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The Burden of Injury in Wales

GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

CAPIC
Collaboration for Accident Prevention and Injury Control

ACKNOWLEDGMENTS

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Glossary

AWISS	All Wales Injuries Surveillance System
BOI	Burden of Injury
CAPIC	Collaboration for Accident Prevention and Injury Control
CIs	Confidence Intervals
DALY	Disability Adjusted Life Year
EASR	European Age-Standardised Rates
ED	Emergency Department
EDDS	Emergency Department Data Set
FCE	Finished Consultant Episodes
GBDI	Global Burden of Disease and Injury
HB	Health Board
HIRU	Health Information Research Unit
IP	Inpatient
JAMIE	Joint Action on Monitoring Injuries in Europe
LA	Local Authority
LSOA	Lower Super Output Area
MDS	Minimum Data Set
MVTC	Motor Vehicle Traffic Collision
NSAIDs	Non-steroidal Anti-Inflammatory Devices
OEP	Otago Exercise Programme
ONS	Office for National Statistics
OR	Odds Ratio
PEDW	Patient Episode Database Wales
QALY	Quality Adjusted Life Year

RR	Relative Risk
SAIL	Secure Anonymised Information Linkage
SES	Socio-Economic Status
WIMD	Welsh Index of Multiple Deprivation
YLD	Years Lived with Disability
YLL	Years of Life Lost

1 Summary

1.1 Background

Measuring the impact of conditions on the population and communicating the results to the public, practitioners and policy makers is a necessary first step in developing appropriate policy responses. This report is the first attempt to comprehensively measure the burden of injuries on the Welsh population, subdivided by Local Authority (LA) and Health Board (HB) area. The report uses information on the number and type of injuries treated in emergency departments (EDs), admitted to hospital for treatment, and those resulting in death. The burden is measured by a combination of premature mortality and disability in survivors called Disability Adjusted Life Years (DALYs) which were created by the World Bank and used in the Global Burden of Diseases and Injury Study (GBDI; Murray and Lopez, 1997).

1.2 Main Findings

Injuries place a substantial burden upon the health of the Welsh population and the NHS in Wales. Unfortunately, the quality of the data collected on injuries in some EDs is poor and incomplete and the results presented here are underestimates. Nevertheless, in 2009 there were 1102 deaths, 41,817 hospital admissions and **at least** 444,274 ED attendances due to injury, incurring direct costs of at least £25.9M. With at least 59,177 DALYs associated with these injuries and if the cost of each DALY was £30,000 (the NICE threshold for funding NHS treatment), this would amount to a minimum of £1.8B in social costs in one year.

Around half the burden occurs in hospitalised (inpatients or IP) patients, and a quarter each from deaths and cases treated at EDs but not admitted. The DALY burden is highest in the economically active age groups, particularly in males. There are marked socio-economic discrepancies with the most deprived 20% of the population experiencing 1.9 times the deaths and hospitalisations of the most affluent 20% of the population.

The leading causes of death are falls (23%), motor vehicle traffic collisions (MVTCs 11%), and poisoning (14%). But many injury deaths are coded as unspecified causes and the real proportion of fall-related deaths in particular, is much higher. In terms of inpatient admissions, falls account for 48% of injury admissions, poisonings 18% and MVTC 4%. Reliable data on the cause of ED injury attendances is missing in 85% of cases. Hence, the burden estimates for specific causes are considerably underestimated.

As the quality and completeness of ED coding of injuries varies by hospital the calculation of DALYs by LA and HB area represents a minimum. The actual injury related DALYs will be substantially higher.

1.3 Recommendations

There are three major recommendations.

1. *Injury data collection in emergency departments needs to be improved. This will require action from policy makers, Health Board executives and managers, ED staff and the general public.*

   Emergency departments are busy places but are uniquely placed to support injury prevention and reduce future demand on their own services. The development of an Emergency Department Data Set (EDDS) in Wales has capitalised on this. However, data quality and coding remains poor. Building on these experiences has led to Wales being a key participant in developing a new European Minimum Data Set (MDS) as part of the European Joint Action on Monitoring Injuries in Europe (JAMIE) project in which the UK is participating. Wales has always led the UK in injury surveillance and prevention and it is important to see this continue with the implementation of the JAMIE MDS in Wales.

   To collect these data will require support and action at all levels. Policy makers in Welsh Government need to make this a requirement of the NHS. HBs need to facilitate the data collection, ED staff need to collect the data and the public need to understand that data collection will not affect either the speed or quality of treatment, but may help to reduce the risk of a similar injury to themselves, their family or their friends.

2. *Injury prevention in Wales needs to be more collaborative and cross-sectoral so that there are greater benefits and the burden of injuries on health is reduced more quickly and more effectively.*

   The only reason to collect information on injuries is to act as a stimulus for prevention. There are many Welsh Government strategies and programmes which relate to injury prevention. However, injury prevention practitioners[i] employed by LAs, HBs and a variety of other agencies and charities struggle to find accurate information on where best to target their interventions and to evaluate their effectiveness. Improving the effectiveness of injury prevention is key to reducing the enormous impact of injuries on individuals, the NHS and wider society and to get best value out of those whose role this is.

   In addition, the work that local public health teams and LAs carry out to prevent injuries needs to be evaluated. To be able to accurately measure the impact that any scheme has on the burden of injury and to properly appreciate the cost savings achieved, better quality emergency department

[i] Injury prevention practitioners is a blanket term used to cover all people working in injury prevention, from policy makers to those directly providing services to those at risk of injury.

data are needed. Without these data, in particular the causes of injury, we are unable to accurately determine the burden of injury or assess the effect of interventions used to reduce this burden. A major risk of this is that projects that are effective are abandoned because they do not appear to work; as a result, considerable amounts of time, money and good will will have been needlessly wasted.

Wales has a world leading system for anonymising data and using this for prevention and research. With a little more effort to collect better data on injuries treated in EDs, better informed prevention would be possible and the burden of injuries on the Welsh population reduced.

To bring about such collaboration, a central, ideally Ministerial, point of contact and therefore accountability is needed. In the absence of a Ministerial or Welsh Government role, a suitable appointment is needed to facilitate collaboration and co-ordination of effort to reduce the burden of injury.

3. *Injury prevention should be recognised as a key public health priority, with greater commitment and capacity to support the implementation of evidence based injury prevention and control initiatives.*

Finally, the scale of the burden of injuries identified in this report supports the need for urgent action and there are a number of key areas of concern. Injury is still a leading cause of death and years of life lost in children and young people and has a significant mortality burden. Although this report does not specifically make the comparison between injuries and other causes of morbidity and mortality, the burden of other causes is generally known to have decreased, mainly because of reductions in communicable disease associated with vaccination and improvements in detection and treatment of other conditions.

The individual and societal burden of fall-related injuries is particularly high. After a long history of improvement the number of fatal and road traffic injuries is increasing (Department for Transport, 2011). Self-harm and violence are also areas of particular concern.

Injury prevention therefore needs to be prioritised in a public health context, by Welsh Government, Public Health Wales and HBs. More indirectly, LAs and others with an interest in this area need to take action. Focussed discussion about these data, their meaning, the evidence base and planning to implement this is now needed. Action is the key to reducing this burden and further strategy development at local levels is not recommended.

To support this, greater effort is now needed, particularly by Welsh Government, to implement the evidence based interventions highlighted by the Child Safety Report Card as not being in use in Wales.

The last report to describe comprehensively the current position around injuries and injury prevention in Wales was produced ten years ago (CAPIC, 2002). Some of the authors of that report have also contributed to this publication. The 2002 report also called for better epidemiological information to support understanding of the incidence and burden of injury and more effective inter-sectoral working. Action is needed to ensure that these recommendations do not have to be repeated in subsequent reports.

1.4 Headline statements

The key statements arising from this study are

Every day in Wales, three people die as a result of injury, 115 are admitted to hospital, 849 hospital beds are occupied by people with injuries, 1200 people attend an ED for the treatment of an injury and 162 DALYs are added to the burden of injury.

Every day in Wales at least 120 ED attendances are for the treatment of fall injuries

Every year in Wales, 1100 people die as a result of injury, 42,000 are admitted to hospital and 445,000 attend an ED, leading to a burden of 59,200 DALYs and a cost of £1.8B.

The most deprived population suffers double the number of deaths and hospitalisations of the most affluent.

The most deprived males (10% of the population) suffer 17.5% of the total burden of injury (10340 of 59179 DALYs).

The leading causes of deaths are falls (23%), motor vehicle crashes (11%) and poisonings (14%). However, these data are based on poorly coded records and the true numbers are likely to be considerably higher.

The leading causes of hospital admissions are falls (48%), poisonings (18%) and motor vehicle crashes (4%).

Emergency Department profiles suggest that the in-patient burden of falls could be tackled by intervening at earlier ages, 40 to 44 years, amongst those attending the ED after falling.

Males aged 15 to 24 years suffer a similar death and disability burden (2200 DALYs) in motor vehicle crashes as all females of all ages combined.

Highest IP poisoning rates are amongst 15 to 19 year old females; more than double those of males of the same age. Female poisoning rates, based on IP data, are consistently higher than males at all ages.

The burden of poisoning is highest amongst 20 to 49 year old males, where most years of life are lost.

Merthyr Tydfil suffers a disproportionate number of injuries and burden of injury.

Improvements are urgently needed in ED data quality and the JAMIE minimum data set should be implemented in Wales to support this.

More effective collaborative working on injury prevention is needed, with clearer understanding of, “who is doing what and where in Wales”, so that information can be exchanged, support given, evaluation effected and advocacy carried out with a stronger, louder, clearer voice in the most appropriate settings.

Injuries, both unintentional and intentional, need to be made a public health priority.

The prioritisation of injury within public health also needs to cover the important contributory factors for injury, including alcohol.

2 Background

2.1 The global perspective

Globally, injuries place a significant burden upon health and health services, mainly because they disproportionately affect younger people and contribute substantially to the burden of premature death and healthy years of life lost (Figure 1). Although the proportion of all cause mortality that is due to injury is relatively low, particularly in the UK, the burden of Years of Life Lost (YLL) due to injury is consistently higher (Table 1). In the UK, given the relative burdens of communicable disease and injuries in terms of both mortality and YLL, it may be of interest to compare resources, for example, in terms of dedicated staffing, given to tackling these health burdens.

Table 1

The global burden of disease, illness and injury

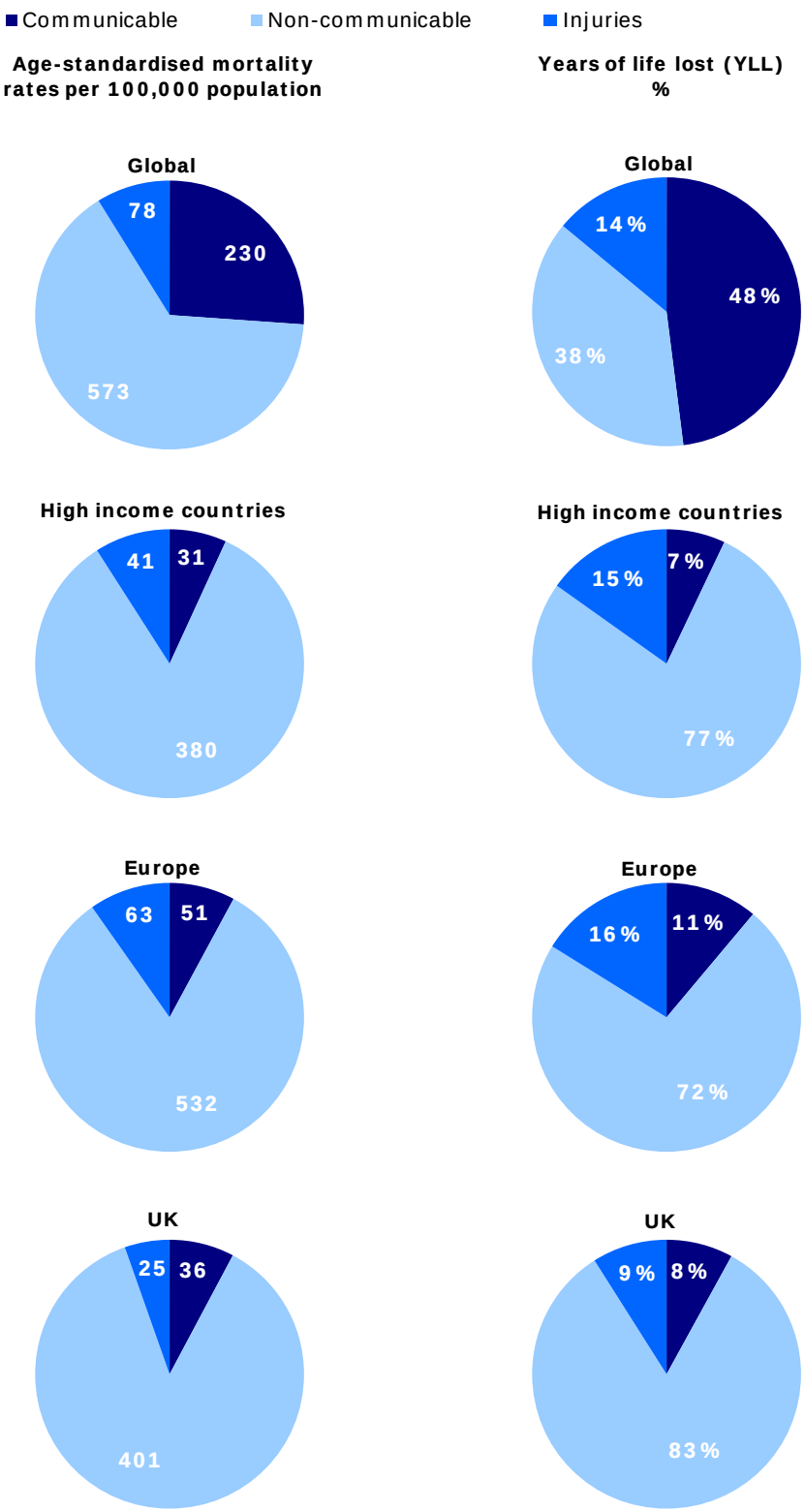
	Age standardised mortality rates per 100,000 population	Age standardised mortality (%)	Years of life lost (YLL) (%)
Global			
Communicable	230	26.1%	48
Non-communicable	573	65.0%	38
Injuries	78	8.9%	14
High income countries			
Communicable	31	6.9%	7
Non-communicable	380	84.1%	77
Injuries	41	9.1%	15
Europe			
Communicable	51	7.9%	11
Non-communicable	532	82.4%	72
Injuries	63	9.8%	16
UK			
Communicable	36	7.8%	8
Non-communicable	401	86.8%	83
Injuries	25	5.4%	9

Produced by Public Health Wales and Swansea University, using data from WHO (2011)[1]

Figure 1

Burden of disease, illness, ill-health and injuries globally, in high income countries, in Europe and for the UK in terms of mortality rates and premature years of life lost.

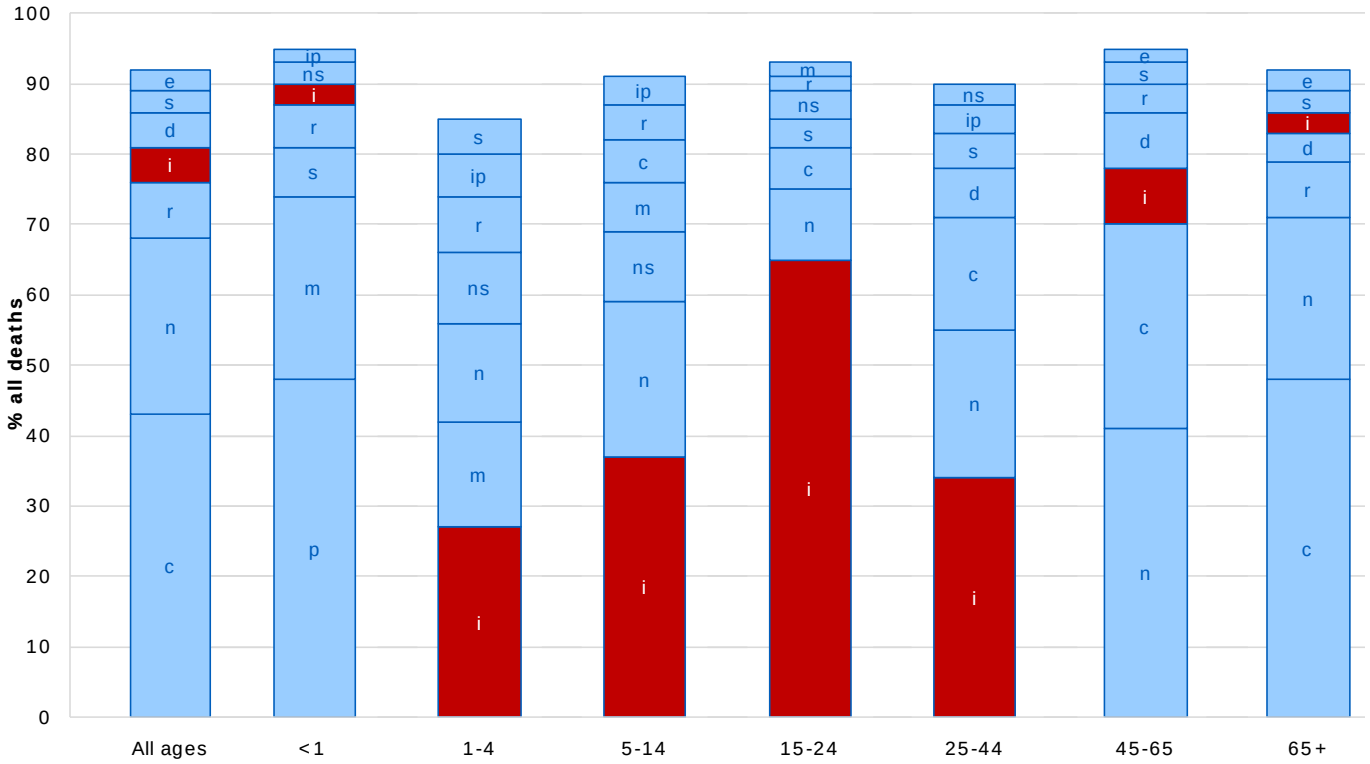
Produced by Public Health Wales and Swansea University, using data from WHO (2011)



A more detailed comparison of the relative importance of injuries for 2003-5, by age group, at the European level, found that injuries were, overall, the fourth leading cause of death and the leading cause in 1 to 44 year olds (Figure 2). Amongst 15 to 24 year olds almost two thirds of all deaths were due to injury.

Figure 2

Relative burden of injury deaths by age group in Europe, 2003-2005
Produced byPublic Health Wales and Swansea Univeristy, using Eurostat (Eurosafe report)



Code	ICD-10	Cause
c	I00-I99	Circulatory system
n	C00-D48	Neoplasms (cancer)
r	J00-J99	Respiratory system
i	V01-Y98	Injury/poisoning
d	K00-K93	Digestive system
a	R00-R99	Abnormal findings and ill-defined causes
e	E00-E90	Endocrine, nutritional and metabolic
p	P00-P96	Perinatal conditions
m	Q00-Q99	Congenital malformations
ns	G00-H95	Nervous system
ip	A00-B99	Infectious and parasitic

Relative burden of injury related deaths (ICD-10 V01-Y98) by age group, Europe, 2003-2005

	Number of injury related	% of all deaths for age group	Rank as cause of death (1 = leading cause of death)
<1	782	3%	5
1-4	1,508	27%	1
5-14	3,186	37%	1
15-24	21,938	65%	1
25-44	59,057	34%	1
45-65	63,900	8%	3
65+	106,866	3%	7
All ages	**257,252**	**5%**	**4**

Produced by Public Health Wales & Swansea University, using Eurostat (Eurosafe 2007)

2.2 Injury prevention in Wales

2.2.1 History of injury prevention in Wales

Historically, Wales has undoubtedly been a leader in global injury prevention efforts, with ground breaking and innovative work on playground injuries, drowning, childhood poisonings and bicycle safety being carried out here (Mott et al, 1997; Sibert, 1996; Kemp and Sibert, 1995; Mott et al, 1994; Kemp and Sibert, 1994).

More recently, attention has focused on road safety, data collection systems and analysis of the burden of injury; but again, with a global profile. Efforts are now needed to ensure that this work is further developed and that the Welsh population experiences the benefit of this expertise.

2.2.2 Recent injury prevention in Wales

It is now 10 years since the last comprehensive analysis of the burden of injuries in Wales was produced (CAPIC, 2002). This document called on the National Assembly for Wales (now Welsh Government) to recognise injury prevention as one of the key public health priorities for Wales. To contribute to this, it was recommended that additional steps were needed in the form of better information (epidemiological information to support understanding of the incidence and burden of injury), more effective inter-sectoral working, enhanced research capacity in Wales to test and evaluate new interventions and better methods of applying existing knowledge.

2.2.3 Progress in the last 10 years

Since 2002, a variety of strategies relating to injury prevention in Wales have been produced[ii], however, none of these cover the full age and prevention range and few specifically relate only to injuries. One of the few strategies that did relate solely to injury prevention was the road safety strategy[iii] that is now expired and in the process of being renewed.

In relation to the recommendations made in the 2002 document (CAPIC, 2002) there has been some progress, particularly in the development of better epidemiological information to support understanding of the incidence and burden of injury. However, whilst there have been improvements in this area, the quality of ED data, in particular, still has considerable room for improvements.

In 2002, the All Wales Injuries Surveillance System (AWISS) had been recognised as a National Database by the Welsh Government and was supported by all EDs in Wales. However, not all departments were providing data to AWISS. This is still the case in 2012 and injury prevention initiatives and comprehensive assessment of the incidence of injury in Wales are being hampered as a result.

A standardised injury surveillance data set, the EDDS was mandated in 2009, some four years after being recommended by Welsh Assembly Government (now Welsh Government) ministers. However, coding of the cause of injury fields is still poor in a number of HBs. Some, but not all hospitals, contribute to surveillance of violence related injuries.

More recently (2012), a new European MDS for injury surveillance has been developed as part of the JAMIE programme. The JAMIE MDS is designed to be collected in all departments and takes around 20-30 seconds to complete (Rogmans, 2012). It was designed in Wales and will be implemented across Europe. Given the roots of this project in Wales, it is important that it is also implemented here.

Injury prevention is still struggling to be recognised as a key public health priority. Some progress has been made in specific areas, namely, falls prevention, road safety and violence prevention, but how much of this is just awareness raising and how much effective intervention has taken place is not clear. In addition, these efforts tend to have been made piecemeal rather than as co-ordinated work within a wider injury prevention effort.

Injury prevention work in Wales still needs to be better co-ordinated. There have been previous calls for CAPIC to be formalised as the Wales Injury Prevention Network (CAPIC, 2002), but this is still yet to be achieved.

[ii] http://www.injuryobservatory.net/welsh_strategies.html. Accessed 10 April 2012
[iii] http://www.capic.org.uk/documents/road_safety_strategy_for_wales.pdf . Accessed 10 April 2012

Research capacity has developed, particularly in relation to epidemiological data improvements. Key studies have included the Department of Health funded Moving from Observation to Intervention (MOI) project with components including Advocacy in Action, a project to encourage and support local policy makers to effectively advocate for road safety interventions, and measuring the UK burden of injury (Lyons et al, 2008, Lyons et al, 2011). The European funded JAMIE project has reflected the significant contribution of Welsh injury e-epidemiology to measuring injury incidence and burden.

2.3 Child injury report cards

Since 2007, the European Child Safety Alliance and Eurosafe have produced Child Safety Report Cards as part of the Child Safety Action Plan initiative[iv]. These report cards require an examination of evidence based good practice to support the development of child and adolescent safety in each country. The intention is that the cards provide an informed position from which to begin efforts to improve child safety by identifying the current position in relation to the adoption, implementation and enforcement of what we already know works.

Wales first participated in 2009, when it was ranked fair in terms of overall child safety[v]. However, with a score of just 29.5, only three of the 24 countries assessed scored less, namely Spain, Portugal and Greece. England were ranked eighth with a score of 39.5 and Scotland were 12th with 35.5. Iceland was the highest scoring nation with 48.5.

Reflecting the sentiments expressed earlier in this report, by 2012 there had been little change. Wales score increased to 31, but out of the now 31 participating countries, Wales was ranked 23 (ranked 20 against the countries participating in 2009). England and Scotland still score more highly; 36 and 39 respectively, with Belgium, Greece, Portugal and Luxembourg scoring less than Wales.

Compared with 2009, the 2012 card shows Wales scoring less on pedestrian safety, passenger safety and cycling safety. Improvements were seen in water safety, fall prevention, burn / scald prevention, choking prevention and child safety leadership and infrastructure.

Whilst these cards only cover children, it is likely that efforts in this area are reflective of wider injury prevention efforts across other ages.

[iv] http://www.childsafetyeurope.org/reportcards/index.html. Accessed 10 April 2012
[v] http://www.childsafetyeurope.org/reportcards/downloads.html. Accessed 10 April 2012

2.4 Terminology

The terminology of injury prevention is often debated; the word accident was banned from the *British Medical Journal* in 2001 to counter prevailing beliefs that accidents are random, unpredictable and unavoidable and therefore cannot be prevented (Stone, 2011). Crash is often used in place of accidents in the road traffic setting, but this is not an appropriate word in all contexts; fall crashes would never be an acceptable usage. Injury has therefore tended to become the accepted terminology; fall injuries make sense, even though it describes an outcome rather than the events leading to the outcome (Stone, 2011).

More recently, the debate has extended to how to describe efforts to reduce the incidence of injury; injury prevention and injury control have been in common usage and are linked to the premise that injuries can be avoided, the severity minimised and the prognosis for victims improved. Safety promotion reflects a move away from health protection and a focus on negatives to health promotion and a focus on positive behaviours (Stone, 2011).

This document uses the term injury prevention, but it is suggested that this is part of a wider debate that is needed in Wales in relation to future directions of this important area of public health.

Injury and injury prevention in this document also includes poisonings.

3 Methods

This Wales burden of injury (BOI) report uses the methods of assessing injury burden developed and implemented as part of the UK BOI study (Lyons et al, 2011), which several authors of this report were involved in. The BOI can be expressed in terms of health service utilisation (i.e. the number of injury related ED attendances and IP admissions), mortality and health status indices (YLL, DALY and Years Lived with Disability, YLDs).

3.1 Study population

The study population were all Welsh residents who attended an ED, were admitted to hospital or died of an injury related condition during the period 01/01/2009 to 31/12/2009 (or the period 01/04/2009 to 31/03/2010 in the case of ED attendances).

3.2 Data sources

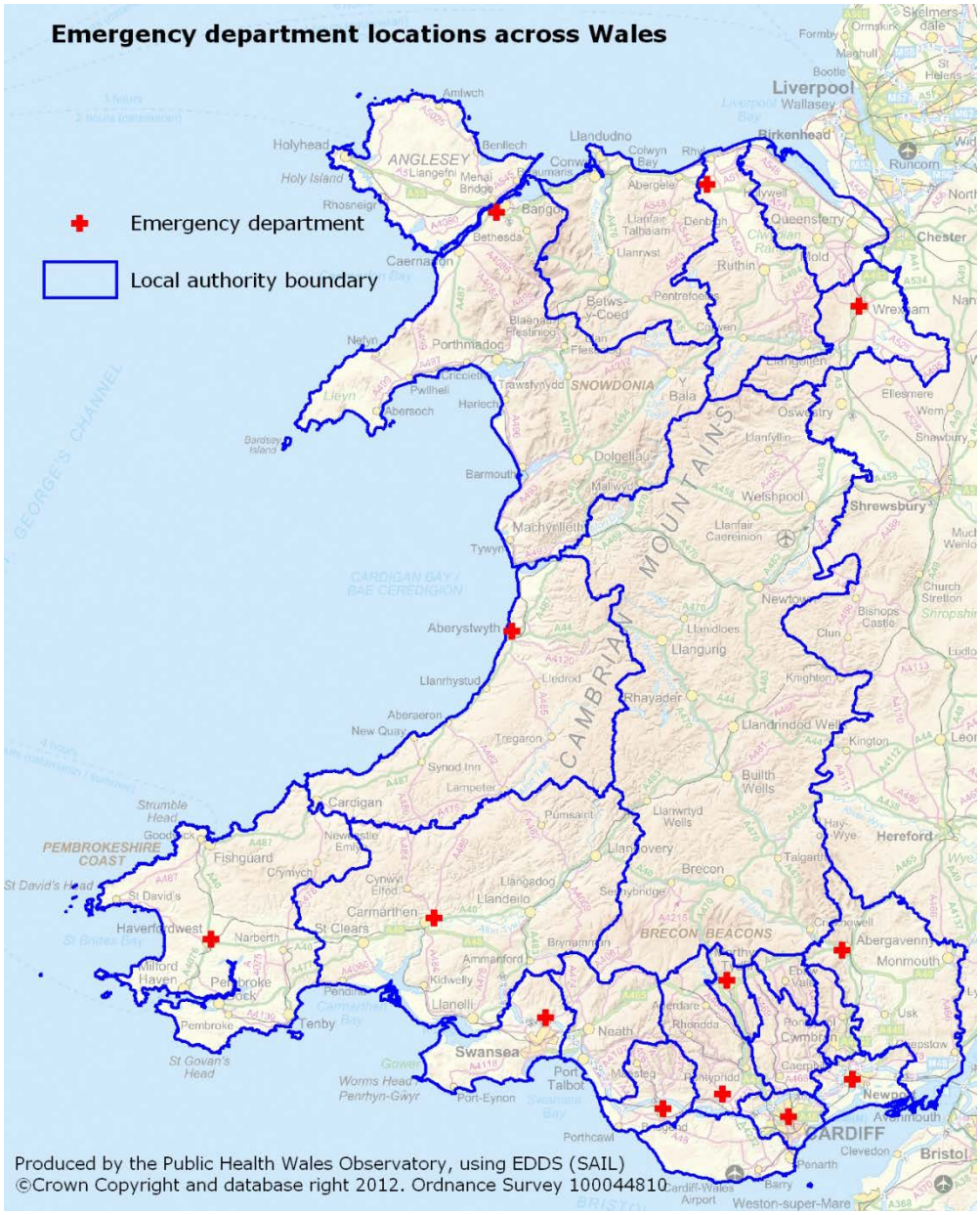
Multiple data sources held and maintained by the Health Information Research Unit (HIRU) based at Swansea University and forming part of the Secure Anonymised Information Linkage (SAIL) project (Lyons et al, 2009, Ford et al, 2009), were analysed. These datasets together form the All Wales Injury Surveillance System (AWISS); an integrated injury surveillance dataset that allows anonymised individuals to be remotely tracked both prospectively and retrospectively over multiple years.

