
Hasty pudding versus tasty bread: regional variations in diet and nutrition during the Industrial Revolution¹

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Abstract

*Using parish-level information from Sir F.M. Eden's *The state of the poor* (1797) we can identify typical diets for the counties of England. These diets varied considerably and afforded very different standards of nutrition. We compute a nutritional score for this diet, paying attention to the presence of vitamins, minerals and micro-nutrients shown to be essential for health and growth in constructing this measure. Other information in the reports allows us to relate county-level nutrition to factors in the local economy. In particular we find nutrition was positively related to the availability of common land in the area and to women's remunerated work if conducted from home. Lack of common land and little local supply of dairy products also pushed households into buying white wheaten bread rather than baking their own wholemeal loaf. Replicating some of this analysis with household-level data confirms these results. Diet also maps onto stature: male convicts to Australia were significantly taller if they originated in a county with a more nutritious diet. This verifies the important impact of nutrition on stature and demonstrates the sensitivity of height as a measure of key aspects of welfare.*

Introduction

Sir Frederic Morton Eden's detailed study published as *The state of the poor* in 1795 highlighted regional differences in diet amongst the working class and extolled the virtues for domestic economy of the northern diet of oatmeal bread and 'hasty pudding' compared with the expensive fare of wheaten bread commonly eaten in the south.² These observations have been used, amongst other things, to construct typical consumption bundles in north and south for the creation of cost-of-living indices, and to compute the calorific content of the typical labourer's diet for comparisons with workhouse dietaries and over time.³ This latter analysis has demonstrated the superior nutritional content of

1 We would like to thank participants at the Local Population Studies Annual Conference in April 2010 where an earlier version of this article was presented, Bernard Harris and Ian Gazeley for their helpful comments and the Australian Research Council for funding the collection of the convict data through grant numbers F79700658, A79702683 and DP0211257.

2 F.M. Eden (Sir), *The state of the poor. A history of the labouring classes of England. Volumes I-III* (1797).

3 N.F.R. Crafts, 'English workers' real wages during the Industrial Revolution: some remaining problems', *Journal of Economic History*, 45 (1985), 139-44; P. Lindert and J.G. Williamson, 'English workers' living standards during the Industrial Revolution: a new look', *Economic History Review*, 36 (1983), 125; C. Shammass, 'The eighteenth century English diet and economic change', *Explorations in Economic History*, 21 (1984), 254-69.

the northern diet, which was some 23 per cent higher in calories than that of the south.⁴ Here we revisit the information provided by Eden to obtain a more detailed regional breakdown of the differences in diet across the nation, explore the nutritional value of these diets, examine the determinants of the diet chosen and see if the different nutrition afforded can be observed in output measures, such as height.

In his three volumes on *The state of the poor*, Eden provided a detailed account of the history of the labouring classes from the Norman Conquest to the present, and collected and presented information on 156 parishes in 42 counties around England and Wales on local agriculture and manufacturing opportunities, wages paid, prices paid for provisions and workhouse financing and dietaries. He used this information to make detailed observations on the domestic economy of the labouring classes with respect to diet, dress, fuel and habitation as well as a commentary on schemes for relief of the poor, the most effective administration of workhouses and the state of Friendly Societies. In addition he collected 42 household budgets detailing the income and expenditure of working families and furnished information on a further 66 rural labourers' households in an appendix. Here, first, the parish level information and, second, the household budgets are utilised to explore regional diet and nutrition.

The 156 parishes represented not only most counties but also a variety of locations from rural hamlets to market towns, such as Leighton Buzzard, Chesterfield, Kettering, Norwich, Lichfield, Kendal and Buckingham, larger urban areas such as Chester, Carlisle, Derby, Newcastle, Nottingham, Manchester, Birmingham, Halifax, Leeds, Wolverhampton and Preston, and ports, such as Portsmouth, Liverpool, Bristol, Hull and Southampton. The metropolis is under-represented but otherwise the survey captures examples of conditions throughout the country. For each of the parishes we extracted information on whether the parish was urban or rural; the type of agriculture, if any; size of farms, crops grown, and rent; availability of common land; manufacturing employments available; work of women and children; typical wages paid; the price of provisions, ranging from bread and grains through dairy and meat to potatoes and coals; any detail on labourers' diets; and information on the number of poor and workhouse dietaries. Not all parishes provided full information so the data collected was collated to provide a picture of the position in each county, noting whether the information had come from rural and/or urban parishes or ports within the county.

Eden declaimed the typical diet of the poor in the south of the country, citing it as costly, particularly with the tremendously high wheat prices evident at the time he was writing, and extolling the virtues of the cheaper 'hasty pudding' eaten in the north. His focus was

4 This is calculated from information in the household budgets of both Eden, *State of the poor*, and D. Davies, *The case of labourers in husbandry* (London, 1795). The calorific content was 2,823 in the north and 2,109 in the south.

more on cost than nutrition, but nutrition was often better too. His view was that the worker demonstrated poor, 'injudicious and wasteful' domestic economy, wages did not afford the essentials because 'either through ignorance, custom, or prejudice, he [the worker] adheres to ancient improvident systems in dress, in diet, and in other branches of private expenditure'.⁵ His remit was to show how expenditure could be reduced and thus make wages sufficient 'by suggesting and explaining the mode of preparing cheap and agreeable substitutes for those articles of diet, which, in times of scarcity and distress, exhaust so much of the daily earnings of a working man'.⁶ He noted the differences in diet in north and south and criticised the southerner for his almost exclusive reliance on bread and cheese, the drinking of tea and, when meat could be afforded, the wastefulness of roasting it rather than boiling it and turning it into a soup. In the north there was more variety of diet and he detailed the particulars of making some items. *Hasty-pudding* headed the list. Hasty pudding was a form of porridge made of oatmeal boiled for a few minutes with water and salt. It was eaten with either a little milk and beer poured on or a little butter or treacle put in the middle. 'This dish is extremely nutritious, and is much liked by those who have been accustomed to it'.⁷ *Crowdie* was eaten by northern miners and was similar to hasty pudding but could be made by using boiling broth stirred into the oatmeal rather than water and using the fat from the broth rather than butter to melt in the centre. *Frumenty*, or barley milk, was dehusked barley boiled for two hours with water and then eaten mixed with skimmed milk. It was generally eaten in Cumberland with barley bread.⁸ *Flummery*, occasionally eaten in the north of England, used the husks left after milling oats for oatmeal. These *seeds* were soaked in water for three days then strained, and the process repeated three times, in order to extract all the mealy particles. The water was left to stand for six or more hours, the sediment then boiled for an hour with continuous stirring and the resulting 'bla-mange' eaten with milk. It was 'an extremely cheap, wholesome, and even delicious food for supper'.⁹ *Pease-kail* constituted peas boiled until they were soft and then eaten with milk after straining.

