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## **ABSTRACT**

### **The First World War and Working-Class Food Consumption in Britain**

In this paper we reassess the food consumption and dietary impact of the regimes of food and food price control and eventually, food rationing, that were introduced in Britain during the First World War. At the end of the War the Sumner Committee was convened to investigate into effects of these controls on the diets of working class families. With the help of some of the original returns of an earlier 1904 survey, we are able to reassess the Sumner Committee findings. We find that although calories intakes did not fall for households headed by unskilled workers, there were substantial falls for skilled workers' households. We also find that the price controls were particularly effective in changing the pattern of food spending. In particular, because the prices of many fruits and vegetables were allowed to rise very much more than other foodstuffs, there were large falls in the intakes of nutrients most associated with these foods, to average levels well below today's recommended intakes.

JEL Classification: N34, N44

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## Introduction

This paper re-assesses the impact of the First World War years on the food consumption of working class British households. The Working Class Cost of Living Committee of 1918 (hereafter the Sumner Committee) was appointed by the Government to enquire into the increase in the cost of living since July 1914.<sup>1</sup> The Committee surveyed the expenditures of a sample of working class households in the first week of June 1918. They compared these findings with estimates of consumption for 1914, which they made by taking the results of a 1904 survey of working class household expenditures and making adjustments for the relatively minor price and income changes 1904-1914. They concluded that in June 1918, ‘the working classes, as a whole, were in a position to purchase food of substantially the same nutritive value as in June 1914’ and that ‘families of unskilled workmen were slightly better fed at the later date, in spite of the rise in the cost of food.’<sup>2</sup> These claims are re-assessed below, by re-working the Sumner Committee’s 1914 benchmark using some recently rediscovered returns<sup>3</sup> of the 1904 survey. In addition we assess whether there is econometric evidence on how household choices in 1918 were affected by price controls and rationing.

Why is this of interest? Recent contributions to the literature on the ‘Home Front’ in Britain during the First World War have emphasised the way in which political and economic spheres were increasingly entwined, especially in the period after the fall of the Asquith Liberal government at the very end of 1916. The formation of Lloyd George’s coalition government is typically seen as marking a shift to one in which political and military leaders more fully embraced the needs of ‘total war’. From the beginning of 1917, it is argued that the government adopted a ‘statist-corporatist’ approach to wartime production and the direction of labour.<sup>4</sup> Ultimately, military victory required the state to control, regulate and direct the activities non-combatants to an extent that was scarcely imaginable in 1914.

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<sup>1</sup> Working Class Cost of Living Committee, 1918. ‘Report of the Committee appointed to enquire into and report upon 9i) the actual increase since June, 1914, in the cost of living to the working classes and (ii) any counterbalancing factors (apart from increases in wages) which may have arisen under war conditions.’ P.P 1918, Cd 8980 (Sumner Committee).

<sup>2</sup> Sumner Committee p.9

<sup>3</sup> See Gazeley and Newell (2010), and discussion of these data in section *N* below.

<sup>4</sup> Millman, B., *Managing Domestic Dissent in First World War Britain*, (2000, p.167).

According to Gregory, in the first two years of the war, food shortages were of localised and of relatively short duration, as high prices had ‘provided incentives for increased supply’. But as the war progressed, shortages and inflationary pressure increased, and demands for state intervention became more persistent. The 1917 enquiry into industrial unrest pointed to increases in the cost of living, along with deep rooted suspicion of profiteering, as the primary causes of discontent, though local factors also played their part in some regions.<sup>5</sup> As a consequence, state control of food prices and food distribution networks was seen as vital to combating this widespread industrial unrest that had increased sharply in the spring of 1917 and continued to significantly disrupt production until the end of the year. In November 1917, more than 0.5 million working days were lost due to strike action, before strike activity declined early in 1918.<sup>6</sup> The extent to which there existed true ‘revolutionary potential’ at this time remains contested, but by mid-1918, most authors agree that the moment had passed.<sup>7</sup>

Moreover, influential comparative accounts have stressed the connection between the form of economic organisation adopted and the state’s ability to pursue the military conflict.<sup>8</sup> Winter maintains that the German corporatist model, whereby economic management was the outcome of a ‘tangled bureaucracy working through the large firms and army’ led to chaos as profits soared and shortages remained chronic. This accelerated inflationary pressures and created a subsistence crisis that ‘undermined the regime itself’.<sup>9</sup> In contrast Winter argues that after a period of amateurish bungling in Britain, characterised by the ‘business as usual’ mantra of the Asquith government, military failures in 1915 shocked Britain into a successful but ‘unplanned experiment in state capitalism.’<sup>10</sup> State regulation and the distribution of essential supplies, particularly foodstuffs, were sufficiently equitable to avert both political and subsistence crisis, despite the potentially crippling impact on Britain of

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<sup>5</sup> Gregory, A *The Last Great War*, (2008, p.196)

<sup>6</sup> Waites, B *A Class Society at War* (1987, p.232)

<sup>7</sup> According to Millman, the growing number of people with social grievances coupled with the example of the Russian Revolution created an ‘embryo revolutionary amalgam’. *Managing Domestic Dissent in First World War Britain*, (2000, p.167). A more nuanced view can be found in Waites, *A Class Society at War* (1987, pp. 185-221)

<sup>8</sup> Winter, J.M., ‘Public Health and the Political Economy of War, 1914-1918’ *History Workshop*, (1988, No.26)

<sup>9</sup> Winter cited in Ferguson, N., *The Pity of War* (1998, p.256)

<sup>10</sup> Winter cited in Ferguson, N., *The Pity of War* (1998, p.255)

Germany's unrestricted submarine warfare campaign that began in January 1917. Indeed, according to Winter, most indicators of civilian health, and especially infant mortality, significantly improved during the War.<sup>11</sup>

Ferguson has recently questioned the viability of the explanation for the Western powers victory based on 'defective organisation' in Germany.<sup>12</sup> With respect to foodstuffs, he argues that consumption of meat and butter was similarly reduced in both Britain and Germany and that Winter overstates his case with respect to health improvements.<sup>13</sup> Furthermore, the rationing of basic foodstuffs, which is typically seen as the greatest success of British regulation, did not commence until December 1917, and then only in a piecemeal fashion. A truly national system that regulated the consumption of basic foodstuffs was not introduced in the United Kingdom until July 1918.

The argument for seeing rationing as the centrepiece of wartime food policy seems to fall because the timing is wrong. However, much else was done earlier, with the Ministry of Food taking increasing control from the middle of the war onwards of food supply and pricing with a central aim of maintaining bread supplies.<sup>14</sup> Thus it is still possible to mount an argument that the progress of the war was affected by the actions of the Ministry of Food.

Before the War about 60 percent of the energy value of the British diet was derived from foodstuffs that were imported, and the Food (War) Committee of the Royal Society was able to ascertain that the supply of food to the UK population was sufficient to provide about 3,400 calories per person on average in the years immediately preceding the outbreak of War. In the first two years of the War, this figure increased to about 3,500 calories, before falling back to around 3,300 calories in 1917 and 1918.<sup>15</sup> This data says nothing about the equitability of the distribution

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<sup>11</sup> Winter, J.M., 'The Impact of the First World War on Civilian Health in Britain', *Economic History Review*, 1977, Vol.30/3 Table 3, p.493. See also, Winter, J.M., *The Great War and the British People*, Macmillan 1985, pp103-153

<sup>12</sup> Ferguson, N., *The Pity of War* (1998, pp.255-267)

<sup>13</sup> See also Bryder, L 'The First World War: Healthy or Hungry?' *History Workshop* (1987 No 24 )

<sup>14</sup> Beveridge, W. H., *British Food Control*, OUP, 1928, is a very full account.

<sup>15</sup> Dewey, P.E., 'Nutrition and living standards in wartime Britain' in Wall, R., and Winter, J.M., (ed.) *The Upheaval of War*, Cambridge, CUP, 1988, p203 Table 6.4

of food supply or changes thereof during the War. It also conceals significant changes in the diet forced upon the population by the shortages of supply.

The argument that *working-class* food consumption in Britain was maintained at roughly pre-war levels rests almost exclusively upon the evidence collected and analysed by the Sumner Committee.<sup>16</sup> The Sumner Committee was not interested in rationing *per se* but all changes in working class living standards caused by the War. They had no suitable 1914 benchmark, so they extrapolated from the published results of Board of Trade's 1904 survey of expenditures of nearly 2,000 working class households, adjusting for changes in prices, incomes and family size. The Sumner enquiry was carried out a few weeks before the imposition of a national rationing scheme in July 1918. Local schemes were already in existence in most areas and their operation was subject to the approval of the Food Controller. The national scheme unified these schemes and introduced the concept of variation of the ration depending upon age and physical activity.<sup>17</sup>

The First World War took place during an era of demographic transition, in which fertility fell and average family size became significantly smaller. The Sumner Committee attempted to address changes in wartime household structure by expressing household food consumption in terms of a 'Standard Family' in 1914 and 1918, based upon a number of equivalent adults (men). Similar procedures were adopted by the Food (War) Committee of the Royal Society in their calculations of food supply, based upon current scientific understanding of the variation in nutritional requirements of individuals of different ages and sex.<sup>18</sup>

The household demand for particular foods would likely have changed as a result of changes in household structure and income, irrespective of the impact upon the War on supply. In this article, we use the original extant returns of the 1904 Board of

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<sup>16</sup> In addition data exists for a small sample of working-class households in Glasgow. In this study, the diets of 48 households in 1911-12 were compared with the diets of 40 (different) households in 1915-16. 10 of these households were re-examined in early 1917. The results broadly indicate that households were maintaining the energy value of their diets during the War. Quoted in Dewey, P.E., 'Nutrition and living standards in wartime Britain' in Wall, R., and Winter, J.M., (eds.) *The Upheaval of War*, Cambridge 1988, p205

<sup>17</sup> See Beveridge, W *British Food Control* 1 pp 217-8.

<sup>18</sup> Dewey, P.E., 'Nutrition and living standards in wartime Britain' in Wall, R., and Winter, J.M., (ed) *The Upheaval of War*, Cambridge, CUP 1988, pp197-8 (under table 6.1/6.2)

Trade's household expenditure survey to forecast what food consumption would have been in 1918, at prevailing June 1918 prices, given the change in income and demographic structure of households between 1904 and 1918. We are then able to compare predicted consumption in 1918 with actual consumption as recorded by the Sumner Committee. This allows us to make judgements about the probable impact of rationing. We find that though no doubt rationing was important to understand the path of spending on some key foods, such as sugar and butter, it is also clear that price controls, and the lack of them on some foods, play a large role in understanding the quite radical shifts in consumption across foodstuffs.