In this report, the data are not linked and all contacts are counted. Therefore, ED data are based on all ED attendances, not those who only attend ED before being discharged home.

3.2.1 Emergency department data

Emergency department data were generated from the EDDS. It began collecting data in April 2009 and covers all 13 of the major EDs in Wales (Figure 3). Unfortunately, the quality and volume of data collected in these EDs is extremely variable.

Figure 3



3.2.2 Inpatient data

Inpatient (IP) admissions were identified from the Patient Episode Database for Wales (PEDW). PEDW collates the demographic information and clinical records associated with all IP admissions, elective and emergency, to Welsh hospitals. Finished Consultant Episodes (FCEs) are used as the basis of this system.

A patient, admitted to hospital A, begins a **spell** in hospital.

For that **spell**, the patient is under the care of a consultant. A completed period of care by a consultant is referred to as a **finished consultant episode** or **FCE**. At the end of an **FCE**, a patient may be;

- Discharged, therefore ending the **spell**;
- Transferred to another consultant in hospital A, therefore creating a new **FCE** within a **spell**;
- Or transferred to hospital B, ending the **spell** at hospital A and creating a new **spell** at hospital B

A **spell** can therefore be made up of multiple FCEs. The duration of a **spell** is the total amount of time spent at a given hospital.

Injuries can result in patients being transferred between hospitals, therefore to properly understand the burden of injury, continuous treatment across hospitals needs to be accounted for. This is achieved by identifying **super spells**.

Super spells aggregate together all **spells** where the gap between **spells** is two days or less. A **super spell** therefore accounts for the entire length of IP care following a given admission, including movements between hospitals. However, a **super spell** does not include any subsequent admissions taking place more than two days after the end of a given **spell**.

Super spells are the unit of IP activity analysed in this report.

3.2.3 Mortality data

The Office for National Statistics (ONS) annual mortality file was used to determine the number of injury related deaths in Wales. This dataset is an annual extract of anonymised deaths data for Welsh residents.

Mortality analyses were undertaken by year of registration, rather than year of occurrence.

3.2.4 Health status indices

The YLLs, YLDs and DALYs were calculated using the ED, IP and mortality data obtained. These calculations used formulae derived by the GBDI study (Murray and Lopez, 1996, Appendix 1).

In very basic terms (for more detail, see Appendix 1)

DALY = YLL + YLD

YLL = Number of deaths x life expectancy at the age at which death occurs (specific to age and sex)

YLD = Number of incident cases x disability weight x average length of time until remission or death[vi].

Hospital YLDs are based on IP data, Non-hospital YLDs on ED data.

3.2.5 Population data

Mid-year population estimates produced by ONS were used to provide the baseline denominator figures. Mid-2009 estimates were used throughout, except when stratifying the population by socio-economic status; here, mid-2010 estimates were used due to the lack of mid-2009 population estimates at Lower Super Output Area (LSOA) level.

3.3 Identification of injuries

The identification of injuries within each dataset varied according to the coding systems used.

Injury related ED attendances in EDDS were all attendances coded 11 to 15 (inclusive) in the attendance group field.

For IP admissions, injury diagnoses were those classified by International Classification of Diseases, 10th revision (ICD 10) as S00 – T73, T75, T78. This therefore excluded maltreatment syndromes (T74), certain early complications of trauma, not elsewhere classified (T79), complications of surgical and medical care, not elsewhere classified (T80-T88), sequelae of injuries, of poisoning and of other consequences of external causes (T90-98).

These diagnoses could appear in any diagnostic position (so first, second, third etc. diagnosis) and in any FCE within a super spell, meaning that the injury did not necessarily relate to the initial admission.

Each IP admission also had to be assigned an ICD 10 external cause code in the range of V01 to Y36.

Injury related deaths were identified by searching for ICD 10 codes V01 to Y36 in the underlying cause field.

[vi] Adapted from http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/ Accessed 1 June 2012

3.4 Data analysis

Data presented in this report have been stratified according to socio-demographics, place of residence and cause / intent of injury.

3.4.1 Socio-demographic characteristics

Injured individuals were stratified according to gender, age and socio-economic status. Individual age was based on date of ED attendance, IP admission or death and counts aggregated into 5 year groups (0-4, 5-9, ..., 80-84, 85+).

Socio-economic status (SES) was described using the Welsh Index of Multiple Deprivation (WIMD) 2008. This assigns a deprivation score based on the area in which an individual lives, therefore taking no account of individual status and is subject to ecological fallacy. The scores for each area in Wales are grouped into fifths and individuals assigned to a fifth according to the place in which they live.

3.4.2 Place of residence

Based on the LSOA of residence of the injured individuals at the date of ED attendance, IP admission or death, injury rates could be calculated for each of the 22 LAs and 7 HBs in Wales.

3.4.3 Cause / intent of injury

Each injury related ED attendance, IP admission and death was classified according to the external cause of the injury. In terms of ED attendances, these classifications were given in the mechanism of injury EDDS field. For IP admissions and deaths, the external cause categories were assigned based on ICD 10 codes (ICECI, 2004).

The intent associated with the injury related ED attendance was classified by the EDDS field attendance. Each injury related IP admission and death was again classified in terms of intent using ICD-10.

3.5 Statistical analysis

Where possible and appropriate to do so, **95% confidence intervals (CIs)** accompany the rates and ratios. For age standardised rates the CIs were calculated according to the method proposed by Dobson et al (1991). For the rate ratios the CIs were calculated according to the method proposed by Boyle and Parkin (1991).

Age-standardisation has been used in this report. Age-standardisation allows comparison of rates across different populations while taking account of the different age structures of those populations. Accounting for different underlying age structures is important as these may vary substantially, particularly between geographical areas, socio-economic groups or across time periods.

To calculate age-standardised rates, the age specific rates for each population are applied to a standard population (direct standardisation). The European standard population has been used in this report; European age standardisation is widely used to assist comparisons with rates produced elsewhere. It is based on a historic notional European age structure and its weighting gives greater importance to events at younger ages.

Comparison of age-standardised rates is not always appropriate. Where the age-specific rates follow different patterns for the groups being compared, the comparisons can be misleading. For example, deaths resulting from falls are far more likely in the elderly than in younger individuals and, conversely, deaths from poisoning are far more likely in younger individuals than in the elderly. Age-standardised rates are therefore useful in separately comparing deaths related to falls between populations, and deaths related to poisoning between populations, but are of little value when comparing deaths related to falls with deaths related to poisoning within one population. The method will give a greater weighting to poisoning deaths than to falls deaths due to the structure of the standard population. Similar issues arise when trying to compare events between males and females rates if the age patterns at which these events occur are different. In technical terms, the underlying assumption of the method, that the age specific rates should differ between the populations by an approximately constant ratio, does not hold.

3.6 Limitations

A key limitation of this report relates to the quality and completeness of the ED data. Coding at hospital level is often poor and this leads to difficulties with translating local codes to standard, national codes.

This means that observed differences by age, sex, SES, type of injury or place of residence could actually be due to errors in data collected, rather than true variations in injury incidence.

In addition, EDDS data collection only began in April 2009, making it impossible to analyse ED data for the same 12 month period as the IP admissions and deaths data and meaning that ED results are not directly comparable with the IP and deaths data. The effect is, however, limited by the use of 12 months of ED data.

These issues with ED data also lead to problems with accurately calculating the burden of injury, since ED data form the non-hospital YLD element of the DALY. Where ED data are coded other / unspecified, then they can only contribute to DALYs that are other / unspecified.

All service use data are subject to variations in attendance practices by people living different distances away, with different severities of injury and different access to transport. This combined with known biases in admission practices,

means that geographical comparisons are very difficult and need to be made and interpreted with caution.

Not all IP injuries data have both an injury diagnosis and external cause of injury code provided; around 10% of records with an injury diagnosis are missing an external cause code. These analyses use only those records with both an injury diagnosis and an injury external cause code, meaning that they under estimate the true numbers and burden of IP injury admissions.

The lack of mid-2009 population estimates at an LSOA level made it necessary to use mid-2010 population estimates for the socio-economic status analysis. All other analyses used mid-2009 population estimates. However, with only minor differences between the mid-2009 and mid-2010 populations any variation associated with different denominators being used is likely to be very small.

3.7 Search for interventions with evidence of effectiveness

To inform the evidence of effectiveness section, it was decided that it would be appropriate to limit the literature search to systematic reviews. This approach was felt to be most appropriate for producing the best quality evidence.

The CAPIC website contains a searchable database of systematic reviews relating to injury prevention covering the 2000 to 2012 period (http://www.capic.org.uk/what_works.html). Also the Cochrane Database of Systematic Reviews contains a number of reviews relevant to this report (http://www.thecochranelibrary.com/view/0/index.html).

A search was carried out for each relevant injury type and then reviewed to identify only articles detailing relevant interventions which either reduced injury rates or improved uptake of the intervention. Excluded were articles that only described epidemiology or risk factors or that referred specifically to low or middle income countries. Where an article mainly examined the risk factors associated with a relevant injury but also recommended interventions based on expert opinion, then these were also included for consideration.

Only the most recent systematic review on a particular subject was included in this report. This decision was based on the fact that the results or conclusions of the most recent review supersede those that have gone previously.

Those reviews that found evidence of effectiveness have been included in this report under the heading interventions with evidence of effectiveness. Where a review found insufficient evidence of effectiveness then they have still been included for completeness, however, they are under the heading interventions lacking evidence of effectiveness.

The full reference of each article is given along with a brief synopsis of its main findings. In addition to this an assessment was made as to the quality of the study.

A review of interventions for the intent section of this report was not included. This is because it does not relate to the method of harm meaning that a preliminary search identified papers from across too broad a range of topics. To distil the findings into a manageable number for this report would have risked excluding a number of potentially important issues.

3.7.1 Caveat

Study assessment was carried out using the quality assessment tool on the Health Evidence Canada website (http://health-evidence.ca/html/HowJudgeforYourself). This tool assesses the quality of the review process, but not the studies it is based on nor the outcome of the review. Therefore a study may still be assessed as 10/10 (strong) but find there is little or no evidence on which to base any conclusions, or the evidence available is of poor quality.

4 All Injuries

Injuries place a significant burden on both health and health services in Wales.

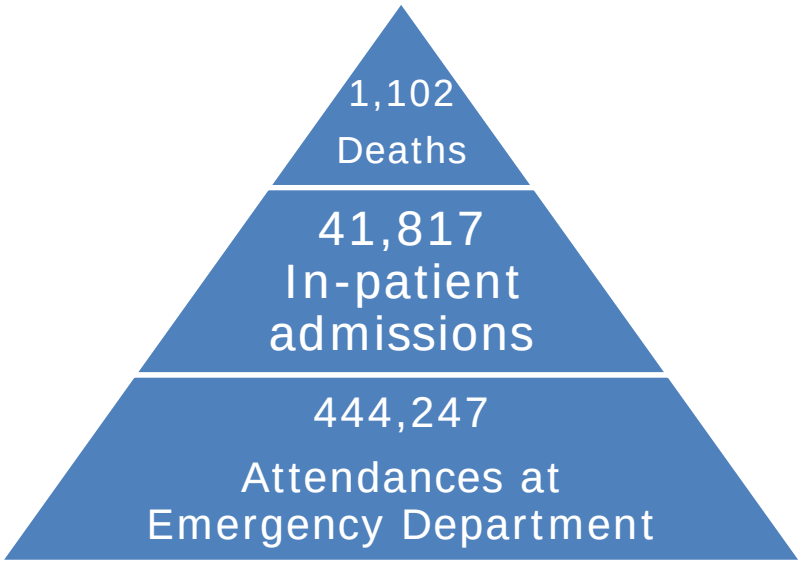
4.1 Epidemiology

4.1.1 Numbers

Over 1,100 people died in Wales in 2009 as a direct result of injury (Figure 4). For every death, there were 38 IP admissions and over 400 ED attendances. Almost 1 in 7 of the population attended an ED in Wales. In addition, the 42,000 IP injury admissions led to 309,844 bed days, an average of 7.4 bed days per admission. Every day in Wales, 849 hospital beds are occupied by people being treated for injuries. This is roughly equivalent to the whole of the University Hospital of Wales treating the consequences of injury every day.

Figure 4

Summary estimate of epidemiology of deaths and health care use related to injuries in Wales in 2009
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)



Every day in Wales

- 3 people die as a result of injury
- 115 are admitted to hospital as a result of injury
- 849 hospital beds are occupied by injured people
- Over 1,200 people attend an ED for the treatment of an injury

4.1.2 Costs

On average, ED direct medical costs are £12.05 per patient and in-patient average direct medical costs are £492.43 per admission (Macey, 2010). Based on 444,247 ED attendances and 41,817 IP admissions, the direct medical costs of these injuries are £5,353,176 and £20,591,945 respectively; £25.9M in total.

4.1.3 Rates and comparisons

Without a comparison (e.g. data from another time period), these rates are difficult to analyse. These data do, however, provide a useful baseline for future reports; the mortality rate was 37 per 100,000, rising to an ED attendance rate for injuries of 15 per 100 population (Table 2). In the 2002 report it was stated that there were around 1,100 injury deaths in Wales each year (compared with 1102 in 2009) and that crude injury death rates were around 32.5 per annum (Figure 5).

Table 2

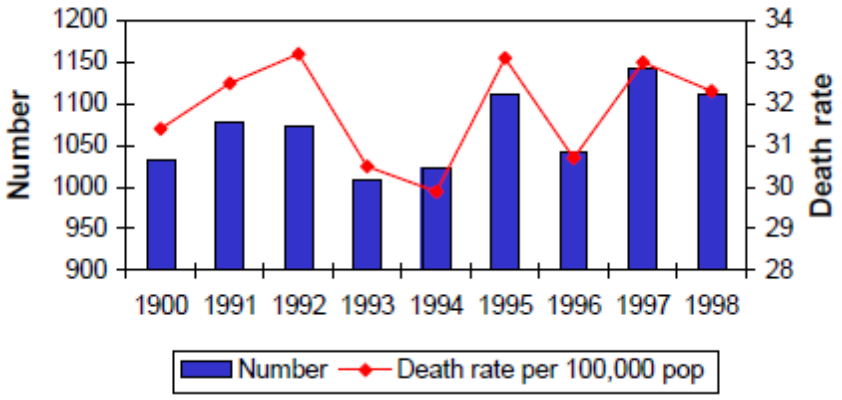
The morbidity and mortality rates due to injuries in Wales, 2009

	Crude Rate (per 100,000 population)	EASR (per 100,000 population)	(95% confidence intervals)
Deaths	36.7	28.8	(27.0 to 30.7)
In-patient admissions	1394.2	1287.5	(1274.5 to 1300.7)
Attendance to Emergency Department	14811.6	14996.9	(14951.3 to 15042.6)

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE & MYE (ONS)

Figure 5 Injury deaths and death rates 1990-1998.

Source: CAPIC, 2002.



2009 saw a similar number of injury deaths to 1998. The number of deaths in 1998 was felt to be high with the suggestion of an upward trend. In addition, death rates for 2009 were also substantially higher than in 1998.

4.2 Burden

In Wales, in 2009, almost 60,000 healthy years of life (DALYs) were lost due to injury (Table 3; Figure 6). Half of these (49.0%) were based on disability (YLD) to people who were hospitalised following their injury, while 26% were YLL. If the cost of each DALY was £30,000 (the NICE threshold for funding NHS treatment (Towse, 2009), this would amount to £1.8B in social costs.

Table 3

The overall burden of injuries in Wales, 2009

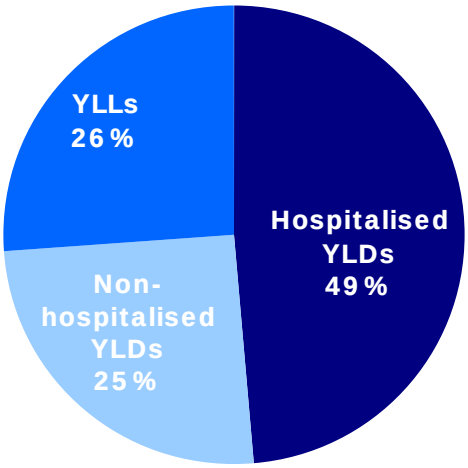
	Total
Hospitalised years lived with disability (YLDs)	28,772
Non hospitalised years lived with disability (YLDs)	14,934
Years of life lost (YLLs)	15,471
Disability adjusted life years (DALYs)	59,177

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

Figure 6

Relative contributions of YLDs and YLLs to overall burden of disease (DALY) in Wales, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)



4.3 Comment

Compared with 1998, injury deaths have shown no change. There was a substantial reduction in injury mortality rates in the 1980s and 1990s which appears to have stalled.

Using DALYs to describe the burden of injury is a more useful and informative approach than just using injury deaths.

It is clear that that the burden of injury in Wales is substantial, with total DALYs being four times higher than premature mortality. Injury related mortality may also be increasing but it is too early to be definitive about trends.

5 Injuries by age and sex

Injury risks and rates vary between males and females and by age group.

In both sexes, with increasing age comes more injuries, but adolescence and young adulthood is also characterised by large numbers of injuries. The greatest burden of injury is suffered by young adult males.

These profiles and their causes will be explored in more detail later.

5.1 Epidemiology

5.1.1 Sex

There were almost 300, or 75%, more male injury deaths than female injury deaths in Wales in 2009 (Figure 7). Male IP admission rates (European Age-Standardised Rates, EASRs) were 39% higher and ED attendances 24% higher than for females (Table 4).

Figure 7

Summary estimate of epidemiological burden of injuries to males and females in Wales in 2009
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

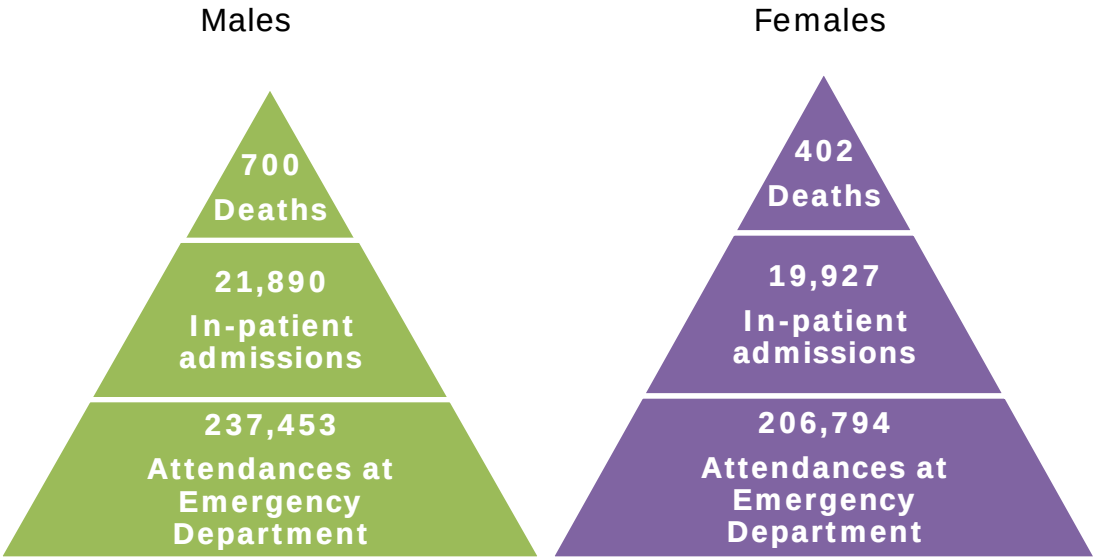


Table 4

Injury deaths, in-patient admission rates and attendance to emergency department rates for males and females (including rate ratios)

	Deaths		In-patient admissions		Emergency department attendance	
	EASR	(95% confidence intervals)	EASR	(95% confidence intervals)	EASR	(95% confidence intervals)
Males	42.7	(39.5 to 46.1)	1486.7	(1466.5 to 1507.0)	16575.2	(16507.2 to 16643.4)
Females	15.6	(13.9 to 17.4)	1073.1	(1056.6 to 1089.7)	13396.5	(13335.7 to 13457.4)
Ratio	2.74	(2.39 to 3.14)	1.39	(1.36 to 1.41)	1.24	(1.23 to 1.24)

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE & MYE (ONS)

5.1.2 Age and sex numbers and proportions

Less than half of male deaths (n= 278, 39.7%) but three-quarters of female deaths (n= 293, 72.9%) occur in over 60 year olds (Table 5). In-patient profiles are different; 38% of male admissions are under 24 year olds (n=8374), compared with 26% of female admissions (n=5130). ED attendances are greatest in children and young adults of both sexes; 42% of male (n=99,742) and 36% of female (n=74,632) ED attendances are by under 24 year olds.

Table 5

Injury deaths, in-patient admissions and emergency department attendances for males and females by age group

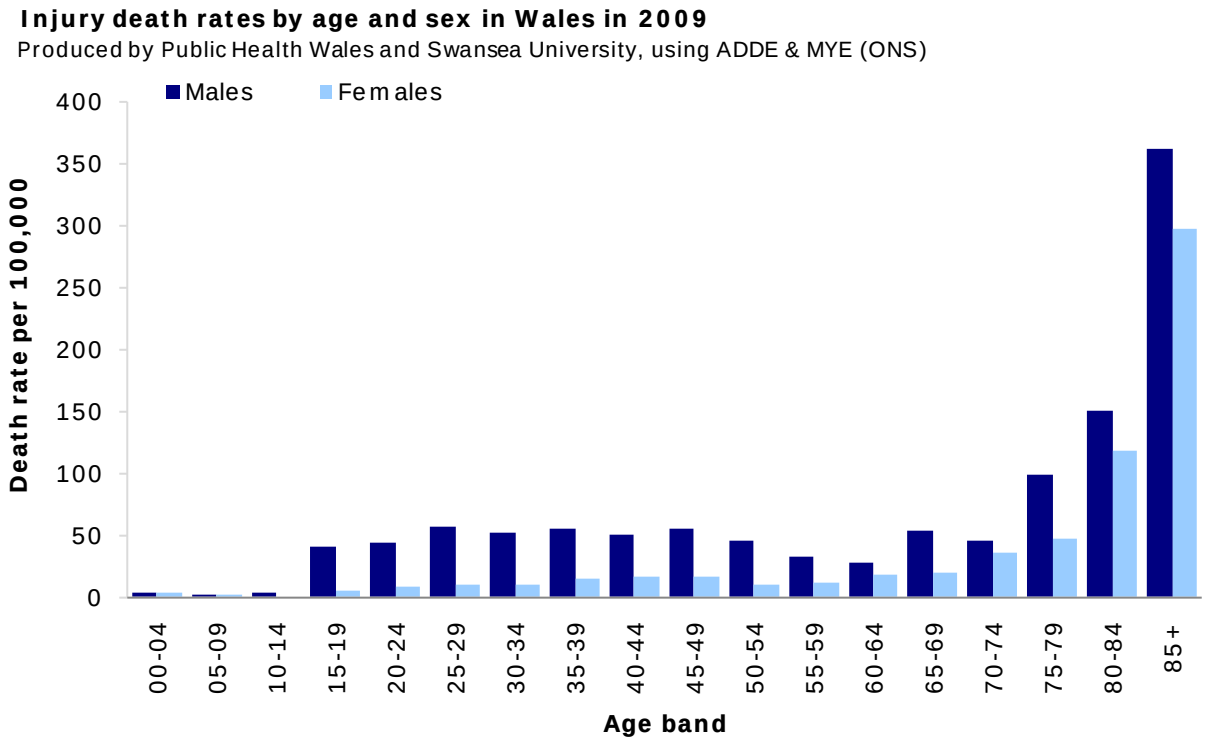
	Deaths (%)				In-patient admissions (%)				Emergency department attendance (%)			
	Male		Female		Male		Female		Male		Female	
0 to 14	8	(1.1)	4	(1.0)	4,180	(19.1)	2,960	(14.9)	50,590	(21.3)	38,334	(18.5)
15 to 24	89	(12.7)	15	(3.7)	4,194	(19.2)	2,170	(10.9)	49,152	(20.7)	36,298	(17.6)
25 to 59	325	(46.4)	90	(22.4)	8,507	(38.9)	5,211	(26.2)	95,583	(40.3)	77,588	(37.5)
60 to 84	192	(27.4)	143	(35.6)	3,865	(17.7)	5,878	(29.5)	35,629	(15.0)	40,159	(19.4)
85+	86	(12.3)	150	(37.3)	1,144	(5.2)	3,708	(18.6)	6,499	(2.7)	14,415	(7.0)
Total	**700 (100.0)**		**402 (100.0)**		**21,890 (100.0)**		**19,927 (100.0)**		**237,453 (100.0)**		**206,794 (100.0)**	

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

5.1.3 Age and sex death rates

Male death rates, particularly between the ages of 15 and 44, are up to 7 times and significantly higher than females (Appendix 2). After the age of 65, death rates climb rapidly for both sexes, from 20-50 per 100,000 to 300-350 by 85+ years, with the gap between males and females narrowing to the extent that only the 75 to 79 year age group shows a significant difference between male and female rates (Figure 8).

Figure 8



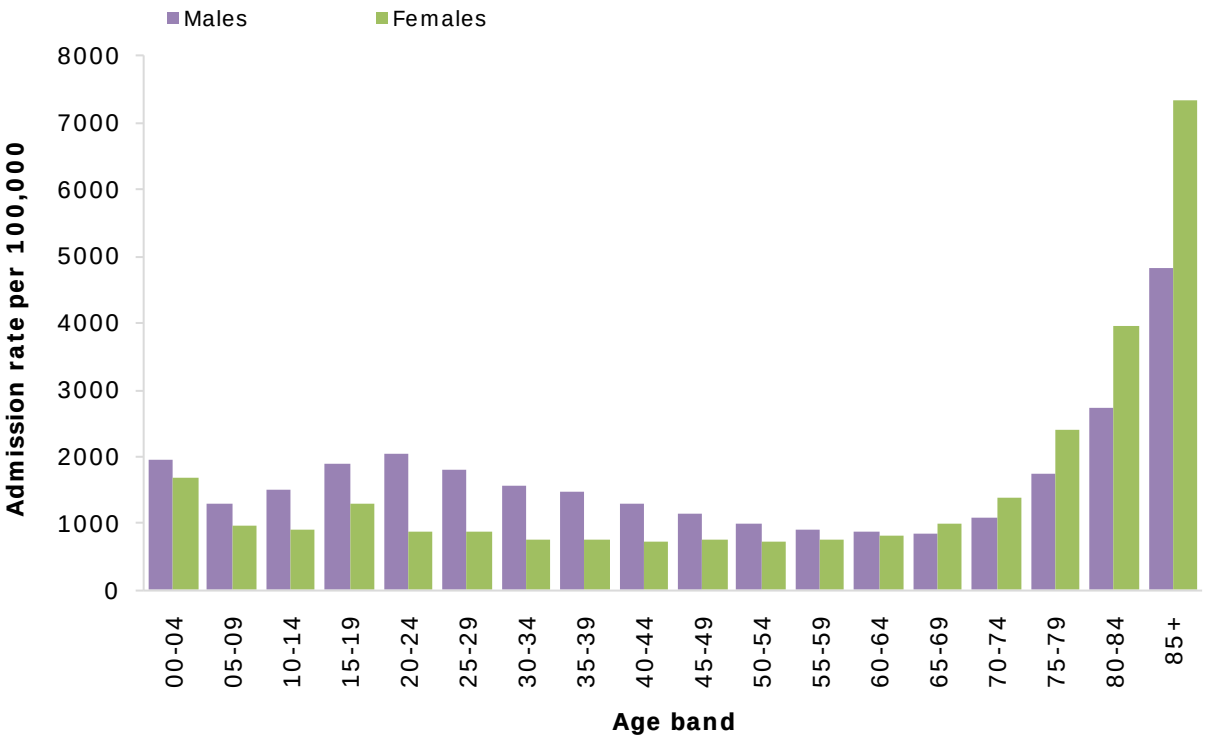
5.1.4 Age and sex inpatient and emergency department rates

IP rates are generally similar to death rates, climbing from 1% at the age of 70 to 5-7% by 85+ years (Figure 9) and with male rates significantly higher than female from 0 to 60 years (Appendix 2). After the age of 65, female rates are significantly higher than those of males. For ED data, incidence is similar for young adults (24% 20 to 24 year males, 18% for 20 to 24 year females) and for 85+ year olds (27%), with male rates consistently, and usually significantly, higher than female rates until the age of 84.

