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ABSTRACT

Nutrition in Interwar Britain: A Possible Resolution of the Healthy or Hungry 1930s Debate?

This paper re-examines energy and nutritional available to British working-class households in the 1930s using the individual household expenditure and consumption data derived from the 1937/8 Ministry of Labour household expenditure survey and the 1938/9 individual dietary data collected by the Rowett Research Institute. We conclude that for working households, energy and nutritional availability improved significantly compared with current estimates of availability before the First World War. For unemployed headed households, and female headed households in employment, the situation was much worse with energy and nutritional availability at similar levels to households that would be described as destitute at the turn of the Twentieth Century. Finally, we examine the impact of state interventions to improve diet and nutrition and conclude that these made a difference, but other than the case of calcium, they did not represent a decisive intervention, as many households in receipt of free school meals and milk did not have sufficient nutrients available in their diets to meet modern dietary standards.

JEL Classification: I30, N34
Keywords: nutrition, Britain, 1930s, working class

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Introduction

The course of working class living standards in Britain during the 1930s is the subject of intense controversy, both at the time and at various points since, with the periodicity of debate seemingly related to the behaviour of the economy over time.[1] Central to this debate is the extent of malnutrition and hunger experienced by the working class during the 1930s and the relationship it has to ill-health and mortality rates. This paper uses individual household level data from the Ministry of Labour 1937/8 household expenditure enquiry and those collected by the Rowett Research Institute in 1938/9 for the Carnegie Trust to re-examine nutritional availability for working class households in the late 1930s and examine the role of state interventions designed to improve nutrition.

It is undeniable that there was widespread contemporary concern about the incidence and depth of deprivation and hunger in 1930s Britain: most famously John Boyd Orr's claimed in *Food, Health and Income* (1937), that 4.5 million Britons had a diet deficient in every nutrient he examined. Typical of pessimistic contemporary commentary is Fenner Brockway's *Hungry England*, in which he claimed that for a Tyne and Wear family living on 14s 6d per week and paying 5s for rent and 1s 6d for fuel and light, and nothing on clothing, household utensils and extras:

> That leaves 8s to provide food for two adults and two children a week. How can it be done without leaving actual hunger – hunger gnawing at the stomach, hunger making one dizzy and weak, hunger starving one's body and destroying one's mind?" (1936, p.120)

Similar examples were highlighted in the national press during the depression. The *Daily Mirror* ran a number of reports on poverty and malnutrition and one such highlighted the case of Minnie Weaving, under the title "Mother's Life for her 7 Children', who died aged 37. Minnie was married to an unemployed general labourer and had seven children. Minnie worked until the end of her life and the family had an income of 48s per week. According to the *Mirror*,

[1] For example, the 1980s was a period of fervent argument at a time when Britain was experiencing the worst depression since the 1930s, with high unemployment and a similar regional pattern of deprivation. Mitchell argues that the unemployment in the 1980s makes it important to understand its impact in the 1930s, since the interwar years are the most relevant comparator at the time of writing. Mitchell, Margaret, "The Effects of Unemployment on the Social Condition of Women and Children in the 1930s." *History Workshop Journal*, 1985.

she sacrificed her life for the sake of her children, as although according to the pathologist, pneumonia was the immediate cause of death, "Had she had sufficient food in the past, the attack would not have proved fatal" [2]

Crucially, however, for Boyd Orr, 1930s malnutrition was not confined to those who were out of work, sick or old, but was pervasive among working households. His conclusions were based upon the comparison of household food consumption evidence from budget studies with contemporary dietary recommendations. These standards incorporated advances in scientific knowledge concerning the identification of vitamins and minerals in food and their significance for wellbeing, unknown to investigators at the turn of the century.

> The food position of the country has been investigated to show the average consumption of the main foodstuffs at different income levels.....The average diet of the poorest group, comprising 4.5 million people, is, by the standard adopted , deficient in every constituent examined. The second group, comprising 9 million people, is adequate in protein but deficient in all the vitamins and minerals considered (Boyd Orr, 1937, p.55)

In the immediate post-Second World War period, the 1930s attracted the sobriquet the "hungry 1930s," which pithily depicted the lived experience of millions and promoted the concerns of a substantial body of contemporary opinion to a canonical description of a time and place. In an oft-quoted passage Mowat (1968) demonised this as "myth, sedulously propagated later,"[3] but as the "Golden Years' of unprecedented affluence drew to a close in the 1970s, a more measured reassessment of living standards in the 1930s rapidly established a new orthodoxy. This interpretation portrayed the period in a more optimistic light, though did not necessarily deny the validity of the descriptions of hardship that characterised the traditional view. One of the key protagonists was Aldcroft (1970), who wrote:

> ….not only was there a significant increase in real incomes and real wages but, partly as a result of this improvement and together with the extension of community services, the nation generally was better fed and clothed, and was housed in better conditions than those prevailing before the war.[4]

A similar conclusion was reached by Winter. In a review of the behaviour of mortality statistics in Britain 1870-1950, he claimed "…the sustained decline in mortality rates such as Britain

[2] *Daily Mirror* 28 January 1933
[3] Mowat, C.L *Britain Between the Wars 1918-40* (1968) p.432 and quoted in Charles Webster, *History Workshop Journal* (1982) p. 126
[4] Aldcroft, D., *The Interwar Economy: Britain, 1919-1939* (1970) p.375

experienced before the 1930s was impossible without major improvements in the quantity and quality of per capita food intakes."[5] And that "… even the severe hardship caused by the world economic crisis of 1929-34 did not reverse the downward trend of mortality rates in the interwar period."[6] Moreover, the results of the annual National Food Survey from 1940 onwards suggest reasonably high mean levels of working-class nutritional availability, with just fewer than 2,400 kcals available per head per day by 1940.[7]

During the 1980s, however, a number of historians questioned this optimistic reassessment. On the basis of a granular analysis of mortality data and a deconstruction of contemporary morbidity assessments, Webster concluded that:

> Fuller exploitation of the available demographic and epidemiological evidence suggests that the persistence of gross disparities between the sexes, or between social and occupational groups constitute the dominant features of interwar patterns of health. For those substantial sections of the population in a position of disadvantage it is difficult to maintain that the interwar period was marked by any meaningful improvement in heath.[8]

Support for Webster's view was provided by Mitchell's (1985) analysis of the effects of unemployment on the infant and maternal mortality rates. Her inference that unemployment had a negative impact on infant mortality is drawn largely from the inspection of aggregate data,[9] but her conclusions on the role played by malnutrition on maternal mortality are more convincing, being based on William's detailed investigation into maternal health in the Rhondda during the 1930s, where the introduction of food to women in clinics resulted in a significant fall in the puerperal death rate in 1935.[10] Vernon (2007) points to the resurrection of this view of the 'hungry 1930s' among historians in the 1980s as direct consequence of the unravelling of the social democratic project and the re-assertion of free-market economics.[11]

[5] Winter, J.M., 'The decline of mortality in Britain 1870-1950' in Barker, Theo and Drake, Michael, (ed) Population and Society in Britain 1850-1980. p.115
[6] *Ibid* p. 116
[7] Ministry of Food (1951) *The Urban Working-Class Household Diet 1940-1949*, HMSO p.15
[8] Webster, C., 'Healthy or Hungry Thirties?', *History Workshop Journal* (1982) p.125
[9] Mitchell, Margaret, "The Effects of Unemployment on the Social Condition of Women and Children in the 1930s." *History Workshop Journal*, 1985.
[10] Mitchell *Ibid* p.115
[11] Vernon, James, *Hunger: A Modern History* (2007), p. 270.

Indeed, the question as to whether Britain in the 1930s was health or hungry is sometimes seen as providing a judgement on capitalism itself.[12]

The recent evidence on the progress of real household incomes in the first forty years of the 20th century, along with estimates of nutritional intakes for working class households at the turn of the century, begs a reinvestigation of Boyd Orr's judgements on nutritional attainment in the 1930s. Gazeley and Newell (2011) use household level data for 1904 and 1937/8 to estimate a doubling of real per capita incomes in the first four decades of the twentieth century. This result is not consistent with Boyd-Orr's conclusion unless the majority of working class households experienced starvation level deprivation at the turn of the century. Gazeley and Newell (2015) show that the majority of working class households in employment in 1904 were able to meet modern standards of nutritional requirements, though there is evidence of deficiencies for some vitamins and amongst the poorest households and in some cases these deficiencies were quite pronounced.

