



## Obesity in the United Kingdom: Analysis of QRESEARCH data

Authors:	
Professor Julia Hippisley-Cox	Professor of Clinical Epidemiology and General Practice
Ronan Ryan	Research Fellow/Program
Institution	University of Nottingham
Report reference number	DH 12
Report version number	1.0
Final submission date	August 2004
QRESEARCH Database version	QRESEARCH version 3
Funding body	Department of Health
Web link	<a href="http://www.qresearch.org">http://www.qresearch.org</a>
Acknowledgments	QRESEARCH is a not-for-profit partnership between the University of Nottingham and EMIS. We acknowledge the contribution of EMIS and to the practices which contribute data
Copyright	© QRESEARCH 2007, all rights reserved
Terms of usage	These reports can be used for personal education, research, health service planning and private study. Materials should not be further copied, photocopied or reproduced, or distributed in electronic form. Any material which is referenced should refer to QRESEARCH and the database version. Any use or distribution for commercial purposes is expressly forbidden and may constitute an infringement of the University's copyright and may lead to legal action.

# CONTENTS

<b>1</b>	<b>EXECUTIVE SUMMARY.....</b>	<b>3</b>
<b>2</b>	<b>AGREED SPECIFICATION.....</b>	<b>4</b>
<b>3</b>	<b>OBJECTIVES .....</b>	<b>4</b>
<b>4</b>	<b>BACKGROUND .....</b>	<b>4</b>
<b>5</b>	<b>METHOD .....</b>	<b>6</b>
5.1	<i>Version of database .....</i>	6
5.2	<i>Patient eligibility criteria .....</i>	6
5.3	<i>Age standardisation.....</i>	6
5.4	<i>Coverage .....</i>	6
5.5	<i>Deprivation.....</i>	7
5.6	<i>Ethnicity .....</i>	7
<b>6</b>	<b>METHOD .....</b>	<b>8</b>
6.1	<i>Case definition for obesity.....</i>	8
<b>7</b>	<b>RESULTS .....</b>	<b>9</b>
7.1	<i>Recording of Body Mass Index 1994 to 2003 .....</i>	9
1.	Recording of body mass index by sex .....	9
2.	Recording of body mass index by age.....	11
	Recording of body mass index by Government Regional Office.....	12
3.	Recording of body mass index by deprivation .....	13
4.	Recording of body mass index in the last 15 months by diabetes .....	14
5.	Recording of body mass index by ethnicity .....	15
7.2	<i>Recorded levels of Obesity 1994 to 2003 .....</i>	16
6.	Obesity by sex .....	16
7.	Obesity by age .....	17
8.	Obesity by Government Regional Office .....	18
9.	Obesity by deprivation .....	19
10.	Obesity in patients with and without diabetes .....	20
11.	Obesity by ethnicity .....	21
12.	Comparison of overweight and obesity prevalence in the Health Survey for England and QRESEARCH.....	22
	<i>Recording of body mass index in children.....</i>	23
13.	Recording of body mass index in children 2-15 years.....	23
14.	Trends in obesity for children aged 2-15 years.....	24
15.	Recording of body mass index by age .....	25
16.	Obesity by single year of age.....	26
17.	Comparison of overweight and obesity prevalence in children in the Health Survey for England and QRESEARCH .....	27
<b>8</b>	<b>REFERENCES.....</b>	<b>28</b>

## **1 EXECUTIVE SUMMARY**

This report describes patterns of obesity and recording of body index by age, sex, location, deprivation, ethnicity and trends over time. There is a second closely related reports which will be produced after this which describes the incidence, prevalence and mortality of diabetes.

- Recording rates for body mass index have risen markedly over the last ten years from 41.0% in 1994 to 60.45% in 2003
- Recording of body mass index is higher in women and highest in patients aged 65 to 69 years where levels rose up to 83.44% in 2003.
- Body mass index recording doesn't differ by deprivation. This suggests than analyses of obesity levels will not be confounded by a recording bias.
- There is a slight recording bias for body mass index by ethnicity with higher body mass index recording rates in areas of lowest ethnicity compared with areas of higher ethnicity.
- Overall levels of recording of body mass index are similar across different Government Office Regions in England.
- The percentage of patients who are obese has almost doubled in ten years from 15.14% in 1994 to 24.49% in 2003 though the majority of this increase has occurred in the last 5 years.
- There has been a 54% increase in obesity from 1994 to 2003 in patients aged 60 to 64 years - 31.20% patients were obese in 2003 compared with 21.85% of patients of the same age in 1994.
- The prevalence of obesity varies across the country with highest levels in West Midlands (28.54%) and lowest in London (20.84%) – a 1.4 fold variation in prevalence.
- Patients in deprived areas have substantially higher levels of obesity than patients in affluent areas and this differs between men and women (33.96% of women in deprived areas are obese vs 27.03% of women in affluent areas compared with 28.06% vs 25.92% in men respectively in 2003).
- Patients with diabetes have increasing levels of obesity over the last ten years as shown below. In 2003, 41.94% of patients with diabetes are obese compared with 22.21% of patients without obesity.

- There is an extremely good correspondence in the prevalence of obesity in adults QRESEARCH compared with the Health Survey for England (HSE). For example 21% of adults in the HSE were obese in 2000 to 2002. In QRESEARCH, the prevalence of obesity in adults with a value recorded in the previous 15 months was 20% in 2000 and 22% in 2002.
- QRESEARCH is not a robust source of data for identifying levels of obesity in children as recording of body mass index is low and children with a ‘weight problem’ are more likely to have a value recorded thus introducing a recording bias. QRESEARCG might be suitable for estimating overall prevalence of children who are either over weight or obese if related Read codes are used rather than body mass index to identify subjects.

## **2 AGREED SPECIFICATION**

“There is concern about levels of obesity across the UK. We would like an analysis of the number (%) of patients with a body mass index recorded by age, sex, Strategic Health Authority, calendar year, deprivation and ethnicity and for patients with and without diabetes.

## **3 OBJECTIVES**

- To describe 10 year trends in recording of body mass index by age, sex, Government Office Region, deprivation and ethnicity and for patients with and without diabetes
- To determine 10 year trends in obesity by age, sex, Government Office Region, deprivation and ethnicity and for patients with and without diabetes
- To determine trends in recording of body mass index and obesity in children aged 0 to 15 years.

## **4 BACKGROUND**

Obesity causes or exacerbates many health problems, both independently and in association with other diseases. In particular obesity is associated with type 2 diabetes mellitus, coronary heart disease, an increased incidence of certain forms of cancer, respiratory complications (sleep apnoea), and osteoarthritis of large and small joints(Kopelman 2000). The prevalence of obesity is rising world wide, not just in Europe and America. For example, 75% of women in Samoa are obese. Obesity is caused by a

complex inter-play of genetic and environmental factors with physical inactivity and energy intake being important factors(Kopelman 2000).

There are a variety of measures for obesity, including body mass index, weight circumference, skinfold thickness. In UK general practice, doctors routinely record weight and height making the body mass index the most applicable measure of obesity in this setting. It is probably the most robust measure for assessing trends over time in adults. A body mass index of over 30 is widely recognized as a measure of obesity.

## **5 METHOD**

### **5.1 Version of database**

This work has been conducted using the version three of the QRESEARCH national database, covering approx 240 practices, 4 million patients, downloaded 10 May 2004.

### **5.2 Patient eligibility criteria**

In order to be included in the analyses, patients had to meet the following criteria:

- Patients must be in a practice that used EMIS for two years prior to the analysis year to be included in the analyses.
- Patient must be registered in practice on 1 January in the analysis year and for the previous 6 months to be included in the analysis.

### **5.3 Age standardisation**

We have directly age-standardised the results using 5-year age groups, from age 0-4 years to ages 90 and the UK Census 2001 population as the standard population.