Eden also noted the more frequent use of potatoes in the north of England and the variety of ways in which they might be cooked: roasted or boiled and eaten with butter (as in the south) or boiled with a small quantity of meat cut into very small pieces and then made into a hash with pepper, salt and onions (*lobscouse*). However, Eden notes that one of the constraints on using potatoes throughout the year for most labourers was the inability to store them adequately. It could be done where the soil was light and sandy, as in Cumberland, when a sort of clamp was formed, but, otherwise, even where storage was

5 Eden, *State of the poor*, 491.

6 Eden, *State of the poor*, 492.

7 Eden, *State of the poor*, 497–8.

8 Eden, *State of the poor*, 499.

9 Eden, *State of the poor*, 500.

possible, stores tended to have been exhausted by March.¹⁰ Even so, the use of the potato as a staple food was spreading throughout the country at this time.

On bread, he noted the different types used in the north: barley bread or barley cake was baked (in ovens heated with heath, furze or brushwood) in Cumberland and was deemed highly nutritious as well as having the advantage of keeping for up to five weeks.¹¹ Oaten bread or oatcakes (oats mixed with water and rolled out thinly and sometimes cooked on a griddle or *girdle*) of various types were also consumed in the Border counties. In Scotland, *bannocks* utilised oatmeal, barley meal and sometimes pease meal and were cooked on a griddle or toasted. In Nottinghamshire bread made from a mixture of wheat, barley and rye was in common usage. Although custom and prejudice might lie behind regional preferences for different types of bread, Eden argued that the custom of eating wheaten bread had not been so long established. In 1626 barley bread was the usual food of ordinary people, with wheaten bread being 'gradually introduced among the labouring classes ... since the commencement of the present century'.¹² In Gregory King's time only 14/79 of crop production was wheat, and in 1764 only around half the population were eating wheaten bread.¹³ Eden also noted the use of savoury soups in the north, such as those made from barley, oatmeal, meat, onions and herbs observed in Cumberland and Northumberland and gave much space to describing the rather unappetising soup recommended by Count Rumford.¹⁴ Boiled milk—one handful of oatmeal boiled in three pints of milk—was another very common dish.

Regional differences in diet

The observations from the 156 parishes enable us to construct a typical county diet. For instance, in Cumwhitton, Cumberland, the usual food of labourers was hasty pudding and milk for breakfast, potatoes with butter and bacon or sometimes milk and barley bread for dinner, with boiled butcher's meat and flour pudding on Sunday, and milk and oatmeal with barley bread for supper; in South Tawton, Devon, milk and potatoes, barley or wheaten bread, and occasionally a little bacon was the normal fare; and in Ashford, Kent tea, finest wheaten bread, potatoes and cheese constituted the usual diet. The information confirms that across the country there was large variability in diet, from the best wheaten bread almost exclusively relied upon in Middlesex, Berkshire, Kent, Surrey and Sussex to the wholesome barley bread, oatmeal made into hasty pudding, crowdie, and porridge, milk, butter, potatoes and occasional meat observed in Cumberland. But the divide was not specifically between north and south. It is true that in Berkshire it was

10 Eden, *State of the poor*, 504.

11 Eden, *State of the poor*, 510.

12 Eden, *State of the poor*, 562.

13 Eden, *State of the poor*, 561–4.

14 Eden, *State of the poor*, 527–31.

commented that ‘best wheaten bread was used by every description of people’¹⁵ and, in Kent, it was noted that people bought the finest wheaten bread and no longer consumed brown bread as, it was claimed, it ‘disorders the bowels’.¹⁶ But in other southern counties normal wheaten bread was used and in Devon and Cornwall the use of barley was frequently observed. The Midlands counties also showed some variation. Although wheaten bread was often the mainstay of the diet, there was more home baking (commented on in Herefordshire, Shropshire and Staffordshire), gleaning provided an important source of wheat (Northamptonshire) and oatbread and pottage were consumed alongside brown bread (Derbyshire). Potatoes were eaten in many, but not all, of these counties. It was specifically mentioned that none were consumed in Oxfordshire or Warwickshire. Indeed, in Gloucestershire it was found that ‘bread and water [constitute] almost the only diet of labourers’ wives and children’ and that there was ‘little milk to be had’.¹⁷ In Oxfordshire milk was also scarce and people here were prevented from consuming a diet that required cooking at home by the high price of fuel, thus compelling the labourer to buy his bread at the baker’s. Varied grains and potatoes were used in Lincolnshire. In Shropshire, as in some other areas, there was recognition that a change in diet was needed in order to make ends meet and parish-provided subsidies in the face of the high grain prices pertaining at the time were noted. Here the poor were able to buy flour at 2d. per pound weight and the prices of meat and potatoes had been fixed in an attempt to get the poor to substitute away from dear grain and into these other commodities. But, in the north, Eden observed a converse trend occurring. In North Yorkshire, the key components of the traditional diet had been oatmeal bread, flour, butter, potatoes and milk but recently there had been a substitution of tea, sugar, *wheaten* bread and butter. This left Lancashire, Westmorland, Cumberland and Northumberland consuming the oatmeal, barley, potato and dairy diet so favoured by Eden.¹⁸

Nutritional value of diet consumed

The nutritional value attached to the various diets identified has been constructed from current day information on bread types, potatoes and essential nutrients. It is clear that at the time there was a preference for refined white bread—because of taste, ease of digestion, social cachet and perhaps among bakers whose eye for profit governed supply. However, whole wheat bread is nutritionally preferable to white bread. White bread

15 Eden, *State of the poor*, 19.

16 Eden, *State of the poor*, 280.

17 Eden, *State of the poor*, 567.

18 Davies, *Case of labourers* provides information on household expenditure for labouring families across Britain in 1787–90. The information on diet and fuelling provided by this source was checked against those diets just mentioned for the 17 counties in both datasets. Although there was some variation by parish within each county, these checks confirmed the classification of diet adopted from the Eden information and suggest that diet was not changing rapidly in the closing years of the eighteenth century.

resulted from an improved milling and rolling process (commonplace from 1870s onwards) that removed the germ and bran from the wheat when making flour (largely eaten by the aristocracy in the 1800s, hence it became known as ‘refined’). This also removed several key nutrients, particularly B vitamins, and the fibre needed for digestive health. Whole wheat flour contains all the original nutrients and much of the fibre.¹⁹ Whole wheat bread contains one third more protein than white bread, four times more fibre and zinc and more folic acid, iron and chromium.²⁰ Rye, barley and oats also have good nutritional properties. Constructing a ranking based on the following nutrients—protein, fibre, iron, zinc, folic acid, vitamin E, riboflavin, niacin, thiamine and calcium (one point each)—puts rye just ahead of oats (although oats contain more protein than rye), both ahead of barley, with whole wheat coming last. Grains are complex carbohydrates and a rich source of protein. They constitute the main source of energy and nutrients for growth and repair for most people around the world and throughout time. However, they do not provide sufficient protein intake on their own as they lack one or more essential amino acid, usually lysine. Lysine is essential for calcium absorption, muscle protein building and the body’s production of hormones, enzymes and antibodies. There is little in cereal grains but it is found in pulses, red meats, eggs and cheese.²¹ Grains need to be mixed with dairy products, legumes or other protein sources to make up for their amino acid deficiency. Rye has twice the lysine of whole wheat.²² Potatoes are also very high in nutrients, as they contain vitamins and minerals, fibre if their skins are eaten, and no cholesterol. They have vitamin C which aids the growth of bones and development of a healthy immune system, vitamin B for the nervous system and heart, vitamin B6 which aids metabolism and the use of fats and proteins, folic acid, potassium, magnesium, copper and zinc—minerals which help the body to maintain a healthy nervous system, repair damaged tissue, reach sexual maturity, aid muscle function, avoid anaemia and aid growth spurts.²³

On the basis of this information a nutritional value is ascribed to the diet found in each county in Eden’s time according to the following points system:

Bread type:	
Rye	5
Oats	5
Barley	3.5
Whole wheat	3
White (best wheaten)	1

19 <http://www.recipetips.com/kitchen-tips/t-1102/bread-nutritional-facts> [January 2010].

