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Artículo

Male Wages, Household Budgets and Living Standards of Barcelona's Working Class (1856-1917)

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ABSTRACT

The debate on the effects of industrialization on the living standards of the working classes has very recently been reignited using the household budget methodology. From this perspective, the aim of this article is precisely to ascertain the capacity of the wages of adult male workers in the city of Barcelona to cover household expenditure in the period 1856-1917. Based on Ildefons Cerdà's *Monografía estadística de la clase obrera de Barcelona en 1856* (*Statistical monograph of Barcelona's Working Classes in 1856*, 1867), as well as on household budgets (1860-1917-1919), the series of wages and consumer prices published by the Oficina Estadística Municipal (Municipal Statistical Office) in the *Anuario Estadístico de la ciudad de Barcelona* (*Statistical Yearbook of the city of Barcelona*, 1902-1929), and other local sources, this article offers new evidence showing that, despite improvements, at the end of the period considered, the salary of male workers had not yet reached a level that could be considered a *family wage*.

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Salarios masculinos, presupuestos familiares y niveles de vida de las clases obreras de Barcelona (1856-1917)

RESUMEN

El debate en torno a los efectos de la industrialización sobre los niveles de vida de las clases obreras es aún un debate abierto que ha sido renovado muy recientemente desde la metodología de presupuestos familiares. Desde esta perspectiva, la pregunta que inspira este artículo es, precisamente, conocer la capacidad de los salarios de los obreros varones adultos de la ciudad de Barcelona para sufragar el gasto familiar y su evolución en el período 1856-1917. A partir de la *Monografía estadística de la clase obrera Barcelonesa en 1856*, de Ildefons Cerdà (1867), así como de los presupuestos familiares (1860-1917-1919) y las series de salarios y precios al consumo de la Oficina Estadística Municipal publicados en el *Anuario estadístico de la ciudad de Barcelona (1902-1929)* y de otras fuentes locales, este artículo ofrece nuevas evidencias que muestran cómo, a pesar de las mejoras en los niveles de vida, al final del período considerado la salarización de la fuerza de trabajo masculina no había llegado aún al nivel del salario familiar.

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1. Introduction

Nowadays, household budget surveys, such as the ones conducted since 1958 by Spain's National Statistics Intitute, are seen by international bodies, public institutions and economists as an ideal instrument for analysing living standards because, in contrast to real wage series, they focus on the household as the unit of consumption, and also enable us to ascertain the intrafamilial distribution of resources and the use of time, as well as reflecting subsistence strategies, thereby providing a more complex overview of welfare strategies (Deaton, 1997; Grosh and Glewye, 2000). Over the last few decades, historiography has similarly shifted back towards the household budget approach (Horrell and Humphries, 1995; Vecchi, 1994; Boter, 2020),[1] a classical method also widely used in positive social science.[2] In the absence of such sources, particularly in the modern period and for long-term analysis, "Allen's welfare ratio method" also places the household at the centre of the analysis of the evolution of living standards (Allen, 2001, 2013, 2015; Allen, Murphy and Schneider, 2015; Horrell, Humphries and Weisdorff, 2021). The high levels of poverty generated by the industrialization process led public institutions, theorists and social reformers to undertake numerous surveys on the consumption and income of working-class and rural households (Le Play, 1877, 1990; Rowntree, 1901). In Spain, however, there are only exceptional cases of such surveys of sufficient validity, most of which are *standard budgets* (Olivanti 2018). Key examples include certain institutional initiatives, such as the pioneering Agricultural Survey of 1849-56 which contained questions on the income and consumption of peasant families; the budgets collected in some towns for the survey carried out by the Social Reform Commission (1889-1893); and surveys conducted by some municipal statistical offices at the start of the 20th century, including a significant example in the case of Barcelona. Some individual initiatives were also undertaken by hygienists and social theorists such as Ildefons Cerdà's pioneering *Monografía estadística de la clase obrera de Barcelona en 1856* (*Statistical monograph of Barcelona's Working Classes in 1856*, 1867), Frédéric Le PLay's budgets of peasant and fishing families in northern Spain (1877, 1990), the Madrid survey conducted by social hygienist Lluis Úbeda Correal, Madrid (1902), and even those published by the textile industrialist and president of the Catalan employers' association Foment del Treball Nacional, Juan Sallarés y Pla, on working-class families in the textile sector (1892), and by Francisco Alabert (1915) focusing on workers in Barcelona.

From second half of the 19th century onwards, in response to frequent unrest over wage rises, the working-class press also published a number of budgets. These all provide valuable data, despite being biased by underlying ideologies of different persuasions and purposes.

Few traces remain of the surveys and reports on which the abovementioned budgets were based. What have been conserved, however, are systematisation of standard budgets that strove to identify the *average* or *most common* consumption pattern of specific working-class groups and households, with a particular emphasis on the nutrition required to ensure certain levels of work performance. As a result, they are subject to a certain degree of abstraction and, sometimes, rather than showing empirical data, they provide theoretical consumption and household economy models (Borderías and López Guallar, 2001). The use of these average budgets for analysing living standards has been marginal, particularly in economic history, which has primarily focused on real wages or, alternatively, indicators of output, such as morbity and mortality, stature and other anthropometric data, as well as more complex indicators of welfare (Escudero and Pérez-Castroviejo 2010; Martínez Carrión, 2012; Quiroga Valle 2001; Ramón-Muñoz and Ramón-Muñoz, 2016, 2021).

While not free from problems, such as limiting consumption to the most basic items, information generally aggregated into very generic categories and sometimes questionable representativity, household budgets have enabled significant contributions to our knowledge of the structure of household consumption, the composition and nutritional value of diets and, in some case, inequality of consumption between men and women and between adults and children. As many of the budgets available contain or are accompanied by data on the wages of adult male workers, they provide insight into the scope of these wages to cover the household's subsistence needs (Ballesteros, 1997a, 1997b; Pérez-Castroviejo, 1992, 2006; Borderías and López Guallar, 2001 and 2003; Pérez-Fuentes, 2013; Olivanti, 2018; Borderías, Muñoz-Abeledo and Cussó, 2022).

In light of the scarcity of available information on periods before modern statistics, Allen's welfare ratio method has become a useful analytical instrument, especially from a comparative and long-term perspective (Allen, 2001, 2013, 2015). However, the method has received numerous criticisms (Humphries, 2013; Boter, 2020; Borderías and Muñoz-Abeledo, 2018; Borderías, Muñoz-Abeledo and Cussó, 2022; Calderón *et al.*, 2017; Zegarra, 2022)[3] for standardizing working days, household type, number of children and diet, as well as for failing to account for the different nutritional requirements of men and women and underestimating household consumption needs[4] (Allen, 2001). The bias produced by certain methodological choices in the Allen diets when comparing living standards between Britain and other countries, including Spain, has also been highlighted (López-Losa and Piquero Zarauz 2016).

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[1] A pioneering study of the evolution of living standards during the industrialization process based on household standard budgets was conducted by Horrell and Humphries (1995). In the study, the authors revised the popular optimistic thesis, based solely on the evolution of male wages, underlining that, although men's wages rose slightly, if we take into account the loss of job opportunities for women and children caused by industrialization, the result is that households saw their income drop. Moreover, they highlighted the relevance of taking other non-salary sources of income into account, such as domestic production of consumer goods, the use of credit, pawning and charity.

[2] For an overview of the historical development of household budgets in Europe, see Olivanti (2018).

[3] The "welfare ratio" is calculated by dividing the annual income by the household expenditure. If the result is higher than 1, the income is above the poverty line and, if it is lower than 1, it is beneath the line. The various criticisms of the model for underestimating nutritional needs, particularly in the case of women and children, have recently led Allen to review his initial baskets (Bare Bone Basket, 1,941 calories; Respectability Basket, 2,500 calories), unifying the two at 2,100 calories with consumptions at a different price range. Household consumption would be equivalent to 4 baskets of 2,100 calories, distributed according to sex and age (Allen 2013, 2015).

[4] See Table 3.

As far as Europe is concerned, this method has predominantly been used to analyse living standards during the early modern period and the first Industrial Revolution, but rarely for the 20th century. As a result, there are only exceptional and occasional cases in which it is possible to make comparisons between Barcelona and other European cities in the 20th century.

In the case of the city of Barcelona in the 19th and 20th centuries, we do, however, have access to the local information required to build a household budget model more adapted to the reality of the urban Mediterranean situation, which does not hinder comparison.

The goal of this article is to ascertain the extent to which the wages of adult male workers in the city of Barcelona were able to cover the subsistence needs of the household in the period 1856-1919. We aim to answer this question by reconstructing household budgets in that period based on local sources.

In the case of the 19th century, we have the aforementioned *Statistical monograph of Barcelona's Working Classes in 1856*, written by Ildefons Cerdà (1867). With respect to the first two decades of the 20th century, we have mainly based our reconstruction on the data on consumption, prices, wages and household budgets published by the Municipal Statistical Office in its *Statistical Yearbooks* for the city[5].