We find that there were large shifts in the contents of the weekly food basket between 1904 and 1918 with large increases in consumption of sausages, bacon, bread, margarine and condensed milk and large falls in the consumption of, *inter alia*, butter, fruit and vegetables. The overall calorific value of foods consumed fell quite notably for skilled workers but fell little for unskilled workers, so the outcome was a partial levelling of food consumption. However, irrespective of skills, the collapse, to between one quarter to one third of former levels, of fruit and vegetable consumption lead to major falls in intakes of vitamins A and C in particular, so the concentration on bread and breadstuff, perhaps inevitably, did have a major medium-term disadvantage. We conclude that our research suggests a modification of the conventional view of the effects of food control in the First World War.

## **1. Food Rationing and Price Controls.**

The Royal Commission on Sugar Supplies was established in the month that War was declared, but for the following two years, it did not intervene to set sugar prices. During the first year of the War, food prices increased by 32 percent (by June 1915) and increased again by a similar amount in the year following (a 61 percent increase by June 1916, relative to June 1914).<sup>19</sup> The Board of Trade appointed a Departmental Committee on Prices in June 1916, which first reported in September, but made no recommendation for radical intervention.<sup>20</sup> Nevertheless, in the face of continuing

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<sup>19</sup>Bowley, A.L. *Prices and Wages of the United Kingdom* (1920) p.36, Table XIV.

<sup>20</sup>Broadberry and Howlett note the reactive nature of food controls during the period, see Stephen Broadberry and Peter Howlett, 'The United Kingdom during World War 1: Business as usual?' in



Parliamentary pressure, a Royal Commission of Wheat supplies was established in October 1916 and the establishment of a Food Department of the Board of Trade, with compulsory powers under DORA, was established in November 1916.

The post of Food Controller was announced in November 1916, but the post was not filled, by Lord Devonport, until after the Asquith government fell and Lloyd George formed his coalition in December 1916. By this stage, as Beveridge tactfully put it 'the existence of a food problem had been recognized but not its seriousness.'<sup>21</sup> By October 1916, about 2m tons of merchant ships had been lost during the War.<sup>22</sup> One civil servant has summed up the seriousness of Lord Devonport's inactivity in response to these losses, by suggesting that 'delays in facing the problem brought the country near to disaster.'<sup>23</sup> This war on British supplies from abroad increased with the German declaration of unrestricted submarine warfare in January 1917. As the volume of tonnage sunk escalated, the retail prices of many foods increased sharply in the first few months of 1917.<sup>24</sup> Only in June 1917, when Lord Devonport was replaced by Lord Rhondda, did the government move to establish almost complete control over most food supplies.

During Lord Rhondda's 'heroic phase' of regulation,<sup>25</sup> the control of the importation, distribution and price of food was predicated on a 'Breadstuffs policy.' This was based on the premise that whatever else was in short supply, the supply of breadstuffs had to be maintained. For instance, it was recognized that it was inefficient to allow the conversion of cereals to animal protein, which would, in turn, be consumed by humans. This recognition led to the government implementing policies designed to: reduce the size of flocks of sheep and herds of cattle while maintaining cereal supplies (both at home and abroad); increase the acreage devoted to grain; increase the percentage of flour extracted from wheat; encourage and then require the dilution of

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Stephen Broadberry and Mark Harrison (eds.) *The Economics of World War I*, Cambridge, CUP, page 224.

<sup>21</sup> Beveridge, p.2

<sup>22</sup> Figure provided by Runciman to the House of Commons, October 17 1916. Quoted in Beveridge p.23

<sup>23</sup> This is attributed to E.M.H. Lloyd, who was a senior civil servant at the Ministry of Food at the time. Quoted in Manton, K 'Sir William Beveridge, The British Government and Plans for Food Control in Time of war, c. 1916-1941', *Contemporary British History*, 23:3 September 2009, p.363

<sup>24</sup> Beveridge p.2

<sup>25</sup> Manton, K 'Sir William Beveridge, The British Government and Plans for Food Control in Time of war, c. 1916-1941', *Contemporary British History*, 23:3 September 2009, p.366

wheat with other grains in breadstuff production and restrict the importation of animal feed-stuffs.<sup>26</sup>

Roughly eighty percent of breadstuffs consumed in the UK came from overseas and the maintenance of supply chiefly depended upon securing sufficient imports. The government (through the auspices of the Wheat Commission) took over importation of wheat and other cereals and in April 1917 flour mills came under state control and importation and the extraction of flour was regulated.<sup>27</sup> The Wheat Commission also attempted to reduce demand by trying to persuade Britons to avoid waste and eat less bread, but unlike most other European combatant nations, bread was never rationed during the war. The policy of the Commission was to ensure a sufficiency of bread to lessen the impact of other foods in short supply.

Local rationing schemes, devised in consultation with the Food Controller, were introduced in December 1917 for sugar, butter and margarine in response to growing food queues in the late autumn of 1917. These schemes became ubiquitous in early 1918, although a National Rationing Scheme was not introduced until July 14<sup>th</sup> 1918, with many foods continuing to be rationed after the armistice. By this stage, rationing took account of variation in the needs of individuals depending upon age and physical activity. Birmingham was the first city to implement rationing, based on a maximum allowance per person measured in ounces per week, which could be purchased on production of a household ration card.<sup>28</sup> Sugar was rationed at 8 oz. per person between January 1918 and September 1919, and butter and margarine was rationed at 4 oz. each, until June 1918 when the allowance increased to 5 oz.

In February 1918, butcher's meat was rationed in London and the Home Counties (and extended to several other districts in March 1918 and to the entire country in April 1918 under the National Meat Scheme). Meat rationing was based upon coupons of a fixed value of 15d (3 coupons of 5d each), which could be used to purchase any cut of meat. This allowed an element of consumer choice regarding the cut of meat purchased, though in reality working class households rarely bought

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<sup>26</sup> Beveridge pp 82-3.

<sup>27</sup> Beveridge pp.88-9.

<sup>28</sup> Beveridge p.197.

expensive cuts. The value of the meat ration was reduced to 12d at the beginning of May, raised to 16d in the middle of May and 21d in July. Bacon and ham were also rationed under London and Home Counties, initially at 4 oz. per person per week in February, and then to 5 oz. with the introduction of the National Meat Scheme in March and 8 ounces in May 1918. Every kind of meat was originally included in the London and Home Counties scheme, but by May, the commoner types of offal had been de-rationed. Lard was rationed locally at 2 oz per person per week from January 1918 and then nationally by July. Tea was rationed locally (typically at 2 oz. per person) from April 1918 and by a system of national registration of customers in July. Local schemes also operated for the rationing of jam (usually 4 oz per person) and cheese.<sup>29</sup>

Set against this background of the control of supply and the rationing of certain basic foods to consumers, the Ministry of Food also regulated the price of most foodstuffs during the later stages of the War. Indeed, as we argue in Section V, price controls were at least as important as rationing in the process of managing consumer demand, but have received far less attention. Indeed, key secondary texts dealing with the 'home front' ignore them or mention them only in passing.<sup>30</sup> The list of foodstuffs where the Ministry of Food controlled prices includes most items in the working-class diet of 1918 and all of the staple foods. According to Beveridge, who was a civil servant at the Ministry of Food during the War, the control of prices falls into five categories. (i) Foods for which the Ministry of Food acted as importer or purchaser: cereals including bread and flour, meat, sugar, tea, cheese, margarine, dried fruits, canned meat, condensed milk, imported bacon and ham, imported lard, imported butter. (ii) Foods which the Ministry exercised some control over production, importation or distribution and where the wholesale and retail price was controlled: home produced bacon and ham, home produced lard, home produced butter, milk, eggs, potatoes, fresh fish, canned salmon, cocoa powder, cocoa butter, desiccated coconut, jam, jelly, marmalade, imported onions. (iii) Foods for which the Ministry did not control production, importation or distribution, but did control wholesale and retail prices:

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<sup>29</sup> Beveridge, Table VII p.224-5.

<sup>30</sup> For example, in his discussion of food and household necessities De Groot discusses rationing, but does not mention price controls. DeGroot, G.J., *Blighty: British Society in the Era of the Great War*. (1996, pp201-204), and the emphasis in Marwick's account *The Deluge*, (Second Edition 1991, pp231-236), is on rationing as a response to shortages.

apples, blackberries, strawberries, marrows, home produced onions, poultry and game, rabbits, syrup. (iv) Foods for which wholesale, but not retail, prices were controlled: currants, damsons, gooseberries, greengages, plums, pears and raspberries. (v) Foods where retail prices were controlled: oats and maize products, rice, beans, peas, lentils, swedes, coffee, chocolate and sweetmeats. Foods that were not controlled include: biscuits, sago, tapioca, pearl barley, macaroni, cornflour, tinned fish (other than salmon) shell-fish, fresh vegetables other than potatoes, onions and marrows, bananas, oranges, nuts, canned fruit, salad oil, vinegar, honey, salt and spices.<sup>31</sup>

## **2. The Sumner Committee's findings**

The Sumner Committee carried out a survey of working class household expenditure in the first week of June 1918. This survey used a modified version of the questionnaire used in the 1904 Board of Trade enquiry. The 1918 questionnaire included more detailed questions on non-food expenditure and the ages of the occupants of the household, but did not enquire about household income. The 1918 enquiry was distributed in a similar way to the previous Board of Trade survey, through Trade Unions, Co-operative Societies and Medical Officers of Health etc. About 10,000 forms were distributed and about 1,400 were returned, the vast majority of which recorded household expenditure for the first week of June, with smaller numbers for later weeks in June and July. 66 of these budgets were rejected as being incomplete or unreliable.<sup>32</sup>

Like its immediate predecessor, this was not a random sample of working-class urban households.<sup>33</sup> Using a set of criteria relating to occupation, wage-rates and the nature of work undertaken, the budgets were classified into five classes, viz: clerks (householder middle-class), skilled, semi-skilled, unskilled working class households, and 'on service' (householder away in the army or navy). Where quantity data on foods consumed was missing, local price data was used to estimate consumption. At the beginning of June, little produce from the garden or allotment would have been

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<sup>31</sup> Beveridge, Food Control, pp.163-4

<sup>32</sup> Sumner p.12

<sup>33</sup> See Gazeley and Newell, EHR forthcoming

available to households, but some householders recorded producing their own eggs and potatoes and the value of these was added to household expenditure.<sup>34</sup>

They were also sub-divided by region, corresponding roughly to the regions of analysis used in 1904. According to the Sumner Report, 'Budgets were received from nearly all the large towns and from a great number of districts in England and Wales and South Scotland.'<sup>35</sup> In comparison with 1904, the households in 1918 were typically older and the number of workers greater. As a consequence, there were fewer families in 1918 with young children than had been the case in the 1904 survey.