### **5.4 Coverage**

Practices in this analysis are drawn from every Strategic Health Authority in England and Wales. There are also some practices in Scotland but none in Northern Ireland due to NHS connection difficulties. The next table shows the number of practices which met the eligibility criteria in each of the analysis years (three practices has incomplete data for 2003 due to the process of bulk uploads) so 231 practices were included in 2001 and 2002 and 228 were included in 2003

### **Number of practices included in analyses, 1994-2003**

#### **Year   Number of practices**

1994	64
1995	95
1996	137
1997	163
1998	197
1999	226
2000	230
2001	231
2002	231
2003	228

### **Number of practices included in analyses by Government Regional Office/country, 2002**

<b>GRO code</b>	<b>GRO name</b>	<b>Number of practices</b>
A	North East	13
B	North West	19
D	Yorkshire and Humberside	28
E	East Midlands	23
F	West Midlands	15
G	East of England	22
H	London	33
J	South East	35
K	South West	31
SC	Scotland	3
W	Wales	6

Whilst Scotland and Wales are countries, we have included them in the above table for completeness.

## **5.5 Deprivation**

For this report, deprivation has been measured using quintile of Townsend score for output area (based on 2001 Census in England and Wales only).

## **5.6 Ethnicity**

We have grouped ethnicity using the proportion non-white population for output area (based on 2001 Census in England and Wales only). In the 2001 Census the white grouping consisted of: 'White British', 'White Irish' and 'White Other White'.

## 6 METHOD

### 6.1 Case definition for obesity

We have used two measures for obesity – one for all ages and an additional one for children and young adults.

- All ages: prevalent cases of people with obesity are defined by the presence of a body mass index of >30 kg/m<sup>2</sup>.
- Children and young adults: obesity defined as the presence of a body mass index of >30 kg/m<sup>2</sup> or a Read code indicating obesity (see the following table).

#### Read codes used to identify children and young adults with overweight or obesity

READCODE	DESCRIPTION
13A3.	Weight reducing diet
13AC.	Diabetic weight reducing diet
1624.	Abnormal weight gain
22A4.	O/E – overweight
22K5.	Body mass index 30+ - obesity
66C..	Obesity monitoring
66C1.	Initial obesity assessment
66C2.	Follow-up obesity assessment
66C3.	Understands reducing diet
66C4.	Has seen dietician – obesity
66C5.	Treatment of obesity changed
66C6.	Treatment of obesity started
66C7.	Treatment of obesity stopped
66C9.	Weight loss advised
66CE.	Reason for obesity therapy - occupational
66CZ.	Obesity monitoring NOS
8B57.	Weight reducing diet
8CA40	Pt advised re wt reducing diet
9OK..	Obesity monitoring admin.
9OK..	Obesity clinic administration
9OK1.	Attends obesity monitoring
9OK2.	Refuses obesity monitoring
9OK3.	Obesity monitoring default
9OK4.	Obesity monitoring 1st letter
9OK5.	Obesity monitoring 2nd letter
9OK6.	Obesity monitoring 3rd letter
9OK7.	Obesity monitoring verbal inv.
9OK8.	Obesity monitor phone invite
9OK9.	Obesity monitoring deleted
9OKA.	Obesity monitoring check done
9OKZ.	Obesity monitoring admin.NOS
C38..	Obesity and other hyperalimentation
C38..	Hyperalimentation incl.obesity

C380.	Obesity
C3800	Obesity due to excess calories
C3801	Drug-induced obesity
C3802	Extreme obesity with alveolar hypoventilation
C3803	Morbid obesity
C38z.	Obesity and other hyperalimentation NOS
C38z0	Simple obesity NOS
Cyu7.	[X]Obesity and other hyperalimentation
Cyu70	[X]Other obesity
EGTON421	Weight reducing diet advised
HNG0212	[RFC] Obesity
L161.	Excessive weight gain in pregnancy
L161.	Maternal obesity syndrome
L16D.	Excessive weight gain in pregnancy
R031.	[D]Abnormal weight gain
ZV653	[V]Dietary counselling in obesity

## 7 RESULTS

### 7.1 Recording of Body Mass Index 1994 to 2003

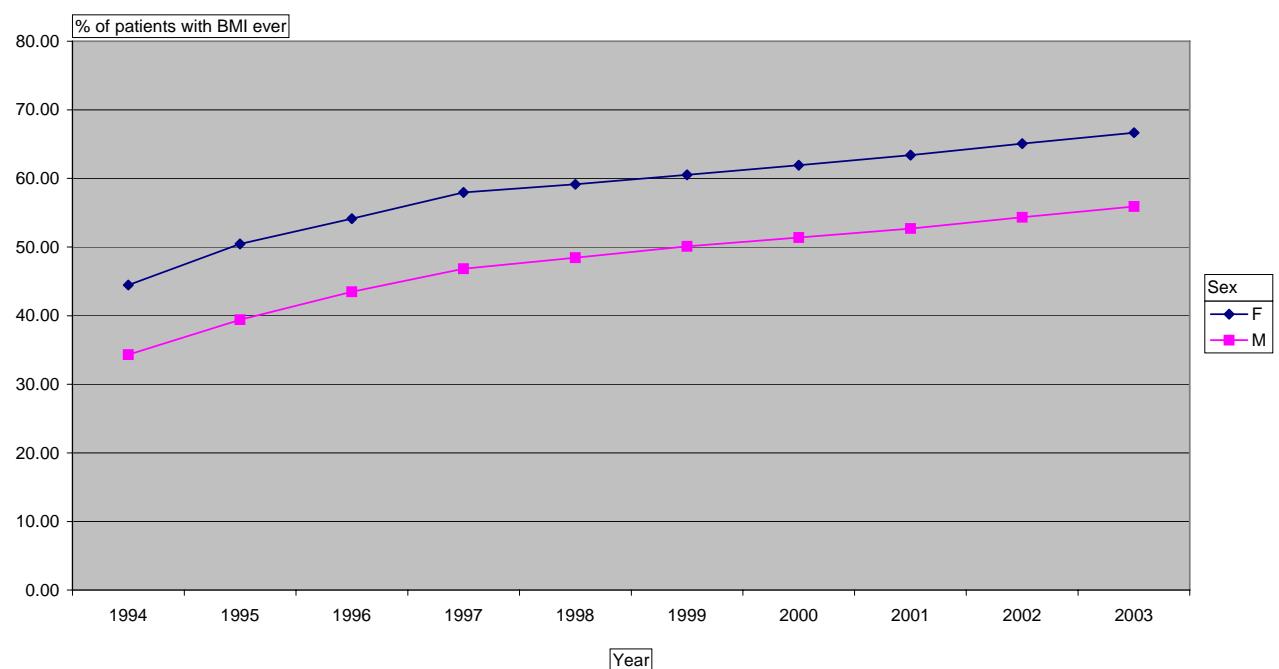
The first section of these results concentrates on recording of body mass index on the computer and how it varies by sex, age, deprivation, location and presence of diabetes. The second section reports on obesity levels in the same population groupings.

#### 1. *Recording of body mass index by sex*

Chart 1a shows the percentage of patients who have ever had body mass index recorded by sex. The rates of recording have risen over the last ten years from 41.0% in 1994 to 60.45% in 2003. The recording rates are higher in women than men. This is likely to be due to monitoring for the oral contraceptive pill or HRT.