After this introduction, the article is divided into four sections. In the first, there is an overview of the sources and the analytical methodology. The second focuses on reconstructing the diets of working-class families between 1856 and 1919. In the third section, the household budget is established, taking food and other expenses into consideration. The fourth presents the balance of the working-class budgets.

2. Sources and methodology

2.1. Working-class census, wages, prices, and household budgets

Spain has been sparing in terms of drafting and collecting household budgets. From the late-19th century onwards, the Social Reform Commission, the Social Reform Institute and the Ministry of Employment published some data on wages and the cost of living among the working classes. Taking on the task of the state, in many European cities, the municipal statistics services played a key role in gathering data on domestic budgets by conducting surveys of working-class families. In Barcelona, although urbans statistics started early with Laureano Figuerola's *Estadística de Barcelona en 1849 (Statistics of Barcelona in 1849)*, and Ildefons Cerdà's *Statistical monograph of Barcelona's Working Classes in 1856* (1867), no municipal statistical service was created until 1902.

A pioneering work within the tradition of European social statistics, Cerdà's monograph is "the first known attempt in Spain to apply accounting principles to the household and the first formal structuring of a statistical model of domestic economics that involved the concept of *family wage*" (Borderías and López Guallar, 2001, 2003). Cerdà adapted some of his calculations to this domestic economic model, but the publication of empirical data on wages and consumption enables us to overcome this bias and propose alternative analyses.

Cerdà formed part of the mixed commission created in response to the 1855 general strike, in his capacity as the "gatherer and compiler" of all the data and news related to the material life of the working classes in order to "respond to the urgent need of the workers to demonstrate with irrefutable data the hardship that they experienced with the established wages in Barcelona", which enabled him, with the aid of working-class associations, to obtain the required information that he would later use to write his monograph. In this work, he presented the first working-class census of salaried workers over 8 years old in the city which, "due to its great complexity", he summarized into 171 trades, categorizing them by employment rank (official, labourer, assistant, apprentice), composition by age and sex, level of qualification, wages and various information about the way work was organized, technology, days of work, and other working conditions. The second part of the monograph presents two standard budgets: the first of a working-class bachelor living in a boarding house and the second of a married working man and his family. Consumption before marriage was a particular focus of interest in Barcelona due to the large proportion of young unmarried workers in the city, both male and female, although budget data was only gathered in the case of men. Cerdà's monograph includes an unprecedented level of detail on the expenditure budget of the two cases studied, the bachelor and the married man with a family, which provides the starting point of our analysis. With respect to food, Cerdà took two scenarios into consideration in each case: a practical or regular diet of the single worker and that of the working-class family; and a "theoretical" diet[6] which, according to the bromatological criteria of the time, ensured that the wear and tear caused by working was replenished. Cerdà used this theoretical diet to calculate the purchasing power balance of the trades of adult men. The diversity and detail of the working-class budgets is unique among its kind because, as well as the cost of food and working-class accommodation, which is hard to ascertain, he also included other costs related to the housing (painting, whitewashing, communal electricity for the stairwell, habitability certificate) and extraordinary expenses such as the dowry and homeware required to form the household, frequent moving costs (three times per year), and lighting and fuel costs. With respect to clothing, as well as considering the purchase of clothes and footwear, with a breakdown of the different garments, Cerdà also took into account their duration and the need for replacement. He also included an entry for "social expenses of the working-class bachelor and married man", which included visits to the barber and hairdresser, the purchase of newspapers and other "out-of-pocket expenses", not attributed to women. Other important household costs considered by Cerdà included medical treatment, payments to the workers' association and schooling. Therefore, we have specific details of the composition and cost of the "other expenses" entry, which is a rarity[7].

For later dates, we have used the data published by the Department of Statistics of the Barcelona City Council in its *Statistical Yearbook* of the city (1905-1932). From 1902 to 1932,

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[5] *Anuario Estadístico de la Ciudad de Barcelona* (AECB).

[6] Cerdà (1867) published 14 theoretical diets with different combinations of foods and different costs which supposedly provided the nutrients required to feed the working-class man satisfactorily.

[7] For a detailed analysis of the monograph, see Borderías and López-Guallar (2001).

the Department was headed by Manuel Escudé Bartolí, who stated that he used Cerdà's monograph "as a guide" to prepare the 1905 census of the working-class and wage statistics, as well as the *Monografía estadística de las clases trabajadoras de Barcelona en 1917* (*Statistical monograph of the Barcelona working classes in 1917*, *Statistical Yearbooks*, 1917) and the surveys of budgets and financial balances of the Barcelona working classes conducted between 1905 and 1929[8]. Although they cannot be considered a series in any way, these budgets have a lot of points in common in terms of the approach taken: the preparation of two budgets, one for a bachelor living in a boarding house and another for a household made up of a married couple and two young children; the consideration of a "practical" or "regular" diet and a "theoretical" diet[9]; the inclusion of clothing and housing costs and the same entries in the "other expenses" section[10].

However, the information presented in the working-class censuses and wage statistics is not homogeneous. The 1905 yearbook included a working-class census of 202 trades with the number of men, women, boys, and girls employed in each, along with their respective average wages. This data is based on a survey conducted by the Municipal Statistical Office among the city's businesspeople, who were asked the number of employees, wages and hours worked. The information gathered from the twenty thousand responses received was cross-checked with the employers' associations, workers' associations and various "competent figures", as well as verified through the surveyors' own observations (*Statistical Yearbooks*, 1905, p. 599). With respect to the working-class diet for the year in question, we used Alabert's[11] estimation as it is far more comprehensive, as is the case for 1912. In 1912, the yearbook published wage statistics for 350 trades, with the numbers of men and women employed and, in 1917, a survey of 75 trades, both conducted by the Social Museum, but without carrying out a new census in either case. Both the information from the 1856 and 1905 working-class censuses and the salary data and statistics from both these years and 1912 and 1917 are considered reliable, both by municipal statisticians and subsequent historiography, which has used the data extensively.

As well as the information included in the budgets, all the yearbooks included a section on household supplies and, in the last few years, a section on the working-class cost of living, containing a comprehensive list of food retail prices in the city's market, as well as housing costs and other expenses. Published regularly, food prices were based on information gathered directly from the different municipal markets. The prices of housing, clothing, fuel, coal, oil, and other expenses

were published more irregularly, but are available and homogenous for the four dates included in our analysis. Prices being published independently from the household budgets has enabled us, firstly, to determine the minimum cost of the working-class budget as, for unknown reasons, neither Cerdà nor the Municipal Statistical Office used minimum prices, although the differences are not very significant[12]; and, secondly, to calculate the cost of an optimal diet in nutritional terms.

To determine the purchasing power of adult male workers in each of the trades and categories, we used the respective average wages specified for the years 1856, 1905, 1912 and 1917. The 1856 and 1905 working-class censuses also enable us to evaluate the relative weight of the workers in each trade with respect to the total working-class population. This is not the case in 1912, 1917 and 1919, as the corresponding working-class censuses were not conducted. For these years, the 1905 working-class census and the 1920 national population census are the only sources that can be taken as a point of reference, with all the corresponding precautions. Annual incomes have been estimated based on the information on days worked recorded in the sources used: 265 for the whole period[13]. With respect to the household, based on the city's demographic figures, the household in our study comprised two adults aged between 30 and 40 years old with two children aged between 5 and 9[14]. The methodology followed in the case of food merits its own explanation, which is given in the following section.

2.2. The diets of the Barcelona working-class population: composition and nutritional value

Food is the main expense throughout the period studied, easily surpassing two thirds of the household budget, just like in the majority of European cities in the period. As such, it is a crucial factor for analysing the budgets and living standards of the population. Food gives rise to many of the discrepancies about the chronology of industrialization and the population's living standards. These discrepancies result from the type of ingredients in the "practical" and "theoretical" diets drafted by Cerdà, the *Statistical Yearbooks* of Barcelona and Alabert, as

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[8] After the 1902, Barcelona City Council created the Department of Statistics, Resident Registry and Elections, which was later renamed the Department of Statistics. From 25th October 1902 until his retirement in 1923, the department was headed by Manuel Escudé Bartolí. The statistical findings of the department were published in the *Statistical Yearbooks of the City of Barcelona* from 1902 to 1923.

[9] "The quantities that we record are carefully calculated in line with our country's customs and always on the assumption that the rations contain the proportions of nitrogen and carbon recommended by science" (AECB 2018-9:580).

[10] "As mentioned, housing is the primary need to be covered, followed by clothing, household items, heating and lighting, education and hygiene to preserve life" (*id.*).

[11] In the case of Alabert (1915), the diet presented was for a family of 4.4 members, which we have adapted to our reference family of 4 members.

[12] As well as the data on the working-class cost of living on these dates, statistics on consumption per inhabitant and per year were published more regularly, as well as information on food prices and other expenses in the city's markets.

