

The Impact of the Agricultural Revolution on Food

the incidence of CHD.¹³⁵ This all suggests that such untoward effects of coffee consumption may take very many years to become manifest. Shorter studies could well fail to show a positive association, however many subjects are entered into the trial. An example is provided by the negative results reported by Grobbee and his co-workers, who followed a cohort of 45,589 men but for only two years.¹³⁶

In conclusion, the introduction of coffee into England in the seventeenth century was followed by a considerable increase in its consumption, especially by male members of the upper and middle classes. The evidence implicating coffee as a risk factor for development of coronary heart disease only appears to be inconclusive if it is considered without regard to other risk factors, method of preparation, duration and extent of consumption. Review of the recent literature suggests that drinking strong boiled coffee has an untoward effect on the serum lipid profile and its consumption in large amounts over a very long period, as was usual in the eighteenth century, is associated with increased risk of developing coronary heart disease. Moreover, the contribution of increasing coffee consumption during the Georgian era to the emergence of angina pectoris must be assessed not in isolation but rather in association with other risk factors. In this connection, any statistical consequences of dissociating the effects of coffee consumption from liberal indulgence in cream and sugar and exposure to tobacco smoke are not strictly relevant to the present postulate. What *is* relevant is the consequence of the eighteenth-century male consumption of very large amounts of concentrated boiled coffee over many years, usually in a smoke-filled atmosphere and in conjunction with excessive sugar intake and occasional use of cream. The evidence from the studies cited suggests that with this combination of factors coffee could have contributed to the emergence of angina pectoris upon the medical scene of Georgian England.

Menus and Meals

Thus far, eighteenth-century changes in agricultural practice and their effects on the availability and composition of food have been reviewed. In the final analysis, however, the impact on cardiac health in Georgian England was determined by the meals that were actually eaten. Fortunately, data about this are readily available in cookery books of the time, in lists of food ordered for special occasions, records completed by diarists and descriptions of eating habits by foreign observers of the English scene.

Gargantuan meals that included large amounts and great varieties of animal foods had been usual among the nobility and gentry during many centuries preceding the Georgian era. The well recognized frequency of gouty arthritis may well have had among its causes grossly excessive consumption of high protein animal foods. It was observed of Charles V, the sixteenth-century King of Spain and Emperor of the Holy Roman Empire, that his inability to control either his appetite or the resulting

¹³⁵ LaCroix *et al.*, *op. cit.* note 122 above, pp. 979; Dan LeGrady *et al.*, 'Coffee consumption and mortality in the Chicago Western Electric Company study', *Am J Epidemiol*, 1987, 126: 803–12, pp. 806–7.

¹³⁶ Grobbee *et al.*, *op. cit.*, note 133 above, pp. 1030–1.

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corpulence contributed in large measure to his final illness.¹³⁷ On 13 January 1663, Samuel Pepys recorded in his diary that at a dinner party which he gave, the guests partook of “a hash of rabbits and lamb, a rare chine of beef . . . [and] a great dish of roasted fowl”.¹³⁸ On April 4th of the same year his visitors were provided with a meal that included, amongst other foods, rabbits and chickens, a boiled leg of mutton, a great dish of a side of lamb, and roasted pigeons.¹³⁹ Samuel Pepys and his guests were probably not exceptional in their eating habits, but only in the detail with which they were documented.

In 1688 Gregory King calculated that the yearly meat consumption of the population of England averaged about 72 lbs a year. He estimated, however, that the meat consumption of the more affluent members of society was more than double this, averaging 147½ lbs per year. King defined the affluent as being members of a family whose head had an annual income of £12.18.0 or more.¹⁴⁰ The meat in all probability had the low fat content and composition characteristic of animals reared prior to the Agricultural Revolution.

When the present work was approaching completion, I had occasion to see in consultation a lady of forty with a complaint of chest pain, ultimately diagnosed as being of musculoskeletal, i.e. non-cardiac, origin. The patient lived in a heavily forested and remote part of the Canadian mid-west. She bought a package of frozen chicken parts about three times a year, but with this exception she was entirely dependent on venison for meat. Her husband would shoot a deer in the wild when occasion demanded and the family would have a couple of meat meals a week without having to stint themselves. She drank only 1 per cent milk, usually less than a litre a week, and had cheese no more than once a month. She rarely fried foods and used a soft margarine. Her carbohydrate consumption was very high; she ate half a loaf of bread every day and large quantities of noodles.