Figure 9

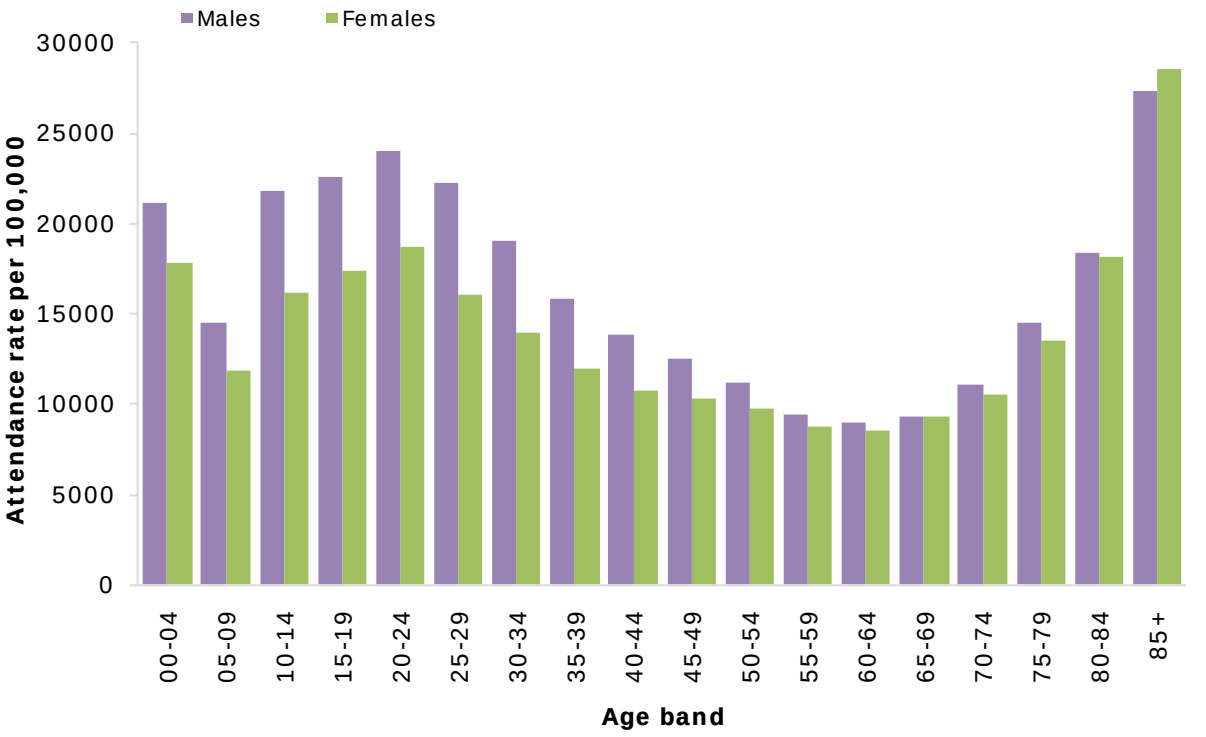
Injury in-patient admission rates by age and sex in Wales in 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)



Emergency Department attendance rates by age and sex in Wales in 2009

Produced by Public Health Wales and Swansea University, using EDDS (NWIS) & MYE (ONS)



5.2 Burden

5.2.1 Sex

The burden of injury for males in Wales is far greater than that for females, particularly for deaths, with the male YLLs 3.2 times higher than females (11,821 v 3649; Table 6). In terms of the overall burden (DALY), 31% is due to YLL in males, but just 17% for females (Figure 9).

Table 6

Burden of injury for males and females, 2009

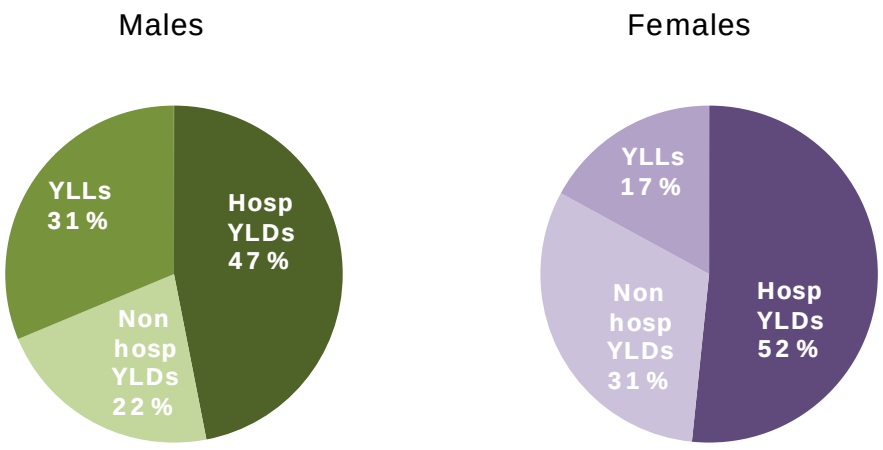
	Hosp YLDs	Non hosp YLDs	YLLs	DALYs
Male	17,723	8,229	11,821	37,774
Female	11,049	6,705	3,650	21,404
Ratio	1.6	1.2	3.2	1.8

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

Figure 10

Burden of injuries in Wales, by sex, 2009

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)



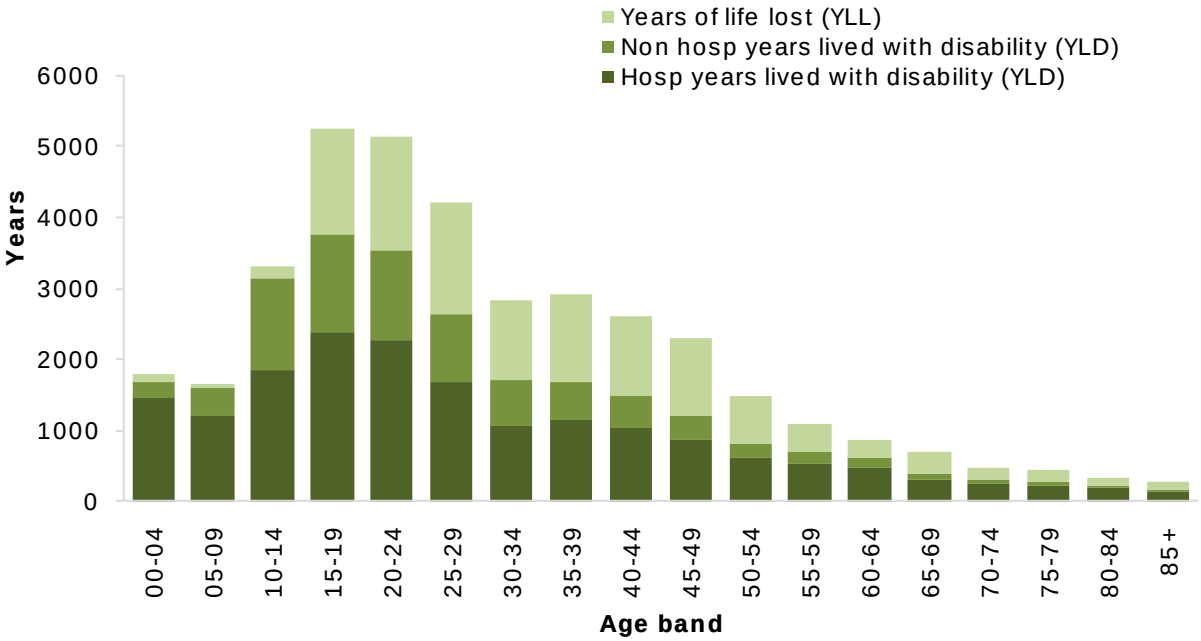
5.2.2 Sex and age

The greatest burden of injury is to 20 to 24 year old males, with over 5000 DALYs (Figure 10). The peak female burden is in the same age group but considerably lower at 2000 DALYs. The burden of injuries is consistently higher for males until the age of 60 (Figure 10).

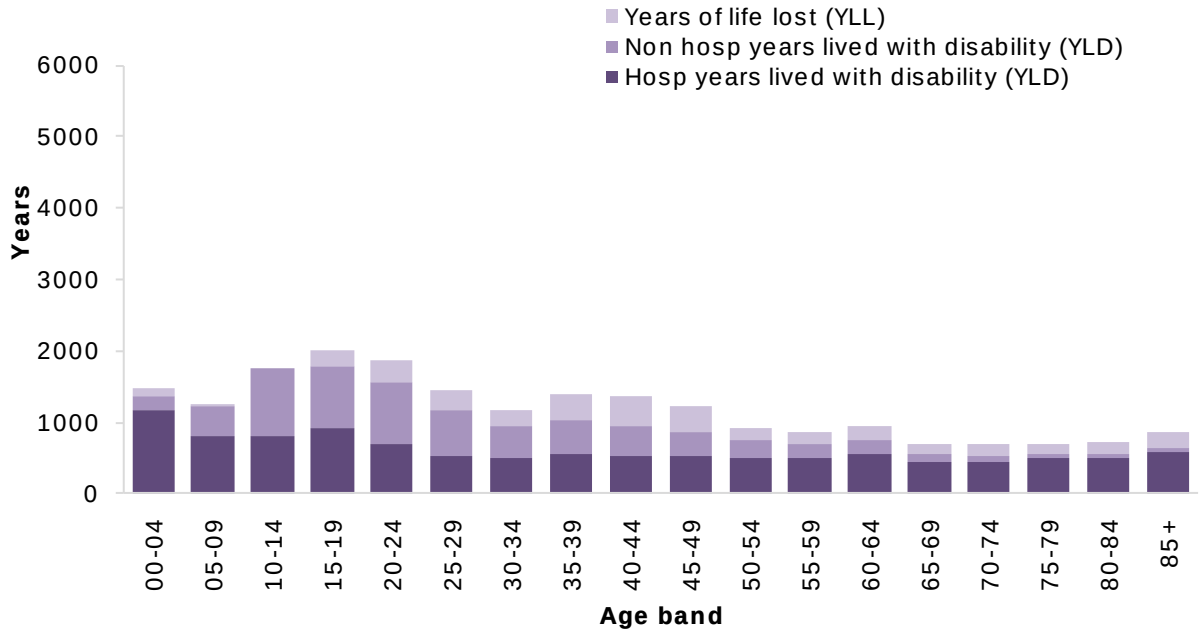
For young males and females, YLL contribute a substantial proportion of the overall burden (see also Appendix 3). Reducing the inequalities gap between males and females across the life span would reduce the number of healthy years of life lost due to injury from around 60,000 to 40,000.

Figure 11

Relative burden of injuries in Wales, by sex and age, 2009, males
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)



Relative burden of injuries in Wales, by sex and age, 2009, females
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)



5.3 Comment

The injury burden on health and health services in Wales is significant and much of it is avoidable.

In addition, substantial inequalities exist, with young males and older females bearing a disproportionate burden.

Reducing injuries and inequalities in these should therefore be a priority. However, injuries have a wide range of causes and effective interventions range from low cost education and intervention to expensive road traffic environment changes and legislative changes. Therefore a coherent, co-ordinated effort that addresses this issue across both sexes, in all age groups and across urban, rural and socio economic areas is necessary.

6 Injuries and Socio Economic Status

6.1 Epidemiology

Injuries are notable for having some of the widest inequalities of any health outcome, a characteristic that is usually linked to environmental factors and therefore provides a sound basis for prevention activity (Stone, 2011).

6.1.1 Deaths

In Wales, in 2009, injury death rates increased with increasing deprivation; rates amongst the most deprived were double, and significantly higher than those of the least deprived (Figure 12, Table 7).

Figure 12

Injury death rates, European age-standardised rates per 100,000 persons, by deprivation fifth, 2009

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS), WIMD 2008 (WG)

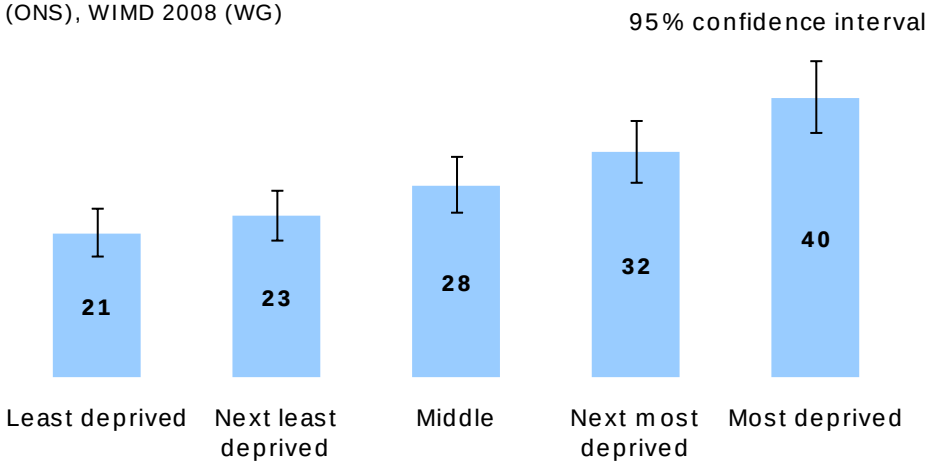


Table 7

Injury deaths, European age-standardised rates per 100,000 and 95% confidence intervals by deprivation fifth

	Deaths	EASR	(95% confidence intervals)
Least deprived	175	21	(18 to 24)
Next least deprived	199	23	(20 to 27)
Middle	230	28	(24 to 32)
Next most deprived	238	32	(28 to 37)
Most deprived	260	40	(35 to 46)
Rate ratio		1.94	(1.57 to 2.38)

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS), WIMD 2008 (WG)

6.1.2 Inpatient admissions

IP admissions also doubled between the most deprived and least deprived (Figure 13, Table 8) and admission rates in each fifth were significantly higher than those in the preceding fifth.

Figure 13

In-patient admission rates due to injury, European age-standardised rates per 100,000 persons, by deprivation fifth, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS), MYE (ONS), WIMD 2008 (WG)

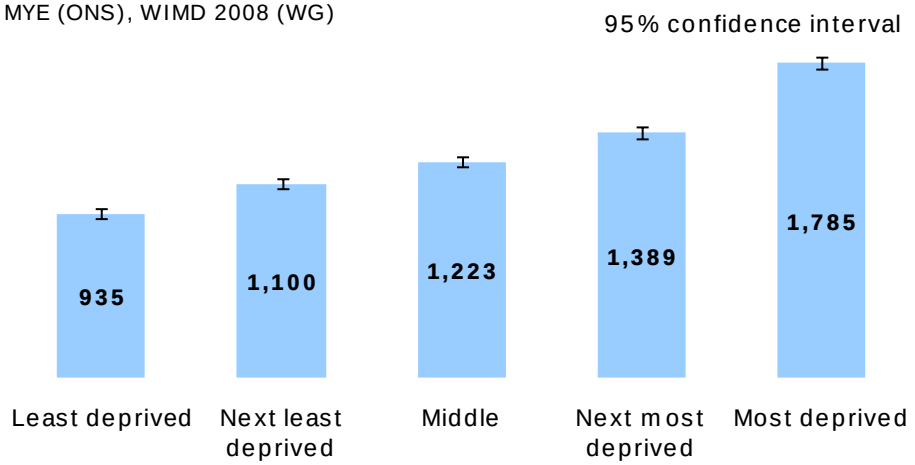


Table 8

In-patient admissions due to injury, European age-standardised rates per 100,000 and 95% confidence intervals by deprivation fifth

	Admissions	EASR	(95% confidence intervals)
Least deprived	6,433	935	(910 to 960)
Next least deprived	7,504	1,100	(1,073 to 1,127)
Middle	8,221	1,223	(1,195 to 1,252)
Next most deprived	8,893	1,389	(1,359 to 1,420)
Most deprived	10,771	1,785	(1,750 to 1,820)
Rate ratio		1.91	(1.85 to 1.97)

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), MYE (ONS), WIMD 2008 (WG)

6.1.3 Emergency department attendances

The ED rates show an unusual pattern; the least deprived had attendance rates significantly higher than both the next least deprived and the middle fifths (Figure 14, Table 9). This may be a true reflection of injury rates amongst the least deprived or it may be a greater tendency to seek medical advice following injury. The pattern of IP admissions (Section 6.1.2), suggest that the least deprived are consulting more often for more minor injuries. This also means that the inequalities gap between the least and most deprived is smaller, at just 40%, than for the deaths or IP data.

Figure 14

Emergency department attendance rates, European age-standardised rates per 100,000 persons, by deprivation fifth, 2009
Produced by Public Health Wales and Swansea University, using EDDS (NWIS), MYE (ONS), WIMD 2008 (WG)

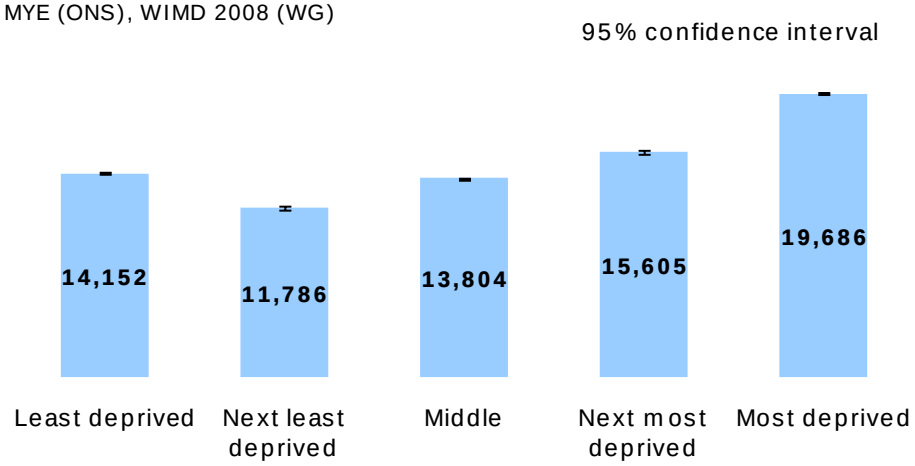


Table 9

Attendances to emergency department, European age-standardised rates per 100,000 and 95% confidence intervals by deprivation fifth

	Attendance to ED	EASR	(95% confidence intervals)
Least deprived	84,960	14,152	(14,052 to 14,253)
Next least deprived	70,218	11,786	(11,695 to 11,878)
Middle	83,279	13,804	(13,706 to 13,902)
Next most deprived	92,156	15,605	(15,502 to 15,709)
Most deprived	113,634	19,686	(19,569 to 19,803)
Rate ratio		1.39	(1.38 to 1.40)

Produced by Public Health Wales and Swansea University, using EDDS (NWIS), MYE (ONS), WIMD 2008 (WG)

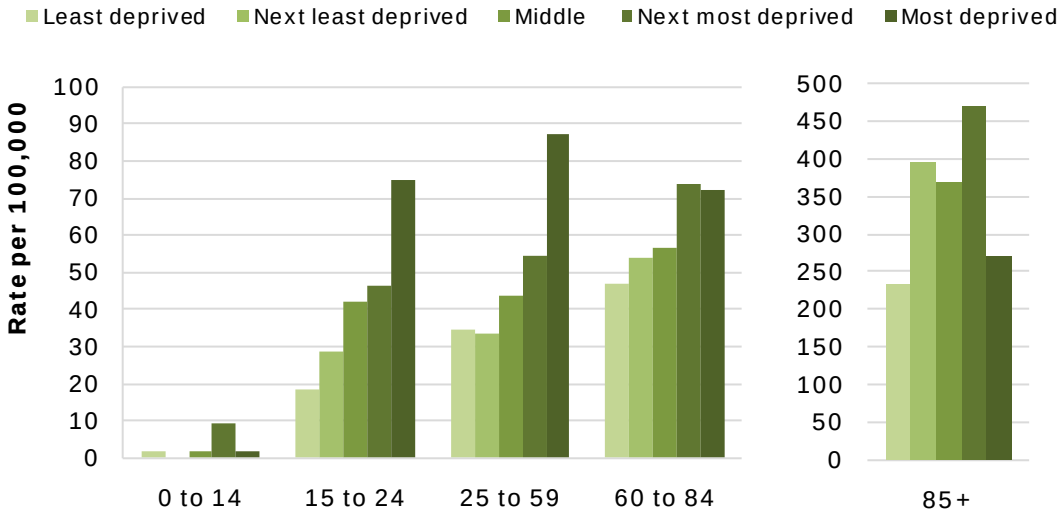
6.2 Epidemiology age and sex

6.2.1 Deaths

Inequalities in death rates are reflected in substantial deprivation gradients for all males (ratio most to least deprived 2.0) and males aged 15 to 84 years (Table 10; Figure 15; Appendix 4). Inequalities are greatest amongst 15 to 24 year olds where death rates amongst the most deprived are 4 times, and significantly, higher than the least deprived. Above the age of 60, there is no significant difference between the most deprived and least deprived for either men or women.

Figure 15

Age-specific death rates by deprivation fifth, males, 2009
Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS), WIMD 2008 (WG)

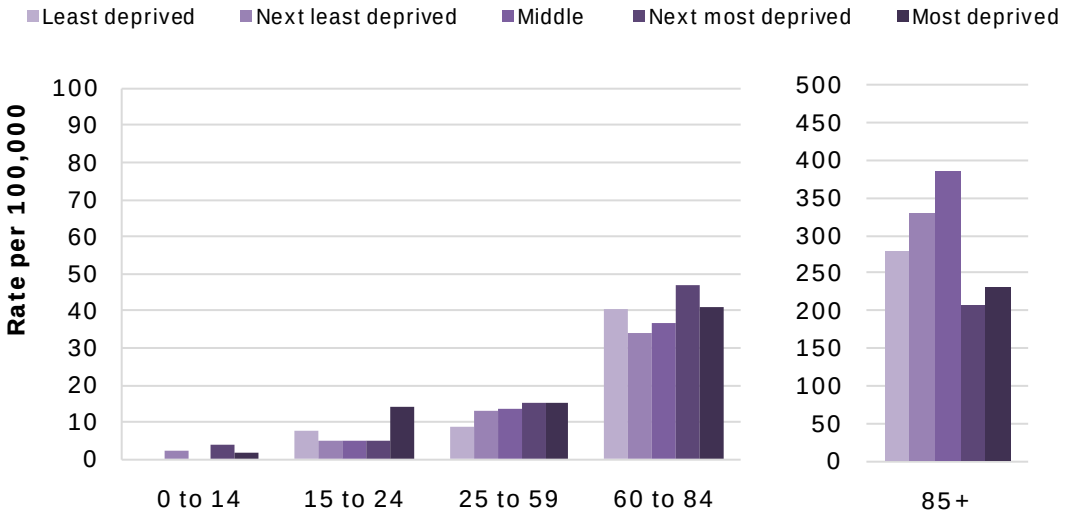


Note that the y-axis scale is different for the 85+ age group

Female gradients are generally smaller and less consistent, partly because of lower death rates, peaking at 1.9 times in 15 to 24 year olds (not significant), with a finding across all ages of no gradient (Figure 16, Table 10, Appendix 4).

Figure 16

Age-specific death rates by deprivation fifth, females, 2009
Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS), WIMD 2008 (WG)



Note that the y-axis scale is different for the 85+ age group

Table 10

Death rate ratios, most deprived to least deprived (95% confidence intervals)

	Male		Female	
0 to 14	0.86	(0.05 to 13.78)	-	-
15 to 24	4.00	(1.84 to 8.70)	1.86	(0.47 to 7.44)
25 to 59	2.55	(1.80 to 3.61)	1.73	(0.85 to 3.54)
60 to 84	1.52	(0.95 to 2.43)	1.00	(0.59 to 1.69)
85+	1.17	(0.53 to 2.62)	0.81	(0.46 to 1.41)
All	2.02	(1.58 to 2.58)	0.99	(0.72 to 1.37)

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS), WIMD 2008 (WG)

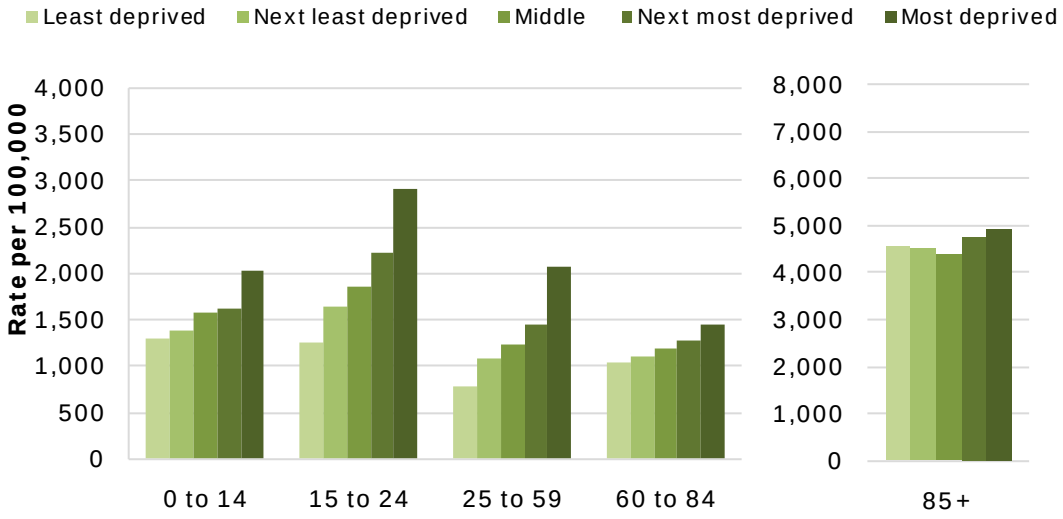
6.2.2 Inpatient admissions

In-patient data show more consistent gradients across all ages for males and females (Figure 17, Figure 18, Table 11, Appendix 4), with the exception of the 85+ year group where little or no gradient exists. The biggest variation is amongst the 25 to 29 year old males where the most deprived have admission rates 2.6 times higher than the least deprived. This is followed by the 15 to 24 year old males and 25 to 59 year old females for whom the most deprived rates are 2.3 times higher than for the least deprived.

The consistency with the deaths data would tend to suggest that these data reflect variations in actual injury rates across the deprivation fifths. However, there is some evidence to show that those in the most deprived areas are more likely to be admitted to hospital following injury (Beattie et al, 1998; Kendrick, 1993).

Figure 17

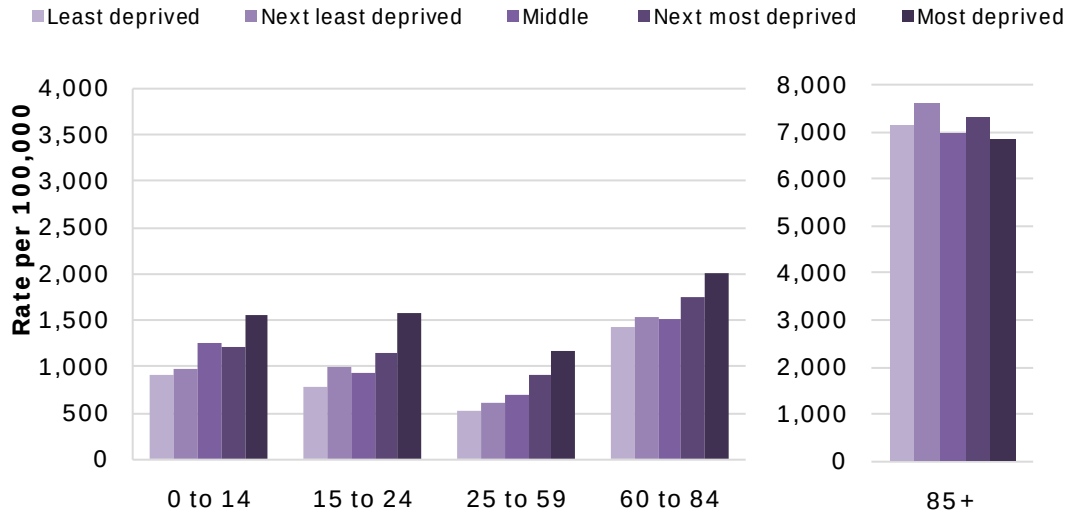
Age-specific in-patient admission rates by deprivation fifth, males, 2009
Produced by Public Health Wales and Swansea University using, PEDW (NWIS) MYE (ONS), WIMD 2008 (WG)



Note that the y-axis scale is different for the 85+ age group

Figure 18

Age-specific in-patient admission rates by deprivation fifth, females, 2009
Produced by Public Health Wales and Swansea University using, PEDW (NWIS) MYE (ONS), WIMD 2008 (WG)



Note that the y-axis scale is different for the 85+ age group

Table 11

In-patient admission rate ratios, most deprived to least deprived (95% confidence intervals), 2009

	Male		Female	
0 to 14	1.58	(1.44 to 1.74)	1.72	(1.54 to 1.94)
15 to 24	2.28	(2.06 to 2.52)	2.00	(1.75 to 2.29)
25 to 59	2.67	(2.48 to 2.87)	2.31	(2.11 to 2.52)
60 to 84	1.40	(1.27 to 1.55)	1.40	(1.30 to 1.52)
85+	1.11	(0.92 to 1.33)	0.93	(0.84 to 1.03)
All	1.99	(1.90 to 2.07)	1.55	(1.48 to 1.62)

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) MYE (ONS), WIMD 2008 (WG)

6.2.3 Emergency department attendances

The u-shaped pattern of ED attendances is consistent across all age groups and both sexes (Figure 19, Figure 20, Table 12, Appendix 4). It is more pronounced amongst the 85+ group and generally has the effect of dampening the deprivation gradient. With the reasons for these profiles being unclear, interpretation is very difficult.