[13] In Ildefons Cerdà's *Statistical Monograph of Barcelona's Working Class in 1856* (1867), the calculations of the general balance of working-class household economies were based on the annual wages earned from an average of 269 working days, despite recognizing that the number of working days varied a great deal depending on the trade, with fewer days in the textile trades, afflicted by regular crises. Until 1917, no new estimates were made of the number of days worked annually, with the new calculation subtracting the following from the 365 days of the year: 62 mandatory days off, 3 days for illness, 18 for ordinary work crises, 13 for unforeseen circumstances and 25 "for other reasons". This estimate left "two hundred and forty-four useful and productive days" (AECB 1917, p. 553). Some authors suggest as many as 300 working days per year at the start of the 20th century, but this figure seems an overestimation taking into account the frequent economic and social crises, company lockouts and numerous strikes. In contrast, we find an average of 265 working days per year throughout the period more realistic. We would like to thank Esteve Deu for his insight on this matter.

[14] Based on the information given by Cerdà, Alabert and Bartolí, and the 1920 census of the city of Barcelona on the average number of children for a woman aged 26 to 35 (2.18 in Barcelona, 2.93 in Spain as a whole).

mentioned earlier. Historiography has made use of both these diets to analyse the living standards of Barcelona's working-class population, but without undertaking any in-depth critique of either the nutritional levels or the prices specified. Our relative contribution to food analysis is particularly original and involves: firstly, the nutritional analysis of the aforementioned practical and theoretical diets; secondly, the calculation of their cost; and, thirdly, the preparation of an "optimal" diet that, providing the nutrients required by each sex and age, enables us to ascertain the wage income needed to cover the healthy subsistence needs of all the members of the household.

To do so, our analysis is based on the practical diets, thereby overcoming the lack of precision with respect to the consumption of certain foods or groups of foods for which the composition and quantity was not specified in the original sources, based on the consumption data per inhabitant of the city of Barcelona published in the *Statistical Yearbooks*,[15] such as in the case of fruit and vegetables in the 1912 and 1919 diets.

The results for the household as a whole and per capita[16] in 1856, 1912 and 1919 are shown in the first columns of Tables 1.1, 1.2 and 1.3. The three diets are typical Mediterranean, with the consolidated presence of potatoes and in the full throes of nutritional transition,[17] from the extreme austerity of the 1856 diet to the relative abundance and diversity of 1919. In all cases, there is a notable contribution of energy and protein from wholemeal bread, potatoes, oil, wine and pulses, and the presence of a small but growing amount of foods of animal origin. Based on this, by multiplying the total quantities of each food consumed by the household by their respective minimum prices as sold to the public at the city's markets, it was possible to calculate the cost of the practical diet on each date.

Secondly, we analysed the energy and nutrient contribution of these diets, estimating nutritional value (in terms of energy, protein, and some micronutrients) of each of the component foods or groups of foods, mainly based on the BEDCA[18]. The values obtained are shown in columns four to twelve of Tables 1.1, 1.2 and 1.3.

Table 1.1.

Practical diet of a Barcelona working-class family in 1856

Practical daily diet	Household consumption g/day	Per capita g/day	Energy Kcal.	Proteins g.	Fibre g.	Calcium mg.	Iron mg.	Zinc mg	Vitamin A ug eq. retinol	Folic acid µg
Wholemeal bread	2000	500	4820	160	170	1980	74	27.6	0	740
Oil	50	12.5	449.5	0	0	0	0	0	0	0
Potatoes	1400	350	999.18	31.5	25.2	113.4	7.56	3.78	0	151.2
Beans (pulse)	400	100	1240	84	68	360	26	14	92	70
2 salted sardines	200	50	282.8	29.4	0	89.6	2.1	0.7	56	22.4
Household TOTAL			7791.48	304.9	263.2	2543	109.66	46.08	148	983.6
Household needs MIW			8480	164.6	118.72	4000	46	50	2560	1200
Household nutritional balance MIW			-689	140	144	-1457	64	-4	-2412	-216
Consumption per capita			1947.87	76.23	65.8	635.75	27.42	11.52	37	245.9
Household needs per capita MIW			2120	41.15	29.68	1000	11.5	12.5	640	300
Nutritional balance per capita MIW			-172	35	36	-364	16	-1	-603	-54
Household needs IW			8880							
Household nutritional balance IW			-1088.5							

MIW: Moderately Intensive Work. IW: Intensive Work.

Sources and notes for Tables 1.1. 1.2. 1.3: drafted by the authors based on Cerdà (1867); Alabert (1915); Escudé Bartolí (1921); *Statistical Yearbooks* (1903, 1905, 1906, 1917); WHO (1985); FAO (2004); Carbajal Azcona (2013), and BEDCA (http://www.bedca.net/bdpub/)

[15] To estimate the amounts of fruit and vegetables not specified in the original source, we used the calculations made by the *Statistical Yearbooks* for the years 1903 and 1905-6, with the assumption that these groups of foods comprised the fruit and vegetables commonly produced in the agricultural areas near the city of Barcelona, which often appear in other examples of the urban and rural diets available, and which had a longer season and conservation period. In the case of fruit: oranges, apples, grapes, figs, peaches and plums. In the case of vegetables: cabbage, chard, peppers, onion, lettuce, pumpkin and tomatoes. In all the diets, we have assumed that the bread eaten by the working class was wholemeal. If it were white, in view of the weight of this food in the diet, the fibre and iron content would be reduced considerable and, therefore, so would the availability and surplus of these nutrients. It should be noted that, if the surplus of fibre is excessive, the capacity to absorb nutrients may decrease, therefore leading to lower availability.

[16] Household consumption divided by the four members of the reference family.

[17] Pujol-Andreu and Cussó (2014).

[18] Spanish Database of Food Composition. https://www.bedca.net/bdpub/index.php

Table 1.2.

Practical diet of a Barcelona working-class family in 1905-1912

Practical daily diet	Household consumption g/day	Per capita g/day	Energy Kcal.	Proteins g.	Fibre g.	Calcium mg.	Iron mg.	Zinc mg	Vitamin A ug eq. retinol	Vitamin D µg	Folic acid µg
Wholemeal bread	1818.2	454.5	4381.8	145.45	154.55	1800	67.27	25.09	0	0	672.73
Noodles	90.9	22.7	333.6	10.91	3.64	22.73	1.45	1.36	0	0	20.91
Oil	90.9	22.7	817.3	0	0	0	0	0	0	0	0
Sugar	45.5	11.4	169.5	0	0	0.91	0	0	0	0	0
Beef	90.9	22.7	180	14.73	0	6.55	1.55	1.47	0	0.41	3.27
Poultry	90.9	22.7	101.8	12.73	0	8.27	0.7	0.64	0	0.95	6.36
Pork	90.9	22.7	245.5	13.09	0	6.55	0.82	1.45	0	0	3.07
Rice	90.9	22.7	321.8	6.91	0.27	9.09	0.73	0.18	0	0	18.18
Vegetables	400	100	80	4.8	7.04	112	2.56	0.66	640	0	91.2
Oranges	166	41.5	42.4	0.97	2.42	43.62	0.36	0.22	39.99	0	44.84
Other fruit	166	41.5	56.4	0.71	2.82	11.29	0.56	0.14	70.55	0	8.82
Potatoes	363.6	90.9	259.5	8.18	6.55	29.45	1.96	0.98	0	0	39.27
Beans (pulse)	181.8	45.5	563.6	38.18	30.91	163.64	11.82	6.36	41.82	0	31.82
Salted fish, cod	45.5	11.4	117.1	27.27	0	18.18	1.31	0.36	5.45	1.82	5.09
Wine	1363.6	340.9	1063.6	1.36	0	118.64	9.55	1.36	0	0	1.36
Household TOTAL excluding wine		0	7670.5	283.93	208.19	2232.28	91.11	38.93	797.81	3.18	945.56
Household needs MIW			8480	164.6	118.72	4000	46	50	2560	60	1200
Household nutritional balance MIW			-809.5	119.3	89.5	-1767.7	45.1	-11.1	-1762.2	-56.8	-254.4
Consumption per capita excluding wine			1917.62	71	52	558.1	22.8	9.7	199.5	0.8	236.4
Needs per capita MIW			2120	41.2	29.7	1000	11.5	12.5	640	15	300
Nutritional balance per capita MIW			-202.4	29.8	22.4	-441.9	11.3	-2.8	-440.5	-14.2	-63.6
Household needs IW			8880								
Nutritional balance IW			-1209.5								

Table 1.3.

