# Epidemiology of lifetime fracture prevalence in England: a population study of adults aged 55 years and over


## Abstract

**Background:** Fractures remain a substantial public health problem but epidemiological studies using survey data are sparse. This study explores the association between lifetime fracture prevalence and socio-demographic factors, health behaviours and health conditions.

**Methods**: Fracture prevalence was calculated using a combined dataset of annual, nationally representative health surveys in England (2002-2007) containing 24,725 adults aged 55 years and over. Odds of reporting any fracture was estimated separately for each gender using logistic regression.

**Results:** Fracture prevalence was higher in men than women (49% and 40%, respectively). In men, factors having a significant independent association with fracture included being a former regular smoker [OR: 1.18 (1.06 to 1.31)], having a limiting long-standing illness [OR: 1.47 (1.31 to 1.66)] and consuming >8 units of alcohol on the heaviest drinking day in the past week [OR: 1.65 (1.37 to 1.98)]. In women, significant factors included being separated/divorced [OR: 1.30 (1.10 to 1.55)], having a GHQ-12 score of 4+ [OR: 1.59 (1.27 to 2.00)], consuming >6 units of alcohol in the past week [OR: 2.07 (1.28 to 3.35)] and being obese [OR: 1.25 (1.03 to 1.51)].

**Conclusion:** A range of socio-demographic, health behaviour and health conditions, known to increase the risk of chronic disease and premature death, are also associated with fracture occurrence, probably involving the aetiological pathways of poor bone health and fall-related trauma.

*Keywords*: lifetime fracture prevalence; fracture sites; risk factors; logistic regression; respondent recall

# Introduction

Fractures resulting from two main aetiological pathways [1] - poor bone health (osteoporosis) and fall-related trauma - are an important public health burden with estimated overall costs in the UK of £5.1 billion [2]. Previous UK studies on the frequency and distribution of fractures relied on large administrative primary- [3-5] and secondary-care databases [6-8] that require contact with healthcare services, or used selective cohorts such as the Million Women Study [9-10]. In contrast, survey data can include a broader set of risk factors than those typically available in administrative datasets while capturing almost all fractures regardless of medical intervention. In an earlier study, we reported on fractures experienced in the past 12 months using a representative sample of the English population drawing upon respondents' recall of their fracture history [11]. We describe here the lifetime fracture prevalence in adults aged 55 years and older and explore its associations with bone- (smoking, body weight) and fall-related (alcohol consumption) risk factors.

# Methods

### Study population, outcome measure and covariates

The Health Survey for England (HSE) is an annual health examination survey of the English non-institutional population. A new sample is selected each year. Data are collected through face-to-face interviews followed by a visit from a trained nurse. Household response rates over the last decade ranged from 64-74% [12]. Sampling methods and data collection instruments are described elsewhere [12]. A fractures module was included for the first time in 2002 and remained in each subsequent year up to and including 2007. Participants were asked to recall the number of episodes of fracture injury sustained in the past 12 months, and whether they had ever fractured a bone, other than in the past 12 months. Respondents identified the site of fracture using diagrams of a skeleton and we subsequently divided

fractures into broad groups such as forearm, hand and hip. Respondents who sustained a fracture beyond the past 12 months identified the location of the most recent fracture. The fracture module is shown in the Supplementary Appendix (Supplementary data are available in *Age and Ageing* online); full questionnaires are available online through the UK Data Service (http://discover.ukdataservice.ac.uk/series/?sn=2000021).

The main outcome measure was fracture prevalence, calculated as the percentage of participants who reported ever having a fracture. Socio-demographic covariates potentially associated with fracture occurrence included: age (defined using 10-year bands: 55-64; 65-74; 75-84; 85+), social class (non-manual and manual/other occupations; National Statistics Socio-Economic Classification), and marital status (married; single; separated/divorced). Health behaviours included smoking (never; former; current smoker), units of alcohol consumed on the heaviest drinking day in the past 7 days (0 units; up to and including 3/4 units (women/men); more than 3/4 units up to 6/8 units; more than 6/8 units), and participation in moderate-to-vigorous physical activity, which has been described elsewhere [13]. Health conditions included long-standing illness (absent; non-limiting; limiting), number of prescribed medications currently being taken, the 12-item General Health Questionnaire (GHQ-12 grouped into 3 categories: 0; 1-3; 4+) with scores of 4+ indicating probable psychological disturbance/mental ill health, presence of cardiovascular disease (stroke; angina; heart attack), diabetes, body mass index (BMI, weight in kilograms divided by the square of height in metres, grouped into 4 categories: underweight; normal weight; overweight; obese) and hormone replacement therapy in women (never; former; current user).

**Statistical analyses**

The present study focused on adults aged 55 years and over to avoid a mixed cohort of pre, peri- and post-menopausal women ($n$=134 women who reported still having periods were

excluded). Analyses revealed no secular change over 2002-2007 and so annual datasets were merged to increase precision. Logistic regression models were used to estimate Odds Ratios (OR) with 95% confidence intervals (CI) for associations between self-reported fracture and the socio-demographic, health behaviour and health conditions as described above. As the association of age with fracture occurrence was modified by sex (*P* for interaction <0.001), we conducted analyses for men and women separately.

We first established age-adjusted associations separately for each covariate using a Wald test; those with $P \leq 0.15$ were included in subsequent models. Three serially adjusted models including: socio-demographic (Model 1), health behaviours (Model 2), and health conditions (Model 3) were fitted. Effect modification was tested using two-way interaction terms (retained if $P \leq 0.05$). BMI was analysed as a categorical variable as previous studies have shown both low and high BMI as risk factors for fracture in elderly populations [14]. We tested for linear trend by entering the categorical variables as continuous terms.

**Missing data and weighting for non-response**

Only a subset of covariates was measured annually. Respondents with missing data due to covariates not covered in the survey year (medications and GHQ-12 in 2004 and 2007, respectively) or collected in ways not comparable with earlier years (alcohol in 2007) were included in analyses by using a missing category indicator. Respondents missing data on at least one covariate were excluded from relevant analyses. 23% of participants did not agree to a visit from the nurse and so had missing data on medication use. Missing data was also non-trivial for BMI (18%), hormone replacement therapy (11%), and GHQ-12 (8%). Survey data from 2003 to 2007 was weighted for non-response (weights were not produced for data prior to 2003 due to good response rates in earlier surveys) with an additional adjustment applied to 2005 data to correct for oversampling of persons aged ≥65 years. Participants gave full informed consent to participate and ethical approval was obtained from the London

Multi-centre Research Ethics Committee. Analyses were performed using Stata 12.1 (StataCorp, College Station, TX, USA).

# Results

### Descriptive analyses

The analytical sample comprised 24,725 people aged ≥55 years; 2,782 men (23%) and 4,187 (31%) women were aged ≥75 years (Supplementary data are available in *Age and Ageing* online, **Tables S1-S2**). Overall, 10,835 (44%) reported having sustained at least one fracture. The proportion of respondents with fracture (overall and site-specific) is shown in **Table 1**. In this population, 49% of men and 40% of women reported a fracture. In men, the proportion reporting any fracture was lower in the older age-groups whilst the opposite pattern was observed in women. For example, 54% of men aged 55-64 reported a fracture compared with 38% of those aged 85+; equivalent figures in women were 37% and 48%.

Over half of all recent/most recent reported fractures were located at the foot, hand or forearm. Scapula, hand, femoral shaft, patella, tibia/fibula and foot fractures were more common in men; hip fractures more common in women. In both sexes, the proportion reporting any hip fracture was higher in older than younger age-groups while foot fractures were lower. The pattern with age in other fracture sites showed differences by gender. In women, most site-specific fracture prevalence rates were higher in older age-groups. In men, fractures of the forearm, hand, tibia/fibula and foot were lower in older than younger age-groups (Supplementary data are available in *Age and Ageing* online, **Table S3**).