This paper is set out as follows: in Section 1 we further explore contemporary concerns over malnutrition in Britain during the 1930s, and review the findings of the major food surveys of the period, identify their shortcomings and examine the standards used to judge nutritional adequacy. Section 2 and 3 introduces the new datasets and our estimates of nutritional availability derived from the household level data. In Section 2 we review the 1937/8 Ministry of Labour working class household expenditure survey, discuss how the individual household data can be utilised for nutritional analysis and compare our estimates with the published results of 1930s food enquiries. Almost all the households taking part in this survey were male-headed and in employment. In Section 3 we move on to consider the nutritional position of unemployed male-headed households and female-headed households in employment, derived from the analysis of the individual household data collected by the Rowett Institute in 1938/9 for the Carnegie Trust. Section 4 concludes and places our results in the context of early twentieth century estimates. We also explore the impact of state interventions; namely free school meals and milk and food forth mothers provided by clinics.

Based on the analysis of recovered individual level household expenditure evidence, it is our contention that both the traditional and ameliorist viewpoints of the 1930s are correct: among

[12] Vernon, Ibid pp.257-8

working households there was a significant improvement in average food consumption per capita, which translated into improvements in average energy and macro-nutrient availability. These nutritional gains permeated through most of the household income distribution among those nuclear households where the head of household was in work. In those households where the head of household was unemployed, however, levels of energy and macronutrient availability per capita were similar to those households that contemporaries described as 'destitute' before the First World War. Importantly, the position of working female-headed households was also poorer, and only somewhat better than the experience of unemployed headed households and significantly below that of most male-headed working households. We also examine the role of the state in improving energy and nutrition levels available through free school meals, milk and assistance to working class mothers in clinics and conclude that these state interventions made a difference, especially with respect to calcium intakes among children, but were probably not sufficient in themselves to ensure adequate standards of nutrition generally.

Section 1: Food consumption and Nutrition in the 1930s

Investigations of poverty in Britain during the interwar period, that were based upon a minimum needs approach, incorporated major advancements in nutrition science into their prescribed dietary requirements. In 1933 the British Medical Association (BMA) set out their own nutritional recommendation, which they translated into a cash sum representing the minimum cost of a diet that would maintain health and working capacity.[13] M'Gonigle and Kirby, in *Poverty and Public Health* (1936), utilised the 1933 BMA recommendations in their landmark study of working class living conditions in Stockton-on-Tees in 1935. They compared the budget available for food in 141 families, once the cost of other necessities had been deducted, with the BMA recommended cost per capita of a minimum diet required to maintain health, re-priced at 1935 Stockton-on -Tees prices. They found that sufficient income was only available in the highest income class of 70s-80s per week. [14]

[13] Mayhew, Madeleine, (1988) 'The 1930s Nutrition Controversy', Journal of Contemporary History, Vol 23, No 3, p.450
[14] M'Congile, G.C.M. and Kirby, J., *Poverty and Public Health*, (1936) pp. 243-7.

For a partially overlapping set of 126 families much more detailed information was available on food expenditure, income and household structure. The nutritional analysis of these 126 families food purchases revealed that, while energy availability rose with income, for income groups below 55s per week, energy values were below the 1933 BMA standard of 3,400 kcal per capita per day. A similar pattern was found in the analysis of the availability of first-class animal protein in the diet.[15] M'Gonigle and Kirby were ambivalent concerning the extent to which their findings for Stockton-on-Tees could be generalised to other areas, but ultimately they concluded that "…it appears not improbable that nearly one half of the population of England and Wales subsist, to a greater or lesser extent, below the safety line of nutrition." [16]

An even more emphatic conclusion was reached by Boyd Orr, who claimed in *Food Health and Income* (1937), that the poorest group of the population– some 4.5 million people, or about 10% of the population of the United Kingdom – had diets deficient in every nutritional constituent he examined, and another 9 million people had a diet deficient in all nutritional constituents other than protein. He argued for a direct causal link between nutrition and the incidence of disease and physical stature: 'as income increases, disease and death rate-decrease, children grow more quickly, adult stature is greater and general health and physiques improve.'[17] The empirical basis of Boyd Orr's conclusions was the analysis of the nutritional content of foods recorded in 1,152 family budgets from six household and dietary surveys carried out between 1932 and 1935. The largest single group (538) were for England and Wales, carried out by the Women's Co-operative Guild in 1935, the next largest were from Merseyside (243) in 1932, followed by Great Britain Middle Class (138) in 1932, Newcastle (102) in 1933-4, Stockton-on-Tees (82) in 1932 and finally Manchester and District (49) in 1933.[18]

[15] M'Congile, G.C.M. and Kirby, J., *Poverty and Public Health*, (1936) Table 46, p.253.
[16] M'Congile, G.C.M. and Kirby, J., *Poverty and Public Health*, (1936) p. 263.
[17] Boyd Orr, J (1937 2nd Edition) *Food Health and Income,* p.55. A recent analysis of adult male heights during the late nineteenth and early part of the twentieth century suggests that average final heights of men who reached maturity in the third quarter of the nineteenth century was 167.2 cm, increasing to 168.2 cm by the first quarter of the twentieth century and 170 cm in the second quarter of the twentieth century. Surprisingly, perhaps, it was not until the third quarter of the twentieth century that average male heights in Great Britain exceeded the estimate for the second quarter of the nineteenth century (175 cm and 171.2 cm respectively). Floud, R Fogel, R.W., Harris, B. and Hong, S.C., *The Changing Body: Health, Nutrition, and Human Development in the Western World since 1700*. 2011, Table 2.5 p.69
[18] Boyd Orr (1937 2nd Edition) *Food Health and Income,* Appendix II p.59. These represented a sub-set suitable for nutritional analysis from the total of budgets collected. The total numbers were Women's Co-Operative Guild 700, Newcastle 105, Manchester and District 50, Stockton on Tees 85, Merseyside 300 and Great Britain Middle Classes 200.

According to Boyd Orr, these surveys included "very poor families spending less than 2s per head weekly on food, up to families with an income of £2,000 per annum spending 15s or more per head on food."[19] From the analysis of these budgets, Boyd Orr estimated food and nutrient availability per head by income class. His estimates were used to derive estimates of national food consumption per head by income class in conjunction with data on household structure and occupation derived from the published 1931 Population Census reports, the analysis of a random sample of 23,000 Census returns provided by the Registrar General, and wages and earnings data by occupation derived from unspecified sources.[20]

Boyd Orr's judgements concerning nutritional adequacy were based upon the application of a contemporaneous United States dietary standard designed by Stiebeling (1937), which specified minimum per capita intakes for protein, calcium, phosphorus, iron and vitamins A and C. There were two other important dietary standards developed in the 1930s: the British Medical Association (1933) and the League of Nations Technical Commission (1937) standard and these three standards differ from each other in detail, as we shall see shortly, and differ significantly from modern nutritional intake recommendations.