Figure 19

Age-specific emergency department attendance rates by deprivation fifth, males, 2009

Produced by Public Health Wales and Swansea University using, EDDS (NWIS) MYE (ONS), WIMD 2008 (WG)

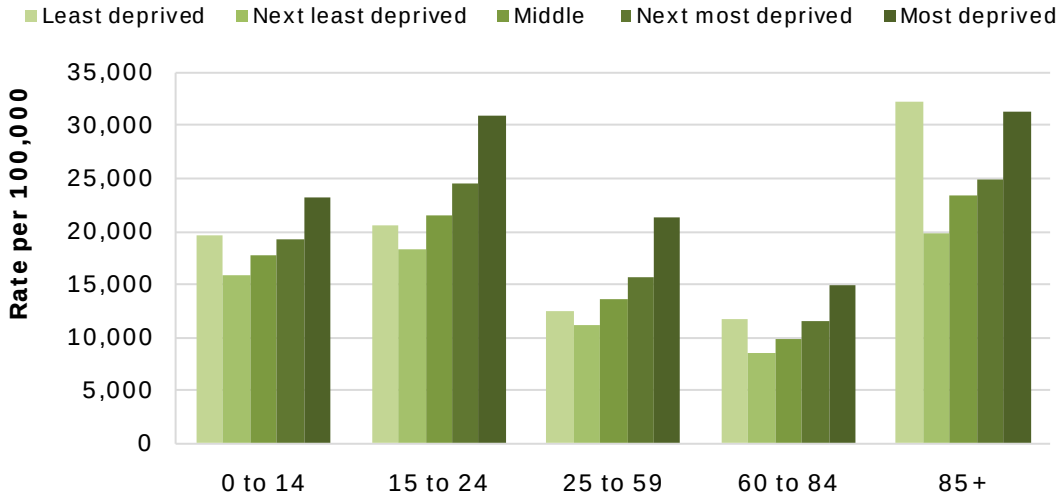


Figure 20

Age-specific emergency department attendance rates by deprivation fifth, females, 2009

Produced by Public Health Wales and Swansea University using, EDDS (NWIS) MYE (ONS), WIMD 2008 (WG)

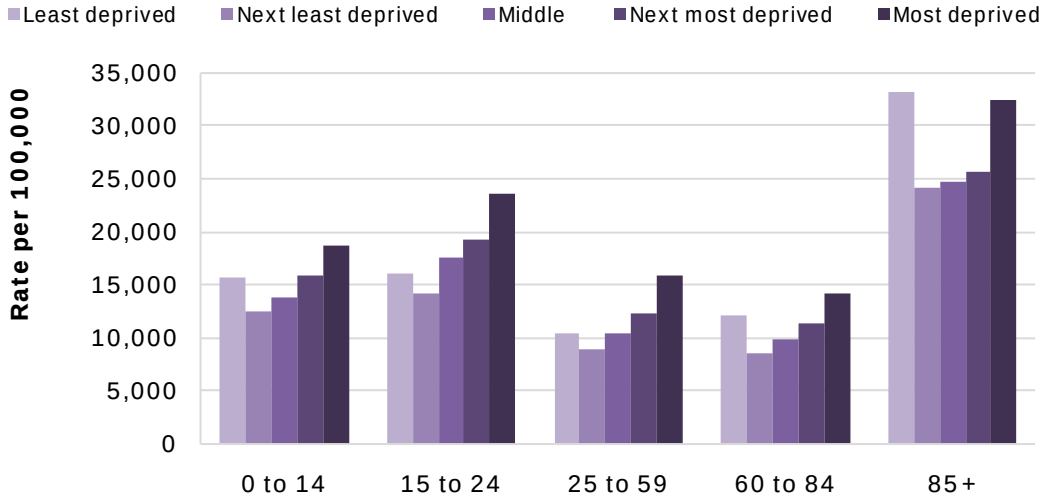


Table 12

Emergency department attendance rate ratios, most deprived to least deprived (95% confidence intervals), 2009

	Male		Female	
0 to 14	1.18	(1.16 to 1.21)	1.20	(1.17 to 1.23)
15 to 24	1.50	(1.46 to 1.53)	1.43	(1.39 to 1.47)
25 to 59	1.73	(1.70 to 1.77)	1.53	(1.50 to 1.56)
60 to 84	1.27	(1.23 to 1.31)	1.17	(1.14 to 1.20)
85+	0.99	(0.93 to 1.05)	0.95	(0.91 to 0.99)
All	1.47	(1.46 to 1.49)	1.34	(1.32 to 1.35)

Produced by Public Health Wales and Swansea University, using EDDS (NWIS) MYE (ONS), WIMD 2008 (WG)

6.3 Burden

According to all measures, the most deprived suffer a greater burden than all other groups (Figure 21, Table 13), particularly in terms of YLLs, where the burden is more double that of the least deprived (2018 v 4600).

Figure 21

Burden of injury by deprivation fifth, 2009
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), WIMD 2008 (WG)

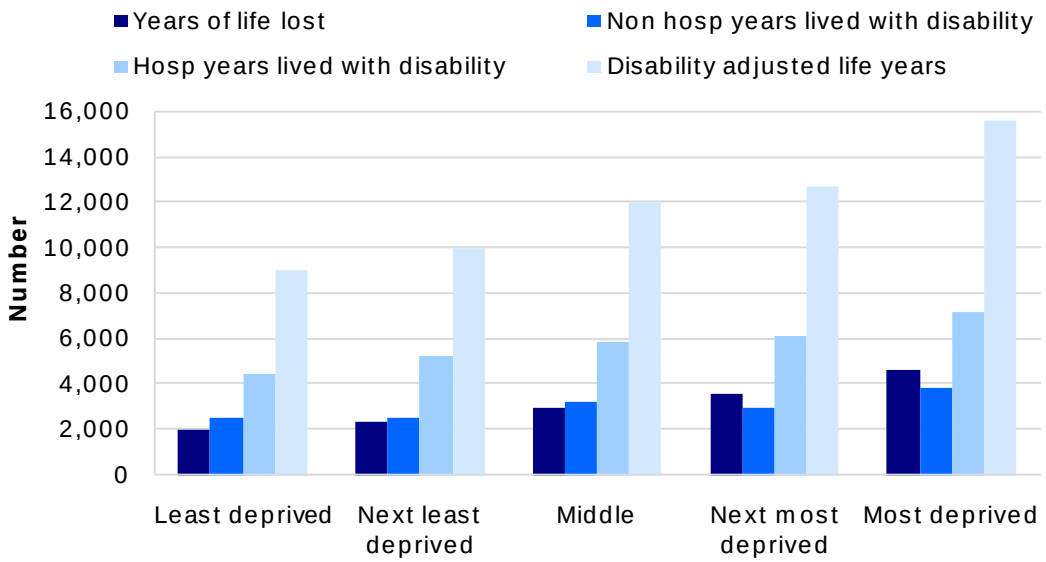


Table 13

Burden of injury by deprivation fifth, 2009

	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years
Least deprived	4,462	2,483	2,018	8,963
Next least deprived	5,211	2,487	2,308	10,006
Middle	5,851	3,222	2,947	12,019
Next most deprived	6,083	2,963	3,599	12,644
Most deprived	7,167	3,780	4,600	15,547
Total	**28,774**	**14,934**	**15,471**	**59,179**
Ratio	1.6	1.5	2.3	1.7

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), WIMD 2008 (WG), ADDE (ONS)

The burden of injury to males in the most deprived fifth (therefore 1/10th of the population) is 1/6th (10340 of 59179) of the total DALYs lost to injury. In addition, the male burden of injury is greater than that for females in all deprivation fifths and the gap between males and females widens with increasing deprivation, from 1.5 to 2.0 (Table 14). Finally, the burden of DALYs for females is lower in all deprivation fifths than the burden for males in the least deprived fifth.

Table 14

Summary burden of injury (disability adjusted life years (DALYs)) by deprivation fifth for males and females, 2009

	Male	Female	Rate ratio (males v females)
Least Deprived	5,417	3,546	1.5
Next Least Deprived	6,085	3,921	1.6
Middle	7,647	4,372	1.7
Next Most Deprived	8,285	4,360	1.9
Most Deprived	10,340	5,207	2.0
Rate ratio (least v most deprived)	1.9	1.5	

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), WIMD 2008 (WG)

Analysis of DALYs by age group and sex found that inequalities between the most and least deprived were greater for females aged 0 to 14 years than they were for males of a similar age. However, the magnitude of the burden was still higher for males (Appendix 5). The relative burden was greater for males in the 15 to 24 and 25 to 59 year groups where the most deprived had 2.2 times the DALYs that the least deprived had, compared with 1.5 to 1.6 times difference for females.

7 Summary of injuries by type

7.1 Epidemiology

7.1.1 Deaths

Of the 1100 injury deaths per year in Wales, almost half (n=489, 44%) are reported to be due to other or unspecified causes (Table 15). This is of concern since it raises questions about data quality and suggests that the true profile of injury deaths could be very different from that shown. This again highlights the need to improve data collection.

Of the classified causes of injury death, the majority are due to falls (22.9%, rate = 8.4 per 100,000), followed by poisonings (14.2%, rate 5.2) and MVTCs (11.4%, rate 4.2).

Table 15

Deaths and death rates per 100,000 by cause, 2009

	No. Deaths	% of all injury deaths	Crude Rate	EASR	(95% confidence intervals)
MVTC	126	11.4	4.2	4.0	(3.3 to 4.8)
Fall	252	22.9	8.4	4.9	(4.2 to 5.6)
Drowning	31	2.8	1.0	0.9	(0.6 to 1.3)
Burns	29	2.6	1.0	0.7	(0.5 to 1.1)
Firearm	5	0.5	0.2	-	-
Cut / pierce	11	1.0	0.4	-	-
Struck by / against	2	0.2	0.1	-	-
Poisoning	157	14.2	5.2	5.4	(4.5 to 6.3)
Other / unspecified	489	44.4	16.3	12.4	(11.2 to 13.6)
Total	**1,102**	**100.0**	**36.7**	**28.8**	**(27.0 to 30.7)**

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)

7.1.2 Inpatient admissions

The proportion of other / unspecified injuries is much lower for IP data; these improvements in data quality are likely to be linked to the finding that almost half of all IP admissions are fall related (n=20058, rate=668.8; 48% v 23% of deaths; Table 16). MVTCs, however, accounted for just 4% of IP admissions. These variations mean that each MVTC death is associated with 13 IP admissions, whilst each fall death is associated with 80 IP admissions.

Table 16

Numbers of in-patient admissions and rates per 100,000 by cause, 2009

	No. admissions	% of all injury	Crude Rate	EASR	(95% confidence intervals)
MVTC	1,666	4.0	55.5	55.5	(52.8 to 58.3)
Fall	20,058	47.7	668.8	520.4	(512.6 to 528.4)
Drowning	23	0.1	0.8	1.0	(0.6 to 1.4)
Burns	405	1.0	13.5	14.8	(13.4 to 16.4)
Firearm	60	0.1	2.0	2.1	(1.6 to 2.8)
Cut / pierce	2,157	5.1	71.9	76.3	(73.1 to 79.6)
Struck by / against	3,873	9.2	129.1	138.4	(134.0 to 142.9)
Poisoning	7,415	17.6	247.2	263.7	(257.7 to 269.9)
Other / unspecified	6,404	15.2	213.5	223.3	(217.7 to 229.0)
Total	**42,061**	**100.0**	**1,402.4**	**1,295.6**	**(1,282.5 to 1,308.8)**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)

7.1.3 Emergency department attendances

Emergency department attendances are not coded using ICD 10 codes, meaning that classifying causes of injuries in a way that is comparable with IP and deaths data is difficult. In addition, pressures on ED data entry clerks mean that accurately coding causes is difficult (Table 17). However, as with IP and deaths, the majority of classified injuries are falls (10% of all ED attendances, 64% of classified injuries). Therefore every day in Wales at least 120 ED attendances are for the treatment of fall injuries.

Table 17

Number Emergency Department attendances and rates per 100,000 by cause, 2009

	No. ED attendances	% of all attendances	Crude Rate	EASR	(95% confidence intervals)
MVTC	12,933	2.9	431.2	460.8	(452.8 to 468.9)
Fall	44,257	10.0	1,475.6	1,446.5	(1,432.4 to 1,460.7)
Drowning	4	0.0	0.1	-	-
Burns	909	0.2	30.3	34.4	(32.2 to 36.8)
Firearm	8	0.0	0.3	-	-
Cut / pierce	1,635	0.4	54.5	56.8	(54.0 to 59.7)
Struck by / against	7,820	1.8	260.7	280.6	(274.4 to 287.0)
Poisoning	901	0.2	30.0	32.4	(30.3 to 34.6)
Other / unspecified	375,780	84.6	12,528.8	12,684.9	(12,643.0 to 12,727.0)
Total	**444,247**	**100.0**	**14,811.6**	**14,996.9**	**(14,951.3 to 15,042.6)**

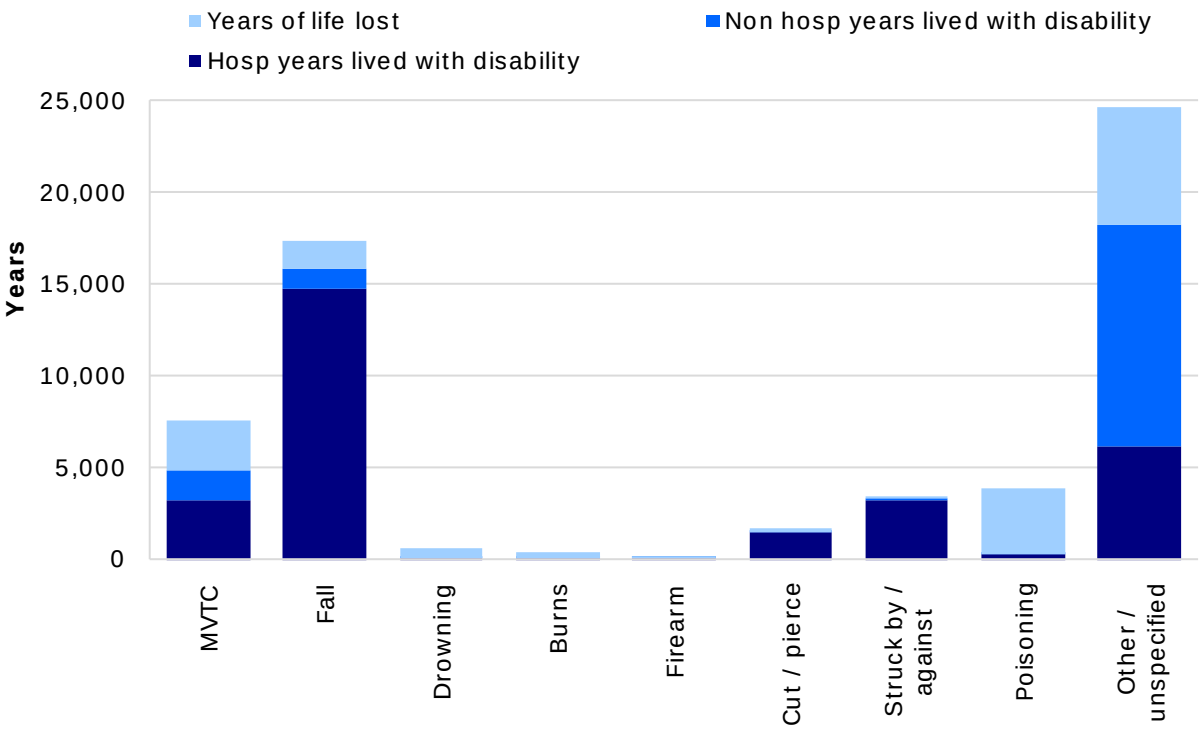
Produced by Public Health Wales and Swansea University, using EDDS (NWIS) & MYE (ONS)

7.2 Burden

Falls are the major cause of injury burden, accounting for 29% of DALYs, mainly associated with IP admissions (Figure 22, Appendix 6). MVTCs account for 13% of all DALYS, but 36% of this burden is associated with YLLs, compared with 8% for falls. There are substantial variations in the relative contributions of the components of the DALY; for poisoning and drowning 90% of the DALY is YLL, for cut / pierce and struck by / against 95% of the DALY is YLD. However, given the large proportion of deaths and ED records coded other, these data should be regarded as a lower estimate of the true burden associated with each specific cause.

Figure 22

Burden of injury by cause, Wales, 2009
Produced by Public Health Wales Observatory, using PEDW (NWIS) & ADDE (ONS)



8 Motor vehicle traffic crash injuries

Motor vehicle traffic crash injuries are a leading cause of death and disability across the globe. With increasing use of cars, particularly in the developing world, and greater control of communicable disease therefore decreasing the burden of disease, the global burden of road traffic crash injuries is projected to rise. Murray and Lopez (1997) predicted that MVTCs would rise from 9 to 6 in the leading causes of death between 1990 and 2020. An alternative, more recent assessment, has suggested that between 2002 and 2030, MVTCs will rise from 10 to 8 on the leading causes of death and from 8 to 4 in terms of the leading causes of burden of disease (Mathers and Loncor, 2006).

The data in this section refer only to MVTCs; there is no analysis by road user group.

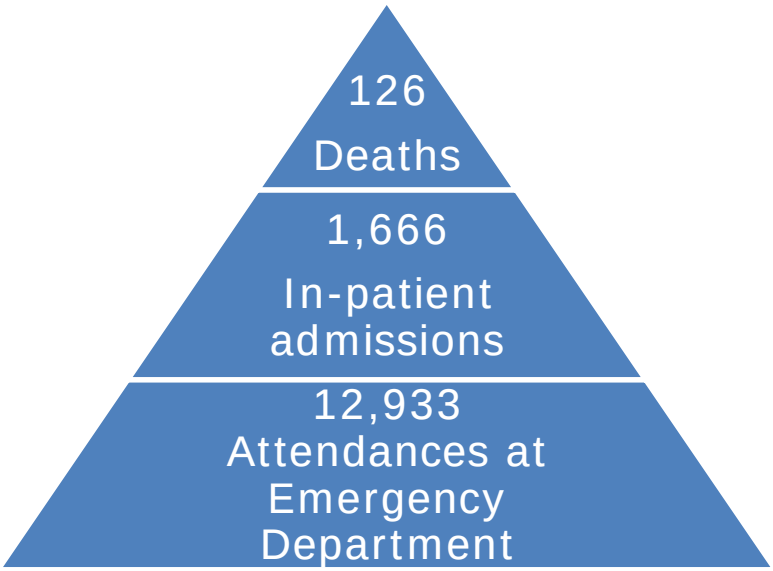
8.1 Epidemiology

8.1.1 Numbers

In 2009, 126 people were killed on the roads in Wales, with almost 15,000 casualties, in total, according to health service based data (Figure 23).

Figure 23

Summary estimate of epidemiology of road traffic crashes in Wales in 2009
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)



This is similar to the data presented in 2002, when deaths and injuries on the roads, based on STATS19 data, were reported to stand at around 14,400 (CAPIC, 2002). However, current official UK Government data based on STATS19 police road crash records show that 125 people were killed, 1096 seriously injured and 9133 suffered slight injuries, a total of 10,354 killed or injured; a third lower than that reported by health services[vii]. Therefore while much is made in official statistics of decreasing numbers of deaths and injuries on the roads, any changes that may have occurred may be much smaller than has been suggested.

Discrepancies between police and hospital MVTC data have been reported previously, both in the UK and internationally (Ward et al, 1994; Joly et al, 1991). In addition, in Wales during 1999 there were 14350 MVTCs reported by STATS 19. During the same year, AWISS reported that more than 16000 MVTC casualties were treated in just 12 of the 17 EDs in Wales (National Assembly for Wales, 2003)

STATS19 data suggest that police report 1/3 fewer casualties than hospital data. However, the overlap between the police and hospital data is likely to be far lower than 100%. This means that rather than the police reporting one third fewer casualties, they could actually be reporting half the number of casualties that the health data are. It is also well known that specific types of crashes are under-reported, for example, child pedestrian injuries and injuries to young adults (Henson et al, 1999; Morrison and Stone, 2000).

Further discussion of this issue is beyond the scope of this document.

8.1.2 Rates

Death and injury rates from MVTCs are consistently higher for males than females (deaths n=93 v 33, rate 6.4 v 2.2; IP n=1096 v 570, rate 74.8 v 37.2; Figure 24, Appendix 7).

The peak ages for MVTC deaths and injuries are around 15 to 29 years, with a secondary peak in over 75 year olds. Further analysis is needed to identify specific appropriate interventions, based on the casualty profiles. It is likely that the high rates in young adults are linked to driver and passenger casualties in crashes involving new drivers. Amongst older adults, casualties are often the drivers themselves and their passengers.

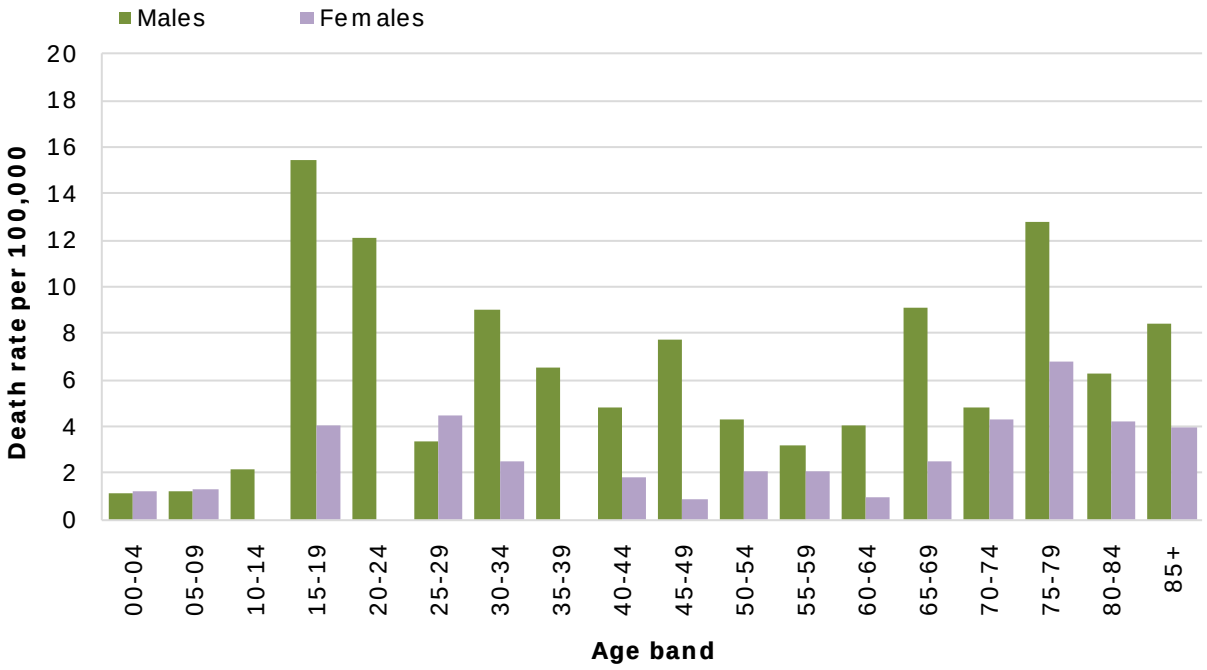
Emergency department profiles are affected by the large proportion of other and unclassified ED attendances and the true MVTC rates are likely to be higher.

[vii] http://wales.gov.uk/topics/statistics/headlines/transport2010/100624/?lang=en.

Figure 24

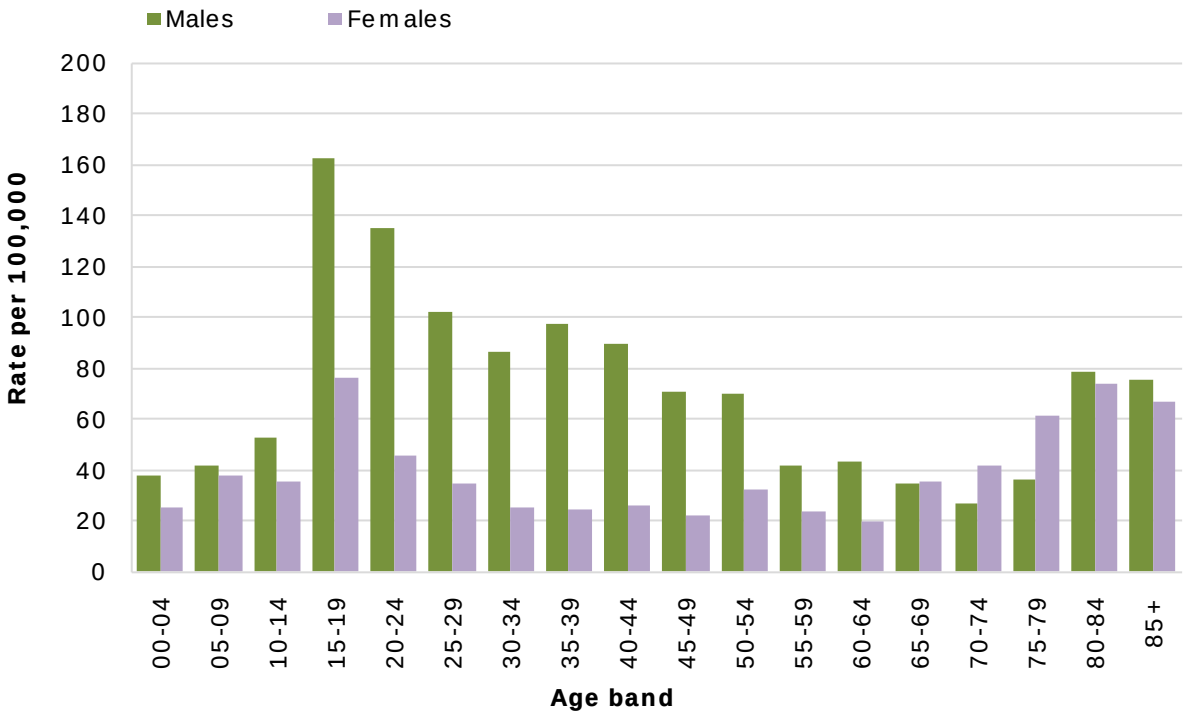
MVTC fatality rates by age and sex, 2009

Produced by Public Health Wales Observatory and Swansea University, using ADDE & MYE (ONS)

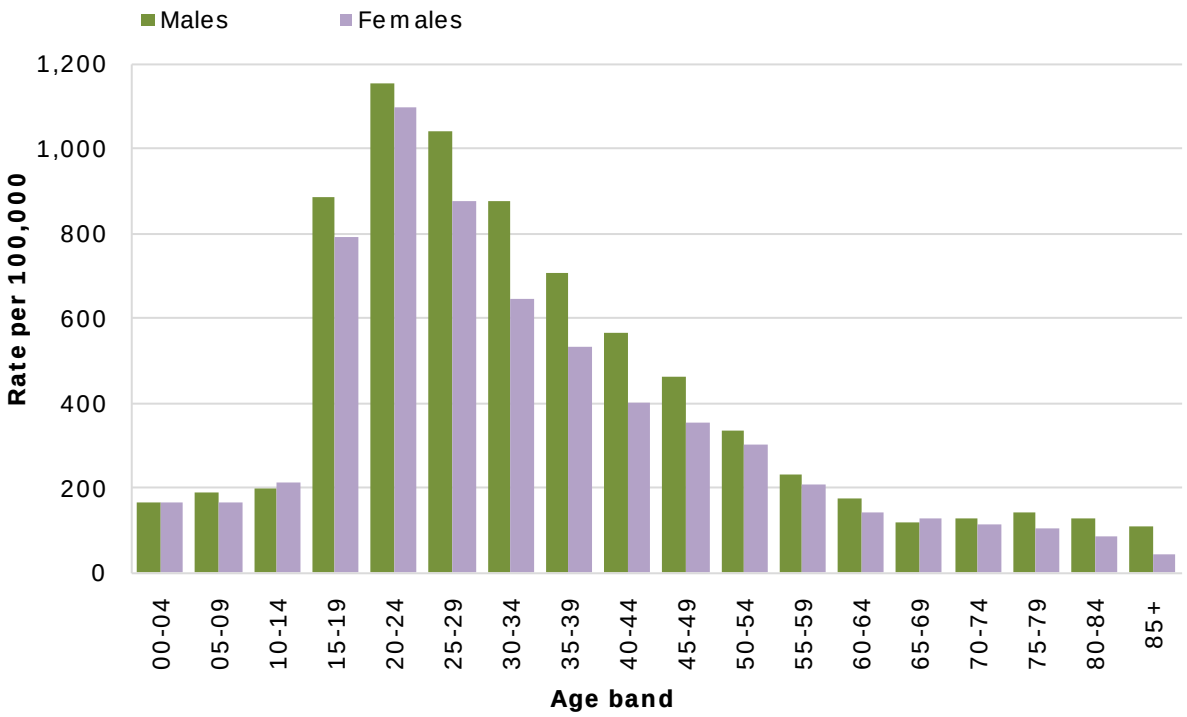


MVTC admission rates by age and sex, 2009

Produced by Public Health Wales Observatory and Swansea University, using PEDW (NWIS) & MYE (ONS)



MVTC Emergency Department attendance rates by age and sex, 2009
Produced by Public Health Wales Observatory and Swansea University, using EDDS (NWIS) & MYE (ONS)



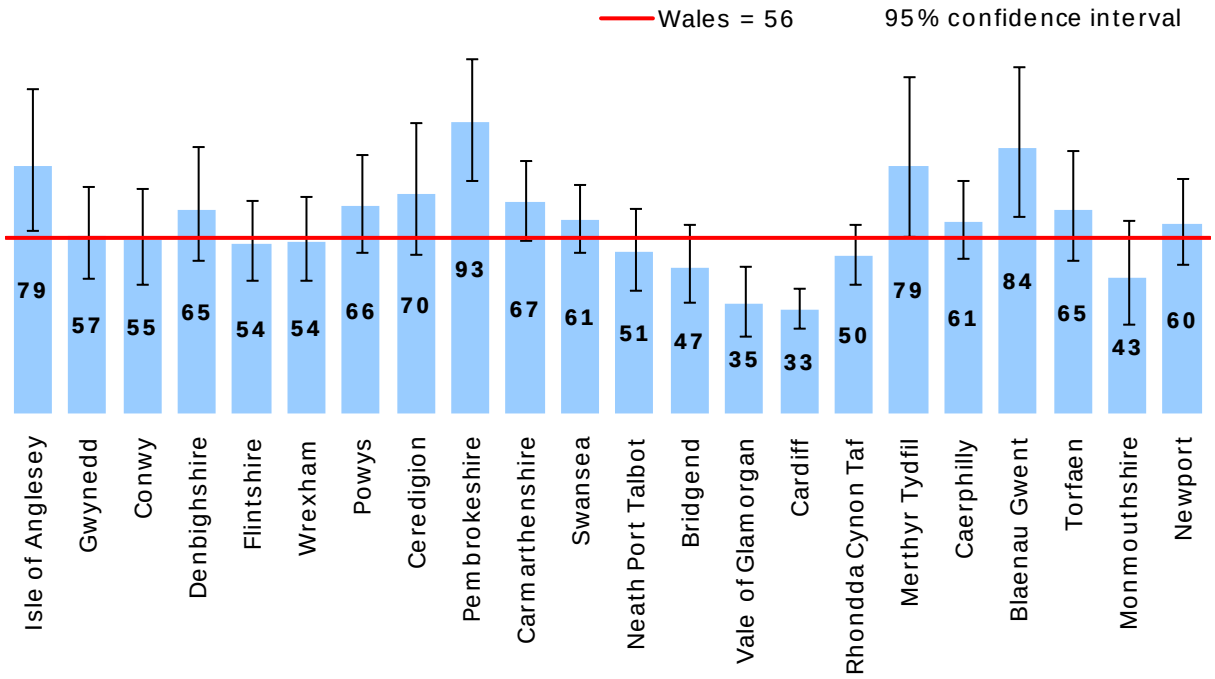
8.1.3 Local authority profiles

Pembrokeshire has the highest MVTC IP rates in Wales (93, Figure 25, Appendix 7), followed by Blaenau Gwent (84). Rates in both areas were significantly higher than the All Wales rate. Lowest rates, and significantly below all Wales were in Cardiff (33) and the Vale of Glamorgan (35).