### Statistical models

Age-adjusted bivariate associations showed that being a former or current smoker, higher levels of alcohol consumption, presence of a non-limiting or limiting longstanding illness, higher GHQ-12 scores, cardiovascular disease, and obese were significantly associated ($P \leq$

0.15) with higher odds of fracture occurrence in both sexes. In men, being single was associated with lower odds of fracture. In women, being single or separated/divorced, physically inactive, currently taking medications and a previous or current user of hormone replacement therapy was associated with increased odds of fracture; being in routine occupational categories was associated with lower risk (Supplementary data are available in *Age and Ageing* online, **Tables S1-S2**).

**Tables 2** and **3** show the mutually adjusted associations between fracture occurrence and socio-demographic (Model 1), health behaviour (Model 2) and health conditions (Model 3) in men and women, respectively. In men, the fully adjusted analysis showed that being a former or current smoker, higher levels of alcohol consumption ($P < 0.001$ for linear trend), and presence of a non-limiting or limiting long-standing illness significantly increased the odds of fracture, while being single reduced the odds. Being separated/divorced, higher levels of alcohol consumption ($P = 0.003$ for linear trend), higher GHQ-12 scores, and a current user of hormone replacement therapy significantly increased the odds of fracture in women. No significant interaction effects in the fully adjusted model were found in both sexes.

## Discussion

In this study we presented estimates of lifetime fracture prevalence in adults aged 55 years and older using 2002-2007 Health Survey for England data and examined its frequency and distribution across socio-demographic factors, health behaviours and health conditions. Previous UK studies have relied on selective primary care databases such as the General Practice Research Database (GPRD) [3-5], secondary care databases (hospital admissions/fracture clinics) [6-8] and prospective cohorts such as the Million Women Study with record-linkage to hospital reports [9-10]. Our study relied on respondents' recall of their

fracture history [11]. This has the advantage of capturing data on almost all fractures regardless of medical intervention and enables lifetime prevalence to be documented.

The present study showed systematic variations in fracture occurrence by socio-demographic factors (gender, age, and marital status), health behaviours (smoking, alcohol consumption) and health conditions (limiting long-standing illness, and psychosocial stress in women). Associations between these risk factors and fractures probably involve one or both of two main aetiological fracture pathways - poor bone health and fall-related trauma [1].

In most cases, our results are in agreement with previous studies. Obesity was associated with higher odds of fracture in women. In contrast, analysis of the Million Women Study showed a protective effect of higher BMI on hospital admissions for hip fracture [9] but increased risk for ankle fractures [10]. Our finding of increased odds of reporting any fracture for obese women remained when hip fractures were excluded from the analysis (data not shown). Our study showed a dose-response relationship between alcohol consumption in the 7 days prior to interview and fractures in both sexes. Likewise, a number of previous studies have shown that excessive alcohol consumption increases fracture risk, particularly in men [15-16]. Similar to our findings, previous studies have also shown psychosocial stress in women [17-18], smoking [4,19], and marital status, particularly in women [17], to be important risk factors. As in other studies we found no evidence of social inequalities in fracture prevalence in this older population [20], but smoking, alcohol consumption, long-standing illness and psychosocial stress are more prevalent in lower than higher socioeconomic groups [21].

As expected, the proportion reporting any hip fracture was higher in older than younger age-groups in both sexes, as did most other site-specific fractures in women. However, as found in our previous study, the proportion reporting any fracture was lower in older than younger age-groups in men [11]. This contrasts with the fairly stable 10-year risk of any fracture with advancing age (7.1% and 8.0% at ages 50 and 80, respectively) in men found using the

GPRD [3]. There are a number of potential explanations for this pattern. First, some of those who sustained fractures in young and/or middle-age, ages at which incidence rates are higher in men [11], may not have survived to old age (a 'healthy survivor' effect). Second, perhaps those fractures occurring in elderly men befall individuals who have had previous fractures and spare those with no such history [5]. Third, the higher rates of middle-aged men may reflect a genuine birth cohort effect [22]. That is, the population currently middle-aged may be more prone to fracture events than their equivalent peers in the past. Finally, perhaps older men recall previous fractures less accurately, particularly as the fractures most commonly experienced in men (hand, forearm and foot) tend to occur in early adulthood, requiring an extended period of recollection [23].

**Strengths and limitations**

The main strengths of this study include its large sample size and standardised measurement protocols. Although primary- and secondary-care databases capture recent and possibly traumatic fractures requiring attention of healthcare services, we have been able to overcome their limitation of incompleteness and selectivity by using a nationally representative sample and examine the associations between fracture prevalence and a wide range of socio-demographic factors, health behaviours and health conditions. Our own analyses show that 1 in 5 self-reported episodes of fracture in the 12 months preceding interview did not involve a hospital visit (data not shown).

Limitations include the potential exclusion of the frailest that were too ill and/or living in institutions. Our estimates of fracture prevalence are therefore likely to underestimate true prevalence, particularly in older age-groups. Cross-sectional studies such as the HSE measure covariates/outcomes on a single occasion and so we were unable to account for any intra-individual changes in health behaviours and conditions. In our study, fracture events preceded the collection of survey data, so our findings represent associations between

contemporaneous risk factors and having experienced a fracture at some point in the past, including childhood. However, it is likely that both socioeconomic status and health behaviours such as physical activity [24] in this older population have been relatively stable over the life-course.

Survey data capture most fractures regardless of medical intervention, provided there is accurate recall of events [23]. Participants were not asked when or at what age their bone fracture(s) occurred. It remains possible, therefore, that fractures occurring recently have been recalled more accurately than events that occurred longer ago and that asymptomatic non-traumatic fractures were underreported [23]. We are unaware of evidence that shows systematic variations in the accurate recall of fracture history, which would be a potential source of bias. Fracture ascertainment through self-report has well-recognised limitations. However, several validation studies comparing self-reports with radiology reports and medical records have showed reasonable accuracy (false-positive rates of ~11%) in older, community dwelling people [25-26].

Although comprehensive, the HSE does not have information on all the potential risk factors for fracture, including bone mineral density, calcium intake and family history of fracture. Information on falls in the 12 months prior to interview was only available in 2005 for 4,263 persons aged 65+. As found in other studies, the incidence of falls was higher in older age-groups and higher in women [27-28]. The percentage of participants reporting any fracture was 49% and 40% in those who had/had not fallen during the last 12 months ($P < 0.001$) (data not shown). Age, limiting long-standing illness and GHQ-12 were significantly associated with the risk of falling [28]. Finally, as in all observational studies, there may be unmeasured confounders that explain the observed associations of socio-demographic factors, health behaviours and health conditions on fracture occurrence.

## Conclusions

Our study confirms that fractures remain a major public health problem, one that has had only limited epidemiological attention. Compared with other contributors to the population health burden, there is an urgent need for population studies of fractures that can separate likely causation related to fall-related trauma from that due to poor bone health. This is because the approach to prevention in each case is very different. Our study examines a wide range of risk factors in relation to fracture events and begins to do this.

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## Conflicts of interests

None declared.

