**Cover Page**

**Article Title:** Use of data from the Health Survey for England in obesity policy making and monitoring

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## Summary

Health data and statistics are the foundation of health policy. Over the last 20 years, numerous government documents have been commissioned and published to inform obesity strategies in the UK. The Health Survey for England, an annual cross-sectional survey of a nationally representative, random general population sample in England. It collects information on health, lifestyle and socio-economic factors, physical measurements and biological samples. Heights and weights measured by the Health Survey for England are believed to have played a major part in promoting, shaping and evaluating obesity strategies. A formal review of how these data have been used has not been conducted previously.

This paper reviews government documents, demonstrating the contribution of Health Survey for England examination data to every stage of the policy-making process:

* quantifying the obesity problem in England (e.g. Chief Medical Officer’s reports);
* identifying inequalities in the burden of obesity (Acheson report);
* modelling potential future scenarios (Foresight);
* setting and monitoring specific, measurable, attainable targets (calorie reduction challenge in manufacturers’ Responsibility Deal);
* developing and informing strategies and clinical guidance; and
* evaluating the success of obesity strategies (*Healthy Weights, Healthy Lives* progress report).

Measurement data are needed and used by governments to produce evidence-based strategies to combat obesity.

## Introduction

Obesity has become an important problem in populations worldwide. Many governments have produced strategies to tackle this problem. In the 20 years since the *Health of the Nation* Strategy was published in 1992, successive UK governments have commissioned and published numerous documents, targets and strategies to deal with growing levels of obesity.

Reliable health data and statistics are the foundation of health policies, strategies, evaluation and monitoring and evidence is also the foundation for sound health information for the general public ([[1]](#endnote-2)). The main source of health data and statistics to inform obesity policies in the UK is the Health Survey for England ([[2]](#endnote-3)).

The Health Survey for England (HSE) is an annual survey which uses a multistage stratified design to sample a nationally representative random cross-section of the free-living general population of England. Following an advance letter to the selected households, an interviewer visits to recruit up to ten adults and up to two children per household. The interviewer collects socio-economic data and information on health and health-related behaviours, and measures height and weight. Participants who agree are then visited by a nurse who measures waist and hip circumferences and blood pressure, and collects biological samples and information on medication use. The nurses have also collected infant length, demi span and mid-upper arm circumference in some years. Field-staff undergo training, with refresher training annually. Data on adults has been collected yearly since 1991 and on children from 1995 onwards. In addition to an annual published report, data are freely available through the UK Data Service to those in the public or academic sectors, and are provided to the Department of Health directly.

Other countries conduct similar health examination surveys on nationally representative samples of their population, a number are planning their first one ([[3]](#endnote-4)); others are seeking evidence of cost-effectiveness to justify funding ([[4]](#endnote-5)). Most health examination surveys have been conducted for a single time point, however others are long running, such as the National Health And Nutrition Examination Survey (NHANES) in the USA, which began in the 1960s and became continuous in 1999; and FINRISK in Finland, updated every 5 years, since 1972. The Health Survey for England has been annual since it began, with the logistics of a smaller annual survey more efficient in terms of staff recruitment, retention and training and survey output more responsive to changes in national priorities. The only other country to have annual measured height and weight for a general population sample is Japan ([[5]](#endnote-6)).

The Health Survey for England results from a 1988 ‘command’ paper *Public Health in England* ([[6]](#endnote-7))*.* This paper also led to the publication of the *Health of the Nation* strategy in 1992 ([[7]](#endnote-8)). *The Health of the Nation* provided a strategic approach to improving the health of the population. It was the first time a UK government had set out to do this. The strategy included a series of targets; the Health Survey for England was to be used to monitor targets where a data deficit had been identified.

The *Health of the Nation* included an obesity target. This target was set after examination of the Office for National Statistics survey data *The Heights and Weights of Adults in Great Britain, 1980* ([[8]](#endnote-9)) where obesity prevalence was 6% of men and 8% of women and data from *The Dietary and Nutritional Survey of British Adults, 1986/7* which showed that obesity prevalence was 8% of men and 12% of women ([[9]](#endnote-10)). In both cases, these data described the population aged 16-64. The *Health of the Nation* target was set as follows: “To reduce the proportion of men and women aged 16-64 who are obese by at least 25% and 33% respectively by 2005 to no more than 6% of men and 8% of women” (7). In 2005, HSE data showed that 22% of men and 23% of women aged 16-64 were obese ([[10]](#endnote-11)). Rather than demonstrating a government failure, the failure to reach the target illustrates the lack of understanding of the scale of the problem or the rate at which it was growing before Health Survey for England data were available. In retrospect, the *Health of the Nation* obesity target may be perceived as awry, but it was set by intelligent civil servants working with the best data available at the time. Had year-on-year data been available, a different target might have been set.

Policy-making includes several stages: from identifying, quantifying and promoting recognition of a health issue to seek or to justify policy intervention; through strategy development, including impact assessment and selection of targets; to target monitoring and policy evaluation. This paper examines where and how the measured height and weight data from the Health Survey for England have been used by obesity policy makers in the UK. Specific examples are presented. These are internationally relevant, where the potential of annual measured heights and weights to affect obesity policy is being considered.