Practical diet of a Barcelona working-class family in 1917-1919

Practical daily diet	Household consumption	Per capita	Energy	Proteins	Fibre	Calcium	Iron	Zinc	Vitamin A	Vitamin D	Folic acid
	g/day	g/day	Kcal.	g.	g.	mg.	mg.	mg	ug eq. retinol	µg	µg
Wholemeal bread	2000	500	4820	160	170	1980	74	27.6	0	0	740
Noodles	60.6	15.2	222.42	7.27	2.42	15.15	0.97	0.91	0	0	13.94
Oil	125	31.3	1123.75	0	0	0	0	0	0	0	0
Milk	1000	250	700	35	0	1300	1	3	470	0.3	50
Sugar	50	12.5	186.5	0	0	1	0	0	0	0	0
Beef	133.3	33.3	264	21.6	0	9.6	2.28	2.16	0	0.6	4.8
Poultry	133.3	33.3	149.33	18.67	0	12.13	1.03	0.93	0	1.4	9.33
Pork	133.3	33.3	360	19.2	0	9.6	1.2	2.13	0	0	4.5
Rice	92.6	23.1	327.78	7.04	0.28	9.26	0.74	0.19	0	0	18.52
Vegetables	400	100	80	4.8	7.04	112	2.56	0.66	640	0	91.2
Oranges	166	41.5	42.41	0.97	2.42	43.62	0.36	0.22	39.99	0	44.84
Other fruit	166	41.5	56.44	0.71	2.82	11.29	0.56	0.14	70.55	0	8.82
Potatoes	625	156.3	446.06	14.06	11.25	50.63	3.38	1.69	0	0	67.5
Beans	45	11.3	139.5	9.45	7.65	40.5	2.93	1.58	10.35	0	7.88
Chickpeas	45	11.3	147.98	8.73	6.75	65.25	3.02	0.36	14.4	0	81
Offal or giblets	250	62.5	317.23	36.26	0	15.16	12.05	4.98	3648.7	1.14	105.13
Salted fish. Cod	25	6.3	64.4	15	0	10	0.72	0.2	3	1	2.8
Fresh fish. Sardine and whiting	25	6.3	18.38	2.98	0	7.88	0.18	0.11	5.6	0.7	1.75
Wine	1000	250	780	1	0	87	7	1	0	0	1
Household TOTAL excluding wine		0	9466	362	211	3693	107	47	4903	5	1252
Household needs MIW			8480	165	0	4000	46	50	2560	60	1200
Household nutritional balance MIW			986	197	211	-307	61	-3	2343	-55	52
Consumption per capita MIW excluding wine			2367	90	53	923	27	12	1226	1	313
Needs per capita MIW			2120	41.15		1000	11.5	12.5	640	15	300
Nutritional balance per capita MIW			247	49	53	-77	15	-1	586	-14	13
Household needs IW			8880								
Household nutritional balance IW			586								

Thirdly, we estimated the household and individual needs for energy and a group of nutrients considered particularly relevant and critical for the physical and intellectual development of children, the maintenance of certain desirable levels of physical activity and proper functioning of the immune system: proteins, calcium, iron, zinc, vitamin A and folic acid. To do so, we took the estimates of energy and nutrient needs calculated by national and international specialists and institutions[19] and adapted them to our household. We made various assumptions regarding age and body sizes (based on the height and weight of different samples of recruits and the population in general); regarding levels of physical activity that we consider moderately intensive (MIW) and intensive (IW), based on the difficulty of the work activity and the availability of means of transport at the time; health (mortality and theoretical morbidity); diet (abundance of fibre); environmental conditions (temperatures) in the households; and work activities in ten period studied. The results obtained are shown in Table 2.

It should be noted that the children's and women's needs with respect to most of nutrients were different and proportionally higher (in terms of body size, etc.) than adult men's, as Humphries (2013) found to be the case in England. Taking this into consideration substantially changes the cost of the budget, shifting it upwards.

Fourthly, to evaluate the nutritional status of the working-class household that would result from consuming the so-called "practical" diet, we compared the needs, as shown in Table 2, with the availabilities, and calculated the corresponding nutritional balances, which are also shown in Tables 1.1, 1.2 and 1.3, highlighting the deficits of the practical diets.

Moreover, with the aim of setting these diets within an international context, Table 3 shows the nutrients and nutritional balance of these diets in per capita terms, comparing them to Allen's diet (2013). Using the same terms, we compare the nutritional value of all the practical diets between 1856 and 1919, which is a useful contribution to the study of food history and the living standards of the urban working classes. In all cases, with the exception of 1917-19, these diets, considered normal for working-class households, are nutritionally insufficient.

As a fifth and final development, in view of the fact that, as we have seen, the practical diets did not satisfactorily cover the household's needs of all the selected nutrients, particularly in the case of Cerdà's and Alabert's diets, we designed a number of diets that covered all the energy and nutritional needs of the working-class household taking into account the characteristics of the population and work in the period, which we refer to as "optimal diets". To uphold the local consumption guidelines, our analysis is based on the local practical diets (Tables 1.1 to 1.3), increasing the amounts consumed of some of the component foods, and incorporating other foods consumed or available at the time (such as those that feature in the theoretical diets or in other sources, including Cerdà's monograph and the *Statistical Yearbook*'s budget). By doing so, we have corrected the deficits observed in terms of energy and all the nutrients at the lowest cost, taking each member of the household's needs into account according to sex, age and the estimated body size and levels of activity. The results are shown in Tables 4.1 and 4.2 for 1856 and 1905-12. The table of optimal food for 1919 is not shown as it is practically identical to the practical diet of that year. The only change required would be to increase the consumption of wholemeal bread from the 2,000 grams per day in the theoretical diet to 2,320 grams in the optimal diet. It should be highlighted that the improvement in the practical diet from 1910 to 1919 does not imply an improvement in the nutritional status of the working-class population between these two years. The household's nutritional status depends on the capacity of the household income to acquire these optimal diets and cover their nutritional needs.

Table 2.

Average daily energy and nutrient needs for each member of the household

	Energy	Protein [1]	Calcium	Iron	Zinc	Vitamin A	Folic acid	Vitamin D	Vitamin B₁₂
	Kcal	G	Mg	mg	Mg	µg	µg	µg	µg
Boys aged 5 to 9	1710	34.8	1000	9	10	380	200	15	1.5
Girls aged 5 to 9	1570	34.8	1000	9	10	380	200	15	1.5
Men aged 30-40 MIW	2850	54	1000	10	15	1000	400	15	2
Women aged 30-40 MIW	2350	41	1000	18	15	800	400	15	2
Men aged 30-40 IW	3050	41	1000	10	15	1000	400	15	2
Women aged 30-40 IW	2550	54	1000	18	15	800	400	15	2

Highest biological value protein.

Sources: Drafted by the authors based on Cussó (2005); WHO (1985); FAO (2004); NRC (1991), and Carvajal Azcona (2013).

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[19] National Research Council (1991); WHO (1985); Carbajal Azcona (2013), and FAO (2004).

Table 3.

Nutritional value and balance of Cerdà's Alabert's and Escudé Bartolí's practical diets, and Allen's subsistence and respectability diets

	Energy	Proteins	Fibre	Calcium	Iron	Zinc	Vitamin A	Folic acid
Nutritional value and balance of practical family diets	Kcal.	g.	g.	mg.	mg.	mg	ug eq. retinol	µg
Household nutritional needs MIW	2120.0	41.2	29.7	1000.0	11.5	12.5	640.0	300.0
Cerdà's practical diet, 1856	1947.9	76.2	65.8	635.8	27.4	11.5	37.0	245.9
Alabert's practical diet, 1911	1917.6	71.0	52.0	558.1	22.8	9.7	199.5	236.4
Escudé Bartolí's practical diet, 1917-19	2366.5	90.4	52.7	923.3	26.7	11.7	1225.6	313.0
Allen Subsistence diet	2100	92.26	58.68	301.89	25.70	20.59	12.60	271.05
Allen respectability diet	2150	70.42	58.22	593.00	25.31	11.12	26.10	204.39
Nutritional balance								
Cerdà's practical diet, 1856	-172.1	35.1	36.1	-364.3	15.9	-1.0	-603.0	-54.1
Alabert's practical diet, 1911	-202.4	29.8	22.4	-441.9	11.3	-2.8	-440.5	-63.6
Escudé Bartolí's practical diet, 1919	246.5	49.3	52.7	-76.7	15.2	-0.8	585.6	13
Allen's subsistence diet	-20	51	59	-698	14	8	-627	-29
Allen's respectability diet	30	29	58	-407	14	-1	-614	-96

Sources: Drafted by the authors based on Tables 1.1. 1.2. 1.3 and Allen (2013, p. 12).

Table 4.1.

Optimal diet of a Barcelona working-class family in 1856.

