentage of energy from fat along with

**Table 5** Daily nutrient intakes of the Caribbean-born group (AfC) compared with national British data by age band (men and women combined) (means and 95% confidence intervals in brackets) (adapted from Gregory *et al.*[12])

| Age band (years) | Number AfC | Number NDNS | Energy (kJ) AfC | Energy (kJ) NDNS | % total energy from fat AfC | % total energy from fat NDNS |
|---|---|---|---|---|---|---|
| 25–34 | | | | | | |
| Caribbean born | 10 | – | 8427 (6243–10 611) | – | 35 (31–38) | – |
| British born | 43 | 507 | 10 343 (9163–11 527) | 8598 (8322–8874) | 35 (34–36) | 38.6 – |
| 35–49* | 35 | 731 | 8171 (7209–9129) | 9017 (8598–9079) | 30 (29–32) | 38.1 – |
| 50–64 | 124 | 556 | 8427 (7824–9029) | 8347 (8121–8573) | 32 (31–32) | 38.6 – |
| 65+ | 36 | – | 8021 (7058–8987) | – | 30 (29–32) | – |
| Total | 251 | 2197 | 8686 (8263–9104) | 8640 (8514–8770) | 32 (31–32) | 38.4 – |

NDNS, National Diet and Nutrition Survey.
* Excludes three people born in Britain in the AfC group.

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frequency of eating traditional foods ($P=0.04$). However, it may be that birthplace is a proxy for age, thus making the relationship more complicated. The proportion of variance (adjusted multiple $R^2$) accounted for by these variables in the models was 12% for total fat and 8% for proportion of energy from fat.

## Discussion

In this study, we characterized the nutrient intakes of an inner-city AfC population living in the UK from whom a response rate of over 80% was obtained using an FFQ developed specifically among and for this community. The response to the original screening survey was 67%. Some 83% of the study group had migrated to Britain a mean of 30 years ago, three-quarters from Jamaica, where CHD was rare but has risen since then. Jamaican CHD mortality, however, was still half that of Caribbean-born migrants in Britain in 1990[9]. Poverty is prominent in British inner-city areas[23]; household annual incomes of less than £10 000 (*c.* US$15–16 000) were found in 64% of the AfC sample compared with available national figures of only 18% of married couples with an annual income below £10 400 (US$16–17 000) in 1993[24]. CHD rates are 2–4 times greater in inner cities as well as in the lowest compared with the highest socioeconomic groups in Britain[23,25], findings also repeatedly reported for the USA[26,27]. Such data add to the contrast with this inner-city AfC community. As in the USA and Caribbean[28,29], AfC women here were generally more obese than AfC men, although not among the younger British-born group (Table 1).

An important paradox illustrating cultural adherence was that more of the traditional consumers had lower incomes than those less frequently eating a traditional diet. Despite this, the former were choosing to spend more of their income on the more expensive Caribbean foods; for example during the study, in 1993, 1 lb of yam cost 77p compared with just 14p for 1 lb of ordinary 'Irish' potatoes (the Jamaican vernacular name, as distinguished from 'sweet' potatoes). Economic influences known to affect food habits include how much disposable income is available and the proportion of their income people are prepared to spend on food[30]. Despite less disposable income in the UK, people were clearly prepared to spend more to maintain cultural food preferences.

The study aimed to assess habitual nutrient intakes so that the instrument of choice was a FFQ which, while relatively imprecise, characterizes groups rather than individuals effectively[31]. We had previously examined how this FFQ compared with results in a subset of 41 subjects who also completed 4-day food diaries and a further 37 subjects who completed a 24-hour recall. A Spearman rank correlation for total energy of 0.55 was found between the FFQ and food diaries and 0.5 between the FFQ and 24-hour recall[19]. It should be remembered that these techniques do not measure the same things; the FFQ is for habitual longer term intakes, the diaries record 4 days, and the 24-hour recall the previous day only.