The other important interwar study of food consumption and nutrition in Britain was Crawford's *Food Inquiry* (1938). He commissioned his own enquiry because he doubted the general validity of Boyd Orr's findings, the results of which informed *The People's Food* (1938). Crawford justified his new survey on the basis that *Food Health and Income* was the outcome of the analysis of less that 1200 budgets, none of which were bespoke to the study, and a high proportion of which were from large low income households in the industrial north of England. Thus, clerical workers (so-called black coated workers) and middle-class households were under-represented and the rich were completely excluded.[21] Crawford's own *Food Inquiry* collected budgets from 5,000 urban households between October 1936 and March 1937 in seven centres (London, Birmingham, Leeds, Glasgow, Newcastle, Liverpool and Cardiff), which Crawford claimed were representative of two-thirds of the population of Great Britain.[22] Details of the method of sampling are scant, but Crawford indicates that households in his study were randomly selected from five income groups, after a preliminary

[19] Boyd Orr (1937 2nd Edition) *Food Health and Income,* Appendix II p.59
[20] Boyd Orr (1937 2nd Edition) *Food Health and Income,* Appendix V p.62-4
[21] Crawford, W., *The People's Food* (1938), pp.25-26
[22] Crawford, W., *The People's Food* (1938), pp.27-31

survey of each centre had identified particular areas that "comprised the bulk of the respective members of those classes in each selected town."[23] Helpfully, Crawford compared his findings with the recommendations of all three interwar nutritional standards (BMA, Steibeling and the League of Nations).[24] The Ministry of Food regarded the Crawford survey as being superior to Boyd Orr's, though expressed doubts over the extent to which it could claim to be representative of Britain as a whole. [25]

Rowntree had also updated the dietary component of the poverty line that he utilised in *Poverty: A Study of Town Life* (1901) and set out this new dietary standard in the *Human Needs of Labour* (1920). A revised (1937) version of which combined the British Medical Association's standard for energy and protein with the League of Nations Technical Commission (1937) recommendations for minerals and vitamins. This composite standard formed the basis of the food component of the poverty line he employed in his second social survey of York, *Poverty and Progress* (1941).[26] Thus, an important change in the minimum needs approach to defining poverty in Britain occurred between Rowntree's first and second social surveys of York: by the 1930s both food quantity and quality were deemed important, the former to provide energy and the later to maintain physical health and prevent disease.[27]

The recommendations Boyd Orr utilised for "moderately active" adult males are set out in Table 1 (a), along with those adopted by Rowntree (1941), and the (1991) UK standard produced by the Department of Health's Committee on Medical Aspects of Food and Nutrition Policy (COMA). The most immediate difference between the minimum nutritional standard used by Boyd Orr's and Rowntree and the modern standard (COMA 1991) is the lower recommendations for energy (and protein) in the modern standard reflecting the lower requirements of sedentary modern life styles.

With respect to vitamin and mineral recommendations, direct comparison is not possible because of the use of different units of measurement. In Table 1 (b) we present a comparison of these recommendations after converting them into standardised units (grams, milligrams and

[23] Crawford, W., *The People's Food* (1938), Appendix I p.310
[24] Crawford, W., *The People's Food* (1938)
[25] TNA MAF 300/1 Crawford Bradley Comparisons. Notes on the comparability of pre-war budgetary samples. p.3
[26] Rowntree, B.S., (1937) *The Human Needs of Labour*, pp.48-76
[27] Vernon, James (2007) *Hunger: A Modern History*, p.81 *et seq*

micrograms). Notice that although Boyd Orr's standard for energy and protein is below Rowntree's, it is above Rowntree's standard for every mineral and vitamin. As a consequence, the use of Boyd Orr's standard would give more evidence of malnutrition than would be the case if Rowntree's standard was used instead. In comparison with a modern nutrition standard – designed to ensure that 97 percent of the population have adequate intakes - both the earlier standards embody very high minerals requirements. The recommendations for vitamins are also high by modern standards, which would further exacerbate the extent of any measured deficiency in the population.

Table 1 (a) Daily minimum dietary intakes for moderately active adult male (units as published)

Nutrient	Boyd Orr (Stiebeling) (1937)	Rowntree (modified BMA) (1941)	Department of Health (1991)
Kcal	3000	3400	2550
Protein	67g	100g	55.5g
Fat	-	100g	-
Calcium	0.68g	0.5g	17.5mmol
Phosphorous	1.32g	1.0g	17.5mmol
Iron	0.015g	10mg	160umol
Vitamin A	4000 SU	2000 IU	1.0mg
Vitamin B1	-	300 IU	0.8mg
Vitamin C	100 SU	600 IU	40mg

Source:
Boyd Orr, *Food Health and Income* (1937), Table VI, p.38, values for moderately active man. These recommendations were compiled by Stiebeling, US Government Bureau of Home Economic;
Rowntree, *Poverty and Progress* (1941) p.183, values for adult male. Rowntree based his recommendations on the 1933 BMA recommendations for energy, protein and fat, but because these did not include recommendations for minerals and vitamins, Rowntree used those provided by the League of Nations (Health Committee of the Technical Commission on Nutrition), *Bulletin of the Health Organisation*, League of Nations, Vol VII, No 3.
Department of Health, Dietary Reference Values for Food Energy and Nutrients for the United Kingdom (HMSO, 1991). Energy (EAR) Table 1.1 p.xix, Protein Table 1.3 p.xxi, vitamins Table 1.4 p.xxii, minerals Table 1.5 p.xxviii. All based on values for an adult male aged 19-50 years.

Table 1 (b) Daily minimum dietary intakes for a moderately active adult male (standardised units)

Nutrient	Rowntree (1901)	Boyd Orr (Stiebeling) (1937)	Rowntree (modified BMA) (1941)	Department of Health COMA (1991)
Kcal	3500	3000	3400	2550
Protein	125g	67g	100g	55.5g
Calcium		0.68g	0.5g	0.07g
Phosphorous		1.32g	1.0g	0.07g
Iron		15mg	10mg	0.89mg
Vitamin A		1680ug	600ug	1000ug
Vitamin B1		-	0.9mg	0.8mg
Vitamin C		50-60mg	30mg	40mg

Notes:
Boyd Orr provides values for Vitamin A and Vitamin C in Sherman Units. One SU of Vitamin C, translates into about 0.5 -0.6 mg. One SU of Vitamin A translates into 1.4 International Units, which is 0.42 micrograms (ug).[28] Rowntree provides vitamin values in International Units. These have been converted to micrograms (ug) and milligrams (mg) on the following basis: Vitamin A, 1 IU equal to 0.3ug of retinol; Vitamin C, 1 IU equal to 0.05mg; Vitamin B1, 1 IU = 0.003mg. The Department of Health provide mineral recommendations in mmol per day. These have been converted to micrograms (ug) and milligrams (mg) on the following basis: Calcium 1 mg = 0.25mmol; 1Phosporous mg = 0.25mmol and Iron 1 ug = 0.179 umol from http://www.globalrph.com/conv_si.htm

Table 1 (c) Daily minimum dietary intakes per unit of population (units as published)

Nutrient	BMA (1935)	Stiebeling (Boyd Orr 1937)	League of Nations Technical Commission (1937)
Kcal	2777	2810	2887
Protein	82g	68g	83g, 63g
Fat	-	-	-
Calcium	0.7g	0.90g	1.0g
Phosphorous	1.18g	1.23g	1.51g
Iron	14.7 mg	11.5mg*	15mgs
Vitamin A	4100 IU	*1900 IU***	6380 IU
Vitamin B1	490 IU	-	690 IU
Vitamin C	1340 IU	1400 IU	2160 IU

Notes
* 11.5 mg adopted by Boyd Orr 13.0-14.0g recommended by Stiebeling (see Crawford p.151)
** not comparable due to differences in estimation technique for Vitamin A (see Crawford, p.152)

Table 1(c) reports the three interwar nutritional recommendations using the same units for comparison. These are for "population units", as reported by Crawford. In other words they

[28] Sherman Units to International Unit conversion based upon Fullerton-Cox, E (1934) 'New U.S. Pharmacopoeial for Cod Liver Oil', *Analyst*, 701, pp.545-6

are a per equivalent person average based upon recommendations by age, gender and physical activity weighted in accordance with their population frequencies.[29] This per equivalent person comparison shows how close all three interwar nutritional standards were in terms of energy and protein recommendations, but also reveals significant differences with respect to micro-nutrients. The League of Nations recommendations, in particular, are significantly higher for vitamins than either of those formulated by Steibeling or the BMA.

The results of Crawford's *Food Enquiry* are set out in Table 2b. These results are for Crawford's aggregated income per capita groups, to facilitate comparison with Boyd Orr's results (Table 2a). Crawford also produced estimates of nutritional availability based upon social class. As can be seen, the figures in these tables accord reasonably well, though Crawford's suggest slightly better nutrient availability for higher per capita income groups. For the lowest per capita income groups, Boyd Orr's show greater nutrient availability. Across all income per capita groups, vitamin A availability is lower in Boyd Orr's study, but the overall conclusion is one of similarity rather than difference.