#### Chart 1a Percentage of patients who have ever had body mass index recorded by sex

Age group|All ages|Diabetes (0=no, 1=yes, 9=both)|9

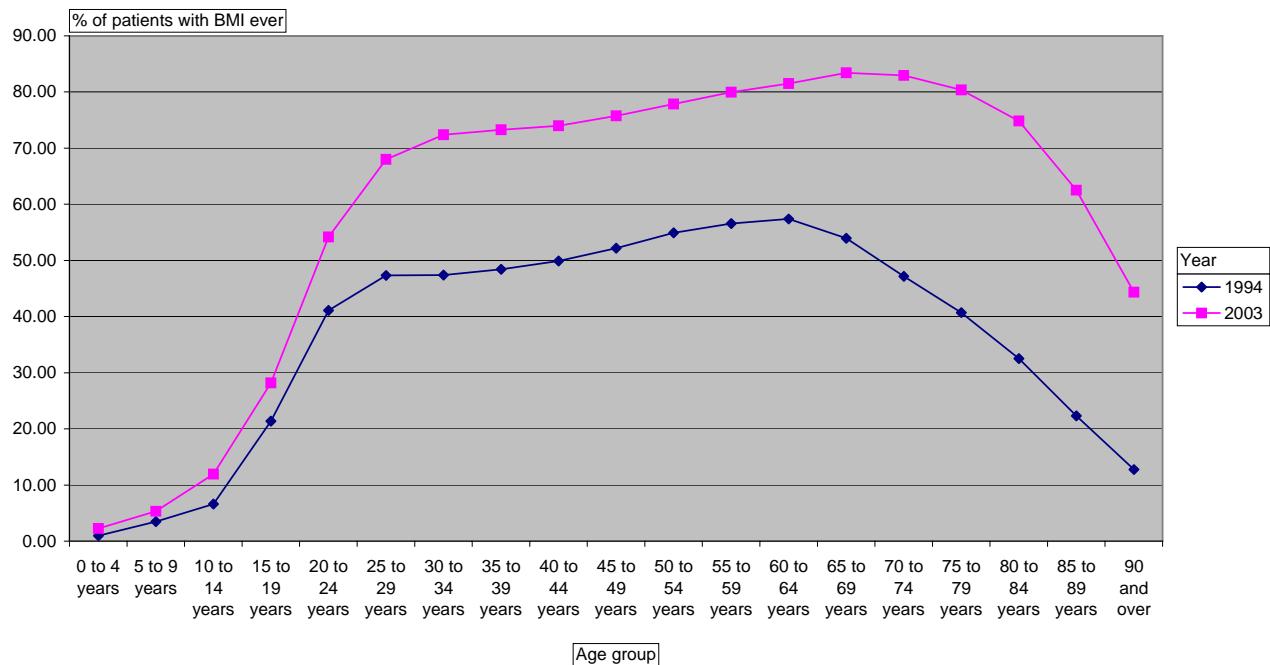


## 2. Recording of body mass index by age.

Chart 1b shows recording of body mass index by age in 1994 and 2003. Recording has increased in all groups and is over 80% for patients 55 to 75 years.

**Chart 1b body mass index recording by age in 1994 and 2003**

Sex[B|Diabetes (0=no, 1=yes, 9=both)|9]

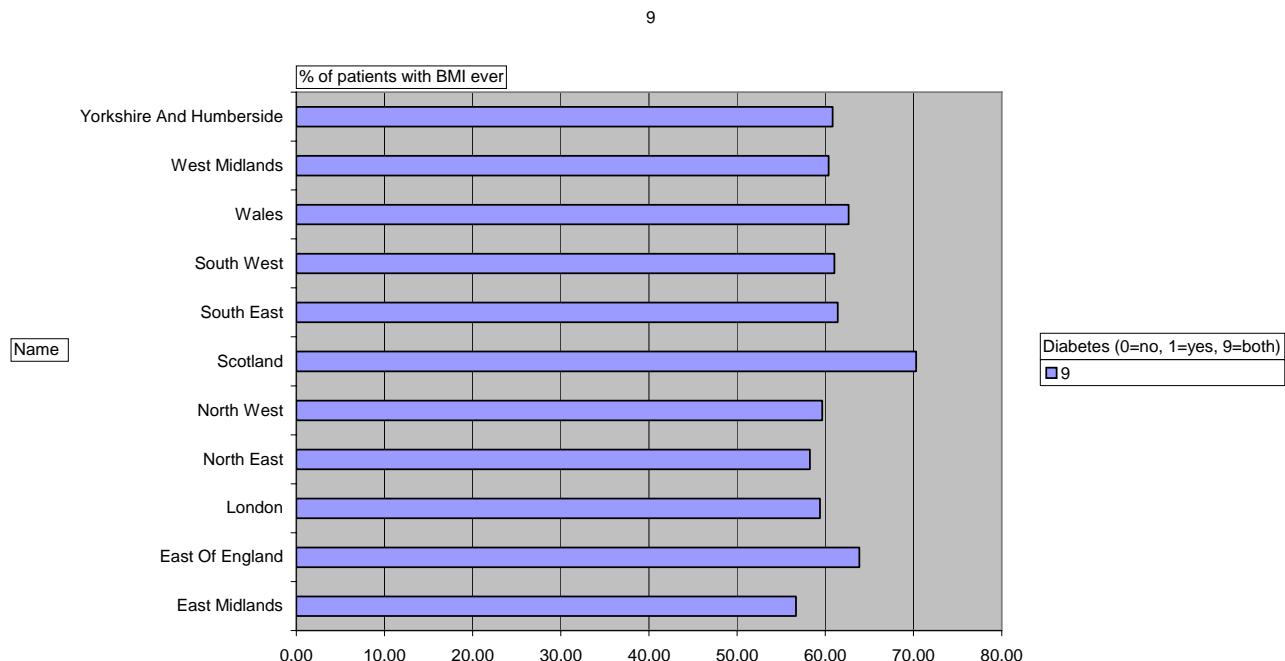


### **Recording of body mass index by Government Regional Office**

Chart 1c shows recording of body mass index by Government Regional Office (GRO) in 2003. There overall variation was less than expected. In 2003, there was an 1.2 fold variation in recording of body mass index between different GROs with the highest recording levels were found in Scotland (70.29%) and lowest in East Midlands (56.68%).

**Chart 1c body mass index recording by Government Regional Office in 2003**

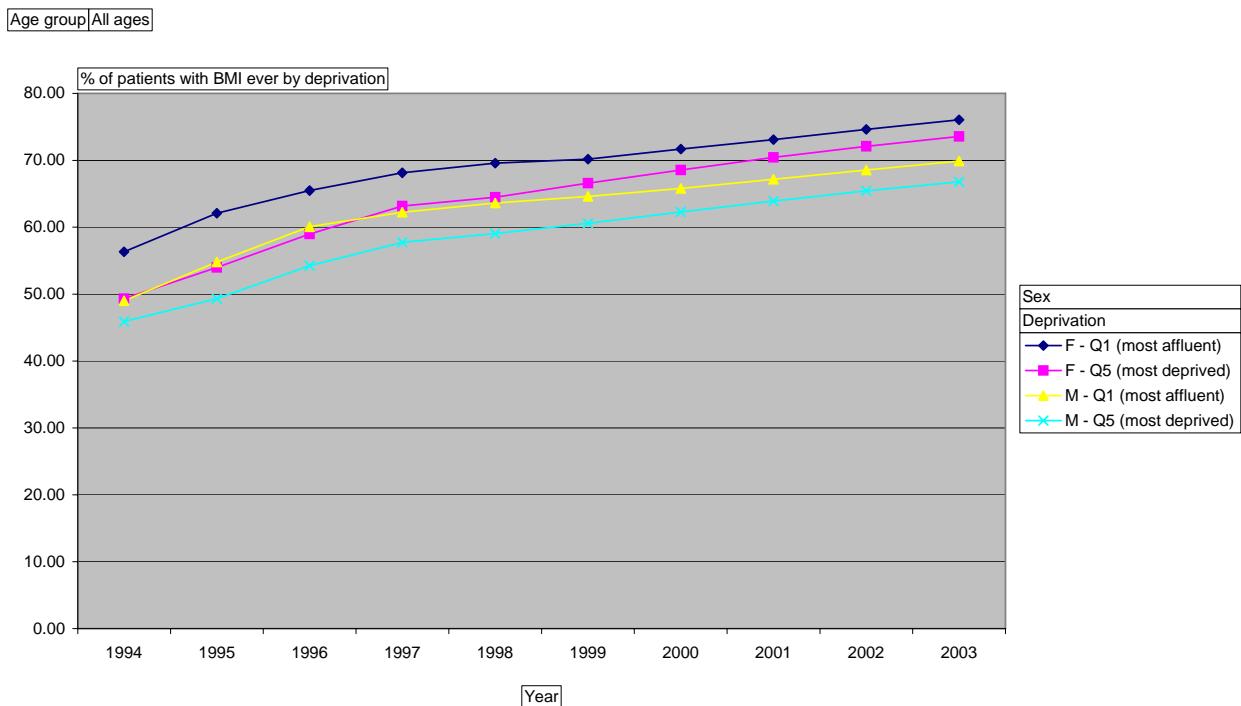
Year|2003|Sex|B|Age group>All ages



### **3. Recording of body mass index by deprivation**

Chart 3a shows trends in recording of body mass index for patients by quintile of deprivation and sex. Recording is marginally higher in more affluent groups though the discrepancy gets less over time. This is useful as it suggests that analyses of obesity by deprivation are less likely to be confounded by a recording bias.