## Uses of the Health Survey for England

### 2.1 Quantifying the Obesity Problem in England

The Health Survey for England began in 1991, when 53% of men and 44% of women were found to be overweight (body mass index, BMI 25-29.9kg/m2) or obese (BMI ≥30kg/m2) ([[11]](#endnote-12)). Children were first surveyed in 1995; 24% of boys and 26% of girls aged 2-15 years were overweight or obese (defined as on or above the 85th or 95th centile respectively for their age and sex, using the UK1990 centiles ([[12]](#endnote-13)))(13). The latest figures show that obesity prevalence has risen to 65% in men and 58% in women [Figure 1], and 31% in boys and 28% in girls [Figure 2] and for men, boys and girls there have been higher peak prevalences ([[13]](#endnote-14)). During the lifetime of the Health Survey for England, simply presenting the obesity prevalence figures, i.e. quantifying the problem, has been enough to shock, shame and urge action. Many of the papers that have influenced obesity policy in England have used Health Survey for England data in this way [Table 1].

A specific example of the use of health examination data to quantify the obesity problem in England, which highlighted this issue to government and was key to developing obesity policy, was the Chief Medical Officer’s Report of 2002 ([[14]](#endnote-15)).

The Chief Medical Officer (CMO) is the government’s most senior medical advisor, responsible for providing expert advice on any issue relating to the population’s health, and independently representing the nation’s health in government. Through his or her annual report, the CMO identifies priorities in health and recommends action to improve public health.

Obesity was a main feature in the Chief Medical Officer’s 2002 annual report by Sir Liam Donaldson (Chief Medical Officer 1998-2010). His report warned of an obesity ‘time bomb’ that would have dire consequences for the future health of the population. Health Survey for England data were used to quantify both the scale of the problem, with two-thirds of all men and half of all women overweight or obese (24 million adults) at the time, and the trend was used to show that the issue was of increasing concern. Rates of obesity were demonstrated to have trebled in the previous 20 years (14) [Figure 1].

Childhood obesity data from the Health Survey for England were also presented. In 2001, 9% of six-year-olds and 15% of 15-year-olds were obese. The trend showed that between 1996 and 2001, the proportion of overweight children aged 6-15y increased by 7% and obesity by 4%. Health inequalities in obesity and ethnic differences were also reported, with higher rates in more disadvantaged groups (14)

The Chief Medical Officer returned to this issue, using Health Survey for England data to highlight obesity as a particular problem for the West Midlands (in 2003 ([[15]](#endnote-16))) and the East Midlands (in 2004 ([[16]](#endnote-17))). The 2005 Chief Medical Officer’s report used the Health Survey for England’s prevalence of obesity in children under 11 to highlight London’s poor performance in this area ([[17]](#endnote-18)).

The 2002 Chief Medical Officer’s report was widely quoted in the media, and obesity rapidly became a matter of public concern. Sir Liam Donaldson said in 2008: “The publicity for my "timebomb" scenario was huge, and a 2004 evaluation of media coverage of my reports showed obesity became a bigger issue than either smoking or the MMR vaccine - both "hot topics".” ([[18]](#endnote-19)). Giving a public health problem, like obesity, such a high profile, in the context of reputable and irrefutable data, ensured that there would be sustained government commitment to tackle the problem.

### 2.2 Identifying inequalities in the burden of obesity

Obesity both contributes to and results from health and social inequalities ([[19]](#endnote-20)). As the Health Survey for England collects information on socio-economic circumstances of participants, analysing prevalence of obesity by a range of individual or household measures of socio-economic position, such as occupational social class, education level, equivalised household income (adjusted for the number of adults and children in the household), area deprivation (Index of Multiple Deprivation (IMD) quintile), overcrowding, or car ownership, is possible. Such analyses have been presented in the inequalities literature produced by and for government over the last 20 years [Table 1].

The Health Survey for England was used in the *Independent Inquiry into Inequalities in Health Report*, led by Sir Donald Acheson in 1998 (the Acheson Report ([[20]](#endnote-21))), one of the key documents in the debate on health inequalities in the UK. The data were used to illustrate the marked social class gradient in obesity which was greater among women than among men. The prevalence of obesity among women in disadvantaged groups was almost twice that in the most affluent groups (25% in class V compared with 14% in class I).

Obesity in women is particularly important, as maternal obesity is a risk factor for adverse perinatal outcomes and infant mortality ([[21]](#endnote-22),[[22]](#endnote-23)). The specific target set in the wake of the Acheson Report was to reduce the inequality in health outcomes between different socio-economic groups by 10%, as measured by infant mortality and life expectancy at birth, by 2010 ([[23]](#endnote-24)). Action on women’s obesity in routine and manual groups was therefore important for meeting the infant mortality goal.

*Tackling Health Inequalities: 10 Years On* ([[24]](#endnote-25)) examined key interventions and their potential contribution to meeting the infant mortality target. Reducing obesity within routine and manual groups to 23% was shown to have the potential to contribute 2.8 percentage points reduction in the gap in infant mortality rate between routine and manual groups and higher socio-economic groups.