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**Table 1.** Overall and site-specific fracture prevalence by sex

| Fracture site | Men | | Women | |
|---|---|---|---|---|
| | % (95% CI) | % of fractures | % (95% CI) | % of fractures |
| Scapula | 2.1 (1.8-2.3) | 2.7 | 1.6 (1.4-1.9) | 2.9 |
| Humerus | 2.4 (2.1-2.7) | 3.4 | 2.3 (2.0-2.5) | 4.3 |
| Forearm | 11.3 (10.7-11.9) | 16.2 | 11.5 (10.9-12.0) | 22.1 |
| Hand | 14.2 (13.5-14.8) | 20.0 | 9.5 (8.9-10.0) | 18.2 |
| Hip | 1.1 (0.9-1.3) | 1.5 | 1.9 (1.6-2.1) | 3.2 |
| Femoral shaft | 1.1 (0.9-1.3) | 1.7 | 0.8 (0.6-0.9) | 1.4 |
| Patella | 1.7 (1.4-1.9) | 2.3 | 1.2 (1.0-1.3) | 2.1 |
| Tibia/fibula | 7.5 (6.9-8.0) | 10.6 | 5.0 (4.6-5.4) | 9.9 |
| Foot | 12.1 (11.5-12.8) | 17.2 | 10.6 (10.1-11.1) | 20.7 |
| Pelvis | 0.7 (0.5-0.8) | 0.9 | 0.8 (0.6-0.9) | 1.3 |
| Clinical vertebral | 1.2 (0.9-1.4) | 1.5 | 1.1 (1.0-1.3) | 2.1 |
| Other | 13.8 (13.1-14.5) | 22.0 | 5.7 (5.3-6.1) | 11.7 |
| Total[a] | 48.6 (47.7-49.6) | 100 | 40.1 (39.3-41.0) | 100 |

CI indicates confidence interval

[a] Sum of site-specific proportions is greater than total due to respondents experiencing multiple fractures

**Table 2.** Odds ratios (95% CIs) for lifetime fracture prevalence in men

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| *Age-group* | | | |
| 55-64 | 1.00 | 1.00 | 1.00 |
| 65-74 | 0.79 (0.72-0.86)*** | 0.83 (0.75-0.91)*** | 0.79 (0.71-0.87)*** |
| 75-84 | 0.59 (0.53-0.65)*** | 0.65 (0.58-0.73)*** | 0.62 (0.54-0.71)*** |
| 85+ | 0.50 (0.41-0.61)*** | 0.55 (0.44-0.69)*** | 0.53 (0.39-0.71)*** |
| *Marital status* | | | |
| Married | 1.00 | 1.00 | 1.00 |
| Single | 0.78 (0.66-0.92)** | 0.81 (0.68-0.97)* | 0.76 (0.61-0.94)* |
| Separated/divorced | 1.08 (0.97-1.20) | 1.06 (0.95-1.18) | 1.01 (0.89-1.15) |
| *Smoking status* | | | |
| Never | | 1.00 | 1.00 |
| Former | | 1.24 (1.13-1.36)*** | 1.18 (1.06-1.31)** |
| Current | | 1.23 (1.07-1.40)** | 1.15 (0.99-1.34) |
| *Alcohol consumption* | | | |
| 0 units | | 1.00 | 1.00 |
| Up to and including 4 units | | 1.14 (1.03-1.26)** | 1.18 (1.05-1.32)** |
| Up to and including 8 units | | 1.26 (1.09-1.44)*** | 1.30 (1.11-1.52)*** |
| More than 8 units | | 1.59 (1.35-1.88)*** | 1.65 (1.37-1.98)*** |
| *Long-standing illness* | | | |
| None | | | 1.00 |
| Non-limiting | | | 1.20 (1.07-1.35)*** |
| Limiting | | | 1.47 (1.31-1.66)*** |
| *GHQ-12* | | | |
| 0 | | | 1.00 |
| 1-3 | | | 0.95 (0.84-1.07) |
| 4+ | | | 1.10 (0.93-1.30) |
| *Stroke* | | | 0.94 (0.82-1.07) |
| *Body mass index* | | | |
| Normal | | | 1.00 |
| Underweight | | | 1.59 (0.82-3.09) |
| Overweight | | | 1.06 (0.95-1.20) |
| Obese | | | 1.12 (0.97-1.28) |

CI indicates confidence interval.
*$P$<0.05.
**$P$<0.01.
***$P$<0.001.

**Table 3.** Odds ratios (95% CIs) for lifetime fracture prevalence in women

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| *Age-group* | | | |
| 55-64 | 1.00 | 1.00 | 1.00 |
| 65-74 | 1.10 (1.00-1.20)* | 1.13 (1.00-1.28) | 1.22 (1.01-1.46)* |
| 75-84 | 1.20 (1.08-1.32)*** | 1.14 (0.98-1.32) | 1.17 (0.93-1.47) |
| 85+ | 1.42 (1.22-1.65)*** | 1.35 (1.07-1.71)** | 1.00 (0.63-1.57) |
| *Marital status* | | | |
| Married | 1.00 | 1.00 | 1.00 |
| Single | 1.17 (0.98-1.40) | 1.07 (0.83-1.38) | 1.18 (0.82-1.71) |
| Separated/divorced | 1.20 (1.10-1.30)*** | 1.18 (1.05-1.32)** | 1.30 (1.10-1.55)** |
| *National Statistics Socio-Economic Classification* | | | |
| Professional/managerial | | 1.00 | 1.00 |
| Intermediate | | 0.88 (0.77-1.02) | 0.97 (0.80-1.18) |
| Routine/manual | | 0.79 (0.69-0.90)*** | 0.90 (0.75-1.08) |
| *Smoking status* | | | |
| Never | | 1.00 | 1.00 |
| Former | | 1.15 (1.03-1.29)** | 1.04 (0.88-1.23) |
| Current | | 1.20 (1.03-1.39)** | 1.10 (0.89-1.35) |
| *Alcohol consumption* | | | |
| 0 units | | 1.00 | 1.00 |
| Up to and including 3 units | | 1.03 (0.92-1.14) | 1.07 (0.91-1.25) |
| Up to and including 6 units | | 1.22 (1.01-1.49)* | 1.37 (1.04-1.79)* |
| More than 6 units | | 1.44 (0.97-2.14) | 2.07 (1.28-3.35)** |
| *Moderate-to-vigorous physical activity* | | | |
| Meets recommendations | | 1.00 | 1.00 |
| Some activity | | 1.09 (0.93-1.28) | 1.04 (0.84-1.29) |
| Low activity | | 1.31 (1.12-1.53)*** | 1.21 (0.97-1.52) |
| *Long-standing illness* | | | |
| None | | | 1.00 |
| Non-limiting | | | 1.23 (1.01-1.50)* |
| Limiting | | | 1.12 (0.91-1.37) |
| *GHQ-12* | | | |
| 0 | | | 1.00 |
| 1-3 | | | 1.13 (0.95-1.35) |
| 4+ | | | 1.59 (1.27-2.00)*** |
| *Stroke* | | | 1.06 (0.81-1.38) |
| *Body mass index* | | | |
| Normal | | | 1.00 |
| Underweight | | | 0.91 (0.45-1.83) |
| Overweight | | | 1.04 (0.87-1.24) |
| Obese | | | 1.25 (1.03-1.51)* |
| *Number of prescribed medications* | | | |
| 0 | | | 1.00 |
| 1 | | | 1.04 (0.83-1.31) |
| 2 | | | 1.11 (0.86-1.42) |
| 3 | | | 1.05 (0.79-1.38) |
| 4+ | | | 1.16 (0.91-1.48) |
| *Hormone replacement therapy* | | | |

| | |
|---|---|
| Never | 1.00 |
| Former | 0.98 (0.82-1.16) |
| Current | 1.34 (1.05-1.71)* |

CI indicates confidence interval.

[a] Meets recommendations: 30 minutes or more of at least moderate-intensity activities on at least 5 days a week; medium: 30 minutes or more on 1 to 4 days a week; low: lower levels of activity.

*$P$<0.05.

