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Obesity and Sickness Absence:

Differentials by age, ethnicity and occupation groups and influence on career progression

Anil Gumber, Ala Szczepura, Sudhesh Kumar
Clinical Science Research Institute
Warwick Medical School, University of Warwick

Su Wang
Head of Health, Royal Mail Group

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Summary

Objectives

The primary aim of the study was to explore the effect of obesity on sickness absence in the Royal Mail. The detail objectives of the research were:

(a) to explore the extent of sickness absence associated with obesity and other ill-health conditions among postal employees;
(b) to identify variations in sickness absence by age, gender, ethnicity, occupational grade and geographical location;
(c) to analyse variation in routinely recorded work days lost in employers' registers across ethnic and occupation groups, and
(d) to record the influence of sickness and obesity on future career progression and sickness absence.

Data

The study was based on a detail analysis of two data sets – a health and well being survey undertaken during 1995-98, and employer recorded routine sickness and absenteeism records for the period 1995-96 to 2006-07 for those employees who had participated in the survey. The health and well being survey covered 58,697 employees (73.3 per cent males and 26.7 per cent females) with a response rate of 29 per cent. The employer recorded routine sickness data (in terms of episodes and number of work days lost) was matched for 37,138 of these employees.

Obesity and Its Variability

The majority of Royal Mail employees were engaged in a manual job (postman), consequently a much lower obesity rate was observed when compared to that of the general population. Only one in ten employees was found to be obese, of which the proportion of morbid obesity (reporting body mass index (BMI) 40+) was just 0.4 per cent. There existed significant associations between BMI categories and age, gender, ethnicity and job type. The obesity rate increased with age and it was higher among female employees. For female employees, the severely obese as well as morbid obese rates were twice those for male employees. In terms of occupational grade, the obesity rate was highest for employees in a middle management role, followed by employees in clerical/ administrative jobs; and the rate was lowest for manual employees. Finally, the obesity rate was found to be higher in Afro-Caribbeans and lower among Asians from the Indian Subcontinent and Asian – Oriental ethnic groups.

Obesity and Health Indicators

Obesity rate was significantly associated with indicators of health status; it increased with the number of chronic diseases reported by individuals in the past or for which they were currently undergoing treatment. It was higher among employees with a disability, and increased with the mental health score. There was also a significant association between indicators of health

behaviour and BMI categories. Obesity rate tended to be higher in those who had ceased smoking and lowest among current smokers. The relationship of obesity with alcohol consumption was U-shaped, but it was negatively linearly related with reported exercise levels. There was a positive linear relationship between obesity and the number of sick days as well as with visits to a general practitioner (GP).

Determinants of Self-reported Sickness Absence

The determinants of variation in self-reported numbers of sick days during the previous six months using regression model considered the varied effects of socio-demographics, health status, health behaviour, dietary and environmental variables. In various models, the relationship between categories of BMI and the number of sick days remained significant, thus suggesting a positive and strong influence of obesity on sick days. Demographic factors (gender and age) showed a significant effect on sickness, with female employees reporting higher sick days than their male counterparts and age demonstrating a U-shaped non-linear relationship. In terms of occupational grade, manual workers tended to report higher sickness days than the professional employees. The effect of ethnicity on sickness absence was very weak. Environmental factors (measured in terms of geographical region) also influenced the number of sick days; compared to the London region, employees in selected other regions reported a higher number of sick days. The most influential factors on the number of sick days turned out to be disability, mental health and diseases or conditions for which the individual was on treatment. Amongst the latter the three most prominent diseases or conditions were heart attack, angina and chronic back pain, exerting a strong influence on sickness days. Health behaviour and dietary factors were found to have a weak influence on self-reported sickness absence.

Determinants of Visits to General Practitioner

The number of visits to a GP during the past six months, was significantly related to categories of BMI, thus suggesting positive and strong influence of obesity on contacts with GP. Demographic factors (gender and age) also showed a significant effect on the number of visits to a GP; female employees reported higher numbers of visits than their male counterparts and age depicted a U-shaped non-linear relationship. With job type, only manual employees tended to report higher GP visits than professional employees. Most ethnic minority groups reported a significantly higher number of GP contacts when compared with the European-UK ethnic group. Employees in selected regions also reported higher contacts with their GP. The most influential factors on the number of visits to a GP were once again disability, poor mental health and the diseases or conditions for which an employee was on treatment. In this case, the three most prominent diseases exerting strong influence on visits to a GP were diabetes, heart attack and angina. The effect of lifestyle including dietary factors had shown weak influence on contacts with a GP.

Reason for Leaving the Job and Age at Leaving

During the 12 year period following 1995-96, nearly half of surveyed employees left their job; the obesity rate was higher among employees who left their job particularly in the initial four years. The most prominent reason for leaving was redundancy (30 per cent); this was followed by transfer (20 per cent), voluntary decision (16 per cent) and retirement (13 per cent). About

one in ten employees took early retirement due to ill health, a majority of them left before reaching age 60 years. Transfer and redundancy were the two common reasons for leaving the job in middle ages, whereas a voluntary decision to leave was more prominent in the younger age cohort. Reasons for leaving the job differed considerably by occupational grade; a large majority of young people leaving their job voluntarily were manual workers. Redundancy was a prominent reason for clerical/administrative and professional employees to leave, and transfer was the most prominent reason for middle management employees. Ill health turned out to be an important reason for quitting the job for manual employees.

The regression analysis to determine the variation in age at the time of leaving showed that employees reporting voluntary and / or dismissed as their reasons left their job nearly 21 years earlier than employees who retired. The number of years left before the usual retirement age was 19 years if transfer was the reason and 12 years if the reason was redundancy. Employees who exited due to ill health left their job 13 years prior to the usual retiring age. The age of leaving was also influenced by gender, job type, ethnicity and geographical location. Female employees were found to leave 2.8 years earlier than male employees. Clerical/administrative and middle management employees left earlier than the professional employees, whereas the manual employees left 0.8 years later than the professional employees.

Determinants of Work Days Lost

The number of episodes, as well as number of employer recorded year-specific work days lost, during 1995-96 to 2006-07 was weakly associated with the categories of BMI. Unlike the determinants of number of sick days or number of visits to a GP, the number of variables influencing employer recorded duration of work days lost for 1995-96 as well as 1996-97 were quite small. The effect of obesity on duration of work days lost was not clearly discernable. Only, age, gender, occupational grade, ethnicity and geographical region showed some influence on the duration of work days lost in 1995-96, but not to the same extent in 1996-97. Contrary to our expectation, the reported diseases/conditions, disability and mental health had shown minimal influence on the duration of work days lost. The influence of health behaviour and dietary variables was also found to be negligible.

The logistic regression model was used to determine variability in the reporting of an incidence of work days lost in the period 1995-96 and 1996-97. Both BMI and age were found to be weak (non-significant) predictors of the incidence of work days lost. Only gender and occupational grade turned out to be strong predictors during both the periods. Among female employees, the odds of reporting an incidence of work days lost was higher than for male employees, and for occupational grades the odds ratio was very high among manual workers when compared to professional employees. This was followed by clerical/administrative and middle management employees. None of the ethnicity categories was significant. The coefficients were found to be significant for select geographical regions of which three regions (Yorkshire & the Humber, West Midlands, and East of England) consistently reported lower odds in both the years. Contrary to our expectation, the influence of health status indicators (disability, mental health and diseases/conditions) was found to be weak. The effect of health behaviour and dietary variables on reporting an incidence of work days lost was very low in both the periods.

Implications

The results of this study are of interest for a number of reasons. The evidence from Royal Mail regarding the health status and health behaviour of the work force is one of the largest UK databases of its kind. This could actively be used for designing general health prevention and promotion strategies specifically tailored to the needs of more vulnerable (on the basis of occupational grade, ethnicity and age) groups. Also, it could help in planning and meeting specific health service needs cost-effectively at select geographical locations. Finally, how effectively management can communicate to their employees about their welfare has enormous externalities. Workplace settings are ideal for health promotion, and providing health education resources sends a positive message to employees that they are valued. Thus the delivery of key messages tailored according to occupational needs and the introduction of incentive schemes to improve health behaviour could be critical in reducing absenteeism especially in relation to obesity.

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1. Background

1.1 Introduction

Absenteeism due to sickness is one of the critical indicators reflecting on performance of an organisation whether it belongs to the public or private sector. Sickness absence and ill-health retirement rates for public sector employees have been higher than for employees in the private sectors (Confederation of British Industry, 2001). Rightly so, the Cabinet Office (1998) has underlined its importance by setting targets to reduce sickness absence in all public sector bodies by 20 per cent in 2001 and by 30 per cent in 2003; similar targets have not been set by the private sector, although there is a desire to reduce sickness absenteeism in these organisations. The Royal Mail (ex-public sector) is one of the oldest and largest such organisations, employing nearly 200,000 people at different locations across the UK. It is estimated (through routine data) that sickness absenteeism is about 10 per cent among postal employees; this accounted for 2.1 million absence days which resulted in 1.9 million work days lost in 2001. A report prepared by the Home Office in 2001 shows that over 1.4 million days were lost through police officer sickness in 1999-2000, with an additional 0.7 million days lost as a result of civilian absences (Arnott and Emmerson 2001).

There is a growing concern about the rising level of obesity in the workforce and its consequences for work limitations and extended absenteeism. Extensive evidence suggests that diabetes, heart disease, hypertension (high blood pressure), osteoarthritis, and select cancers are found to be more common in overweight and obese people. Further, the risk of heart disease increases several fold if a Type 2 diabetic patient is also obese. The House of Commons Health Committee report (2004) showed that the prevalence of obesity in England has tripled over the last 20 years. The data from the Health Survey for England have suggested that most adults in England are now overweight, and one in five is obese. No gender difference is found in obese adults; however a higher proportion of men than women are overweight. A higher proportion of women were morbid obese (2.6 per cent) as compared to men (0.8 per cent).

Obesity tends to be concentrated in lower social class. Whitehall study shows that lower-status people continue to gain weight more rapidly than higher-status ones; being overweight is thus likely to be of growing importance as a pathway to social inequalities in ill health (Martikainen and Marmot 1999).

The House of Commons Health Committee (2004) report provided the estimates of the costs and consequences of obesity in England. The report of the Comptroller and Auditor General estimated that obesity accounted for 18 million days of sickness absence and 30,000 premature deaths in 1998 (Comptroller and Auditor General, 2001). On average, each person whose death could be attributed to obesity lost nine years of life. Treating obesity costs the NHS at least £500 million a year. The wider costs to the economy in lower productivity and lost output could be a further £2 billion each year. Nearly two thirds of men and over half of women in England are now overweight or obese. And the problem in the UK is increasing faster than in most other European countries. If the prevalence continues to rise at the current rate, more than one in four

adults will be obese by 2010. This would significantly increase the incidence of associated diseases, such as coronary heart disease, and would cost the economy over £3.5 billion a year by that date (House of Commons Health Committee, 2004).

Despite the fact that many employers have significant problems with sickness absence most people agree that having regular work is good for their own mental and physical health. According to a report published in Medical News Today (2005) indicated that employers who give their workers more health information may see a decrease in sickness absence, with nearly two thirds of people agreeing that if they had more information about managing common ailments they would be less likely to take time off work. The survey included 1116 adults aged 18 and above in either full time or part time employment. Nearly half of people would like to receive information directly from their employer to help them. Workplace settings are ideal for health promotion and providing health education resources sends a positive message to employees that they are valued, whilst having the potential to reduce time off work with sickness absence and reducing consultations with health professionals.

A number of recommendations for tackling obesity are suggested by government including by the Department of Health. These include a combination of measures, some targeted at individuals to encourage lifestyle change (e.g. public education campaigns promoting physical activity and reducing the consumption of energy dense foodstuffs) with others aimed at addressing environmental factors (e.g. increasing opportunities for people to become more physically active). It is also recommended that the NHS should incorporate the prevention and management of overweight and obesity into health service plans, policies and strategies.

1.2 Objectives of the study

The central aims of the study are to:

- explore the extent of sickness absence associated with obesity and other ill-health conditions among postal employees.
- identify variations in sickness absence by age, gender, ethnicity, occupation and geographical location.
- analyse variation in routinely recorded work days lost in employers' registers across ethnic and occupation groups.
- record influence of sickness and obesity on future career progression and sickness absence

1.3 Structure of the report

The report has been divided into six sections. Section one presents the background and laid down the main objectives of the report. Data and methodology are described in section two. This also includes a brief description of two data sets used in the study as well as of confounding factors used in the multivariate analysis. Section three presents the relationship of obesity with socio-demographic and health related variables. Section four examines the determinants of self reported sickness absence as collected in the Q-health survey. The relationship between obesity

and employer recorded work days lost are looked at in details in Section five. Exit from employment and reasons for leaving and age at leaving are also examined in greater details in this section. Section six summarises the findings of analyses undertaken in the previous sections.

2. Data and Methodology

2.1 Health and wellbeing data set

The Royal Mail's Employee Health Service (EHS) looks after the health and wellbeing of this large and geographically dispersed workforce. To address their occupational health needs, in 1994 the Royal Mail developed an innovative partnership with BUPA. BUPA provided the Royal Mail with data analysis and processing, database management and other services for a confidential employee health screening programme undertaken during 1995-98. The programme known as 'Q-Health' elicited information on key health indicators collected through a structured questionnaire prepared by BUPA on a free and voluntary basis from all employees. Between April 1995 and April 1998, 203,869 Post Office employees (79.6 per cent males and 20.4 per cent females) were asked to complete a questionnaire (Welch et al. 1999). Completed questionnaires were received from 58,697 employees (73.3 per cent males and 26.7 per cent females), a completion rate of 29 per cent. Due to cost limitations no repeated mailings were undertaken; however, attempts were made to improve the response rate through further publicity at Post Office sites.

The items of information collected in the Q-Health survey included demographics (age, sex, geographical location), socio-economic (job type, ethnicity), anthropometry (height and weight), health screening (blood pressure, cholesterol level, dental check up, breast and cervical examinations, testicular examination), health behaviour (alcohol, smoking, exercise, diet, seat belt use), and family history of heart attack and cancer.