	Household consumption	Per capita	Energy	Proteins	Fibre	Calcium	Iron	Zinc	Vitamin A	Folic acid
Optimal daily diet	g/day	g/day	Kcal.	g.	g.	mg.	mg.	mg	ug eq. retinol	µg
Wholemeal bread	2440	610	5880.4	195.2	207.4	2415.6	90.28	33.67	0	902.8
Oil	50	12.5	449.5	0	0	0	0	0	0	0
Semi-cured cheese	130	32.5	507	37.7	0	994.5	0.83	5.2	468	27.69
Oranges	132	33	33.73	0.77	1.93	34.69	0.29	0.17	31.8	35.65
Other fruit	132	33	44.88	0.56	2.24	8.98	0.45	0.12	56.1	7.01
Potatoes	1400	350	999.18	31.5	25.2	113.4	7.56	3.78	0	151.2
Beans (pulse)	400	100	1240	84	68	360	26	14	92	70
Offal	130	32.5	164.96	18.85	0	7.88	6.26	2.59	1897.32	54.67
2 salted sardines	200	50	282.8	29.4	0	89.6	2.1	0.7	56	22.4
Household TOTAL			9602.45	397.99	304.77	4024.65	133.77	60.23	2601.22	1271.42
Household needs MIW			8480	164.6	118.72	4000	46	50	2560	1200
Household nutritional balance MIW			1122	233	186	25	88	10	41	71
Household needs IW			8880							
Household nutritional balance IW			722.45							

In the optimal diets of 1856 and 1905-12, we have introduced or replaced part of the meat for offal, improving the nutritional contribution of the diet and considerably reducing the cost. We have also introduced foods present in Cerdà's and Escudé Bartolí's theoretical diets, such as cheese and chick peas.

MIW: Moderately intensive work. IW: Intensive work.

Sources and notes: Drafted by the authors based on Cerdà (1867); Alabert (1915); Escudé Bartolí (1921); AECB (1903, 1905, 1906, 1917); WHO (1985); FAO (2004); Carbajal Azcona (2013), and BEDCA (http://www.bedca.net/bdpub/).

Table 4.2.
Optimal diet of a Barcelona working-class family in 1905-1912

Optimal daily diet	Household consumption g/day	Per capita g/day	Energy Kcal.	Proteins g.	Fibre g.	Calcium mg.	Iron mg.	Zinc mg	Vitamin A ug eq, retinol	Vitamin D µg	Folic acid µg
Wholemeal bread	2054.5	**513.6**	4951.45	164.36	174.64	2034	76.02	28.35	0	0	760.18
Noodles	90.9	**22.7**	333.64	10.91	3.64	22.73	1.45	1.36	0	0	20.91
Oil	90.9	**22.7**	817.27	0	0	0	0	0	0	0	0
Semi-cured cheese	200	**50**	780	58	0	1530	1.28	8	720	0.56	42.6
Sugar	45.5	**11.4**	169.55	0	0	0.91	0	0	0	0	0
Beef	45.5	**11.4**	90	7.36	0	3.27	0.78	0.74	0	0.2	1.64
Poultry	45.5	**11.4**	50.91	6.36	0	4.14	0.35	0.32	0	0.48	3.18
Pork	45.5	**11.4**	122.73	6.55	0	3.27	0.41	0.73	0	0	1.53
Rice	90.9	**22.7**	321.82	6.91	0.27	9.09	0.73	0.18	0	0	18.18
Vegetables	400	**100**	80	4.8	7.04	112	2.56	0.66	640	0	91.2
Oranges	166	**41.5**	42.41	0.97	2.42	43.62	0.36	0.22	39.99	0	44.84
Other fruit	166	**41.5**	56.44	0.71	2.82	11.29	0.56	0.14	70.55	0	8.82
Potatoes	363.6	**90.9**	259.53	8.18	6.55	29.45	1.96	0.98	0	0	39.27
Beans (pulse)	136.4	**34.1**	422.73	28.64	23.18	122.73	8.86	4.77	31.36	0	23.86
Chick peas	45.5	**11.4**	149.48	8.82	6.82	65.91	3.05	0.36	14.55	0	81.82
Offal	136.4	**34.1**	173.04	19.78	0	8.27	6.57	2.72	1990.2	0.62	57.34
Salted fish. Cod	45.5	**11.4**	117.09	27.27	0	18.18	1.31	0.36	5.45	1.82	5.09
Wine	1363.6	**340.9**	1063.64	1.36	0	118.64	9.55	1.36	0	0	1.36
Household TOTAL excluding wine		**0**	8938.08	359.61	227.38	4018.86	106.26	49.9	3512.1	3.68	1200.47
Household needs MIW			8480	164.6	118.72	4000	46	50	2560	60	1200
MIW household nutritional balance			458	195	109	19	60	0	952	-56	0
IW household nutritional needs			8880								
IW household nutritional balance			58.08								

Sources and notes: See Table 4.1

3. Working-class cost of living (1856-1917)

We will now present the results of reconstructing the cost of the household budget in 1856, 1905, 1912 and 1917, focusing on the differences in consumption depending on whether we consider the practical or optimal diet (Table 5). As discussed earlier, the table shows that the difference between the practical and the optimal diet was very significant in 1856, but almost insignificant in 1919, when the practical diet already provided most of the energy and nutrients required to cover the household's needs satisfactorily.

Although Cerdà published a "practical" or "regular" working-class household budget, he based his calculations of the purchasing power of the different trades on his "theoretical" budget. In fact, he tried to calculate the wage required to cover the household's subsistence in good conditions of health and the capacity to work, aware of the food precarity that the workers were commonly forced to endure[20]. However, in light of current knowledge, we can see that it was an unbalanced diet. The budgets published by the Municipal Statistical Office over the following years are the ones generally used in historiographic studies, in line with this model, despite the fact that, from 1919 onwards, the practical diet was already sufficient. Table 5 shows the cost of the regular or practical diet, recalculated using minimum prices. This decision is based on our attempt to replicate as much as possible the rational behaviour of household within the context of precarity, obviously based on the knowledge of the time and information that they would have had access to. Table 5 also shows the cost of what we refer to as the "optimal" diet, with minimum prices and cheaper replacement products to adapt it to the lowest possible expenditure[21].

One of the remarkable aspects of the data shown in Table 5 is the information about the evolution of the composition of the budget[22]. According to Escudé Bartolí's report, food prices rose between 10% and 20% from the turn of the twentieth century to 1913 and 100% in the following five years. Within such a context, in contrast to the predictions of Engel's law, the proportion of the budget allocated to food (regular diet) was very stable over the course of the years, with even a slightly upward trend, from 56% at the start of the period, to 58% in 1905, 60% in 1911 (against a backdrop of considerable price stability) and 61.7 % in 1917. This does not seem strange, however, bearing in mind the context of food precarity and the need for improvements in food between 1856 and 1919, by the end of which, according to our estimations, the usual working-class diet approached what could be considered sufficient (optimal), as well as taking the rising prices due to inflation during the war into account. The shortage of housing in the city of Barcelona has already been established (Maluquer 2013, p. 100-103) but, according to the City Council, it affected the working-class to a greater extent due to the lack of accommodation "at a decent price for the poor", leading to people on lower incomes had to resort to "renting rooms" (AECB, 1917, p. 575). Indeed, while the average price of housing in Barcelona climbed by 15% from 1913 to 1917 (Maluquer, 2013), according to the data in the municipal *Statistical Yearbook*, the price of working-class accommodation rose by 33%. The clothing and footwear entry grew the most over the course of the whole period, climbing twice as much as housing prices and 20% more than food prices, a fact corroborated by Maluquer's price indices. However, the proportion with respect to the overall budget remained stable throughout the period, at between 8% and 10%, as the elasticity with respect to clothing and footwear was higher and households adapted more easily to fluctuations in the price. However, the structure of household expenditure remained stable, with few changes over the period.

Table 5.

Cost of the household budget with the practical/regular diet and with the optimal diet (Barcelona 1856-1917)

	1856 (1)	1856 (2)	1905 (1)	1905 (2)	1912 (1)	1912 (2)	1917 (1)	1917 (2)
Food	509.36	782.48	685.01	698.55	848.41	851.84	1408.01	1466.41
Rent	120.00	120.00	160.00	160.00	180.00	180	240.00	240.00
Clothing and footwear	132.80	132.80	90.00	90.00	109.00	109.00	206.55	206.55
Household and other expenses	137.82	210.40	239.00	239.00	263.0	263.0	426.00	426.00
Total annual budget	899.98	1245.68	1174.01	1187.55	1400.41	1403.84	2280.56	2338.96
Daily cost	2.47	3.41	3.22	3.25	3.84	3.85	6.25	6.41
Wage required	3.40	4.70	4.43	4.48	5.28	5.3	8.61	8.83

Note: (1) Drafted by the authors with the regular or practical diet but calculating the cost based on minimum prices.

(2) with the optimal diet drafted by the authors based on minimum prices.

Sources: Drafted by the authors based on Cerdà (1867); *Statistical Yearbooks of the city of Barcelona* (1905, 1912, 1917), and Alabert (1915).

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[20] Although the data would allow, he did not calculate, however, the weight of each trade in the census compared to the total. On this point, see Borderías and López-Guallar (2001).

[21] For instance, eating offal rather than meat.