She was enormously obese. Her height was only 161 cm, her weight 154.2 kg and her body mass index 59.5. The blood pressure, measured with a wide cuff, was 130/70. Her total serum cholesterol was 5.2, HDL 1.59, LDL 3.16 and triglycerides 2.18 mmol/L. The total/HDL ratio was 3.27 and a random blood sugar 7.2 mmol/L.

In many respects the patient's diet resembled the eating patterns of wealthy people who lived unstintingly prior to the Agricultural Revolution. It shows that consumption grossly in excess of energy requirements and with a plentiful supply of meat obtained from animals grazing in the wild is compatible with a lipid profile that is completely normal, even by current stringent standards. It is illustrative of findings reported by Kevin O'Dea and his colleagues who studied ten volunteers for whom animal protein was provided by beef from which all visible fat was very carefully trimmed. “Ordinary” beef in identical amounts was allowed during a

¹³⁷ William Robertson, *History of the reign of Charles the Fifth*, 3 vols, London, George Routledge and Sons, 1896, vol. 2, p. 531.

¹³⁸ *The diary of Samuel Pepys. Volume IV, 1663*, ed. R C Latham and W Matthews, University of California Press, 1971, p. 14.

¹³⁹ *Ibid.*, p. 95.

¹⁴⁰ Gregory King, *Natural and political observations and conclusions upon the state and condition of England 1696*, ed. George E Barnett, Baltimore, Johns Hopkins Press, 1936, p. 38.

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control period. In two weeks the substitution of low fat beef resulted in a reduction of serum total cholesterol from 5.84 ± 0.36 to 4.84 ± 0.31 mmol/L, and the LDL from 3.88 ± 0.44 to 2.82. The HDL rose minimally from 1.71 ± 0.18 to 1.60 ± 0.15 mmol/L. The total and LDL changes were significant, the HDL not so.¹⁴¹ My patient's incidentally normal blood pressure and sugar add to the favourable prognostic implications.

Seventeenth-century eating habits were continued into the eighteenth, but with advantage taken of the greatly increased availability of animal foods. The changes in food characteristics that accompanied the Agricultural Revolution were welcomed with enthusiasm by the consumer, especially when costs were not a concern. B A Holderness calculated that by 1760 per capita meat consumption in England averaged 100.8 lbs a year.¹⁴² Compared to Gregory King's 1696 estimate it was half as much again. It is probable that the consumption by the affluent, as earlier defined by King, increased proportionally to at least the same extent. In absolute amounts it would have been to a greater extent. Not uncommonly, an entire chicken was consumed at a meal by one person. The amount of meat and poultry eaten was proportional to a family's position in the social scale. In the eighteenth century gluttony was regarded as "honourable" and "handsome eating", a measure of the status of the host. A contemporary historian, commenting on Elisabeth Ayrton's 1765 recipes in *The cookery of England* (1974) refers to "the heroic days of English cattle when carnivorous gusto was virtually a condition of patriotism".¹⁴³

The evidence in Chapters IV and V indicated that the changes from the seventeenth to the eighteenth century resulted not only in increasing availability, but, more importantly, in marked differences in the characteristics of the animal food that became available. In the earlier period eating to excess resulted for the most part in a surfeit in energy and protein intake. In contrast, the evidence reviewed earlier suggests that the food consumed in ever greater amounts during the course of the eighteenth century also contained ever increasingly large quantities of animal and therefore predominantly saturated fat. The changes were regarded by consumers as highly desirable, fatty meat for example being considered more succulent and tasty. William Cobbett, famed for his descriptions of English rural life in a slightly later period, remarked in 1828 that, "Lean bacon is the most wasteful thing that a family can use"¹⁴⁴ and he was by no means alone in his opinion. Even today, a greater appeal of fatty meat to the palate often dictates consumer preference, despite current knowledge of its potentially harmful effects on the heart and circulation.¹⁴⁵ With adequate means, the middle and upper classes were probably able to increase their intake of animal foods to at least the extent that is suggested by the reported rise in consumption in England as a whole. Meals taken by the affluent during the late eighteenth century frequently included a late breakfast and a substantial midday

¹⁴¹ Kevin O'Dea *et al.*, 'Cholesterol-lowering effect of a low-fat diet containing lean beef is reversed by the addition of beef fat', *Am J Clin Nutr*, 1990, **52**: 491-4, p. 493.