20 <http://www.askdrsears.com/html/4/T042700.asp>. [January 2010].

21 <http://www.wikipedia.org/lysine> [January 2010].

22 *Sunday Times*, Style magazine, 43, 24 January 2010.

23 <http://www.lovepotatoes.co.uk/potato-nutrition> [January 2010].

Milk/ butter (provides lysine):	
None	0
Little	0.5
Some	1
Use	2—where explicitly mention use of
Potatoes:	
None	0
Few/ some	1
Used a lot	2

Of some concern is the omission of meat and cheese from these accounts. In fact, only three areas make any mention of the consumption of cheese: Gloucestershire, Kent and South Wales. In each of these butter is also consumed so the inclusion of cheese would have little effect on the score. Meat is also mentioned as part of the diet in very few counties: Devon, Cornwall, Lancashire, Northumberland, Westmorland and West Yorkshire. The four northern counties are already the highest scoring areas on the nutrition score so incorporating meat into the score would only stretch out the scale here, although it might move Devon and Cornwall a little further up the ranking. However, it is uncertain whether meat was a net addition to nutrition or whether it substituted for other items of consumption. Indeed, switches in foodstuffs cannot be straightforwardly linked to changes in nutritional value due to the complex composition of most foods.²⁴ We examine the calorific and protein content of the diets using the household budgets provided by Eden later in this paper.

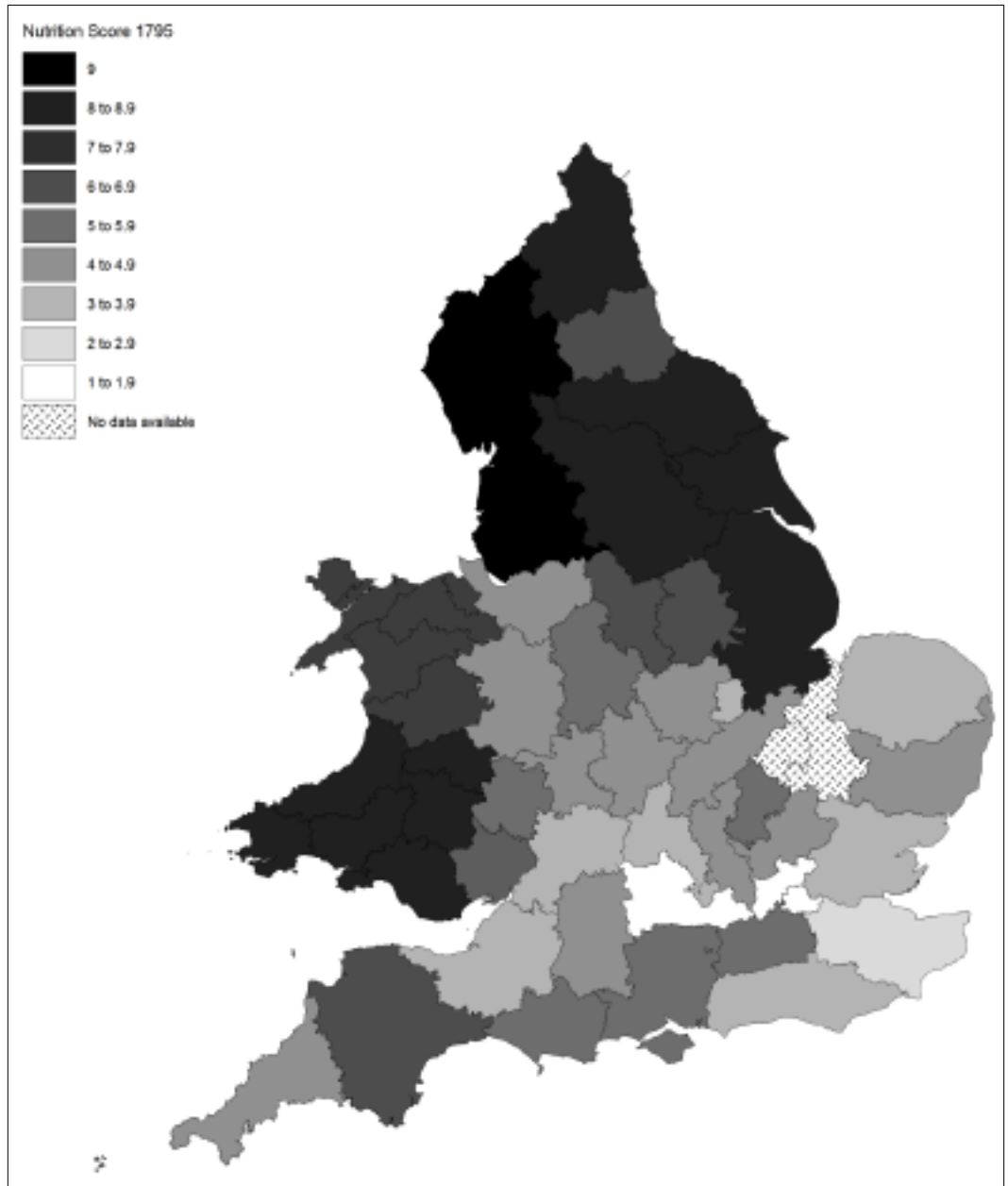
Of course, the nutritional value ascribed from the scores above is somewhat arbitrary and should be taken as a ranking rather than a clear indication of nutritional content. The results range from 1 in Middlesex (where only best wheaten bread is mentioned in Eden's account) to 9 in Cumberland and Lancashire. Map 1 illustrates this geographical distribution of nutrition.

What caused the differences in diet? County level data

On explaining the differences in diet, Eden observed that 'the cheapness of fuel is, perhaps, another reason why the culinary preparations of the Northern peasant are so much diversified, and his table so often supplied with hot dishes' but mainly attributed the regional differences to 'the prejudices [of the southern labouring classes] against these sorts of food ... It is generally supposed ... that these kinds of (apparently coarse) food are neither so wholesome, nor so nutritious, as the wheaten-bread It is not a very

²⁴ T.D. Logan, 'Food, nutrition, and substitution in the late nineteenth century', *Explorations in Economic History*, 43 (2006), 527–45.