The Committee did not have a comparable survey for 1914, so the results of the 1904 enquiry were adapted to provide estimates of working class consumption for July 1914. The Sumner Committee used a sample of household budgets from the 1904 enquiry and on the basis of these a number of modifications were made to the analysis originally published in 1905.<sup>36</sup> First, the published results were re-weighted on the basis of population proportions, as the original enquiry over-represented London and Scotland. Ireland was also excluded from the analysis, as the 1918 survey did not include it. In fact, these modifications made little difference to average working class expenditure, compared with the average reported in 1905.<sup>37</sup> Second, the quantities of food purchased in 1904 were adjusted in various ways to reflect the changes that were estimated to have occurred between 1904 and 1914.<sup>38</sup> Finally, the revised quantity estimates was combined with data on changes in relative prices to provide estimates

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<sup>34</sup> Six classes were actually used, the sixth being where the householder was away on munitions work, but only 6 of these were returned and these were discarded from the analysis. Sumner p.12

<sup>35</sup> Sumner p.13.

<sup>36</sup> Cd2337 BPP1905

<sup>37</sup> Average total household weekly expenditure based on the re-weighted calculations using 818 household budgets was 263.5d (110p), compared with 270d (112.5p) given in the original analysis presented in 1905. Sumner p.10

<sup>38</sup> The method chosen for this adjustment depended upon the type of food. Data on consumption per head published in Statistical Abstract was used to estimate these changes for sugar, tea, coffee, cocoa and rice. In the case of meat and bacon, Ministry of Food estimates based on data provided by the Board of Agriculture were used. Data on the production and importation of wheat was used to estimate changes in bread and flour consumption. The consumption of eggs, potatoes, vegetables and other foods were assumed unchanged and some allowance was made for the diminished importance of cheese. Changes in the consumption of butter and margarine were interpolated from Ministry of Food and Board of Trade data. In this way, the Sumner Committee generated estimates of average working class consumption in 1914 for some but by no means all foods. The foods for which estimated 1914 quantities were reported were: bread and flour, meat, bacon, lard and suet, new milk, cheese, butter, margarine, potatoes, vegetables, rice and tapioca, oatmeal, tea, coffee, cocoa and sugar. Expenditure, but not quantity, estimates were provided for biscuits and cake, fish, eggs, condensed milk, vegetables, fresh fruit, jam, syrup, pickles, and other food. Sumner Committee pp.10-11

of expenditure in July 1914. The changes resulting from modifying quantities were 'very slight' as the Sumner Committee Report maintains that 'practically the same total expenditure is found whether we apply 1914 prices to the 1904 expenditures as first given or to the revised 1914 quantities.'<sup>39</sup>

The results of the analysis of the 1918 budgets were presented in terms of a 'standard Family' by class. This was an attempt to make comparable figures for the average expenditure on food by class, where the classes had a different structure, accomplished by using an equivalence scale based on food needs to express household composition in terms of 'equivalent men' They then inflated or deflated the recorded expenditures by class by the difference between the male equivalent for an average 'Standard Family' and the average male equivalent household size for each class.<sup>40</sup> The same adjustment was carried out for the average working class expenditure and quantity of food consumed derived from the analysis of the 1904 budgets, in order to produce 1914 estimates of the consumption of a 'Standard Family.'

### **3. Reinvestigating the path of food consumption through the First World War**

The results of the 1904 enquiry were published as Cd 2337 in 1905 under the heading '*Consumption and Cost of Food in Workmen's Families in Urban Districts in the United Kingdom.*'<sup>41</sup> The enquiry made use of a fixed format questionnaire. The forms provide information on locality; number and age of children; occupation of the head of household; household weekly income, including earnings of the head and average additional weekly family income; weekly house rent and number of rooms occupied. Fully half the questionnaire is concerned with expenditure and quantity of

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<sup>39</sup> Sumner p.11

<sup>40</sup> The food needs of individuals were based on the Inter-Allied Scientific Food Commission recommendations. The equivalence scale used was: male over 14 years old =1, female over 14 years old and children 10 to 14 = 0.83, children 6-10 years = 0.70 and children under 6 = 0.5. The average working class family in the Sumner Committee enquiry consisted of 5.60 persons, which translated into a 'Standard Family' of 4.57 equivalent men. Skilled households consisted of 5.5 persons or 4.5 equivalent men, semi-skilled households consisted of 5.3 persons or 4.3 equivalent men, unskilled households consisted of 6.0 persons or 4.8 equivalent men and clerks consisted of 4.6 persons or 3.7 equivalent men. The average expenditures on food (and quantities consumed) for each of these classes was adjusted to make them comparable with the average working-class standard family by inflating or deflating expenditure (and quantities consumed) by the ratio of the number of equivalent men to the standard family. Sumner Committee pp.13 and 14

<sup>41</sup> 1,808 of the 2283 returns were considered usable. These were combined with 136 returns collected from London and suburbs during the 1903 enquiry.

food consumed by the family, but no details of non-food expenditures were requested other than rent.

1,033 returns from this enquiry are extant. Gazeley and Newell (2010) provides a detailed discussion of the relationship between this sub-sample and the original enquiry, potential biases in both the recovered returns and the original survey and the implication of these biases for the analysis of average working class consumption behaviour. Readers interested in the detail of these arguments are referred to that article, but it is necessary to re-iterate the main conclusions here.

First, the recovered returns are not a simple sub-sample of the 1,944 returns using in the Board of Trade's analysis that is published as Cd 2337 (1905). The recovered extant returns include a number of those that were received too late for the Board of Trade's analysis or were considered to be incomplete in some way. We have carefully reviewed all of those in this category and most are useable. The elimination of those that are problematic in some way reduces the useable sample to 990 useable returns. We refer to this sample as the Board of Trade recovered returns (hereafter BoTR). Secondly, the geographical distribution of BoTR returns is not a random sample of the original. The BoTR returns include most, if not all, of the original Scottish budgets and correspondingly fewer from England, and especially from London, than the original. Thirdly, the BoTR sample has slightly more children per household and a little higher average food expenditure. Overall, the households in the BoTR sample have an average of 3.8 children compared with 3.6 children in the original survey. Finally, in terms of weekly household income distribution, the BoTR sample has a few more families in both extremes of the distribution, but otherwise the match between the two samples is very close.<sup>42</sup> We also suggest a method whereby the BoTR data can be made more representative of average working class experience by using it in conjunction with the 1906 wage census.

The recovery of a sizeable proportion of the original Board of Trade returns for 1904 allows for a careful re-examination of the analysis undertaken by the Sumner

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<sup>42</sup> Gazeley, I. and Newell, A.T. (2010) 'Poverty in Edwardian Britain', *Economic History Review* forthcoming

committee. The committee's investigation was hamstrung by differences between the questions asked in the 1904 and 1918 enquires. The 1918 survey did not collect data on weekly income of the household members and the 1904 data was not analysed by skill group. In consequence, the Sumner committee was forced to make comparison by skill category in 1918 with the average working-class experience in 1914 (derived, as we have seen, from average working class experience in 1904). This is problematic because as Gazeley and Newell (2010) show, the 1904 survey was not based on a good approximation of the distribution of male incomes (as shown by the 1906 wage census), as it includes too few low income wage earners.

It is not known how well 1918 survey captured the distribution of male earner incomes, as the respondents were not asked to record their weekly income. Moreover, there is no near contemporaneous wage census with which to compare the results had they of done so. It is clear, however, that their investigation of changes in food consumption that occurred during the First World War starts from a too high base. A better way forward would seem to be to make a comparison by skill group and then weighting these in accordance with estimates of the relative numbers within each skill category. This involves assigning a skill category to each of the head of households in the 1904 BoTR sample, using their description of occupation in conjunction with data on their weekly wage.

The results of this exercise for the 1904 and 1918 enquiries are summarised in Table 1. This table also reports total household income for the 1904 survey and recorded total expenditure in the case of the respondents to the 1918 survey. Both surveys contain a large proportion of skilled working class head of households, but this is especially true in the case of the 1904 survey, where nearly two-thirds of all households in the sample have a skilled head, compared with just over half of the sample in 1918. Also, in both surveys there are relatively few semi-skilled heads of household and a fairly small number of clerical heads of household. In the 1904 survey less than 5 percent have a head of household in a clerical occupation. Total household income in 1904 was roughly half of recorded total expenditure in 1918, reflecting the significant increase in nominal pay during World War One.



*<Tables 1 and 2 about here>*

Differences in household structure between the 1904 and 1918 surveys are also evident in Table 2. For all skill categories, household size was smaller in the 1918 survey than it had been in 1904. The household size among unskilled respondents was larger than semi-skilled or skilled households in both surveys.<sup>43</sup> Most of the difference in household structure between 1904 and 1918 is the significantly greater number of children in the earlier survey – especially in the 5-10 year old age bracket. Generally, there are slightly more children aged 11-14 years in the 1918 survey, reflecting the older age of the head of household in the later survey.<sup>44</sup>

Table 3 provides a summary of food consumption per head, by skill, in 1904 derived from the analysis of the BoTR sample. Recall that this was a fixed format survey that recorded household expenditure on foods and sometimes the quantity of food purchased. In cases where expenditure on a food type was recorded, but the quantity purchased was not, the average unit price derived from the survey returns was used to estimate the missing quantity data. In keeping with the methodology adopted by the Sumner Committee, the quantity of food grown in the garden or on allotments in 1904 is also included in these estimates.<sup>45</sup>

Comparing either of the published average values for quantities of food consumed for the working-class households in the 1904 enquiry with those derived from an analysis of the recovered original expenditure records from this enquiry (Table 3 column (1) and (2) compared with column (3)), there is a close correspondence for most articles of food. Note that quantities consumed are only reported for a sub-set of foods in the published reports of the 1904 enquiry, whereas it has been possible to derive a full set

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<sup>43</sup> Head of households with a clerical occupation had significantly larger households in 1904 than in 1918, but as already noted, there were few of these in the 1904 sample.