Nutrient intake patterns using this FFQ showed consistent differences within the sample. Lower per cent energy from both total and saturated fat and hence generally a higher proportion of energy from carbohydrate was found for those Caribbean born rather than British born, among those eating traditional meals more frequently, in all but the youngest age groups and hence for the community as a whole. Clearly these variables are interconnected but as shown in Tables 2–4 the findings recur and are somewhat more prominent in the men than women, again a reflection of coronary risk status as judged by mortality. The younger UK-born (second generation) men had significantly greater intakes of energy and all macronutrients than Caribbean-born men, with similar but smaller differences between the women. In the AfC population, physical activity scores were twice as high in the youngest age group of men compared with the oldest group[17]. The energy intake to basal metabolic rate (EI : BMR) ratio was similar between men born in the UK and the Caribbean. However, the proportions of energy from fat were only marginally lower in the younger AfC subjects, whatever their place of birth, than in the same aged national British sample (Table 5).

Comparison with a representative sample of the whole British population (Tables 4 and 5) has to be cautious because the National Diet and Nutrition Survey (NDNS)[12] of 2000 subjects, of whom only 38 were of non-European descent, used 7-day weighed records rather than a FFQ as used here. Total energy intakes were similar in men between the two studies. AfC women consumed more energy (8062 kJ) compared with white women (6739 kJ) nationally and had higher BMIs ($28.7\,\mathrm{kg\,m^{-2}}$) than the white women ($26.2\,\mathrm{kg\,m^{-2}}$). Alcohol intake in AfC men or women was not prominent. The NDNS found that about one-third of men and half of the women were under-reporting their energy intake as assessed by an EI : BMR ratio of less than 1.2. Our subjects appeared to be under-reporting energy intakes less, with a mean EI : BMR of 1.39 for men and 1.38 for women. Interestingly, it was the less traditional and British-born group that reported higher EI : BMR ratios. Our FFQ did not appear to lead to overreporting since there was only a 31 kcal (130 kJ) higher intake reported from the FFQ compared with the 4-day food diaries and a 33 kcal (139 kJ) lower intake reported from the FFQ compared with the 24-hour recalls[19].

The total sample here reported consuming just over 32% of total energy as fat compared with 39% by the white population. The percentage of energy from

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saturated fat was similarly some 5% less. Consistent with the dietary fat/CHD hypothesis, it is interesting to note that the most recent SMRs for CHD in Caribbean-born men were 45, 48 and 44 for age groups 25–44 years, 45–59 years and 60–69 years, and were 97, 74 and 67 for women, respectively[8]. Notably, younger women had rates no different to the general population. Furthermore, the distribution of socioeconomic status of the participants in the NDNS study was somewhat higher than that in the AfC population in this study. As poorer inner-city white British populations not only tend to have greater CHD rates but also higher percentages of energy intake from fat[32,33] the differences between the AfC sample and the local inner-city white population here are likely to be underestimated. A direct nutritional assessment of the latter is not available. However, three small British studies have found the AfC diet to be lower in fat and higher in carbohydrate than the diets of local white control populations[34–36] and this has been reflected in lower circulating concentrations of plasma triglycerides and factor VII coagulant activity, both risk factors for CHD[34,37–39]. The two studies of specific AfC subgroups, lone parents and mothers of young children, had similar results[36,40].

The other most interesting and related results were those for the higher green vegetable and fruit intakes in the (older) Caribbean-born community compared with younger UK-born AfC people. The former is consistent with a greater intake of folic acid in the diet, although some foods in the younger group, for example white breads, are now fortified with extra folate but were not when this study started (in 1993). No blood measurements of plasma homocysteine are available but these dietary data are consistent with a protective effect of such intakes on CHD risk from that factor[41]. Similarly, the higher fruit intakes in those who were born in the Caribbean would be supplying a diet higher in antioxidants such as vitamin C, which are also implicated in reducing CHD risk through inhibiting plasma lipid oxidation[42,43].

In conclusion, while the coronary risk profile of this AfC community may be being maintained by a diet that is *quantitatively* too great as judged by the prevalence of high BMIs, its *qualitative* make-up is already within national recommendations for proportions of energy from fat with increased proportions from carbohydrate and higher fruit and green vegetable intakes, also associated with favourable CHD risk. While these are ecological associations with CHD risk without direct markers in this study, the apparently beneficial dietary features we report are less prominent in the youngest age group whatever their place of birth. If deterioration in CHD risk is to be avoided, public health efforts need to reinforce the potential benefits of traditional dietary quality.

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