Information collected on outcomes included physical health, psychological distress/mental health and health service use. Self-reports were obtained of lifetime occurrence of a variety of diseases and conditions including arthritis, asthma, angina, heart attack, back pain, bronchitis, emphysema, diabetes, high blood pressure, high cholesterol, pneumonia, migraine, and skin condition as well as whether the respondent was disabled. The above list of 13 diseases/conditions was generated on the basis of routinely recorded occupational health data on reasons for sickness absence. Psychological and psychosocial measures were based on the 12-item version of the General Health Questionnaire (GHQ-12). Scoring was modified so that the respondent replied in a yes/no format according to how they had been feeling during the previous two months. The listing of 12 items and scoring is provided in Annex 1. The lower score indicated better health or conversely higher score demonstrated greater psychological distress. Job satisfaction and ability to cope with current situation were also asked in a yes/no format. Health service use during the last 6 months included contact with General Practitioner (GP), inpatient days, and days unable to work because of accidents, illness, injury or assault.

A range of information on health behaviours was also collected. It included smoking status (cigarette, pipe or cigar smoking, and their number smoked per day, if earlier smoker then years since stopped smoking); units of alcohol consumed during the preceding week (with a unit defined as a half pint of beer/lager, a glass of wine or a single measure of spirits); exercise each week; seat belt use in terms of six categories of percentage of time wearing a seat belt, either as a

driver or as a passenger; and behaviour related to health screening (breast self-examination, mammography, cervical screening for women and self-examination of testicular for men).

2.2 Routine sickness and absenteeism data set

The Royal Mail employment data set contains routine information compiled on a monthly basis from all employees (approximately 180,000) on sickness absence status (including incidence and length of sickness), disease/ailments, service delivery area (SDA) or geographical location, age, gender and type of job. However, when actual data were downloaded from archived records held at the computer centre for matching with respondents of Q-Health self-reported survey data, only the following information was made available. This included National Insurance Number, Employer Number, Employee Number, Absence Begin Date, Absence End Date, Work Days Lost, Absence Reason, Absence Type (authorised or not), End of Employment Code, End of Employment Date. The 'end of employment code' referred to detailed reasons for leaving the job which were broadly categorised into nine groups. These were: voluntary, casual, transfer, dismissed, redundancy, retirement due to ill health, usual retirement, others, and reason not known.

The computer centre of the Royal Mail downloaded episode specific employer recorded data of sickness absence from the period 1995 onwards for those employees who responded to Q-Health survey. The total number of episode specific records added up to 498,471 (78.7 per cent males, 21.3 per cent females). This was then sent to BUPA for matching with the Q-health data on common identification variables (national insurance number and date of birth) which were held by BUPA separately from main data set. The matched file without common identifier was then made available to us for further analysis.

A cursory look of month by month routine sickness absence processed statistical tables for the most recent period available (July 2000-June 2001) demonstrated some interesting features as follows:

1. Absenteeism was three times higher for postal workers than for managers;
2. Seasonal variation was apparent in absenteeism by job type (with higher seasonal variation among managers and other staff as opposed to postal workers);
3. Incidence of absenteeism was highest for gastrointestinal (including gastric upset) conditions followed by injury and other unknown conditions;
4. Duration (number of days) of absenteeism was highest for injury, followed by musculoskeletal and gastrointestinal conditions;
5. On a per episode basis, the duration of absenteeism was highest for conditions such as cancer, cardiovascular disease (CVD) and psychiatric illness;
6. There was a very high geographical variation in overall absenteeism rates (e.g. high sickness absenteeism days lost in Edinburgh, Glasgow, Birmingham and Coventry and a very low rate in Inverness, Peterborough and Bournemouth). Different regions also showed varied levels of sickness absenteeism by job type (e.g. higher absenteeism for managers in Bolton, Chester and Doncaster whereas for postal workers higher levels of absenteeism were recorded in Edinburgh, Slough, Glasgow and Coventry)

The matched data set containing 498,471 episode specific records were then aggregated to arrive at employees based records. On the basis of episode begin date and end date, all sickness absence episodes were classified into 12 financial years beginning April 1, 1995 to March 31, 1996 and finishing at April 1, 2006 to March 31, 2007 for each employee. The aggregated file recorded the total number of episodes and associated accumulated number of work days lost in each financial year for each employee for which the data was matched. In all, out of 58,967 employees who reported Q-Health survey only for 37,138 employees (70.5 per cent males, 19.5 per cent females) the employer recorded sickness absence information was matched. The percentage distributions on key variables were studied for both matched and unmatched employee records. Interestingly, the distribution for most key variables (six categories of body mass index (BMI), gender, obesity, categories of number of sick days, number of visits to GP and number of inpatient days) didn't differ between matched and unmatched groups; it differed only by the categories of age.

2.3 Hypotheses

The linked data set would allow us to examine the relationship between the extent of obesity and other risk indicators (Q-Health data) and the level of workdays lost across different groups (routine sickness and absenteeism data) prospectively over 12 years (1995-96 to 2006-07).

From our earlier study conducted for the Health and Safety Executive (Szczepura et al. 2004), it would appear likely that ethnicity may turn out to be an important determinant of variations in health status, incidence of sickness related absenteeism, and premature severance on health grounds among postal employees, especially for those undertaking manual jobs.

Before undertaking analysis of linked data set a few possible hypotheses were constructed. These included:

- Univariate analysis: Is there an increase in sickness absenteeism associated with obesity e.g. the average number of episodes, average time off work?
- Univariate analysis: Is there a gradient for the degree of obesity (e.g. BMI normal/ 25-30/ 30-35/ 35-40/ 40+) and work days lost?
- Univariate analysis: Is there an increase in sickness absenteeism associated with particular conditions?
- Univariate analysis: Is there an increase in sickness absenteeism associated with other demographic factors e.g. geographical location, age, gender, ethnicity and job type?
- Multivariate analysis: Is obesity associated with the incidence and duration of sickness absenteeism corrected for the confounding effects of existing clinical conditions, age, gender, ethnicity, geographical location and job type?

2.4 Description of Variables Used in Multivariate Analysis

Logistic regression analyses and ordinary least square multiple regression analyses were used throughout the results. These analyses had been used to allow associations to be assessed independently after controlling for possible confounding factors.

We have used Ordinary Least Square (OLS) regression model to determine variability in the self-reported sickness days during the past six months, number of visits to a GP during the past six months and employer reported number of work days lost in a given year due to differences in socio-demographic, health and environmental factors. These factors included body mass index (BMI), age, gender, job type, ethnicity and geographical region of the work site. BMI was grouped into six most conventional categories (as classified by WHO) which were: less than 18.5 (underweight), 18.5-24.9 (normal), 25-29.9 (overweight), 30-34.9 (obese), 35-39.9 (severely obese), 40 or more (morbid obese). To capture the non-linear effect of age on number of sick days or number of visits to a GP or duration of work days lost, age was introduced as a continuous variable as well as in its squared form. Four categories of job type were considered viz. manual, clerical or administrative, middle management/technical, and senior management/professional. The ethnicity details were recorded in seven groups, namely Afro-Caribbean, Asian-Indian subcontinent, Asian-Oriental, European-UK, European-other, Jewish and other. Using the post code data of the employee work site and matching this with the National Statistics Post Code Directory has resulted in grouping the data into 12 geographical regions. These were: North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West, Wales, Scotland and Northern Ireland.

The other independent variables considered in the multivariate analysis depicted health status in terms of prevalent diseases or conditions for which the person was on treatment, disability and psychological distress (or mental health). The regression models incorporated 13 diseases or conditions in a dummy form (whether or not currently on treatment) which included heart attack, angina, high blood pressure, diabetes, bronchitis, emphysema, arthritis, chronic back pain, high cholesterol, pneumonia, asthma, migraine, and skin condition. The employee suffering from any type of disability was also included in a dummy form. The employee reporting on 12 questions of General Health Questionnaire (GHQ) was converted into psychological distress or mental health score which varied from 0 to 12. The scores were later on grouped into five categories depicting severity of distress: 0 (none), 1-3 (low), 4-6(medium), 7-9(high), and 10-12 (very high).

We have also looked into the effect of lifestyle factors on duration of sick days, number of visits to a GP and duration of work days lost. These included smoking status, use of alcohol, exercise pattern and diet. The dietary factor consisted of five variables. These were: (a) consumption of bread/cereal/potatoes/rice/pasta depicting carbohydrate energy recorded as hardly, as part of 1-2 meals, and as part of every meal; (b) consumption of fruit and vegetables portions recorded as 5 or more portions per day, 3-4 portions per day, 1-2 portions per day, and none; (c) consumption of fatty or sugary foods recorded as rarely or never, 2-3 times a week, and every day; (d) adding salt on table or while cooking was recorded as rarely or never, sometimes, and always; and (e) eat food cooked in animal fats recorded as rarely or never, 2-3 times a week, and every day.

Smoking status (never smoked, used to smoke, and currently smoke) was derived from two separate questions stating smoking of cigarettes and a pipe/cigar. Alcohol consumption was measured in number of units consumed per week and grouped as none, 1-14 units, 15-24 units, 25-40 units and 41 or more units. The exercise pattern was recorded as less than once a week, 1-2 times a week, 3 times a week and 4 or more times a week.

3. Obesity and Socio-demographic and Health Characteristics

According to the House of Commons Health Committee (2004) report, the obesity prevalence rate (30+) was 22.1 per cent for males and 22.8 per cent for females during 2002. The respective figures for 1993 were 13.2 and 16.4. A majority of Royal Mail employees are doing manual (postman) job, therefore one would expect a much lower obesity rate when compared to that of the general population or workforce. The distribution of employees across six categories of BMI had shown that the share of under weight was 1.3 per cent, normal BMI 53.0 per cent, overweight 35.9 per cent and the remaining 9.8 per cent were obese (30+ category). The break up of the obese group showed 7.9 per cent were of grade 1 obese (30-34.9), 1.5 per cent of severely obese (35-39.9) and only 0.4 per cent were of morbid obese (40+). According to the House of Commons Health Committee (2004) report the morbid obese was 0.8 per cent for males and 2.6 per cent for females in 2002 (the respective percentages for year 1993 were 0.2 and 1.4).

Table 3.1 presents the distribution of employees by age, sex, ethnicity and job type. The chi-square values were found significant and thus suggested that there existed significant associations between BMI categories and age, gender, ethnicity and job type. It is clear from the table, as age increased, the proportion of employees having normal BMI decreased (from 71.2 per cent in 16-24 age group to 45.5 per cent in 55 and above age group); the proportion of overweight increased from 19.1 per cent in 16-24 age group to 43.3 per cent in 55 and above age group. Similarly the overall share of obese (30+) employees also increased from 4.9 per cent in 16-24 age group to 11.6 per cent in 45-54 age group and then marginally decreased to 10.5 per cent in the 55 and above age group. The share of severely obese and morbid obese employees was the highest in the middle age group (35-44 years).

Interestingly, female employees had reported higher proportion of both having normal BMI as well as falling in obese category. Compared to 50.6 per cent males, 59.5 per cent of females were in normal BMI threshold and compared to 9.3 per cent obese (30+) males, 11.3 per cent of females were obese. Among females, the severely obese as well as morbid obese rates were twice than those among males. Overall obesity rates also differed by occupational grade. This was highest for employees in the middle management job (12.2 per cent) which was followed by employees in clerical/ administrative job (11.1 per cent). For the senior management job the overall obesity rate was 10.6 per cent and for manual job it was 8.8 per cent. The variation in obesity rate by ethnicity suggested that overall obesity rate was the highest among Jews (15.2 per cent); however, their sample size was rather small. This was followed by Afro-Caribbean (14.5 per cent) and 'Other' ethnic group (10.9 per cent). It was 10.3 per cent for European – Other ethnic group and 9.8 per cent for European – UK ethnic group. Asian from Indian Subcontinent reported the lowest obesity rate (6.7 per cent) which was followed by Asian – Oriental ethnic group (7.3 per cent).

Table 3.2 presents the association of obesity rate with indicators of health status which were also found significant (based on the Chi-square values). Out of 13 diseases/conditions for which information was collected, 9 were chronic in nature. The number of chronic diseases suffered by

the employees in the past had shown a positive relationship with overall obesity rate. It is clear from the table that among employees having no chronic ailment in the past, 6.3 per cent were found to be obese of grade 1, 1.9 per cent were severely obese and 0.3 per cent were morbid obese with overall obesity rate of 7.7 per cent. The respective percentages for having reported four or more chronic diseases in the past were 19.1, 5.6 and 2.8 with overall obesity rate of 27.5 per cent (recording more than three times increase). Similar relationship/pattern was found with respect to the number of chronic diseases for which treatment was undergoing. The share of overall obesity rate among those having no chronic ailment was 8.7 per cent which increased to 23.4 per cent for employees undergoing treatment for four or more diseases. Employees having reported any type of disability had also reported higher obesity rate than those having no disability. Disabled employees had reported 11.6 per cent obesity of grade 1, 2.2 per cent as severely obese and 0.8 per cent as morbid obese. The respective percentages for employees having no disability were 7.7, 1.1 and 0.4. There also existed positive relationship between obesity rate and mental health score. The overall obesity rate increased from 8.4 per cent in those having no mental health problem to 13.3 per cent having very high mental health problem.

There were significant associations between indicators of health behaviour and BMI categories (see Table 3.3). Obesity rate tended to be higher in those who left the smoking, this was followed by employees who never smoked. Interestingly, the obesity rate was found to be the lowest among current smokers. The relationship of obesity with alcohol consumption does not seem to be straight forward. The obesity rate was highest in those consuming 41 or more units of alcohol per week (13.3 per cent) which was followed by consuming no alcohol (12.2 per cent). Those consuming 25-40 units had obesity rate of 10.4 per cent and those consuming 15-24 units and 1-14 units of alcohol the obesity rate was 8.3 and 8.8 per cent respectively. Exercise has a direct effect on obesity. Employees doing no exercise had reported the highest obesity rate of 13.6 per cent; the percentage declined to 8.9 for those doing 1-2 exercise per week, further to 7.0 for doing exercise 3 times and finally to 6.1 for those doing exercise four or more times per week.