<sup>44</sup> It was noted in the report that there was ‘as absence of a great proportion of men under 45’. Sumner p.13

<sup>45</sup> Note that the results of the 1904 enquiry as published by Sumner are a little different from those published in 1905 in Cd 2337 (compare column (1) and (2) in Table 3). It is not clear why these differences exist. In the case of bread and flour, it is probably due to the inclusion of a small amount of biscuits and cakes in Cd 2337. The discrepancy is large and possibly important for potatoes and it is possible that the Sumner report is in error here as the implied unit price is also higher Cd 2337 gives an average of 16.92 lbs of potatoes (3.02lbs per capita given household size is 5.6 persons), with an average expenditure of 11d, giving a unit price of 0.65d/lb. Sumner reports an average of 14.9lbs, with an average expenditure of 10.75d, giving a unit price of 0.72d/lb. Cd 2337 p, 5 and Sumner Table 1 p.11. This value was carried forward as the 1914 and gives an especially low base for comparison with consumption in 1918.

of food quantities purchased from the extant returns. In the case of bread and flour, bacon, all meat (other than bacon), cheese, butter, margarine, rice and tapioca, tea, coffee and cocoa, the correspondence between the two sets of values is very close, as Table 3 shows.

*<Table 3 about here>*

There is, however, significant variation with respect to potatoes and oatmeal. With respect to the former, we have already noted that Sumner report a low figure for average potato consumption. The difference between the BoTR and Cd.2337 data is probably partly explained by the inclusion of garden and allotment produce in the estimates of consumption derived from the recovered original returns, where as in the published results of the analysis of the original enquiry this was excluded.<sup>46</sup> In addition, the consumption of potatoes was higher among households in Scotland and Ireland, and these form a higher proportion of the extant BoTR sample than the full survey. Whatever the cause, the significant difference between the Sumner figure, the 1904 published results and the BoTR data are important, as we shall see later. The much higher per capita consumption of oatmeal in the extant returns is due to the preponderance of Scottish households in the extant returns.<sup>47</sup> Within the BoTR sample, the consumption of food per capita generally increases with skill category within the working class, except for bread and flour and margarine, where higher per capita consumption is recorded among the unskilled than the skilled households.

Table 4 sets out comparable evidence for the June 1918 enquiry. These data have been derived from the Sumner Report, but are expressed in terms of weekly per capita consumption by skill category. For some foods, quantity estimates have been derived from the reported expenditure data (see notes to Table 4). As already noted, these

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<sup>46</sup> In the BoTR data 35 households state that they grow potatoes in their garden or allotment and 2 households receive potatoes as gifts. Of the 35 households that grow their own, a number provide details of the quantity produced. The average is 10lbs per week and this has been used as an estimate for all households than self-produce. The addition of home grown produce makes the 1904 data consistent with the 1918 budgets because the Sumner Committee also included home grown produce in their budgets. However, the inclusion of self-produced potatoes is not in itself sufficient to explain the disparity between the published returns and the extant returns of the 1904 Board of Trade survey.

<sup>47</sup> The higher recorded consumption of fresh milk in the extant returns is probably due to the inclusion of buttermilk.

estimates were derived from household expenditure returns that used the same fixed questionnaire headings as used in the 1904 survey.

<Table 4 about here>

Table 5 demonstrates how per capita consumption changed between 1904 and 1918, by skill group, using the BoTR data in comparison with Sumner. For all skill types, household consumption of bread, bacon, sausages, offal and tinned meat, fish, milk, condensed milk, margarine, potatoes, rice and tapioca, oatmeal, coffee, cocoa, jam and syrup was greater in 1918 than it had been in 1904. Note that the smaller increase in the *per capita* consumption of potatoes between 1904 and 1918 than reported in most secondary texts is the result of using a higher base figure derived from the 1904 BoTR data than Sumner.<sup>48</sup> Per capita consumption of bacon and condensed milk was roughly twice what it had been in 1904, while margarine consumption increased greatly, 13-fold on average for skilled workers.

Set against these increases, the *per capita* consumption of flour, butcher's meat (pork, mutton, veal and beef), lard and suet, cheese, butter, sugar, tea and fruit, vegetables (other than potatoes) and dried fruit declined.<sup>49</sup> The list of foods for which *per capita* consumption unambiguously declined between the turn of the century and end of the last summer of the First World War includes nearly all the items that were staple items of consumption in working class households before the War, other than bread and potatoes.

<Table 5 about here>

As Table 1 shows, total household income/expenditure roughly doubled between 1904 and 1918. Taken together with the reduction in household size recorded in Table 2, this rise in nominal household income outweighs increases in overall consumer prices between the two dates.<sup>50</sup> As a consequence, real per capita income modestly

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<sup>48</sup> For example, Dewey, P.E. 'Nutrition and Living standards in Wartime Britain' in Wall, R and Winter, J. *The Upheaval of War*, Cambridge, CUP (1988, Table 6.8, p208)

<sup>49</sup> The consumption of oatmeal also declined, but this probably reflects the preponderance of Scottish households in the 1904 survey, which is not replicated in the 1918 data.

<sup>50</sup> The Office for National Statistics composite price index also roughly doubles between 1904 and 1918 (it has a value of 9.3 in 1904 and 19.9 in 1918, based on 1974 = 100). Consumer price inflation since 1750, Table 1 p.43. Thus, if a skilled worker's household earned 460d on average (see Table 1) in 1904, then a similar household spent on average 486.5d in 1918 at 1904 prices.

increased<sup>51</sup> and hence, in the absence of wartime shortages and rationing, it might be expected that consumption per head would also have increased for most foods. The natural question that follows is over the causes of the shifts in food consumption that we have documented. In the next section we present data and perform statistical exercises that suggest that price movements, some of which were generated by price controls, were the key to the shifts in food consumption.

### **5: What caused the changes in food spending through the War?**

As we have outlined, the Sumner Committee estimated expenditure and consumption for 1914 by adjusting data from the 1904 survey. These adjustments were not major, though. As the Report notes:

‘The results of the changes of quantities estimated from 1904 to 1914 is so slight that practically the same total expenditure is found whether we apply 1914 prices to the 1904 quantities ..... or to the 1914 quantities as now estimated.’<sup>52</sup>

In consequence a comparison of consumption in 1904 with 1918 is going to be little different a comparison based on 1914 and 1918. In order to try to evaluate the impacts of the price and income changes on food expenditures, we estimated a system of demand equation for the main food types and then use 1918 price and income data to construct forecasts of 1918 food expenditures, by main skill group. Our estimates are based on a standard budget share equation for 1904, where the share of food  $j$  in family of type  $k$  is:

$$S_{jk} = a_j + \beta_{1j} \log X_k + \beta_{2j} \log N_k + \beta_{3j} R_k + e_{jk} \quad (1)$$

Here  $S$  is the share of food in total expenditure,  $X$  is total expenditure,  $N$  is family size,  $R$  is the share of children in the family and  $e_{jk}$  is an error term. Appendix Table A provides estimates of the parameters for this equation using the 1904 data, for the food types described in both the 1904 and 1918 household surveys. The Tobit estimation procedure is employed, to account for the natural censoring that occurs in data for a single week’s expenditure on some kinds of food. The estimated

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<sup>51</sup> The increase was of the order of 10% over those fourteen years.

<sup>52</sup> Sumner p.11

parameters are generally significant. In most cases the parameters on total expenditure and family size take equal but opposite values as predicted by standard utility theory. For some foods, it was not possible to generate estimates of the parameters of demand. These were storable foods with high percentages of zero recorded expenditure (for example, sausages, bacon, offal and tinned meat, cocoa, coffee and margarine).

We then take price, income and household structure data for 1918 to forecast 1918 food shares by skill group using the parameters from this equation:

$$\hat{S}_{jk}^{1918} = a_j^{1904} + \beta_{1j}^{1904} \log X_k^{1918} + \beta_{2j}^{1904} \log N_k^{1918} + \beta_{3j}^{1904} R_k^{1918} \quad (2)$$

Finally we take these food share forecasts together with income and price data to derive estimates of predicted 1918 quantities of household food consumption by skill category as follows:

$$\hat{Q}_{jk}^{1918} = \hat{S}_{jk}^{1918} * X_k^{1918} / P_{jk}^{1918} \quad (3)$$

Where  $\hat{Q}$  is predicted quantity of food  $j$  for household  $k$  in 1918,  $\hat{S}$  is the predicted share of food  $j$  in household  $k$  expenditure,  $X$  is total household expenditure for 1918 for household  $k$  recorded in the Sumner report and  $P$  is the price of food  $j$  for household  $k$  in 1918. Since both expenditure and quantity are recorded for most foods, predicted quantities reported in Table 6 have been estimated using the implicit average price of foods by skill category.<sup>53</sup>

*<Tables 6 and 7 about here>*

The statistics in table 7 suggest a limited impact of rationing at prevailing (mostly controlled) prices. In the case of sugar, our forecast of demand is about 50 percent higher than the rationed quantity and consumption was at the maximum rationed level. This test suggests that sugar rationing had a significant impact. For butter and tea, both subject to shortage, the ration is above the level of consumption found by Sumner, but below our forecast. One interpretation of this is that the ration was set

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<sup>53</sup> It has not been possible to estimate predicted food consumption in 1918 for clerks because the Sumner report does not provide details of household total expenditure for clerks.

too high and the shortages bit hard into consumption.<sup>54</sup> For the other foods where we have numbers in Table 7, lard, meat, bacon and jam, the ration was greater than or equal to actual and forecast levels of consumption, so it seems that the price controls were sufficient to restrain demand.

The history of price regulation and control during the War is complicated, though as we noted in Section I, by the time of the last months of the War the prices of almost the entire British diet were controlled.<sup>55</sup> The part of that story that interests us here pertains to those price controls that were in operation at the time of the Sumner enquiry in June 1918. The Ministry of Food had fixed the wholesale price of meat (home killed beef, veal, mutton and lamb) at 104d per 8lb in September 1917. The price of imported meat was fixed at 92d per 8lb. Retailers were required to sell meat at no more than 2.5d per lb above this figure. The price of home produced meat remained roughly constant after date this until May 1918, whereas imported meat increased to the same price as home produced meat. The price of high quality bacon was fixed at 28d per lb in June 1918.<sup>56</sup>

The idea that people should have as much 'war bread' as they could afford to buy was at the centre of government policy, but this was threatened by significant price increases in the spring of 1917.<sup>57</sup> The price of a pre-war 4lb loaf had increased from about 5.5d to 12d and worries over industrial unrest prompted the government in September 1917 to introduce a price subsidy for bread to reduce the price of a 4lb loaf to 9d.<sup>58</sup> This price was fixed for two years.<sup>59</sup> Similarly, the Sugar Commission fixed the retail price of sugar to 7d per lb in September 1917, for nineteen months.<sup>60</sup> Maximum milk prices were fixed for the producer of 5.5d a quart in early 1917 and this was the price prevailing a year later. During 1918 butter was sold at a uniform

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<sup>54</sup> Bowley, *Prices and Wages*, p.55

<sup>55</sup> See Beveridge *Food Control* and Bowley *Prices and Wages*

<sup>56</sup> Bowley, *Prices and Wages* pp.49-50

<sup>57</sup> The Board of Trade increased extraction rates in November 1916 from 70 to 76 percent and again in January 1917 to 81 percent (or the substitution of 5 percent of other cereals). In February 1917 a further 5 percent of addition of other cereals became compulsory, making it impossible to produce white bread. In April 1917 the percentage addition of other cereals was raised to a minimum of 10 and maximum of 25 percent. In September 1917 the percentage was raised again to a minimum of 20 percent and a maximum of 30 percent and finally in March 1918 to a minimum of 30 and maximum of 50 percent. Beveridge p.96 and 98.