Map 1 Geographical distribution of nutrition by county from Eden's parish reports, 1795



Source: County nutrition level computed from Eden's *State of the poor*, parish reports, see text. This work is based on data provided through EDINA UKBORDERS with the support of the ESRC and JISC and uses boundary material which is copyright of the Great Britain Historic GIS Project, Portsmouth University.

uncommon opinion in Kent and Sussex, that even brown wheaten-bread is purgative and relaxing'.²⁵ However, he does return to the cost of fuel later. 'It must be confessed, that the difficulty of introducing any species of food, which requires much culinary preparation, into the South of England, arises, in a great measure, from the scarcity and high price of fuel. It is owing to this cause that even the labourer's dinner, of hot meat on a Sunday, is generally dressed at the baker's; and that his meals during the rest of the week consist almost wholly of bread purchased from the same quarter'.²⁶ This should, perhaps, act as a pointer to the currently under-regarded role played by the baker in shaping diet in the south. In the north, the varied diet observed in Lincolnshire was attributed to the availability of turfs for fuelling at low cost and, in Durham, it was noted that potatoes were frequently used as fuel was cheap. Nonetheless, Eden was critical of southern practices. He considered that the fuel used to brew tea twice a day might be better used to make a potato soup. Improved chimneys and cooking pots would also have aided fuel economy.

It is noteworthy that many of the northern recipes required considerable use of milk and Eden mentioned that could not be the case in the south 'until the practice of keeping cows becomes more general among cottagers than it is at present'.²⁷ He commented on the high value of grassland close to towns which commanded rents prohibitive to the cottager and the cost of feeding an animal on straw, turnips, cabbages or hay in arable counties as being factors that prevented the keeping of livestock. Additionally, what milk supplies there were, were more often used to fatten livestock. In Gloucestershire, the shortage of milk was attributed to its use to feed veal calves and, in Oxford, to its use to feed commercially-reared pigs. Conversely, in Durham many miners kept a cow so allowing the household plenty of milk. However, he remained 'persuaded, that, even in London, where milk is extremely dear ... poor householders might occasionally use it to considerable advantage'.²⁸

On soups and broths, he proclaimed the southerner particularly adverse, claiming that 'this is washy stuff, that affords no nourishment: we will not be fed on meal, and chopped potatoes, like hogs!'²⁹ Even employers felt soups inferior to bread and thus rendered their labourers unable to perform their work because 'it will not stick to their ribs, like plain dry wheaten bread'.³⁰ But, Eden observed, southerners were not totally adverse to a largely liquid diet, drinking, as they did, copious amounts of tea. Beer drinking on a daily basis was also more common in the south and the Midlands.³¹

25 Eden, *State of the poor*, 525–6.

26 Eden, *State of the poor*, 547–8.

27 Eden, *State of the poor*, 531.

28 Eden, *State of the poor*, 532.

29 Eden, *State of the poor*, 533.

30 Eden, *State of the poor*, 533.

31 Eden gave a reason for the increased consumption of tea found in Sussex. It was noted that here, as elsewhere, few brewed beer as the rising price of malt had led to a decline in brewing and the drinking of tea instead.

The foregoing observations underline the importance of availability and cost of fuel and milk in determining diet. They also point up the availability of commons, which influenced the ability of the cottager to keep his own livestock, particularly a cow, and to collect firing; the type of agriculture in the region, pastoral agriculture sometimes favoured the nutrition of livestock over people and reduced opportunities for gleaning whereas arable made it more difficult for the labourer to access livestock products; and women's time use, as some meals required lengthy preparation and, where women were working, particularly away from the home, time constraints would reduce the amount of home baking and cooking undertaken.

We use the county-level data collated from the parish information to test the extent to which these factors influence nutrition and choice of diet.³² These regressions are ecological, they do not indicate how individuals made their choices about what to eat: instead they describe the influence of the environment in which households are operating, the socio-economic nexus in which decisions are made. In her analysis of the Eden budgets, Shamma points out that dietary choices in this era seem to have been as much affected by macro-level changes in production as by micro-level household decisions and it is these macro factors that these regressions will help to identify.³³

Of these hypothesised influences only whether women work from home and the extent of common land available have a significant positive impact on county level nutrition, being in a largely arable county detracts from it (Table 1).³⁴ As already noted common resources are an important adjunct to a good diet in this period. Indeed they have been shown to be crucial in defending the agricultural labourers' households' standard of living.³⁵ Cow keeping and fuel collecting were the key stones of this domestic economy, but pig and geese raising and general foraging activities also furnished important resources. The enclosure of the commons has been posited as a significant factor behind the declining nutritional status, and therefore heights, observed in southern counties in the late-eighteenth

32 Common land was classified on a scale of 0–4 with 4 representing a lot of mountainous common. Wood and coal use was classified on a 0–2 scale, ranging from none mentioned to a lot available/used. Rural, urban, market town dummies reflect the composition of the parishes providing information in the county. Dummy variables were also included for urban areas and ports but never proved to be significant. Work for women represents the availability of work in the area and ranges from none to a lot and dummy variables capture whether the typical work for women was in agriculture, in factories or manufacturing outwork in the home.

33 Shamma, 'Eighteenth-century English diet'. The regressions are estimated using OLS; this methodology assumes that the errors between observations are uncorrelated. Standard tests are developed for time series data where a specific relationship over time might be hypothesised. It is difficult to specify in advance how errors might be correlated across counties.

34 If the price of coal is also included in the regression the sample is reduced to only 20 and yields fewer significant influences on diet. The availability of milk and potatoes is excluded from these regressions as this is already incorporated into the nutrition variable.

35 J. Humphries, 'Enclosure, common rights and women: the proletarianization of families in the late eighteenth and early nineteenth centuries', *Journal of Economic History*, 50 (1990), 17–42.

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Table 1 Regression analysis of choice of diet, county data

Dependent:	Nutrition level	Wheaten bread	Loaf
Regression	OLS	Probit	Probit
Constant	3.727 (0.92)*	-0.880 (2.07)	0.565 (0.88)
Rural			-0.335 (0.66)
Urban	0.800 (0.74)	2.816 (1.55)*	-0.505 (0.88)
Market		4.378 (1.57)*	1.025 (0.57)*
Arable	-0.801 (0.36)*	4.033 (1.29)*	0.385 (0.26)
Pasture	0.222 (0.33)	-0.204 (0.56)	0.203 (0.22)
Manufacturing		-4.081 (1.48)*	-0.620 (0.76)
Commons	1.486 (0.41)*	-1.506 (0.49)*	-0.121 (0.34)
Work for women	-0.397 (0.25)	2.086 (0.56)*	0.383 (0.22)*
Women work home	1.456 (0.68)*	-3.888 (1.24)*	-1.06 (0.50)*
Milk available		-1.337 (0.62)*	-0.351 (0.26)
Potatoes used		1.094 (1.60)	-0.418 (0.57)
Wood used	-1.221 (1.08)	4.056 (1.50)*	0.117 (0.80)
Coal used	0.516 (0.62)	2.150 (0.74)*	0.005 (0.45)
Sample	42	42	42
Adjusted R ²	0.238	0.71	0.32
F	2.599*		
Wald chi ²		60.32*	18.46

Source: Dataset compiled from Eden's *State of the poor*, parish reports, see text.

Notes: Standard errors (robust s.e. for probit) in parentheses, * indicates significant at 10% or higher.

century.³⁶ Women's time use also emerges as important in determining diet. While increased availability of work for women has a marginal negative effect on nutrition this was primarily for those that worked away from the home, whereas those that could combine paid work with domestic labour seem able to make the most of the food resources available to them.³⁷ Supporting evidence for such a relationship has been found

³⁶ F. Cinnirella, 'Optimists or pessimists? A reconsideration of nutritional status in Britain, 1740-1865', *European Review of Economic History*, 12 (2008), 325-54.