*Tackling Health Inequalities: 10 Years* On used a framework of indicators proposed by the WHO Commission on Health Inequalities ([[25]](#endnote-26)) to help analyse the contribution of different social determinants to the overall burden of health inequalities within England. One of the 39 indicators is prevalence of obesity in adults by gender and income quintile. To assess performance against this indicator, the report examined the Health Survey for England data from 1998, 2003 and 2006. This showed that there was a consistent pattern of increasing obesity as household income decreased for women. The pattern for men was more complex, with data from 2003 and 2006 showing no relationship between equivalised household income and obesity. The continued disparity between obesity prevalence in women from routine and manual groups and women from other socio-economic groups showed there was more work to be done, which could help to achieve the inequalities target.

### 2.3 Modelling potential future scenarios

Year on year data on obesity prevalence allows modelling work to be completed, projecting trends in obesity into the future. One key and much-cited document informing obesity policy in the UK, usually termed the Foresight report ([[26]](#endnote-27)), used Health Survey for England data to model potential future scenarios.

Foresight is funded by the Government Office for Science within the Department for Business, Innovation and Skills, and is headed by the government chief scientific advisor, who reports directly to the prime minister and cabinet. In 2005, Foresight was asked to consider how society might deliver a sustainable response to obesity in the UK over the next 40 years. This work was published as *Tackling Obesities: Future choices* (26).

*Tackling Obesities* used Health Survey for England data to show the prevalence of, and trends in, obesity in adults and children in England; this was further examined by age-group, social class, ethnicity and geographical region. These prevalence figures were used to estimate economic costs of overweight and obesity. The report then explored the possible future trajectories for overweight and obesity in the population. This was done through quantitative modelling, using the Health Survey for England from 1994-2004 and extrapolating trends to 2050. The simulation was then used to examine future impact on life expectancy and potential future economic costs of overweight and obesity (26).

This work has been often quoted in subsequent obesity policy documents ([[27]](#endnote-28),[[28]](#endnote-29)), justifying investment of money and focus on obesity in government. These data are used as a tool by policy-makers to keep the issue of obesity on the government’s agenda. In subsequent years, as more data is collected and reported by the Health Survey, the models produced by the Foresight Report have been updated ([[29]](#endnote-30),[[30]](#endnote-31)). Other reports that used obesity data for modelling future scenarios, such as the Wanless reports ([[31]](#endnote-32),[[32]](#endnote-33)), can be seen in Table 1.

### 2.4 Strategy Development

Under equality legislation pre-2010, it was a legal requirement to carry out an Equality Impact Assessment to screen all new policies for their impact on people from particular protected groups. 2010 saw the introduction of the Equality Act and its associated Public Sector Equality Duty. The duty ensures that public bodies are specifically acting to advance equality as well as eliminate discrimination and remove or minimise disadvantage for the protected characteristics covered by the Act (ethnic background, disability, gender, sexual orientation, age group, socio-economic group and belief).

Both *Healthy weights, healthy lives: a cross governmental strategy for England*, 2007 (27) and *Healthy lives, healthy people: a call to action on obesity*, 2011 (28) had equality impact assessments carried out during their development ([[33]](#endnote-34),[[34]](#endnote-35)). These used Health Survey for England data on BMI by age, sex and ethnicity. These data were used to show that the obesity strategies met their legal requirements and could be implemented.

Other inputs into strategy development exist. For example in *Change4Life: One Year On*([[35]](#endnote-36)), Health Survey for England data were used to choose the appropriate adult age group to target for a new health promotion campaign [Table 1].

### 2.5 Clinical Guidance

The availability of valid, reliable and accurate population data is useful when making clinical public health guidance.

In 2006, the National Institute of Health and Clinical Excellence (NICE) published clinical guidelines on the prevention, identification, assessment and management of overweight and obesity in adults and children ([[36]](#endnote-37)). Health Survey for England data were used to justify the document’s creation, by quantifying the issue of obesity and attaching economic costs to the prevalence of obesity.

Health Survey for England data were used in modelling to examine cost-effectiveness of sibutramine, orlistat and surgery for treatment of morbid obesity. This data originated in a discussion paper that used BMI and data on quality of life collected from Health Survey for England participants in their interview to model Quality of Life Years (QALYs) attached to weight loss ([[37]](#endnote-38)).

Health Survey for England data on BMI by age and sex were also used as the basis of a model to examine the health economics of obesity prevention through workplace counselling, counselling from primary care staff, a whole school approach and family based interventions. The modelling demonstrated that each of these prevention measures is cost-effective (36).

Mean measured height by age and sex from the Health Survey for England were used by the Standing Advisory Committee on Nutrition (SACN) in the SACN Dietary Recommendations for Energy to calculate energy requirements ([[38]](#endnote-39)).

### 2.6 Target Setting

Targets set in government policy documents are important not just for the people affected by them but also for anyone who wants to assess whether the policies are working, and to judge whether or not the government is delivering on its commitments ([[39]](#endnote-40)).

