Anthropometric data has provided a new source of information with which to quantify aspects of living standards. Traditional measures, such as Gross National Product per capita, ignore questions of distribution and fail to capture non-market production and services and other elements vital to determining welfare, such as health and work intensity. Height and weight data can capture some of these factors. Historical analyses have typically relied on height data. How tall an individual grows is a function of genotype (determining growth potential) and environmental factors (determining the actual outcome). Genetic make-up puts a maximum limit on the height an individual can attain, but how closely that limit is approached depends on a delicate balancing act between nutritional intake on the one hand, and energy expenditure made by working, system maintenance, fighting disease, resisting cold or compensating for other disamenities on the other. Nutrition is considered by far the most important of these environmental factors. If average nutritional status is good, potential is reached. When nutrition is inadequate to meet the demands placed on the growing body, the period of growth is prolonged and stunting may occur. Much data has been collected, but the correlation between trends in heights and in living standards remains contested. However, the data have proved more successful in capturing differences between socio-economic groups, by gender and across regions. For instance, work on life expectancy and infant mortality in towns confirms the pessimistic view of urbanisation yielded by the data on heights.

Anthropometric data is also forming a cornerstone of welfare analysis in developing countries. Here data on height and weight is frequently used to assess the position of children in the poorest countries. Better than any other
single index’, argue the child biologists Eveleth and Tanner, ‘the average values of children’s heights and weights reflect accurately the state of a nation’s public health and the average nutritional status of its citizens ... This is especially so in developing or disintegrating countries. Thus a well-designed growth study is a powerful tool with which to monitor the health of a population, or to pinpoint subgroups of a population whose share in economic and social benefits is less than it might be.’ 8

Height tells us about cumulative nutritional status but is unable to date nutritional ‘insults’ exactly. Nor can heights respond to conditions experienced during adulthood. Weight is different, offering a guide to current nutritional status. Across an individual’s lifetime, weight can fluctuate in response to shifting levels of nutrition, demands on that nutrition, and also illness and the ability to absorb nutrients. As it is normal for height and weight to be strongly correlated, a measure of weight adjusted for height is used, typically the Body Mass Index (BMI) measured as weight in kilograms divided by the square of height in metres.

The BMI appeals to researchers of both developing and developed countries, although for the opposite reasons of measuring under-consumption and over-consumption respectively. Extremes of underweight and overweight are associated with health risks. Waaler’s pioneering longitudinal study of 1.8 million Norwegians, commencing in 1963 and including some 18 million observation years, identified a ‘bathtub-shaped’ mortality risk curve when mortality was plotted against BMI for different ages: there was a large range of body mass values around the mean for which mortality did not vary, but at either extreme mortality was elevated.9 High levels of risk from being overweight started around a BMI of 27 kg/m², those from being underweight at BMIs below 21 kg/m². A person is undernourished when energy intake is inadequate to sustain both a stable body weight and ‘a socially desirable level of activity’.10 Undernourishment results in less energy for work and for fighting illness and greater susceptibility to many infections and diseases.11

With care in interpretation, information on the masses of peoples’ bodies offer important insights into the well-being of populations both at points in time and between groups in society.12

Weight data has been typically unavailable for historical populations.13 But the discovery of large numbers of recorded height and weight data for prisoners have allowed us to start making these comparisons. The mass of data available enables us to look at Ireland, Scotland and Wales alongside England and so move away from a focus on industrialisation to considering a wider set of economic transformations underway in the nineteenth century, such as de-industrialisation in parts of Ireland and Scotland. The data are available for men, women, girls and boys, thus avoiding the neglect of women and children and the absence of the household in most discussions of living standards over this period. It is through the family that individuals experience well-being, as it is here that they gain access to pooled resources such as nutrition, housing and education. But males and females are not always subject to equal treatment within the household and one of the aims of the research is to identify the gendered consequences of economic change. Development economists have
highlighted the unequal division of resources within the household and have attributed this to power over decision making, which may itself arise, in part, from labour market participation and other economic contributions. Economic historians too have started to look within the family and consider how experience may vary by gender. Work on heights of men and women during British industrialisation tied the fall in women’s status to declining labour market opportunities.\textsuperscript{14} This finding has been reinforced by work on differential mortality rates.\textsuperscript{15} Other authors have also mapped a complex set of relationships between economic opportunity and the allocation of resources within the household.\textsuperscript{16} This body of research confirms that well-being is experienced through the medium of the family, and thus how families operated to secure and distribute resources is a fundamental economic question.