The variations in injury rates across these areas are likely to be linked to a number of factors, including access to hospital, admission policy, road network type, rurality and deprivation (Milner et al, 1988; Chambers and Johnson, 1986; Beattie et al, 1998; Kendrick, 1993; RoSPA, 2002; Christie, 1995).

Figure 25

MVTC in-patient admission rates, European age-standardised rate per 100,000 and 95% confidence intervals, by local authority, 2009
Produced by Public Health Wales and Swansea University, PEDW (NWIS) & MYE (ONS)



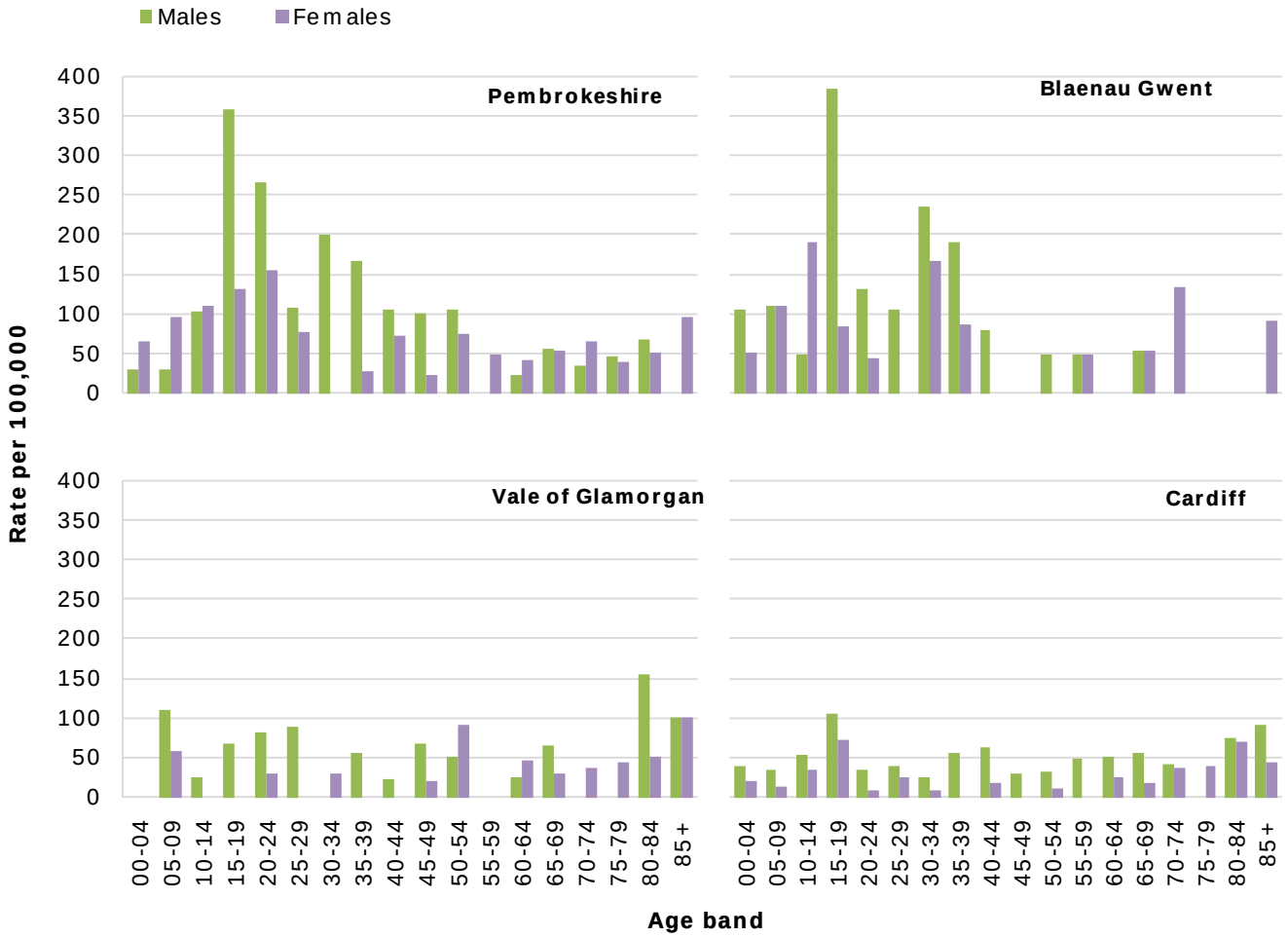
Looking solely at the LAs with the highest and the lowest rates, it is clear that in Pembrokeshire and Blaenau Gwent, MVTC injury rates amongst 15 to 39 year olds are far higher than the same age groups in Cardiff and the Vale of Glamorgan; 15 to 19 year old male rates are 359 per 100,000 in Pembrokeshire, 384 in Blaenau Gwent, 68 in the Vale and 105 in Cardiff (Figure 26).

Although these data cover all MVTC types, the patterns here suggest that interventions targeting newer drivers could have a significant impact on MVTCs in Pembrokeshire and Blaenau Gwent in particular, narrowing these inequalities in injury rates.

Figure 26

Local authority areas with the highest and lowest MVTC in-patient admission rates per 100,000, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) and MYE (ONS)



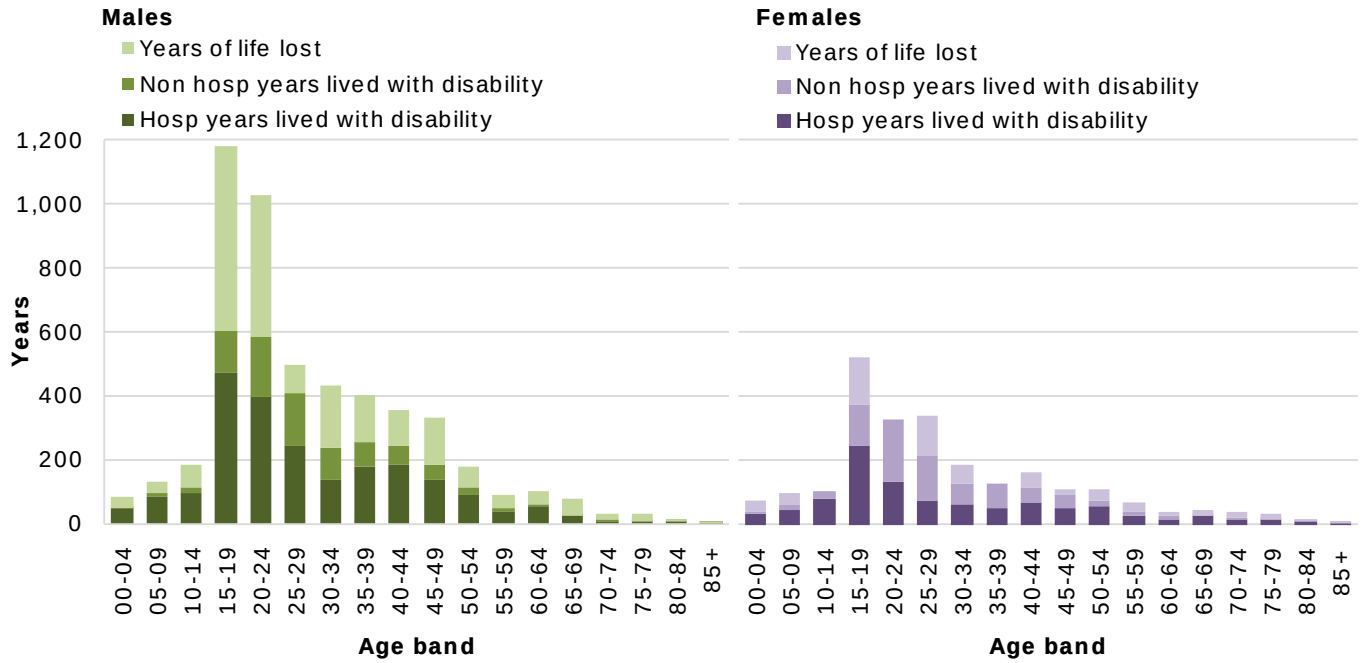
8.2 Burden

The excess burden of MVTCs in young males is predominantly associated with premature YLL, with around half of the total DALY (almost 1200) burden being YLL (around 600; Figure 27; Appendix 8). Males aged 15 to 24 years also suffered around 2,200 MVTC DALYs, compared with a total of 2,400 for all females. The steep change in burden in both groups occurs in the 15 to 19 year group, the age range when driving begins.

Figure 27

Relative burden of MVTC injuries in Wales, by sex and age, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)



8.3 Evidence of effectiveness

Intervention / risk factor	Evidence
Street lighting This review concluded that street lighting may prevent MVTCs, injuries and fatalities. The pooled rate ratio comparing total crashes in lit areas with similar un-lit areas was 0.45 (95% CI 0.29-0.69) and for injury crashes, was 0.78 (95% CI 0.63-0.97). This evidence should be carefully considered when LAs are considering turning off street lighting to reduce costs and carbon emissions. Study assessment: 10/10 (strong)	Beyer F.R. and Ker K. (2009). Street lighting for preventing road traffic injuries (Review). *Cochrane Database of Systematic Reviews,* 2009, Issue 1. Art. No.: CD004728. DOI: 10.1002/14651858.CD004728.pub2
Traffic calming Area wide traffic calming may reduce road traffic deaths and injuries. The review found statistically significant improvements in all road traffic injuries (pooled rate ratio 0.85, 95% CI 0.75-0.96) associated with traffic calming. MVTCs were also generally reduced (pooled rate ratio 0.89, 95% CI 0.76-1.05). There was no significant effect on deaths (pooled rate ratio 0.79, 95% CI 0.23-2.68). Study assessment: 10/10 (strong)	Bunn F. *et al* (2003). Area-wide traffic calming for preventing traffic related injuries (Review). *Cochrane Database of Systematic Reviews,* 2003, Issue 1. Art. No.: CD003110. DOI: 10.1002/14651858.CD003110.
Speed limit enforcement Road fatalities in Norway could be reduced by around 25% if drivers observed the speed limit. Based on these assumptions researchers in Sweden calculated that their road fatalities could be reduced by 34%. It is estimated that 50% of drivers break speed limits and that enforcement cannot be achieved by traditional policing. However using average speed cameras can improve compliance on longer sections of road. Study Assessment: 3/10 (weak)	Elvik R. (2012). Speed limits, enforcement and health Consequences. *Annual Review of Public Health,* 33: 225-38.

Booster seats Interventions for promoting use of booster seats among 4 to 8 year olds increased use by 43% (RR 1.43; 95% CI 1.05-1.96). Free booster seats plus education had the strongest effect (RR 2.34; 95% CI 1.50-3.63). Programmes involving incentives (booster seat discount coupons or gift certificates) combined with education of parents were also beneficial (RR 1.32, 95% CI 1.12-1.55), as were education only interventions (RR 1.32; 95% CI 1.16-1.49). Study assessment: 10/10 (strong)	Ehiri J.E. *et al* (2006). Interventions for promoting booster seat use in four to eight year olds travelling in motor vehicles (review). *Cochrane Database of Systematic Reviews,* 2006, Issue 1. Art. No.: CD004334. DOI: 10.1002/14651858.CD004334.pub2
Safety belt interventions This review examined a number of elements. The introduction of safety belt legislation resulted in a median reduction of 5% in fatal and non-fatal injuries. Enhanced enforcement of safety belt laws resulted in a median 9% increase in safety belt use. This review did not examine the repeal of safety belt laws. Study assessment: 5/10 (moderate)	Dinh-Zarr T.B. *et al* (2001). Reviews of evidence regarding interventions to increase the use of safety belts. *American Journal of Preventive Medicine,* 21(4S): 48-65.
Car restraints for children The authors of this study advise caution in interpreting the results of their review due to the variable quality of the studies involved. There is evidence to support community based interventions aimed at increasing the use of child car restraints; a programme of legislation, targeted education and a mass media campaign showed that the odds of motor vehicle occupant injury was 3 times higher pre-intervention, compared with post (odds ratio 2.78). A targeted education and mass media campaign approach reduced risk of injury by between 33% and 55%. Study assessment: 8/10 (strong)	Turner C. *et al* (2005). Community-based programs to promote car seat restraints in children 0-16 years – a systematic review. *Accident Analysis and Prevention*, 37: 77-83.

Cycle helmets for children This study reviewed the interventions that work best at encouraging cycle helmet use by the young. Community based interventions (OR 4.30, 95% CI 2.24 to 8.25) and those that provide free helmets are most effective (OR 4.35, 95% CI 2.13-8.89), followed by school based interventions, (OR 1.73, CI 95% 1.03-2.91). Interventions delivering education and free helmets worked better than education only. Interventions targeting children under 12 years old had a statistically significant impact, but those targeting over 12s did not. Study assessment: 10/10 (strong)	Owen R. *et al* (2011). Non-legislative interventions for the promotion of cycle wearing by children (Review). *Cochrane Database of Systematic Reviews,* 2011, Issue 11. Art. No.: CD003985. DOI: 10.1002/14651858.CD003985.pub3.
Speed cameras There is sufficient evidence to support the view that speed cameras are effective at reducing speed and the numbers of MVTC injuries and deaths. Due to the mix of evidence available the magnitude of this positive effect cannot be calculated. However in the vicinity of cameras the pre to post reductions in crashes ranged from 8% to 49% and for serious and fatal crashes from 11% to 44%. Study assessment: 10/10 (strong)	Wilson C. *et al* (2010). Speed cameras for the prevention of road traffic injuries and deaths (Review). *Cochrane Database of Systematic Reviews.* 2010, Issue 11. Art. No.: CD004607. DOI: 10.1002/14651858.CD004607.pub4.
Bicycle helmet legislation This review found that legislating bicycle helmet use increased the use of helmets and reduced the incidence of head injuries sustained by cyclists. In one study in Canada, a 45% reduction in head injuries was reported in provinces following the enactment of legislation. This reduction was statistically significant when compared with a 27% reduction in head injuries in similar areas that did not have such legislation. Study assessment: 10/10 (strong)	Macpherson A. and Spinks A. (2008). Bicycle helmet legislation for the uptake of helmet use and prevention of head injuries (Review). *Cochrane Database of Systematic Reviews.* 2008, Issue 3. Art. No.: CD005401. DOI: 10.1002/14651858.CD005401.pub3.

Adolescent drivers The authors conclude that the most effective response to risky driving practices by teenagers is the adoption of Graduated Driver Licences and extending the involvement of parents in monitoring their children's driving. Study assessment: 4/10 (weak)	Keating D.P. and Halpern-Felsher, B.L. (2008). Adolescent drivers. A developmental perspective on risk, proficiency, and safety. *American Journal of Preventive Medicine.* 35(3S): S272-S277.
Restricting passengers of teenage drivers Restricting passenger numbers reduces the number of teenage passengers killed. One study in the USA reported that multiple passenger crashes declined by 32% amongst 16 year olds and 15% amongst 17 year olds. Study assessment: 4/10 (weak)	Williams A.F., Ferguson, S.A., McCatt, A.T. (2007). Passenger effects on teenage driving and opportunities for reducing the risks of such travel. *Journal of Safety Research*, 38: 381-90.
Graduated driver licensing This review included programs in the USA, Canada, New Zealand and Australia. Among 16 year old drivers, the median decrease in per population adjusted overall crash rates during the first year was 15.5% (range -27 to -8%). There was a decrease in per population adjusted injury crash rates (median -21%, range -46 to -2%). Results for all teenage drivers, rates per licensed driver, and rates adjusting for internal controls, were generally reduced when comparing within jurisdictions. Study assessment: 10/10 (strong)	Russell K.F., Vandermeer, B. and Hartling, L. (2011). Graduated driver licensing for reducing motor vehicle crashes among young drivers (Review). *Cochrane Database of Systematic Reviews*. 2011, Issue 10. Art. No.: CD003300. DOI: 10.1002/14651858.CD003300.pub3.

Red light cameras Red light cameras were found to be effective at reducing crashes at controlled junctions. 10 controlled before / after studies of mixed quality were assessed. For total casualty crashes the best quality evidence demonstrated a significant reduction in crashes of 29% (RR 0.71; 95% CI 0.55 to 0.93). For total crashes the reduction was 7% and not significant (RR 0.93; 95% CI 0.83-1.05). Study assessment: 10/10 (strong)	Aeron-Thomas, A. and Hess, S. (2005). Red-light cameras for the prevention of road traffic crashes (Review). *Cochrane Database of Systematic Reviews.* 2005, Issue 2. Art. No.: CD003862. DOI: 10.1002/14651858.CD003862.pub2.
Cataract surgery The study found a positive association between cataract surgery and reduction of driving-related difficulties by up to 88%. Due to differences in the research reviewed more detailed conclusions related to specific outcomes cannot be reached. Study assessment: 9/10 (strong)	Subzwari S. *et al.* (2008). Effectiveness of cataract surgery in reducing driving-related difficulties: a systematic review and meta-analysis. *Injury Prevention,* 14: 324-28.

8.4 Evidence of no effect

Intervention / risk factor	Evidence
Ignition interlocks This review looked at ignition interlocks for reducing drink driving and associated crashes amongst those already convicted of a drink driving offence. Use of interlocks led to a significant decrease in re-arrest rates whilst they were fitted (64% in one study). However, the effect on crashes was inconclusive. The review also noted that the use of interlocks did not have any effect on re-arrest rates once the interlocks were removed, Study assessment: 8/10 (strong)	Elder R.W. *et al* (2011). Effectiveness of Ignition Interlocks for Preventing Alcohol-Impaired Driving and Alcohol-Related Crashes. A Community Guide Systematic Review. *American Journal of Preventive Medicine.* 40(3): 362-76.
School-based driver education This review looked at the effectiveness of school-based driver education, delivering driver safety issues prior to licensing. The evidence indicated that this type of programme leads to a reduction in the time between eligibility for and obtaining a drivers licence. There is no evidence that such education results in a reduction in injury / accident rates, indeed it suggests that it may result in a small increase in crashes involving teenage drivers. Study assessment: 10/10 (strong)	Roberts, I.G. and Kwan, I. (2001). School-based driver education for the prevention of traffic crashes. *Cochrane Database of Systematic Reviews*. 2001, Issue 3. Art. No.: CD003201. DOI: 10.1002/14651858.CD003201.
Post-licence driver education This review assessed evidence from 24 trials, 23 in the USA and 1 in Sweden. There was no evidence that post-licence driver education is effective in preventing road traffic injuries or crashes. Training did have a positive effect on road traffic offences (pooled RR 0.96, 95% CI 0.94 to 0.98), however the authors caution that this may be due to bias. Study assessment: 10/10 (strong)	Ker K., *et al* (2003). Post-licence driver education for the prevention of road traffic crashes. *Cochrane Database of Systematic Reviews.* 2003, Issue 3. Art. No.: CD003734. DOI: 10.1002/14651858.CD003734.

8.5 Lack of robust evidence

Intervention / risk factor	Evidence
Pedestrian education None of the studies in this review assessed the effect of pedestrian education on injury rates. Some studies found that road safety education improved observed road crossing behaviour but the authors point out that this improved behaviour will decline with time and has an unknown impact on injury rates. Study assessment: 10/10 (strong)	Duperrex, O., Roberts, I., Bunn, F. (2012). Safety education of pedestrians for injury prevention (Review). *Cochrane Database of Systematic Reviews.* 2002, Issue 2. Art. No.: CD001531. DOI: 10.1002/14651858.CD001531.
Vision screening for older drivers This review found that older drivers are more likely to be involved in more MVTCs per kilometre driven than other groups. Eye sight is a key component of driving safely. Since sight deteriorates with age the review looked for evidence of eye sight tests that were effective in assessing an individual's suitability to drive. Licensing agencies do employ eye sight tests, but these are not comprehensive enough to be fully effective. The review could not find sufficient evidence to suggest effective tests for this purpose. Study assessment: 10/10 (strong)	Desapriya, E. *et al* (2011). Vision screening of older drivers for preventing road traffic injuries and fatalities (Review). *Cochrane Database of Systematic Reviews.* 2011, Issue 3. Art. No.: CD006252. DOI: 10.1002/14651858.CD006252.pub3
Motorcycle rider training The authors recognised the need for pre-licence motorcycle training. However, current evidence does not allow for firm conclusions as to the type of training that should be provided or what effect this training has on crashes, fatalities and injuries to motorcyclists. Study assessment: 10/10 (strong)	Kardamanidis K., *et al* (2010). Motorcycle rider training for the prevention of road traffic crashes (Review). *Cochrane Database of Systematic Reviews.* 2010, Issue 10. Art. No.: CD005240. DOI: 10.1002/14651858.CD005240.pub2.

Interventions targeting alcohol servers This review looked at injury reduction generally, rather than MVTCs. Two controlled before and after studies that looked at effects on drink driving were reviewed. Although the reviewers found that the interventions in these two studies appeared to have a positive effect, they conclude that the evidence is not of sufficient quality to recommend any particular interventions for implementation. Study assessment: 10/10 (strong)	Ker, K. and Chinnock, P. (2008). Interventions in the alcohol server setting for preventing injuries (Review). *Cochrane Database of Systematic Reviews.* 2008, Issue 3. Art. No.: CD005244. DOI: 10.1002/14651858.CD005244.pub3.
Assessment of drivers with dementia The increasing number of older drivers has also led to an increase in number of drivers with dementia. Although it is recognised that dementia has a negative effect on the mobility and safety of drivers this review could find no evidence as to whether assessment reduces accidents involving drivers with dementia. Study assessment: 10/10 (strong)	Martin, A.J., Marottoli, R. and O'Neill D. (2009). Driving assessment for maintaining mobility and safety in drivers with dementia (Review). *Cochrane Database of Systematic Reviews.* 2009, Issue 1. Art. No.: CD006222. DOI: 10.1002/14651858.CD006222.pub2.
Pedestrian and cyclist visibility Visibility aids, especially markings that highlighted the form and movement of the person, were found to improve the conspicuity of pedestrians and cyclist at night. No evidence was found that assessed the effects of these measures on accident / injury rates. Study assessment: 10/10 (strong)	Kwan, I. and Mapstone, J. (2006). Interventions for increasing pedestrian and cyclist visibility for the prevention of death and injuries (Review). *Cochrane Database of Systematic Reviews.* 2006, Issue 4. Art. No.: CD003438. DOI: 10.1002/14651858.CD003438.pub2.

Post-licence driver education This review assessed evidence from 24 trials, 23 in the USA and 1 in Sweden. There was no evidence that post-licence driver education is effective in preventing road traffic injuries or crashes. Training did have a positive effect on road traffic offences (pooled RR 0.96, 95% CI 0.94 to 0.98), however the authors caution that this may be due to bias. Study assessment: 10/10 (strong)	Ker, K., *et al* (2003). Post-licence driver education for the prevention of road traffic crashes. *Cochrane Database of Systematic Reviews* , Issue 3. Art. No.: CD003734. DOI: 10.1002/14651858.CD003734.
Adolescent motor vehicle crashes Reality based prevention programmes incorporate effective adolescent learning styles such as role play, behavioural rehearsal and group discussion. Although the evidence of their effectiveness differs, most studies show some benefit compared to controls, although in some cases this was marginal. Study assessment: 6/10 (moderate)	Small, K. (2008), Interventions to prevent adolescent motor vehicle crashes. A literature review. *Orthopaedic Nursing,* 27, 5: 283-90.
Increased police patrols Increasing police patrols and / or improved police training, as a method of preventing alcohol-impaired driving had a beneficial effect on crashes and fatalities. An assessment of the available evidence found weaknesses and inconsistencies that meant that this review could not firmly establish a causal link. Study assessment: 10/10 (strong)	Goss, C.W., *et al* (2008). Increased police patrols for preventing alcohol-impaired driving (Review). *Cochrane Database of Systematic Reviews.* 2008, Issue 4. Art. No.: CD005242. DOI: 10.1002/14651858.CD005242.pub2.

9 Fall injuries

Serious fall injuries mainly affect older people (Gribben et al, 2009; ONS, 2009), but falls during play and falls from windows are also a feature of child injury profiles (Stone, 2011).

Amongst older people falls are extremely common; 30 to 60% fall each year and 15 to 30% fall more than once (Rubenstein and Josephson, 2002; Cummings and Melton, 2002; Peel et al, 2002). This high incidence means that fall injury incidence and serious fall injury incidence is high; 2-6% of falls lead to serious injury, 1% lead to hip fracture (Rubenstein and Josephson, 2002; Cummings and Melton, 2002; Peel et al, 2002; Masud and Morris, 2001). Following a hip fracture, 25% to 75% of people return to previous levels of independence, placing a significant burden on health and health services (Magaziner et al., 1990; Scuffman, 2003).

However, even given the reported high frequency of falls there is also good evidence that fall related deaths are greatly underestimated. The ICD-10 code X59 refers to exposure to unspecified factor causing other and unspecified injury, but analysis carried out in Wales has shown that around 25% of injury deaths are coded X59 and can be linked to an IP admission for a fall (Gabbe and Lyons, 2010).

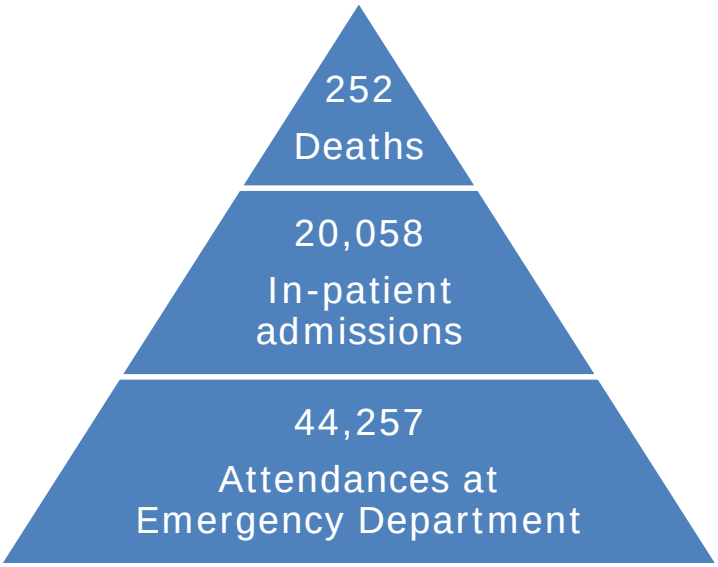
9.1 Epidemiology

9.1.1 Numbers

In 2009, 252 fall related deaths were reported in Wales (Figure 28). With 20,000 IP admissions and 44,000 ED falls, there are considerably more fall admissions per ED attendance than for any other cause of injury.