<sup>58</sup> Beveridge pp.108-09

<sup>59</sup> Bowley, *Prices and Wages*, p.52

<sup>60</sup> Bowley, *Prices and Wages*, p.53

price of 30d per lb and the price of margarine was regulated at 12 or 14d per lb.<sup>61</sup> For tea, supply failures in 1917 led the Ministry of Food to create a uniform blend of tea from all of its supplies, which was sold at 32d per lb from April 1918 until March 1919.<sup>62</sup> Table 8 shows the relationship between the controlled retail prices of foods and the implied retail prices given in the Sumner report. Note that, with the exception of butcher's meat, the correspondence between the Ministry of Food's price and the price actually paid by consumers is very close.

Chart 1 summarises the changes in prices and quantities demanded for the main foods 1904-1918. There is a rough negative correlation across food types. Foods where no controls were attempted, fruit and vegetables in particular, experienced very large price hikes, and heavy reductions in consumer purchases. For foods where prices were successfully controlled, such as bread, milk and margarine, demand increased strongly. This graph suggests strongly that changes in wartime diet primarily reflect changes in prices, rather than the control of quantities through rationing. Remember that price controls preceded the introduction of rationing by some time. This suggests strongly that historians who have focussed on the success of the rationing programme have emphasised the wrong element of the Ministry of Food's activities.

*<Table 8 about here>*

*<Chart 1 about here>*

## **6. The nutritional consequences of the First World War.**

Lastly we turn to the assertion made in the Sumner Report, Beveridge, and most histories, to the effect that the food planning efforts of the Ministry of Food were eventually successful in maintaining the nutrition of the population through the war. We investigate this by converting the food quantities purchased, on average, by households of (a) skilled workers and (b) unskilled workers, into nutrients and macronutrients. For this exercise we take the nutritional values of foodstuffs from McCance and Widdowson (1978)<sup>63</sup>. We then create a foodstuff-nutrient matrix and apply it to the data on average consumption by skill type presented in Tables 3 and 4,

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<sup>61</sup> Bowley, Prices and Wages, pp.55-56

<sup>62</sup> Bowley, Prices and Wages, p.59

<sup>63</sup> Paul, A.A. and D.A.T. Southgate, 'McCance and Widdowson's The Composition of Foods', London, HMSO, 1978.

creating average weekly *per capita* intakes of nutrients and macronutrients. These are presented in Table 9 alongside *per capita* daily recommended intakes (DRIs) from the US Food and Nutrition Board (2002).

Evaluating the extent to which these diets were nutritionally adequate is fraught with difficulties. As we have seen the estimates of per capita consumption of nutritional intakes that we have derived are themselves subject to error because we only have generic descriptions of food purchased (such as ‘beef’), not the precise type purchased (such as ‘stewing steak off the bone’) and do not know how the food was stored, prepared or cooked. The yardsticks by which we could judge these intakes are themselves extremely controversial and subject to change over time, as ‘adequacy’, even ‘nutritional adequacy’ is partly socially determined.<sup>64</sup> Moreover, the standards are also revised in relation to improvements in nutritional knowledge. It is also worth distinguishing between levels of nutritional intake to maintain life and levels of nutritional intake necessary to maintain a *healthy* life. The former are typically very low indeed and quite controversial.<sup>65</sup> The latter are periodically revised in accordance with changing conceptions of ‘health’. They also incorporate a safety margin to allow for individual nutritional variation.<sup>66</sup>

Recommend Dietary Intake or Allowances were developed and designed by nutritionists to evaluate food supplies for population groups, and were not intended as a tool for ‘...assessing either the adequacy of nutrient intakes or nutritional status..’<sup>67</sup> This is because an individual’s nutritional status can only be identified by clinical assessment. Nevertheless, in general terms, as Harper has observed, ‘if the intake of a nutrient is equal to or greater than the RDA, the risk of nutritional adequacy is remote. If it is less than 50% of the RDA, the risk of inadequacy is high. However, when intake falls between these extremes all that can be said is that the farther intake falls below the RDA the greater is the risk of deficiency.’<sup>68</sup>

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<sup>64</sup> See Rein., M ‘Problems in the definition and measurement of poverty’, in Townsend, P., *The Concept of Poverty* pp.44-63

<sup>65</sup> See Truswell, A.S., ‘Minimal estimates of needs and recommended intakes of nutrients’. In Yudkin. J., (Ed), *The Diet of Man: Needs and Wants* (1978, pp.4-19)

<sup>66</sup> Miller, D.S., ‘Nutritional surveys’ in Oddy, D.J. and Miller, D.S. (Eds) *The Making of the Modern British Diet* (1978, p.208)

<sup>67</sup> Harper, A.E ‘Evolution of Recommended Dietary Allowances – New Directions?’ *Annual Review of Nutrition*, 1987 p.526

<sup>68</sup> Harper p.526



At the turn of the twentieth century, the scientific understanding of nutrition was in its infancy. While it was appreciated that protein was necessary for muscle development the relationship between food consumed and diseases arising from nutritional deficiency was understood in only the vaguest terms.<sup>69</sup> It was not until the interwar period that the dietary importance of vitamins was recognised. In consequence it is not really possible to appraise the adequacy of turn of the twentieth century working class diets by using a contemporaneously devised standard. Instead, we have used the UK 1991 standard.<sup>70</sup>

The 1991 Reference Nutritional Intake (RNI) values replaced the 1979 Recommended Daily Amounts (RDAs) and the change of language is import here. RDAs were defined as ‘the average amount of the nutrient which should be provided per head in a group of people if the needs of practically all members of the group are to be met.’<sup>71</sup> In contrast, RNI were set so as to define more rigorously what ‘practically all’ meant. RNIs are set at’ a notional two standard deviations above the Estimated Average Requirement (EAR), and assuming that requirements of a nutrient are normally distributed, this ensures an amount of a nutrient that is at least adequate for 97.5% of the population.<sup>72</sup>

Approaching this problem on a per capita basis, although having the merit of simplicity, does not allow us to take full account of the differing nutritional needs of household members depending upon gender, age and activity. In consequence, individuals in the households in the 1904 survey have been assigned to broad groups, defined by age and gender.<sup>73</sup> On this basis, individual RNIs have been aggregated to create a household RNI value, which has then been compared with the available nutrients for the household derived from the household’s food consumption data.

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<sup>69</sup> See Oddy Plain Fare p.43

<sup>70</sup> , Department of Health, ‘Dietary Reference Values for Food, Energy and Nutrients for the United Kingdom: Report of the Panel on Dietary Reference Values of the Committee on Medical Aspects of Food Policy’, HMSO 1991

<sup>71</sup> Dietary reference values , 1991, p.1

<sup>72</sup> Dietary reference values , 1991, p.3

<sup>73</sup> In the 1904 survey the genders of children are generally not given. We assigned household members aged less than 19 years into the following age range groups: less than 1 year, 1-3 years, 4-6 years, 7-10 year, 11-14 years, 15-18 years. The average McCance and Widdowson RDA/RNI values of nutrients for people in these age ranges were assigned to member s of these groups.

*<Table 9 about here>*

The results of this exercise confirm the Sumner Committee's findings about calorie intakes, but also show that the concentration on breadstuff came at a nutritional price. Calorie intakes for skilled households fall somewhat, but those for unskilled households fall very little on average. Thus there is some reduction in the skill gap in nutrition overall. For the average skilled household, the fall in calorie intake mostly takes the form of a fall in fat intake. There are marked falls, to close to or below the DRI levels, in the Vitamins A and C content of foods. These are the vitamins whose major sources are likely to be fruit and vegetables. There are falls in other nutrients, notably Vitamins B12 and D especially for skilled workers, but the massive proportional falls in fruit and vegetable consumption visible in Table 5 seem the most likely cause of these emerging shortfalls of Vitamins A and C. These were the foods for which price control was, according to Beveridge, either 'not wholly successful', or never tried.<sup>74</sup>

## **Conclusion**

It is surprising that the impact of the regulation of food distribution and food pricing has not received more attention from historians. This is especially so in view of the unanimity within the literature that points to the centrality of cost of living increases, particularly food price rises, in causing industrial unrest and significant lost production. The relative prices changes we document are the products of the effects of price and distribution controls, of rationing in some cases, and of shifts in demand caused by the war, as well as shifts in supply caused by the actions of the Ministry of Food and by the hostilities.