**Chart 3a body mass index recording by quintile of deprivation and sex**

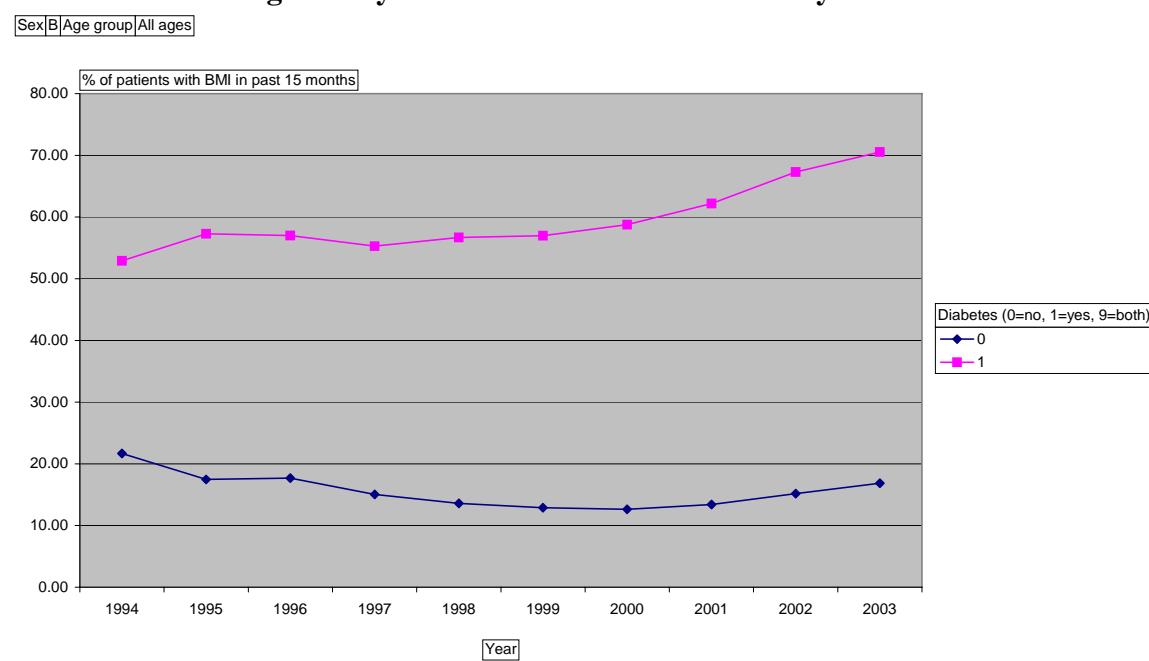


#### **4. Recording of body mass index in the last 15 months by diabetes**

Chart 3b shows recording of body mass index in the last 15 months for patients with and without diabetes. Recording of body mass index is one of the measures in the new General Medical Services Contract for GPs for diabetes. Overall recording rates are much lower than the ever recorded values as it is limited to 15 months. Overall 18.25% of patients in 2003 had a body mass index recorded in the last 15 months (70.53% of patients with diabetes and 16.87% of patients without diabetes)

There has been an increase in the percentage of patients with diabetes who have had a body mass index recorded over the past 5 years though values are much lower than we would like. We expect these to rise rapidly with the introduction of the new GMS contract in 2004.

**Chart 3b Recording of body mass index in last 15 months by diabetes**

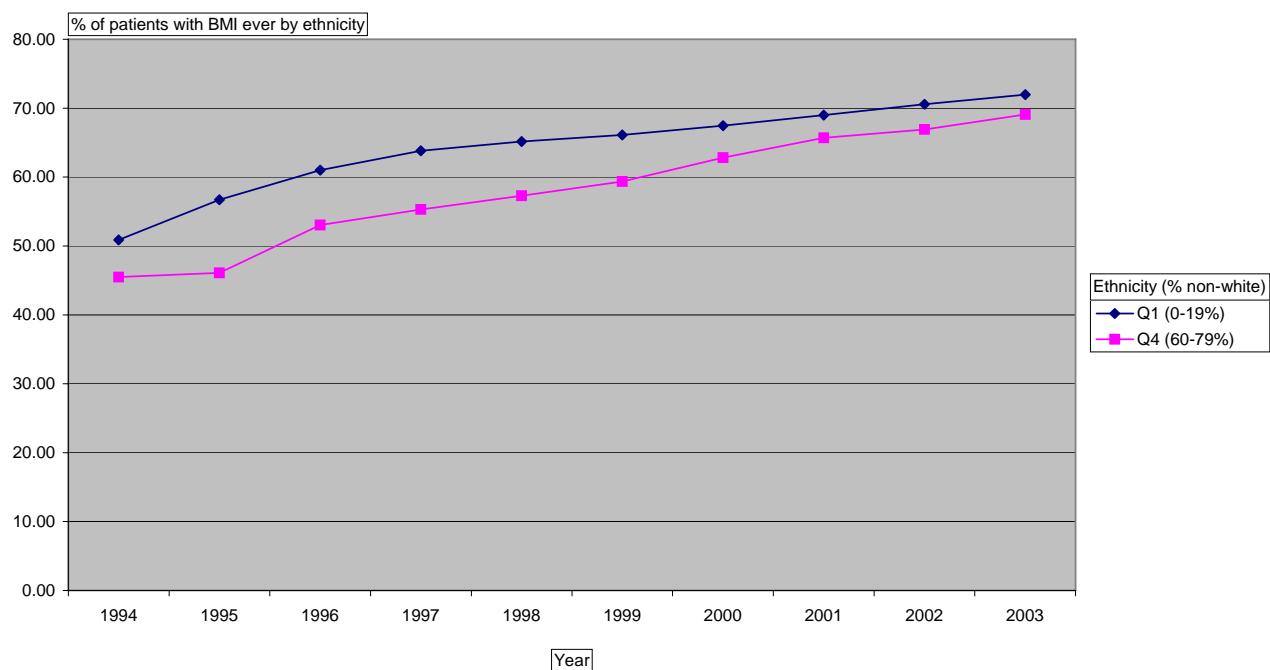


## 5. Recording of body mass index by ethnicity

The next chart shows that recording of body mass index tends to be marginally higher in areas of low ethnicity compared with areas of high ethnicity though both have increased over time in a similar way.