A statistically robust target is one in which there is a transparent and objective way to measure how far the target is from being achieved when it is set, and then to measure the progress being made towards it (39). Meeting a target that is simply the continuation of a current trend is quite different from one that requires halting or even reversing a trend. Since the *Health of the Nation* in 1992 (7), many statistically robust targets for obesity prevalence have been set after examination of trends in obesity prevalence through Health Survey for England findings [Table 1].

Other targets also addressing the issue of obesity have used Health Survey for England data: for example, the calorie reduction target stated in both *Healthy lives, healthy people: a call to action on obesity*, 2011 (28) and the *Responsibility Deal* ([[40]](#endnote-41)). A group of independent experts, chaired by Professor Ian MacDonald, used Health Survey for England data showing weight gain in England over the years of data collection to estimate the number of excess calories consumed by the population. This group advised that a reduction in energy intake of 100 calories (kcal) per person per day on average would correct the energy imbalance at a national level. The Call to action on obesity in England issued a challenge to the population to do this (28).

This calculation is taken further in the Responsibility Deal, where companies are asked to pledge that they will support the population to reduce total calorie consumption by 5 billion calories a day, enabling their customers to eat and drink fewer calories by reformulating products and menus, reviewing portion sizes, increasing information on calorie content, and actions to shift the marketing mix towards lower calorie options (40).

### 2.7 Monitoring

As mentioned in the introduction to this paper, the Health Survey for England was brought into being partly to monitor targets, including the obesity target from the *Health of the Nation*. Measured heights and weights from the survey are still used to monitor many targets now [Table 1].

In 1998, the government issued Public Service Agreement targets to increase effective performance management of centrally determined targets. In 2004, the reduction of childhood obesity became a Public Service Agreement target, with three government departments (ministries) jointly responsible: Department of Health, Department of Culture Media and Sport, and the Department for Education and Skills (23). The target was “to halt the year-on-year rise in obesity among children under 11 by 2010 in the context of a broader strategy to tackle obesity in the population as a whole”. A boost to the child population sample size of the Health Survey for England was commissioned to increase precision of the measurement of prevalence and resolution of differences in prevalence of childhood obesity between subgroups of interest, while monitoring this target. Monitoring this target through Health Survey for England data showed that prevalence of obesity in children aged 2-10y declined from 17.3% in 2005 to 13.9% in 2008 ([[41]](#endnote-42)) (Figure 1c). This reversal of the childhood obesity trend, attaining the target set in 2004, could be read as a success for the government obesity strategy.

### 2.8 Evaluation and review

It can be useful to step back from monitoring targets and assess the picture more fully to evaluate whether a strategy is having a good outcome overall. Healthy Weight, Healthy Lives: Two Years On ([[42]](#endnote-43)) evaluates *Healthy Weight, Healthy Lives* (27). Health Survey for England data were presented to demonstrate that childhood obesity prevalence had stopped rising. The reported figure for childhood obesity was 13.9%, the lowest reported figure since 2001. The sustained focus on childhood obesity included government action such as the National Child Measurement Programme, which promoted recognition by families of their own child’s weight status; Change4Life, a government public health social marketing campaign, particularly directed at families of young children; and restrictions on marketing ‘junk’ food, high in salt, fat and sugar, to children. These appeared to be having some success. Other results were not as promising. The data presented showed that obesity prevalence among 11–15-year olds remained high and significantly increased in boys in that age-group [Figure 1d]. The upward trend also continued in adults, with the most striking upward trends in older adults.

This type of evaluation is important for reviewing strategy priorities. A strategy focus on childhood obesity seemed to be yielding benefit, but equivalent data on teenage or adult obesity showed failure to change trends in these age-groups. Through monitoring the target alone, the wider effects of the strategy would remain unknown. The new obesity strategy, produced following this evaluation, has relaxed the focus on childhood obesity and examines the whole life course (28).

## Discussion

### 3.1 Summary of Findings

This paper shows the many uses of measured height and weight data collected as part of a health examination survey, the Health Survey for England, in obesity policy making and monitoring. Because of the Health Survey for England, this issue was able to be quantified and the extent and escalation of obesity within the whole population, and specific sub-groups, understood. With Health Survey for England data on prevalence and trend, a number of documents put pressure on the government, resulting in this issue being given significant attention. Health Survey for England data has supported strategy development, examination of future scenarios and creation of clinical guidance. Targets have been set and monitored and through Health Survey for England data we have the first indication that the focus on childhood obesity is paying off, with wider evaluation shifting further strategy work to adult cohorts.

### 3.2 Limitations

Policy-making is a complex process and not all the sources that have fed into decision making are formally documented in final published documents. This means that all the ways in which the Health Survey for England has influenced obesity strategy in the UK may not have been identified. In addition, even where Health Survey for England is referenced, this does not tell us the precise role of the availability of the data or its relative importance compared with other factors contributing to the formation of obesity policy. However, this paper presents several ways in which height and weight data collected as part of the Health Survey for England have been used and their use reported.