We find that, for families, the outcomes of the food control system that emerged through the war were broadly as Sumner and Beveridge, among others, have concluded, with some important qualifications. Calorie intakes were on average maintained, especially for lower wage households. However, our calculations strongly suggest that calorie intake was lowered for more prosperous households, and

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<sup>74</sup> Beveridge 'British Food Control', page 167.

in particular, fat intake was lowered. This story of the wartime levelling of nutrition has not prominent in the historiography of the First World War, whereas levelling is one of the dominant themes of the literature on the home front during the Second World War.<sup>75</sup>

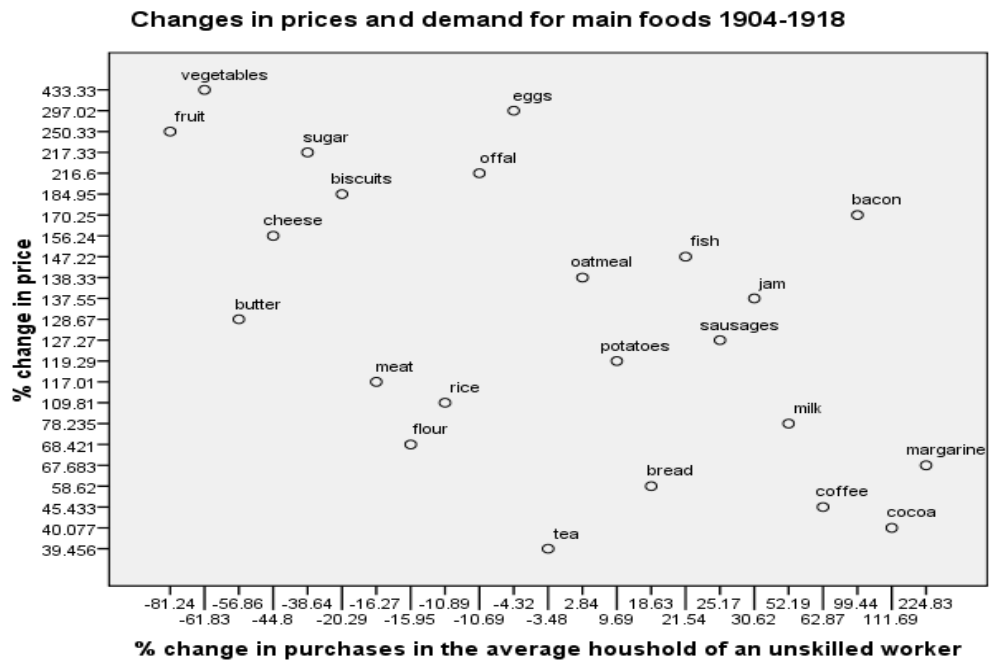
Below these headlines we record that for many foodstuffs that were not regulated, prices rose dramatically, and consumption of these foods fell hard. These were not, in the main, items that were considered at the time to be key foodstuffs, but they were those foods that delivered important vitamins. The consequence of the prices rises for fruit and vegetables, and the general lack of attention to maintaining intakes of them, was a very notable reduction in the intakes of vitamins A, B12 and C, to very low levels well below today's RDIs. It seems likely a lesson was learnt later on in food administration, as during the Second World War the government introduced the vitamins welfare scheme in an effort to protect vulnerable groups from vitamin shortfalls.<sup>76</sup>

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<sup>75</sup> See, for example, Zweiniger-Bargielowska, Ina, *Austerity in Britain: Rationing, Control, and Consumption 1939-1955*, OUP 2000.

<sup>76</sup> Zweiniger-Bargielowska, Ina, *Austerity in Britain: Rationing, Control, and Consumption 1939-1955*, OUP 2000, pp32-3

**Chart 1: Price and demand changes**



**Table 1: Income and Expenditure 1904 and 1918 by skill category**

|              | <b>Number of cases</b> | <b>Total Household Income</b><br><i>(d per week)</i> | <b>Total Household Expenditure</b><br><i>(d per week)</i> | <b>Total Household Food Expenditure</b><br><i>(d per week)</i> |
|--------------|------------------------|--|---|--|
| <b>1904</b>  |                        |  |   |  |
| Skilled      | 521                    | 460  |   | 278  |
| Semi-Skilled | 68                     | 437  |   | 258  |
| Unskilled    | 137                    | 351  |   | 227  |
| Clerical     | 35                     | 569  |   | 284  |
| Total        | 791                    |  |   |  |
| <b>1918</b>  |                        |  |   |  |
| Skilled      | 566                    |  | 988 (972)   | 598 (588)  |
| Semi-Skilled | 139                    |  | 876 (824)   | 555 (522)  |
| Unskilled    | 266                    |  | 790 (833)   | 513 (541)  |
| Clerical     | 104                    |  | Not given   |  |
| Total        | 1075                   |  |   |  |

Source: 1904 data derived from 1,024 of the original returns to the Board of Trade survey as calculated by Gazeley and Newell (2010). 1918 data derived from Sumner p.7 and Table III p.15

Notes:

1. The figures reported are for a Standard Family and were adjusted by Sumner to provide comparable estimates for a Standard Family of constant 4.57 persons.

2. In Table 1, the figures in parenthesis are our adjustments to the Sumner Committee estimates to reflect differences in household size. These have been calculated by using the inverse of the multiple applied by the Sumner committee; vis: Skilled have been deflated by 0.984, semi-skilled deflated by 0.941, unskilled increased by 1.054, clerks deflated by 0.806)

**Table 2: Household Structure in 1904 and 1918**

| <b>1904</b>  | <b>Children under 5 yrs</b> | <b>Children 5-10 yrs</b>   | <b>Children 11-14 yrs</b> | <b>Persons 15 and over</b> | <b>Total persons</b> |
|--------------|-----------------------------|----------------------------|---------------------------|----------------------------|----------------------|
| Skilled      | 0.84                        | 1.23                       | 0.63                      | 3.02                       | 5.72                 |
| Semi-Skilled | 0.78                        | 1.31                       | 0.61                      | 2.96                       | 5.66                 |
| Unskilled    | 0.95                        | 1.37                       | 0.78                      | 2.98                       | 6.08                 |
| Clerical     | 0.84                        | 1.33                       | 0.82                      | 3.11                       | 6.1                  |
| <b>1918</b>  | <b>Children under 6 yrs</b> | <b>Children 6 - 10 yrs</b> | <b>Children 10-14 yrs</b> | <b>Persons 14 and over</b> | <b>Total persons</b> |
| Skilled      | 0.72                        | 0.74                       | 0.86                      | 3.17                       | 5.49                 |
| Semi-Skilled | 0.72                        | 0.61                       | 0.83                      | 3.12                       | 5.28                 |
| Unskilled    | 1.02                        | 0.85                       | 0.93                      | 3.15                       | 5.95                 |
| Clerical     | 0.45                        | 0.50                       | 0.71                      | 2.97                       | 4.63                 |

Source: 1904 data derived from 1,033 of the original returns to the Board of Trade survey as calculated by Gazeley and Newell. 1918 data derived from Sumner Table II p.14

Notes

- The reporting of household structure by economic class is ambiguous in the Sumner Committee Report. The age categories as described appear to overlap. We interpret their description as children five and under; children 6-10, children 11-14, and persons over 15.

**Table 3: 1904 per capita consumption of food by skill category (lbs per week)**

|                | <b>Average<br/>BoT<br/>Sumner</b> | <b>Average<br/>BoTR<br/>unweighted</b> | <b>Average<br/>BoTR<br/>Census<br/>weighted</b> | <b>Skilled<br/>Working-<br/>Class</b> | <b>Semi-<br/>Skilled<br/>Working<br/>-Class</b> | <b>Unskilled<br/>Working-<br/>Class</b> |
|----------------|-----------------------------------|--|---|---------------------------------------|---|---|
| Bread          | n/a                               | 4.25                                   | 3.77  | 3.70                                  | 3.81  | 3.83                                    |
| Flour          | n/a                               | 1.31                                   | 1.71  | 1.68                                  | 1.71  | 1.79                                    |
| Bread Flour    | 5.61                              | 5.56                                   | 5.48  | 5.38                                  | 5.52  | 5.62                                    |
| Biscuits Cake  | n/a                               | 0.2                                    | 0.14  | 0.19                                  | 0.10  | 0.10                                    |
| Butchers meat  | n/a                               | 0.97                                   | 1.03  | 1.02                                  | 1.08  | 0.81                                    |
| Sausages       | n/a                               | 0.09                                   | 0.05  | 0.06                                  | 0.04  | 0.05                                    |
| Bacon          | 0.25                              | 0.22                                   | 0.26  | 0.29                                  | 0.25  | 0.19                                    |
| Offal tin meat | n/a                               | 0.08                                   | 0.09  | 0.11                                  | 0.07  | 0.08                                    |
| Fish           | n/a                               | 0.37                                   | 0.34  | 0.32                                  | 0.38  | 0.26                                    |
| Lard suet      | 0.17                              | 0.12                                   | 0.18  | 0.19                                  | 0.18  | 0.15                                    |
| Eggs           | n/a                               | 0.34                                   | 0.27  | 0.29                                  | 0.28  | 0.18                                    |
| Milk           | 1.57                              | 2.21                                   | 1.69  | 1.77                                  | 1.79  | 1.17                                    |
| Cond Milk      | n/a                               | 0.03                                   | 0.05  | 0.05                                  | 0.04  | 0.06                                    |
| Cheese         | 0.16                              | 0.15                                   | 0.16  | 0.18                                  | 0.14  | 0.13                                    |
| Butter         | 0.33                              | 0.38                                   | 0.35  | 0.37                                  | 0.35  | 0.27                                    |
| Margarine      | 0.03                              | 0.02                                   | 0.02  | 0.01                                  | 0.01  | 0.05                                    |
| Potatoes       | 2.67                              | 3.90                                   | 3.29  | 3.51                                  | 3.18  | 2.99                                    |
| Vegetables     | n/a                               | 0.74                                   | 0.90  | 1.01                                  | 0.90  | 0.59                                    |
| Fruit          | n/a                               | 0.32                                   | 0.40  | 0.44                                  | 0.42  | 0.21                                    |
| Rice Tapioca   | 0.18                              | 0.20                                   | 0.20  | 0.21                                  | 0.18  | 0.20                                    |
| Oatmeal        | 0.22                              | 0.56                                   | 0.21  | 0.22                                  | 0.19  | 0.24                                    |
| Tea            | 0.11                              | 0.11                                   | 0.12  | 0.12                                  | 0.12  | 0.09                                    |
| Coffee         | 0.02                              | 0.01                                   | 0.01  | 0.02                                  | 0.01  | 0.01                                    |
| Cocoa          | 0.03                              | 0.02                                   | 0.03  | 0.03                                  | 0.02  | 0.01                                    |
| Sugar          | 0.94                              | 1.01                                   | 1.02  | 1.05                                  | 1.05  | 0.84                                    |
| Jam            | n/a                               | 0.28                                   | 0.21  | 0.24                                  | 0.20  | 0.20                                    |
| Syrup          | n/a                               | 0.06                                   | 0.06  | 0.04                                  | 0.06  | 0.08                                    |
| Dried Fruit    | n/a                               | 0.10                                   | 0.14  | 0.14                                  | 0.16  | 0.10                                    |

Notes:

1. All foods measured in lbs per head, except milk (pints per head) and eggs (number)
2. Column (1) derived from Sumner Table 1 p.11. This table reports consumption per week, converted into per capita consumption by dividing by 5.6 persons. Column (2) derived from Cd. 2337 p.5, converted into per capita consumption by dividing by 5.6 persons.
3. The average number of persons in a family by class for Great Britain is : Skilled 5.5; Semi 5.3; Unskilled 6.0; Working Class average 5.6; Clerks 4.6 (Sumer Table II p.14)