Although the notion of pro-adult-male gender bias in resource allocation in nineteenth-century households is in keeping with contemporary anecdotal evidence, recent anthropometric work has struggled to identify a correlation. Roderick Floud’s work on heights and weights reaches the conclusion that ‘All one can say is that these new data do not support the suggestion that there were gross inequities in the division of resources within nineteenth century households’.\textsuperscript{17} In a review of the existing anthropometric evidence Bernard Harris similarly concludes that ‘taken together with the evidence provided by children’s heights, the mortality data provide few grounds for believing that past generations of girls were any more likely to suffer discrimination in the distribution of essential resources than girls today’.\textsuperscript{18} Thus gender differences in access to resources remain contested, and this is a key issue to be addressed by the prison data. The variety of socio-economic and geographical backgrounds of the prison population also allow links to be made between inequality and local economic conditions.

The data

The project has collected and computerised data from a large number of British prison records. The intention is to capture regional as well as gender differences and, to this end, the major series used are prison registers drawn from the Prison Commission for England and Wales, and the Home and Health Department for Scotland. In general the variables collected have been age, sex, height, weight, level of literacy and occupation. Our initial analysis has been of the data collected from the Surrey House of Correction in Wandsworth, and we therefore focus on the nature of these data and the results yielded so far in what follows.\textsuperscript{19}

Houses of correction formed one branch of the local prison system. Dating back to Elizabethan times, houses of correction (also known as bridewells) were locally-administered institutions aimed at ‘correcting’ the behaviour and attitudes of welfare recipients and misdemeanants (those guilty of petty crime, primarily social incivilities and thefts below the value of one shilling). From 1706 parliament permitted judges to sentence convicted felons (more serious offenders, such as those stealing goods worth one shilling of more, pickpockets, shoplifters and the like) to terms of imprisonment in a house of
correction for up to two years, with the option of hard labour. Over the course of the nineteenth century, imprisonment became the major form of secondary punishment for all felonies. Necessarily, the prison system expanded, and the modern prison we know today was born. Wandsworth House of Correction was conceived amidst this penal development. It opened in 1851, and housed prisoners facing short-term sentences.

The Prison Commission series for the Surrey House of Correction in Wandsworth commences at Volume 230 in 1858 and runs through uninterrupted to Volume 289 in 1878. There are approaching 100,000 prisoners documented. Throughout the series the heights and weights of men are recorded. From January 1866 women’s heights and weights were also measured and recorded. Heights were measured in feet and inches, mainly to the half inch but with a small proportion to the quarter inch. Weights were measured in stones and pounds. Outgoing weight was not consistently recorded, but incoming weight was. Different rules governed our collection of data on males and females, due to the completeness of the data and differences in their incarceration rates. Males were sampled to include the years 1858 and 1859 (the earliest records with weight), 1866, and 1878, yielding a sample of 13,301. All females were collected, from the earliest recording of weight in 1866 through to the end of the series in 1878. This created a data set of 19,569 females. Information was collected on age, height, incoming weight, pockmarks, occupations, literacy, religion, country of birth, registration number, date of custody, and date and registration number of last conviction where relevant. In a sub-set of 1907 cases, more detailed information was also gathered on crime, type of offence (felony or misdemeanour) and punishment, and exit weight was collected in 1528 cases. In addition, repeat offenders provide a longitudinal dataset on 5,700 women prisoners.

A return of the number of prisoners received at the House of Correction, Wandsworth Common, during the year ending 29th September, 1861 offers some insight into who was incarcerated in the Surrey House of Correction. In that year, some 2,764 males were imprisoned at Wandsworth, 44 per cent under 21 years of age. There were also 1,261 females, 28 per cent aged under 21 years. About half the females were first offenders, as were three quarters of the males. Both men and women were in the main misdemeanants, a smaller portion were felons, and some were vagrants.

Comparison with the information on crime collected for our sub-set of prisoners shows that seven in ten women were first offenders. Misdemeanours counted for around one half of women and even more men. About one fifth were guilty of felonies, and three-in-ten of crimes associated with vagrancy and vagabondage. The single most popular offence for women was being drunk and riotous with over 30 per cent of women being imprisoned for being drunk. Exactly 35 per cent of the women were admitted for just seven days or less; half that proportion for 14 days, 8 per cent for 21 days, one-tenth for one month, with diminishing proportions thereafter. On the whole men were rogues and vagabonds (24 per cent), vagrants (21 per cent), and thieves (18 per cent). Sentences were slightly heavier than for women; fewer were in for just
seven days (20 per cent), but most were in for a few weeks, or one, two or three months. Just 15 per cent were in for longer. Men were incarcerated for an average of 67 days and women for 50.