***3.3 The Health Survey for England and other data sources***

As well as the Health Survey for England, there are other UK data sources that obesity policy makers could use. Data could be extrapolated from research studies, although high quality, nationally-representative data will always provide a more robust indication of what is happening in the general population (2).

In terms of routine data, for adults, there is the General Practice Quality and Outcomes Framework obesity register ([[43]](#endnote-44)). The national Quality and Outcomes Framework (QOF) was introduced in 2004. The Quality and Outcomes Framework obesity register is based on patients aged 16 and over who have a body mass index greater or equal to 30kg/m2, recorded in the previous 15 months. This data collection is designed to support the calculation of payments to GPs for their achievement of defined objectives; prevalence data is a by-product of this, so there are limitations which must be acknowledged. Participation by general practices in the QOF is voluntary, though participation rates are very high (99%), so if there is a particular bias towards or away from obesity in the GP practices that choose not to participate, this could affect the representativeness of results to a limited extent. The denominators used to calculate prevalence are general practice lists and as such, those who are not registered with a GP are not included in the denominator. Similarly there may be double counting of those who have recently changed GP or died and not yet been removed from a previous list. It is not stipulated whether recorded BMIs are measured or self-reported and they may be either. Where a recorded BMI is based on measurements, it is unknown to what extent the practitioners have followed a protocol, and different techniques may mean results are less accurate. Not all obese patients will have a BMI recorded within the previous 15 months. The biggest limitation is that data are available only by practice, with no breakdown possible by age and sex, or other sub-groups.

There is another source of routine data on obesity prevalence for children, the National Child Measuring Programme (NCMP) ([[44]](#endnote-45)). This is now an excellent source of data on prevalence of obesity in children in reception year (aged 4-5y) and school year 6 (10-11y). However, the trends do not go back as far as Health Survey for England data; teenagers are not examined at all; and in the early years of the National Child Measuring Programme, the locally variable response rate affected recorded prevalence rates. In the early years, when response rates were lower in some areas, there was some evidence that the children with a greater extent of overweight were less likely to take part, resulting in lower estimates of prevalence of obesity in those areas (44). For this reason, an increase in obesity prevalence over the first few years, at a time when the Health Survey for England was showing declining obesity prevalence, is probably because as participation rates increased, the full picture of obesity prevalence was emerging.

A less costly alternative to the Health Survey for England, a health examination survey in which heights and weights are measured, is a health interview survey where heights and weights are self-reported. However, many studies, in adults from at least 16 countries, have indicated that self-reported weight and height tend to be under- and over-reported respectively ([[45]](#endnote-46),[[46]](#endnote-47)). This leads to a compound effect on BMI where weight is the numerator and height squared the denominator. The extent of underreporting of weight has been shown to increase with increasing measured weight ([[47]](#endnote-48)). This could markedly bring down obesity figures if self-report were used rather than measurement data. Although regular health interview surveys have highlighted the rise in obesity, studies have found that the differential between self-reported and measured height and weight in the same population has increased over time. Both Irish and Canadian data supports this suggestion, finding that inaccuracy in self-report has increased. However, Swiss and US data have found that the degree of inaccuracy has remained constant over time (47). Without knowing how the population’s self-report changes over time, trend data based on self-report becomes difficult to interpret. Without measured height and weight data, it may have been that the extent of the problem of obesity was never highlighted to government as of top priority, with Britain appearing further down world rankings, and less shocking statistics to present when urging action.

In addition, with self-reported data, inequalities data would be difficult to interpret. Those from different socio-economic backgrounds or with different levels of education differ in the extent to which their self-reported heights and weights vary from measured heights and weights (47). Different age groups also have different degrees of inaccuracy in their reporting of the data, meaning that identification of target age groups would be compromised (47). The discrepancies between self-report and measured data are greatest in those who are obese, of lower socio-economic position or are older.

Table 2 shows the difference in self-reported and measured data on obesity prevalence from around the world. In the ten countries with both self-report and measured data recorded, the measured data is up to 52% higher than the self-report. Although it may be the case that there are differences in the settings in which the self-reported and measured data are taken, the consistent underestimate provided by self-report against the measured prevalence demonstrates robustly that self-report diminishes the scale of the problem. The smallest degree of inaccuracy through self-report results in an 11% difference between self-report and measured prevalence, with the average inaccuracy being 28%. Rankings among the countries are greatly affected by whether they use measured or self-reported data. For example, Chile is ranked 6th lowest of the countries with self-reported data; however when measured data is taken into account it is ranked 29th out of the 34 countries, i.e. 6th highest.

Having discussed limitations of other data sources, it is important to note that height and weight measurements are not available from all Health Survey for England participants, with an increasing refusal rate over the past 10 years. If, as is likely, a disproportionate number of those not measured have a higher BMI, the Health Survey for England data will have underestimated obesity prevalence. In addition to bias, reduced sample size may result in insufficient power to detect all the factors associated with obesity. In Japan, the survey rules allow for self-report where measurements are refused, although this option is rarely taken (5).