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[22] In the "theoretical" budgets drafted by the City Council, the diet was calculated based on the requirement that it contained "at least, 20 grams of nitrogen and 310 grams of carbon to form the essential calories needed for a substance ration". This theoretical diet cost 10% more than the "practical" diet, but was equally stable over time until the start of the period of inflation, when it rose to account for as much as 75% of household expenditure, having remained below 70% until that date (AECB, 1917). The City Council estimated the following daily expenditure for budgets with the theoretical diet: 1856-3.35; 1905-4.14; 1910-4.71; 1917-8.06.

Based on all this, we calculated the capacity of male wages to cover the subsistence needs of the whole household. We present the results of these calculations in the following section. We realize that wages were not the only resource for subsistence. This is, however, a reasonable approximation given the high degree of salaried employment among the working class and the reduced access to self-consumption compared to rural environments. In any case, we are estimating the extent to which the wage of adult male workers covered the subsistence needs of working-class families, and approached what could be considered a *family wage* as social reformers and workers' associations advocated from the mid-19th century onwards, as did the Municipal Statistical Office itself in the early 20th century in the pages of its *Statistical Yearbooks*:

> In our humble opinion, wages in Barcelona have to adjust to the current essential expenses for the life of the family. If the cost of living in a working-class household in the middle of the last century was just slightly over 3 pesetas per day and, in 1900, it was 4, the minimum wage nowadays cannot be below 10 pesetas. This leaves a margin for social improvement, saving and possible allowances, the contribution made by the wife and children to the household budget, although we aspire to the ideal situation of only the father and children over 14 years old working outside the home and covering the expenses of the household budget (Escudé Bartolí. Statistical Yearbooks, 1918-1919, p. 592).

4. The purchasing power of the wages of adult male workers

In this section, we present the result of the ratio between the male breadwinner's wages and the household expenditures, based on two assumptions: a consumption of food in line with the diet considered standard or practical in the sources consulted, and in line with a diet that we refer to as optimal because it would provide the nutrients required for all the household taking account of the different needs of the members depending on their sex and age. For the first two years analysed, 1856 and 1905, we can calculate this ratio for each of the trades, while also estimating the relative weight of each trade in the city, as we have data on the wages and the number of workers per trade.

As shown in Table 6, in 1856, the consumption of an optimal diet was affordable for only 1% of the working class. However, even if we lower the diet to the precarious "regular" consumption, only 5% of the workers earned enough to afford it. There is an overwhelming contrast between this reality and the aspirations of social reformers and the workers' movement to achieve a *family wage*. In 1856, only a tiny minority earned a wage that could cover what Cerdà called the practical household budget, so it was necessary to seek out other resources. As Cerdà indicated in 1856, the City Council acknowledged the need for the wife and children to work as well. Unless the household had both these resources, some of the budget entries had to be cut, such as the money spent on clothing, and renting rooms instead of independent housing, with the consequent worsening of hygiene conditions, which were already precarious by nature. Alternatively, households could reduce the already tight food allocation, with particularly severe consequences for women and children, not only affecting their health (higher morbidity and mortality through deficiency or infection related to their nutritional state), but also their potential work capacity.

Denounced by workers and early social reformers, this situation of precarity, while perhaps not the only factor, helps to explain the acute social unrest in the mid-19th century.

By 1905, living standards had improved moderately, as indicated by the mortality rates published in the Statistical Yearbooks in the first few years of the century. In fact, by that point, almost a quarter of adult male workers earned enough to cover the household expenditure. Nevertheless, the majority remained below this level. In its *Statistical Yearbooks*, the City Council attributed the high rates of female workers in the city to the deficit of the working-class economies, advocating the establishment of minimum wages for male workers equivalent to a working-class household budget, while considering that women's wages could be lower[23].

Table 6.

Volume of the census of adult male workers according to the capacity of their wages to cover the household budget (Barcelona 1856 and 1905)

Coverage of the household budget (%)	1856 (1)	1856 (2)	1905 (1)	1905 (2)
100 and over	5.22%	0.70%	27.76%	27.76%
80-99.99	29.14%	1.58%	42.85%	41.68%
60-79.99	48.47%	25.34%	24.57%	25.74%
<60	8.05%	63.26%	2.23%	2.23%
% of adult male workers with known wage with respect to the waged population based on the working-class censuses	90.88%	90.88%	97.41%	97.41%
Total number of adult male workers on the working-class censuses	25,848		89,313	

Note: Drafted by the authors, with the practical diet (1) and with the optimal diet (2). This does not include the trades paid wholly or partly in kind or included the wages of assistants or apprentices.

Sources: Ildefons Cerdà (1867) and the *Statistical Yearbook of the city of Barcelona* (1905).

How did the working-class economies evolve over the following decade? The Municipal Statistical Office did not conduct another working-class census, so we can analyse the purchasing power of different trades based on the wage statistics published in 1912 and 1917, but we cannot estimate its weight with respect to the city working-class population as a whole. Indirect approximations can be found in the 1905 working-class census and the 1920 National Population Census. The results are shown in Table 7, in which we can see the evolution between 1912 and 1917 and appreciate the strong impact of inflation, which reversed the trend occurring prior to the First World War: there was a reduction in the proportion

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[23] The analysis of household budgets in certain sectors, such as the textile industry (Borderías, 2021), even in the case of big companies (Enrech, 2009, pp. 167-168), reveals that there was even a decline in the purchasing power of the trades in this sector, which was one of the most important in the city.

of the working-class population that covered 100% of house-hold expenditure (from 15.91% to 3.5%), while the proportion of workers whose wages covered less than 70% of household outgoings rose from 4.61% to 10.75%. While we have to treat these results with caution, they are, nonetheless, consistent with our knowledge of the period and the wages for each trade, as observed in Graph 2[24].

Table 7.

Estimation* of the census of adult male workers according to the capacity of their wages to cover the household budget (Barcelona 1912 and 1917)

	1912	1917
100 and over	15.91%	3.54%
80-90.99	21.98%	33.12%
60-79.99	36.13%	39.93%
<60	4.61%	10.75%
Total working-class population with known wage %	78.63%	87.34%
Total number of workers in the active population	110,593	125,793

Note: *Estimation of the working-class population assuming a constant annual increment between the data on the working-class population from the 1905 working-class census of 1905 and the working-class population in the 1920 National Population Census. Adult working population in 1920 census: 134,913.

Sources: Drafted by the authors a based on the Statistical Yearbooks of the city of Barcelona 1912 and 1917, and the 1920 National Population Census.

Therefore, in contrast to what appears to have been the case in the pre-industrial period, Barcelona cannot be considered a city of high wages in this period[25]. On the contrary, in the mid-19th century, the city ranked alongside Florence and Vienna below the subsistence threshold, with most adult male workers' wages failing to cover the subsistence basket of a household of a married couple with two young children, and bearing in mind that our calculations are based on 265 working days per year rather than the standard 250 days used in this kind of study (Allen 2013, 2015).

In the early decades of the 20th century, despite improving living standards, the majority of working-class wages were still insufficient to cover the budget of household expenses. The fall in wages due to the inflation caused by the First World War lasted until 1920, as in the rest of Spain. The period of economic expansion, arising from the benefits of neutrality, and working-class unrest during the "Bolshevik Triennium", of which Barcelona was one of the most active hotspots, led to an im-

provement in wages from 1917 onwards, though no increase in purchasing power was clearly observed until the second half of the 1920s (Borderías, Muñoz-Abeledo y Cussó, 2022).

The results for 1912 and 1917, based on the National Population Censuses with respect to the size of the working-class population, are reinforced by observing the purchasing power for each trade individually (Graphs 1 and 2)[26]. In 1912, only a quarter of the trades reached what could be considered a *family wage* (Graph 1). The situation was worst in the food, textile, and leather and hides sectors, all three of which employed a high proportion of female workers and had lost purchasing power as a result of mechanization in the late 19th century, a trend which worsened in the early decades of the 20th century with the emergence of the sectors of the Second Industrial Revolution (Enrech, 2005; Borderías, 2021). In 1917, the impact of inflation resulted in only five of around fifty trades, all highly specialized and exclusively employing male workers, earned enough to cover the budget of working-class households (Graph 2). Table 8 shows the trades in question. In 1856, only 13 of the 171 trades listed on the working-class census cover the working-class household budget. These were all traditional trades with long apprenticeship periods, in sectors that generated great added value and which were performed in small workshops that still followed the guild regulations, and, in some cases, linked to luxury goods. In the later dates analysed, the number of trades that earned enough to cover the household's subsistence needs increased, including those that were still performed in workshops and some manufacturing trades, with a growing presence of new sectors associated with the Second Industrial Revolution. The extent to which the wage of these trades covered the household budget also rose while, in 1856, they barely covered 100% of the budget, from 1905 onwards, they did so comfortably. However, perhaps the most relevant finding is that, in all cases on the four sates analysed, these trades not only had a high proportion of male workers, but they were exclusively male[27].