**Chart 5 Percentage with body mass index recorded ever by ethnicity**

Sex | B | Age group | All ages



## 7.2 Recorded levels of Obesity 1994 to 2003

### 6. Obesity by sex

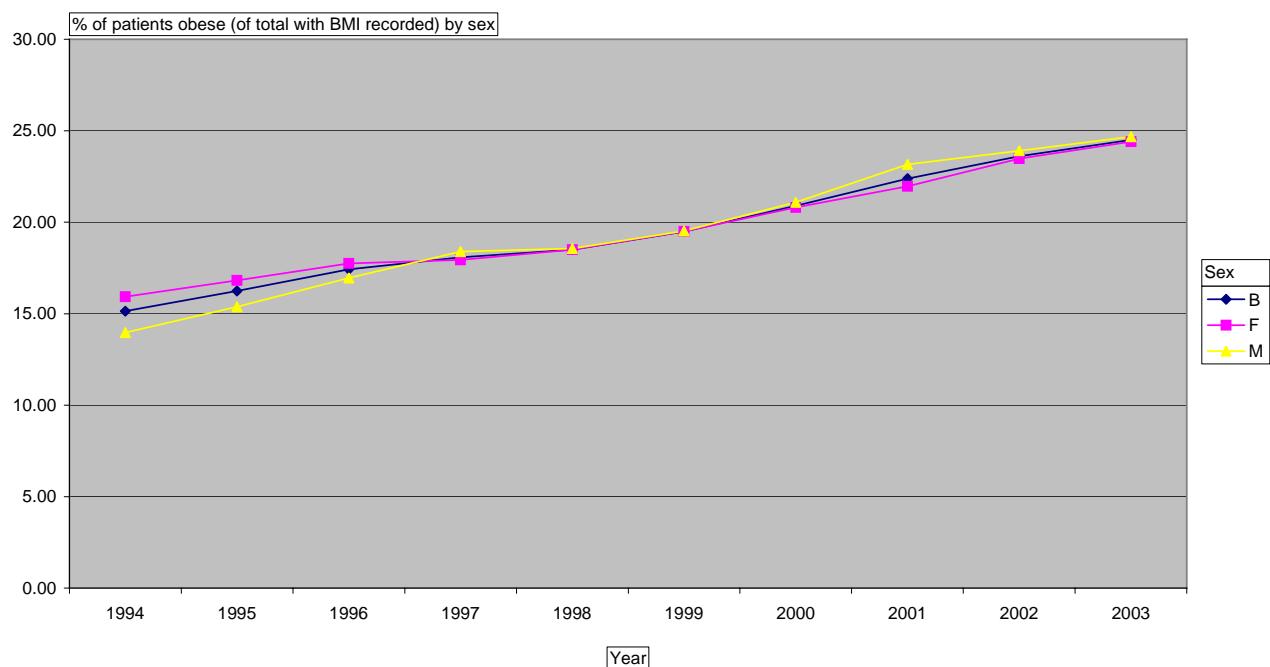
Chart 2a shows the proportion of patients with obesity by sex. The percentage of patients who are obese has almost doubled in ten years from 15.14% in 1994 to 24.49% in 2003 though the majority of this increase has occurred in the last 5 years.

Women have similar levels of obesity than men (24.40% vs 24.68%) and both have risen at a similar rate over the last ten years. Levels of obesity in the UK are broadly similar to those in the US -- a telephone survey reported that 20.9% of adults in 2001 were obese (Mokdad, Ford et al. 2003).

29.68% of women and 41.36% of men in QRESEARCH were overweight (ie have a body mass index between 25 and 30). In the US, 58% of all adults in 2001 were overweight (Mokdad, Ford et al. 2003).

### Chart 2a shows the proportion of patients with obesity by sex.

Age group|All ages|Diabetes (0=no, 1=yes, 9=both)|9

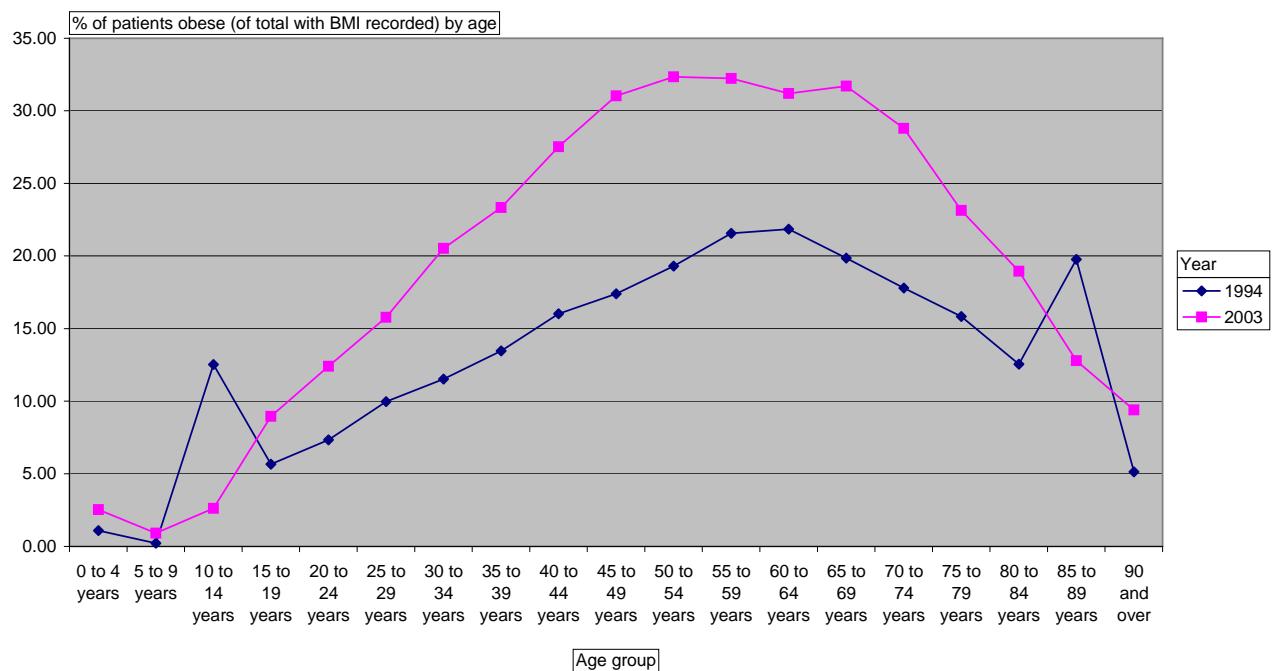


## 7. *Obesity by age*

Chart 2b shows how obesity varies by age in 1994 and 2003. 31.20% of patients aged 60 to 64 years were obese in 2003 compared with 21.85% of patients of the same age in 1994. This represents a 54% increase in 10 years in patients aged 60-64 years.

**Chart 2b trends in obesity by age in 1994 and 2003**

Sex[B|Diabetes (0=no, 1=yes, 9=both)|9]



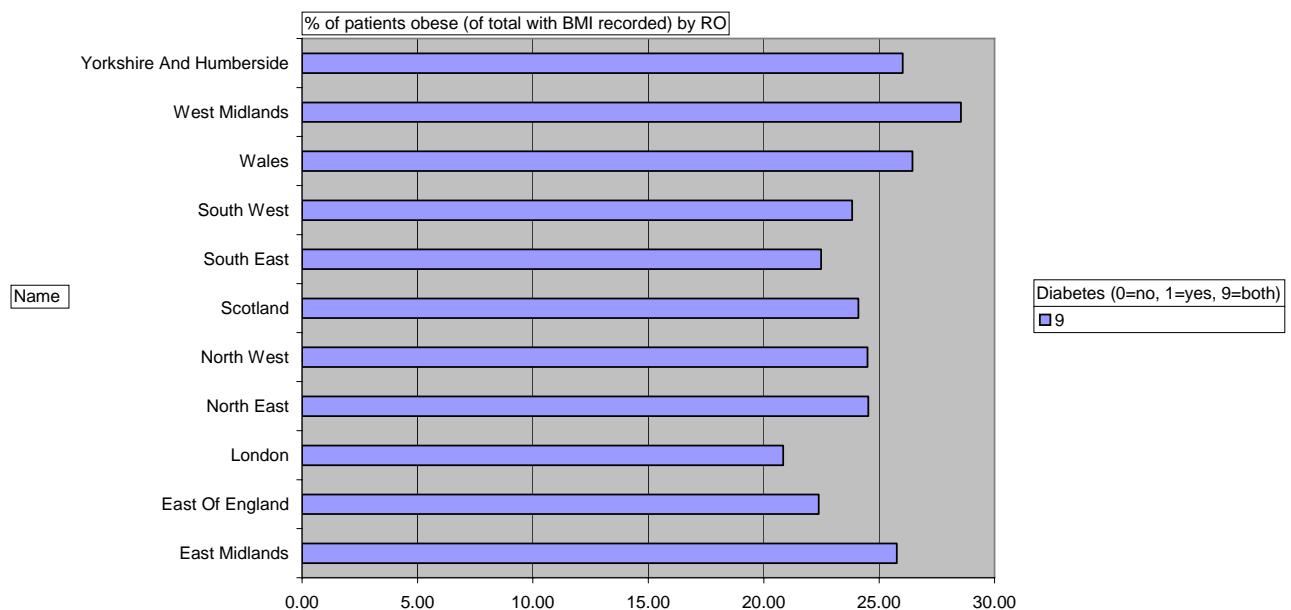
## **8. Obesity by Government Regional Office**

Obesity levels vary across the country with highest levels in West Midlands (28.54%) and lowest in London (20.84%) – a 1.4 fold variation in 2003.