### 3.4 Further use of the Health Survey for England in Obesity Policy

Wilkinson *et al* suggested a minimum core dataset which should be measured for obesity surveillance (2). These authors noted problems with BMI for classification of obesity in some ethnic groups, the elderly, extreme athletes or people with particular disabilities. They therefore suggest prevalence indicators should include measured height, weight and waist circumference. In fact, waist circumference and waist to hip ratio are both obtained as part of the Health Survey for England measurements, however similar work to that presented here examining height and weight data found limited use of waist circumference and waist to hip ratio in government documents. There is scope for increased use of these additional measurements in policy work, particularly given the burgeoning of evidence showing that for most obesity-related diseases, central obesity is more important than generalised obesity ([[48]](#endnote-49)). The extent to which the continued policy focus on BMI reflects a lack of awareness of the importance of abdominal obesity among decision-makers or the greater difficulty in measuring waist circumference accurately ([[49]](#endnote-50),[[50]](#endnote-51)), particularly by untrained staff, (or agreeing which of several definitions should be used) is not known.

There were no instances found of mid-upper arm circumference or demi-span being referenced in government documents; these measures have not been included in recent years, increasing efficiency of the survey. A full economic evaluation of the Health Survey for England is currently being conducted.

Wilkinson *et al* also considered it desirable to evaluate potential predictors and points of intervention when conducting obesity surveillance (2). The Health Survey for England has collected data on all the indicators suggested by the authors. Physical activity and consumption of fruit and vegetables (from interview data) are used in many government documents and have targets set and monitored through their collection.

The Health Survey for England data most commonly used by policy-makers are the figures from the annual report. However, there are examples where raw data has been analysed: the calculation of excess calories used to set the responsibility deal target; the modelling work performed for the Foresight Report and the modelling of QALYs per kg/m2 that was used in the development of clinical guidance on prevention and treatment of obesity. In all three cases, these analyses were led by academic staff, rather than Department of Health analysts. Further examination of how Health Survey for England data is used, and why it may not always be used, despite potential to inform policy-making is presented elsewhere ([[51]](#endnote-52)).

## Conclusion

Since 1992, the measurements taken as part of the Health Survey for England have been used extensively at every stage of policy making. Measurement data are needed and used by governments in the production of evidence-based strategies to combat obesity.

**Figure captions**

Figure 1. Prevalence of obesity and of overweight including obesity among adults in England, 1991-2011.

Footnote:

Data are shown as three-year rolling averages.

Figure 2. Prevalence of obesity and of overweight including obesity among children in England, 1995-2011.

Footnote:

a. Aged 2-15y; b. Aged 2-10y; c. Aged 11-15y. Data are shown as three-year rolling averages.

**Table captions**

Table 1: Specific identified uses of measured height and weight data from the Health Survey for England in UK health and obesity strategy and associated documents.

Table 2: Comparison of prevalence of obesity in 2010, or the closest year for which data are available, derived from measured or self-reported height and weight data, by country. Countries are ranked by increasing prevalence of obesity, using measured data where available and self-reported if not.

Footnote:

Note that survey methodologies, even within self-report or measured types, can differ and cautiousness is advised when comparing the figures.

*Source: OECD Health Data 2012.* [*http://stats.oecd.org/Index.aspx?DataSetCode=HEALTH\_LVNG*](http://stats.oecd.org/Index.aspx?DataSetCode=HEALTH_LVNG) *(5).*