**$P$<0.01.

***$P$<0.001.

**Supplementary Appendix**

# Epidemiology of lifetime fracture prevalence in England: a population study of adults aged 55 years and over

**Table S1 Association between socio-demographic, health behaviour and health outcome measures and lifetime fracture prevalence in men, bivariate adjusted models, the Health Survey for England, 2002-2007**

| Covariates | All (*n*=11,047) | Fracture prevalence | | |
|---|---|---|---|---|
| | | No fracture (*n*=5,696) | Fracture (*n*=5,351) | Age-adjusted bivariate association (Odds Ratios and 95% Confidence Interval)* |
| **Age-group** | | | | |
| 55-64 | 4,310 | 1,988 (46.5) | 2,322 (53.5) | 1.00 |
| 65-74 | 3,955 | 2,054 (52.2) | 1,901 (47.8) | 0.79 (0.73-0.87) |
| 75-84 | 2,282 | 1,342 (59.1) | 940 (40.9) | 0.60 (0.54-0.67) |
| 85+ | 500 | 312 (62.4) | 188 (37.6) | 0.52 (0.43-0.64) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **Marital status** | | | | |
| Married | 8,450 | 4,323 (50.9) | 4,127 (49.1) | 1.00 |
| Single | 633 | 359 (56.3) | 274 (43.7) | 0.78 (0.66-0.92) |
| Separated/divorced | 1,959 | 1,010 (51.7) | 949 (48.3) | 1.08 (0.97-1.20) |
| *Adjusted Wald test* | | | | *P=0.002* |
| **Social class** | | | | |
| Non-manual | 5,292 | 2,735 (51.5) | 2,557 (48.5) | 1.00 |
| Manual | 5,641 | 2,891 (51.0) | 2,750 (49.0) | 1.02 (0.94-1.10) |
| *Adjusted Wald test* | | | | *P=0.599* |
| **National Statistics Socio-Economic Classification** | | | | |
| Professional | 4,043 | 2,083 (51.5) | 1,960 (48.5) | 1.00 |
| Intermediate | 2,036 | 1,048 (50.7) | 988 (49.3) | 1.02 (0.91-1.14) |
| Routine/other | 4,945 | 2,547 (51.4) | 2,398 (48.6) | 1.02 (0.93-1.11) |
| *Adjusted Wald test* | | | | *P=0.897* |
| **Number of cars** | | | | |
| 0 | 1,993 | 1,082 (54.4) | 911 (45.6) | 1.00 |
| 1 | 5,864 | 3,063 (51.9) | 2,801 (48.1) | 1.02 (0.91-1.14) |
| 2 | 2,605 | 1,267 (48.6) | 1,338 (51.4) | 1.04 (0.91-1.18) |
| 3+ | 580 | 283 (49.4) | 297 (50.6) | 0.95 (0.78-1.17) |
| *Adjusted Wald test* | | | | *P=0.813* |
| **Smoking status** | | | | |
| Never regular | 3,183 | 2,106 (55.2) | 1,707 (44.8) | 1.00 |
| Former | 5,578 | 2,799 (49.9) | 2,779 (50.1) | 1.29 (1.18-1.41) |
| Current | 1,636 | 779 (47.2) | 857 (52.8) | 1.30 (1.15-1.47) |
| *Adjusted Wald test* | | | | *P<0.001* |

*$P<0.15$ for adjusted Wald test (considered for inclusion in multivariate modelling)

**Table S1…..*continued***

| Covariates | All (*n*=11,047) | Fracture prevalence | | |
|---|---|---|---|---|
| | | No fracture (*n*=5,696) | Fracture (*n*=5,351) | Age-adjusted bivariate association (Odds Ratios and 95% Confidence Interval)* |
| **Fruit and vegetable consumption** | | | | |
| Below 5 daily portions | 7,013 | 3,618 (51.4) | 3,395 (48.6) | 1.00 |
| 5 portions of more | 2,859 | 1,440 (50.5) | 1,419 (49.5) | 1.02 (0.94-1.12) |
| *Adjusted Wald test* | | | | *P=0.602* |
| **Alcohol consumption** | | | | |
| 0 units | 2,654 | 1,490 (56.0) | 1,164 (44.0) | 1.00 |
| >0 to ≤ 4 units | 4,836 | 2,518 (52.1) | 2,318 (47.9) | 1.15 (1.04-1.27) |
| >4 to ≤ 8 units | 1,486 | 706 (47.4) | 780 (52.6) | 1.29 (1.12-1.48) |
| 8+ | 830 | 341 (40.4) | 489 (59.6) | 1.65 (1.40-1.95) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **Moderate-to-vigorous physical activity** | | | | |
| Meets recommendations | 1,289 | 619 (48.1) | 670 (51.9) | 1.00 |
| Some activity | 1,517 | 762 (50.5) | 755 (49.5) | 0.97 (0.83-1.13) |
| Low activity | 2,631 | 1,332 (51.1) | 1,299 (48.9) | 1.01 (0.88-1.17) |
| *Adjusted Wald test* | | | | *P=0.761* |
| **Long-standing illness** | | | | |
| None | 3,768 | 2,084 (55.2) | 1,684 (44.8) | 1.00 |
| Non-limiting | 2,951 | 1,513 (50.7) | 1,438 (49.3) | 1.24 (1.12-1.37) |
| Limiting | 4,328 | 2,099 (48.4) | 2,229 (51.6) | 1.43 (1.30-1.57) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **GHQ-12** | | | | |
| 0 | 6,113 | 3,161 (51.3) | 2,952 (48.7) | 1.00 |
| 1-3 | 1,973 | 1,005 (50.7) | 968 (49.3) | 1.06 (0.95-1.18) |
| 4+ | 1,006 | 482 (48.2) | 524 (51.8) | 1.17 (1.01-1.34) |
| *Adjusted Wald test* | | | | *P=0.083* |
| **Stroke** | | | | |
| Not present | 9,161 | 4,720 (51.3) | 4,441 (48.7) | 1.00 |
| Present | 1,886 | 976 (51.7) | 910 (48.3) | 1.09 (0.98-1.21) |
| **Diabetes** | | | | |
| Not present | 9,867 | 5,087 (51.4) | 4,780 (48.6) | 1.00 |
| Present | 1,180 | 609 (51.0) | 571 (49.0) | 1.04 (0.92-1.19) |
| **Body mass index** | | | | |
| Normal | 2,191 | 1,186 (54.1) | 1,005 (45.9) | 1.00 |
| Underweight | 45 | 21 (45.0) | 24 (55.0) | 1.53 (0.80-2.90) |
| Overweight | 4,524 | 2,321 (50.9) | 2,203 (49.1) | 1.11 (1.00-1.24) |
| Obese | 2,504 | 1,216 (48.3) | 1,288 (51.7) | 1.20 (1.06-1.36) |
| *Adjusted Wald test* | | | | *P=0.021* |

**P*<0.15 for adjusted Wald test (considered for inclusion in multivariate modelling)

**Table S1…..*continued***

| Covariates | All (*n*=11,047) | Fracture prevalence | | |
|---|---|---|---|---|
| | | **No fracture** (*n*=5,696) | **Fracture** (*n*=5,351) | **Age-adjusted bivariate association (Odds Ratios and 95% Confidence Interval)*** |
| **Number of prescribed medications** | | | | |
| 0 | 2,151 | 1,068 (49.2) | 1,083 (50.8) | 1.00 |
| 1 | 1,029 | 520 (50.3) | 509 (49.7) | 1.02 (0.87-1.19) |
| 2 | 949 | 487 (51.1) | 462 (48.9) | 1.04 (0.89-1.22) |
| 3 | 943 | 463 (48.4) | 480 (51.6) | 1.19 (1.02-1.40) |
| 4+ | 2,719 | 1,394 (51.0) | 1,325 (49.0) | 1.11 (0.99-1.26) |
| *Adjusted Wald test* | | | | *P=0.184* |