We have also looked at the relationship between obesity and two outcome variables, namely the number of sick days and the number of visits to a GP. Table 3.4 presents the distribution of employees by categories of number of sick days and number of visits to a GP by BMI categories. The share of overall obesity increased from 9.3 per cent for those employees having reported no sick days to 13.5 per cent for those reporting 15-21 sick days and further to 15.4 per cent for those reporting 36 or more sick days. Similar positive relationship existed between obesity and number of visits to a GP. The share of overall obesity increased from 8.3 per cent for those employees having reported no visit to GP during the past six months to 11.4 per cent for those reporting three visits to GP and further to 16.7 per cent for those reporting five or more visits to their GPs.

Table 3. 1 Distribution of Employees by Age, Sex, Ethnicity and Job Type across BMI Category

Characteristics		BMI Category						
		<18.5	18.5-24.9	25-29.9	30-34.9	35-39.9	40+	Total
Age	16-24	185	2719	729	142	34	11	3820
		(4.8)	(71.2)	(19.1)	(3.7)	(0.9)	(0.3)	(100)
	25-34	245	10189	5139	1050	213	56	16892
		(1.5)	(60.3)	(30.4)	(6.2)	(1.3)	(0.3)	(100)
	35-44	168	8215	6109	1423	306	91	16312
		(1.0)	(50.4)	(37.5)	(8.7)	(1.9)	(0.6)	(100)
	45-54	107	6737	6001	1347	261	67	14520
		(0.7)	(46.4)	(41.3)	(9.3)	(1.8)	(0.5)	(100)
	55+	42	3234	3079	657	74	21	7107
		(0.6)	(45.5)	(43.3)	(9.2)	(1.0)	(0.3)	(100)
Sex	Male	428	21787	16827	3348	495	130	43015
		(1.0)	(50.6)	(39.1)	(7.8)	(1.2)	(0.3)	(100)
	Female	319	9307	4230	1271	393	116	15636
		(2.0)	(59.5)	(27.1)	(8.1)	(2.5)	(0.7)	(100)
Job	Not Stated	7	240	146	43	12	1	449
		(1.6)	(53.5)	(32.5)	(9.6)	(2.7)	(0.2)	(100)
	Manual	487	19835	12854	2624	459	126	36385
		(1.3)	(54.5)	(35.3)	(7.2)	(1.3)	(0.3)	(100)
	Clerical/Administrative	166	6347	3787	967	239	69	11575
		(1.4)	(54.8)	(32.7)	(8.4)	(2.1)	(0.6)	(100)
	Middle Management	64	3719	3487	812	154	38	8274
		(0.8)	(44.9)	(42.1)	(9.8)	(1.9)	(0.5)	(100)
	Senior Management	23	953	783	173	24	12	1968
		(1.2)	(48.4)	(39.8)	(8.8)	(1.2)	(0.6)	(100)
Ethnicity	Afro-Caribbean	20	520	407	126	26	9	1108
		(1.8)	(46.9)	(36.7)	(11.4)	(2.3)	(0.8)	(100)
	Asian (Indian Subcontinent)	53	981	580	93	14	8	1729
		(3.1)	(56.7)	(33.5)	(5.4)	(0.8)	(0.5)	(100)
	Asian (Oriental)	16	202	85	20	3	1	327
		(4.9)	(61.8)	(26.0)	(6.1)	(0.9)	(0.3)	(100)
	Europe (UK)	627	27980	19028	4154	802	211	52802
		(1.2)	(53.0)	(36.0)	(7.9)	(1.5)	(0.4)	(100)
	Europe (Other)	16	929	646	146	25	12	1774
		(0.9)	(52.4)	(36.4)	(8.2)	(1.4)	(0.7)	(100)
	Jewish	0	41	26	9	2	1	79
		(0)	(51.9)	(32.9)	(11.4)	(2.5)	(1.3)	(100)
	Other	15	441	285	71	16	4	832
		(1.8)	(53.0)	(34.3)	(8.5)	(1.9)	(0.5)	(100)
Total		747	31094	21057	4619	888	246	58651
		(1.3)	(53.0)	(35.9)	(7.9)	(1.5)	(0.4)	(100)

Table 3. 2 Distribution of Employees by Health Status (Chronic Diseases, Disability and Mental Health Score) across BMI Category

Health Characteristics		BMI Category						
		<18.5	18.5-24.9	25-29.9	30-34.9	35-39.9	40+	Total
No. of Chronic Diseases- Past	0	548	21749	12779	2410	420	106	38012
		(1.4)	(57.2)	(33.6)	(6.3)	(1.1)	(0.3)	(100)
	1	163	7236	5822	1449	288	79	15037
		(1.1)	(48.1)	(38.7)	(9.6)	(1.9)	(0.5)	(100)
	2	27	1768	1870	564	129	44	4402
		(0.6)	(40.2)	(42.5)	(12.8)	(2.9)	(1.0)	(100)
	3	9	287	484	155	39	11	985
		(0.9)	(29.1)	(49.1)	(15.7)	(4.0)	(1.1)	(100)
	4+	0	54	102	41	12	6	215
		(0)	(25.1)	(47.4)	(19.1)	(5.6)	(2.8)	(100)
No. of Chronic Diseases on Treatment	0	612	24314	15104	3069	553	154	43806
		(1.4)	(55.5)	(34.5)	(7.0)	(1.3)	(0.4)	(100)
	1	107	5530	4497	1146	241	67	11588
		(0.9)	(47.7)	(38.8)	(9.9)	(2.1)	(0.6)	(100)
	2	21	1074	1198	340	80	22	2735
		(0.8)	(39.3)	(43.8)	(12.4)	(2.9)	(0.8)	(100)
	3	7	160	225	54	11	1	458
		(1.5)	(34.9)	(49.1)	(11.8)	(2.4)	(0.2)	(100)
	4+	0	16	33	10	3	2	64
		(0)	(25.0)	(51.6)	(15.6)	(4.7)	(3.1)	(100)
Disability	None	710	29927	20061	4321	832	226	56077
		(1.3)	(53.4)	(35.8)	(7.7)	(1.5)	(0.4)	(100)
	Yes	37	1167	996	298	56	20	2574
		(1.4)	(45.3)	(38.7)	(11.6)	(2.2)	(0.8)	(100)
Mental Health (GHQ score)	None (0)	227	12076	8167	1570	255	68	22363
		(1.0)	(54.0)	(36.5)	(7.0)	(1.1)	(0.3)	(100)
	Low (1-3)	259	11720	8103	1778	335	89	22284
		(1.2)	(52.6)	(36.4)	(8.0)	(1.5)	(0.4)	(100)
	Medium (4-6)	151	4315	2918	723	158	43	8308
		(1.8)	(51.9)	(35.1)	(8.7)	(1.9)	(0.5)	(100)
	High (7-9)	81	2082	1296	363	95	33	3950
		(2.1)	(52.7)	(32.8)	(9.2)	(2.4)	(0.8)	(100)
	Very High (10-12)	29	901	573	185	45	13	1746
		(1.7)	(51.6)	(32.8)	(10.6)	(2.6)	(0.7)	(100)
Total		747	31094	21057	4619	888	246	58651
		(1.3)	(53.0)	(35.9)	(7.9)	(1.5)	(0.4)	(100)

Table 3. 3 Distribution of Employees by Health Behaviour Indicators across BMI Category

Health Behaviour Indicators		BMI Category						
		<18.5	18.5-24.9	25-29.9	30-34.9	35-39.9	40+	Total
Smoking	Never	391	15833	10062	2194	421	135	29036
		(1.3)	(54.5)	(34.7)	(7.6)	(1.4)	(0.5)	(100)
	Ever	95	7117	6445	1511	286	68	15522
		(0.6)	(45.9)	(41.5)	(9.7)	(1.8)	(0.4)	(100)
	Current	261	8144	4550	914	181	43	14093
		(1.9)	(57.8)	(32.3)	(6.5)	(1.3)	(0.3)	(100)
Alcohol	None	284	7749	5018	1376	338	111	14876
		(1.9)	(52.1)	(33.7)	(9.2)	(2.3)	(0.7)	(100)
	1-14 units	348	17191	11174	2276	403	93	31485
		(1.1)	(54.6)	(35.5)	(7.2)	(1.3)	(0.3)	(100)
	15-24 units	76	3892	3039	544	77	17	7645
		(1.0)	(50.9)	(39.8)	(7.1)	(1.0)	(0.2)	(100)
	25-40 units	29	1718	1448	315	41	19	3570
		(0.8)	(48.1)	(40.6)	(8.8)	(1.1)	(0.5)	(100)
	41+ units	10	544	378	108	29	6	1075
		(0.9)	(50.6)	(35.2)	(10.0)	(2.7)	(0.6)	(100)
Exercise Frequency (per week)	None	349	11090	9110	2513	561	145	23768
		(1.5)	(46.7)	(38.3)	(10.6)	(2.4)	(0.6)	(100)
	1-2 times	134	7125	4605	962	146	47	13019
		(1.0)	(54.7)	(35.4)	(7.4)	(1.1)	(0.4)	(100)
	3 times	61	3766	2409	387	66	13	6702
		(0.9)	(56.2)	(35.9)	(5.8)	(1.0)	(0.2)	(100)
	4+ times	203	9113	4933	757	115	41	15162
		(1.3)	(60.1)	(32.5)	(5.0)	(0.8)	(0.3)	(100)
Total		747	31094	21057	4619	888	246	58651
		(1.3)	(53.0)	(35.9)	(7.9)	(1.5)	(0.4)	(100)

Table 3. 4 Distribution of Employees by Categories of Number of Self-reported Sick Days and Visits to a GP across BMI Category

Sick Days / Visits to GP		BMI Category						
		<18.5	18.5-24.9	25-29.9	30-34.9	35-39.9	40+	Total
Sick days	0	370	16674	11497	2376	411	116	31444
		(1.2)	(53.0)	(36.6)	(7.6)	(1.3)	(0.4)	(100)
	1-7	205	7970	4960	1070	221	53	14479
		(1.4)	(55.0)	(34.3)	(7.4)	(1.5)	(0.4)	(100)
	8-14	38	1472	941	247	59	17	2774
		(1.4)	(53.1)	(33.9)	(8.9)	(2.1)	(0.6)	(100)
	15-21	18	630	398	124	29	11	1210
		(1.5)	(52.1)	(32.9)	(10.2)	(2.4)	(0.9)	(100)
	22-35	12	514	379	117	21	6	1049
		(1.1)	(49.0)	(36.1)	(11.2)	(2.0)	(0.6)	(100)
	36+	28	849	729	226	54	13	1899
		(1.5)	(44.7)	(38.4)	(11.9)	(2.8)	(0.7)	(100)
Total		671	28109	18904	4160	795	216	52855
		(1.3)	(53.2)	(35.8)	(7.9)	(1.5)	(0.4)	(100)
Visits to GP	0	254	11847	7946	1507	238	62	21854
		(1.2)	(54.2)	(36.4)	(6.9)	(1.1)	(0.3)	(100)
	1	190	8315	5547	1099	221	54	15426
		(1.2)	(53.9)	(36.0)	(7.1)	(1.4)	(0.4)	(100)
	2	126	4620	3045	782	143	40	8756
		(1.4)	(52.8)	(34.8)	(8.9)	(1.6)	(0.5)	(100)
	3	57	1863	1336	335	66	20	3677
		(1.6)	(50.7)	(36.3)	(9.1)	(1.8)	(0.5)	(100)
	4	28	1044	710	243	59	16	2100
		(1.3)	(49.7)	(33.8)	(11.6)	(2.8)	(0.8)	(100)
	5+	56	1441	1130	383	107	38	3155
		(1.8)	(45.7)	(35.8)	(12.1)	(3.4)	(1.2)	(100)
Total		711	29130	19714	4349	834	230	54968
		(1.3)	(53.0)	(35.9)	(7.9)	(1.5)	(0.4)	(100)

4. Determinants of Sickness Absenteeism

4.1 Determinants of self-reported sick days

The OLS regression model was used to determine variability in the self-reported number of sick days during the past six months due to differences in socio-demographic, health and environmental factors. The mean values of sick days by these independent variables are presented in Annex 2. The mean value of number of sick days was positively related with BMI categories, which increased from 5.16 for normal weight category to 10.19 for morbid obese category. The mean value also increased with age but marginally till it reached ages 55 and above which reported 7.96 sick days compared to an overall average of 5.83 days. The mean value did not differ much by gender but do vary by occupational grade where professional reported the least value (4.84 days) and clerical/administrative the highest value (6.03 days). The variability in mean values was also discernible by ethnic groups and geographical regions. Asian-Oriental employees reported the highest value of 8.38 days and European – UK the lowest value of 5.76 days. As far as geographical regions were concerned mean values were higher in Northern Ireland, North West and West Midlands and lower in East Midlands, South East and South West than the overall average.

With respect to diseases/conditions mean values were higher for heart attack, angina, diabetes, emphysema and chronic back pain. Those reporting disability the mean value of sick days was very high (19.17 days) compared to employees having no disability (5.20 days). Mean value of sick days increased considerably from 3.27 days for having none mental health score to 19.16 days for very high mental health score. Not much variability in mean number of sick days was observed by health behaviour and dietary variables.

The regression results by alternate models are presented in Table 4.1. Model 1 describes a very crude effect of BMI on sick days. It clearly showed a positive and significant relationship of BMI with sickness. The number of sick days increased with categories of BMI; an obese employee on average reported 2.72 higher numbers of sick days when compared to those with BMI in normal range. This figure rose to 3.85 days for severely obese employees and further to 4.11 days for the morbid obese employees. The constant term was significant and indicating on average when other things kept constant an employee with normal BMI tended to report 5.12 days of sickness.