**Table 1**

|  |  |  |
| --- | --- | --- |
| **Document** | **Year** | **Use of HSE data** |
| Quantifying the Obesity Problem in England |
| Our Healthier Nation ([[52]](#endnote-53)) | 1999 | Reports prevalence data for 1996. |
| National Audit Office: Tackling Obesity in England ([[53]](#endnote-54)) | 2001 | Reports prevalence data. This document was presented in parliament along with recommendations to address the problem. |
| Chief Medical Officer's Reports (14, 15, 16, 17) | 2002-2005 | 2002 report warned of an obesity ‘time bomb’. Prevalence and trend data for adults were presented as were statistics on child obesity, health inequalities and ethnic differences in obesity. Obesity highlighted as a particular problem for the West Midlands in 2003, the East Midlands in 2004 and childhood obesity for London in 2005. |
| A Leaner Fitter Future ([[54]](#endnote-55)) | 2003 | Presents figures on prevalence and on trend. Discussed in parliament ([[55]](#endnote-56)) and was reported to be putting pressure on ministers to consider obesity more seriously ([[56]](#endnote-57)). |
| Storing up future problems, RCP ([[57]](#endnote-58)) | 2004 | References the Chief Medical Officer’s 2002 report and National Audit Office 2001 report. Presents figures from Health Survey for England 2002. Raises profile of obesity among the medical profession. |
| The House of Commons Select Committee Report on Obesity ([[58]](#endnote-59)) | 2004 | Prevalence figures used to quantify health implications, social and economic costs, so as to make recommendations for government strategy. |
| Choosing Health: Making Healthy Choices Easier ([[59]](#endnote-60)) | 2004 | Prevalence data presented to justify inclusion of this issue as one of six government health priorities. |
| Preventing Childhood obesity, BMA ([[60]](#endnote-61)) | 2005 | Presents prevalence figures and trend data on childhood obesity to urge action from medical professionals in the context of Choosing Health. |
| Choosing a better diet ([[61]](#endnote-62)) | 2005 | Presents figures on prevalence and trends for context setting and to justify production of the strategy. |
| NICE obesity guidance CG43 (36) | 2006 | Uses data on prevalence and trend for context setting, to justify production of this document and to urge use of it in order to address this important issue. |
| Health Profile of England and Local Health profiles ([[62]](#endnote-63)) | 2006-2009 | Indicators presented in the health profiles reflect the six priority areas identified in Choosing Health. These profiles were for public service professionals and local councillors. Prevalence data was used for the obese adults indicator, and for the obese children indicator, until the NCMP was validated for this purpose. Prevalence and trend data is presented in the "rationale" attached to both the childhood and adult obesity indicator justifying their inclusion. |
| Healthy weight, healthy lives: a cross-government strategy for England (27) | 2007 | Data on prevalence and trend used for context setting and to justify development of this strategy. |
| Tackling obesities: Future choices (Foresight Report) (26) | 2007 | Prevalence of and trends in obesity in adults and children, further examined by age-group, social class, ethnicity and geographical region. Prevalence figures used to estimate economic costs of overweight and obesity. |
| National Obesity Observatory work ([[63]](#endnote-64)) | 2007-2012 | Prevalence and trends of adult obesity, examined by age, sex, ethnicity, deprivation quintile, income quintile and examination of the link between obesity and mental illness (GHQ-12 also collected for HSE participants) used in various tools for commissioners, policy-makers and practitioners such as factsheets, briefings, data presentations. |
| Healthy lives, healthy people: our strategy for public health in England ([[64]](#endnote-65)) | 2010 | Prevalence of obesity is presented. |
| Change for Life: One Year On (35) | 2010 | Data on prevalence and trend is presented for context. |
| Healthy lives, healthy people: a call to action on obesity (28) | 2011 | Prevalence is contrasted across developed countries. Adult and childhood obesity and trend data is presented. Evidence that the upward trends in child obesity are beginning to flatten out used to give cautious hope that strategy focus is working. Prevalence of obesity by limiting longstanding illness and ethnic group are presented to show groups at particular risk. |
| SACN Dietary Recommendations for Energy (38) | 2011 | Prevalence of underweight compared and contrasted to prevalence of overweight and obesity demonstrating under consumption of calories is not a problem in the free living population of the UK. Comparison of 1993 and 2003 data showed both BMI and waist circumference increased most in the upper part of the distribution i.e. Thinner people were almost as thin as they were 10 years earlier, but fatter people were considerably fatter. |
| Responsibility deal (40) | 2012 | Background on the responsibility deal pledges “out of home calorie labelling” and “calorie reduction” for businesses includes presentation of obesity prevalence. |
| Parliamentary Questions ([[65]](#endnote-66)) | 2005-2011 | A selection of many parliamentary questions answered using prevalence data PQ216374; PQ217057; PQ217667; PQ69602; PQ67197; PQ82144; PQ161092; PQ132141; PQ111823; PQ151071; PQ3094; PQ48492; PQ47026.  |
| ***Identifying inequalities in the burden of obesity*** |
| Independent Inquiry into Inequalities in Health Report (Acheson Report) (20) | 1998 | The marked social class gradient in obesity was reported, with illustration of this in women (where the inequality is most marked). |
| Our Healthier Nation (52) | 1999 | Presents inequalities in the prevalence of obesity by social class for women. States that obesity is unequally distributed throughout the population. |
| Wanless Reports (31,32) | 2002, 2004 | Obesity gradient by income in women presented as one risk factor for chronic disease which is associated with deprivation. |
| The House of Commons Health Committee on Health Inequalities ([[66]](#endnote-67)) | 2009 | References the Foresight report when showing inequalities in the prevalence of obesity. Trends in obesity prevalence 1993–2004 by Social Class I and V are shown. |
| Tackling Health Inequalities: 10 Years On (24) | 2009 | Examines the WHO framework of indicators used to monitor the social determinants of health inequalities. One of these is: Prevalence of obesity in adults by gender and by income quintile. Also examines the contribution of obesity to the UK health inequalities in infant mortality target |
| Fair Society, Healthy Lives (Marmot Review)[[67]](#endnote-68) | 2010 | Presents obesity prevalence, 1997-2007 for adults by social class, by region and deprivation quintile. Also presents childhood obesity prevalence. |
| ***Modelling Future Scenarios*** |
| Wanless Reports (31,32) | 2002, 2004 | In order to predict future health needs and demands of the population one of the key factors examined by the report was the health status in the population. Health problems resulting from obesity were identified by Wanless as likely to put significant strain on future NHS budgets. |
| Forecasting obesity to 2010 ([[68]](#endnote-69)) | 2006 | A report commissioned by the Department of Health to examine obesity prevalence by age, sex, and socio-economic position in 2003, and to project these forward to 2010. Uses trend and prevalence data. |
| Tackling obesities: Future choices (Foresight Report) (26) | 2007 | The report explores future trajectories for overweight and obesity in the population. This is done through quantitative modelling, using the Health Survey for England from 1994-2004 and extrapolating trends to 2050. The simulation is then used to examine future impact on life expectancy and potential future economic costs of overweight and obesity. |
| Obesity: Recent Trends in Children Aged 2-11y and 12-19y (29) | 2009 | Returns to the model produced by Foresight for Tackling Obesities and updated the data based on the three additional years of HSE data that had become available since Tackling Obesities was published. This shows an improved picture for England with the rising prevalence of childhood obesity slowing down. |
| Obesity Trends for Adults Analysis from the Health Survey for England 1993 – 2007 (30) | 2010 | Data from 2004-2007 were incorporated into the software developed for Foresight to show trends until 2020, by gender, age and social class. Future obesity trends for the UK population are presented and the consequences in terms of the costs of BMI related diseases are predicted. |
| ***Clinical Guidance*** |
| NICE obesity guidance CG43 (36) | 2006 | Health Survey for England data was used in modelling to examine cost-effectiveness of sibutramine, orlistat and surgery for treatment of obesity. Health Survey for England data was also used as the basis of a model to examine the health economics of obesity prevention through various measures. |
| SACN Dietary Reference Values for Energy (38) | 2011 | Mean measured height by age and sex used with ideal weights to calculate energy requirements. |
| ***Strategy Development*** |
| Healthy weights, healthy lives: a cross-government strategy for England (27) | 2007 | Equality Impact Assessment used data on BMI by age, sex and ethnicity in order to draw the conclusion that there is no evidence that Healthy Weight, Healthy Lives may adversely affect equality of opportunity (33) |
| Change for Life: One Year On (35) | 2010 | Prevalence data used to show that obesity peaks in the 45–65 age range. This justified the launch of a campaign for adults centred on this age-group. |
| Healthy lives, healthy people: a call to action on obesity (28) | 2011 | Equity Analysis (34) |
| ***Target setting and monitoring*** |
| Health of the Nation (7) | 1992 | To reduce the proportion of men and women aged 16-64 who are obese by at least 25% and 33% respectively by 2005 to no more than 6% of men and 8% of women. Monitored by prevalence data. |
| HM Treasury. Public Service Agreements 2005-2008 (23) | 2004 | Halt the year-on-year rise in obesity among children under 11y by 2010 in the context of a broader strategy to tackle obesity in the population as a whole. Both set and monitored using child obesity prevalence data. |
| Choosing a better diet (61) | 2005 | As above. |
| Healthy weights, healthy lives: a cross-government strategy for England (27) | 2007 | 1. To reverse the rising tide of obesity and overweight in the population by ensuring that all individuals are able to maintain a healthy weight. 2. By 2020 we will have reduced the proportion of overweight and obese children to 2000 levels. Both these targets set and monitored with prevalence data. |
| Tackling Health Inequalities: 10 Years On (24) | 2009 | One indicator from the framework proposed by the WHO Commission on Health Inequalities (25): Prevalence of obesity in adults by gender and income quintile. Monitored with prevalence data. |
| Responsibility Deal (40) | 2012 | To support the population to reduce its total calorie consumption by 5 billion calories a day. Target set using measured weight trend data. |
| Public Health Outcomes Framework ([[69]](#endnote-70)) | 2012 | Excess weight in adults will be monitored at a national level with obesity prevalence data. |
| ***Evaluation and review*** |
| Healthy weights, healthy lives: a cross-government strategy for England (27) | 2010 | Evaluated in Healthy weight, healthy lives: two years on (42). This evaluation reports progress towards targets and examines prevalence of obesity in other age-groups. |