**P*<0.15 for adjusted Wald test (considered for inclusion in multivariate modelling)

**Table S2 Association between socio-demographic, health behaviour and health outcome measures and lifetime fracture prevalence in women, bivariate adjusted models, the Health Survey for England, 2002-2007**

| Covariates | All (*n*=13,678) | Fracture prevalence | | |
|---|---|---|---|---|
| | | No fracture (*n*=8,194) | Fracture (*n*=5,484) | Age-adjusted bivariate association (Odds Ratios and 95% Confidence Interval)* |
| **Age-group** | | | | |
| 55-64 | 4,940 | 3,099 (62.9) | 1,841 (37.1) | 1.00 |
| 65-74 | 4,551 | 2,743 (60.3) | 1,808 (39.7) | 1.11 (1.02-1.21) |
| 75-84 | 3,226 | 1,849 (57.1) | 1,377 (42.9) | 1.27 (1.16-1.39) |
| 85+ | 961 | 503 (52.0) | 458 (48.0) | 1.57 (1.36-1.81) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **Marital status** | | | | |
| Married | 7,661 | 4,774 (62.6) | 2,887 (37.4) | 1.00 |
| Single | 594 | 343 (56.7) | 251 (43.3) | 1.21 (1.01-1.44) |
| Separated/divorced | 5,421 | 3,075 (56.3) | 2,346 (43.7) | 1.19 (1.10-1.29) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **Social class** | | | | |
| Non-manual | 7,875 | 4,673 (59.4) | 3,202 (40.6) | 1.00 |
| Manual | 5,107 | 3.075 (60.2) | 2,032 (39.8) | 0.95 (0.88-1.02) |
| *Adjusted Wald test* | | | | |
| **National Statistics Socio-Economic Classification** | | | | |
| Professional | 2,898 | 1,672 (57.7) | 1,226 (42.3) | 1.00 |
| Intermediate | 3,541 | 2,117 (59.9) | 1,424 (40.1) | 0.89 (0.80-0.98) |
| Routine/other | 7,205 | 4,382 (60.7) | 2,823 (39.3) | 0.85 (0.77-0.93) |
| *Adjusted Wald test* | | | | *P=0.001* |
| **Number of cars** | | | | |
| 0 | 4,614 | 2,675 (57.7) | 1,939 (42.3) | 1.00 |
| 1 | 6,246 | 3,747 (59.8) | 2,499 (40.2) | 1.02 (0.93-1.11) |
| 2 | 2,345 | 1,468 (62.8) | 877 (37.2) | 0.94 (0.84-1.06) |
| 3+ | 468 | 301 (64.6) | 167 (35.4) | 0.88 (0.71-1.10) |
| *Adjusted Wald test* | | | | *P=0.343* |
| **Smoking status** | | | | |
| Never | 7,521 | 4,608 (61.3) | 2,913 (38.7) | 1.00 |
| Former | 4,101 | 2,391 (58.0) | 1,710 (42.0) | 1.15 (1.06-1.25) |
| Current | 2,024 | 1,173 (57.9) | 851 (42.1) | 1.23 (1.10-1.36) |
| *Adjusted Wald test* | | | | *P<0.001* |

**P*<0.15 for adjusted Wald test (considered for inclusion in multivariate modelling)

**Table S2…..*continued***

| Covariates | All (*n*=13,678) | Fracture prevalence | | |
|---|---|---|---|---|
| | | No fracture (*n*=8,194) | Fracture (*n*=5,484) | Age-adjusted bivariate association (Odds Ratios and 95% Confidence Interval)* |
| **Fruit and vegetable consumption** | | | | |
| Below 5 daily portions | 8,485 | 5,043 (59.3) | 3,442 (40.7) | 1.00 |
| 5 portions of more | 3,690 | 2,262 (61.2) | 1,428 (38.8) | 0.96 (0.89-1.04) |
| *Adjusted Wald test* | | | | |
| **Alcohol consumption** | | | | |
| 0 units | 5,709 | 3,424 (59.7) | 2,285 (40.3) | 1.00 |
| >0 to ≤ 3 units | 5,385 | 3,209 (59.8) | 2,176 (40.2) | 1.04 (0.96-1.12) |
| >3 to ≤ 6 units | 862 | 503 (58.4) | 359 (41.6) | 1.19 (1.03-1.39) |
| 6+ | 181 | 93 (50.3) | 88 (49.7) | 1.69 (1.24-2.31) |
| *Adjusted Wald test* | | | | *P=0.002* |
| **Moderate-to-vigorous physical activity** | | | | |
| Meets recommendations | 1,071 | 690 (64.7) | 381 (35.3) | 1.00 |
| Some activity | 1,966 | 1,222 (62.4) | 744 (37.6) | 1.09 (0.93-1.27) |
| Low activity | 3,719 | 2,122 (56.9) | 1,597 (43.1) | 1.29 (1.10-1.50) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **Long-standing illness** | | | | |
| None | 4,552 | 2,990 (65.8) | 1,562 (34.2) | 1.00 |
| Non-limiting | 3,397 | 2,048 (60.4) | 1,349 (39.6) | 1.25 (1.14-1.38) |
| Limiting | 5,726 | 3,154 (54.8) | 2,572 (45.2) | 1.53 (1.40-1.66) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **GHQ-12** | | | | |
| 0 | 7,054 | 4,368 (62.1) | 2,686 (37.9) | 1.00 |
| 1-3 | 2,595 | 1,481 (56.9) | 1,114 (43.1) | 1.22 (1.11-1.34) |
| 4+ | 1,509 | 799 (53.1) | 710 (46.9) | 1.44 (1.28-1.62) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **Stroke** | | | | |
| Not present | 12,122 | 7,345 (60.6) | 4,777 (39.4) | 1.00 |
| Present | 1,556 | 849 (53.8) | 707 (46.2) | 1.22 (1.09-1.37) |
| **Diabetes** | | | | |
| Not present | 12,625 | 7,548 (59.8) | 5,077 (40.2) | 1.00 |
| Present | 1,053 | 646 (60.9) | 407 (39.1) | 0.94 (0.83-1.08) |
| **Body mass index** | | | | |
| Normal | 3,368 | 2,096 (62.2) | 1,272 (37.8) | 1.00 |
| Underweight | 145 | 85 (58.3) | 60 (41.7) | 1.12 (0.79-1.58) |
| Overweight | 4,244 | 2,569 (60.9) | 1,675 (39.1) | 1.05 (0.96-1.16) |
| Obese | 3,187 | 1,873 (58.6) | 1,314 (41.4) | 1.18 (1.06-1.31) |
| *Adjusted Wald test* | | | | *P=0.015* |

**P*<0.15 for adjusted Wald test (considered for inclusion in multivariate modelling)

**Table S2…..*continued***

| Covariates | All (*n*=13,678) | Fracture prevalence | | |
|---|---|---|---|---|
| | | No fracture (*n*=8,194) | Fracture (*n*=5,484) | Age-adjusted bivariate association (Odds Ratios and 95% Confidence Interval)* |
| **Number of prescribed medications** | | | | |
| 0 | 2,072 | 1,375 (66.3) | 697 (33.7) | 1.00 |
| 1 | 1,476 | 892 (61.0) | 584 (39.0) | 1.25 (1.08-1.43) |
| 2 | 1,304 | 767 (58.8) | 537 (41.2) | 1.34 (1.16-1.56) |
| 3 | 1,155 | 682 (59.4) | 473 (40.6) | 1.28 (1.10-1.50) |
| 4+ | 3,179 | 1,732 (53.9) | 1,447 (46.1) | 1.59 (1.40-1.79) |
| *Adjusted Wald test* | | | | *P<0.001* |
| **Hormone replacement therapy** | | | | |
| Never | 5,823 | 3,482 (59.8) | 2,341 (40.2) | 1.00 |
| Former | 2,126 | 1,267 (59.5) | 859 (40.5) | 1.17 (1.04-1.30) |
| Current | 815 | 474 (58.4) | 341 (41.6) | 1.24 (1.06-1.46) |
| *Adjusted Wald test* | | | | *P=0.003* |