Model 2 considers the influence of BMI on sick days after controlling for the effect of age, sex, job type, ethnicity and geographical location. Age demonstrated a non-linear U-shaped relationship with sick days; however, the coefficient against age variable was not statistically significant whereas for the age squared it was significant which inferred that sick days rose in the older ages. Sick days were higher for females which had reported 2.06 days more than their male counterparts. As far as job type is concerned, compared to professional employees manual employees had reported higher sick days by 2.83 days and clerical or administrative ones reported higher by 0.88 days. The coefficient was not significant for employees in the middle

management category. Overall, ethnicity had shown a weak influence on sick days; except for other ethnic group, the coefficients for all the remaining ethnic groups were not significant. The other ethnic group reported 1.71 more sick days when compared with European-UK ethnic group. Only in three geographical regions the coefficient was found significant. Employees located in North West and West Midlands regions respectively reported 1.74 and 1.47 more sick days than employees in London region whereas in East of England region it was 0.64 less sick days than the London region. There is not much change in the effect of BMI on sick days as was observed in the Model 1.

Diseases/conditions currently on treatment, disability and psychological distress factors were introduced in Model 3. Of 13 diseases/conditions currently on treatment 6 were found significant. Amongst them the greatest influence on sick days exerted by heart attack which accounted for 5.37 additional sick days, it was followed by angina (4.38 days), chronic back pain (2.96 days), pneumonia (0.94 days) and bronchitis (0.55 days). The influence of skin condition was negative i.e. accounted for 0.53 less sick days. Disability turned out to be one of the strongest predictors of sick days. Employees reporting any disability tended to report additional 11.61 sick days compared to a normal person. Mental health has also shown substantial linear effect on sick days i.e. the number of sick days increased with the level of mental health problem. Persons in the low mental health score category had shown 1.60 more sick days, which in fact had risen to 15.32 more sick days for the very high score category when compared to those having reported no mental health problem.

Compared to Model 2, the influence of age factor became significant in Model 3; and also coefficients of three more regions, namely Wales, Scotland and Northern Ireland became significant. The pattern of relationship with BMI remained similar as was observed for the Model 2; however, the coefficient of underweight category turned out to be insignificant. The values of coefficients for the remaining categories of BMI decreased as against the values obtained in the Model 2, suggesting that some of the BMI influence was captured by diseases/conditions, disability and mental health variables.

In the Model 4 we added lifestyle factors, namely smoking, alcohol use, exercise and diet. Compared to employees who never smoked, ever smokers accounted for additional 0.54 sick days and current smokers additional 1.23 sick days. To our surprise, alcohol consumption was significantly but negatively related with sick days. Compared to non-drinkers irrespective of units of alcohol consumption, employees had reported at least one less day of sickness. Exercise pattern had shown some positive influence over sick days, those having 3 times exercise per week reported additional 0.52 sick days and this was 0.37 days in the case of those having 4 or more times exercise per week when compared to those not doing any exercise. Consumption of bread/cereal/potatoes/rice/pasta denoting carbohydrate energy as well as consumption of fruit/vegetables both had revealed positive but non-significant influence on sick days. Contrary to the fact, those consuming fatty or sugary foods every day or 2-3 times a week reported lower sick days (2.16 days and 1.28 days respectively) when compared to those consuming these items hardly. Those employees adding salt on table or while cooking food every time reported additional 0.76 sick days compared to those rarely adding salt in the food. The influence of food cooked in animal fat was found to be non-significant on days of sickness.

Table 4. 1 Alternate regression models of determinants of duration of sick days

Independent Variables	OLS Regression Coefficients			
	Model 1	Model 2	Model 3	Model 4
Constant term	5.12***	2.91**	2.37**	3.77**
1. Body Mass Index (18.5-24.9)				
<18.5	1.42*	1.26*	0.42	0.40
25-29.9	0.87***	1.04***	0.92***	0.92***
30-34.9	2.72***	2.83***	2.05***	2.05***
35-39.9	3.85***	3.82***	2.48***	2.47***
40+	4.11***	4.14***	2.61**	2.58***
2. Age				
Age (Years)		-0.08	-0.19***	-0.19***
Age Squared		0.002**	0.003***	0.003***
3. Whether female (Male)		2.06***	1.78***	1.46***
4. Job type (Professional)				
Manual		2.83***	2.71***	2.44***
Clerical/Admin		0.88*	0.63	0.51
Middle management		-0.19	-0.36	-0.45
5. Ethnicity (European -UK)				
Afro-Caribbean		-0.16	0.21	-0.14
Asian-Indian subcontinent		0.68	0.58	0.27
Asian-Oriental		1.79	1.67	1.19
European-Other		0.44	0.16	0.04
Jewish		-0.97	-2.01	-2.12
Other		1.71**	1.46**	1.27**
6. Geographical Region (London)				
Unclassified		-0.5	-0.4	-0.29
North East		0.65	0.88	1.08**
North West		1.74***	1.68***	1.83***
Yorkshire & Humber		-0.22	-0.17	0.02
East Midlands		-0.16	0.14	0.34
West Midlands		1.47***	1.13**	1.23**
East of England		-0.64*	-0.42	-0.38
South East		-0.3	-0.27	-0.25
South West		-0.54	-0.16	-0.11
Wales		0.53	0.95**	1.04**
Scotland		0.56	0.88**	1.05***
N Ireland		0.65	1.12*	1.29**
7. Diseases/Conditions-On Treatment				
Heart attack			5.37***	5.26***
Angina			4.38***	4.26***
High blood pressure			-0.09	-0.05
Diabetes			2.19	1.74
Bronchitis			0.55*	0.49
Emphysema			0.91	1.02
Arthritis			0.12	0.12
Chronic back pain			2.96***	2.90***
High cholesterol			-0.35	-0.32

Pneumonia	0.94*	0.88*
Asthma	0.33	0.34
Migraine	0.03	-0.01
Skin condition	-0.53*	-0.51*
8. Disability	11.61***	11.52***
9. Psychological Distress/ Mental Health (None)		
GHQ score 1-3 - Low	1.60***	1.66***
GHQ score 4-6 - Medium	4.14***	4.21***
GHQ score 7-9 - High	7.98***	8.04***
GHQ score 10-12 - Very High	15.32***	15.34***
10. Smoking Status (Never smoked)		
Ever		0.54***
Current Smoker		1.23***
11. Alcohol (None)		
1-14 units/week		-1.17***
15-24 units/week		-1.02***
25-40 units/week		-1.18***
41+ units/week		-1.30***
12. Exercise (None)		
1-2 times a week		0.07
3 times a week		0.52*
4+ times a week		0.37*
13. Bread/Cereal/Potatoes/Rice/Pasta (Hardly)		
As part of every meal		0.70
As part of 1-2 meals		0.53
14. Fruit/Vegetables portions (1-2 portions/day)		
5 or more portions/day		0.28
3-4 portions/day		0.36
15. Fatty or sugary foods (None/Rarely)		
2-3 times a week		-1.28***
Every day		-2.16***
16. Add Salt - Table/Cooking (Never/Rarely)		
Sometimes		0.27
Always		0.76***
16. Cooked in Animal Fat (None/Rarely)		
2-3 times a week		-0.29
Every day		-0.27

Notes: *** p<.01, ** p<.05, * p<.10.
Figures in parentheses indicate base category of the independent variables used in categorical form.

To sum up the discussion, alternative models have explained the type of influence different categories of independent variables have exerted on employees reporting number of sick days during the last six months. In all the models, the relationship between categories of BMI with sick days remained significant, thus suggesting positive and strong influence of obesity on sick days. Demographic factors (gender and age) have shown significant effect on sickness, as female employees reporting higher sick days and age depicting U-shaped non-linear relationship with older age reporting higher sick days. Only manual employees tended to report higher sickness than the professional employees. The effect of ethnicity was very weak on sickness absence. Compared to London, employees in select regions (North East, North West, West Midlands, Wales, Scotland and Northern Ireland) had reported higher number of sick days. The most influential factors on sick days turned out to be disability, mental health and diseases or conditions for which they were on treatment. Amongst diseases the three prominent ones were heart attack, angina and chronic back pain exerting strong influence on number of sick days. Lifestyle factors had shown weak influence on sickness absence.

4.2 Determinants of visits to general practitioner

The other outcome measure as a proxy for morbidity or health status is the access to general practitioner (GP). The survey included a question on the number of visits to a GP during the past six months. We have used OLS regression model to determine variability in the number of visits to a GP as explained by differences in socio-demographic, health and environmental factors. The number of independent variables included in the alternate models is the same as used for the determinants of sick days.

The mean value of the number of visits to a GP by different confounding factors is presented in Annex 2 table. The mean value of number of visits to a GP was positively related with BMI categories, which increased from 1.31 for normal weight category to 2.14 for morbid obese category. The relationship of contacts with GP with age was non-linearly related. The mean value declined from 1.58 for age group 16-24 to 1.27 for middle age group of 35-44 and then rose again to 1.54 in the highest age group of 55 and above. The mean value did not differ much by gender and occupational grade. The variability in mean values was found to be negligible across ethnic groups and geographical regions.

With respect to diseases/conditions mean values were higher for heart attack, angina, diabetes, emphysema chronic back pain and migraine. The mean value of visits to a GP for those employees reporting disability was high (2.50 visits) compared to employees having no disability (1.34 visits). The mean value of visits to a GP increased considerably from 1.01 visits for employees with no mental health score to 2.85 visits for employees having very high mental health score. Not much variability in mean number of visits was observed by health behaviour and dietary variables.

Model 1 depicted a very crude effect of BMI on visits to a doctor. The analysis clearly showed a positive and significant relationship of BMI with visits. The number of visits to a GP increased with categories of BMI; an obese employee on average reported 0.44 additional visits to a GP when compared to those having BMI in normal range. This figure rose to 0.78 visits for severely

obese employee and further to 0.94 visits for the morbid obese employee. The constant term was significant and indicated on average when other things kept constant an employee with normal BMI tended to report 1.31 visits to a GP during the past six months.

Model 2 describes the effect of BMI on visits to a GP after controlling for the influence of age, sex, job type, ethnicity and geographical location. Age demonstrated a significant non-linear U-shaped relationship with the number of visits to a GP which shows that for younger age cohorts the number of visits was lower; however as age increased the number of visits to a doctor also increased particularly in the older ages. Visits to a GP were higher for female employees which had reported additional 0.77 visits when compared to their male counterparts. With respect to job type, manual employees had reported 0.09 higher numbers of visits to a doctor when compared to the professional employees. The regression coefficients were found non-significant for clerical/ administrative and middle management categories. In contrast to determinants of sick days, here ethnicity had shown a strong influence on the number of visits to a GP. The coefficient was found to be highest for employees of Asian-Indian subcontinent ethnicity (0.60 visits) followed by Asian-Oriental (0.49 visits), Afro-Caribbean (0.42 visits), Jews (0.39 visits) and others (0.35 visits). It was non-significant for European-other category. Only in four geographical regions the coefficient was found significant. Employees located in North West, West Midlands, East of England and Scotland regions reported higher number of visits when compared to employees in London region. There was not much change in the effect of BMI on visits to a GP as was observed in the Model 1; however, the coefficient against the underweight category became non-significant.

Model 3 captures the effect of diseases/conditions currently on treatment, disability and psychological distress on visits to a GP. Except emphysema and skin condition, all the remaining 11 diseases/conditions were found significant. Amongst them the greatest influence on visits to a GP was exerted by diabetes which accounted for additional 0.82 visits; it was followed by heart attack (0.70 visits) angina (0.49 visits), chronic back pain (0.28 visits), bronchitis (0.23 visits), high blood pressure (0.19 visits), migraine (0.18 visits), arthritis (0.15 visits), high cholesterol (0.13 visits), asthma (0.10 visits) and pneumonia (0.10 visits). Compared to the determinants of sickness days, here higher number of diseases had shown influence on visits to a GP. Disability turned out to be the strongest predictor. Employees with disability tended to report additional 0.95 visits to a GP when compared to the normal employees. Mental health had also shown substantial linear effect on visits to a GP which increased with the level of mental health score. Persons in the low mental health score category had shown 0.27 more visits, which in fact had risen to 1.76 more visits for persons in very high score category when compared to persons with no mental health problem.

Compared to Model 2, coefficients of two more regions namely South East and South West became significant in Model 3. The pattern of relationship with BMI remained similar as observed in the Model 2; however, the values of coefficients for BMI categories decreased as compared to the values obtained in the Model 2, suggesting that some of the influence of BMI was captured by diseases/conditions, disability and mental health variables.