The sources used do not allow us to go beyond 1917, when the Municipal Statistical Office published its last survey on wage statistics. However, our research into the purchasing power of the different trades in the capitals of Spanish provinces enables us to extend this analysis through to 1929 (Borderías, Muñoz-Abeledo and Cussó Segura, 2022). The results of this study include 9 trades: peri-urban farmers, tailors, shoemakers, ironmongers, metalworkers, painters, carpenters, stonemasons and masons. In Barcelona, just as in the other provincial capitals, until 1926, the *family wage* was only reality for a minority[28]. The same occurred in Catalonia's other industrial cities, such as Sabadell (Camps, 1991, 2004), and other smaller industrial towns (Borderías and Muñoz-Abeledo, 2018).[29] At the start of the 20th

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[24] Between 1915 and 1920, annual inflation reached 87.25% (Maluquer de Motes, 2013). The real wage series based on official sources suggest that, in the period 1914-20, rising prices exceeded norminal wage increases (Balcells, 1974; Gabriel, 1988; Maluquer de Motes, 2013). The acute unrest in the period not only led to rising wages, but also to the suppression of prices and food tampering.

[25] For wages in preindustrial Catalonia (1500-1808), see Martínez-Galarraga and Prats (2016). According to their study, in view of the purchasing power of the textile trades, Barcelona could be considered a high-wage economy in this period, which would explain the city's technological modernization and industrialization.

[26] Apprentices and assistants are not included due to their age, and neither were trades whose wages were partly paid in kind or in board. We have also not shown the incomes of the working-class hierarchies (directors, subdirectors, stewards, foremen, workshop managers, overseers, etc.) as all these categories easily exceeded the household budget.

[27] It should be noted, as mentioned earlier, that this diet already contained the nutrients required for the effort of work and social reproduction.

[28] The results are in line with Houpt and Rojo's recent study (2022) on Bilbao in the interwar period.

[29] Similar conclusions have been reached based on the analysis of real salaries (Maluquer de Motes, 2005, 2006, 2013; Escudero, 2003; Silvestre, 2005; Llonch, 2007; Escudero and Pérez Castroviejo, 2010; Vilar 2014)

century, in the cotton and linen industry in Ghent, the male breadwinners earned around 60% of the household budget, compared to 70% in the metal trades and 77% among craftsmen (Van den Eeckhout, 1993). Around the same time, in the Netherlands, textile workers reached a household budget with a basic "bare-bone" basket, but not earn enough for a "respectability" basket (Boter, 2020).
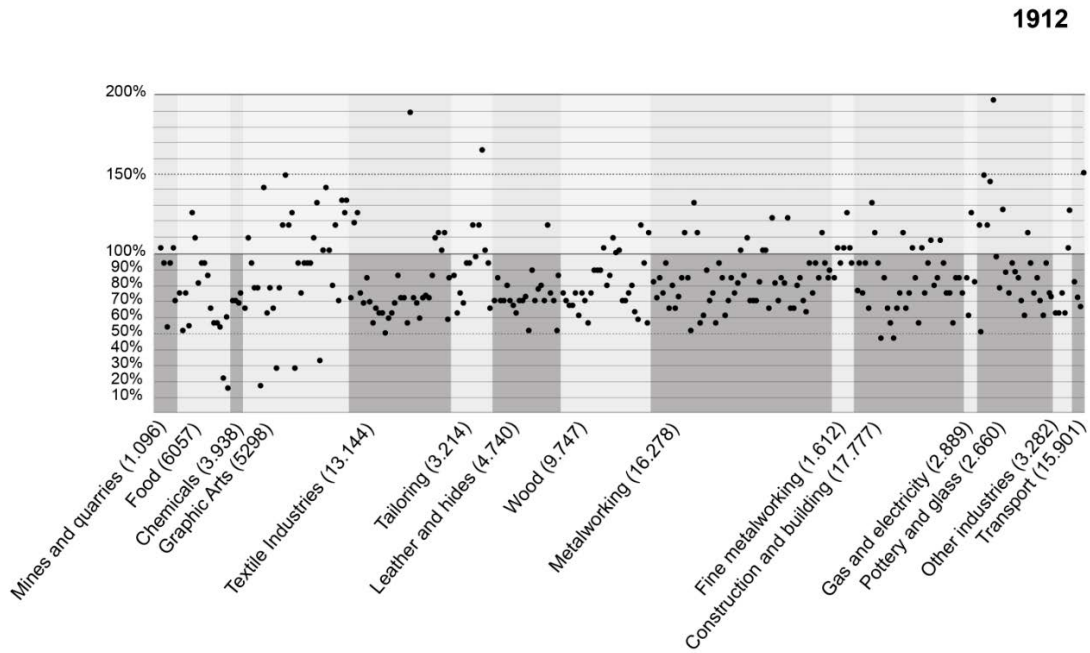
1912

Graph 1. Purchasing power of male trades in 1912.
Note: Drafted by Nuria Font based on data elaborated by the authors.
Source: *Statistical Yearbook of the city of Barcelona*, Barcelona (Ajuntament de Barcelona, 1912).
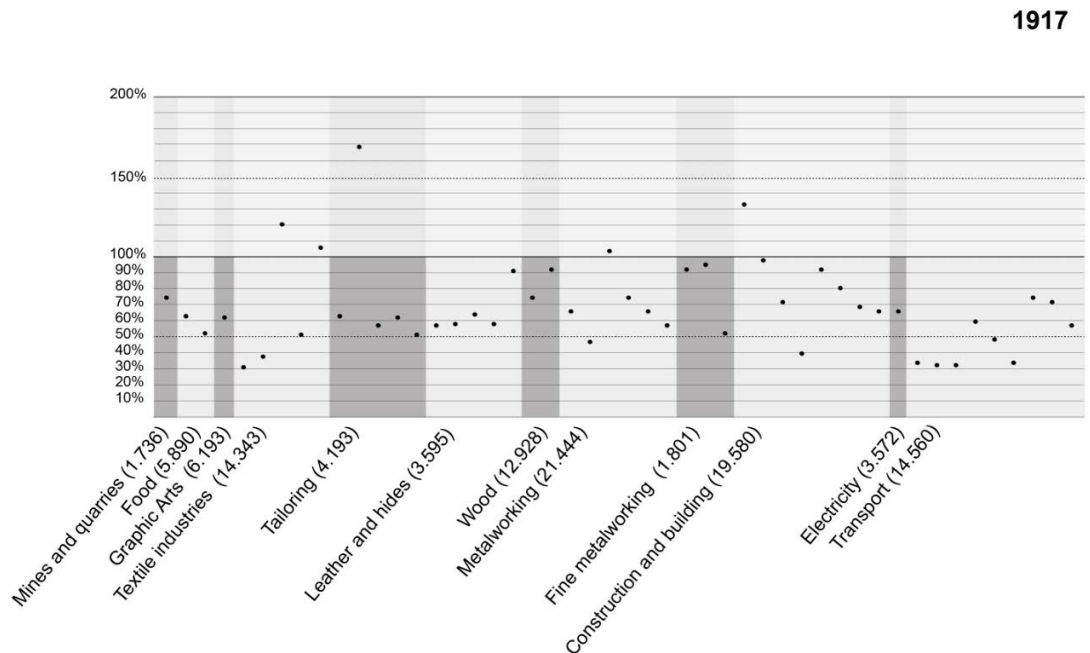
1917

Graph 2. Purchasing power of male trades in 1917.
Note: Drafted by Nuria Font based on data elaborated by the authors.
Source: *Statistical Yearbook of the city of Barcelona*, Barcelona (Ajuntament de Barcelona, 1917).

Table 8.

Trades with a wage that covered the household budget (Barcelona 1856, 1905, 1912 and 1917)

	1856		1905		1912		1917	
Mines and quarries	Quarryman	101.10	Stonework Layout Man	135.44	Stonemason	146.73		
			Hard rock mason	112.87	Stonework Layout Man	124.15		
Food			Bread maker	101.58	Bread maker	131.68		
Graphic arts			Phototypesetter	188.11	Photographer and phototypese-tter	159.89		
			Phototypesetter-photographer	159.89	Compositor	158.01		
			Machine operator	141.08	Finisher	150.49		
			Photoengraver	141.08	Photoengraver	141.08		
			Typesetting maker-up	122.27	Machine operator	141.08		
			Printer's reader	122.27	Monotype operator	131.68		
			Phototypesetting machine operator	122.27	Bookbinder	131.68		
			Transporter	112.87	Maker-up	122.27		
			Bookbinder	103.46	Proofreader	122.27		
			Box maker	103.46	Machine opera-tor	122.27		
Textiles	Embroiderer	108.46	Painter	223.38	Painter	225.73	Spinning foreman	120.98
			Machine operator (prints)	206.92	Loomer	150.49	Apprentice of desk employee	106.47
			Loom fixer	150.49	Mule spinner	142.96		
			Printing Machinery Fitter	135.44	Tulle manufacturer	135.44		
			Tulle weaver	135.44	Damask weaver	135.44		
			Lace weaver	131.68	Synthetic silk maker	131.68		
			Cord maker	122.27	Cord and braid maker	122.27		
			Locksmith	122.27				
			Textile factory worker	122.27				
			Elastic weaver	112.87				
			Textile carpenter	107.22				
			Cotton finisher (turner)	103.46				
			Boiler	103.46				
			Folder-turner	103.46				
			Finisher (prints)	103.46				
			Finisher (wool)	103.46				
Tailoring	Tailor	102.94	Felt hood former	197.52	Felt hood former	141.08	Tailor-Cutter	169.38
			Hatmaker	141.08	Hatmaker	141.08		
			Felt hood former	141.08	Felt hood former	197.52		
			Hat finisher	122.27	Hat finisher	122.27		
			Hat presser	117.57				
			Hat blocking operator	112.87				
			Felt hood former	112.87				
			Hat blocking operator	112.87				
			Hatmaker assistant (bag section)	112.87				