¹⁴² Holderness, *op. cit.*, note 64 above, p. 155.

¹⁴³ Simon Schama, 'Mad cows and Englishmen', *New Yorker*, 8 April 1996, pp. 61-3.

¹⁴⁴ Julian Wiseman, *A history of the British pig*, London, Duckworth, 1986, p. 18.

¹⁴⁵ Adam Drewnowski, 'Sensory properties of fats and fat replacements', *Nutr Rev*, 1992, **50** (4, Part 2): 17-20, p. 18.

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meal, possibly accompanied by some entertainment. After this there was often a dinner at four in the afternoon that would usually last a couple of hours or more and be followed by some late evening refreshment to conclude the day. The length of time spent at table contributed to excessive consumption. Meat in one form or another was often a mainstay of every meal of the day and of many individual courses. Fridays were no longer different in this regard. Because of their fatty nature, the high proportion of lamb, duck and goose in the diet contributed in a specific way to increases in fat consumption, as did the greater availability and richness of dairy products. Hannah Glasse, writing in the mid-eighteenth century, mentioned a cook who used six pounds of butter to fry twelve eggs and commented, with what she must have thought to be relative austerity, that even half a pound would have been more than necessary.¹⁴⁶ Egg yolks were frequently used to enrich bread, butter, biscuits, cakes and pastries. Added sugar improved the palatability of cakes, biscuits and pastries, and if more were eaten there was inevitably a rise in consumption of sucrose as well as fats.

The eighteenth-century changes in the relative availability of different cereals were reflected in the new eating habits as recorded by contemporary writers. As dietary staples, wheaten loaves replaced oatmeal, oat cakes and rye bread. However, the cart must not be put before the horse, even if eating oats. The agricultural innovations were to a large extent driven by changing tastes and fashions in food. The increasing demand for wheaten loaves was accompanied by an expectation that they should be as light in colour as possible. White bread was considered more attractive in appearance, more palatable and digestible, less flatulent and of greater food value. In contrast, because of the bulkier stools associated with high intake of coarse grains, they were thought to have poorer nutritional qualities.¹⁴⁷ Eating white bread was considered a mark of refinement and gentility, while dark breads were “common”. With improvements in milling techniques the demand was being met by removal of the husks to an ever increasing extent.¹⁴⁸ Wheat ground in this way replaced coarse grains in the flour used for making biscuits, cakes and pastries as well as bread. The changes were earlier and greater among the prosperous than among the poor who could only follow the example of their “betters” if and when they could afford so to do.¹⁴⁹ These eighteenth-century dieting innovations suggest that in all probability there was at that time a reduction in the consumption of fibre, particularly among the upper and middle classes.

Country gentry were reportedly prodigious meat eaters. In 1731 Lord Hervey partook of a dinner that included beef, venison, geese and turkeys.¹⁵⁰ The Reverend

¹⁴⁶ Hannah Glasse, *The art of cookery made plain and easy*, facsimile reprint of 1796 ed., Hamden, CT, Archon Books, 1971.

¹⁴⁷ J C Drummond and Anne Wilbraham, *The Englishman's food*, London, Readers Union and Jonathan Cape, 1959, p. 212.

¹⁴⁸ W A Armstrong and J P Huzel, 'Food, shelter and self help', in G E Mingay (ed.) *The agrarian history of England and Wales, Volume VI: 1750–1850*, Cambridge University Press, 1989, pp. 731–2.

¹⁴⁹ Jennifer Tann, 'Corn milling', in G E Mingay (ed.) *The agrarian history of England and Wales, Volume VI: 1750–1850*, Cambridge University Press, 1989, pp. 404–9.

¹⁵⁰ H J Habbakuk, 'England's nobility', in Daniel A Baugh (ed.), *Aristocratic government and society in England*, New York, Francis Watts, 1975, p. 100.