Figure 28

Summary estimate of epidemiology of falls in Wales in 2009
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

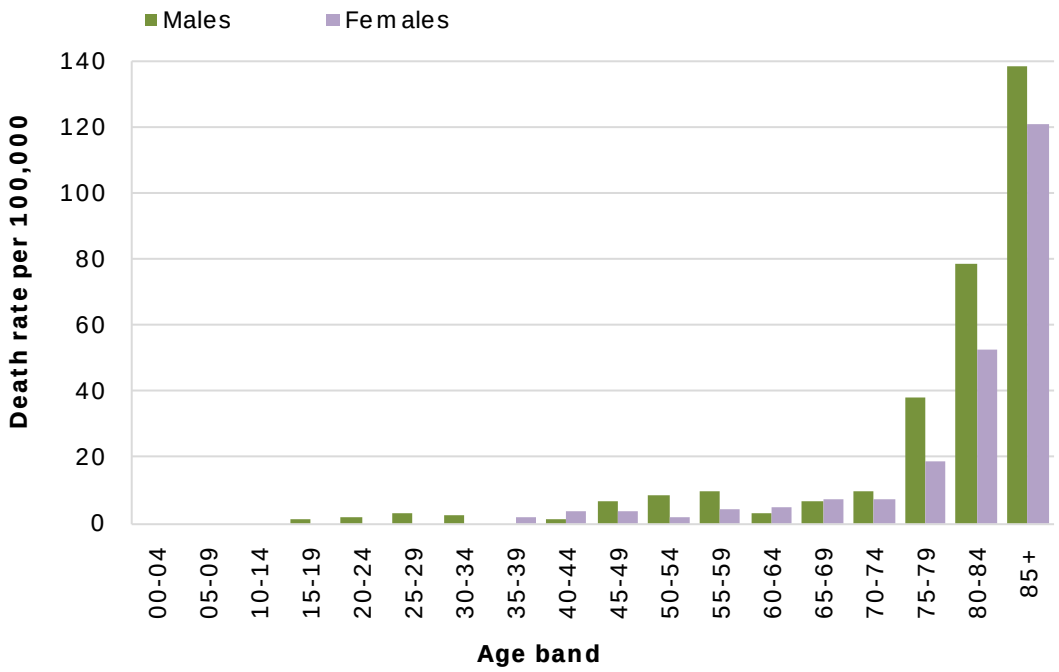


9.1.2 Rates

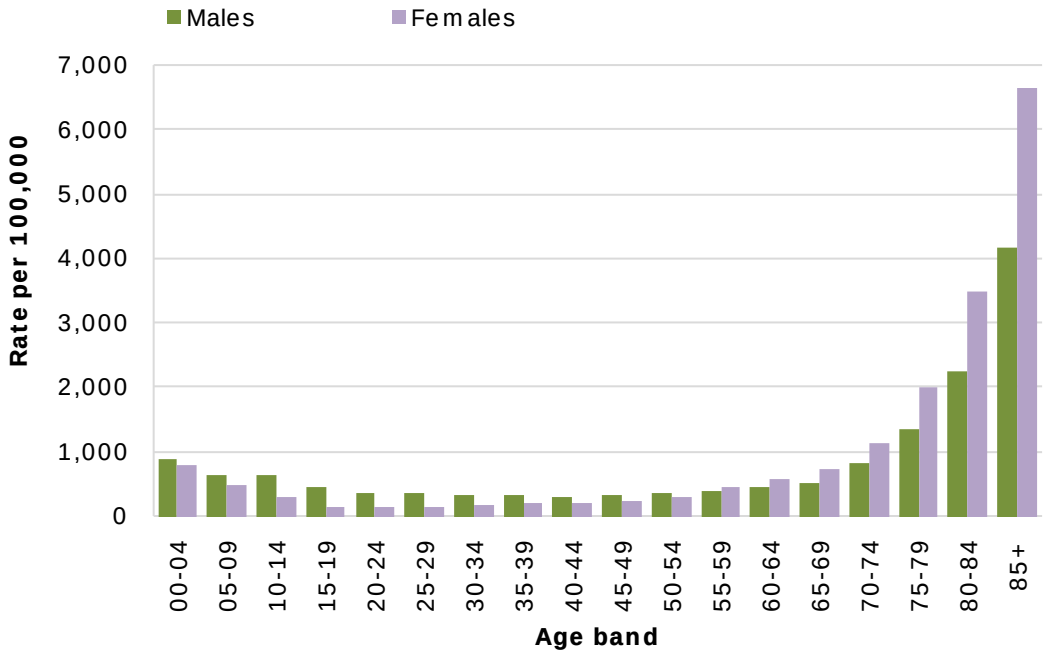
Fall death rates are low in all age groups until 70 years when they start to rise, from 9.7 per 100,000 (males) and 7.2 (females), to 138.7 (males) and 120.8 (females) by age 85+ (Figure 29, Appendix 9). Male fall death rates are consistently higher than those for females.

Figure 29

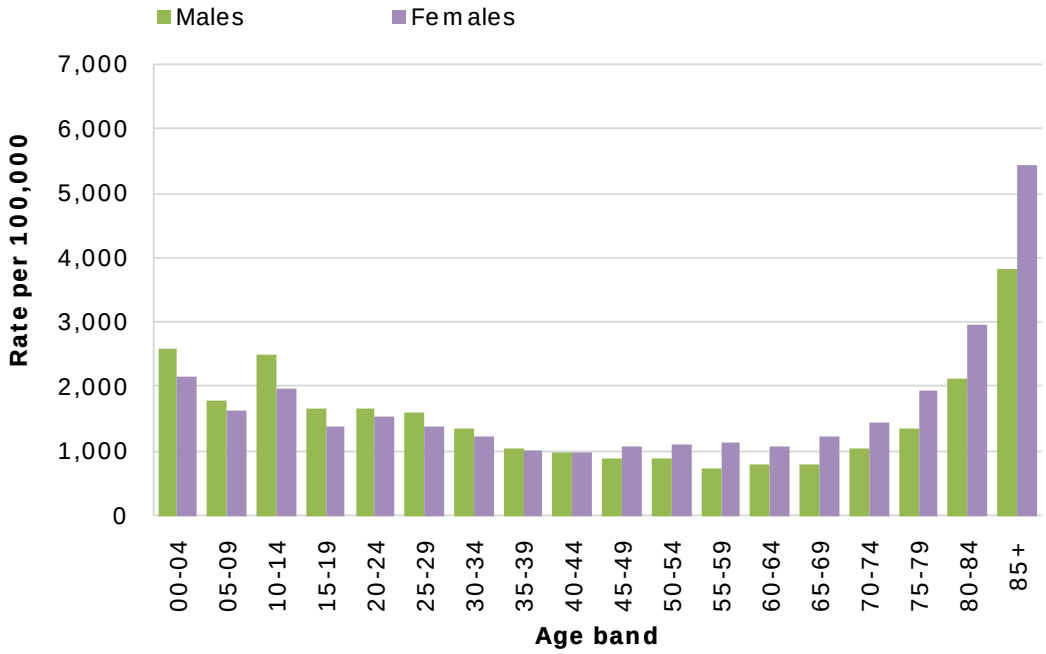
Fall fatality rates by age and sex, 2009
Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)



Fall related in-patient admission rates, by age and sex, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)



Fall related emergency department attendance rates, by age and sex, 2009
Produced by Public Health Wales and Swansea University, using EDDS (NWIS) & MYE (ONS)



Both IP and ED rates have two peaks; in childhood and in old age. However, whilst male rates are higher in childhood, amongst the older population, female rates are higher. The change from higher to male to higher female rates occurs earlier for ED data (40 to 44 years) than for IP data (55 to 59 years). Accepting all of the limitations of these data sets, this suggests that there are opportunities to intervene with fallers attending the ED at an earlier age than is currently recognised.

9.1.3 Local authority profiles

At the LA level, fall rates range from 453 in Cardiff to 678 in Merthyr Tydfil (Figure 30). Rates in Cardiff and the Vale of Glamorgan were significantly lower than those for all Wales, while Swansea, RCT, Merthyr Tydfil, Caerphilly, Blaenau Gwent and Newport were significantly higher than all Wales.

Following on from the above, comparison of the highest rate LAs with the lowest shows that female IP rates are higher than males from the ages of 45 in Cardiff and the Vale of Glamorgan, however in Blaenau Gwent this does not occur until 55 and in Merthyr Tydfil, 65 years (Figure 31). Whether this contributes to differences in fall rates, what exactly the means of the finding is and how it could be addressed will require more detailed analysis.

Figure 30

Fall related admission rates, European age-standardised rates per 100,000 population and 95% confidence intervals, by local authority, 2009
Produced by Public Health Wales and Swansea University, PEDW (NWIS) & MYE (ONS)

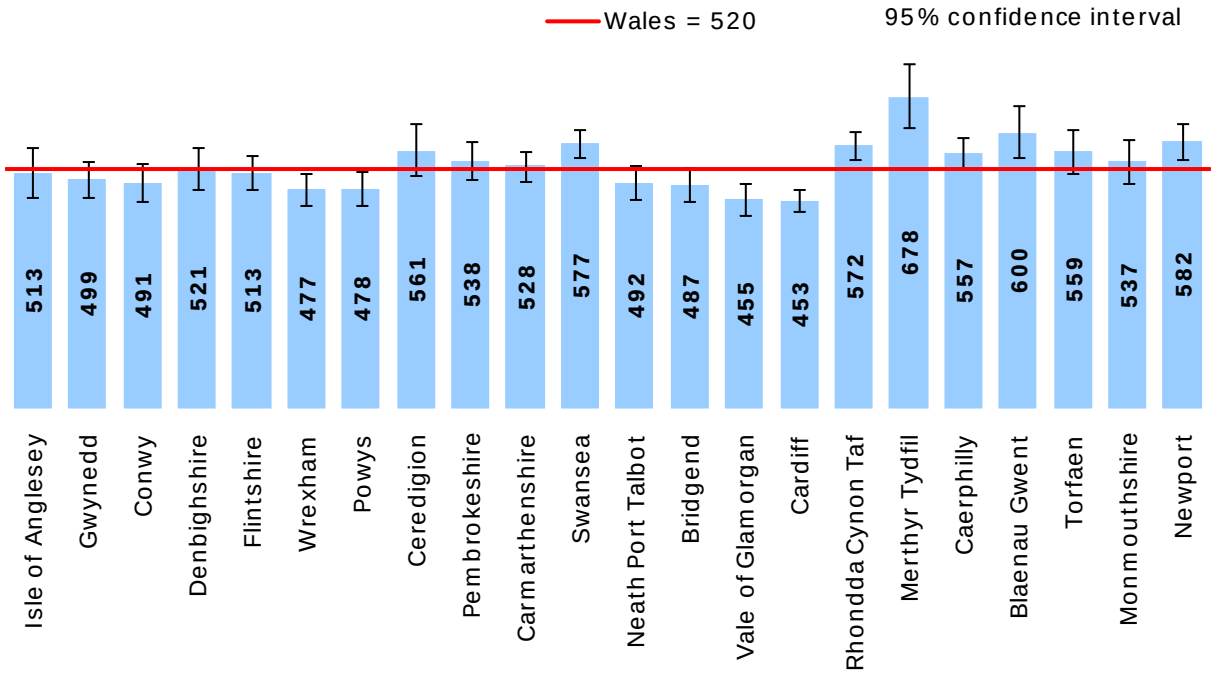
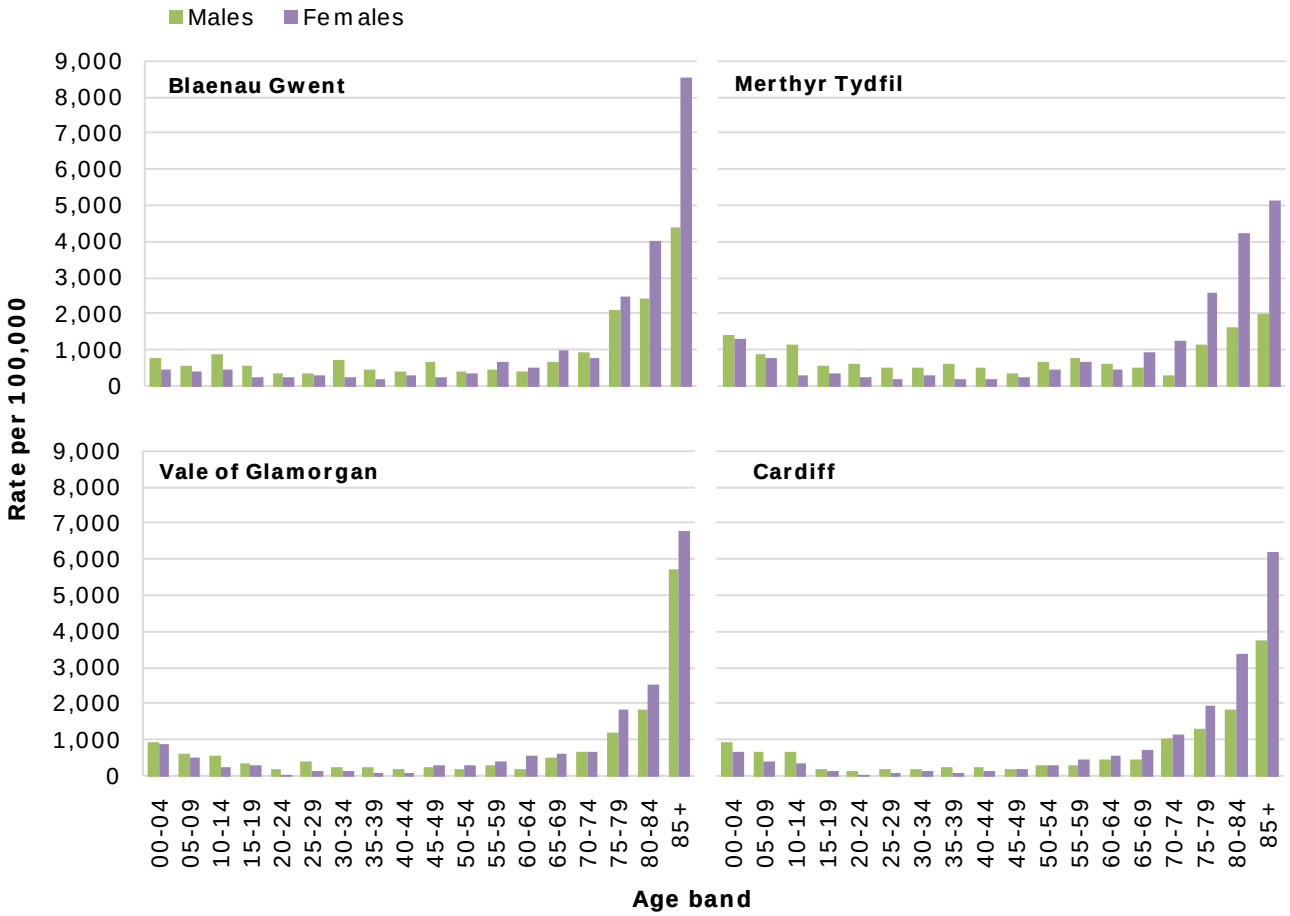


Figure 31

Local authority areas with the highest and lowest fall related in-patient admission rates per 100,000 population, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) and MYE (ONS)



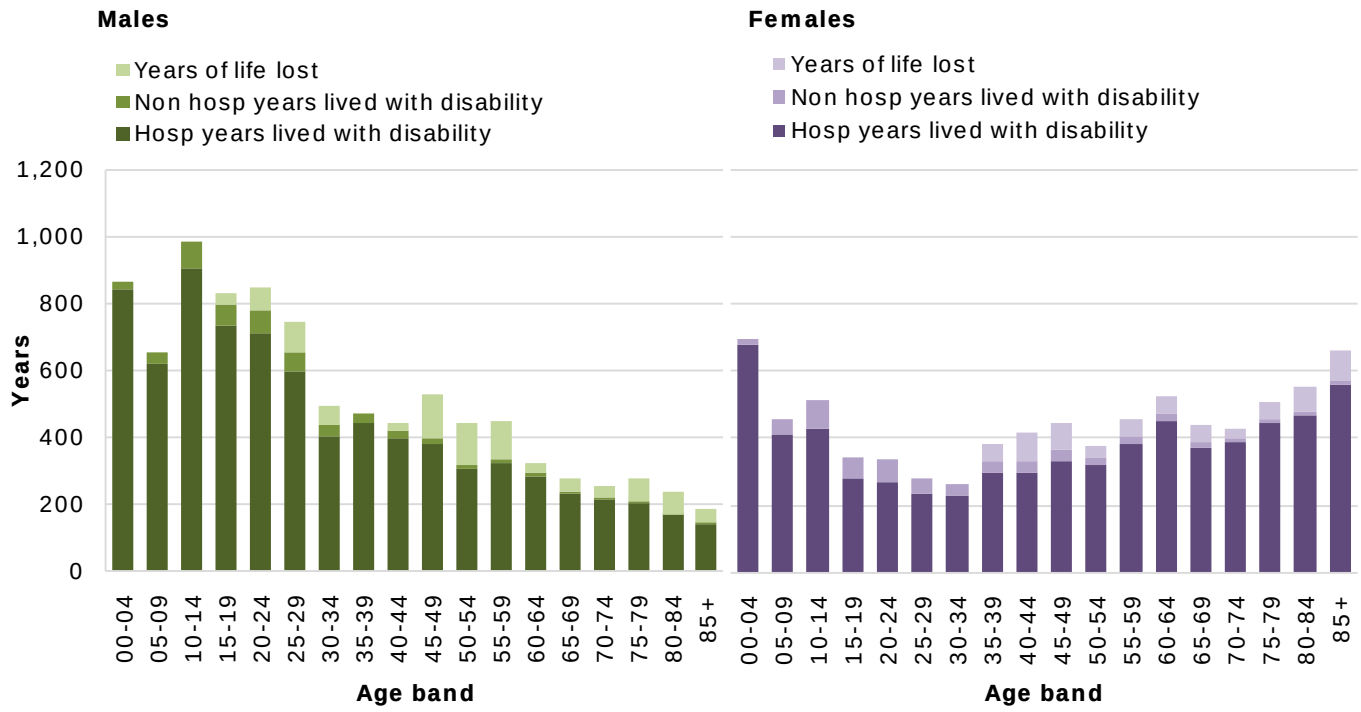
9.2 Burden

The profile of the burden of fall related injuries is very different for males compared with females (Figure 32). For males, the burden is mainly on the young, with 10-14 year old males suffering a greater burden of falls than any other group (almost 1000 DALYs); this is almost entirely associated with disability amongst those who are hospitalised. The profile of the female burden of injuries is again U shaped, with the greatest burden to a single age group being associated with 0 to 4 year olds (699 DALYs) and disability following injury requiring admission to hospital (681 hosp YLDs) (Appendix 10). Lowest female burden is amongst 30 to 34 year olds (264 DALYs), after which the burden, and particularly the burden associated with years of life lost, increases rapidly. Amongst the 40-44 year group, 21% of the DALYs are associated with YLL; a greater proportion than any other age group.

Figure 32

Relative burden of fall injuries in Wales, by sex and age, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)



9.3 Evidence of effectiveness

Intervention / risk factor	Evidence
Managing falls amongst the elderly living in the community In selected populations a 30% fall risk reduction can be achieved by accurate assessment, combined with targeted multi-disciplinary and multi-factorial interventions. Study assessment: 5/10 (moderate)	McKay, C. and Anderson K.E., (2010). How to manage falls in community dwelling older adults: a review of the evidence. *Postgraduate Medical Journal*, 86: 299-306.
Physical environment as a risk factor Home hazards increased fall risk of older adults (OR 1.15, 95% CI 0.97–1.36) although not significantly. When only high quality studies were included risk increased to OR 1.38 (95% CI 1.03–1.87; significant). Mobility aids significantly increased fall risk in community (OR 2.07, 95% CI 1.59–2.71) and institutional settings (OR 1.77, 95% CI 1.66–1.89). Home hazards are a significant risk factor in older community-dwelling adults. Interventions targeted at high risk groups such as repeated fallers or those using mobility aids may be worthwhile. Study assessment: 9/10 (strong)	Letts, L. *et al* (2010). The physical environment as a fall risk factor in older adults: systematic review and meta-analysis of cross-sectional and cohort studies. Australian Occupational Therapy Journal. 57: 51-64
Economic evaluation of home-based interventions 3 programmes were cost saving in sub-groups of the elderly; a multi-factorial programme targeting 8 fall risk factors; the home based Otago Exercise Programme (OEP) delivered to people aged 80 or over; and, a home safety programme for those recently discharged from hospital. But, no specific QALY data were given. Of these programmes, single interventions (such as the OEP) targeted at high risk groups can prevent the greatest number of falls at the lowest incremental cost. Study assessment: 8/10 (strong)	Davis, J.C. *et al* (2010). Does a home-based strength and balance programme in people aged ≥80 years provide the best value for money to prevent falls? A systematic review of economic evaluations of falls prevention interventions. *British Journal of Sports Medicine,* 44, 2: 80-9.

Exercise for older people Multiple component group exercise significantly reduced falls and risk of falling (rate ratio 0.78, 95% CI 0.71-0.86; risk ratio 0.83, 95% CI 0.72-0.97), as did Tai Chi (rate ratio 0.63, 95% CI 0.52-0.78; risk ratio 0.65, 95% CI 0.51-0.82), and individual multi-component home-based exercise (rate ratio 0.66, 95% CI 0.53-0.82). Study assessment: 10/10 (strong)	Gillespie, L.D., *et al* (209), Interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews* 2009, Issue 2. Art. No.: CD007146. DOI: 10.1002/14651858.CD007146.pub2
Population based interventions All 6 studies suggested that population based falls intervention reduced fall related injuries amongst older people. Stay on your feet, an Australian programme, led to a significant 20% reduction in fall related hospitalisations (rate ratio 0.80, 95% CI 0.76 to 0.84. A programme in Denmark saw a significant reduction (OR 0.63, p = 0.03) in fall related lower limb fractures and a non-significant drop in hip fractures Study assessment: 10/10 (strong)	McClure, R.J. *et al* (2005). Population-based interventions for the prevention of fall-related injuries in older people (Review). *Cochrane Database of Systematic Reviews,* 2005, Issue 1. Art. No.: CD004441. DOI: 10.1002/14651858.CD004441.pub2
Vision Optometrists were concluded to have a major role in optimising visual function in older people to prevent falls. Expedited cataract surgery reduced falling by 34% (rate ratio 0.66, 95% CI 0.45 to 0.96). Use of multifocal spectacles was associated with increased risk of falling. Study assessment: 4/10 (weak)	Black A. and Wood J. (2005). Vision and falls. *Clinical and Experimental Optometry,* 88, 4: 212-22.
Effectiveness of falls prevention programs Mean weighted effect of the included studies of 0.799 ($p < 0.001$). Falls decreased in the intervention group (from 52% to 48%). Interventions included: exercise; mobility training; education; screening and assessment; modifications to	Hill-Westmoreland, E.E., Soeken, K., and Spellbring, A.M. (2002). A meta-analysis of fall prevention programs for the elderly. How effective are they? *Nursing Research*. 52(1): 1-8

medication and home. Study assessment: 9/10 (strong)	
Use of Vitamin D Vitamin D plus calcium led to a significant reduction in falls, (OR 0.86, 95% CI 0.77–0.96). Caution is advised in drawing conclusions as the evidence is of low to moderate quality due to differences in the studies analysed. Study assessment: 10/10 (strong)	Murad, M.H. *et al* (2011). The effect of Vitamin D on falls: A systematic review and meta-analysis. *Journal of Clinical Endocrinology and Metabolism.* 96(10): 2997-3006.
Effect of NSAID use on likelihood of falls The use of non-steroidal anti inflammatory drugs (NSAIDs) produced a significant increase in falls in the elderly. The largest study reported OR 1.62 (95% CI 1.16-2.25). However, it was concluded that due to poor controlling in these studies, this increased risk was likely to be due to confounding by factors such as existing chronic illnesses. Study assessment: 9/10 (strong)	Hegeman, J., *et al* (2009). NSAIDs and the risk of accidental falls in the elderly. A systematic review. *Drug Safety*, 32, 6: 489-98.
Effect of Tai Chi on falls and risk of falling Tai Chi reduces falls and risk of falling (rate ratio 0.63, 95% CI 0.52-0.78; risk ratio 0.65, (95% CI 0.51-0.82). Study assessment: 10/10 (strong).	Gillespie, W.J., Gillespie, L.D., and Parker, M.J. (2010). Hip protectors for preventing hip fractures in older people (Review). *Cochrane Database of Systematic Reviews.* 2010, Issue 10. Art. No.: CD001255. DOI: 10.1002/14651858.CD001255.pub4.

9.4 Evidence of no effect

Intervention	Evidence
Use of hip protectors Hip protectors for the elderly in nursing or residential homes led to significant reductions in fall related hip fracture (risk ratio 0.81, 95%CI 0.66-0.99). But, once biased studies were excluded the result was no longer significant (risk ratio 0.93, 95% CI 0.74-1.18). In the community, hip protectors do not have a significant effect on fall related hip fracture (risk ratio 1.14, 95% CI 0.83-1.57). Study assessment: 10/10 (strong)	Gillespie, W.J., Gillespie, L.D., and Parker, M.J. (2010). Hip protectors for preventing hip fractures in older people (Review). *Cochrane Database of Systematic Reviews.* 2010, Issue 10. Art. No.: CD001255. DOI: 10.1002/14651858.CD001255.pub4.

9.5 Lack of robust evidence

Intervention / risk factor	Evidence
Icy and snowy surfaces Recommendations were drawn from numerous sources but quality of primary studies was not assessed. Recommendations included: use of suitable winter footwear; effective snow clearing and the spreading of anti-slip materials; improvement of visual and lighting conditions, weather warnings; prioritising winter maintenance to higher risk roads, monitoring locations pedestrians slips; provision of walking aids and slip risk warnings to those at greatest risk. Study assessment: 3/10 (weak)	Gao, C. and Abeysekera, J. (2004). A systems perspective of slip and fall accidents on icy and snowy surfaces. *Ergonomics*. 47(5): 573-98.
Potentially inappropriate medications The authors found a number of different criteria for potentially inappropriate medications. It was generally agreed that the use of long acting benzodiazapines, tricyclic anti-depressants and concomitant NSAIDs and warfarin should be avoided. If validated, explicit criteria could be established and integrated into medication ordering systems to ensure that inappropriate medications are avoided in older adults. Study assessment: 5/10 (moderate)	Chang, C.B. and Chan, D.C. (2010). Comparison of published explicit criteria for potentially inappropriate medications in older adults. *Drugs and Aging*, 27, 12: 947-57.

10 Drowning

Drowning is rare. It tends mainly to affect children and young adults who drown in uncontrolled or unsupervised environments; swimming in environments supervised by lifeguards reduces the risk of drowning (Manolios and Mackie, 1988; Fenner et al, 1995).

10.1 Epidemiology

In 2009, there were 31 drowning related deaths recorded in Wales; 19 males and 12 females. Eight of the male deaths were aged under 40, 7 aged 40 to 59. Seven of the female deaths were amongst women aged 60 to 84.

Given the epidemiological profile of drowning, it is not unexpected that much of the burden is associated with YLLs (415.8 male, 190.0 female; Table 18).

Table 18

Burden of drowning, by sex, 2009

	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years
Male	20.6	0.01	416	436
Female	10.5	0.01	179	190

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS) & ADDE (ONS)

10.2 Evidence of effectiveness

Intervention / risk factor	Evidence
Pool fencing Pool fencing significantly reduces the risk of drowning. Risk of drowning or near drowning in a fenced pool compared to an unfenced pool is 0.27 (95% CI 0.16-0.47). Isolation fencing (enclosing pool only) is superior to perimeter fencing (enclosing property and pool), OR 0.17 (95% CI 0.07-0.44). Study assessment: 10/10 (strong)	Thompson D.C. and Rivara, F. (1998). Pool fencing for preventing drowning of children (Review). *Cochrane Database of Systematic Reviews* 1998, Issue 1. Art. No.: CD001047. DOI: 10.1002/14651858.CD001047.c

10.3 Lack of robust evidence

Intervention / risk factor	Evidence
Travel safety This study makes a number of detailed recommendations for improving water safety for those travelling. Alcohol is a factor in 30% to 50% of adult and adolescent drownings. However, no specific recommendations are given. Study assessment: 8/10 (strong)	Cortes, L.M., Hargarten, S.W. and Hennes, H.M. (2006). Recommendations for water safety and drowning prevention for travellers. *Journal of Travel Medicine.* 13, 1: 21-34.
Swimming ability and the risk of drowning Improved swimming ability could lead to greater exposure to hazardous bodies of water. It recommends that safe swimming practices are included in programs that aim to improve swimming ability. Study assessment: 7/10 (moderate)	Brenner, R.A., Saluja, G. and Smith, G.S. (2003). Swimming lessons, swimming ability, and the risk of drowning. *Injury Control and Safety Promotion*, 10, 4: 211-16

11 Burns

Although burns account for a small proportion of all injuries, they are generally associated with the largest inequalities in injury epidemiology; children in social class V are 9 times more likely to die in house fires than children in social class I (Jarvis et al, 1996).