**Chart 2c Obesity by Government Regional Office**

Year|2003|Sex|B|Age group|All ages

9

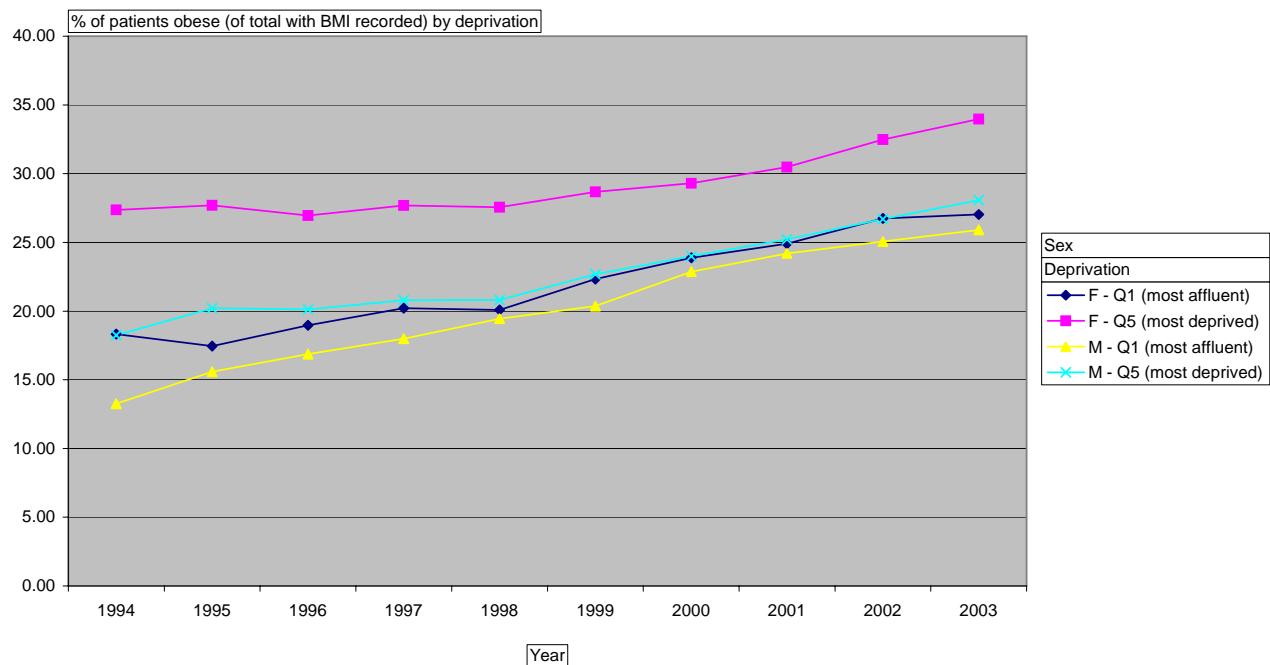


## **9. Obesity by deprivation**

Patients in deprived areas have substantially higher levels of obesity than patients in affluent areas (33.96% vs 27.03% in women and 28.06% vs 25.92% in men in 2003).

**Chart 4a Obesity by deprivation**

Age group All ages

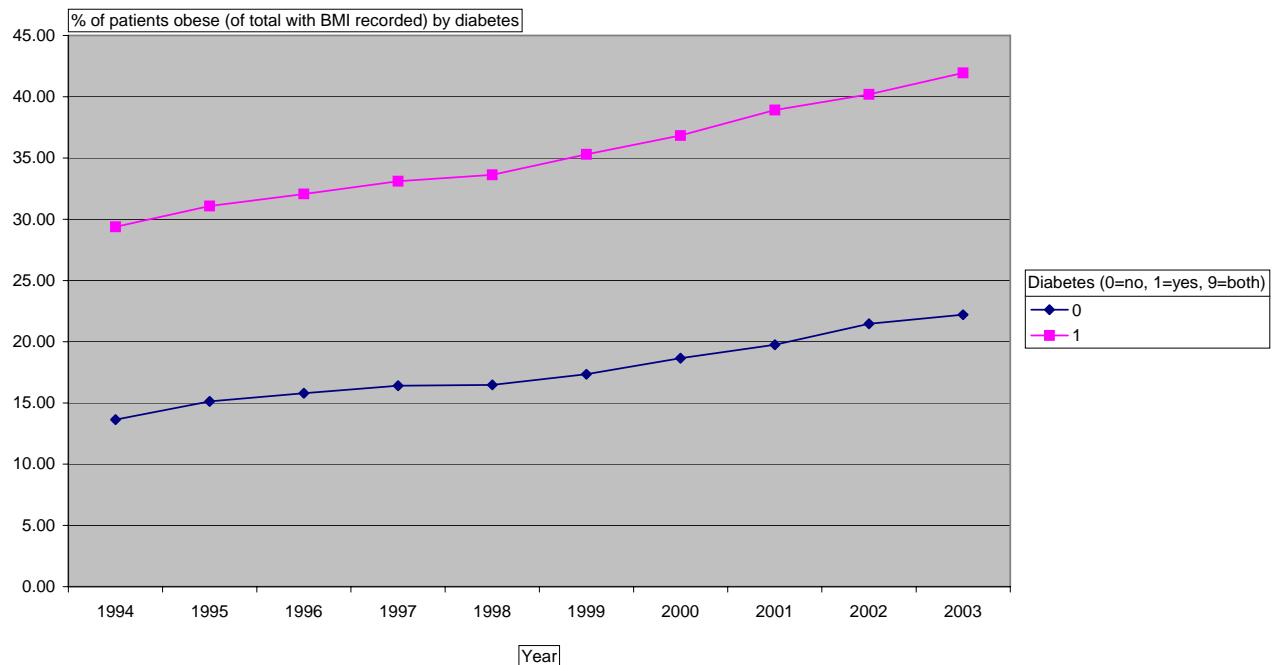


## **10. Obesity in patients with and without diabetes**

Patients with diabetes have increasing levels of obesity over the last ten years as shown below. In 2003, 41.94% of patients with diabetes are obese compared with 22.21% of patients without diabetes