**Table 4: 1918 per capita consumption of food by skill category (lbs per week)**

|                     | <b>Average Working-Class</b> | <b>Skilled Working-Class</b> | <b>Semi-Skilled Working-Class</b> | <b>Unskilled Working-Class</b> | <b>Clerks</b> |
|---------------------|------------------------------|------------------------------|-----------------------------------|--------------------------------|---------------|
| Bread               | 4.70                         | 4.60                         | 4.62                              | 4.80                           | 2.87          |
| Flour               | 1.46                         | 1.47                         | 1.63                              | 1.41                           | 1.84          |
| Biscuits & Cake     | 0.14                         | 0.17                         | 0.13                              | 0.08                           | 0.16          |
| Meat                | 0.71                         | 0.70                         | 0.71                              | 0.70                           | 0.67          |
| Sausages            | 0.07                         | 0.07                         | 0.07                              | 0.05                           | 0.07          |
| Bacon               | 0.46                         | 0.48                         | 0.47                              | 0.39                           | 0.44          |
| Offal & tinned meat | 0.11                         | 0.11                         | 0.09                              | 0.09                           | 0.09          |
| Fish                | 0.37                         | 0.40                         | 0.28                              | 0.31                           | 0.33          |
| Lard suet etc       | 0.14                         | 0.13                         | 0.14                              | 0.12                           | 0.15          |
| Eggs                | 1.63                         | 1.91                         | 1.58                              | 1.30                           | 1.45          |
| Milk                | 2.09                         | 2.33                         | 1.95                              | 1.83                           | 2.73          |
| Cond Milk           | 0.09                         | 0.09                         | 0.09                              | 0.09                           | 0.06          |
| Cheese              | 0.07                         | 0.08                         | 0.08                              | 0.07                           | 0.07          |
| Butter              | 0.14                         | 0.16                         | 0.13                              | 0.11                           | 0.14          |
| Margarine           | 0.16                         | 0.16                         | 0.16                              | 0.18                           | 0.14          |
| Potatoes            | 3.57                         | 3.58                         | 3.55                              | 3.39                           | 3.15          |
| Vegetables          | 0.29                         | 0.31                         | 0.29                              | 0.24                           | 0.35          |
| Fruit               | 0.08                         | 0.11                         | 0.06                              | 0.04                           | 0.13          |
| Rice & Tapioca      | 0.23                         | 0.23                         | 0.23                              | 0.19                           | 0.25          |
| Oatmeal             | 0.25                         | 0.29                         | 0.21                              | 0.25                           | 0.23          |
| Tea                 | 0.10                         | 0.11                         | 0.11                              | 0.09                           | 0.09          |
| Coffee              | 0.02                         | 0.03                         | 0.02                              | 0.02                           | 0.02          |
| Cocoa               | 0.04                         | 0.04                         | 0.03                              | 0.03                           | 0.04          |
| Sugar               | 0.50                         | 0.50                         | 0.50                              | 0.51                           | 0.46          |
| Jam                 | 0.29                         | 0.30                         | 0.30                              | 0.25                           | 3.50          |
| Syrup               | 0.13                         | 0.16                         | 0.11                              | 0.09                           | 0.14          |
| Dried Fruit         | 0.03                         | 0.04                         | 0.04                              | 0.02                           | 2.87          |

Source: calculated from Cd 8980 Working Classes Cost of Living Committee, 1918 *Report of the Committee*, Table IV p.15-16. and Table II p.14.

Notes:

1. The Sumner report provides expenditure, but not the quantity consumed for a small number of foodstuffs, viz: biscuit and cakes; fish, condensed milk, vegetables and fruit. For these foodstuffs, average quantity consumed has been ascertained from the expenditure data using price derived from other sources: biscuits and cakes expenditure divided by prices. based on the June 1918 unit price for biscuits (16.67d per lb) derived from Cmd 76 p.63; fish expenditure divided by prices based on the average of the unit prices for fresh fish (11.36d per lb) and dried fish (10d per lb) given in Cmd 76 p.63. Average price used is 10.68d per lb; condensed milk expenditure divided by 16.67d per lb in June 1918 derived from Cmd 76 p.63; vegetables expenditure divided by twice the wholesale price of peas and onions for 1918-1919. Cmd 1902 p.28 Price used 8d per lb; fresh fruit expenditure divided by twice the wholesale price of cheapest apples and cheapest plums for 1918 from Cmd 1892 p.27 (price used 10.5d per lb).
2. Other food: according to the Sumner Committee Report, haricot beans, honey and dried fruit account for 2/3rds of other food as recorded. Expenditure decomposed on this basis for dried fruit and quantity estimated using the average unit price for currants quoted by Co-operative stores in Jan 1918 given in Cmd 76 p.25
3. Expenditure on meals out and other foods was a similar proportion of total food expenditure for all groups, except clerks who spent roughly double the proportion of any other group; viz: skilled 2.84%, semi-skilled 2.79%, unskilled 2.75%, clerks 5.03%.

4. The Sumner Committee expressed household expenditure for 1918 per standard family. Using the Sumner Committee's equivalence scale this is 4.57 persons for an average working class household. The equivalence scale employed is: male over 14 =1; female over 14 = 0.83; children 10-14 = 0.83; children 6-10=0.70; children under 6 = 0.50
5. To render the budgets for other skill categories compatible, the Sumner Committee raised the skilled class by 1.6%; semi-skilled by 6.3% and lowered the unskilled by 4.8%. The clerical class and on service class household were 24 % and 17 % smaller than the average, so were increased by those proportions. Sumner Committee p.15.
6. Per capita estimates have been derived from the *Standard Family* consumption figures reported in Cd 8980, by deflating or increasing (as appropriate) by the inverse of the proportion the Sumner Committee used to express the budgets of each class as consumption for a Standard Family of 4.57 persons and then dividing by the average number of persons in a family in each class. Skilled households have been deflated by 0.984, semi-skilled deflated by 0.941, unskilled increased by 1.054, clerks deflated by 0.806 (these figures are the inverse of the proportions used by the Ministry of Labour to adjust household expenditure to a 'Standard Family').



**Table 5: 1918-1904 per capita consumption comparison [(1918/1904)]**

|                     | Average Working-Class | Skilled Working-Class | Semi-Skilled Working-Class | Unskilled Working-Class |
|---------------------|-----------------------|-----------------------|----------------------------|-------------------------|
| Bread               | 1.24                  | 1.19                  | 1.07                       | 1.19                    |
| Flour               | 0.85                  | 0.88                  | 1.00                       | 0.84                    |
| Biscuits & Cake     | 0.80                  | 0.82                  | 1.34                       | 0.80                    |
| Butcher's Meat      | 0.70                  | 0.64                  | 0.60                       | 0.84                    |
| Sausages            | 1.41                  | 1.38                  | 1.89                       | 1.25                    |
| Bacon               | 1.71                  | 1.60                  | 1.73                       | 1.99                    |
| Offal & tinned meat | 1.14                  | 1.05                  | 1.40                       | 0.89                    |
| Fish                | 1.08                  | 1.12                  | 0.62                       | 1.22                    |
| Lard suet etc       | 0.76                  | 0.66                  | 0.74                       | 0.83                    |
| Eggs                | 0.75                  | 0.79                  | 0.68                       | 0.96                    |
| Milk                | 1.18                  | 1.23                  | 1.02                       | 1.52                    |
| Cond Milk           | 1.77                  | 1.64                  | 1.81                       | 1.79                    |
| Cheese              | 0.42                  | 0.41                  | 0.57                       | 0.55                    |
| Butter              | 0.39                  | 0.41                  | 0.35                       | 0.43                    |
| Margarine           | 6.59                  | 12.79                 | 10.86                      | 3.25                    |
| Potatoes            | 1.06                  | 0.97                  | 1.11                       | 1.10                    |
| Vegetables          | 0.31                  | 0.29                  | 0.30                       | 0.38                    |
| Fruit               | 0.20                  | 0.23                  | 0.13                       | 0.19                    |
| Rice & Tapioca      | 1.05                  | 1.02                  | 1.19                       | 0.89                    |
| Oatmeal             | 1.15                  | 1.28                  | 1.09                       | 1.03                    |
| Tea                 | 0.88                  | 0.89                  | 0.78                       | 0.97                    |
| Coffee              | 1.33                  | 1.99                  | 1.36                       | 1.63                    |
| Cocoa               | 1.52                  | 1.20                  | 1.32                       | 2.12                    |
| Sugar               | 0.49                  | 0.45                  | 0.45                       | 0.61                    |
| Jam                 | 1.24                  | 1.16                  | 1.47                       | 1.31                    |
| Syrup               | 2.25                  | 3.29                  | 1.66                       | 1.28                    |
| Dried Fruit         | 0.22                  | 0.26                  | 0.23                       | 0.21                    |

Source: calculated from Tables 3 and 4

**Table 6: 1918 predicted weekly working-class per capita consumption of food by skill category (lbs per week)**

|                      | <i>Skilled Working-Class</i> | <i>Semi-Skilled Working-Class</i> | <i>Unskilled Working-Class</i> | <i>Average Working-Class</i> |
|----------------------|------------------------------|-----------------------------------|--------------------------------|------------------------------|
| Bread                | 5.14                         | 5.17                              | 4.72                           | 5.12                         |
| Flour                | 2.19                         | 2.16                              | 1.84                           | 2.08                         |
| Biscuits & Cake      | 0.07                         | 0.05                              | 0.04                           | 0.06                         |
| Meat                 | 0.81                         | 0.80                              | 0.72                           | 0.79                         |
| Sausages*            |                              |                                   |                                |                              |
| Bacon                | 0.15                         | 0.15                              | 0.13                           | 0.14                         |
| Offal & tinned meat* |                              |                                   |                                |                              |
| Fish                 | 0.22                         | 0.22                              | 0.18                           | 0.21                         |
| Lard suet etc        | 0.15                         | 0.15                              | 0.12                           | 0.16                         |
| Eggs*                |                              |                                   |                                |                              |
| Milk                 | 2.11                         | 1.97                              | 1.70                           | 1.97                         |
| Cond Milk*           |                              |                                   |                                |                              |
| Cheese               | 0.12                         | 0.13                              | 0.12                           | 0.12                         |
| Butter               | 0.35                         | 0.34                              | 0.30                           | 0.33                         |
| Margarine*           |                              |                                   |                                |                              |
| Potatoes             | 3.69                         | 3.75                              | 3.22                           | 3.56                         |
| Vegetables           | 0.22                         | 0.21                              | 0.17                           | 0.20                         |
| Fruit                | 0.15                         | 0.11                              | 0.08                           | 0.12                         |
| Rice & Tapioca       | 0.47                         | 0.43                              | 0.36                           | 0.47                         |
| Oatmeal              | 0.08                         | 0.07                              | 0.08                           | 0.08                         |
| Tea                  | 0.19                         | 0.19                              | 0.14                           | 0.18                         |
| Coffee*              |                              |                                   |                                |                              |
| Cocoa                | 0.00                         | 0.00                              | 0.00                           | 0.00                         |
| Sugar                | 0.73                         | 0.72                              | 0.63                           | 0.70                         |
| Jam                  | 0.17                         | 0.16                              | 0.14                           | 0.16                         |
| Syrup*               |                              |                                   |                                |                              |
| Dried Fruit          | 0.04                         | 0.04                              | 0.03                           | 0.04                         |