³⁷ In some specifications the increased availability of women's work has a marginally significant negative effect.

from mortality and heights data. Female mortality in the mid-nineteenth century exhibited a U-shaped curve, being high where women had no work or toiled arduously in, for instance, factory employment. The mortality experience was improved where women had work in cottage industries and trades.³⁸ The decline of cottage industry has also been alluded to as fuelling the decline in nutritional status in late-eighteenth century England with the inferred causation being the reduction in household income occasioned by women's loss of employment.³⁹ The results here suggest that it may also be caused by a move to other forms of work whose time and location demands are less compatible with household maintenance. As Eden suggested, being in an arable county has a negative effect on diet, presumably through the increased cost of keeping livestock and the reduced availability of meat and dairy products in the region. Being in a predominantly urban area had no independent effect on nutrition. It has been observed elsewhere that the urban diet was very similar to the rural one throughout the early years of the nineteenth century. Both comprised bread, potatoes, bacon, cheese and butter; although access to perishable foods was limited by lack of transport.⁴⁰ But change was occurring, by the middle of the nineteenth century a distinctive urban diet was clearly evident. It was occasioned by more retailed food being available, smaller living spaces curtailing room for complex cooking procedures and many women working. This led to a reliance on store-bought and ready-cooked bread, potatoes, bacon and tea.⁴¹ Contrary to expectations the availability and type of fuel in the region did not emerge as a significant determinant of diet, however the impact of wood availability may already have been captured in the common land variable.

We also investigate what determined whether households used wheaten bread (64 per cent of the sample of counties used wheaten bread as the staple of their diet) rather than other grains and whether they bought a loaf of bread or baked at home.⁴² Cross-tabulations of proportions in towns, arable, with commons, and so on for each type of bread eaten (wheaten/non-wheaten) reveal only four factors that vary significantly (Table 2). Wheaten bread was more likely to be eaten where commons were less available, where there was more arable agriculture, where milk was less available and where potatoes were not available. This is consistent with the earlier observations. Lack of commons could imply less fuel for home baking and less opportunity for dairy production, and arable

38 J. Humphries, 'Bread and a pennyworth of treacle: excess female mortality in England in the 1840s', *Cambridge Journal of Economics*, 15 (1991), 451–73; K. McNay, J. Humphries and S. Klasen, 'Excess female mortality in nineteenth century England and Wales: a regional analysis', *Social Science History*, 29 (2005), 649–81.

39 Cinnirella, 'Optimists or pessimists?'

40 J. Burnett, *Plenty and want: A social history of food in England from 1815 to the present day* (London, 1989, 3rd edn.)

41 Burnett, *Plenty and want*, 42.

42 Wheaten bread is defined as best wheaten bread, a loaf of bread or when wheat flour is being used. Mixed grains, barley, wheat and rye, and oatmeal constitute the non-wheaten category. In some cases more than one type of bread was consumed within the county and a second variable for exclusively wheaten bread was computed. 57 per cent of the sample of counties ate only wheaten bread.

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Table 2 Determinants of consumption of wheaten bread, county level data

% within bread category	Wheaten	Other grains	Pearson chi-squared
Market town	59	40	1.43
Urban	26	27	0.00
Rural	78	67	0.62
Commons:			
None	19	27	7.86*
Some/little	74	40	
Lot	7	13	
Lot/mountainous	0	20	
Work for women:			
None	15	27	4.86
Little	26	40	
Some	22	0	
Work	26	27	
Lots	11	7	
Women in agriculture	33	20	0.84
Women work at home	59	73	0.83
Women work in manufacturing	15	13	0.02
Arable:			
None	19	53	5.70*
Little/some	26	20	
Yes	56	27	
Pasture:			
None	37	27	1.45
Little/some	15	7	
Yes	48	67	
Milk available:			
None	15	20	6.44*
Little	33	0	
Some	15	20	
Yes	37	60	
Butter/ cheese available	89	93	0.22
Potatoes	67	93	3.78*
Wood used	11	7	0.22
Coal used	56	40	0.93

Source: Dataset compiled from Eden's *State of the poor*, parish reports, see text.

agriculture may imply greater wheat availability in the area as well as less dairy available. Furthermore wheaten bread has been considered more palatable without dairy than other types of bread and the significance of milk availability supports this. 'White bread was more palatable and easily digestible than the coarser household bread and, when necessary, could be eaten without meat, cheese or even butter: in this case, tea became even more important because it converted a cold meal into the semblance of a hot one'.⁴³ Shammass agrees: where there is less dairy available, wheaten bread is preferred to wholemeal as it is tastier with water. Certainly probate inventory evidence finds that the

⁴³ Burnett, *Plenty and want*, 5.

ability of labourers to produce their own dairy products diminished over the seventeenth century.⁴⁴ Choice of bread does not, at first glance, appear to be related either to women's work or the type of fuel used. However, regression analysis reveals all factors to be important (Table 1).⁴⁵ Consumption of wheaten bread was more likely in towns, in arable areas, and where there was work for women. It was less likely where there were commons, where there was manufacturing industry in the area, where women worked from home and where milk was available. It was also more likely to be consumed where either wood or coal were in plentiful supply.⁴⁶ This is consistent with the earlier discussion. Women's domestic time would have been constrained by work in agriculture or manufactures outside the home, baking could be combined with home-based paid work. Much of the manufacturing observed by Eden is domestic outwork, hence the observed negative effect of manufacturing on the consumption of wheaten bread. However, it was more likely to have been eaten in towns. Townspeople were found to have taken up the new diet of wheat bread and to have dropped producing their own 'household' bread by 1815.⁴⁷

When considering the determinants of the store-bought loaf we take those cases where best wheaten bread and loaves were stated as being bought; purchase of flour or other grains were assumed to be home baked. Here the only significant determinants were being in a market town, presumably reflecting a greater number of bakers from which to buy, and where there was more work availability for women, again offset by more home baking by those women who worked from home. This again gives clear evidence of the competing uses for women's time in dietary choice and mode of production.⁴⁸

44 Shammass, 'Eighteenth-century English diet', 259.

45 Probit regressions are used reflecting the binary nature of the dependent variable and robust standard errors calculated.

46 Using 'exclusively consumes wheaten bread' as the dependent variable yields very similar results although the significance of being in an urban area and milk availability are lost. Alternative specifications include the price of milk and the price of coal. Including the price of milk reduces the sample to 39 cases and reduces the significance of being in an urban area or market town (possibly high prices of milk capture high costs of distribution to towns and scarcity there) and of availability of common land. There is a significant, positive effect of milk price on the consumption of wheaten bread, again reflecting the substitution between wheat bread and milk. Including the price of coal reduces the sample to only 21 cases and coal price itself is not significant. However, the earlier findings of a positive effect of being in an urban area or market town on consumption of wheaten bread and negative effect of women working from home and the availability of milk still hold.