Table 2a: Boyd Orr's results (per day)[30]

Per capita income group per week	kcal	Protein gms	Calcium gms	Phosphorus gms	Iron mgms	Vit A I.U.	Vit B1 I.U.	Vit C I.U
<10s Group 1	2317	63.4	0.37	0.81	8.0	774		838
10s-15s Group 2	2768	76.0	0.52	1.04	9.9	1250		1134
15s-20s Group 3	2962	83.6	0.61	1.17	11.0	1624		1314
20s-30s Group 4	3119	89.4	0.71	1.28	12.0	2015		1577
30s-40s Group 5	3249	94.4	0.83	1.42	12.7	2210		1832
>45s Group 6	3326	98.3	0.95	1.54	13.7	2875		2323

Table 2b: Crawford's Food Enquiry results (per day) [31]

[29] Crawford, W., *The People's Food* (1938), pp.143-155
[30] Boyd Orr Table VII p.40
[31] Crawford p.159

Per capita income group per week	kcal	Protein gms	Calcium gms	Phosphorus gms	Iron mgms	Vit A I.U.	Vit B1 I.U.	Vit C I.U
<10s	2003	53	0.35	0.76	8.27	1480	270	680
10s-15s	2252	61	0.45	0.91	9.40	1940	330	870
15s-20s	2607	71	0.57	1.08	11.08	2340	400	1030
20s-30s	2786	77	0.66	1.21	12.31	2760	450	1280
30s-45s	3164	88	0.81	1.42	13.96	3100	540	1460
>45s	3489	100	1.06	1.73	15.79	4230	680	2600

It is worth pointing out that it is not known what food composition tables were utilised by Boyd Orr or Crawford in their analysis and this choice could heavily influence their findings.

Section 2: The 1937/8 Ministry of Labour Household Expenditure Survey

None of these contemporary investigators had available to them the food consumption records collected by the Ministry of Labour's survey of working class household expenditure, carried out in four quarters during 1937-38. This was the largest interwar survey of its type carried out using two-stage stratified random sampling techniques. The Ministry of Food's own assessment of the relative worth of this survey was that it is "….without doubt as representative a sample as can humanly be made of its universe, defined as industrial households of which the head is employed and not earning more than £250 per year, i.e manual workers and lower black-coated workers." [32] Using the surviving returns from this survey, we are able to report new estimates of energy and nutritional availability and make direct comparison between Boyd Orr's and Crawford's findings.

In 1937-38, after prolonged debate, the Ministry of Labour carried out a large-scale household expenditure enquiry, so as to be able to update the official cost of living index. 12,

[32] TNA MAF 300/1 Crawford Bradley Comparisons. Notes on the comparability of pre-war budgetary samples. p.2

967 working class household expenditure records were collected for the week beginning 17 October 1937. These were from a stratified random sample of about 22,000 manual and non-manual households from the unemployment insurance register, earning less than £250 per annum and currently employed.[33] These were supplemented by data recorded by households where the head of household was not currently insured against unemployment (particularly railway workers, local authority and public utilities employees and those employed by government departments).[34] The Ministry designed the survey so that it would produce national coverage.[35]

The full survey was repeated for the weeks beginning 23 January 1938, 24 April 1938 and 17 July 1938. The subsequent quarterly investigations for the three weeks in 1938 produced 11,518, 11,126 and 10,920 useable household budgets. The total number of households supplying expenditure records for all four weeks of the enquiry was 10,762.[36] Of these, 623 are extant for all four quarters (about 2,500 budgets, around 5.8 per cent of the total) and have been analysed.[37] As Gazeley and Newell (2011) show, the small number of surviving returns appears to be an extremely good sample of the entire enquiry with respect to regional coverage, the size distribution of households, the distribution of children and numbers of secondary workers. They also compared the distributions of total household expenditure in the surviving sample with that given for the random sample of 2225 that was used for analysis by the Ministry of Labour. Table 3 gives this comparison. It is noticeable that the surviving sample has a greater proportion of low expenditure households than the random sample, and other things being equal we would expect this modest over-sampling of poorer households to increase the extent of measure malnutrition in these data

Table 3: The distribution of total expenditure among households in the 'surviving 600' and in the full 1937/8 survey

Percentage shares of households by total expenditures in shillings	*Surviving 600*	*Full Survey*
Under 40	8.5	2.8

[33] Approximately 31,000 households were identified and visited, but about 9,000 were found by the enquiry investigators to fall outside the scope of the enquiry. TNA LAB 17/7 99338, p.7
[34] TNA LAB 17/7 99338 p 5
[35] For example, to ensure that all regions were adequately covered the Ministry required that it received responses from households amounting to at least two-fifths of the total number of households in random sample from any district. If less than this were received, further questionnaires were sent to households on a reserve list in the under-represented district. *Ibid*, p.5
[36] TNA LAB 17/7 99338 p.8
[37] 524 of these are extant at the University of Bangor and 99 at TNA under LAB 17.

40 and under 50	9.2	5.9
50 and under 60	13.7	10.3
60 and under 70	13.0	15.7
70 and under 80	13.5	14.7
80 and under 90	9.5	12.8
90 and under 100	6.8	9.5
100 and under 110	6.1	7.7
110 and under 120	3.7	5.7
120 and under 130	3.9	4.5
130 and under 140	2.6	3.1
Over 140	9.6	7.3

Source, authors' own calculations

The 1937/8 survey reports household expenditure, and the quantity purchased, for 57 items of food. Some of these items, however, were purchased in ambiguous units of quantity or volume (tins, packets, bottles, or numbers bought etc.) and others routinely do not have quantities assigned. Even for regular items of expenditure such as bread, potatoes or milk, quantity data is occasionally missing, but generally for important categories of food consumption, quantity data is present in nearly all cases. We attended to this missing quantity data in two ways. First, where some quantity data is recorded across the 623 households in any of the four quarters (2,492 observations), we calculated the average unit price from the expenditure and quantity data. This is then used to derive the implied quantity purchased, in cases where only expenditure was recorded. Second, average unit prices are recorded in Stone (1954) for most items of food and these were used to derive implied quantities in cases where only expenditure data is recorded in the surviving 1937/8 survey returns. The Stone average unit price was also used to evaluate the within survey derived prices in cases where quantity was rarely recorded. For items where the recorded quantity is in ambiguous units, we invariably relied upon the prices quoted in Stone (1954) to derive quantities in unambiguous units from the expenditure data. Full details are provided in Appendix A1

In translating food consumption data into nutritional intakes we have used McCance and Widdowson's food composition tables, adjusted so as to remove the impact of fortification on the values for bread, flour and margarine.[38] The estimates of micronutrient availability derived from this survey are subject to larger errors than are the estimates of macronutrient availability, as we have no knowledge relating to the methods of storage and preparation used by the

[38] Paul, A.A., and Southgate, D.A.T., *McCance and Widdowson's The Composition of Foods* (HMSO 1979)..

households in the 1937/8 enquiry. The 1937/8 survey was not a bespoke nutritional or food survey, and as a consequence the estimates of household nutritional intake that can be obtained from these household food consumption records are subject to a number of potential errors. For example, there is no information relating to the existing stock of food or any food purchased during the week of the survey that remained unconsumed. However, the survey has the advantage of being repeated in four quarters, which smoothens out the impact of unusual or "lumpy" expenditures on typical food consumption behaviour, and all the results we report are based upon four-quarter averages. Because this survey is a fixed-format design, some of the records of expenditure lack precision from a nutritional perspective. So, for example, although it is known that the household purchased a quantity of meat, it is not known what cut of meat was purchased and whether it was on or off the bone. This is important because the nutritional composition of cuts of meat varies, especially in relation to fat content. For meats, we take an average of a variety of different cuts for each type, including both on the bone and off-the-bone cuts.