Notes: It has not been possible to estimate predicted per capita consumption in 1918 for the foods marked \*. In all cases this is due to the very high proportion of zero expenditure on these foodstuffs by households in the 1904 enquiry

**Table 7: Quantities consumed per head of rationed foods, June 1918 (lb per head)**

|                | <i>Ration June 1918</i> | <i>Sumner (range by class)</i> | <i>Predicted (range by class)</i> |
|----------------|-------------------------|--------------------------------|-----------------------------------|
| Sugar          | 0.5lb                   | 0.50-0.51                      | 0.63-0.73                         |
| Butter         | 0.25 or 0.3125lb        | 0.11-0.16                      | 0.30-0.34                         |
| Margarine      | 0.25 or 0.3125lb        | 0.16-0.18                      |                                   |
| Lard           | 0.125lb                 | 0.12-0.14                      | 0.12-0.16                         |
| Butcher's Meat | 16d, about 0.88lb       | 0.70-0.71                      | 0.72-0.81                         |
| Bacon & Ham    | 0.5lb                   | 0.39-0.48                      | 0.13-0.15                         |
| Other Meat     | 1.75 lb                 | 0.09-0.11                      |                                   |
| Jam            | 0.25lb                  | 0.25-0.30                      | 0.14-0.17                         |
| Tea            | 0.125lb                 | 0.09-0.11                      | 0.14-0.19                         |
| Cheese         | Varied locally          | 0.07-0.08                      | 0.12-0.13                         |

Notes:

1. Rationed quantities as provided by Beveridge Table VII, pp.224-5
2. Other Meat figure is for poultry. The commoner types of offal (tripe, heads, trotters etc) were all de-rationed in May 1918.
3. Sumner figures as calculated by the authors, taken from Table 4, predicted quantities from Table 6

**Table 8: Retail prices of rationed foods, June 1918 (lb per head)**

|                | <b>Controlled retail price (d/lb, d/pint)</b> | <b>Implied retail price from Sumner budgets (range by class)</b> |
|----------------|---|--|
| Bread          | 2.25  | 2.27-2.32  |
| Sugar          | 7   | 6.96-7.14  |
| Butter         | 30  | 28.33-29.89  |
| Margarine      | 12 -14  | 12.07-12.38  |
| Butcher's Meat | 15.5  | 18.25-19.36  |
| Bacon & Ham    | 28  | 25.0-26.08   |
| Tea            | 32  | 30.83-36.0   |
| Milk           | 2.75  | 2.98-3.03  |

Notes:

1. Controlled retail prices from Bowley, Prices and Wages, pp.49-56
2. Implied prices from the Sumner enquiry derived from expenditure/quantity given in Table IV, pp15-16
3. Retail price of bread is based upon the fixed price of a 4lb loaf
4. Retail price of bacon and ham refers to meat of the highest quality.
5. Retail price of Butcher's meat based on average of the price of 8 cuts (British and Foreign) of beef and mutton for May1 to September 1 1918, given in Bowley Table XVII p.48 = 15.23d. The price implicit in the Sumner budgets corresponds to the better cuts of beef and mutton listed by Bowley.

**Table 9: Estimated average daily per capita levels of nutrients purchased in 1904 and 1918, by skill of the head of household**

|              | Skilled,<br>1904 | Unskilled,<br>1904 | Skilled,<br>1918 | Unskilled,<br>1918 | Δ%<br>for<br>skilled | Δ%<br>for<br>unskilled | DRI/AI <i>per</i><br><i>capita</i> for<br>the average<br>BoTR family |
|--------------|------------------|--------------------|------------------|--------------------|----------------------|------------------------|--|
| Kcalories    | 2510.8           | 2106.7             | 2284.8           | 2094.3             | -9.0                 | -0.6                   | 1984   |
| Protein      | 84.2             | 68.3               | 79.2             | 71.0               | -5.9                 | 3.9                    | 34.8   |
| Fat          | 83.7             | 60.2               | 71.8             | 60.9               | -14.2                | 1.2                    | 76   |
| Carbohydrate | 389.4            | 356.0              | 365.3            | 350.4              | -6.2                 | -1.6                   | 264  |
| Vitamin A    | 666.8            | 469.7              | 511.7            | 386.5              | -23.3                | -17.7                  | 578  |
| Vitamin B6   | 1.2              | 0.9                | 1.1              | 1.0                | -8.1                 | 2.1                    | 1.12   |
| Vitamin B12  | 5.3              | 3.7                | 4.7              | 3.6                | -12.6                | -4.3                   | 1.20   |
| Vitamin C    | 36.8             | 27.2               | 26.4             | 22.9               | -28.4                | -15.8                  | 36   |
| Vitamin D    | 4.4              | 2.7                | 3.9              | 2.8                | -10.9                | 4.1                    | 1.0  |
| Vitamin E    | 4.1              | 2.8                | 3.9              | 3.2                | -4.6                 | 13.3                   | 10.4   |
| Niacin       | 10.0             | 8.9                | 10.0             | 9.6                | -0.6                 | 7.8                    | 13.2   |
| Riboflavin   | 1.3              | 0.9                | 1.1              | 0.9                | -13.5                | 1.9                    | 1.05   |
| Thiamin      | 1.2              | 1.1                | 1.2              | 1.1                | 0.0                  | 7.8                    | 0.86   |
| Iron         | 11.6             | 9.7                | 11.3             | 9.9                | -2.9                 | 2.3                    | 10.5   |
| Calcium      | 495.7            | 345.7              | 475.5            | 382.5              | -4.1                 | 10.6                   | 665  |

\* calculated using McCance and Widowson's RDA/RNI as outlined in the footnote 72, and averaged across the BoTR sample.

## Appendix

**Table A: Tobit Estimated Parameters for Budget Share Equation for 1904**

|                     | $a_j$  | $\beta_{1j}$ | $\beta_{2j}$ | $\beta_{3j}$ | LR test $\chi^2_3$ | $\sigma$ | % zero |
|---------------------|--------|--------------|--------------|--------------|--------------------|----------|--------|
| Food                | 2.450  | -0.371       | 0.303        | -0.245       | 257.95             | 0.249    | 1.5    |
| Bread               | 0.332  | -0.060       | 0.058        | 0.009        | 169.64             | 0.057    | 9.9    |
| Flour               | 0.176  | -0.034       | 0.040        | -0.014       | 92.54              | 0.050    | 18.4   |
| Biscuits & Cake     | -0.047 | 0.010        | -0.007       | 0.011        | 28.14              | 0.019    | 37.8   |
| Meat                | 0.373  | -0.055       | 0.039        | -0.034       | 61.99              | 0.075    | 11.6   |
| Sausages            | 0.048  | -0.011       | 0.008        | -0.056       | 14.62              | 0.040    | 63.2   |
| Bacon               | 0.098  | -0.015       | 0.011        | -0.013       | 15                 | 0.040    | 40.3   |
| Offal & tinned meat | 0.124  | -0.027       | 0.014        | -0.022       | 17.23              | 0.056    | 78.9   |
| All Fish            | 0.078  | -0.011       | 0.006        | -0.019       | 27.25              | 0.024    | 22.1   |
| Lard suet           | 0.060  | -0.010       | 0.012        | -0.002       | 65.39              | 0.017    | 30.0   |
| Eggs                | 0.032  | -0.005       | -0.002       | -0.003       | 3.78               | 0.022    | 10.3   |
| Milk                | 0.099  | -0.011       | 0.002        | 0.002        | 18.8               | 0.029    | 60.0   |
| Cond Milk           | 0.040  | -0.013       | 0.014        | -0.019       | 10.5               | 0.036    | 84.0   |
| Cheese              | 0.060  | -0.010       | 0.010        | -0.003       | 46.73              | 0.019    | 25.0   |
| Butter              | 0.149  | -0.025       | 0.049        | -0.049       | 108.45             | 0.042    | 5.0    |
| Margarine           | 0.243  | -0.060       | 0.016        | 0.022        | 43.35              | 0.058    | 91.2   |
| Potatoes            | 0.102  | -0.017       | 0.017        | -0.002       | 158.6              | 0.019    | 5.8    |
| Vegetables          | 0.036  | -0.004       | 0.001        | -0.008       | 11.01              | 0.017    | 13.8   |
| Fruit               | -0.042 | 0.011        | -0.006       | -0.015       | 59.98              | 0.023    | 51.4   |
| Rice & Tapioca      | 0.031  | -0.004       | 0.007        | -0.004       | 33.14              | 0.008    | 27.5   |
| Oatmeal             | 0.014  | -0.003       | 0.004        | -0.001       | 11.05              | 0.014    | 33.5   |
| Tea                 | 0.171  | -0.025       | 0.014        | -0.017       | 177.89             | 0.019    | 1.9    |
| Coffee              | 0.012  | -0.004       | 0.006        | -0.016       | 16.42              | 0.017    | 78.7   |
| Cocoa               | 0.007  | -0.001       | 0.000        | -0.009       | 9.29               | 0.016    | 57.7   |
| Sugar               | 0.118  | -0.019       | 0.019        | -0.011       | 229.45             | 0.015    | 2.5    |
| Jam                 | 0.012  | -0.002       | 0.005        | 0.001        | 11.94              | 0.015    | 28.0   |
| Syrup               | 0.031  | -0.009       | 0.009        | 0.002        | 74.69              | 0.012    | 72.8   |
| Dried Fruit         | 0.029  | -0.004       | 0.001        | -0.004       | 12.82              | 0.011    | 49.2   |

Notes:

1. Conventional statistical significance is indicated at the one percent level or lower by \*\*\* and at between ten percent and one percent by \*\*.
2. Offal and Tinned Meat is share of Pig's Head, Offal, Sheep's Head, Liver, Tripe, Pig's Fry and Tinned Meat
3. All Fish includes fresh fish and tinned fish