**Table 2.**

|  |  |  |
| --- | --- | --- |
| **Country** | **Measured** | **Self-report** |
| Japan | 3.5 | .. |
| Korea | 4.1 | 2 |
| Switzerland | .. | 8.1 |
| Norway | .. | 10 |
| Italy | .. | 10.3 |
| Netherlands | .. | 11.4 |
| Austria | .. | 12.4 |
| France | .. | 12.9 |
| Sweden | .. | 12.9 |
| Denmark | .. | 13.4 |
| Belgium | .. | 13.8 |
| Germany | .. | 14.7 |
| Portugal | .. | 15.4 |
| Poland | .. | 15.8 |
| Israel | .. | 16 |
| Spain | .. | 16 |
| Slovenia | .. | 16.4 |
| Estonia | .. | 16.9 |
| Slovak Republic | 16.9 | 15.1 |
| Turkey | .. | 16.9 |
| Greece | .. | 17.3 |
| Finland | 20.2 | 15.6 |
| Czech Republic | 21 | 17.4 |
| Iceland | .. | 21 |
| Luxembourg | 22.5 | .. |
| Ireland | 23 | 15 |
| Canada | 24.2 | 17.5 |
| Australia | 24.6 | 21.3 |
| Chile | 25.1 | 12.1 |
| United Kingdom | 26.1 | .. |
| New Zealand | 27.8 | .. |
| Hungary | 28.5 | 19.5 |
| Mexico | 30 | .. |
| United States | 35.9 | 28.1 |

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