**P*<0.15 for adjusted Wald test (considered for inclusion in multivariate modelling)

**Table S3 Overall and site-specific fracture prevalence by age-group and sex**

| Fracture site | Men | | | | Women | | | |
|---|---|---|---|---|---|---|---|---|
| | 55-64 % (95% CI) | 65-74 % (95% CI) | 75-84 % (95% CI) | 85+ % (95% CI) | 55-64 % (95% CI) | 65-74 % (95% CI) | 75-84 % (95% CI) | 85+ % (95% CI) |
| **Scapula** | 2.4 (1.9-2.8) | 1.9 (1.5-2.3) | 1.7 (1.2-2.3) | 1.6 (0.5-2.7) | 1.0 (0.7-1.3) | 1.4 (1.0-1.7) | 2.7 (2.1-3.2) | 2.5 (1.5-3.5) |
| **Humerus** | 2.5 (2.0-2.9) | 2.5 (2.0-3.1) | 1.9 (1.3-2.5) | 2.8 (1.4-4.2) | 2.1 (1.6-2.5) | 1.9 (1.5-2.4) | 2.7 (2.1-3.3) | 3.0 (1.9-4.2) |
| **Forearm** | 12.7 (11.7-13.7) | 10.8 (9.8-11.8) | 9.5 (8.3-10.7) | 7.7 (5.4-10.0) | 9.7 (8.9-10.5) | 11.1 (10.2-12.1) | 13.7 (12.4-14.9) | 15.1 (12.7-17.5) |
| **Hand** | 17.2 (16.0-18.3) | 13.6 (12.5-14.7) | 9.5 (8.2-10.7) | 7.6 (5.2-10.0) | 8.6 (7.8-9.4) | 9.8 (8.9-10.7) | 10.4 (9.3-11.5) | 9.8 (7.9-11.7) |
| **Hip** | 0.8 (0.5-1.1) | 1.1 (0.7-1.4) | 1.6 (1.0-2.1) | 2.1 (0.8-3.4) | 0.4 (0.2-0.6) | 1.3 (1.0-1.7) | 2.6 (2.0-3.1) | 8.4 (6.6-10.2) |
| **Femoral shaft** | 1.1 (0.8-1.4) | 1.0 (0.7-1.3) | 1.1 (0.6-1.5) | 1.1 (0.1-2.0) | 0.5 (0.3-0.7) | 0.5 (0.3-0.7) | 1.0 (0.6-1.4) | 1.9 (1.0-2.8) |
| **Patella** | 1.6 (1.2-2.0) | 1.8 (1.4-2.2) | 1.7 (1.1-2.2) | 1.6 (0.5-2.8) | 0.8 (0.6-1.1) | 1.0 (0.7-1.3) | 1.9 (1.4-2.3) | 1.3 (0.6-2.0) |
| **Tibia/fibula** | 8.4 (7.5-9.2) | 7.2 (6.3-8.0) | 6.1 (5.1-7.1) | 5.7 (3.6-7.8) | 4.7 (4.1-5.3) | 5.3 (4.6-5.9) | 5.1 (4.3-5.9) | 5.3 (3.9-6.8) |
| **Foot** | 13.9 (12.9-15.0) | 12.4 (11.3-13.5) | 8.9 (7.7-10.1) | 6.3 (4.1-8.4) | 12.2 (11.3-13.1) | 11.1 (10.1-12.0) | 8.5 (7.5-9.5) | 7.4 (5.7-9.0) |
| **Pelvis** | 0.6 (0.4-0.9) | 0.6 (0.3-0.8) | 0.8 (0.4-1.2) | 1.0 (0.1-2.0) | 0.5 (0.3-0.7) | 0.5 (0.3-0.7) | 1.1 (0.7-1.4) | 2.1 (1.2-3.1) |
| **Clinical vertebral** | 1.3 (1.0-1.6) | 1.0 (0.7-1.3) | 1.3 (0.8-1.8) | 0.5 (0.0-1.1) | 1.0 (0.7-1.3) | 1.2 (0.8-1.5) | 1.1 (0.8-1.5) | 1.8 (0.9-2.6) |
| **Other** | 16.9 (15.7-18.0) | 12.6 (11.5-13.6) | 9.6 (8.3-10.8) | 8.8 (6.1-11.5) | 6.1 (5.4-6.8) | 5.4 (4.7-6.1) | 5.5 (4.7-6.3) | 5.2 (3.8-6.7) |
| **Total**[a] | 53.5 (52.0-55.0) | 47.8 (46.2-49.4) | 40.9 (38.9-43.0) | 37.6 (33.2-42.0) | 37.1 (35.7-38.5) | 39.7 (38.2-41.1) | 42.9 (41.1-44.6) | 48.0 (44.8-51.3) |

CI indicates confidence interval

[a] Sum of site-specific proportions is greater than total due to respondents experiencing multiple fractures

## Adult fractures

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**ASK ALL AGED 16+**

**FracYr**
Now some questions about fractured or broken bones. In the last 12 months have you fractured or broken a bone? INTERVIEWER: INCLUDE BONES THAT WERE CHIPPED.

1 Yes
2 No

**IF FracYr = Yes THEN**

**FYrNo**

How many times in the last 12 months have you fractured or broken a bone – if you fractured more than one bone in the same incident, please count this as one time?

Range: 0..50

**FOR Idx: = 1 to 10 DO**
**IF (Idx <=FyrNo) THEN**

**FyrWh**
SHOW CARD K
*Thinking about the most recent time you fractured or broke a bone/Now thinking about the time before that* – which bone or bones did you fracture or break on that occasion? Please call out the names from this card.
PROBE: What others? CODE ALL THAT APPLY.

1 Shoulder (Scapula)
2 Upper arm (Humerus)
3 Elbow
4 Lower arm (Radius/Ulna)
5 Wrist
6 Hand, fingers or thumb
7 Knee
8 Ankle, foot and toes
9 Lower leg (Tibia/Fibula)
10 Upper leg (Femur)
11 Hip joint (Neck of femur)
12 Pelvis
13 Spine
14 Ribs
15 Collar (Clavicle)
16 Jaw
17 Nose
18 Face
19 Skull
20 Neck
21 Other bone

**IF FyrWh = Other**

**FYrWhO**

What was the name of the other bone that you fractured/broke?

Text: Maximum 50 characters

**ENDIF**

**IF FYrWh = Shoulder OR Upper arm OR Lower Arm OR Wrist OR Hand THEN**

**FArm**

You said that you broke a bone or bones in your shoulder, arm, wrist or hand.

SHOW CARD L.

Looking at this card can you tell me which part of the bone or the name of the bone you fractured/broke?

CODE ALL THAT APPLY.

1 Shoulder (Scapula)
2 Upper arm – upper end/neck
3 Upper arm – middle/shaft
4 Upper arm – lower end/above elbow
5 Elbow
6 Lower arm – upper end/below elbow
7 Lower arm – middle/shaft
8 Lower arm – at the wrist (Colles fracture)
9 Hand – at the wrist (carpals)
10 Hand (metacarpals)
11 Finger(s)/thumb (phalanges)

**ENDIF**

**IF FYrWh = Knee OR Ankle OR Lower leg OR Upper leg OR Hip joint THEN**

**FLeg**

You said that you broke a bone or bones in your hip, leg, knee or foot.

SHOW CARD M.

Looking at this card can you tell me which part of the bone or the name of the bone you fractured/broke?

CODE ALL THAT APPLY.

1 Hip joint – neck of femur
2 Upper leg – middle/shaft
3 Upper leg – lower end/above knee
4 Knee (patella)
5 Lower leg – upper end/below knee
6 Lower leg – middle/shaft
7 Lower leg – lower end/at the ankle
8 Foot – at the ankle (tarsals)
9 Foot (metatarsals)
10 Toes (phalanges)

**ENDIF**

**FyrHs**

And on that occasion, were you…

INTERVIEWER: READ OUT EACH IN TURN AND CODE ALL THAT APPLY.

1 ..admitted to hospital for one night or more because of the break or fracture?

2 ..seen in an A&E department or hospital outpatient department?
3 ..or given treatment elsewhere for the break or fracture?
4 (None of these)

**ENDIF**

**ENDDO**

**ENDIF**

**ENDIF**

**ASK ALL AGED 16+**

**FEvr**

Still thinking about fractures and broken bones, *apart from the ones you have already told us about* have you ever broken or fractured (*a bone/any other bones*)?

INTERVIEWER: INCLUDE BONES THAT WERE CHIPPED.