47 Burnett, *Plenty and want*.

48 Higher consumption of starch and farinose products where women are working has been identified from a late C18th-mid-C19th household data set, S. Horrell, 'Home demand and British industrialization', *Journal of Economic History*, 56 (1996), 561-604. The extra expenditure in this area was compensated by smaller purchases of meat and fish. However, that dataset did not enable the correlates of bread baking and store purchases to be identified thus leaving the effect of women's time constraints on household production methods a matter of conjecture. The data presented here lends support to the argument that higher expenditures were, in part, occasioned by the purchase of bread due to time constraints. The availability and price of coal were not significant determinants. This is contrary to observations that, where fuel was more available, home baking persisted in the early 1800s, Burnett, *Plenty and want*.

What caused the differences in diet? Household level data

The preceding analysis is conducted at county level. The availability of a number of household accounts allow us to check whether similar determinants are affecting consumption choices at the micro-level of the household. Eden provides 42 household accounts detailing income and expenditure within the parish information and a further 61 in an appendix.⁴⁹ Of these latter, 27 are added to the initial ones to create a dataset of 69 households.⁵⁰ The appendix accounts are not as detailed as the others and only where it is possible to discern the type of bread used and whether it was home baked were they included. The budgets cover a range of male occupations: tradesmen, artisans and agricultural and general labourers⁵¹; and provide information across 27 counties.⁵² The type of information related in the budgets was the sex and age composition of the household, occupations and earnings of each household member and other sources of income, such as poor relief. On the expenditure side Eden provided details of spending on key items of consumption: bread, flour, oatmeal, tea, sugar, beer, dairy products, meat, potatoes and sundries: as well as rent, fuelling, clothing, soap, candles, schooling and work expenses, such as thread. In addition he recorded where families obtained items through self-provisioning, such as keeping a cow or collecting firewood, and where the employer or parish provided items. Thus we have a detailed picture of the circumstances of a varied, if small, selection of households. For each household a nutrition variable was calculated based on the type of grain consumed and the availability of milk and potatoes.⁵³ This ranged between 2 and 7.25 and showed a small tendency to cluster around the middling values of 4 and 5.5. Dummy variables representing the use of coal, wood for fuel and milk and whether each was free (from employer, collected or self-provisioned), whether the woman worked and whether the man worked in agriculture were included in the analysis.⁵⁴ The availability of common land in the county, as collected from the parish-level information, was also incorporated.

49 Eden, *State of the poor*, appendix XII, pp.cccxxxix–cccl.

50 In parts of the analysis some households had to be omitted. One of the original set had insufficient information on the household to be useful and we had no county level data for the households in Huntingdonshire.

51 A range of occupations was represented. Although all the households in the appendix budgets were headed by agricultural labourers the households in the main text were headed by miners, textile workers, a tailor, ostler, vestry clerk, spectacle framer, cooper, carter, mason, gardener, and dockyard worker as well as some labourers.

52 It is possible that the selection of these appendix budgets biases the whole sample towards those households who do not eat wheaten bread as the use of alternative grains was more likely to be commented upon. However, comparisons of the two sources reveal less flour and more other grains purchased by the original 42 households. The use of milk and potatoes did not differ noticeably between the two samples.

53 $\text{Nutrition} = ((\text{wheat flour} / \text{bread} * 2) + (\text{barley} * 3.5) + (\text{oats} * 5) + (\text{wheat and rye} * 4) / (\text{no. grains stated})) + 1 \text{ if milk bought} / 2 \text{ if self-provision milk} + 1 \text{ if potatoes bought} / 2 \text{ if grow own potatoes}$

54 Variables for being located in a market town or urban area and representing the year in which the account was collected were also included but were never significant.

Table 3 Regression analysis of choice of diet, household level data

Dependent:	Nutrition level for household	Non-wheaten bread used	Adult equivalent calories per day	Adult equivalent protein per day
Regression method	OLS	Probit	OLS	OLS
Constant	4.229 (0.67)*	-1.487 (0.76)*	1593.56 (325.67)*	161.13 (29.76)*
Household income per capita	-0.190 (0.07)*	-0.090 (0.63)	115.83 (31.02)*	7.73 (2.83)*
Woman works	0.757 (0.37)*	1.113 (0.57)*	7.38 (178.84)	-2.22 (16.96)
Man works in agriculture	-0.712 (0.38)*	-0.846 (0.52)*	-101.24 (175.45)	-17.17 (16.41)
Commons in county	0.279 (0.16)*	0.758 (0.20)*	-50.88 (84.89)	-15.02 (7.76)*
Coal used by household	1.295 (0.37)*		-232.97 (177.92)	-3.37 (16.23)
Wood used by household	0.667 (0.27)*	0.344 (0.30)	-65.10 (136.34)	-5.37 (12.51)
Milk used by household		0.647 (0.33)*		
Year 1796			647.59 (203.76)*	59.86 (18.73)*
Adjusted R ²	0.332	0.346	0.304	0.293
F	6.21*		4.30*	4.08*
Wald chi ²		30.88*		
Sample size	64	65	54	53

Source: Dataset compiled from Eden's *State of the poor*, household accounts, see text.

Note: *indicates significance at 10% level or higher.

As previously, the woman working, more use of wood and coal and availability of common land all improved the household's level of nutrition (Table 3). Nearly 80 per cent of these women worked and their contribution was obviously important to the household's welfare. Furthermore the type of work undertaken generally did not have deleterious effects of being away from home. The vast majority worked in textiles, mainly spinning but a few were involved in winding, weaving and lace making, and others baked bread or took in washing. Only a handful were employed outside the home, usually in seasonal agricultural work such as harvesting.⁵⁵ Increased household income per capita detracted from household nutrition as calculated here. This negative effect is surprising, but it may indicate other consumption choices being made. Purchases of meat and cheese have not been included in the nutritional standard, nor tea and sugar. It may be that households switched expenditure to these items as income increased and, with the former goods at least, nutrition would have been enhanced. Correlations of the amount spent by each household on meat and bacon and cheese with household income per capita revealed

55 The exception to this was one miner's wife who washed ore.

a positive and significant correlation with meat products, but not with cheese.⁵⁶ This is investigated further when we consider the calorie and protein content of the diets below. Of the men who worked in agriculture, 86 per cent were in arable counties, thus the negative effect of work in agriculture on nutrition is presumed to capture the limited availability of livestock and dairy products.

Over one half, 57.4 per cent, of these households purchased grain other than wheat⁵⁷. The woman working (from home), common land availability and use of milk all increased the likelihood of the household using bread made of grains other than wheat. This is consistent with the county level results and the same explanations apply. The increased likelihood of the household consuming wheaten bread when the man worked in agriculture is again picking up the influence of wheat availability in arable areas. Thus, at the individual household level, we have evidence of the same motivations affecting choice of bread consumed as already identified at the ecological, county level.⁵⁸

We can use these household accounts to determine the nutritional value of the diets more explicitly. Using Shammas's valuations of calories per penny for various food items the calorific content of the diet can be established.⁵⁹ She also provides the price per pound or pint for these items, and combining this with the information on nitrogen (the main component of protein) by weight for a selection of foodstuffs allows a valuation to be given to the protein content of each diet.⁶⁰ Unfortunately, the resultant information suffers some shortcomings. Although Shammas provides the calorific content of both wheaten bread and oatmeal no distinction is drawn between 'best' wheaten bread and wholemeal, nor are there the calories per penny for barley, rye, peas and flour. In what follows the calorific content of wheaten bread per penny is applied to all the grain foodstuffs just mentioned, thus some of the key distinctions drawn between counties on the basis of the type of bread usually consumed, particularly barley bread, are lost here.⁶¹ There will be some understatement of the calorie consumption afforded by other grains: Smith's estimates of calories per pound weight are between 2,650 and 2,770 for peas, barley, flour and oatmeal, while bread is lower at 1,968: and this will be further exacerbated by price

56 Correlation of 0.304, significant at the 1% level for meat.

57 Only one household in Surrey was recorded as purchasing the best wheaten bread.

58 We also considered what might determine why the 27 households who purchased their bread did so. The range of variables used above to explain choice about type of bread consumed were incorporated in the regression but in no specification were any of the variables significant, thus offering no explanation of the choice to buy ready-baked bread at the household level.