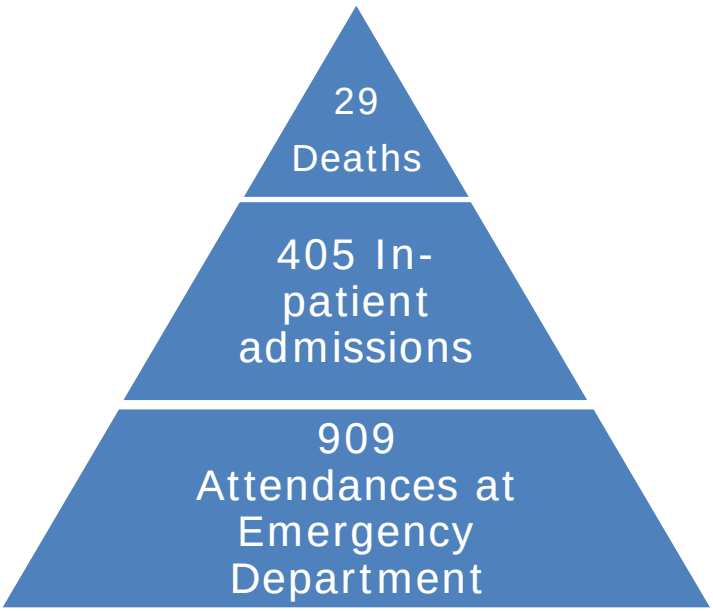
However, interpreting data is difficult because different age groups are likely to suffer different types of burns, for example, fire related compared with hot water related. This then becomes an issue when aiming to identify appropriate interventions. Therefore, these data provide a guide to the incidence and burden of the problem but further analysis will be needed to identify and target interventions.

11.1 Epidemiology

In 2009, there were 29 deaths associated with burn injuries (Figure 33, Appendix 11 – numbers, rates and burden of burn injuries by age and sex). All of the dead were aged over 30; 21 were aged over 60 (72%) and 20 were males (69%).

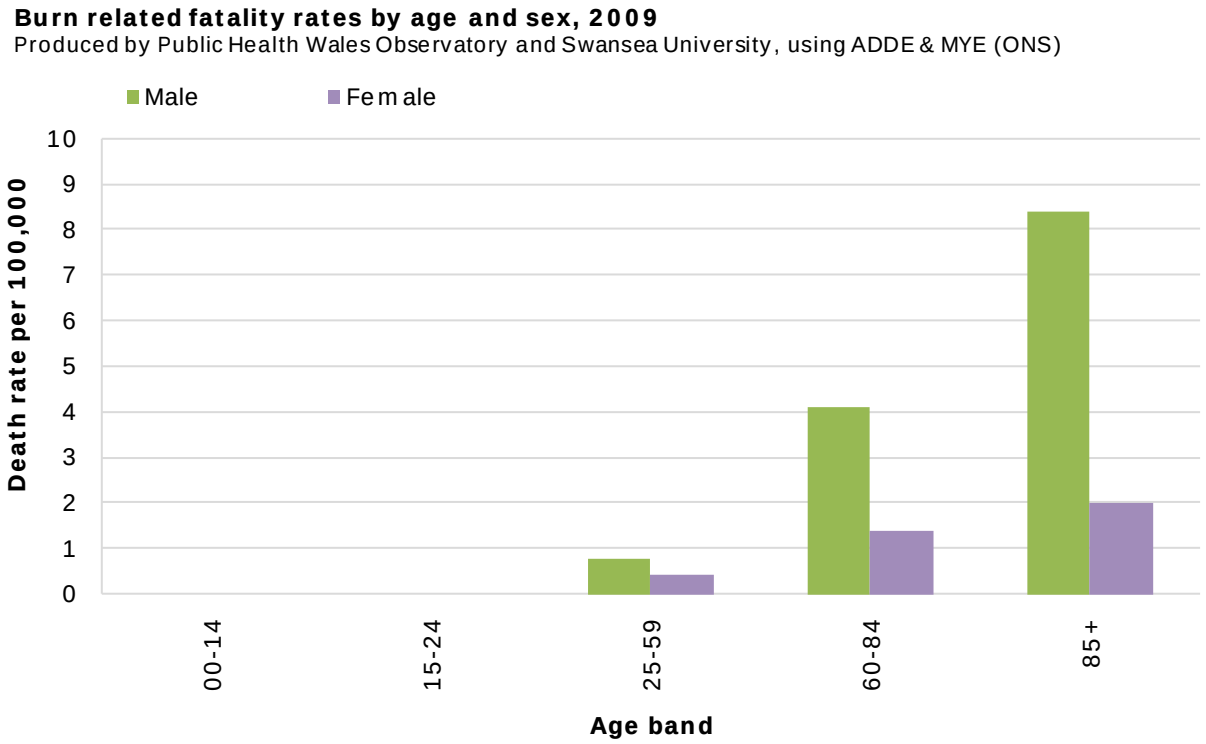
Figure 33

Summary estimate of epidemiology of burns in Wales in 2009
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

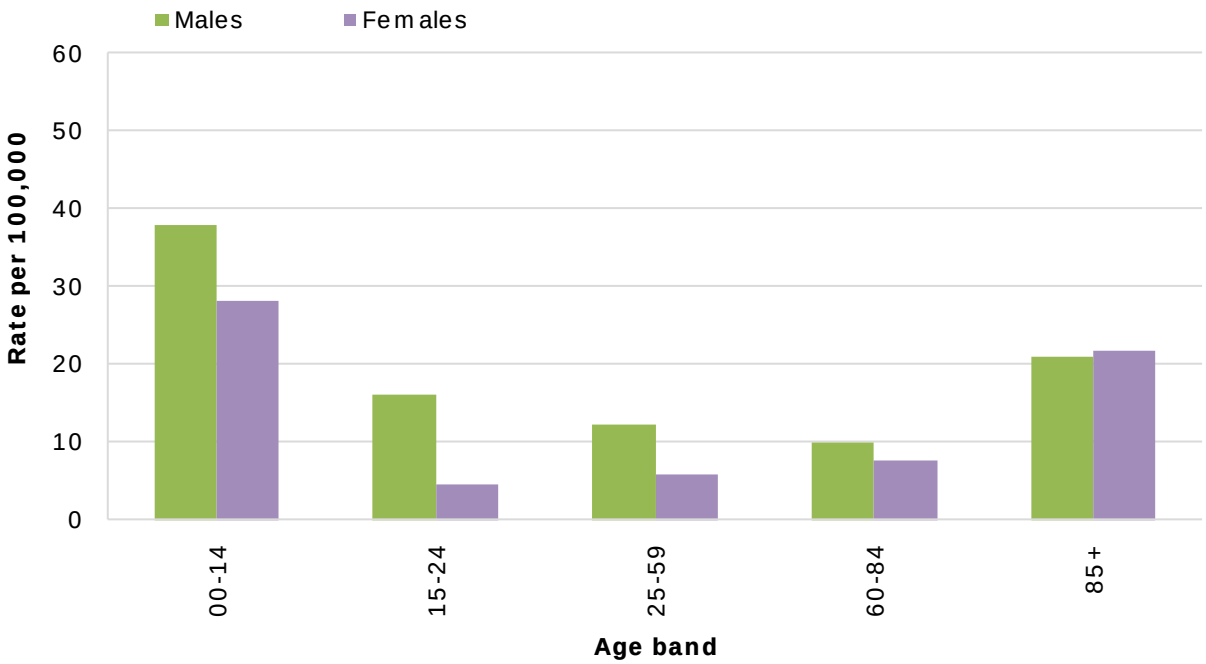


While deaths are experienced exclusively by older age groups, burns treated in ED and IP settings are suffered mainly by children (Figure 34), with ED burn rates amongst 0 to 14 year olds of 54.8 and 56.6 per 100,000 for males and females respectively. Higher burn incidence rates amongst girls are a common finding.

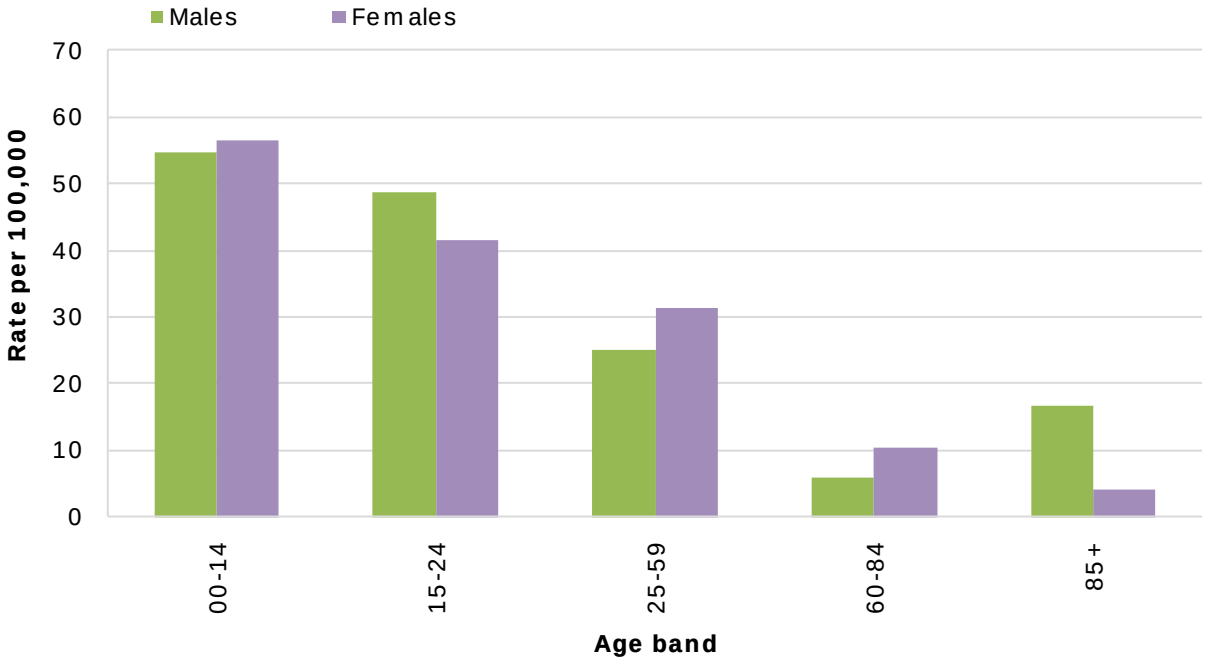
Figure 34



Burn related in-patient admission rates by age and sex, 2009
Produced by Public Health Wales Observatory and Swansea University, using PEDW (NWIS) & MYE (ONS)



Burn related emergency department attendance rates by age and sex, 2009
Produced by Public Health Wales Observatory and Swansea University, using EDDS (NWIS) & MYE (ONS)

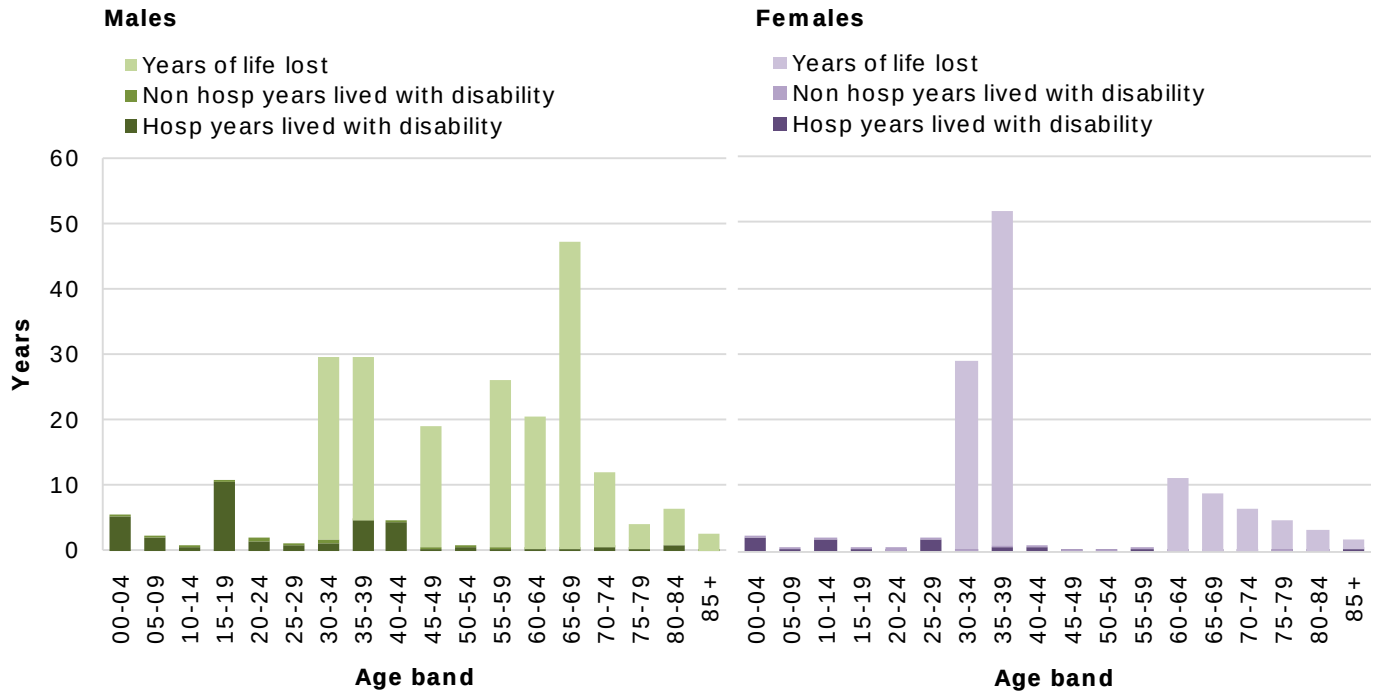


11.2 Burden

The burden associated with YLLs is suffered by older age groups (Figure 35, Appendix 11). The 110 DALYs suffered by 25 to 59 year old males is similar to the total burden of DALYs for females (127).

Figure 35

Relative burden of burn injuries in Wales, by sex and age, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)



11.3 Evidence of effectiveness

Intervention / risk factor	Evidence
Increasing uptake of smoke alarms The most effective means of increasing uptake included elements of providing equipment (alarms), home inspection and education. Interventions combining all these elements increased uptake 7 times (OR 7.15, 95% CI: 2.40-22.73). Study assessment: 10/10 (strong)	Cooper, N.J. *et al* (2012). Network meta-analysis to evaluate the effectiveness of interventions to increase the uptake of smoke alarms. *Epidemiologic Reviews*, 34, 1: 32-45.
Increasing uptake of smoke alarms Canvassing and installation schemes can improve uptake and functionality of alarms. The involvement of Fire Authorities has also been successful. One study demonstrated an 81% reduction in residential fire related injuries compared to a 7% reduction in the control group. No details of the results of statistical testing were available. Study assessment: 9/10 (strong)	Ta, V.M., *et al* (2006). Evaluated community fire safety interventions in the United States: a review of current literature. *Journal of Community Health*, 31, 3: 176-97
Promoting smoke alarm ownership and function This review aimed to evaluate interventions to promote residential smoke alarms, to assess their effect on smoke alarm ownership, smoke alarm function, fires and burns and other fire-related injuries. Counselling and education had a modest effect on the likelihood of owning or having a functional alarm (OR 1.21, 95% CI 0.89-1.64). Counselling as part of primary care child health surveillance had greater effects on smoke alarm ownership (OR 1.96, 95% CI 1.03-3.72) and function (OR 1.46, 95% CI 1.15-1.85). Media and community education showed little benefit in non randomised trials (adjusted rate ratio 1.4, 95% CI 1.1-1.6). Study assessment: 10/10 (strong)	DiGuiseppi, C. and Higgins, J. (2010). Interventions for promoting smoke alarm ownership and function. *Cochrane Database of Systematic Reviews*. 2001, Issue 2. Art. No.: CD002246. DOI: 10.1002/14651858.CD002246.

11.4 Lack of robust evidence of effectiveness

Intervention / risk factor	Evidence
Community-based interventions for the prevention of burns and scalds in children There are a very limited number of research studies allowing conclusions to be drawn about the effectiveness of community-based injury prevention programmes to prevent burns and scalds in children. There is a pressing need to evaluate high-quality community-based intervention programmes based on efficacious counter-measures to reduce burns and scalds in children. Study assessment: 10/10 (strong)	Turner, C. *et al* (2004), Community-based interventions for the prevention of burns and scalds in children. *Cochrane Database of Systematic Reviews*. 2004, Issue 2. Art. No.: CD004335. DOI: 10.1002/14651858.CD004335.pub2.
Emergency department based interventions that address domestic smoke detectors A recommendation could not be made for or against an ED based strategy for counselling on the importance of functioning smoke alarms in the home. Study assessment: 7/10 (moderate)	Maas Cortes, L. and Hargerten, S. (2001). Preventive care in the emergency department: a systematic literature review on emergency department-based interventions that address smoke detectors in the home. *Academic Emergency Medicine*, 8,9: 925-9.

12 Poisonings

The intent associated with poisoning incidents may be difficult to determine. Here, they are grouped under the unintentional injuries heading, but it is likely that some cases were intentional.

In terms of unintentional childhood poisoning, there is little doubt that child resistant containers and unit packaging have brought about significant reductions in numbers of incidents, including deaths. This has also been aided by the withdrawal of toxic medications such as Lomotil and barbiturates. However, there are still too many children being admitted following non-toxic medication poisoning and there is little evidence that education has made much difference.

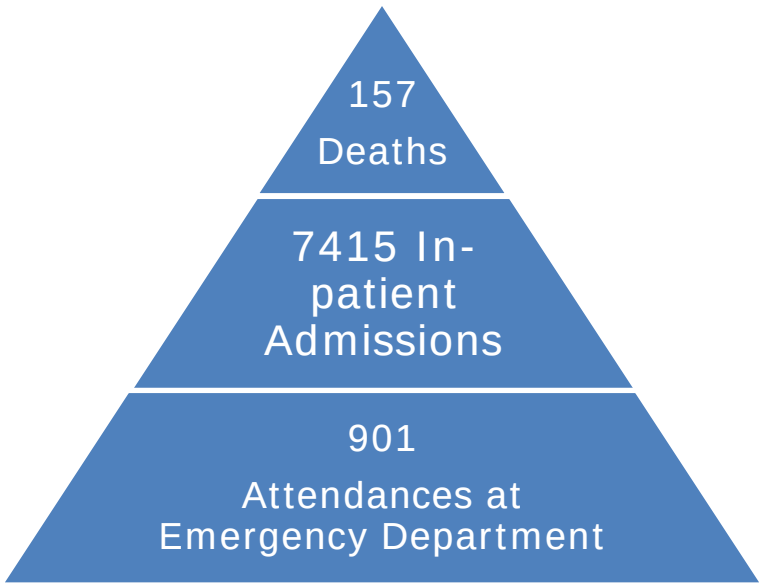
There are data quality problems with these data, particularly in the ED setting. Therefore, any use of these data should be with caution.

12.1 Epidemiology

In 2009, the majority of poisoning episodes were treated in the IP setting (n=7415, Figure 36). Three quarters of the deaths (77.0%) were of males and none of the deaths (total n=157) were amongst under 15 year olds. The deaths were mainly of young to middle aged adults, with 73.0% being amongst 20 to 49 year olds.

Figure 36

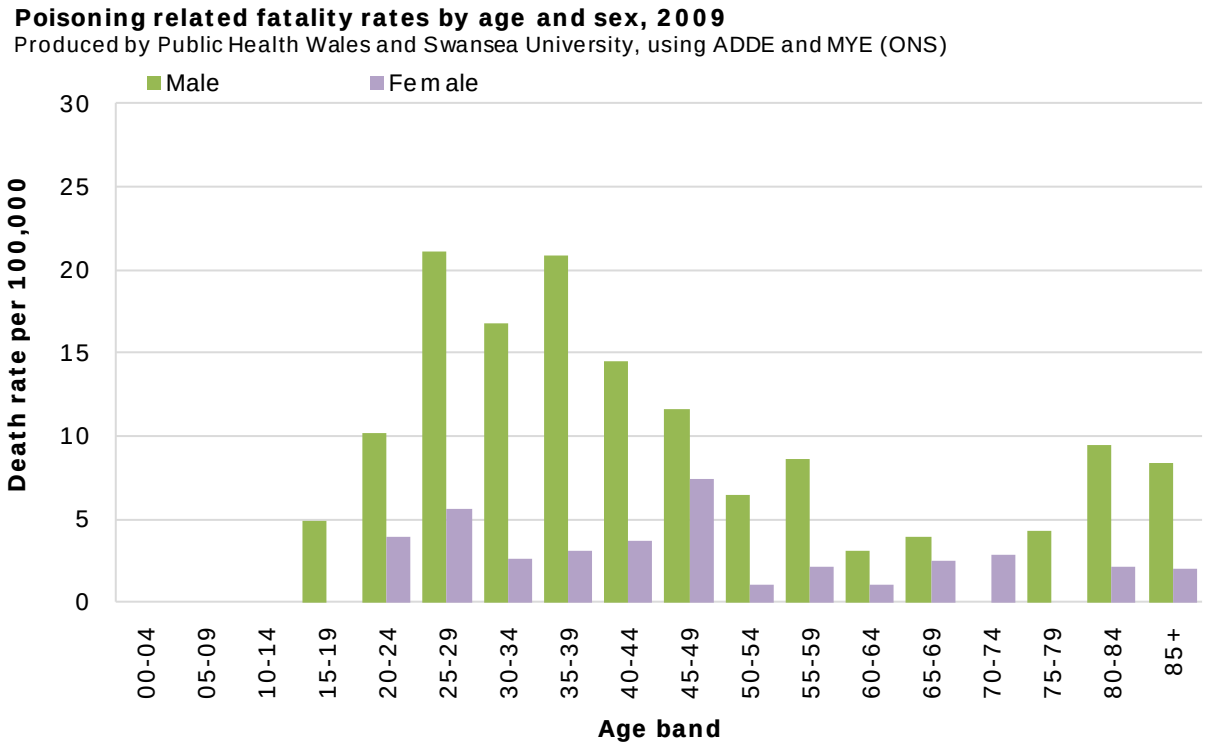
Summary estimate of epidemiology of poisonings in Wales in 2009
Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)



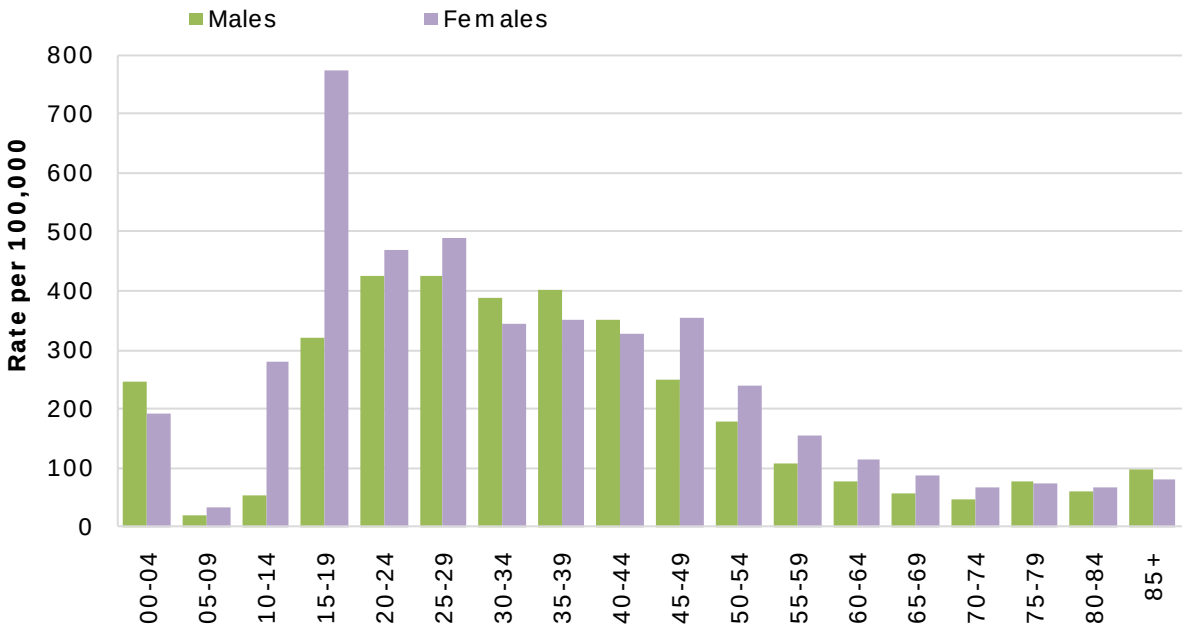
Both IP and ED data also show poisonings occurring mainly amongst young to middle aged adults (Figure 37, Appendix 12). However, the peak IP rates are amongst females aged 15 to 19 years (n=758, rate 775.1), more than double those of males of the same age (320.8). Female IP rates were consistently higher than those of males. It seems unlikely that all of these cases were unintentional and suggests a need to develop appropriate interventions to address the issue.

IP data also show that child poisoning is still an issue, with one 0 to 4 year old admitted to hospital every day in 2009 following a poisoning incident (n=374, male rate=245, female rate=190).

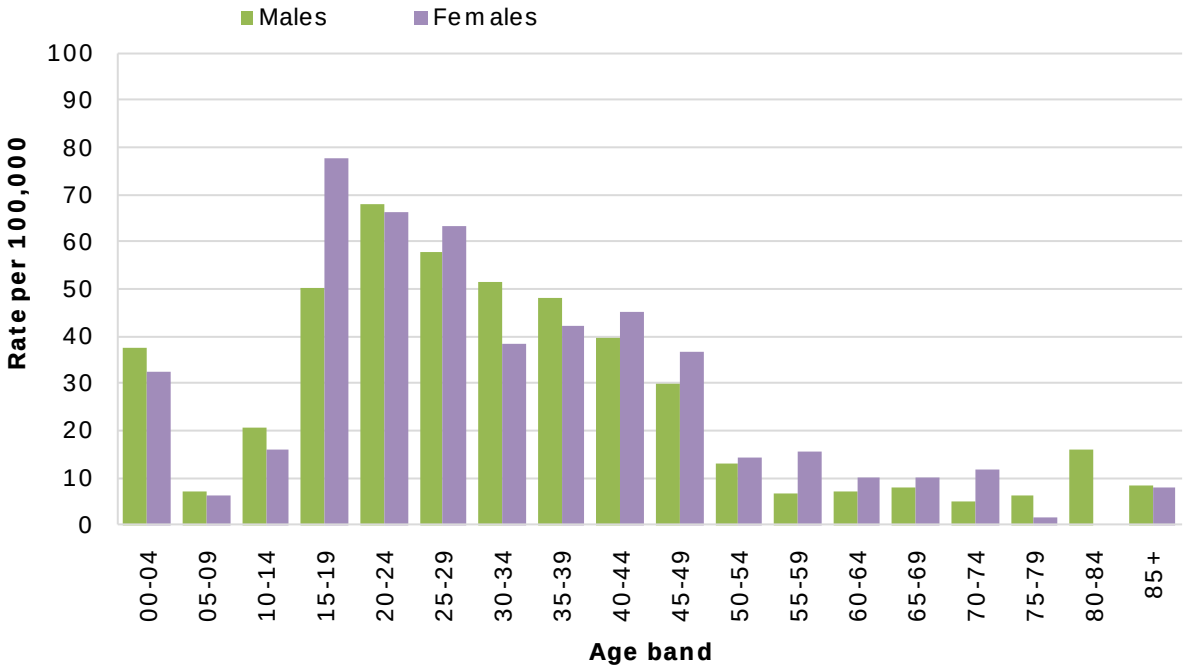
Figure 37



Poisoning related in-patient admission rates by age and sex, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) and MYE (ONS)



Poisoning related emergency department attendance rates by age and sex, 2009
Produced by Public Health Wales and Swansea University, using EDDS (NWIS) and MYE (ONS)

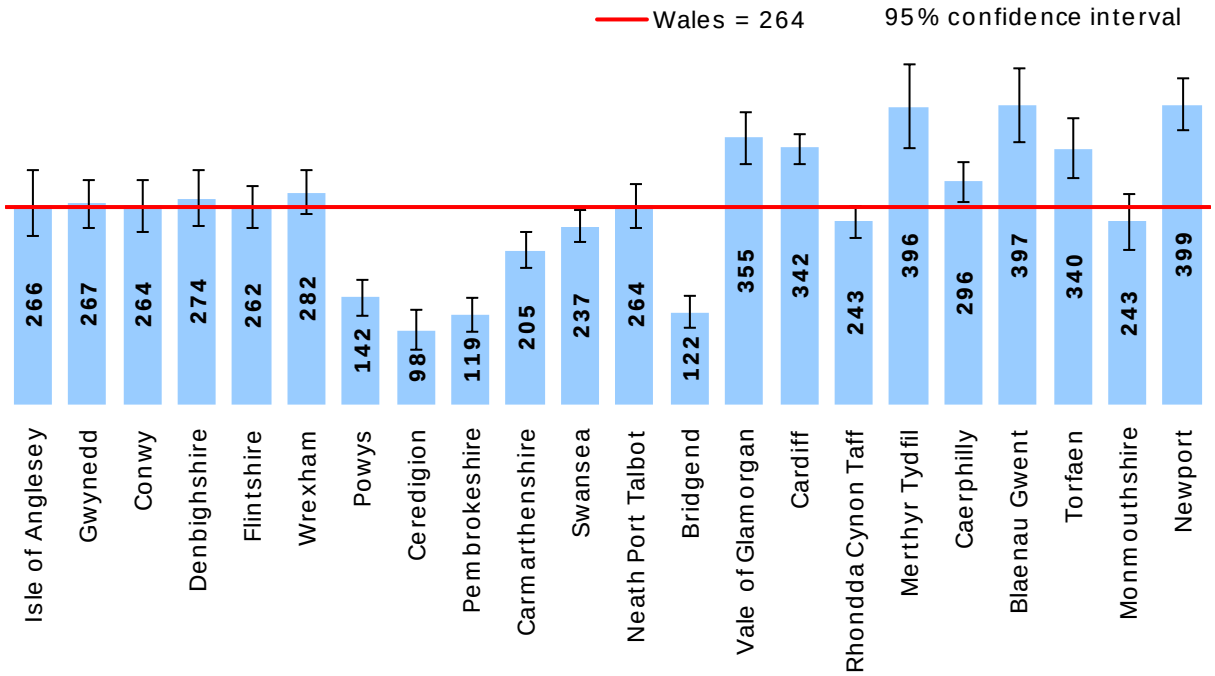


12.1.1 Local authority profile

Newport, Blaenau Gwent and Merthyr Tydfil all had rates significantly greater than all Wales (399, 397 and 397 respectively compared with 263; Figure 38). Lowest rates, and significantly below all Wales, were found in Ceredigion (98), Pembrokeshire (119) and Bridgend (122). The high and low rates are geographically clustered, suggesting that this may be linked to the reported incidence in terms of, for example, likelihood of seeking treatment or being admitted to hospital.