Table 4. 2 Alternate regression models of determinants of number of visits to a GP

	OLS Regression Coefficients			
Independent Variables	Model 1	Model 2	Model 3	Model4
Constant term	1.31***	2.18***	2.04***	2.35***
1. Body Mass Index (18.5-24.9)				
<18.5	0.25***	0.08	-0.03	-0.04
25-29.9	0.05***	0.15***	0.12***	0.12***
30-34.9	0.44***	0.49***	0.38***	0.36***
35-39.9	0.78***	0.71***	0.52***	0.50***
40+	0.94***	0.83***	0.61***	0.59***
2. Age				
Age (in Years)		-0.07***	-0.08***	-0.08***
Age Squared		0.001***	0.001***	0.001***
3. Whether female (Male)		0.77***	0.70***	0.65***
4. Job type (Professional)				
Manual		0.09**	0.09**	0.08*
Clerical/Administrative		0.02	-0.002	-0.02
Middle management		-0.05	-0.07	-0.09*
5. Ethnicity (European -UK)				
Afro-Caribbean		0.42***	0.47***	0.41***
Asian-Indian subcontinent		0.60***	0.59***	0.52***
Asian-Oriental		0.49***	0.51***	0.43***
European-Other		0.08	0.04	0.03
Jewish		0.39*	0.28	0.23
Other		0.35***	0.32***	0.28***
6. Geographical Region (London)				
Unclassified		0.02	0.04	0.05
North East		0.03	0.05	0.07
North West		0.10***	0.10***	0.13***
Yorkshire & Humber		-0.002	0.01	0.03
East Midlands		-0.03	0.02	0.05
West Midlands		0.18***	0.15***	0.16***
East of England		0.07*	0.10***	0.10***
South East		0.04	0.05*	0.05
South West		0.02	0.07**	0.07**
Wales		-0.03	0.04	0.05
Scotland		0.11***	0.16***	0.18***
N Ireland		-0.05	0.03	0.04
7. Diseases/Conditions-On Treatment				
Heart attack			0.70***	0.68***
Angina			0.49***	0.48***
High blood pressure			0.19***	0.19***
Diabetes			0.82***	0.75***
Bronchitis			0.23***	0.23***
Emphysema			0.15	0.16
Arthritis			0.15***	0.16***
Chronic back pain			0.28***	0.28***
High cholesterol			0.13****	0.13***
Pneumonia			0.10*	0.10*

Asthma	0.10**	0.10**
Migraine	0.18***	0.17***
Skin condition	0.03	0.04
8. Disability	0.95***	0.94***
9. Psychological Distress/ Mental Health (None)		
GHQ score 1-3 - Low	0.27***	0.27***
GHQ score 4-6 - Medium	0.65***	0.65***
GHQ score 7-9 - High	0.98***	0.98***
GHQ score 10-12 - Very High	1.76***	1.76***
10. Smoking Status (Never smoked)		
Ever		0.11***
Current Smoker		0.06***
11. Alcohol (None)		
1-14 units/week		-0.13***
15-24 units/week		-0.19***
25-40 units/week		-0.29***
41+ units/week		-0.35***
12. Exercise (None)		
1-2 times a week		-0.02
3 times a week		0.01
4+ times a week		-0.06***
13. Bread/Cereal/Potatoes/Rice/Pasta (Hardly)		
As part of every meal		0.02
As part of 1-2 meals		0.01
14. Fruit/Vegetables portions (1-2 portions/day)		
5 or more portions/day		0.08
3-4 portions/day		0.02
15. Fatty or sugary foods (None/Rarely)		
2-3 times a week		-0.14***
Every day		-0.20***
16. Add Salt - Table/Cooking (Never/Rarely)		
Sometimes		-0.01
Always		0.03
16. Cooked in Animal Fat (None/Rarely)		
2-3 times a week		0.00
Every day		0.02

Notes: *** p<.01, ** p<.05, * p<.10.
Figures in parentheses indicate base category of the independent variables used in categorical form.

Lifestyle factors, namely smoking, alcohol use, exercise and diet were incorporated in Model 4. Compared to employees who never smoked, ever smokers accounted for additional 0.11 visits and current smokers additional 0.06 visits to a GP. Here also, the effect of alcohol consumption was significant but negatively related with the number of visits. Compared to non-drinkers the number of visits were 0.13 less days in the category of drinkers of 1-14 times per week, which raised to the figure of 0.35 less days for those drinking more than 40 units per week. For exercise pattern, only the category reporting having 4 or more times exercise per week had shown significant negative influence on the number of visits to a GP. Consumption of bread/cereal/potatoes/rice/pasta as well as consumption of fruit/vegetables both had revealed positive but non-significant influence on the number of visits to a GP. Contrary to our expectation, consumption of fatty or sugary food was negatively related with the number of visits to a GP. Those consuming fatty or sugary food every day (0.20 visits) or 2-3 times a week (0.14 visits) reported lower number of visits to a GP when compared to those consuming these items hardly. The influence of variables adding salt on table or while cooking food, and food cooked in animal fat was found to be non-significant on the number of visits to a GP.

To sum up, in all the models, the relationship between categories of BMI with number of visits to a GP remained significant, thus suggesting positive and strong influence of obesity on contacts with GP. Demographic factors (gender and age) have shown significant effect on number of visits to a GP, as female employees reporting higher visits and age depicting U-shaped non-linear relationship with older age reporting higher visits to a GP. Only manual employees tended to report higher visits than the professional employees. Most ethnic minorities groups had reported significantly higher contacts with GP when compared with European-UK group. Compared to London region, employees in select regions (North West, West Midlands, East of England, South West and Scotland) had reported higher contacts with GP. The most influential factors on number of visits to a GP turned out to be disability, mental health and diseases or conditions for which they were on treatment. Amongst diseases the three prominent ones were diabetes, heart attack and angina exerting strong influence on number of visits to a GP. The effect of lifestyle including dietary factors on the number of visits to a GP was found to be weak.

5. Obesity and Work Days Lost

5.1 Episodes and recorded work days lost during 1995-96 to 2006-07

Table 5.1 presents the average annual number of episodes and number of workdays lost recorded by the employer over time by six categories of BMI. The period covered was 12 years (1995-96 to 2006-07) and the number of employees for which the data were available declined from 37111 in 1995-96 to 19226 in 2006-07 due to attrition (death, retirement, job change, dismissed, etc.). In 10 out of the 12 years data the average number of episodes for the morbid obese (40+) category was greater than the overall mean and in eight years it was greater than the rest of categories. However, as far as average number of annual work days lost was concerned, in 8 out of 12 years work days lost for morbid obese category was greater than the overall mean and in 7 years it was greater than the rest of categories. One can infer from the data that there existed a weak overall association between BMI categories and work days lost.

5.2 Exit from employment and reasons for leaving

Table 5.2 presents the distribution of employees currently in the job and those who left by year of leaving across three broad groups of BMI categories. Out of 37138 employees 17898 (48.2 per cent) left the job any time between 1995-96 and 2006-07. The table showed that there was slightly over representation of over weight (25-29.9) and obese (30+) employees who left the job during the past 12 years. When we looked at the data by year of leaving, a relatively higher proportion of obese employees (varied between 10.7 per cent and 14.5 per cent) left the job during initial 4 years period (i.e. between 1996-97 and 1999-2000). This could possibly points toward an early exit from the job due to obesity. A big chunk of employees leaving the job (majority due to redundancy) took place during 2002-03 and 2004-05.

Table 5.3 shows the distribution of employees who left the job by reasons for leaving and age at the time of leaving. The most prominent reason for leaving was redundancy (29.8 per cent); it was followed by transfer (20.3 per cent), voluntary decision (16.1 per cent) and retirement (13.3 per cent). About one in ten employees took early retirement due to ill health condition, a majority of them left before turning age 60 years. Out of 17898 employees 5361 (30 per cent) had taken retirement at age 60 or over and thus the remaining 70 per cent (a majority) left the job early. Transfer and redundancy were the two prominent reasons for leaving the job in middle age groups whereas the voluntary decision to leave the job was prominent in the younger cohort (about 53 per cent employees of below the age 30 and 34 per cent between ages 30-39 years left voluntarily). The mean age at leaving was found to be lowest for dismissed employees followed by employees reporting voluntary exit and transfer as a reason for leaving. This showed that the employees due to voluntary and transfer reasons left the job at the age of 45 to 46 years (19-20 years earlier than the retirement age of 65). The employees due to ill health conditions on average exited at 52 years of age (13 years earlier than the retirement age of 65). The mean age at leaving was 53 years for those reporting redundancy reason and 61 years for those reporting casual reason for leaving.

Table 5.4 demonstrates a significant association (chi-square) between reason for leaving the job and BMI categories. There was under representation of obese employees who undertook voluntary decision to quit the job (as seen in the Table 5.3 that a majority of them were young people). There was over representation of obese employees who left the job due to redundancy or ill health conditions. The retirement category had also shown marginally under-representation of obese people. Thus the analysis indicates that an early exit from job due to obesity can not be ruled out.

A large majority of young people leaving job voluntarily were manual workers i.e. postman (see Table 5.5). Redundancy was a prominent reason for clerical/administrative and professional employees and not for manual employees. Transfer was the prominent reason for middle management employees. Ill health turned out to be an important reason for quitting the job for manual employees (postman). Thus this is interesting to note that the reason for leaving the job differed considerably by occupational grade.

We have used OLS regression model to determine the variation in age at the time of leaving the Royal Mail job by socio-demographic characteristics of the employees (see Table 5.6). During the preliminary analysis it was found that the effect of obesity on age at leaving was not significant, thus it was dropped from the final analysis. Model 1 depicted a very crude effect of reason for leaving on age at leaving the Royal Mail any time during the past 12 years. It clearly and significantly showed that employees reporting voluntary and / or dismissed reasons for leaving had left the job nearly 21 years earlier than the employees who usually became retired. The number of years left earlier than the usual retirement age was 19 years in the case of transfer and 12 years in the case of redundancy from the job. The employees who exited due to ill health reason left the job 13 years prior to the usual retiring employees. The casual employees left 5 years earlier than the retiring employees. The constant term was significant and indicating on average when other things kept constant an employee reporting retirement as the reason for leaving left the Royal Mail job at age 65.7 years.

Besides reason for leaving, Model 2 also included sex, job type, ethnicity and geographical location in the regression analysis. The results showed that female employees were leaving 2.8 years earlier than the male employees. As far as effect of job type on age at leaving was concerned, the manual employees left 0.8 years later than the professional employees whereas clerical/administrative and middle management employees left earlier by 1.01 and 0.71 years respectively than the professional employees. In terms of influence of ethnicity on age at leaving, Afro-Caribbean left 1.16 years earlier than the European – UK employees. Employees of Asian – Oriental, Other and European – Other ethnic origin left later by 4.81, 1.32 and 0.92 years respectively when compared to European – UK employees. Employees working in seven geographical locations had also shown significant results. The employees in North East, North West, Yorkshire & the Humber, East of England, South East, South West and Northern Ireland reported leaving the job at later age than the employees working in London region.

Table 5. 1 Average Annual Number of Episodes and Work Days Lost by BMI Categories, 1995-96 to 2006-07

	1995-96			1996-97			1997-98			1998-99			1999-2000			2000-01		
BMI Category	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases
<18.5	1.32	7.73	477	1.28	9.36	476	1.31	11.37	472	1.39	9.56	470	1.47	10.52	466	1.50	13.86	458
18.5-24.9	1.23	7.60	19734	1.29	9.35	19694	1.28	9.28	19573	1.33	10.07	19447	1.39	11.34	19283	1.37	12.45	19035
25-29.9	1.22	7.25	13228	1.29	9.34	13197	1.28	9.56	13138	1.35	10.12	13049	1.37	11.00	12952	1.39	12.70	12775
30-34.9	1.27	7.44	2962	1.35	10.23	2952	1.33	9.50	2929	1.37	10.91	2909	1.37	11.90	2885	1.39	13.24	2846
35-39.9	1.27	9.12	554	1.29	8.95	554	1.33	8.47	548	1.35	9.74	546	1.37	11.93	538	1.35	10.72	531
>40	1.35	9.21	156	1.51	10.64	156	1.38	6.97	154	1.43	7.89	152	1.47	15.44	151	1.55	17.72	148
Total	1.23	7.49	37111	1.30	9.42	37029	1.29	9.40	36814	1.34	10.13	36573	1.39	11.28	36275	1.38	12.62	35793

	2001-02			2002-03			2003-04			2004-05			2005-06			2006-07		
BMI Category	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases	Episodes	Work days lost	No. of cases
<18.5	1.30	12.59	450	1.45	17.36	393	1.32	15.45	348	1.09	11.34	283	1.14	10.36	262	1.15	7.55	238
18.5-24.9	1.28	13.01	18501	1.33	13.78	16319	1.26	13.45	14416	1.08	11.68	12219	1.02	9.93	11278	1.06	9.32	10259
25-29.9	1.30	13.75	12420	1.30	13.66	10971	1.25	13.04	9709	1.07	11.53	8194	1.02	9.91	7502	1.05	9.05	6832
30-34.9	1.30	13.13	2760	1.33	14.36	2435	1.23	13.38	2170	1.07	10.92	1805	1.01	10.22	1666	1.07	10.43	1526
35-39.9	1.37	11.04	519	1.33	16.66	466	1.27	16.04	422	1.03	10.65	353	1.09	7.87	323	1.09	8.77	297
>40	1.32	16.73	142	1.50	17.57	127	1.47	15.13	109	1.13	8.45	91	0.93	7.40	82	0.93	5.97	74
Total	1.29	13.26	34792	1.32	13.89	30711	1.25	13.37	27174	1.08	11.53	22945	1.02	9.91	21113	1.06	9.27	19226

Table 5. 2 Distribution of Employees in the Job and Left Employment by Year of Leaving across BMI Category

Status	Year Left	No. of Employees	BMI Category				
			Missing	<25	25-29.9	30+	Total
Continued		19240	0.1	56.4	35.0	8.5	100
Left		17898	0.1	52.1	37.4	10.3	100
Total		37138	0.1	54.3	36.2	9.4	100
	1995-96	2		100.0			100
	1996-97	83		61.4	24.1	14.5	100
	1997-98	215		55.3	34.0	10.7	100
	1998-99	241		49.4	36.9	13.7	100
	1999-00	298		50.0	35.9	14.1	100
	2000-01	483		58.2	34.2	7.7	100
	2001-02	1001	0.3	55.2	34.0	10.5	100
	2002-03	4084	0.1	51.4	38.0	10.4	100
	2003-04	3540	0.1	52.6	37.3	10.0	100
	2004-05	4229	0.1	51.3	38.3	10.2	100
	2005-06	1833	0.3	50.6	38.6	10.5	100
	2006-07	1889	0.1	52.8	37.3	9.8	100

Table 5. 3 Distribution of Employees who Left the Job by Reason of Leaving and Age at the Time of Leaving, and Mean Age at the Time of Leaving by Reason of Leaving

	Age at Leaving (Group)						Mean age at leaving (years)
Reason for Leaving	<30	30-39	40-49	50-59	60+	All	
Voluntary	113	974	904	454	439	2884	44.90
	(52.8)	(33.9)	(18.4)	(10.0)	(8.2)	(16.1)	
Casual	0	19	11	15	110	155	61.01
	(0)	(0.7)	(0.2)	(0.3)	(2.1)	(0.9)	
Transfer	35	772	1519	1064	244	3634	46.49
	(16.4)	(26.9)	(30.8)	(23.5)	(4.6)	(20.3)	
Dismissed	42	205	247	121	86	701	44.56
	(19.6)	(7.1)	(5.0)	(2.7)	(1.6)	(3.9)	
Redundancy	9	486	1322	1888	1624	5329	53.31
	(4.2)	(16.9)	(26.8)	(41.7)	(30.3)	(29.8)	
Ill Health Retirement	6	190	410	614	400	1620	51.76
	(2.8)	(6.6)	(8.3)	(13.6)	(7.5)	(9.1)	
Retired	0	3	5	47	2330	2385	65.66
	(0)	(0.1)	(0.1)	(1.0)	(43.5)	(13.3)	
Other incl. Death	4	22	55	99	104	284	54.31
	(1.9)	(0.8)	(1.1)	(2.2)	(1.9)	(1.6)	
Not Known	5	203	451	223	24	906	45.01
	(2.3)	(7.1)	(9.2)	(4.9)	(0.4)	(5.1)	
All	214	2874	4924	4525	5361	17898	51.40
	(100)	(100)	(100)	(100)	(100)	(100)	

Note: Figures in parentheses are column percentages.