	1856		1905		1912		1917	
Wood	Model-maker	102.94	Wood turner-fitter	124.15	Carver	141.08		
	Caulker	147.06	Bed factory worker	112.87	Upholsterer	135.44		
	Boatwright	161.76	Chairmaker	112.87	Fitter	124.15		
	Wood engraver	113.97	Carver	112.87	Joiner	120.39		
	Print engraver	113.97	Upholsterer	112.87				
			Wood turner	107.22				
			Wood-tuner varnisher	107.22				
			Joiner	101.58				
Metal	Locksmith-smelter	117.65	Locksmith-forger	118.51	Boilermaker-forger	158.01	Turner	104.53
	Metal engraver	117.65	Iron boilermaker	112.87	Embosser	146.73		
			Jeweller and silversmith	112.87	Cutter	146.73		
			Weapon factory worker	112.87	Boiler draftsman	135.44		
			Carriage builder	105.30	Locksmith-forger	135.44		
			Chest fitter	101.58	Forger	135.44		
			Chest forger	101.58	Setter	124.15		
			Pin and needle factory worker	101.58	Varnisher	122.27		
			Bottle-top factory worker	101.58	Installer	122.27		
			Nail factory worker	101.58				
			Wagon builder	101.58				
Construction/building			Painter-gilder	169.30	Finisher	158.01	Miner	133.57
			Stucco plasterer	124.15	Modeller	135.44		
			Pottery thrower	118.51	Decorative painter	135.44		
			Stonemason	112.87	Caster	129.80		
			Painter-gilder	107.22	Engraver	124.15		
			Mason	101.58	Beveller	124.15		
			Glass fitter	101.58				
Gas/electricity			Electrician	108.35	Machine operator	150.49		
			Electrician	101.58				
			Gas factory worker	101.58				
Ceramics/glass			Acid etcher-glazier	112.87	Chocolate maker	178.71		
			Porcelain factory worker	101.58	Glass blower	141.08		
			Pottery factory worker	152.37	Glass presser	141.08		
Various industries	Marble mason	205.88	Piano factory worker	152.37				
	Sculptor	102.94	Piano factory worker	124.15				
	Watchmaker	102.94	Chiselling marble mason	112.87	Jeweller	124.15		
			Gilder	101.58				

4. Conclusions

Despite the prominence of the city of Barcelona in the economic, social, and political history of Catalonia, the city's living standards have not been analysed to a comparable degree to other industrial urban centres in the region. This article contributes towards this history that is still being constructed, and it does so by analysing household budgets, with the aim of ascertaining the capacity of adult male wages to cover the household's subsistence needs. To do so, we opted for a model based on local sources on working-class consumption, Allen's standardized model (2013), although this does not imply forgoing the use of comparisons. This article makes contributions on various levels. Firstly, in relation to food, we reconstructed the regular diet of local working-class consumption throughout the period under study. Nutritional analysis has enabled us to establish that this diet was deficient until at least 1919. With this in mind, we constructed a nutritionally satisfactory diet, which we refer to as *optimal*, because it takes into consideration the different needs of the members of the household depending on their sex and age, as well as the degree of intensity of the work. Beyond this article, these diets constitute two original and useful contributions for future studies on working-class food and nutrition, urban living standards, and long-term economic and gender inequalities, not only in relation to city of Barcelona, but also for all Mediterranean cities of similar characteristics. We calculated the cost of this diet at minimum prices for each of the dates analysed, to provide a more economical alternative to the calculations made by Ildefons Cerdà in his *Statistical monograph of Barcelona's Working Classes in 1856*, and by Alabert (1915), as well as those published in the *Statistical Yearbooks of the city of Barcelona* in the period 1902-1920. Therefore, our calculations are of greater use for historiography that aims to establish the minimum cost of subsistence. Secondly, the exceptional richness of these sources has enabled us to calculate the budget of household expenses, including entries that are not usually known, such as rent for housing, homeware, lighting costs and other expenses related to the home, clothing, health, medicine, schooling and various social costs. Thirdly, we ascertained the capacity of the wages of adult male workers to cover these budgets in all the trades recorded on the working-class censuses and wage statistics of 1856, 1905, 1912 and 1917. Most of the available studies on the living standards of the Catalan working class that we have referred to over the course of these pages have highlight the precarity faced by the working class throughout the second half of the 19th century and the first few decades of the 20th century. According to our results, Barcelona appears not to have been a high-wage city throughout the period studied, if we consider high wages to be equivalent to the *family wage*, a level attained only by a minority of workers, even in 1905, the year with the highest recorded level of welfare in the period. For households that failed to reach this threshold, the wage contribution of wives, whose employment rates rank among the highest in Spain (Borderías, 2002), was essential, although even with this contribution it was by no means certain that the household income would cover the subsistence needs of working-class families in healthy conditions. This explains the constant existence of extremely high child employment rates until the 1920s (Borrás, 2013; Borderías, 2013). In fact, during the second half of the 19th century and the early 20th century, particularly in the period of inflation triggered by the First

World War, insufficient male and female wages and irregular working cycles, due to strikes, lockouts, economic crises and frequent unemployment and illness, prevented many working-class households from acquiring quality food and the goods and services required to achieve a decent, healthy life. This led to the need to adjust household budgets to the income earned, which had an inevitable negative impact on the main category of spending, food, with all the repercussions entailed by a deficient diet, especially in the case of children and women (Borderías and Cussó Segura, 2021): ranging from a temporary or permanent reduction in the levels of physical activity for work or social purposes, to match energy consumption to availability, right through to a broad range of deficiency diseases (including pellagra, various types of anaemia and scurvy) and infectious diseases associated with a deficient nutritional state,[30] or deficient physical and intellectual development in children. This all may well have resulted in more days of sickness, lower performance at work, difficulties to perform hard physical activities or long journeys, with the consequent negative impact on potential income, thereby creating a vicious circle that was hard to break. The situation was even more severe if we take the terrible working and living conditions into account, which would also have affected the workers' health and welfare. The accounts from qualified sources of the time and the data available besides wage analysis corroborate this assumption. The precarity of the situation is also confirmed by the high gross mortality rates and child and juvenile mortality rates, the practically non-existent natural population growth in Barcelona during the second half of the 19th century, child sizes remaining stagnant almost until the second decade of the 20th century, and the height of recruits from Barcelona and urban Catalonia, which only improved at the end of the 19th century and were always considerably lower than among Spain's European neighbours to the north[31]. Our study ends just before the start of the series of strikes known as the Bolshevik Triennium, the progress achieved by which in terms of wages was, in any case, absorbed by inflation until the 1920s. Despite improvements in terms of food and other types of household consumption, at the end of the period, the wages of adult male workers in the majority of trades, except in the case of highly qualified craftsmen, were still a long way from reaching what could be considered the *family wage*. Barcelona was no exception. The working-class population in a significant proportion of industrial towns could not afford to live on the breadwinner's wages. This situation was extensively the case in most Spanish provincial capitals. A very similar story is found in the few European cities for which data is available for this period. As such, the breadwinner-housewife model became a key feature of the discourse of social reformism and an aspiration in some sectors of the working class rather than a reality. This conclusion highlights the need for a better understanding of the workings of household economies,

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[30] For instance, tuberculosis, cholera, viral or bacterial diarrhoea and respiratory infections, and measles. See Chandra (1987); Cussó (2005), and Muñoz Pradas (2020).

[31] See the testimonials from qualified sources of the time, including Cerdà (1867); Alabert (1915), and Escudé Bartolí (1921), and a complete summary of the evolution of mortality and population in Barcelona in López Gay (2011). Also on population, see Torrents, Ros and Gonzalvo (1996); on child and recruit sizes, see Martínez Carrión (2012); Muñoz Pradas (2020), and Ramon Muñoz and Ramon Muñoz (2016, 2021).

starting with the contribution of women and other strategies to offset the wage deficit that afflicted the majority of working-class households during these years.

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Author's contribution

All authors contributed to the study.

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