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Woodforde kept an eighteenth-century diary in which meals figured prominently. He described an weekday dinner in which he was served boiled chicken and tongue, bacon, stewed beef and roasted venison. Roasted duck and leveret were part of a second course. Another time, he partook of a dinner which included a boiled turkey, roasted saddle of lamb, beef steak pie, slices of veal and roast chicken. On an occasion when he entertained neighbours to a dinner, it included ham, boiled chickens, a leg of mutton and a goose.¹⁵¹ Like Samuel Pepys, Parson Woodforde was probably not exceptional in his daily eating habits, but only in the detail with which he documented them. His niece Nancy could not only rival him at the table but showed the not uncommon eighteenth-century ability to overcome speedily any temporary indisposition that might have interfered with gluttonous eating habits. She once developed abdominal pains and vomiting after a meal that included beef that was rather fat, a good deal of roast duck and a dessert that included raspberries with cream. Nancy recovered after being treated by her Reverend uncle with large quantities of rum. By the next day she was partaking of roast neck of mutton.¹⁵²

Pastor Woodforde's "ordinary" meals pale into insignificance in comparison with celebratory repasts. The Duke of Marlborough commemorated the birth of his fourth son with a supper that included roast beef, mutton, pork, veal, pork and mutton pies, chicken, ducks, geese and tongue. Without knowledge of the number of guests, the amounts consumed by each person cannot be ascertained. However, the list gives an excellent idea of the relative importance of the various foods. Not listed above but noteworthy, apart from the large variety of meat and poultry, is the limited amount of fish and the low proportion of green vegetables on the menu.

Green vegetables constituted only a relatively small part of the ingredients of the meals described in books of the era such as that of Hannah Glasse, published in 1796.¹⁵³ The newly urbanized affluent classes could no longer depend exclusively on vegetables grown in their own gardens. They had to rely largely on market gardens and there was some aversion to use of their produce because of the conditions under which they were transported. The wagons that brought vegetables into the towns were utilized on the return journey for carrying night soil from the cesspools and privies of London back to the country for use as fertilizer. Despite washing, knowledge of this practice reduced the attractiveness of greens as food and heightened health concerns. Vegetables in the diet were associated with flatulence and their tendency to produce bulky stools was thought to indicate a lack of nutritive value. For all of these reasons they were not held in high regard by the more "refined" members of society and were "distrusted" by most medical experts of the day.¹⁵⁴ Appreciation of vegetables for their nutritive value only began to come late in the Georgian era. Green vegetables also had to compete for space on the plate with the newly introduced

¹⁵¹ *The diary of a country parson 1788–1792, The Reverend James Woodforde*, ed. John Beresford, 3 vols, Oxford University Press, 1927, vol. 3, pp. 208, 242, 279.

¹⁵² *Ibid.*, p. 217.

¹⁵³ Glasse, *op. cit.*, note 146 above.

¹⁵⁴ Vincent J Knapp, 'The coming of vegetables, fruits and key nutrients to the European diet', *Nutr Health*, 1996, 10: 313–21, pp. 314–15.

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potato and with foods such as rice and sago that were arriving from faraway countries for the first time. As a consequence a mild form of “land scurvy” became recognized among members of the middle and upper classes during the eighteenth century. Low and possibly decreasing green vegetable consumption may also have been significant in view of what is now known about the resulting dietary low folic acid intake and consequent elevation of serum homocysteine levels. One can speculate too that the latter would also have been aggravated by the high consumption of meat and therefore of methionine of which it is a constituent. Taken in excess, this amino-acid can cause increase in blood levels of homocysteine, currently recognized as a cause of damage to the endothelium of blood vessels and a significant risk factor for coronary heart disease.¹⁵⁵

Recipes of the period depict in detail numerous examples of evolving traditional tastes that took full advantage of the now readily available animal fats and the abundance of sugar. Some examples from Hannah Glasse’s 1796 publication *The art of cookery made plain and easy* serve as illustrations.

Different Sorts of Sauce for a Hare

Take for sauce, a pint of cream and half a pound of fresh butter; put them in a saucepan, and keep stirring it with a spoon till the butter is melted and the sauce is thick; then take out the hare, and pour the sauce into the dish.

Sauce for a Boiled Turkey

Take as many oysters as you want . . . in a stew pan . . . some butter rolled in flour . . . boil them up, and then put in cream in proportion . . .

To Fry Cold Veal

Cut it in pieces about as thick as half-a-crown . . . dip them in the yolk of an egg . . . and fry them in fresh butter . . .¹⁵⁶

Similar lavishness characterized the use of dairy products. In Hannah Glasse’s 1796 recipes butter was a common ingredient of stuffing for a pig, used for basting rabbits and when preparing “ragoos” of beef. After being dipped in egg yolk, sheep’s rumps were commonly fried in butter. Ever lavish, the eighteenth century can be described with justification as “the age of cream”. It was used extensively in sauces, with meats and chicken, in entrées, with vegetables and desserts and with coffee.¹⁵⁷ Hannah Glasse, when giving instructions for preparation of a drink to accompany meals, advised using the thickest and sweetest cream obtainable together with double refined sugar. Her recommendations for making a butter cake are equally lavish. “You must take a dish of butter and beat like cream with your hands, two pounds of fine sugar well beat, three pounds of flour well dried and mix them in with the butter, 24 eggs, leave out half the whites and then beat all together for an hour.”¹⁵⁸ The modern reader can almost sense the coronary arteries of eighteenth-century diners narrowing even as they ate.