Table 5. 4 Reason for Leaving Job by BMI Category

	BMI Category				
Reason for Leaving	Missing	<25	25-29.9	30+	Total
Voluntary	4	1805	889	186	2884
	(15.4)	(19.3)	(13.3)	(10.1)	(16.1)
Casual	1	90	53	11	155
	(3.8)	(1.0)	(0.8)	(0.6)	(0.9)
Transfer	6	1911	1335	382	3634
	(23.1)	(20.5)	(19.9)	(20.7)	(20.3)
Dismissed	0	398	236	67	701
	(0)	(4.3)	(3.5)	(3.6)	(3.9)
Redundancy	7	2553	2135	634	5329
	(26.9)	(27.4)	(31.9)	(34.4)	(29.8)
Ill Health Retirement	4	772	618	226	1620
	(15.4)	(8.3)	(9.2)	(12.3)	(9.1)
Retired	2	1160	1020	203	2385
	(7.7)	(12.4)	(15.2)	(11.0)	(13.3)
Other incl. Death	0	138	107	39	284
	(0)	(1.5)	(1.6)	(2.1)	(1.6)
Not Known	2	502	308	94	906
	(7.7)	(5.4)	(4.6)	(5.1)	(5.1)
All	26	9329	6701	1842	17898
	(100)	(100)	(100)	(100)	(100)

Note: Figures in parentheses are column percentages.

Table 5. 5 Reason for Leaving Job by Job Type

Reason for Leaving	Job Type					All
	Not recorded	Manual	Clerical/ Administrative	Middle Management	Professional	
Voluntary	20	2408	250	183	23	2884
	(17.4)	(23.1)	(8.1)	(5.2)	(3.0)	(16.1)
Casual	2	135	11	7	0	155
	(1.7)	(1.3)	(0.4)	(0.2)	(0.0)	(0.9)
Transfer	20	1051	881	1419	263	3634
	(17.4)	(10.1)	(28.7)	(40.4)	(34.6)	(20.3)
Dismissed	9	609	40	41	2	701
	(7.8)	(5.8)	(1.3)	(1.2)	(0.3)	(3.9)
Redundancy	23	2303	1245	1357	401	5329
	(20.0)	(22.1)	(40.6)	(38.7)	(52.7)	(29.8)
Ill Health Retirement	20	1358	135	100	7	1620
	(17.4)	(13.0)	(4.4)	(2.8)	(0.9)	(9.1)
Retired	14	2003	206	144	18	2385
	(12.2)	(19.2)	(6.7)	(4.1)	(2.4)	(13.3)
Other incl. Death	0	222	34	25	3	284
	(0)	(2.1)	(1.1)	(0.7)	(0.4)	(1.6)
Not Known	7	354	267	234	44	906
	(6.1)	(3.4)	(8.7)	(6.7)	(5.8)	(5.1)
All	115	10443	3069	3510	761	17898
	(100)	(100)	(100)	(100)	(100)	(100)

Note: Figures in parentheses are column percentages.

Table 5. 6 Determinants of Age at Leaving the Job (OLS Regression Model)

Independent Variables	Model 1	Model 2
(Constant)	65.66***	64.77***
1. Reason for Leaving (Retirement)		
Voluntary	-20.76***	-20.36***
Casual	-4.64***	-4.10***
Transferred	-19.17***	-18.04***
Dismissed	-21.10***	-21.12***
Redundancy	-12.35***	-11.47***
Ill Health Retirement	-13.90***	-13.56***
Others including death	-11.35***	-11.36***
Not known	-20.65***	-19.70***
2. Whether female (Male)		-2.78***
3. Job type (Professional)		
Manual		0.83***
Clerical/Administrative		-1.01***
Middle management		-0.71**
4. Ethnicity (European -UK)		
Afro-Caribbean		-1.16***
Asian-Indian subcontinent		0.48
Asian-Oriental		4.81***
European-Other		0.92**
Jewish		0.62
Other		1.32**
5. Geographical Region (London)		
Unclassified		0.52**
North East		1.00**
North West		1.19***
Yorkshire & Humber		0.67**
East Midlands		-0.10
West Midlands		0.61
East of England		0.93***
South East		0.51**
South West		1.86***
Wales		0.28
Scotland		-0.10
N Ireland		1.30*

Notes: *** p<.01, ** p<.05, * p<.10.
Figures in parentheses indicate base category of the independent variables used in categorical form.

5.3 Determinants of duration of work days lost

The link data set contained information on employer recorded work days lost for the past 12 years (1995-96 to 2006-07). We have used OLS regression model to determine variability in the number of work days lost in year 1995-96 and 1996-97 as explained by differences in socio-demographic, health and environmental factors. The number of independent variables included in the alternate models is the same as used for the determinants of number of sick days / number of visits to a GP. The mean values of the number of work days lost for 1995-96 and 1996-97 by different confounding factors are shown in the Annex 2.

5.3.1 Mean number of work days lost

The mean value of work days lost for 1995-96 by six categories of BMI had shown some variability with rising values for severely obese (35-39.9) and morbid obese (40+) categories. This was not the case for work days lost for 1996-97 which reported marginally higher values for obese (30-34.9) and morbid obese (40+) categories. For both years mean values did not differ much by age groups; however, these differed between sexes with female employees reporting 9.41 work days lost (as compared to 7.03 for male employees) during 1995-96 and 12.03 days lost (8.78 for male employees) during 1996-97. Interestingly, mean values in both the years declined with occupational grades (highest for manual and lowest for senior management/professional group). Some variability in mean values was noticed by ethnic groups. During 1995-96 as well as 1996-97 the Jewish reported the lowest mean value and other ethnic group reported the highest mean value of work days lost. Some variability in mean values was also noticed across geographical regions. During 1995-96, Northern Ireland and East Midland reported two highest values and Scotland and West Midlands the two lowest values of mean work days lost. For year 1996-97, the ranking of regions were different with North West and South west reported the two highest values and North East and Yorkshire & the Humber the two lowest values of work days lost.

The variability in mean values by diseases/conditions for which currently on treatment was also discernable. During 1995-96, mean values of work days lost were lower for heart attack, angina, diabetes, high cholesterol and pneumonia, and higher for high blood pressure, emphysema and migraine diseases. In contrast, the mean values for 1996-97 were found higher for heart attack, angina, diabetes, emphysema, chronic back pain and high cholesterol. The mean value did not differ by disability in both the years. Not much variability was noticed in mean values by mental health score categories. Similarly variability in mean values in both the years was minimal for the rest of variables included in the model i.e. by smoking status, alcohol consumption, exercise pattern, consumption of bread/cereals/potatoes/rice/pasta, fruit/vegetables and fatty food, as well as by adding of salt in food at table or while cooking, and food cooked in animal fat.

5.3.2 Determinants of duration of work days lost 1995-96

Model 1 depicted a very crude effect of BMI on the number of work days lost during 1995-96. The analysis did not show clearly a significant relationship of BMI with the duration of work days lost. During 1995-96, the number of work days lost was significantly associated with only severely obese category which showed that severely obese employee tended to report additional 1.52 work days lost compared to an employee with normal BMI. This figure was higher for morbid obese employee but was not statistically significant. The constant term was significant and indicating on average when other things kept constant an employee with normal BMI tended to report 7.6 work days lost during 1995-96.

Model 2 considered inclusion of all other variables. The effect of inclusion of all other variables in the model was minimal on coefficients of BMI category. During 1995-96, severely obese employees continued to report significantly additional 1.49 work days lost compared to those employees having normal BMI. The non-linear relationship with age variable was not significant. It showed only increasing linear tendency of the number of work days lost with age. Female employees tended to report significantly 2.59 additional work days lost compared to men employees. The relationship of duration of work days lost was significantly related with occupational grade. Manual employees had reported an additional 4.02 work days lost compared to the professional employees. Similarly, compared to the professional employees, the additional work days lost for clerical/administrative and middle management employees were 3.10 and 1.95 respectively.

Work days lost also varied significantly across ethnic groups and geographical regions. Compared to European –UK ethnic group, employees in 'other' ethnic category reported 2.89 additional work days lost, this was followed by Asian-Indian subcontinent group (2.28 days) and Afro-Caribbean group (1.53 days). Employees of Asian-Oriental ethnicity also reported 1.83 additional work days lost but it was not significant. With respect to geographical regions, compared to London region, the additional work days lost was the highest for Northern Ireland (1.89 days) which was followed by East Midlands (1.29 days) and North West (0.96 days).

Contrary to our expectations, out of 13 diseases/conditions, coefficients for only three diseases were found significant. To our surprise, employees undergoing treatment for chronic back pain and high cholesterol reported significantly lower work days lost (0.65 and 0.98 days respectively) compared to those having no disease/condition. Employees undergoing treatment for migraine reported 0.70 additional work days lost. Both disability and mental health score categories did not exert significant influence on annual number of work days lost.

Similarly, the influence of health behaviour variables (smoking status, alcohol consumption and exercise pattern) on work days lost was found to be non-significant. The coefficients for consumption of bread/cereals/potatoes/rice/pasta, fruit/vegetables and fatty/sugary food as well as food cooked in animal fat were also found to be non-significant. Those employees always adding salt at table or while cooking had reported significantly 0.46 additional work days lost compared to those rarely or never do so.

5.3.3 Determinants of duration of work days lost 1996-97

The regression Model 1 for year 1996-97 showed a bare minimal influence of BMI on work days lost. Out of six BMI categories the analysis only depicted one significant coefficient which was against obese category (30-34.9). This shows that during 1996-97, employees in obese category had reported significantly 0.88 additional workdays lost when compared to employees having normal BMI. Although this figure was the highest for morbid obese employees (1.29 days), it was not found to be statistically significant. The constant term was significant and indicating on average when other things kept constant an employee with normal BMI tended to report 9.35 work days lost during 1996-97.

Model 2 depicted results for determinants of work days lost while considering all the remaining variables. Once we included all other variables in the model the effect of BMI became minimal i.e. none of the BMI coefficients were found significant. Unlike the results for 1995-96, the influence of age was found to be non-significant for work days lost during 1996-97. Female employees tended to report significantly 3.66 additional work days lost compared to men employees. The relationship of work days lost was significantly related with occupational grade. Manual employees had reported an additional 3.82 work days lost compared to the professional employees. Similarly, for clerical/administrative and middle management employees the additional workdays lost were 1.92 and 1.55 respectively when compared to the professional group.

During 1996-97, the duration of work days lost did not varied significantly by ethnic groups except for those belonging to 'other' ethnic group (2.11 additional wok days lost compared to European – UK group). With respect to geographical regions, the additional work days lost was found to be significant for only one region (Yorkshire & the Humber) which reported 0.99 lower days compared to London region.

Here again the influence of diseases/conditions on the duration of work days lost was minimal as only for 3 out of 13 conditions the coefficients were found to be significant. Employees undergoing treatment for angina, diabetes and chronic back pain reported significantly higher work days lost (3.37, 4.34 and 0.80 days respectively) compared to those having no disease/condition. Once again, both disability and mental health score categories did not exert significant influence on the number of work days lost.

Similarly, except consumption of alcohol, the influence of health behaviour and dietary variables on the duration of work days lost was found to be non-significant. Only one coefficient in the alcohol consumption category i.e. those consuming 25-40 units per week was found significant. Employees in this category reported 1.37 additional work days lost when compared to those not consuming alcohol.

To sum up the discussion, unlike the determinants of sick days or visits to a GP, the number of variables influencing the duration of work days lost for 1995-96 as well as 1996-97 was quite small. The effect of obesity on the duration of work days lost was not clearly discernable (only in the 1995-96 model there was some influence of morbid obese employees on the number of work days lost). The number of significant variables / coefficients declined as we moved from

determinants of duration of work days lost during 1995-96 to that for 1996-97. Age, gender, occupational grade, ethnicity and geographical region had shown some influence on the duration of work days lost in 1995-96 but not to the same extent in those pertaining to 1996-97 period. Diseases/conditions, disability and mental health had reported minimal influence on work days lost during both the periods. Similarly the influence of health behaviour and dietary variables on work days lost was negligible in both 1995-96 and 1996-97 periods.