**Chart 4b obesity by diabetes**

Sex | B | Age group | All ages

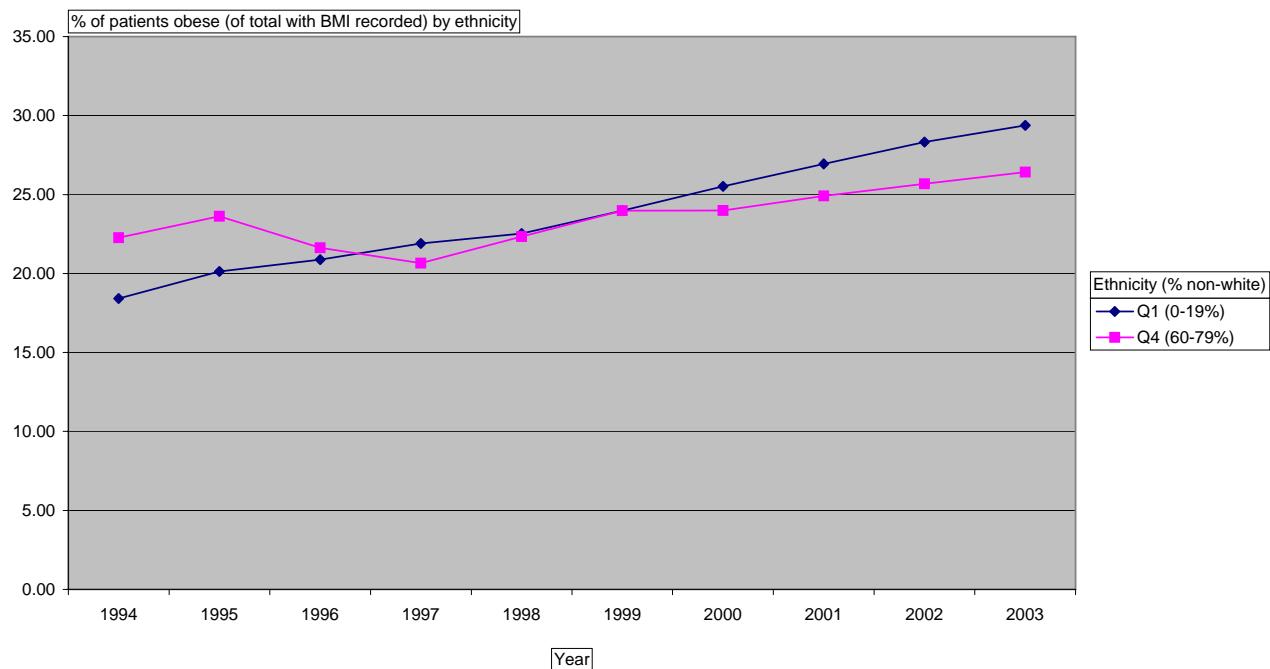


## **11. Obesity by ethnicity**

The next chart displays trends in the proportion of patients with recorded obesity by ethnicity. There is a marginally higher rate of obesity in patients from areas of low ethnicity (ie 0-19% non white) compared with areas of high ethnicity (60-79% non white).

**Chart 6 obesity by ethnicity**

Sex | B | Age group | All ages



## **12. Comparison of overweight and obesity prevalence in the Health Survey for England and QRESEARCH**

The following table compares the prevalence of overweight and obesity in QRESEARCH and Health Survey for England (HSE). There is an extremely good correspondence. For example 21% of adults in the HSE were obese in 2000 to 2002. In QRESEARCH, the prevalence was 20% in 2000 and 22% in 2002. In 1996, the prevalence of obesity in HSE was 16%. The prevalence of obesity in QRESEARCH in 1996 was also 16%.

**Table QRESEARCH vs HSE adults**

**HSE overweight and obesity prevalence by year, adults**

	1994-96	1995-97	1996-98	1997-99	1998-00	1999-01	2000-02
% obese	16	17	18	19	20	21	21
% overweight	38	39	39	38	38	39	39
% not fat	45	44	43	43	42	41	40

Age standardised proportion of adults who are obese/overweight, by year (3-year moving average)

Source: Health Surveys for England, 1994 to 2002

**QRESEARCH overweight and obesity prevalence by year, all ages**

Data	1995	1996	1997	1998	1999	2000	2001
% obese	16	16	17	18	19	20	22
% overweight	33	33	33	33	33	34	34
% not fat	51	51	50	49	48	46	44

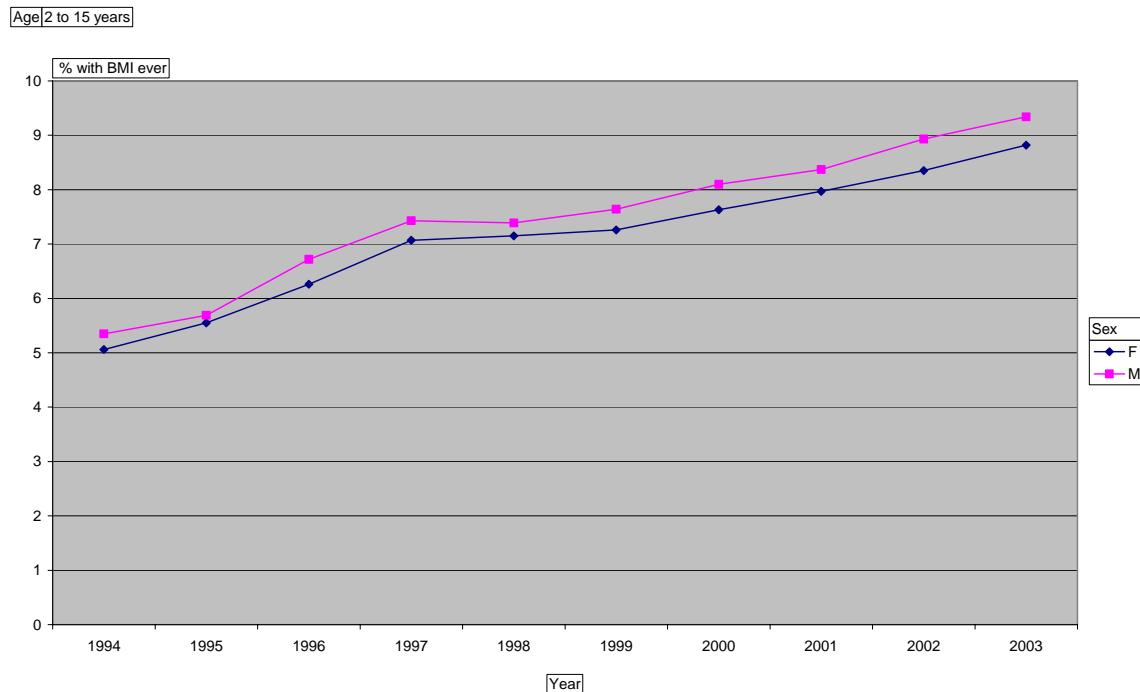
Percentages based on number of people who had a valid BMI recorded in previous 15 months

Source: QRESEARCH NATO3 database

## Recording of body mass index in children

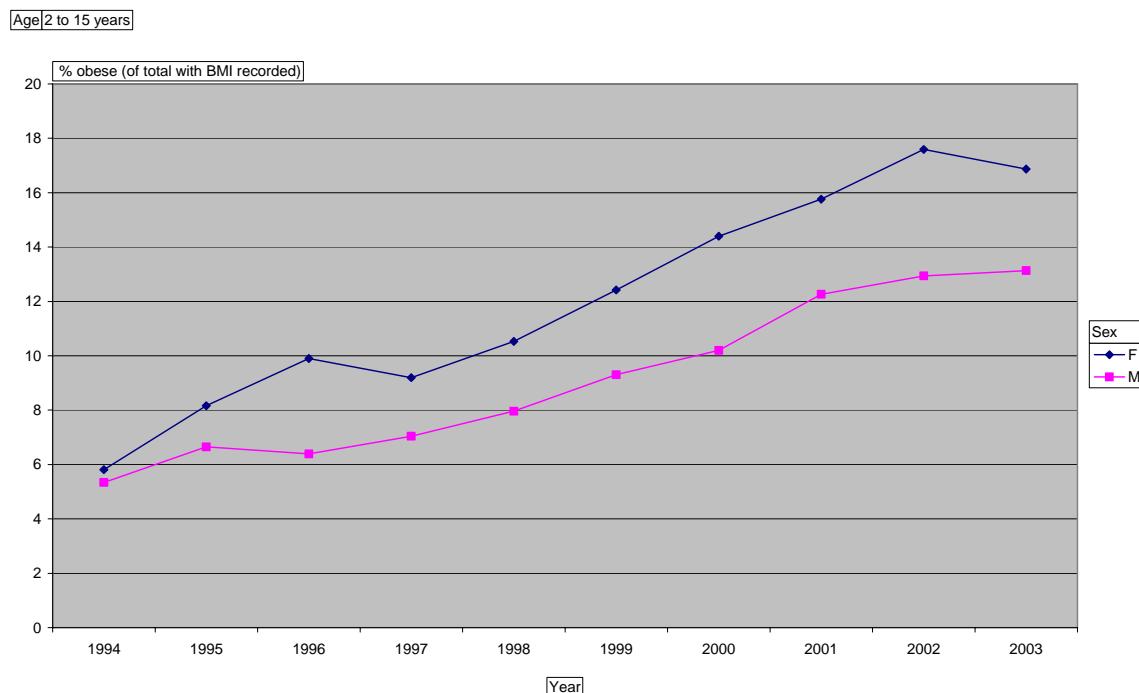
### 13. Recording of body mass index in children 2-15 years

The next chart shows the percentage of children aged 2 to 15 years with a body mass index recorded. As expected, the overall levels of recording are very low with fewer than 10% of patients aged 15 with a recorded value.