We have adopted McCance and Widdowson's assumptions concerning the amount of waste associated with the each food consumed. These are often fairly generous. The food groups most affected by waste assumptions are meat, fish and vegetables, but for each food type modern food composition tables make assumptions about the proportion of the food that is actually edible. We hold the view that these 'edible proportion' assumptions are partly culturally determined. We cannot know exactly the way in which food was prepared in these households or how much was wasted from a given quantity of food purchased. We consider that the edible proportions reported in modern food composition tables imply significantly more food waste that would have been the case in the 1930s. Moreover, Crawford made no allowance for edible waste, though he recognised that some energy and nutrients would be lost.[39] Boyd Orr similarly acknowledges the potential loss, but it is not clear how his reported figures adjust for edible waste in the food preparation and cooking processes, as they are not based solely on the analysis of budgetary data, but instead are adjusted in various ways to take account of discrepancies between estimates derived from budgetary data and estimates of average quantities consumed derived from production data. [40]

[39] Crawford p.123
[40] Boyd Orr pp.71 -75

There is also the problem of how to treat meals consumed away from the home. The 1937/8 survey includes expenditure on meals out, but it is obviously impossible to gauge the nutritional content of these meals. In consequence, where we report nutritional availability inclusive of meals out, the nutritional content of meals away from home have been assumed to be the average of the weekly diet. [41] This is probably an upper bound assumption, but a better one than ignoring what is becoming an increasingly important component of food expenditure. For the purpose of comparison with Boyd Orr and Crawford, we also report results that exclude meals out, because neither include them in their calculations for lower income households, though Boyd Orr does make adjustments for meals out consumed by the two highest income per head classes.[42] Crawford was interested in food consumed within the home, and although he records the average expenditure and quantity consumed in the home of beer by social class, and expenditure for home consumption on wines and spirits by social class, it is not clear whether his estimates of energy and nutrient availability includes those derived from alcohol. [43] However, according to Crawford, the home consumption of beer in working-class homes was "negligible". [44] Similarly, he claims that it was only the wealthiest social class that had expenditure on wines and spirits "of any significance". [45]

Finally, it is not clear whether Crawford or Boyd Orr includes energy and nutrients available from all foods purchased. In particular, their treatment of sweets and confectionary remains unclear. In the case of Crawford, he does not report expenditure or quantities consumed on these items and notes that consumption of sweets and confectionary forms part of the discrepancy between his estimates of sugar (and jam, marmalade and honey) consumption and the estimate produced by the Advisory Committee on Nutrition, with the clear implication that sweets and confectionary consumption is not included in his *Food Inquiry* calculations.[46] Similarly, Boyd Orr reports the quantity of sugar (purchased as such) and jams, jellies and syrups, but not sweets and confectionary, so it seems he also excluded them from his analysis.[47]

[41] For example, if 10 percent of food expenditure is recorded on meals way from home, we have inflated the estimates of nutritional availability by this amount.
[42] Boyd Orr p. 69-70
[43] Crawford p.284 notes that " It is only fair to recognize that beer does posses food value."
[44] Crawford p.283 0.03 pints per week for class D.
[45] Crawford p.286
[46] Crawford p.270
[47] Boyd Orr Table 1 (appendix VI) p.72 There is also a list of exclusions to Boyd Orr's estimates provided in these notes to this table, including chipped potatoes, fried and tinned fish, and biscuits and cakes.

Table 4: Characteristics of the three large-scale nutritional investigations

	Food Enquiry	Food Health and Income	Working Class Household Expenditure Survey
Date	October 1936-March 1937	1932-1935	Oct 1937 – July 1938
Sample type	Two-stage sample, 7 key urban areas	not known	Two-stage random sample of most urban areas in GB.
No. budgets	5,000	1,152	2,492 (623 x 4)
Adjusted for waste	No	possibly	yes
Including sweets & confectionary	No	no	yes
Alcohol	No	no	yes
Meals out	No	Only for top two income groups	yes

As can be seen from the information recorded in Table 4, making a smooth comparison between the nutritional information derived from the food consumption data in the surviving returns of the Ministry of Labour 1937/8 enquiry and either Boyd Orr or Crawford's published results is not straightforward. Table 5 (a) reports out "best guess" estimates of energy and nutritional availability from the Ministry of Labour 1937/8 enquiry by the same income per capita groups used by Boyd Orr and Crawford. These include: all recorded foods, with nutritional quantities deflated by McCance and Widdowson's waste assumptions; recorded alcohol and soft drinks; and meals consumed outside of the home (included at the average nutritional value of all foods consumed at home). Table 5(b) reports details of household structure and energy consumption by income per capita group.

Table 5 (a) Nutrients per day MoL1937/38 survey, (Boyd Orr Income Groups, including meals away from home and alcohol consumption)

Per capita income group per week	kcal	Protein gms	Calcium Gms	Phosphorus gms	Iron mgms	Vit A (Retinol only)	Vit B1	Vit C
<10s	2065	52.4	0.40	0.83	7.70	330.3	0.74	25.0
10s-15s	2478	65.1	0.50	1.01	9.38	452.9	0.91	36.2
15s-20s	2711	71.0	0.61	1.15	10.44	542.4	1.03	47.5
20s-30s	3030	80.7	0.73	1.29	11.69	647.5	1.13	62.8
30s-40s	3441	92.2	0.87	1.48	13.82	736.7	1.28	80.47
>45s	3868	103.4	0.98	1.65	15.54	903.5	1.46	101.18
mean	2923	77.33	0.68	1.24	11.36	600.1	1.09	57.9

Source: authors' estimates

Table 5 (b) Household Structure MoL1937/38 survey, (Boyd Orr Income Groups)

Per capita income group per week	Household members	adults	children	Oecd equiv adults	Kcal per person per day	Kcal per equiv adult per day
<10s	5.75	2.64	3.1	2.74	2065	4204
10s-15s	4.92	3.09	1.81	2.59	2478	4578
15s-20s	4.17	3.01	1.11	2.34	2711	4656
20s-30s	3.67	2.94	0.72	2.19	3030	4816
30s-40s	3.07	2.65	0.41	1.95	3441	5131
>45s	2.45	2.26	0.21	1.69	3868	5321

Source: authors' estimates

Generally, our estimates are more similar to Crawford's than they are to Boyd Orr's. Crawford's results showed a wider dispersion at both the bottom and top of the income per capita classes, and our "best guess" estimates from the Ministry of Labour 1937/8 data show

similar energy and macronutrient availability to Crawford at the bottom end, but higher availability at the top end. However, although the estimates reported in Table 5 are compatible with our own estimates of energy and nutritional availability for working class households early in the twentieth century (which we will consider in the next section), they are not directly comparable with Boyd Orr or Crawford as they stand. To do so requires removing meals out, alcohol and sweets and confectionary. Table 6 reports estimates of nutritional availability derived on this basis from the 1937/8 Ministry of Labour survey.

Table 6 Nutrients per day MoL1937/38 survey, (Boyd Orr Income Groups, excluding meals away from home, confectionary and alcohol consumption)

Per capita income group per week	**kcal**	**Protein gms**	**Calcium Gms**	**Phosphorus gms**	**Iron mgms**	**Vit A (Retinol only)**	**Vit B1**	**Vit C**
<10s	2030	51.7	0.38	0.82	7.7	313.8	0.73	23.6
10s-15s	2333	60.9	0.48	0.95	8.7	437.7	0.84	34.1
15s-20s	2623	69.4	0.60	1.11	10.0	539.5	0.99	45.0
20s-30s	2924	78.5	0.70	1.26	11.3	616.8	1.12	61.0
30s-40s	3175	86.0	0.79	1.37	12.6	689.5	1.20	74.9
>45s	3480	94.5	0.90	1.51	14.3	816.9	1.31	95.2
unweighted mean	2785	74.3	0.65	1.18	10.8	577.9	1.05	55.76

Source: authors' estimates

Notice that in comparison with Table 5(a) excluding recorded alcohol, sweets and meals out accounts for about 140 kcal and 10gms of protein per capita per day for the average household

in the survey. It is highly likely, however, that this is an underestimate, as alcohol consumption in the Ministry of Labour 1937/8 survey is probably under-recorded.