Table 5. 7 Determinants of Employer Recorded Work Days Lost for 1995-96 and 1996-97

	1995-96		1996-97	
Independent Variables	Model 1	Model 2	Model 1	Model 2
(Constant)	7.60***	0.16	9.35***	5.40*
1. Body Mass Index (18.5-24.9)				
<18.5	0.13	0.02	0.02	-0.17
25-29.9	-0.35	-0.34	-0.01	-0.05
30-34.9	-0.16	-0.22	0.88*	0.69
35-39.9	1.52*	1.49*	-0.4	-0.58
40+	1.61	1.59	1.29	1.17
2. Age				
Age (Years)		0.15*		-0.02
Age Squared		-0.001		0.001
3. Whether female (Male)		2.59***		3.66***
4. Job type (Professional)				
Manual		4.02***		3.82***
Clerical/Administrative		3.10***		1.92**
Middle management		1.95***		1.55**
5. Ethnicity (European -UK)				
Afro-Caribbean		1.53**		1.31
Asian-Indian subcontinent		2.28***		0.41
Asian-Oriental		1.83		-1.12
European-Other		-0.31		0.09
Jewish		-2.08		-3.3
Other		2.89***		2.11**
6. Geographical Region (London)				
Unclassified		1.07**		0.04
North East		0.56		-0.89
North West		0.96**		0.31
Yorkshire & the Humber		0.29		-0.99*
East Midlands		1.29**		-0.66
West Midlands		-0.01		-0.66
East of England		0.35		-0.01
South East		0.49		-0.28
South West		-0.002		0.18
Wales		0.75		-0.32
Scotland		-0.37		-0.24
N Ireland		1.89*		-0.20
7. Diseases/Conditions-On Treatment				
Heart attack		-1.39		0.19

Angina	-1.97	3.37**
High blood pressure	0.7	0.19
Diabetes	-1.4	4.34*
Bronchitis	0.12	-0.05
Emphysema	1.06	3.79
Arthritis	0.39	0.31
Chronic back pain	-0.65*	0.80*
High cholesterol	-0.98*	0.6
Pneumonia	-0.59	-0.18
Asthma	0.45	-0.05
Migraine	0.70*	0.14
Skin condition	0.24	0.26
8. Disability	0.1	0.28
9. Psychological Distress/ Mental Health (None)		
GHQ score 1-3 - Low	-0.05	-0.21
GHQ score 4-6 - Medium	0.03	0.52
GHQ score 7-9 - High	-0.37	0.37
GHQ score 10-12 - Very High	-0.43	0.94
10. Smoking Status (Never smoked)		
Ever	0.23	-0.47
Current Smoker	0.19	-0.23
11. Alcohol (None)		
1-14 units/week	-0.13	0.03
15-24 units/week	-0.21	-0.5
25-40 units/week	0.13	1.37**
41+ units/week	-0.46	0.6
12. Exercise (None)		
1-2 times a week	-0.05	0.1
3 times a week	0.04	-0.57
4+ times a week	-0.03	-0.11
13. Bread/Cereal/Potatoes/Rice/Pasta (Hardly)		
As part of every meal	0.27	0.88
As part of 1-2 meals	0.24	0.89
14. Fruit/Vegetables portions (1-2 portions/day)		
5 or more portions/day	-1.06	-0.01
3-4 portions/day	-0.75	-0.39
15. Fatty or sugary foods (None/Rarely)		
2-3 times a week	-0.22	-0.09
Every day	-0.05	-0.43
16. Add Salt - Table/Cooking (Never/Rarely)		
Sometimes	0.14	0.34
Always	0.46*	-0.36
16. Cooked in Animal Fat (None/Rarely)		
2-3 times a week	0.02	0.35
Every day	0.49	0.28

Notes: *** p<.01, ** p<.05, * p<.10.
Figures in parentheses indicate base category of the independent variables used in categorical form.

5.3 Incidence of work days lost

We have used logistic regression model to determine variability in the reporting of incidence of work days lost in year 1995-96 and 1996-97 as explained by differences in socio-demographic, health and environmental factors. Here the dependent variable (the incidence of work days lost) is in a dummy form. The number of predictors included in the model was the same as used for the determinants of number of sick days / number of visits to a GP / number of work days lost, as discussed in the previous sections. The only difference was the form of age variable – instead of continuous form the age was used here in a categorical form (16-24, 25-34, 35-44, 45-54 and 55+).

The results of logistic regression model are separately presented for work days lost for 1995-96 and 1996-97 in Table 5.8. The table revealed that both BMI and age were not found to be strong predictors of determining an incidence of workdays lost during both the periods. Gender and occupational grade turned out to be strong predictors for reporting incidence of work days lost during 1995-96 as well as 1996-97. Among female employees the odds of reporting an incidence of work days lost was higher than the male employees. Odds of reporting an incidence of work days lost in 1995-96 was 6.6 times higher among manual workers when compared to the professional employees. Similarly the odds were 4.0 times higher for clerical/administrative and 3.1 times higher for middle management employees when compared to the professional employees. For 1996-97, the odds for the manual, clerical/administrative and middle management employees were higher by 3.8, 2.5 and 1.7 times respectively when compared to the professional employees. None of the ethnicity category was found to be a significant predictor of an incidence of work days lost in both 1995-96 and 1996-97. The coefficients were found to be significant for select geographical regions. During 1995-96, two regions (North West and South East) reported higher odds and four regions (Yorkshire & the Humber, West Midlands, East of England and Scotland) reported lower odds when compared to London region. For 1996-97, the regions with significant odds were Yorkshire & the Humber, West Midlands, East of England and Northern Ireland; all of them reported lower odds when compared to London region. Interestingly, compared to London region three regions, namely Yorkshire & the Humber, West Midlands and East of England consistently reported lower odds in both the years.

Only two diseases/conditions were found significant during 1995-96. High cholesterol had lower odds whereas asthma had higher odds of reporting an incidence of work days lost. None of the disease / condition was found significant in 1996-97. Disability was turned out to be a significant predictor of reporting an incidence in 1996-97 but not in 1995-96. Mental health was not found to be a significant predictor of incidence of work days lost in both the years.

Amongst health behaviour and dietary variables, smoking status was turned out to be a significant predictor of an incidence for 1996-97 (with ever smoked employee had lower odds of reporting an incidence than the never smoked employee). Alcohol consumption was found to be non-significant whereas exercise frequency was found to be a significant predictor in both the years. The odds of reporting an incidence was lower for an employee having exercise 1-2 times per week or 4 or more times per week when compared to having done no exercise during 1995-96. For an incidence in 1996-97, the odds were significantly lower for those following exercise 4

or more times per week. Among dietary variables, consumption of bread/cereal/potatoes/rice/pasta was found to be non-significant predictor in both the years. Consumption of fruit/vegetables portions was a significant predictor in 1995-96 whereas the consumption of fatty or sugary foods was a significant predictor in 1996-97. Both adding salt to food at table or while cooking as well as foods cooked in animal fats were found to be significant predictors of reporting an incidence of work days lost in 1996-97.

Table 5. 8 Determinants of Incidence of Work Days Lost, 1995-96 and 1996-97 (Logistic Regression)

Predictors	1995-96			1996-97		
	Odds Ratio	95% Confidence Interval		Odds Ratio	95% Confidence Interval	
		Lower	Upper		Lower	Upper
1. Body Mass Index (18.5-24.9)						
<18.5	0.985	0.813	1.193	0.890	0.732	1.082
25-29.9	1.007	0.960	1.055	0.995	0.948	1.045
30-34.9	0.996	0.917	1.081	1.050	0.964	1.143
35-39.9	1.096	0.915	1.312	1.050	0.872	1.264
40+	1.191	0.851	1.666	0.989	0.703	1.391
2. Age (16-24)						
25-34	1.014	0.925	1.113	1.007	0.915	1.107
35-44	0.986	0.898	1.083	1.030	0.935	1.135
45-54	1.037	0.941	1.144	1.062	0.960	1.174
55+	0.996	0.892	1.111	1.032	0.922	1.155
3. Sex (Male)						
Female	1.049*	0.992	1.110	1.243***	1.172	1.317
4.Job type (Professional)						
Manual	6.625***	5.622	7.808	3.830***	3.341	4.392
Clerical/Administrative	4.036***	3.397	4.796	2.463***	2.127	2.852
Middle management	3.128***	2.633	3.714	1.706***	1.475	1.973
5. Ethnicity (European -UK)						
Afro-Caribbean	0.997	0.853	1.164	0.914	0.778	1.073
Asian-Indian subcontinent	1.076	0.951	1.218	0.915	0.806	1.038
Asian-Oriental	1.128	0.859	1.480	0.925	0.701	1.219
European-Other	0.917	0.808	1.041	0.935	0.821	1.065
Jewish	0.676	0.379	1.205	0.856	0.482	1.521
Other	1.097	0.903	1.333	0.948	0.777	1.156
6. Geographical Region (London)						
Unclassified	1.042	0.956	1.136	0.893***	0.817	0.976
North East	1.041	0.907	1.194	0.941	0.816	1.084
North West	1.216***	1.116	1.326	0.941	0.862	1.028
Yorkshire & the Humber	0.863***	0.785	0.948	0.752***	0.683	0.828
East Midlands	0.901	0.793	1.023	0.900	0.789	1.026
West Midlands	0.775***	0.671	0.894	0.865**	0.746	1.003
East of England	0.910**	0.838	0.988	0.925*	0.849	1.008
South East	1.116***	1.034	1.205	1.010	0.933	1.094
South West	0.947	0.872	1.030	1.008	0.924	1.099
Wales	1.091	0.969	1.228	0.967	0.855	1.093
Scotland	0.839***	0.761	0.925	0.977	0.883	1.082
N Ireland	1.031	0.825	1.288	0.777**	0.621	0.973
7. Diseases/Conditions-On Treatment						
Heart attack	0.871	0.592	1.282	0.738	0.500	1.092
Angina	1.073	0.821	1.403	1.195	0.899	1.588
High blood pressure	1.049	0.950	1.159	1.090	0.982	1.209
Diabetes	1.101	0.718	1.686	0.854	0.556	1.313
Bronchitis	1.032	0.947	1.125	1.013	0.926	1.107

Emphysema	1.137	0.573	2.256	1.091	0.538	2.210
Arthritis	0.950	0.881	1.025	0.989	0.915	1.070
Chronic back pain	1.007	0.931	1.089	1.048	0.966	1.138
High cholesterol	0.849***	0.756	0.952	0.972	0.862	1.096
Pneumonia	1.044	0.916	1.191	0.994	0.869	1.137
Asthma	1.102*	0.987	1.230	1.072	0.957	1.201
Migraine	1.039	0.964	1.121	0.989	0.915	1.069
Skin condition	1.012	0.934	1.097	1.027	0.945	1.116
8. Disability	1.053	0.949	1.168	1.094*	0.982	1.219
9. Psychological Distress/ Mental Health (None)						
GHQ score 1-3 – Low	1.039	0.989	1.091	1.032	0.981	1.085
GHQ score 4-6 – Medium	1.034	0.967	1.105	1.006	0.939	1.078
GHQ score 7-9 – High	0.991	0.906	1.084	0.970	0.884	1.064
GHQ score 10-12 - Very High	0.954	0.839	1.085	1.062	0.929	1.215
10. Smoking Status (Never smoked)						
Ever	0.994	0.943	1.048	0.927***	0.878	0.979
Current Smoker	1.029	0.975	1.087	0.967	0.914	1.023
11. Alcohol (None)						
1-14 units/week	0.986	0.936	1.039	1.008	0.956	1.064
15-24 units/week	0.952	0.884	1.025	0.974	0.902	1.051
25-40 units/week	0.955	0.866	1.052	1.032	0.934	1.141
41+ units/week	0.959	0.815	1.128	1.152	0.971	1.366
12. Exercise (None)						
1-2 times a week	0.928***	0.876	0.983	0.952	0.897	1.010
3 times a week	0.973	0.905	1.047	0.957	0.888	1.032
4+ times a week	0.936**	0.886	0.989	0.951*	0.899	1.007
13. Bread/Cereal/Potatoes/Rice/Pasta (Hardly)						
As part of every meal	1.017	0.869	1.191	1.109	0.944	1.303
As part of 1-2 meals	1.043	0.892	1.219	1.118	0.953	1.311
14. Fruit/Vegetables portions (1-2 portions/day)						
5 or more portions/day	0.978	0.901	1.062	1.040	0.955	1.133
3-4 portions/day	1.063**	1.012	1.118	1.013	0.962	1.066
15. Fatty or sugary foods (None/Rarely)						
2-3 times a week	0.943	0.881	1.010	0.936*	0.872	1.005
Every day	0.967	0.900	1.039	0.945	0.878	1.017
16. Add Salt - Table/Cooking (Never/Rarely)						
Sometimes	1.008	0.955	1.064	1.054*	0.997	1.114
Always	1.025	0.970	1.084	0.992	0.937	1.050
16. Cooked in Animal Fat (None/Rarely)						
2-3 times a week	0.966	0.917	1.017	1.049*	0.995	1.107
Every day	0.984	0.887	1.091	1.106*	0.993	1.233
(Constant)	0.249***			0.545***		

Notes: *** p<.01, ** p<.05, * p<.10.
Figures in parentheses indicate base category of the independent variables used in categorical form.

6. Summary and Conclusion

The main aim of the study was to explore the effect of obesity on sickness absence in the Royal Mail. The study undertook the analysis of two data sets – a health and well being survey undertaken during 1995-98 and routine sickness and absenteeism records for the period 1995-96 to 2006-07 for those employees who had participated in the survey. The health and well being survey covered 58,697 employees (73.3 per cent males and 26.7 per cent females) with a response rate of 29 per cent. The employer-recorded routine sickness data (in terms of episodes and number of work days lost) was matched for 37,138 of these employees.

The majority of Royal Mail employees were engaged in a manual job (postman), consequently a much lower obesity rate was observed when compared to that of the general population. Only one in ten employees was found to be obese, of which the proportion of morbid obesity (reporting BMI 40+) was just 0.4 per cent. There existed significant associations between BMI categories and age, gender, ethnicity and job type. The overall obesity rate increased with age and it was higher among female employees (11.35 per cent). For female employees, the severely obese as well as morbid obese rates were twice those for male employees. The overall obesity rate was highest for employees in a middle management role, followed by employees in clerical/ administrative jobs. The rate was lowest among manual employees (8.8 per cent). Finally, the obesity rate was found to be higher in Afro-Caribbeans and lower among Asians from the Indian Subcontinent and Asian – Oriental ethnic groups.

Obesity rate was significantly associated with indicators of health status; it increased with the number of chronic diseases reported by individuals in the past or for which they were currently undergoing treatment. It was higher among employees with a disability, and increased with the mental health score (from 8.4 per cent in those having no mental health problem to 13.3 per cent in those with very high mental health problem). There was also a significant association between indicators of health behaviour and BMI categories. Obesity rate tended to be higher in those who had ceased smoking and lowest among current smokers. The relationship of obesity with alcohol consumption was U-shaped, but it was linearly related with reported exercise levels. There was a direct relationship between obesity and the number of sick days and the number of visits to a GP i.e. the number of sick days as well as the number of visits to a GP increased with obesity rate.