1 Yes
2 No

**IF FEvr=Yes THEN**

**FEvWh**

SHOW CARD K

Thinking about the most recent time you fractured or broke a bone – which bone or bones did you fracture or break on that occasion? Please call out the names from this card.

PROBE: What others? CODE ALL THAT APPLY.

1 Shoulder (Scapula)
2 Upper arm (Humerus)
3 Elbow
4 Lower arm (Radius/Ulna)
5 Wrist
6 Hand, fingers or thumb
7 Knee
8 Ankle, foot and toes
9 Lower leg (Tibia/Fibula)
10 Upper leg (Femur)
11 Hip joint (Neck of femur)
12 Pelvis
13 Spine
14 Ribs
15 Collar (Clavicle)
16 Jaw
17 Nose
18 Face
19 Skull
20 Neck
21 Other bone

**IF FEvWh = Other**

**FEOth**

What was the name of the other bone that you fractured/broke?

Text: Maximum 50 characters

**ENDIF**

**IF FEvWh = Shoulder OR Upper arm OR Lower Arm OR Wrist OR Hand THEN**

**FEArm**

You said that you broke a bone or bones in your shoulder, arm, wrist or hand.
SHOW CARD L.
Looking at this card can you tell me which part of the bone or the name of the bone you fractured/broke?
CODE ALL THAT APPLY.

1 Shoulder (Scapula)
2 Upper arm – upper end/neck
3 Upper arm – middle/shaft
4 Upper arm – lower end/above elbow
5 Elbow
6 Lower arm – upper end/below elbow
7 Lower arm – middle/shaft
8 Lower arm – at the wrist (Colles fracture)
9 Hand – at the wrist (carpals)
10 Hand (metacarpals)
11 Finger(s)/thumb (phalanges)

**ENDIF**

**IF FEvWh = Knee OR Ankle OR Lower leg OR Upper leg OR Hip joint THEN**

**FELeg**

You said that you broke a bone or bones in your hip, leg, knee or foot.
SHOW CARD M.
Looking at this card can you tell me which part of the bone or the name of the bone you fractured/broke?
CODE ALL THAT APPLY.

1 Hip joint – neck of femur
2 Upper leg – middle/shaft
3 Upper leg – lower end/above knee
4 Knee (patella)
5 Lower leg – upper end/below knee
6 Lower leg – middle/shaft
7 Lower leg – lower end/at the ankle
8 Foot – at the ankle (tarsals)
9 Foot (metatarsals)
10 Toes (phalanges)

**ENDIF**

**IF FEvWh = Pelvis, Spine, Ribs, Collar (Clavicle), Jaw, Nose, a bone in your face, Skull, Neck, (other bone)**

**FEGenNo**

How many times have you fractured/broken your (*Pelvis, Spine, Ribs, Collar (Clavicle), Jaw, Nose, a bone in your face, Skull, Neck, (other bone*))?
ARRAY [1..11]
Range: 1-20

**ENDIF**

**IF FEArm = Response**

**FEArmNo**

How many times have you fractured/broken your (*Shoulder(Scapula), Upper arm – upper end/neck, Upper arm – middle/shaft, Upper arm – lower end/above elbow, Elbow, Lower arm – upper end/below elbow, Lower arm – middle/shaft, Lower arm – at the wrist (Colles fracture), Hand – at the wrist (carpals), Hand (metacarpals), Finger(s)/thumb (phalanges)*)?

ARRAY [1..11]