The age distribution of prisoners shows that the criminal justice system drew into prison everyone from a seven year-old English boy through to an 89 year-old woman who had been born at sea, but there is support for the notion of the masculinity of juvenile delinquency in England. While 10 per cent of English females were aged 18 years or less, this category accounted for a substantial 26 per cent of English males. Many Irish emigrants to London were to be found in Wandsworth House of Correction. Irish men and women were more mature than their English counterparts, with median ages of 32 and 38 years respectively, while their English compatriots had median ages of 23 and 30 years.

Occupational data from the 1861 Census shows men living in the area of Wandsworth to be predominantly classified as occupied in manufacturing (20 per cent), building (16 per cent), dealing (13 per cent), agriculture and farming (10 per cent), general labour, public and domestic service (each at around 9 per cent) and transport and storage (7 per cent). Male prisoners were disproportionately drawn from the labouring category (46 per cent of the English, 66 per cent of the Irish). Half of women recorded by the census enumerators were classified as ‘unwaged and indefinite’, and some 30 per cent of English and Irish prisoners also fell into this category. Women identified as working were overwhelmingly domestics in all categories. Wandsworth prison housed the rough and rowdy end of the working class, many the working poor.

Results

It is instructive to compare the heights and body masses of the nineteenth-century prisoners with the population today using results from the Health Survey for England 2003. The most notable difference between the historical and contemporary populations is the absolute difference in heights (over three inches for females, and nearly four inches for males) and the delay in reaching physical maturity in the nineteenth century, especially among boys. Delayed maturity is suggestive of childhood deprivation followed by improved opportunities as adulthood approached.

In England today there is little to distinguish between the mean body mass of adult men and women. Among those aged 16 years and over, the 2001 Health Survey for England found that women have a mean body mass of 26.7 kg/m$^2$ and men 26.9 kg/m$^2$, both with standard errors of the mean of 0.07. Body mass increases with age, the phenomenon known as ‘middle-aged spread’, until the mid-70s when the trend reverses as aging diminishes bone density, muscle bulk and fat deposits. Men were more likely to be overweight, both sexes equally likely to be obese, and more women than men were morbidly obese, with a body mass of 40kg/m$^2$ or more.
How do the bodies of Wandsworth prisoners compare? Taking adults aged 16 and over, English women had a mean body mass of 22.3 kg/m² and men 22.5 kg/m² which would appear to replicate the modern pattern of sexual equality. However, this apparent similarity is misleading for two reasons: one, because there are comparatively few teenage girls in the study, and two, Wandsworth boys did not reach their terminal height until later in life, around 21 years of age. Restricting the age range to those over 21 does nothing to change the body mass index of women, but it does push up the mean body mass of men to 23.1 kg/m², a sizable and significant difference when compared with women of 0.8 kg. There was an even more sizeable distinction between Irish women at 21.8 kg/m² and Irish men at 23.0 kg/m². Per unit of height, women had less mass, particularly the Irish women.

The proportions ‘at risk’ by Waaler’s calculations are considerable. A full one quarter of English women, and 31.5 per cent of Irish women, had a body mass below 21 kg/m². Ten per cent of Irish men and nearly the same of English men were similarly at risk. Very few fell into the obese danger category of above 29 kg/m²: 2 per cent of English women, one per cent of Irish women and English men, and less than one per cent of Irish men. Clearly being underweight was a significant problem for this community in general, but gender and ethnicity are also important parts of the historical story.

A most striking finding is evident when we consider trends in adult body mass with age. English men in Wandsworth continued to increase body mass into their mid-30s, after which there is some variation about a fairly flat trend. Irish men, who had completed growth earlier than the English and already possessed more mass at age 20, made little gain into their mid-30s, after which there was a general decline in BMI. English women, who in their early 20s were on par with English men, suffered a steady and significant decline over their life-cycle, a trend that was even more pronounced for Irish women. This is further emphasised by taking the proportions with a body mass less than 21 kg/m² within each age group. Around one-quarter of 20 year-olds were undernourished by this measure, rising to nearly one half of English women in their 60s, and three in every five Irish women of the same age.

Further evidence of the low levels of nutrition generally received by women is revealed by the comparison of weights on entering and leaving prison, where these data are available. Prison dietaries in Wandsworth were basic and designed to be punitive. They were graded by the duration of sentence. Convicted prisoners confined for one week were expected to survive on a diet that would have killed a person interned for months or years. Most women were imprisoned for between 7 and 21 days and were allowed two pints of oatmeal gruel a day and 18 ounces of bread. Alarmingly, 60 per cent of women who were in prison for 14 days or more gained weight. Conversely 70 per cent of men lost weight on this diet supplemented with a further 6 ounces of bread per day. Women gained on average 3 pounds while men lost the same. The exceptions were boys and elderly men, who also tended to gain weight. This reflects very badly on life outside and points to very high levels of deprivation.
A clear gender gap emerges over the life course of these poor Londoners. From their early 20s, just when English boys were catching up on some of their earlier deprivation, young women entered a less fruitful time that was to last the rest of their lives. Contemporaries observed that men needed feeding in order to work, and that children and wives went without before their menfolk went hungry. The anthropometric data fit that model. Boys and girls were undernourished, but as boys became adults their claims on food increased, and so did their heights and weights. As girls became adults and mothers they had to make hard decisions about the allocation of scarce family resources, with resultant self-sacrifice. When families grew, women shrank. At the point when children left home, taking their wages with them, and age had reduced the earning capacities of herself and her husband, women suffered even more. And if life was hard in the English household, it was even more difficult for the Irish who had crossed the sea to London.