Neither Crawford nor Boyd Orr report estimates of the mean energy and nutrient availability from the diets recorded in their surveys. Boyd Orr provides details of the assumed population proportions of each per capita income class, and we have used these in conjunction with Boyd Orr's energy availability data by per capita income class to generate an estimate of mean energy and macro nutrient availability. We have also used these weights to generate a set of comparable estimates from Crawford's Food Survey and the BoT37/8. These calculations are reported in Table 7.

Table 7. Weighted mean energy and macronutrient availability per capita per day

	Energy (kcal)	Protein (gms)	Calcium (gms)	Phosphorus (gms)	Iron (mgms)
Boyd Orr	2984	84.9	0.70	1.25	10.6
Crawford	2711	74.7	0.67	1.21	11.8
MoL37/8	2762	73.6	0.65	1.21	10.7

Source: authors' estimates

The outcome of this comparison is that on average macro nutrient availability is similar in the data recorded in both the Ministry of Labour 1937/8 and Crawford enquiries. Differences between these two surveys are minor. With respect to energy availability, the average per capita estimates from Crawford and Ministry of Labour 1937/8 are around 230-270 kcal per capita below Boyd Orr's figures. Protein availability is also higher in the later. The reasons for these differences are unclear, but could easily be accounted for by differing waste assumptions and treatments of meals out, alcohol and sweets. None of these results suggest overall malnutrition

at the levels postulated by Boyd Orr. From an analysis of the MoL 1937/8, it is only the lowest income group that there is any obvious evidence of nutritional shortfall in macronutrients relative to a modern standard.

Section 3. The Carnegie Trust survey: moving away from working, nuclear households.

In the previous section, we have presented evidence that macronutrient availability estimates derived from the best household food expenditure data available do not suggest widespread malnutrition among working households at the end of the 1930s. But much of the contemporary concern for malnutrition related to households who did not conform to this description; either because they were not working or were not nuclear households. Indeed, the example of Minnie Weaving highlighted in the introduction is an example where the principle wage earner became unemployed. Yet the MoL1937/8 survey was designed to sample nuclear households, the vast majority of which were working. It is possible that the surveys utilised by Boyd Orr included some non-working, single headed households, but his original data appears to be no longer extant. The same is true of the data underlying Crawford's study. However, the Carnegie United Kingdom Trust commissioned the Rowett Research Institute to undertake a dietary and clinical survey of around 1350 households from sixteen areas in Scotland and England in 1937, and this survey does contain non-nuclear and non-employed households.[48]

We have extracted the data from the original records[49] and analysed the nutritional content of the household diets, using the same methods as employed for the analysis of the MoL1937/8 survey. Many of the households included in the Rowett survey were unemployed and/or single headed. Of the 1352 households in the survey, 363 had a head of household who described themselves as unemployed at the time of the survey, or subject to frequent periods of unemployment. There are also 40 households, which were female headed where no male over 18 is present. These included households where the female head has described herself as "deserted by husband", "widow' and typical low paid adult female occupations of the period ("washerwoman", "charwoman" "cleaner" etc.).

[48] The regions were Aberdeen, Kintore, Hopeman, Barthol Chapel, West Wemyss, Dundee, Edinburgh, Barrow-in-Furness, Liverpool, Yorkshire West Riding, Wisbech, Fullham, and Bethnal Green.

[49] We gratefully acknowledge the research assistance of Dr Samantha Shave, who photographed the original records, Dr Natacha Chevalier who extracted the data and the Rowett Institute, Aberdeen for their assistance.

The 934 households who were working at the time of the survey include heads of households employed in occupations across the primary, secondary and tertiary sectors. Of those that provide a description of their occupation, there are 169 households where the head of household is working in agriculture,[50] 104 miner's households, and 92 households where the head describes himself as a "labourer" of some kind. The remainder are diverse cross-section of the social fabric of interwar Britain, including on the one hand a "University Lecturer", "Doctor", "Presbyterian Minister" and "Police Chief Constable" and on the other a "Dustman", "Chimney Sweep", "Hawker" and "Window Cleaner". It is not clear, however, how these households were selected as the published Report from the Rowett Institute provides scant detail, [51] but it seems unlikely that random sampling methods were used, as this surely would have been highlighted in the Report. The survey returns provide full details of the demographic structure of the household, including the age and sex of all the children. Moreover, despite the many virtues of this enquiry, household income was not recorded in the vast number of cases, as the response was "very poor".[52] The lack of detail on head of household income and total household income makes it difficult to assess any biases in the data. Food expenditure and food expenditure per capita is known (but not food as a share of total expenditure) and Rowett allocated households into six-food expenditure per capita groups, ranging from the poorest class with food expenditure of less than 36d per capita per week to the richest with expenditure of over 132d per capita per week.

The dietary analysis carried out by the Rowett Institute is based upon net consumption in the survey week (including allowance for stock on hand before and after the survey, household members absent for meals, additional visitors etc). What is unique about the dietary component of this survey is the inclusion of food provided at school and by other agencies (primarily clinics providing to mothers free food and milk for themselves or their children).[53] This allows the Rowett Institute to report food/nutrition at home, food consumed at school and food provided by clinics. For each household the original record cards provide the weights and volumes of foods purchased for consumption at home, plus food obtained from

[50] Including occupations described as "Farmer" "Crofter", "Grieve", "Small Holder", "Farm Labourer", "Land Labourer", "Farm Servant", "Horseman", "Cattleman" or "Dairymen"
[51] *Family Diet and Health in Pre-War Britain*. A Report to the Carnegie United Kingdom Trust from the Rowett Research Institute, 1955 (hereafter *Report* 1955).
[52] *Repor*t 1955 p.18
[53] *Report* 1955 p.18

gardens, allotments and as a perquisite from employers. Table 8 reports our estimates of the mean nutritional availability per capita per day for all 1352 households in the survey. These have been calculated from the Rowett Institute's own estimates for each household of the nutritional content of all foods consumed at home (including those from gardens and allotments), of foods provided as school meals and at clinics and an adjusted total for the household that combines both sources.

Table 8. Carnegie Trust 1938/9: All households mean energy and nutrient availability per capita per day

	Energy (kcal)	Protein (gm)	Calcium (gm)	Phos (gm)	Iron (mgm)
Home consumption	2346	63.77	0.54	1.03	10.83
School Meals & Clinics	65	2.7	0.09	0.13	1.97
Carnegie Adjusted Total	2449	67.86	0.65	1.14	12.59
Crawford	2711	74.7	0.67	1.21	11.8

Table 8 shows that across the 1352 households in the Carnegie Trust survey, energy and nutritional availability was lower than the near contemporaneous Crawford survey. On average, the Carnegie households had around 400 fewer kcal and 10 gms of protein per capita per day available than the Crawford households. Similar differences are apparent for other macronutrients and this comparison makes no allowance for the foods excluded in the Crawford study.

Table 9 Carnegie Trust 1938/9: Employment status (household mean energy and nutrient availability per capita per day)

Unemployed (n=363)	Energy (kcal)	Protein (gm)	Calcium (gm)	Phos (gm)	Iron (mgm)
Home consumption	1982	54.0	0.36	0.77	9.24

School Meals & Clinics	105	4.48	0.15	0.12	0.21
Carnegie Adjusted Total	2076	58.9	0.50	0.91	10.47

Working (n=989)	Energy (kcal)	Protein (gm)	Calcium (gm)	Phos (gm)	Iron (mgm)
Home consumption	2480	67.35	0.61	1.13	11.42
School Meals & Clinics	50	2.09	0.07	0.13	0.37
Carnegie Adjusted Total	2586	71.14	0.70	1.22	13.36
Crawford	2711	74.7	0.67	1.21	11.8

Table 9 reports the impact of labour market status of the head of household on energy and nutritional availability for all households in the Carnegie survey. The bottom panel reports the results for the 989 households where the head of household is working at the time of the survey. For these households, energy and nutrient availability is now more similar to the results of the Crawford survey, though there are still around 230 fewer kcal per capita available on average among the working Carnegie households. This could be accounted for by differences in mean income or household size between the Crawford and Carnegie surveys, or differences in assumptions concerning waste.