The determinants of variation in self-reported numbers of sick days during the previous six months were explored with the help of OLS regression model. Alternative models were used to capture the varied effects of socio-demographics, health status, health behaviour, dietary and environmental variables. In all models, the relationship between categories of BMI and the number of sick days remained significant, thus suggesting a positive and strong influence of obesity on sick days. Demographic factors (gender and age) showed a significant effect on sickness, with female employees reporting higher sick days than their male counterparts and age demonstrating a U-shaped non-linear relationship. In terms of occupational grade, manual workers tended to report higher sickness days than the professional groups. The effect of ethnicity on sickness absence was very weak. Environmental factors (measured in terms of geographical region) also influenced the number of sick days; compared to the London region,

employees in selected other regions reported a higher number of sick days. The most influential factors in terms of the number of sick days turned out to be disability, mental health and diseases or conditions for which the individual was on treatment. Amongst the latter the three most prominent diseases or conditions were heart attack, angina and chronic back pain in terms of exerting a strong influence on the number of sick days. Health behaviour and dietary factors were found to have a weak influence on self-reported sickness absence.

The other equally important outcome measure, i.e. the number of visits to a GP during the past six months, as a proxy measure for morbidity or health status, was also used as the dependent variable in the regression analysis. The number of independent variables included in the alternate models was the same as used for the determinants of number of sick days. In all the models, the relationship between categories of BMI and the number of visits to GP remained significant, thus suggesting positive and strong influence of obesity on contacts with GP. Demographic factors (gender and age) also showed a significant effect on the number of visits to a GP; female employees reported higher numbers of visits than their male counterparts and age depicted a U-shaped non-linear relationship. With job type, only manual employees tended to report higher GP visits than professional employees. Most ethnic minority groups reported a significantly higher number of GP contacts when compared with the European-UK ethnic group. Employees in selected regions also reported higher contacts with their GP. The most influential factors on the number of visits to a GP were once again disability, poor mental health and the diseases or conditions for which an employee was on treatment. In this case, the three most prominent diseases were diabetes, heart attack and angina, exerting a strong influence on the number of visits to a GP. The effect of lifestyle including dietary factors on contacts with a GP was found to be weak.

The number of episodes, as well as number of employer recorded year-specific work days lost, during 1995-96 to 2006-07 was weakly associated with the categories of BMI. During the 12 year period following 1995-96, 17,898 (48 per cent) left their job; the obesity rate was higher among employees who left their job particularly in the initial four years (1996-97 to 1999-2000). The most prominent reason for leaving was redundancy (30 per cent); this was followed by transfer (20 per cent), voluntary decision (16 per cent) and retirement (13 per cent). About one in ten employees took early retirement due to ill health, a majority of these left before reaching age 60 years. Transfer and redundancy were the two common reasons for leaving the job in middle age groups, whereas a voluntary decision to leave was more prominent in the younger age cohort. Reasons for leaving the job differed considerably by occupational grade; a large majority of young people leaving their job voluntarily were manual workers. Redundancy was a prominent reason for clerical/administrative and professional employees to leave, and transfer was the most prominent reason for middle management employees. Ill health turned out to be an important reason for quitting the job for manual employees.

The regression model to determine the variation in age at the time of leaving showed that employees reporting voluntary and / or dismissed as their reasons left their job nearly 21 years earlier than employees who retired. The number of years left before the usual retirement age was 19 years if transfer was the reason and 12 years if the reason was redundancy. Employees who exited due to ill health left their job 13 years prior to the usual retiring age. The age of leaving was also influenced by gender, job type, ethnicity and geographical location. Female employees

were found to leave 2.8 years earlier than male employees. Clerical/administrative and middle management employees left earlier than the professional employees, whereas the manual employees left 0.8 years later than the professional employees.

Interestingly, unlike the determinants of number of sick days or number of visits to a GP, the number of variables influencing employer recorded duration of work days lost for 1995-96 as well as 1996-97 were quite small. The effect of obesity on duration of work days lost was not clearly discernable (only in the 1995-96 regression model was some influence of morbid obesity found on the number of work days lost). The number of significant variables of the determinants of duration of work days lost during 1995-96 had decreased when analysed for the 1996-97 period. Age, gender, occupational grade, ethnicity and geographical region showed some influence on the duration of work days lost in 1995-96, but not to the same extent in 1996-97. Reported diseases/conditions, disability and mental health had minimal influence on the duration of work days lost during both periods. Similarly, the influence of health behaviour and dietary variables was negligible in both 1995-96 and 1996-97 periods.

The logistic regression model was used to determine variability in the reporting of an incidence of work days lost in the period 1995-96 and 1996-97. Both BMI and age were found to be weak (non-significant) predictors of incidence of workdays lost during both the years. Only gender and occupational grade turned out to be strong predictors during both these periods. Among female employees, the odds of reporting an incidence of work days lost was higher than for male employees, and for occupational grades the odds ratio was very high among manual workers when compared to professional employees. This was followed by clerical/administrative and middle management employees. None of the ethnicity categories was found to be a significant predictor for incidence of work days lost. The coefficients were found to be significant for select geographical regions of which three regions (Yorkshire & the Humber, West Midlands, and East of England) consistently reported lower odds in both the years. Contrary to our expectation, the influence of health status indicators (disability, mental health and diseases/conditions) was found to be weak. Similarly the effect of health behaviour and dietary variables on reporting an incidence of work days lost was very low in both the periods.

From the study, a strong relationship has been emerged between BMI categories and health indicators and self reported sickness absence (both in terms of number of sick days as well as visits to a GP); however such relationship was found to be weak when related to the employer recorded work days lost. Further research work is necessary to look at the detailed relationship between BMI and other confounding factors and sickness absence in order to demonstrate a concrete picture.

The results of this study are of interest for a number of reasons.

Management of sickness absence within the Royal Mail is challenging but provides opportunities to improve the working lives of Royal Mail employees. Long term sickness absence particularly as a result of obesity and associated diseases can not be removed but it can be reduced by implementing certain interventions which could directly or indirectly impact the wellbeing and their work environment. The most common interventions aimed at managing sickness absence are those which exert some form of control over an employee's absence; holding an interview

with an employee immediately on return to work, filling in appropriate forms, setting individual trigger points, counselling for poor attendees and the uses of an organisation's disciplinary policy (Johnson et al., 2003). Once the programme to reduce sickness absence has been implemented, it is very important to monitor its effectiveness and accordingly suggest corrective actions.

The evidence from Royal Mail regarding the health status and health behaviour of the work force is one of the largest UK databases of its kind. This could actively be used for designing general health prevention and promotion strategies specifically tailored to the needs of more vulnerable (on the basis of occupational grade, ethnicity and age) groups. Also, it could help in planning and meeting specific health service needs cost-effectively at select geographical locations.

Finally, how effectively management can communicate to their employees about their welfare has enormous externalities. Workplace settings are ideal for health promotion, and providing health education resources sends a positive message to employees that they are valued. Thus the delivery of key messages tailored according to occupational needs and the introduction of incentive schemes to improve health behaviour could be critical in reducing absenteeism especially in relation to obesity and associated disorders.

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Annex 1

General Health Questionnaire (GHQ 12) – Mental Health Score Value

Question	Yes	No
1. Have you lost much sleep through worry?	1	0
2. Have you been able to concentrate on what are doing?	0	1
3. Have you felt you are playing a useful part in things?	0	1
4. Have you felt able to make decision?	0	1
5. Have you felt constantly under strain?	1	0
6. Have you felt you could not overcome your difficulties?	1	0
7. Have you been able to enjoy your normal day to day activities?	0	1
8. Have you been able to face up to your problems?	0	1
9. Have you been feeling depressed?	1	0
10. Have you been loosing confidence in yourself?	1	0
11. Have you been thinking of yourself as a worthless person?	1	0
12. Have you been feeling reasonably happy, all things considered?	0	1

Annex 2

Mean Values of Sick Days, Number of Visits to a GP, Work Days Lost 1995-96 and 1996-97 by Variables used in the Multivariate Analysis

Variables in Multivariate Analysis	Sick Days	GP Visits	Work Days Lost 1995-96	Work Days Lost 1996-97
All	**5.83**	**1.39**	**7.49**	**9.42**
1. Body Mass Index				
<18.5	6.29	1.69	7.73	9.36
18.5-24.9	5.16	1.31	7.61	9.35
25-29.9	6.26	1.38	7.25	9.34
30-34.9	7.69	1.75	7.44	10.23
35-39.9	8.01	2.06	9.12	8.95
40+	10.19	2.14	9.21	10.64
2. Age				
16-24	5.30	1.58	7.64	9.25
25-34	5.30	1.39	7.45	9.38
35-44	5.56	1.27	7.60	9.44
45-54	5.91	1.41	7.30	9.48
55+	7.96	1.54	7.70	9.39
3. Sex				
Male	5.85	1.40	7.03	8.78
Female	5.75	1.36	9.41	12.03
4. Job type				
Not stated	5.58	1.15	10.15	12.19
Manual	5.88	1.40	7.89	9.92
Clerical/Administrative	6.03	1.40	7.76	9.09
Middle management	5.60	1.36	5.89	7.69
Professional	4.84	1.32	2.97	5.34
5. Ethnicity				
Afro-Caribbean	6.62	1.42	9.31	11.37
Asian-Indian subcontinent	6.02	1.38	9.52	9.64
Asian-Oriental	8.38	1.59	9.97	9.43
European -UK	5.76	1.39	7.35	9.34
European-Other	6.01	1.34	6.98	9.40
Jewish	8.13	1.14	5.06	5.69
Other	7.43	1.49	10.24	11.59
6. Geographical Region				
Unclassified	5.39	1.44	8.24	9.72
North East	6.77	1.32	7.53	8.54
North West	7.66	1.40	8.06	9.86
Yorkshire & Humber	5.51	1.34	7.36	8.59
East Midlands	4.87	1.40	8.32	8.98
West Midlands	7.56	1.64	6.98	8.99

East of England	5.42	1.42	7.40	9.52
London	5.70	1.40	7.13	9.63
South East	5.14	1.37	7.56	9.32
South West	5.43	1.36	7.06	9.67
Wales	5.81	1.21	7.89	9.24
Scotland	6.39	1.42	6.66	9.13
Northern Ireland	7.75	1.29	9.03	9.26
7. Diseases/Conditions-On Treatment				
Heart attack				
No	5.81	1.39	7.50	9.41
Yes	13.45	2.25	5.55	10.38
Angina				
No	5.78	1.38	7.51	9.39
Yes	14.63	2.36	5.47	13.30
High blood pressure				
No	5.75	1.37	7.47	9.39
Yes	7.48	1.82	8.02	9.97
Diabetes				
No	5.83	1.39	7.50	9.40
Yes	8.72	2.10	6.22	14.07
Bronchitis				
No	5.70	1.36	7.49	9.41
Yes	7.66	1.79	7.59	9.54
Emphysema				
No	5.73	1.38	7.49	9.41
Yes	9.65	1.94	8.61	13.44
Arthritis				
No	5.63	1.35	7.47	9.37
Yes	7.86	1.78	7.76	9.86
Chronic back pain				
No	5.48	1.35	7.54	9.34
Yes	9.63	1.80	6.99	10.28
High cholesterol				
No	5.78	1.38	7.53	9.39
Yes	7.25	1.71	6.62	10.23
Pneumonia				
No	5.77	1.38	7.51	9.42
Yes	8.18	1.65	6.93	9.34
Asthma				
No	5.80	1.38	7.48	9.42
Yes	6.65	1.66	7.92	9.42
Migraine				
No	5.71	1.34	7.43	9.39
Yes	7.11	1.84	8.12	9.65
Skin condition				
No	5.81	1.37	7.48	9.39

Yes	6.10	1.60	7.72	9.71
8. Disability				
No	5.20	1.34	7.49	9.39
Yes	19.17	2.50	7.60	9.92
9. Psychological Distress/ Mental Health				
None	3.27	1.01	7.49	9.33
GHQ score 1-3 - Low	5.26	1.34	7.49	9.16
GHQ score 4-6 - Medium	8.28	1.81	7.67	9.93
GHQ score 7-9 - High	12.16	2.18	7.23	9.76
GHQ score 10-12 - Very High	19.16	2.85	7.27	10.44
10. Smoking Status				
Never smoked	5.08	1.34	7.39	9.55
Ever	6.22	1.44	7.57	9.22
Current Smoker	6.93	1.42	7.63	9.36
11. Alcohol				
None	7.23	1.66	7.59	9.45
1-14 units/week	5.28	1.35	7.46	9.40
15-24 units/week	5.57	1.21	7.34	8.75
25-40 units/week	5.60	1.07	7.78	10.64
41+ units/week	5.61	1.07	7.21	9.93
12. Exercise				
None	6.15	1.50	7.53	9.48
1-2 times a week	5.10	1.38	7.45	9.60
3 times a week	5.61	1.31	7.52	8.94
4+ times a week	6.05	1.26	7.46	9.37
13. Bread/Cereal/Potatoes/Rice/Pasta				
As part of every meal	5.76	1.37	7.52	9.45
As part of 1-2 meals	5.84	1.39	7.48	9.42
Never or hardly ever	6.38	1.53	7.87	9.02
14. Fruit/Vegetables portions				
5 or more portions/day	6.65	1.54	7.18	10.03
3-4 portions/day	5.68	1.36	7.48	9.59
1-2 portions/day	5.79	1.38	7.54	9.25
15. Fatty or sugary foods				
Rarely or never	7.68	1.60	7.60	9.74
2-3 times a week	5.95	1.39	7.37	9.54
Every day	5.16	1.33	7.62	9.18
16. Add Salt - Table/Cooking				
Rarely or never	5.39	1.37	7.30	9.39
Sometimes	5.62	1.34	7.41	9.75
Always	6.39	1.45	7.75	9.09
17. Cooked in Animal Fat				
Rarely or never	5.91	1.40	7.45	9.37
2-3 times a week	5.52	1.34	7.53	9.59
Every day	6.26	1.50	8.04	9.41