¹⁵⁵ Douglas R Murphy-Chutorian *et al.*, ‘Methionine intolerance: a possible risk factor for coronary artery disease’, *J Am Coll Cardiol*, 1985, 6: 725–30, p. 728.

¹⁵⁶ Glasse, *op. cit.*, note 146 above, pp. 35, 142.

¹⁵⁷ Sara Paston-Williams, *The art of dining: a history of cooking and eating*, London, National Trust, 1993, p. 177.

¹⁵⁸ Glasse, *op. cit.*, note 146 above, p. 310.

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Table V.15

Relationship between relative weight and cardiovascular disease incidence. Non-diabetic, non-smokers, total serum cholesterol <250 mg/dl

Relative weight*	Cardiovascular disease 26 year incidence/1000			
	Men		Women	
	No.	Incidence	No.	Incidence
<110	56	125	191	105
110–129	75	200	199	121
130 +	30	267	78	128

* Percentage of desirable weight, i.e. midpoint of weight range for persons of medium build at specified heights, based on Metropolitan Life Insurance Co. data.

Source: H Hubert *et al.* 'Obesity as an independent risk factor for cardiovascular disease. A 26-year follow-up of participants in the Framingham heart study', *Circulation*, 1983, **67**: 968–77. (With permission of the publishers (Lippincott Williams & Wilkins) and Dr H Hubert.)

The impact of these dietary practices on the incidence of obesity in Georgian England is discussed in Chapter VII. Here it suffices to note the well-established linkage of obesity with a high incidence of coronary heart disease. It is due in large measure to the association of excessive weight with other risk factors, notably hypertension and abnormalities of lipid and glucose-insulin metabolism. However, the Framingham study and insurance company data (Table V.15) suggest that when marked, obesity is by itself a significant risk factor with a stepwise relation between the extent of weight excess and cardiovascular disease incidence (Figure V.5).¹⁵⁹

Eating on the scale described was not confined to the nobility, but also became a part of the way of life of the affluent among the growing eighteenth-century middle classes. Successful shopkeepers' tables were as well served as those of rich merchants. The physician and the man of law ate as well as the archbishop, and the landowning gentry as well as the nobleman with his broad acres. In contrast, with the exception of the potato, the newly available foods, and those with a high amount of fat content in particular, were far beyond the reach of labourers and their families. The great majority of them suffered from chronic nutritional deprivation, especially when harvests failed and the price of the bread that was their main staple rose precipitately. They may have even suffered a decline in the adequacy of their diets during the course of the eighteenth century. Many of those who remained on the land ate less well as the practice of having labourers board with the farmers that employed them

¹⁵⁹ Helen H Hubert *et al.*, 'Obesity as an independent risk factor for cardiovascular disease: a 26-year follow-up of participants in the Framingham heart study', *Circulation*, 1983, **67**: 968–77, p. 970.