59 Shammas, 'Eighteenth-century English diet', 258 n.4. The items are: wheaten bread, oatmeal, potatoes, meat, cheese, milk, butter, beer and sugar.

60 *P.P. XXV (1863) Reports to the Commissioners. Public Health Act.* (Dr Edward Smith).

61 All households in Cumberland and Durham consume barley bread as do one in Wiltshire and one in North Wales. Of the agricultural labourers' budgets provided in the appendix, two in each of Huntingdon and Norfolk consume barley bread and the single households in Northamptonshire, Norfolk and Oxfordshire as well as four in Somerset consume a mixture of wheat, barley, rye and pease bread. Thus 11 out of the 19 appendix households considered consume grains other than wheat.

differences to the extent that barley, particularly, is cheaper per pound than wheat.⁶² Additionally, in about half of the original 42 household accounts tea and sugar expenditure are reported as one item and no attempt has been made to estimate exactly how much will then be spent on sugar although where it had been separately listed or treacle is purchased the calories afforded have been included. In the appendix budgets tea, sugar and butter are typically given as a composite item and here a midway valuation of calories per penny for butter and for sugar are attributed to this expenditure. Protein valuations also suffer some inaccuracies. Again for grains other than oatmeal we have to use the value for wheat, although here the grains of nitrogen per pound are almost the same for barley and wheat, so inaccuracies arise only to the extent that price per pound differed. Additionally, there is no protein value given for butter so this is assumed to be the same per penny as milk.⁶³ Where items are self-provisioned a calorie and protein valuation has been attributed. Budgets for 1795 and 1796 only have been selected to mitigate the effect of changing prices over time,⁶⁴ but we are unable to make any adjustment for regional price variations, which may be considerable in this period. Thus, overall, there is considerable potential for measurement error in these calculations.

A perusal of the diets consumed in these households highlights more similarities than differences. More than four fifths of these households consume some bacon or meat, albeit often in very small quantities, and around two thirds consume some cheese. Grains were the mainstay of the diet and here some of the earlier regional differences are discernible. Oatmeal was purchased in the north and barley was consumed in the north and by agricultural labourers in the east. Consideration of three families of similar size and income illustrates. A labourer with four young children in Ealing, Middlesex on an income of £38.60 purchased bread, a little meat, tea and sugar and beer and benefited from having some milk and potatoes provided by his employer; an agricultural labourer's family in Kendal, Westmorland with a household income of £39.00 purchased flour, oatmeal, potatoes, meat, butter and milk, tea and beer, and a widow's family of eight in Wiltshire with a total income of £39.68 drank tea (with no sugar or milk), used barley flour to make bread and ate potatoes, butter and cheese. These diets also afford similar nutritional content: 1,893, 1,962 and 1,659 calories per adult equivalent per day and 139, 165 and 154 grains of nitrogen (protein) per adult equivalent per day.⁶⁵ Also worthy of mention is the consumption of the two households in Manchester, Lancashire. They achieved calorie consumption of 3,154 and 3,180 per adult equivalent and protein of 255 and 286 on a diet of bread (one oatmeal), tea and sugar, butter, milk, cheese, meat, potatoes and beer, thus confirming the high valuation given to nutrition in Lancashire in the county evaluations

62 *P.P. XXV (1863) Reports.*

63 In the appendix budgets the expenditure on tea, sugar and butter has not been included in the protein calculation as it is impossible to discern how much of this expenditure would have been on butter.

64 37 of the original budgets and 19 appendix ones are selected giving a total sample of 56.

65 Adult equivalents were calculated as: man 1, woman 0.8, child 3–14 0.5, child 0–2 0.25.

Hasty pudding versus tasty bread

Table 4 Average consumption of calories and protein by county compared with nutritional score

County	No. households	Average income per capita (£ p.a)	Calories peradult equivalent per day	Protein (grains nitrogen) per adult equivalent per day	Nutritional score for county diet
Bedfordshire	1	5.63	1,662	88	5.0
Berkshire	1	9.34	3,142	282	1.5
Cumberland	8	4.68	1,643	134	9.0
Durham	4	5.00	1,652	136	6.5
Gloucestershire	1	6.10	1,213	182	3.5
Huntingdonshire	2	3.59	1,236	86	–
Hertfordshire	2	6.08	2,242	227	4.0
Lancashire	2	13.81	3,167	271	9.0
Leicestershire	1	8.94	3,056	288	4.5
Middlesex	1	6.43	1,893	139	1.0
Monmouth	1	2.50	1,213	100	5.0
Norfolk	3	4.22	1,998	186	3.5
Northamptonshire	2	6.65	1,390	101	4.5
Oxfordshire	2	6.01	1,921	149	3.5
Shropshire	1	5.80	1,421	152	4.5
Somerset	5	5.84	2,486	182	3.5
Staffordshire	1	8.25	2,520	197	5.0
Suffolk	4	5.40	2,264	189	4.0
Surrey	1	4.75	1,821	151	5.0
Westmorland	7	6.26	2,702	234	9.0
Wiltshire	3	6.98	2,012	176	4.5
W. Yorkshire	1	3.59	1,631	116	8.0
N. Wales	1	4.30	1,520	127	6.0
Average by county		6.09	1,990	169	

Source: Dataset compiled from Eden's *State of the poor*, household accounts, see text.

and underlining the adequacy of diet in the early industrial towns. Indeed, these households achieved better nutrition than any others by county in our sample (Table 4).

Consideration of nutritional content of diet by county immediately reveals the influence of income on diet. Counties that achieved adequate consumption of calories and protein tended to be those where the households selected exhibited incomes considerably above the average and deficiencies were largely related to low incomes.⁶⁶ This often obscures the relationship with county-level nutrition as determined from the typical diet cited in the parish accounts, although we should recall that Cumberland and Durham, particularly, should show higher calorie scores through their use of barley bread and many of the households exhibiting low nutrition are located in the arable south and east of the country.

⁶⁶ Adequate calories were deemed to be 2,000 per day per adult equivalent and adequate protein 200 grains of nitrogen.