Range: 1-20

**ENDIF**

**IF FELeg = Response**

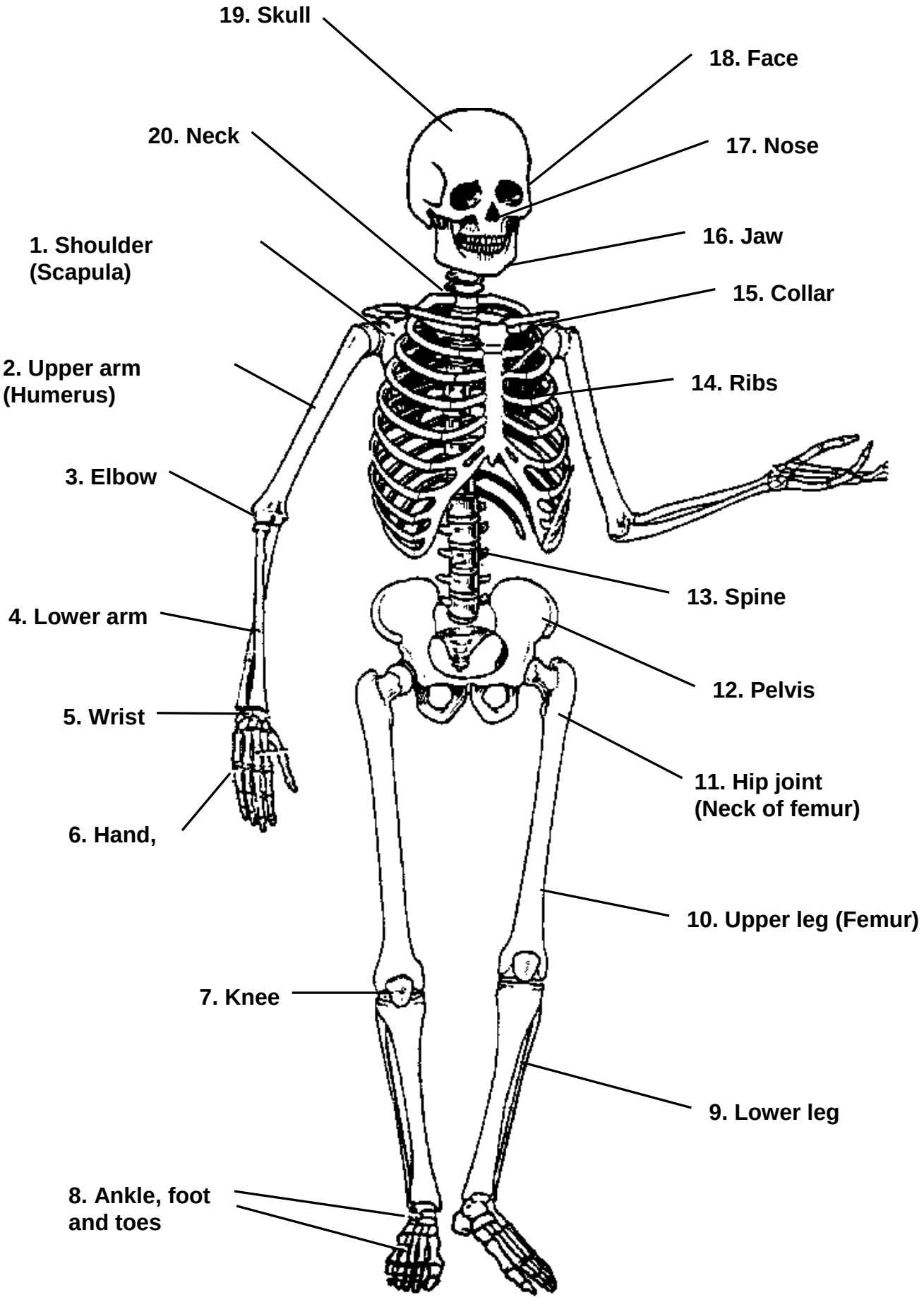
**FELegNo**

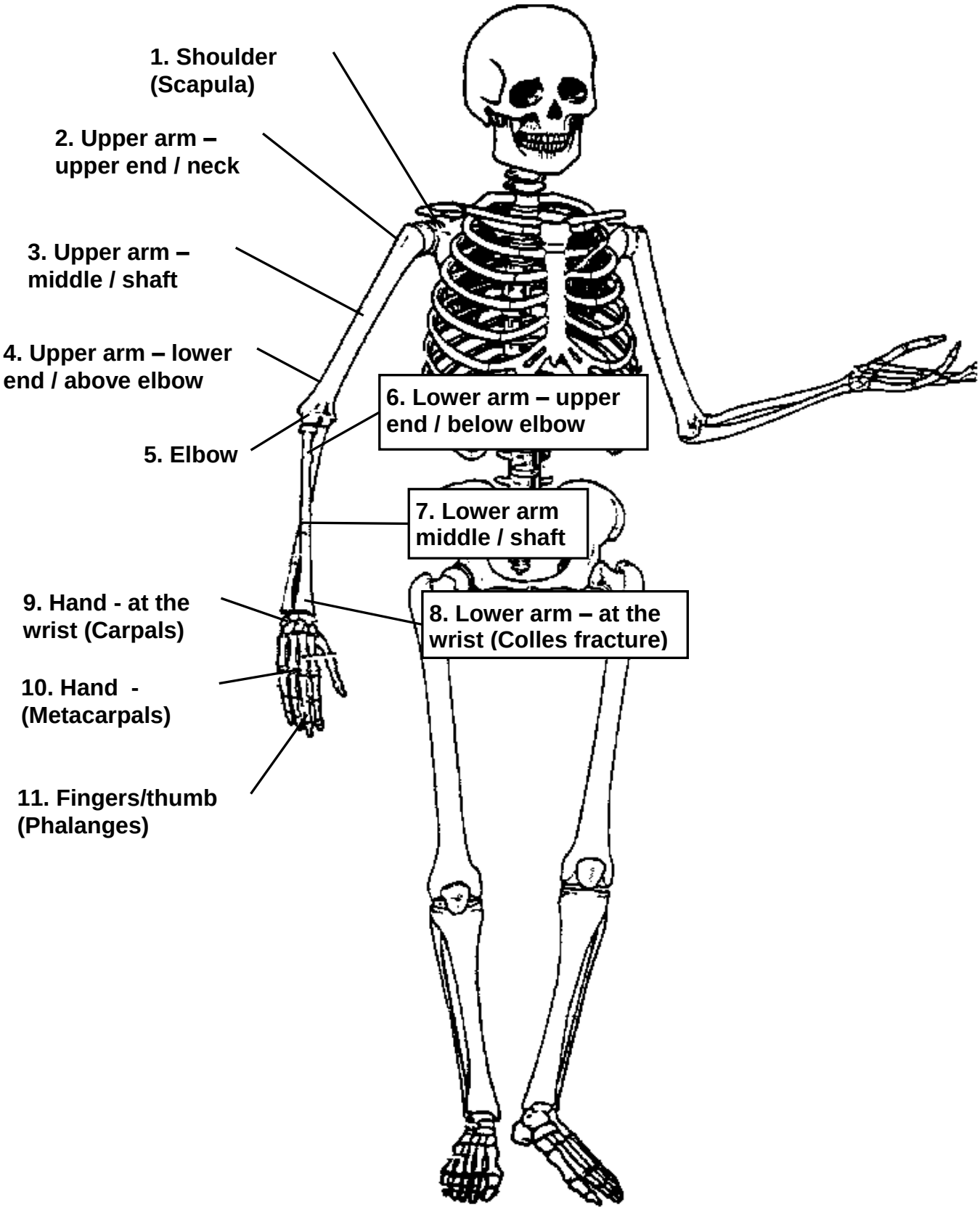
How many times have you fractured/broken your (*Hip joint – neck of femur, Upper leg – middle/shaft, Upper leg – lower end/above knee, Knee (patella), Lower leg – upper end/below knee, Lower leg – middle/shaft, Lower leg – lower end/at the ankle, Foot – at the ankle(tarsals), Foot (metatarsals), Toes (phalanges)* ?

ARRAY [1..10]

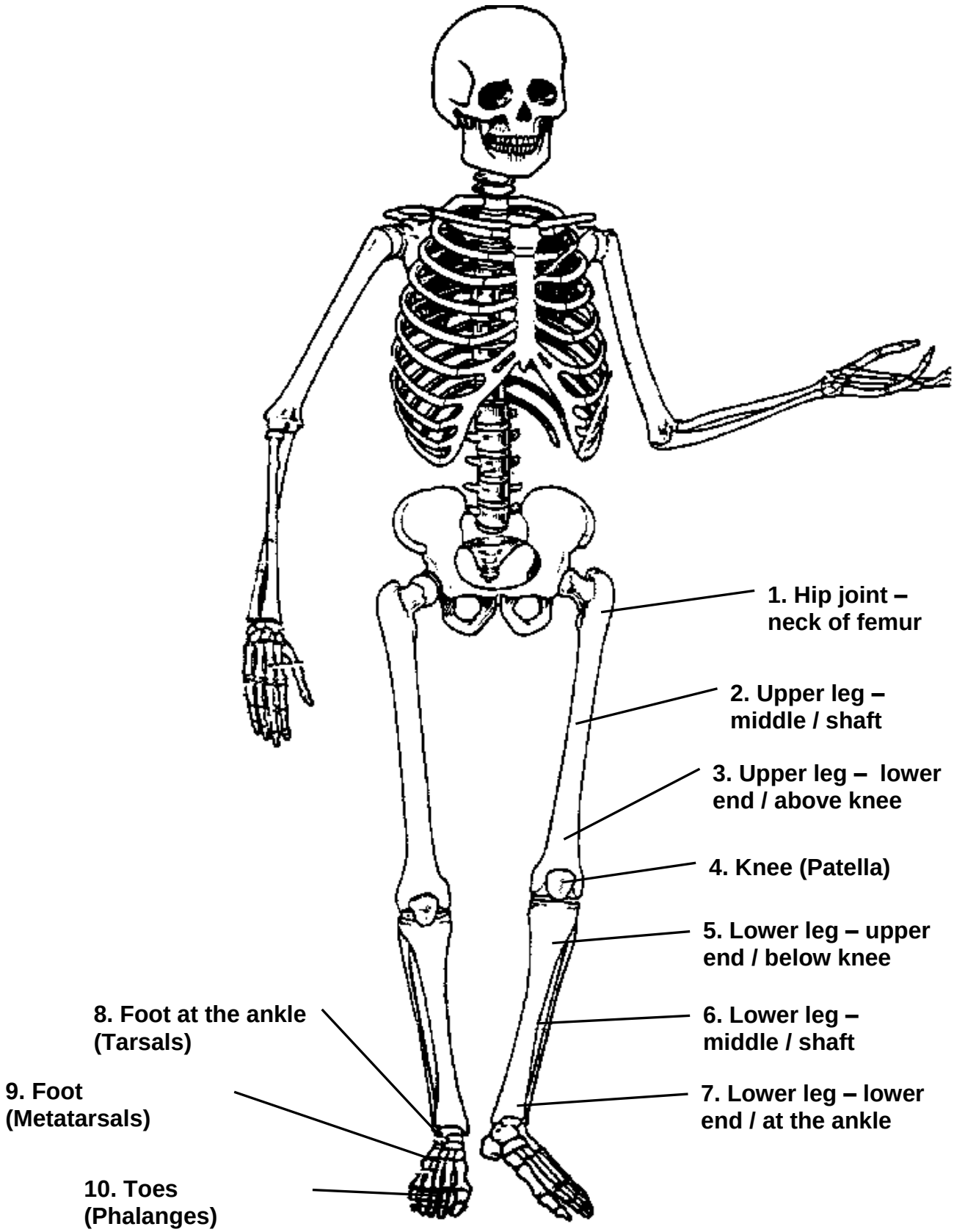
Range: 1-20

**ENDIF**


19. Skull
18. Face
20. Neck
17. Nose
1. Shoulder (Scapula)
16. Jaw
15. Collar
2. Upper arm (Humerus)
14. Ribs
3. Elbow
13. Spine
4. Lower arm
12. Pelvis
5. Wrist
11. Hip joint (Neck of femur)
6. Hand,
10. Upper leg (Femur)
7. Knee
9. Lower leg
8. Ankle, foot and toes




# ARM FRACTURES




# LEG FRACTURES