The impact of unemployment can be gauged from Table 9. Households with an unemployed head have roughly 500 fewer kcal available per capita than those where the head of household is working. Unsurprisingly, shortfalls of this order of magnitude are evident throughout, with 13 fewer grams of protein available per capita per day. The availability of calcium appears to be the macronutrient most affected by labour market status. On average the unemployed have only about 60% of the calcium available to those in employment. But this macronutrient is particularly affected by state action. When the calcium available from foods consumed at school and provided by clinics is taken into account, available calcium per capita levels rise to around 70% of those households where the head is working, almost certainly because of milk provided under the provisions of 1906 Education (Provision of Meals) Act, which was extended in 1921, and allowed local education authorities to provide

school meals to poorer children. In addition, from 1923 a provision of one-third of a pint of milk for one penny was introduced, and in 1934, the Milk Marketing Board supplied milk to schools at half a penny a bottle. By 1939 just over 13% of children received free milk under the provisions of the Education Acts and a further 55% received milk supplied by the Milk Marketing Board.[54] Notice, however, that even allowing for the impact of school meals and clinics, the per capita estimates for unemployed households are significantly below the contemporaneous recommended minimum intakes for adult men reported in Section 1.

On average energy and nutrient availability from food provided at school and in clinics has a positive impact on household nutritional availability, especially among households with an unemployed head, but probably not a decisive one except other than in the case of calcium availability. Of course, the entire household would not consume these foods, as they would only be consumed by school aged children and the mother. In consequence, a per capita analysis is somewhat misleading here, but since we do not know about the distribution of other foods within the household, it is the only option available to us

Table 10 Carnegie Trust 1938/9: Female headed households (household mean energy and nutrient availability per capita per day)

Female headed (n=40)	Energy (kcal)	Protein (gm)	Calcium (gm)	Phos (gm)	Iron (mgm)
Home consumption	2209	60.83	0.54	0.97	10.09
School Meals & Clinics	100	4.03	0.12	0.11	0.23
Carnegie Adjusted Total	2391	67.18	0.67	1.12	11.46

The results reported in Table 10 show that female-headed households, most of who are working, have on average less energy available per capita than the average for all households. The shortfall is around 270 kcal per capita per day. However, as would be expected, they have around 230 more kcal per capita day available than households where the head is unemployed.

[54] Harris, B *The Health of School Children*, (1995), pp.120-121

Finally, for all foods consumed at home (but not foods provided in clinics or school meals), we were able to make our own estimates of the nutritional value of the quantities of foods recorded in the Carnegie survey, using McCance and Widdowson's food composition tables and making the same set of assumptions as described for the 1937/8 Ministry of Labour survey in Section 2. These are reported in Table 11 below.

Table 11 Carnegie Trust 1938/9: Household 'Home Consumption' mean energy and nutrient availability per capita per day, calculated using McCance and Widowson's food composition tables.

All households (n=1352)	Energy (kcal)	Protein (gm)	Calcium (gm)	Phos (gm)	Iron (mgm)
Home consumption (as reported by Carnegie Trust)	2346	63.77	0.54	1.03	10.83
Home consumption (as estimated by authors)	1994	56.55	0.42	0.90	8.65
MoL37/8 (as estimated by authors)	2762	73.6	0.65	1.21	10.7

It is clear from Table 11 that using McCance and Widdowson food composition tables, with modern food waste assumptions, generate lower estimates of nutritional availability. The only difference between the estimates reported in Table 11 row 1 and row 2 are the assumptions made to transform the quantities of the foods recorded into quantities of nutrients available. Our estimates are around 80 to 88% of those reported by the Carnegie Trust. There are three possible reasons for this. First, mismatch between foods in large food groups. The most obvious candidate here is "meat", where our estimates are an average of a wide variety of different cuts for beef and veal, mutton and lamb, pork, poultry, rabbits and offal, weighted in accordance with Stone's estimates of total consumer expenditure on each.[55] For these items, the Carnegie Trust had the precise breakdown based on the descriptions in the households' record sheets. Secondly, the nutritional values for a given food type may have changed between the 1930s and the present day. The most obvious example here would be the fat content of meat. Thirdly, and in our view the factor likely to be responsible for the greater

[55] Stone (1954) p.

part of the discrepancy reported in Table 11, the waste assumptions utilised by the Carnegie Trust are unknown, whereas those reported in McCance and Widdowson, which we have applied to generate our estimates, often reduce the quantity of food purchased to an edible proportion that is 60% to 70% of the purchase value. This is particularly true of meats and vegetables. Elsewhere, we have argued that these modern waste assumptions are likely to be an over-estimate of those relevant to the analysis of 1930s household consumption.[56] There is also evidence, from the Ministry of Food's attempt to replicate the Carnegie Trust calculations in the 1950s, using the Rowett Institute's original record sheets for all households in Tarves, that there was sometimes confusion between the use of "as purchased" quantities and "edible proportions". [57] Nevertheless, it also seems likely from this comparison that the estimates we report for average nutritional availability from the Ministry of Labour's working class expenditure survey, based as they are on the use of modern food composition tables (Table 11 row 3), are themselves likely to be lower bound estimates.

Section 4: Conclusions

The research reported here offers a simple resolution of the conflicting of working class nutrition in the 1930s as reported in the introduction. In early part of the 20th century, British working class households had mostly moved into a position of comfortably being able to provide a nutritionally adequate diet for their members. However, unemployed households and those without a male breadwinner were, on average, significantly less well fed.
The research is based upon transparent and carefully documented assumptions required to convert food purchases data and diet books into potential nutrition.

We have documented elsewhere the significant improvement in real incomes per head for working households between the Board of Trade's first survey of working class household expenditure in 1904 and the Ministry of Labour's survey of working class household expenditure in 1937/8.[58] We assign the almost complete elimination of destitution (defined as households below Bowley's poverty line) to a rise in real incomes and a fall in household size

[56] Gazeley and Newell, *Economic History Review* "Food consumption and Nutrition in Edwardian Britain" REF
[57] TNA MAF 300/18 'The Family Food Survey. Carnegie Survey 1938-1939' Letter from Ministry of Food to Dr D. Harvey, Rowett Institute Aberdeen, 9th December 1955, paragraph (h) which states, "The most important discrepancy, however, concerns the relation between quantities purchased and edible proportions…The sources of difference arise, namely that the Rowett Institute coders have either (i) not converted E.P to A.P, or (ii) converted E.P to A.P. using a different conversion from ours."
[58] Gazeley and Newell (2011) *Oxford Economic Papers* "The End of Destitution"

in roughly equal measure. It should not be a surprise, therefore, that in comparison with our estimates of nutritional availability for working households in 1904, there was significant improvement by 1937/8. Table 12 provides the evidence for this statement. The average working household in 1904 had available roughly 2300 kcal per capita per day. The results reported here for the nutrient availability for the average household in the Ministry of Labour's 1937/8 survey, was 600 kcal per capita per day more (based on a smooth comparison using modern food composition tables for both estimates). Similar increases are evident for the other nutrients tabulated in Table 11, with the exception of Vitamin B1 availability, which improves marginally.

Table 12: Nutrient availability per day MoL1937/38 survey and BoT 1904

Per capita Income Group or Skill Group	Energy kcal	Protein gms	Calcium gms	Iron mgm	Vit A	Vit B1	Vit C
BoT 1904 "Bowley poor"	1653	47.7	0.25	6.7	268	0.8	26.1
BoT 1904 Unskilled Head of Household	2028	60.6	0.32	8.6	344	1.0	32.2
BoT 1904 Average	2328	68.0	0.43	9.3	415	1.0	42.3
Mol 1937/8 <10s	2065	52.4	0.40	7.70	330	0.74	25.0
Mol 1937/8 10s-15s	2478	65.1	0.50	9.38	453	0.91	36.2
Mol 1937/8 15s-20s	2711	71.0	0.61	10.44	542	1.03	47.5
Mol 1937/8 Average	2923	77.33	0.68	11.36	600.1	1.09	57.9

Among the poorest households, there was an equally striking improvement between the two surveys. Energy availability for those households and the bottom of the distribution in 1904 ('Bowley Poor') was only 1650 kcal per capita. The poorest income class in 1937/8 had available 400 kcal per capita per day more than this. This is a significant gain that has import

implications for overall health and possibly for labour productivity. It is also reflected in an improvement in average heights as Table 13 makes clear.