Conclusion

The analysis of the Wandsworth prison data has shown that the problem of underweight was shaped by both gender and ethnicity, and that the wasting of women increased over the life cycle. We can offer tentative explanations as to what might underlie these observations. One possibility is that household resources were distributed unevenly in favour of men and, possibly, children and younger women, but that the older a woman was, the less she received. She may have been less successful at bargaining within the household or, as the person dishing out the food, she might have made the noble decision to favour others above her own needs. Another is that these women were not part of families and instead were single or widowed and dependent on their own earnings. Women’s wages were low and work was often irregular which would leave such women vulnerable to poor nutrition and the consequent effects on weight and health. A third possibility is that the ageing process was accelerated among the poor of mid-Victorian London and that the experience of ageing was gendered. It is plausible that all three explanations are valid and interrelated.

Much more work needs to be done before conclusions can be reached about the meanings of the findings identified here. In particular, the relationships between different biological indicators need further exploration, with height and body mass ultimately wedded to mortality data and these related to economic circumstances. Some of the data we have collected offer the opportunity to study such links. For instance, a related dataset of 1,003 women prisoners was collected from licences for release granted between 1864 and 1884. These records contain a considerable amount of information. Height, weight and age data have been collected, as has information on family structure (marital status, number of living children), skills (occupation, ability to read and write), place of birth (usually town, county and country), place of conviction, crime, and length of sentence. Height and weight data were recorded for the whole sample on leaving prison and for a large sub-sample on entering prison. In addition, some women were repeat offenders and their files were linked with their previous records, so offering a longitudinal perspective.
Initial analysis of this data has enabled differing life-cycle profiles of BMI to be discerned by marital status, and something about the impact of local economic conditions can be inferred from place of birth and/or place of conviction. These data will allow more comprehensive tests of the links between women’s household and labour market position and their well-being, as measured anthropometrically, by correlating location with variables extracted from other sources. Analysis of the data sets for other areas, such as Paisley in Scotland, will also offer similar opportunities to investigate both gender and regional differences in experience.29

NOTES
10. Sixth World Food Survey, 3.


20. For notes on adjustments for clothing and shoes and details of how accurate the measurements taken were see S. Horrell, D. Meredith and D. Oxley ‘Measuring misery: body mass among Victorian London’s poor’, Explorations in Economic History (forthcoming). We believe prisoners were weighed without clothing and thus err towards overstatement of weight if there exists a bias in our results.

21. In only 20 cases were prior convictions recorded for men.


25. Weighted figures for 2003 from trend tables, Health Survey for England 2003: key findings, ch.6, p. 18 Anthropometric measures; the study excluded the weights of pregnant women: ch.6, p. 2. The 2004 National Diet and Nutrition Survey found mean values of 27.2 and 26.4 kg/m² respectively for men and women aged 19–64 years: tables 2.3 and 2.4 (includes Scotland and Wales).

26. This problem, if not identified, creates the impression of Irish men having greater mass than English men, as Irish men reached terminal height at an earlier age.


28. Unlike the Wandsworth women, the women for whom we have release licences were serious criminals. They were usually older, a median of 32 rather than 23 years old, and they had committed more serious crimes, from larceny to murder, and were imprisoned from between 5 years (53 per cent) and life (2.4 per cent). The mean duration of conviction was 8.64 years. However, these records provide some useful geographical and socio-economic comparisons. The women came from across the nation. They were convicted in, for instance, Middlesex, Durham, Liverpool and Worcester, among many other places: 16.5 per cent were born in London, 36.6 per cent were born in an industrial town, 20.5 per cent in a village, and most of the remainder were born in a small town, with a few born overseas. The women listed 77 different occupations: 23 per cent had no occupation. For those with an occupation popular ones were servant (8.1 per cent), charwoman (9.3 per cent), factory hand (9.7 per cent), hawk (7.7 per cent), laundress (6.8 per cent), prostitute (4 per cent), but they ranged up to professional occupations, such as a post office servant.