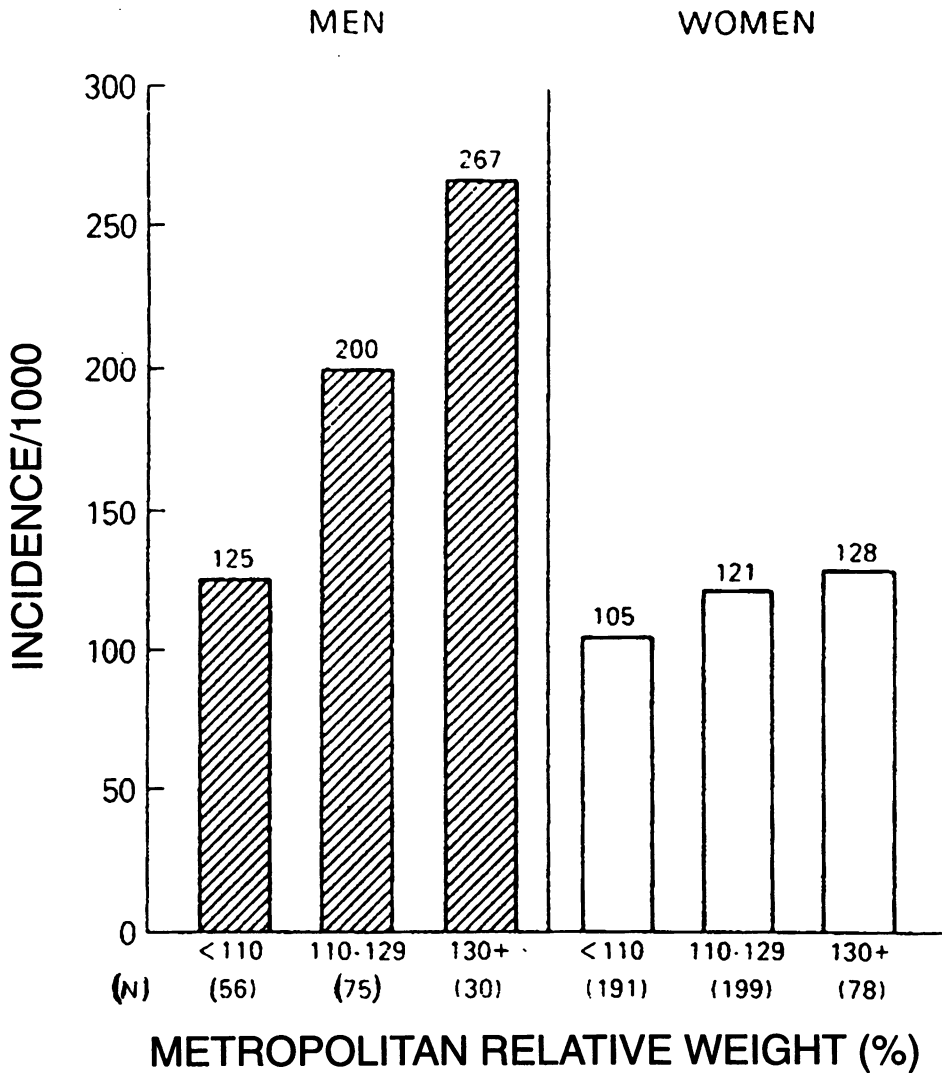


Figure V.5: 26-year incidence of cardiovascular disease by Metropolitan Life Insurance Co. relative weight. Framingham men and women below age 50, normotensive, with cholesterol below 250 mg/dl, not using cigarettes, no evidence of glucose intolerance. Number at risk bracketed. Incidence rates/1000 above the bars. Source: Helen B Hubert *et al.*, 'Obesity as an independent risk factor for cardiovascular disease; A 26-year follow-up of participants in the Framingham heart study', *Circulation*, 1983, **67**: 968-77, p. 974. (With permission of the publishers (Lippincott Williams & Wilkins) and Dr H Hubert.)

grew less common.¹⁶⁰ Indigent migrants from the countryside to the towns lost the small plots of land on which some food may have been grown or one or two animals

¹⁶⁰ B H Slicher van Bath, *The agrarian history of western Europe A.D. 500-1800*, transl Olive Ordish, London, Edward Arnold, 1965, p. 321.

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kept. The plight of the labourer without work was even worse. The consequences of nutritional differences between the upper and lower classes can be gauged by comparison of their heights, a physical feature highly sensitive to any prolonged dietary inadequacies.¹⁶¹ The stunted and delayed growth of sons of the impoverished working classes has been well documented and is detailed in Chapter III and shown in Table III.4. Their general health suffered, but in so far as a high incidence of angina pectoris is linked with prolonged dietary excess and a surfeit of fats in particular, the absence of this complaint among the labouring classes can be explained readily. The small shopkeepers and the skilled workers, the artisans, and their families ate somewhat better and their nutritional and general physical state and health may well have improved towards the end of the eighteenth century.¹⁶² However, even for these people, eating on the scale of the affluent middle and upper classes was not usually affordable or practicable and they too were apparently spared the untoward cardiac consequences of the dietary excesses of the opulent.

¹⁶¹ Roderick Floud, Annabel Gregory and Kenneth Wachter, *Height, health and history: nutritional status in the United Kingdom 1750–1980*, Cambridge University Press, 1990, p. 17.

¹⁶² *Ibid.*, pp. 140–1, 148.