What then are the determinants of calorie and protein content of the diet? Using the same factors in regression as used to consider the nutritional score of household diet, reveals the overwhelming influence of income (Table 3). Higher income households could, and did, afford more nutrition for their members. This overrode any influence of occupation, location and women's work.⁶⁷ The increment in nutrition afforded in 1796 reflects not more consumed but more pennies having to be expended. Inflation for all goods was around 2.4 per cent between 1795 and 1796 and was higher for foodstuffs.⁶⁸ There were no other influences on calorie consumption but protein was, surprisingly, negatively affected by the presence of commons in the county. Maybe commons allowed more reliance on lower protein meat, for instance, pork, and less on higher protein dairy products as, it has been argued, few labourers were in a position to keep a cow on the commons.⁶⁹

The different factors determining overall nutrition as computed from the scoring of bread type, dairy and potato consumption and calorie and protein consumption require some explanation. The most obvious is the problem of classifying the different types of bread consumed in the calorie and protein computations. Earlier we argued that different types of bread afforded very different nutrition and found best wheaten bread particularly lacking. It was not possible to make such a distinction here. In fact, calorie consumption per 100 grammes is very similar for all types of bread today and protein too ranges between 7 and 10 grammes, although white bread today is fortified and would earlier have been nutritionally very substandard, so this can form only a partial explanation. More important is that the earlier nutritional rankings were based on many types of vital nutrients, for instance, B vitamins, fibre, zinc, folic acid, iron and chromium. These aspects of nutrition are key to health and growth, they differ between grain types and this is captured in the nutrition score but is not reflected in the specific measures adopted here. Also we should bear in mind that there are many ways of achieving calorie consumption but fewer for consuming the range of vitamins and minerals needed. Thus we would suggest that the choice of diet is regionally determined by local conditions and this affects the combination of foods consumed. These combinations can provide similar amounts of energy and protein, with the overall amount being determined by the income of the household, but they don't all provide all the essential nutrients and thus have differential impacts on health: witness 'Derbyshire neck' (goitre) resulting from the lack of iodine in that region's diet.

67 A dummy variable showing whether the budget was sourced from the appendix sample was included to capture the possible effect of differences in classification but was never significant.

68 C.H. Feinstein, 'Pessimism perpetuated: real wages and the standard of living in Britain during and after the Industrial Revolution', *Journal of Economic History*, 58 (1998), 625–58, p.653.

69 L. Shaw Taylor, 'Parliamentary enclosure and the emergence of an English agricultural proletariat', *Journal of Economic History*, 61 (2001), 640–62. The regression for nutrition was replicated using this reduced sample of 56 households to ensure that sample selection bias was not responsible for the different results. This produced the same results as reported previously.

Relationship with output measures: height

If regional patterns of diet had distinctly different nutritional content this should have had an impact on output measures, such as height. While sources of height data for this period are limited, one possibility is the large data set of adult male convicts to Australia. In total there are 21,184 observations on height for men aged over 20 years, where county is also known. Taking mean height by county for three samples—those born between 1785–1805, 1806–23 and 1824–44—gives a dataset to test against the county-level nutritional content of diet. Data for the first two samples are drawn from New South Wales and Van Diemens Land (Tasmania), where county of birth is recorded. For the third sample the data comes from Western Australia and the records only note county of trial. Some counties for which there is height data (e.g. Cambridgeshire, Huntingdonshire) do not have corresponding nutritional values, others (e.g. Rutland, Westmorland) have insufficient height observations to be meaningful (any cell with fewer than 20 cases has been excluded). Additionally, Yorkshire is given as an aggregate in the height data so this height has been attached to all three Ridings, despite the slightly different nutritional statuses indicated by the Eden commentary. Wales is simply divided into north and south. A regression of county nutrition level on mean height by place of birth for these male convicts shows a significant positive relationship across all three periods, although notably diminished in the last of these (Table 5).

What might this imply? From 1785 to 1823, each increment of the created 1–9 nutritional standard scale added around one-tenth of an inch to male height. For those born 1824–44 the incremental gain fell, to 0.06 inches. This helps establish that the different diets observed by Eden in 1795 had a different nutritional content that did impact on terminal height. Such regional differences in diet and stature persisted well into the first quarter of the nineteenth century. Using the large army recruit dataset, Cinnirella tells a consistent story, demonstrating that the height advantage of northern men persisted into the early nineteenth century.⁷⁰ Beyond that point, however, change set in. By the second quarter of the century, the regional diets observed by Eden in 1795 were exerting less influence on men's stature. This could be suggestive of general dietary changes which were having an uneven effect across the country: more consumption of an 'urban diet', with less hasty pudding and more tasty wheaten bread, tea and sugar. Or the effect of nutritional content of diet was being superceded by the influence of other factors, such as poor urban living conditions and the loss of common land mentioned earlier. Both factors may have operated.⁷¹ What these results do indicate is two-fold: first, that height is a genuinely

70 Cinnirella, 'Optimists or pessimists?'

71 Additionally, the relationship might be affected by observations on county of trial for the last period if nutrition in county of birth has a more direct relationship with height than nutrition later in life for those that migrated to other counties. However, this does not seem to be a major factor in male heights. Using these data we have tested the association between heights in places of birth and trial and find a correlation of 0.818, significant at the 1% level for men, possibly indicating that migration usually did not occur until adulthood.

Table 5 Regression of adult male convict height by nutritional status, county level data

	Birth Cohort		
Dependent: height	1785–1805	1806–23	1824–44
Constant	65.293 (0.17)*	65.090 (0.14)*	65.163 (0.16)*
Nutritional level (county)	0.094 (0.03)*	0.103 (0.027)*	0.062 (0.03)*
Sample size	38	39	39
Adjusted R ²	0.173	0.267	0.08
F	8.71*	14.82*	4.34*
No. of convicts aged 20 and above	3,784	11,074	6,326
Transported to	NSW & VDL	NSW & VDL	WA

Sources: Nutrition level computed from Eden's *State of the poor*, parish reports, see text. Male heights from Convict Indents 1788–1842, State Records Authority of New South Wales, Sydney, Australia; Indents of Male Convicts, Archives Office of Tasmania, Hobart, Australia; Tasmanian papers, Mitchell Library, Sydney, Australia; Convict Lists and Registers, 1850–1868, State Record Office of Western Australia, Perth (made available online through the Dead Person's Society).

Notes: *Indicates significance at 5% level or higher. Standard error in parentheses.

sensitive measure of net nutritional status, so much so that it can detect regional variations in the nutritional quality of diet, not simply its calorific quantity; and secondly, the importance of understanding economic history at the regional level.

Conclusion

This consideration of the nutritional information contained in Eden's work on the *State of the poor* in 1795 has led to a number of important conclusions. There were distinct regional variations in diet and these impacted on height, thus verifying the important impact of nutrition on observed outcomes. But the factors lying behind the different dietary choices are also informative. The loss of common land had a major impact on labouring household's nutrition and while women working helped the household reach higher nutritional standards (presumably because of the extra income this brought in) the location of this work was crucial in its nutritional impact. Working from home allowed the most to be made of, often scarce, resources while work outside the home had a detrimental effect. Over time the effect on height dissipates. One possible reason for this may have been the greater uniformity of diet emerging from the early 1800s onwards: wheaten bread, tea and sugar became more universal. Another is that environmental factors, such as prevalence of disease, overrode the impact of differential nutrition.