Table 13: Estimated average final heights of men and nutrition of poorer households, 1904-1932-5

		Unskilled, BoTR 1904	MoL 1937/8 10-15s per week per capita
Kcals	*/day*	2006	2478
Height (by birth cohort)	Cm	170	175
Height (cohort reaching maturity)	Cm	168.2	170

Height data from Floud et al (2011) Table 2.5 p.69. Floud et al report the heights of mature males by by century and quarter. In Table 10 above we have adjusted these to represent birth cohorts. So, for example, 170cm was attained by men reaching maturity in the second quarter of the twentieth century, so would have been born in the first quarter

We concur with the Ministry of Food's assessment that "… neither the Orr or Carnegie samples can be representative of Great Britain as whole, or of any particular class throughout the country." [59] On the basis of the average estimates we have derived from the Ministry of Labour 1937/8 working class expenditure survey, it is difficult to accept the view that malnutrition was widespread in 1930s Britain., This is a stratified random sample of all working class households and we have shown that the surviving returns are a reasonable sample of the original survey. What then of the widespread contemporary concern, and the fierce debate among historians, relating to malnutrition in Britain prior to the Second World War? We believe that the analysis of the Carnegie Trust household budgets do provide the key to addressing this paradox. The 1937/8 Ministry of Labour survey relates to nuclear households, mainly in employment. For the substantial sub-set of unemployed households in the Carnegie Trust 1938/9 survey, energy availability as calculate by the Rowett Institute, was less than 2,000 per capita. Using modern food composition tables we estimate that

[59] TNA MAF 300/1 Crawford Bradley Comparisons. Notes on the comparability of pre-war budgetary samples. p.2

energy availability for these unemployed households was around 1640 per capita per day - almost identical to our estimate for those in abject destitution before the First World War. Among female-headed households, the Rowett Institute estimate energy availability at around 2,200 kcals per capita, but using modern food composition tables, we reckon this figure would be around 10 per cent lower still. As J.B. Priestley reminds us, there was more than one Britain in the 1930s.[60] For the vast majority of working class households' life was immeasurably better than it had been a generation earlier. Real wages were higher, households were smaller on average and the state was providing additional help with feeding children at school. This translated into significantly better diets than those enjoyed by their forefathers before the First World War. But if the head of household lost their job, or the wife was deserted or forced to survive alone in widowhood, 1930s Britain could look remarkably similar to the struggle for survival that characterised life for the poor in the Edwardian period.

[60] J.B. Priestley *English Journey*

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Appendix A1: Food Quantity and Price Data Ministry of Labour 1937/8 Survey

Tea, coffee cocoa: The prices for these three items are available on Stone (p.151: Table 51). The respective prices have also been computed from the survey data. The differences in prices between the two sources are very low (0.07-0.22d/lb).

Fresh, cured (dried) and shellfish: Except for shellfish for which price information was not available from the survey data, both price sources had price information for the respective items (Stone p.67: Table 17). While the price differential was minimal for fresh fish (0.12d/lb), the price differential for dried and cured fish was quite significant (2.62d/lb). The prices for fresh fish were averaged over seven different categories of fish. The price for canned fish category was only available from Stone.

Meat and Eggs: The price information for all meat (beef, mutton, pork) is available from both sources (Stone p.52: Table 11). It should be noted that there is no distinction between home and imported prices for all the different meat categories in the survey data while such a distinction is made in Stone. Hence, an average of home and imported prices for each of the meat categories was used as a corresponding price for each category. The home produced beef price differential is minimal (0.05d/lb) while the price differential for all other categories of meat, including that of imported beef is quite high, ranging from 1.77 to 4.35 d/lb. The price for eggs was also available from both sources (p.52: Table 11). The price discrepancy was small (0.068d per egg). However, the units of measurement were reported as number (survey data) and dozen (Stone). In Stone, egg price was available for home produced and imported eggs, and hence, averaging the price over the two generated the corresponding general price for eggs. Eggs quantity was reported in number and in dozens in the survey data and in Stone, respectively. For bacon and ham, the available price in Stone was bacon and ham separately so we used the price averaged over the two to generate the corresponding price for Stone. The price for tinned meat, (reported as canned imported meat in Stone) was available only from Stone. The price for other meat, (reported as offal in Stone) was available only from Stone. The price for rabbit, (reported as game and rabbit in Stone) was available only from Stone.

Sugar and confectionery: The price information for sugar is available from both sources (Stone p.144: Table 46) and is reported in lb in both cases. The price discrepancy is small (0.15d/lb). Sweet price info (reported as sugar confectionery in Stone), is only available in Stone.

Fruits: The prices for these items are available on Stone (p.134: Table 51). There are considerable price discrepancies in most of the fruit items, ranging from 0.23 to 3.59 d/lb. Due to the fact that the units mostly in numbers in the survey data and are reported per lb in Stone, we have converted the number units into lb units. Accordingly, we used 0.25lb per one apple, 0.38lb per one banana, and 0.42lb per one orange. The price for tinned and bottled fruit, (reported as canned and bottled fruit) is available only in Stone. Since there was distinction between the home produced and imported categories, we computed the price figure by averaging the figure over the two. The price for other fruit category was only available from Stone.

Dairy products: The prices for most of dairy products are available from both sources (Stone p 95: Table 28). Fresh and skimmed milk are reported in pints in the survey data and in quarts in Stone. Similarly, condensed milk is reported in by the tin in the survey data and in lb. in Stone. To standardize this, a 0.5lb/tin and 1lb/tin conversion factors were used depending on whether the prices per tin were 3-4d/tin and 6-8d/tin, respectively. Moreover, in Stone, fresh milk prices and butter prices are available for both consumed on farms and purchased for final

consumption- we used the figure corresponding to the latter. There was no price info available for the cheese not by weight category, and hence we used the cheese by weight price instead. There were several categories of cream prices in stone, depending on whether they are home or factory produced, and whether they are for final consumption or for distribution. We used the price for factory fresh cream purchased for final consumption as cream price. The price differentials range between 0.18 and 4.1d/lb, but this is a small item of consumption.

Margarine and other fats: The prices for margarine and other fats are available from both sources (Stone p.95: Table 28). All items are reported in lb in both price sources. The price differential be

Bread, flour and cereals: The prices for most bread, flour and cereal items are available from both sources (Stone, p.27: Table 3). Flour and bread were reported in d. per 7lb and d. per 4lb and the price figures were adjusted into lb units. We used the survey data implied unit price for bread to derive quantity data in for the rare cases in which none was reported. Information on bread not by weight was not available from both sources, so we used the bread price available from Stone. In addition, we added a 50% premium to the bread price on Stone to get the corresponding fancy bread price. Oatmeal and rice had one price in Stone and we used this one figure for all the three categories. In addition, we used this same price for the item proprietary cereals for which no price was available. The price differentials between the survey data and those from Stone, range from 0.117 to 0.435d/lb.

Biscuits and cake mixture: The prices for biscuits were available from both sources (Stone, p.27: Table 3). For cake mixture, however, while the price is available only from the survey, the corresponding price information was unavailable in Stone. The closest information available is the price for cakes, which we used as a proxy for cake mixtures.

Vegetables: The price for most vegetables is available from both sources (Stone p.120: Table 38). The price for greens and legumes (reported as Green Peas in Stone), and tinned and bottled vegetables (reported as canned vegetables in Stone) is available only in Stone.

Jam, marmalade and syrup: The prices for jam and marmalade are available from both sources (Stone p.160: Table 54) and measured in lb. Syrup price (reported as syrup and treacle) is available in Stone only.

Other items with price information from the survey information only: Items with price info computed from the survey information but with no corresponding entries in Stone include dried legumes sausage and meat pie categories. In addition, no price info was available from both sources for the dried milk and other food category.