#### **14. Trends in obesity for children aged 2-15 years**

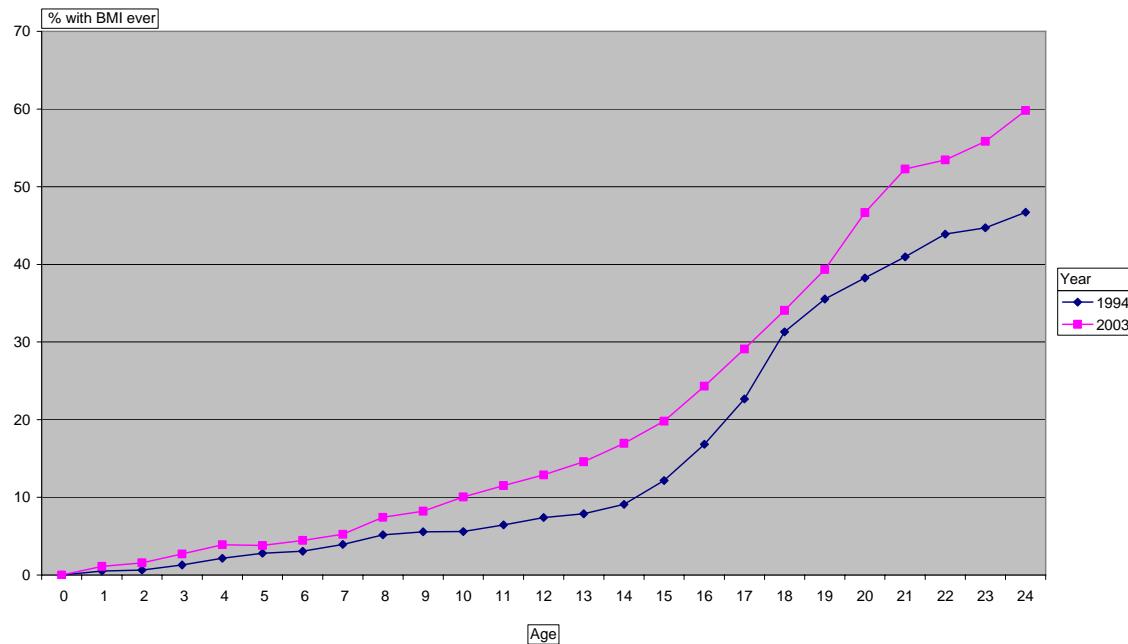
The next chart shows the proportion of children aged 2-15 years who have a recorded body mass index over 30 kg/m<sup>2</sup>. Whilst there has been a steady increase in obesity over the last ten years in males and females, there is likely to be a very strong recording bias since the overall recording rates are so low. In other words, this is not likely to be a valid reflection of the absolute levels of obesity in this age group.



### **15. Recording of body mass index by age**

The following chart shows body mass index recording by single year of age in 1994 and 2003. As expected, recording levels increase steeply with age and are higher in women than men. There has also been a modest increase in recording levels in the last ten years.

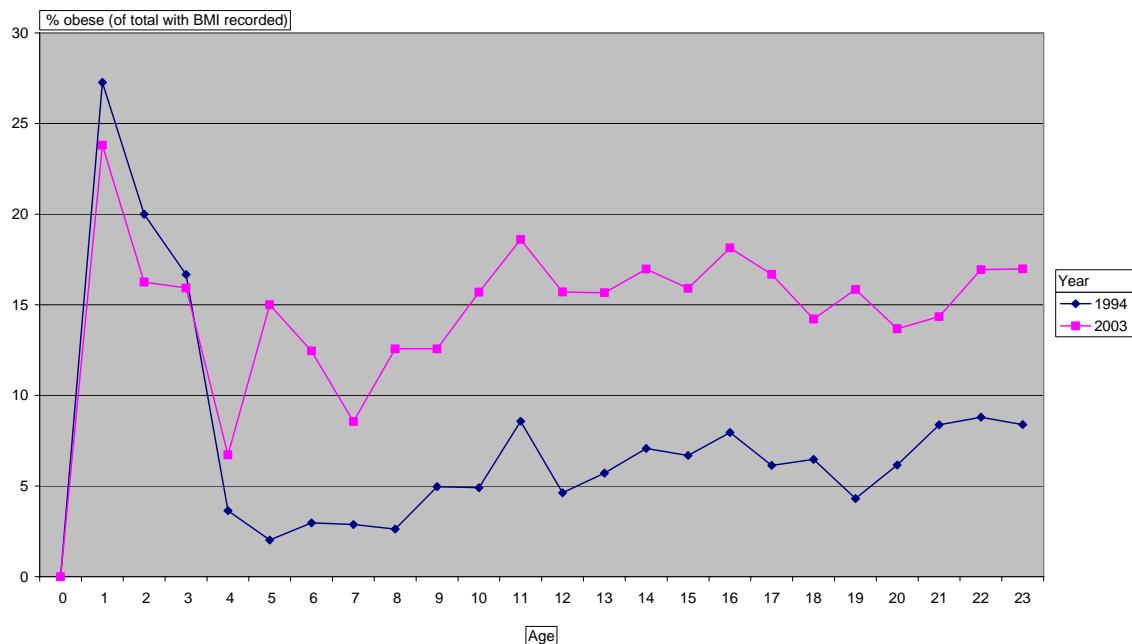
Sex[B]



## 16. Obesity by single year of age

The next chart shows the proportion of children and young adults with obesity by single year of age in 1994 and 2003. Obesity in this analysis is defined as a recorded body mass index of  $>30 \text{ kg/m}^2$  or a Read code indicating obesity. Recording levels are especially low in very young children and the proportion with obesity at such a young age will be confounded by recording patterns.

Sex[B]



**17. Comparison of overweight and obesity prevalence in children in the Health Survey for England and QRESEARCH**

The next table compares the prevalence of overweight and obesity in children in the Health Survey for England (2002) and in QRESEARCH. QRESEARCH gives a higher prevalence of obesity and a lower prevalence of overweight compared with HSE but a similar proportion of patients who are not fat. In other words, QRESEARCH is reasonable for estimating the prevalence of weight problems in children but not for distinguishing between obesity and overweight. This is likely to be due to the use of Read codes in QRESEARCH to record weight problems rather than levels of recording of body mass index are low.

**Table QRESEARCH vs HSE children**

**HSE overweight and obesity prevalence for children (International classification), by age and sex, 2002**

		age														
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Males	% obese	5	6	5	5	4	4	6	6	6	8	6	5	5	6	
	% overweight	19	12	17	14	13	12	17	17	17	20	18	20	14	18	
	% not fat	75	83	79	81	83	83	77	77	77	72	76	75	81	76	
Females	% obese	2	6	7	7	8	7	8	11	7	7	6	8	7	7	
	% overweight	20	18	16	14	19	18	22	21	27	24	21	20	23	19	
	% not fat	78	76	77	79	73	74	70	68	67	69	73	72	70	73	

Source: Health Survey for England, 2002 (HSE 2002 Table 9.6)

**QRESEARCH overweight and obesity prevalence for children (using BMI measurement or coded obesity), by age and sex, 2002**

		Age														
Sex	Data	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
M	% obese	6	12	9	8	10	8	11	13	15	14	13	16	13	18	
	% overweight	2	1	0	1	1	2	0	4	3	6	5	8	10	10	
	% not fat	92	87	91	91	88	90	89	83	83	80	82	76	78	73	
F	% obese	13	7	18	14	15	12	14	15	21	16	18	19	19	22	
	% overweight	3	4	1	1	1	1	0	1	4	7	6	9	9	12	
	% not fat	85	89	81	85	85	87	85	83	75	77	76	72	72	66	

Source: QRESEARCH NATO3 database

## **8 REFERENCES**

Kopelman, P. G. (2000). "Obesity as a medical problem." Nature. **404**(6778): 635-43.

Mokdad, A. H., E. S. Ford, et al. (2003). "Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001." Jama. **289**(1): 76-9.