Figure 38

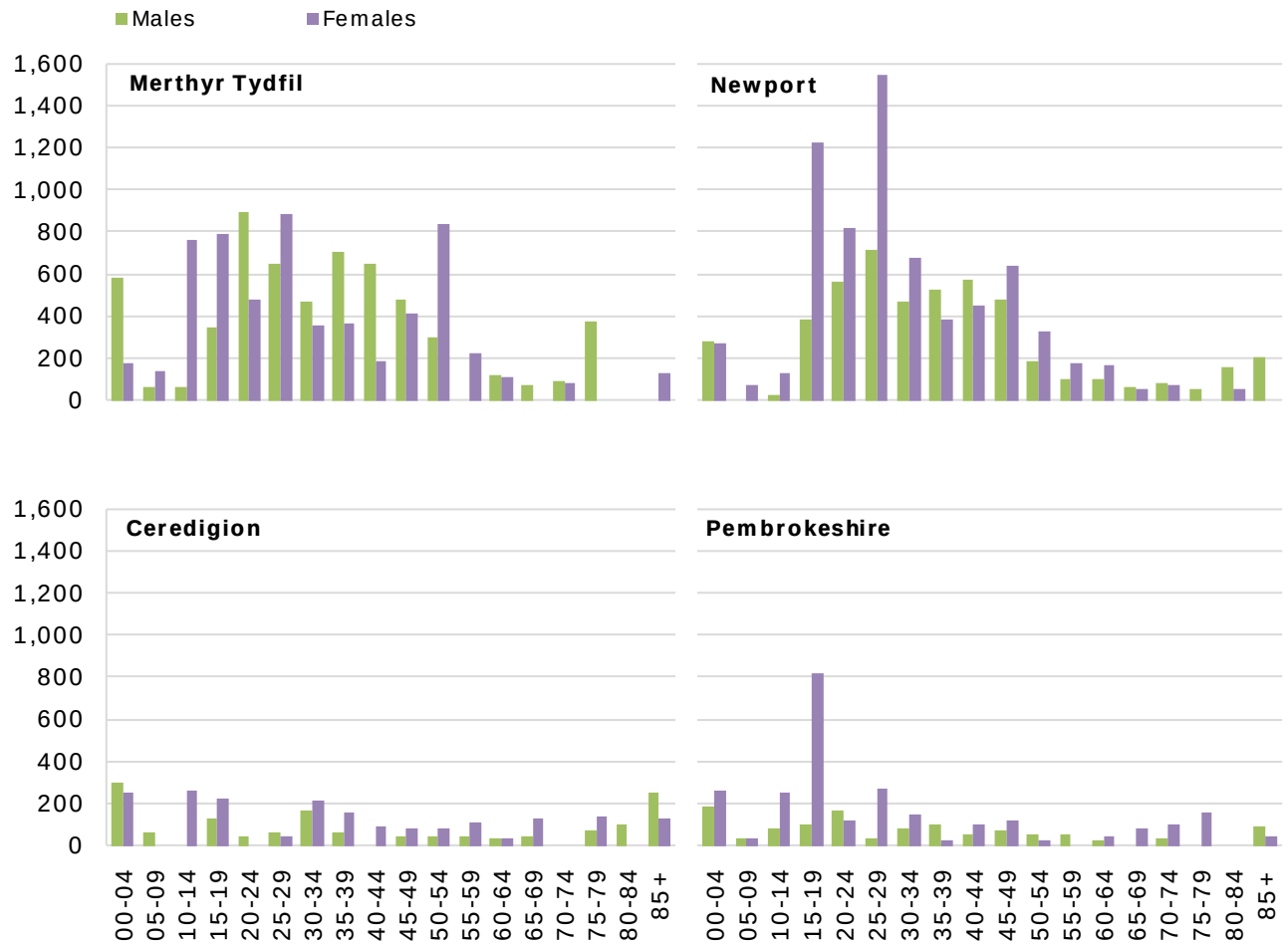
Poisoning related in-patient admission rates, European age-standardised rate per 100,000 and 95% confidence intervals, by local authority, 2009
Produced by Public Health Wales and Swansea University, PEDW (NWIS) & MYE (ONS)



Comparison of the poisoning profiles between the LAs with the highest and lowest poisoning rates showed that, in general, the excess is associated with young and middle adulthood (Figure 39).

Figure 39

Local authority areas with the highest and lowest poisoning related in-patient admission rates per 100,000, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) and MYE (ONS)

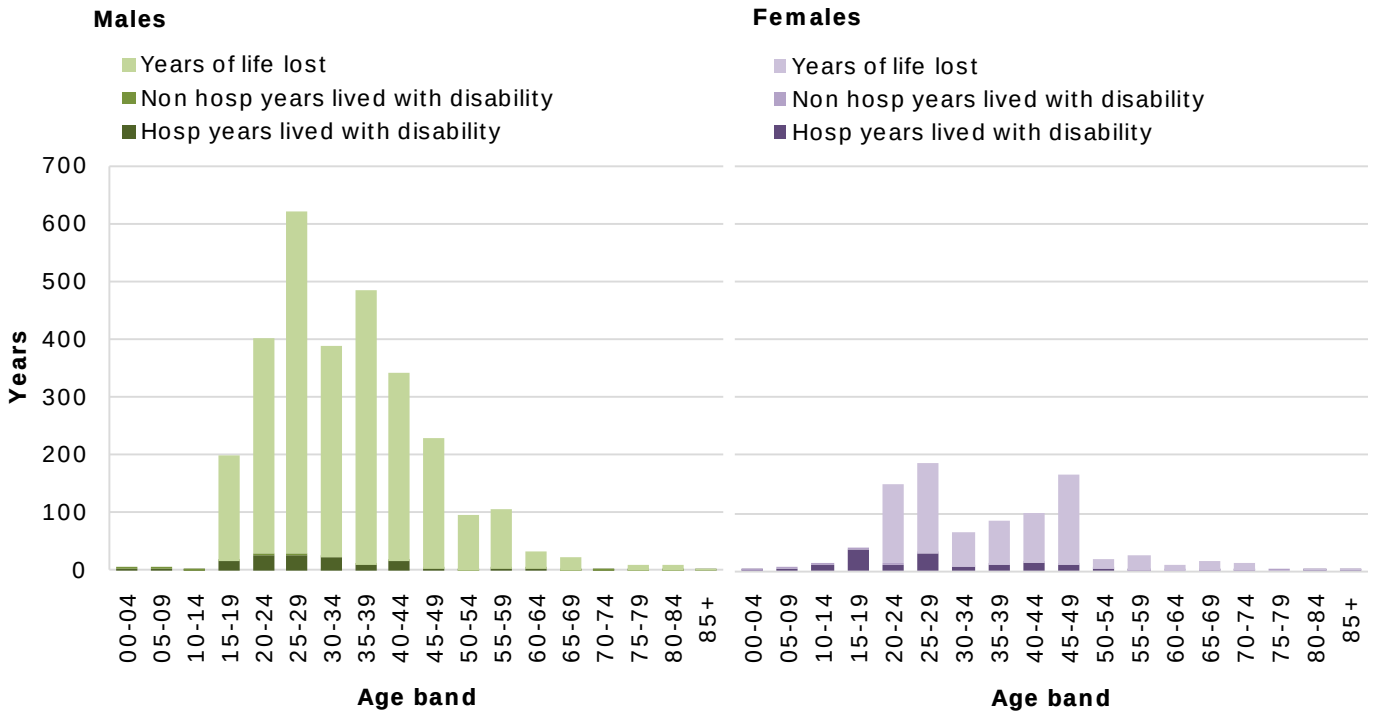


12.2 Burden

Since males suffer more poisoning related fatalities and there are rarely long term effects of poisoning, the burden is greater for males (2945 v 909 DALYs; Figure 40). In addition, 95% of male DALYs are YLL (2800/2945), 83% of female (757/909). Since these deaths are predominantly amongst young to middle aged adult males, this is where most years of life are lost (95% of DALYs in 20 to 49 year age group are YLL, Appendix 13).

Figure 40

Relative burden of poisoning in Wales, by sex and age, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & ADDE (ONS)



12.3 Evidence of effectiveness

Intervention	Evidence
Community programs for preventing poisonings in children Home safety interventions increased the safe storage of medicines (OR 1.57, 95% CI 1.22-2.02) and cleaning products (OR 1.63, 95% CI 1.22-2.17) in the home. The effect size was larger where an intervention relating to storage of cleaning products was delivered at home (OR 2.31, 95% CI 1.00-5.32) rather than a clinical setting (OR 1.29, 95% CI 1.09-1.53). There was insufficient evidence to determine whether these interventions had resulted in a decrease in poisoning rates. Study assessment: 10/10 (strong)	Kendrick, D. *et al* (2008). Effect of education and safety equipment on poison-prevention practices and poisoning: systematic review, meta-analysis and meta-regression. *Archives of Disease in Childhood*, 93,7: 599-608.

12.4 Lack of evidence of effectiveness

Intervention / risk factor	Evidence
Opioid related overdose deaths An expert panel reviewed of opioid deaths in the US. They recommended that after assessing patients for mental health disorders, clinicians should consider structured care for those with depression, anxiety or other mental illness to include possible minimisation of opioids. Methadone related deaths were higher than expected compared to other opioids, but, 2/3 of opioid deaths were due to substances other than methadone. Study assessment: 5/10 (moderate)	Webster, L., *et al* (2011). An analysis of the root causes for opioid-related overdose deaths in the United States. *Pain Medicine*, 12, S26-S35
Restricting paracetamol pack sizes There is conflicting evidence as to the effectiveness of legislation limiting paracetamol pack size in the UK. Paracetamol associated mortality rates, IP admissions and severity of overdose seem to have reduced since 1998, the year legislation came in, one study found that rates had already begun to drop in 1997. Study assessment: 8/10 (strong)	Hawkins, C., Edwards, J.N., Dargan, P.I. (2007). Impact of restricting paracetamol pack sizes on paracetamol poisoning in the United Kingdom. A review of the literature. *Drug Safety*, 30, 6: 465-79.
Community-based programs to prevent poisoning in children This review found there to be a lack of evidence to draw appropriate conclusions about the effectiveness of community-based programmes aimed at preventing poisoning in children. Study assessment: 7/10 (moderate)	Nixon, J. *et al* (2004). Community-based programs to prevent poisoning in children 0-15 years. *Injury Prevention,* 10, 43-6
Co-proxamol overdose Co-proxamol has been withdrawn in the UK, but this study is included as the intervention may be applicable to other drugs. Some evidence suggested that educating clinicians on the dangers of co-proxamol led to a reduction in the amount prescribed and in the number of cases of self poisoning using the drug, but no data were provided to support this statement Study assessment: 6/10 (moderate)	Simkin, S. *et al* (2005). Co-proxamol and suicide: preventing the continuing toll of overdose deaths. *Quarterly Journal of Medicine*, 98, 159-170.

13 Intent

Analysis of intent in injury incidence is very difficult; many people may be reluctant to report that they have self-harmed or been the victim of an assault and in EDs, in particular, staff are often reluctant to question people in too much detail about the reasons for their injuries. Pressures on data entry clerks to check people in to the ED for treatment can also contribute to under classification of intentional injuries. For these reasons and because of the small numbers of deaths in some categories, only IP data and overall burden data are presented here. However, interpretation of these data still needs to be mindful that IP data are subject to a variety of limitations.

Globally, both self harm and violence are becoming more important in terms of causes of death and disability. Murray and Lopez (1997) suggested that self harm would rise from 12 to 10 in the leading global causes of death between 1990 and 2020, with violence rising from 16 to 14. More recently, it has been suggested that self harm will rise from 14 to 12 in the leading causes of death, but from 17 to 14 in terms of leading causes of DALYs, between 2002 and 2030. Violent injuries are expected to rise as a leading cause of DALYs from 15 to 13 (Mathers and Loncar, 2006). Obviously, the relative contributions of high, middle and low income countries affect these profiles, but intentional injuries are important causes of injury and the burden of injury and need to be addressed.

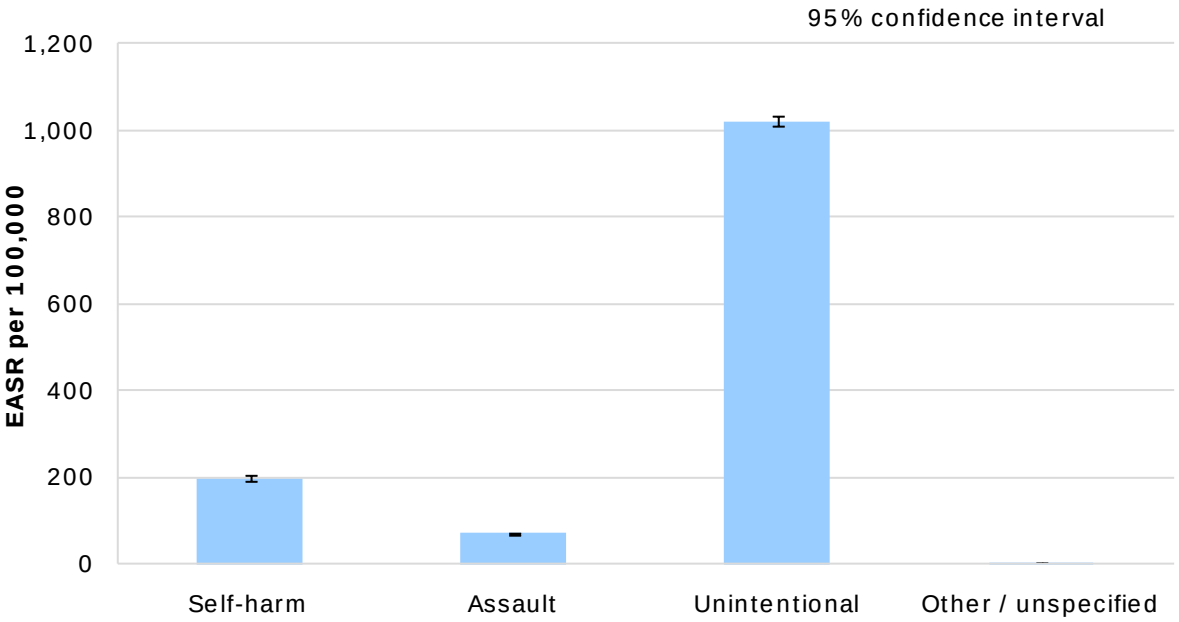
13.1 Epidemiology

The majority of IP admissions are for unintentional injuries (n=34339, 1022 per 100,000, Figure 41, Appendix 14), with rates 5 times higher than those for self harm (n=5619, rate 198, rate ratio 5.2) and more than 10 times those for assaults (n=1943, rate=70.3, rate ratio 14.5).

Figure 41

In-patient admission rates by 'intent' category, European age-standardised rates per 100,000 population, 2009

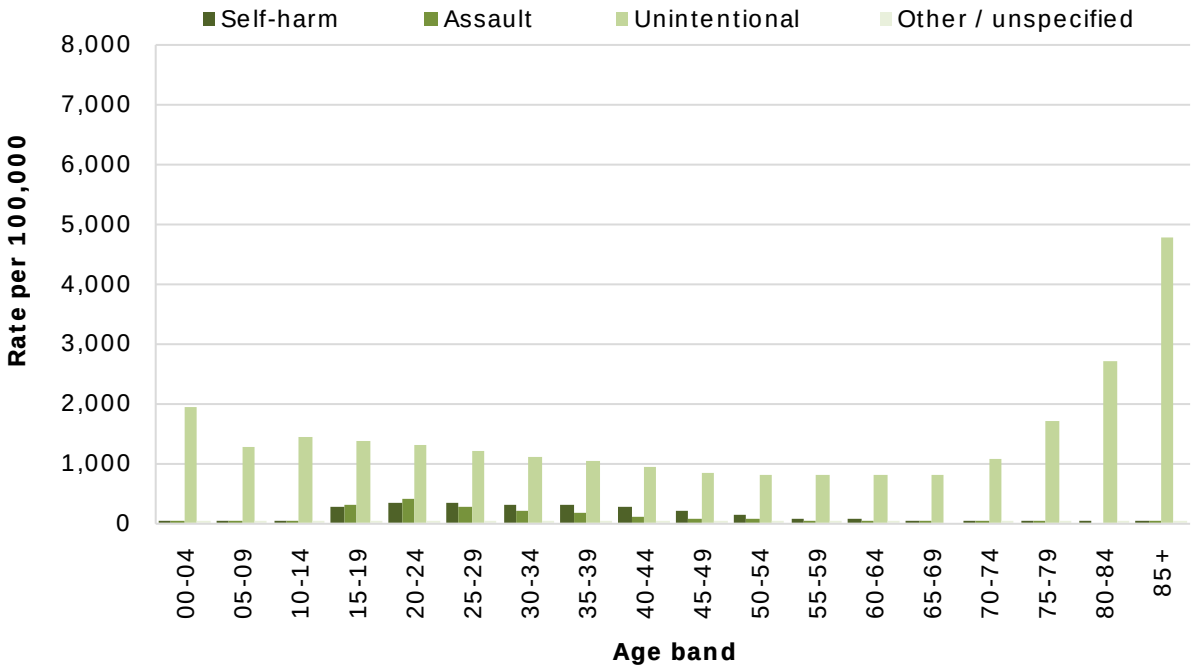
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) and MYE (ONS)



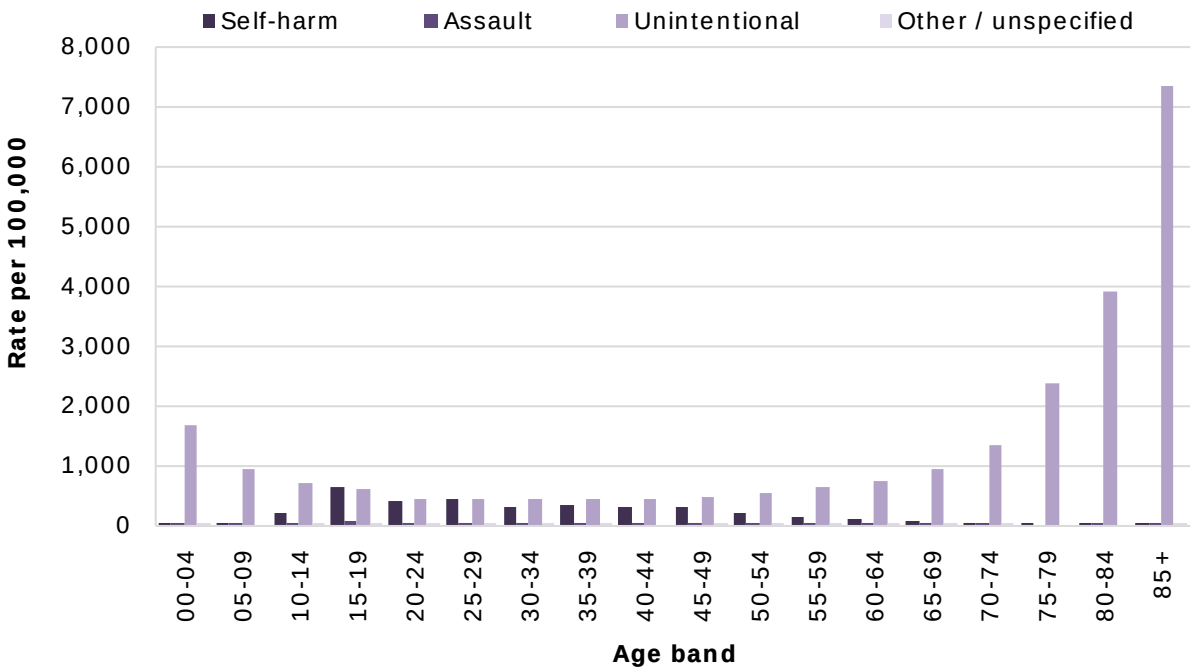
Female self harm rates are higher than those for males at all ages to 74 years, peaking at 650 per 100,000 for 15 to 19 year olds, and a profile consistent with that for poisonings. Assault rates are considerably lower, but also peak in 15 to 19 year olds, at 54. Male intentional injury profiles are similar for assault and self harm, and are highest between 15 and 49, with assault rates peaking at 403 for 20 to 24 year old males, self harm at 348 for the same age group (Figure 42).

Figure 42

In-patient admission rates by age and 'intent' category, males, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)



In-patient admission rates by age and 'intent' category, females, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)



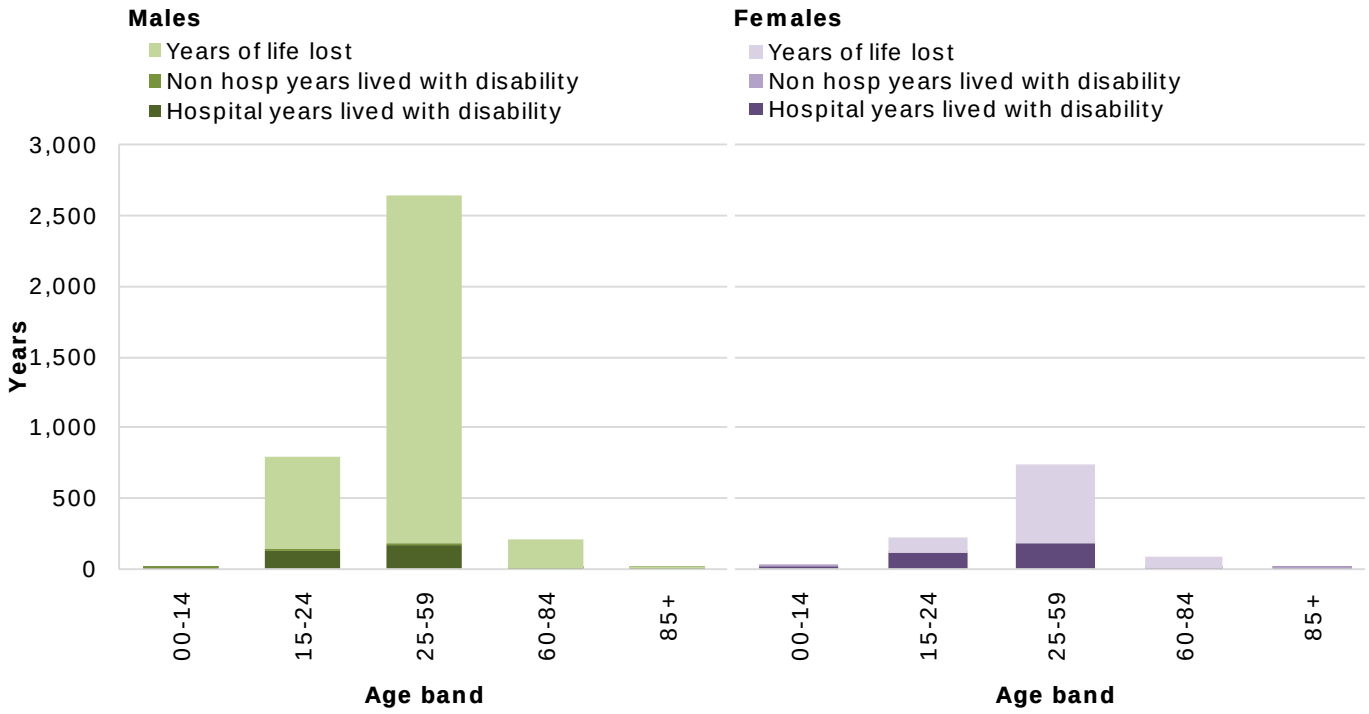
13.2 Burden

The burden of intentional injuries differs between self harm and assaults (Figure 43, Appendix 15); self harm leads to considerable numbers of YLL, particularly amongst adult males (n=2470), whilst the burden of assault injuries is in the long term impact of injuries not requiring IP treatment. Although the magnitude of the assault injuries burden is lower for females, the age related profiles are similar to males.

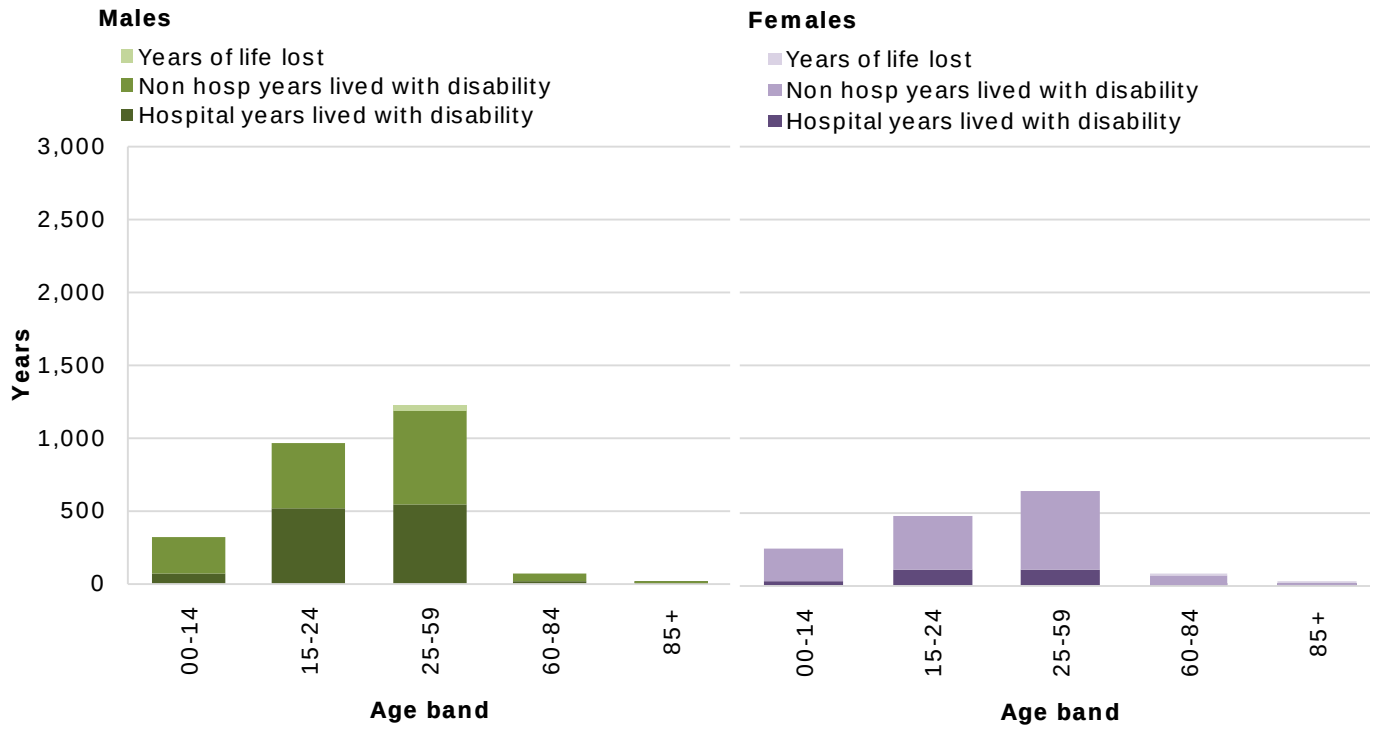
Figure 43

Burden of self harm and assault injuries, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)

Self harm



Assault


Males
Years of life lost
Non hosp years lived with disability
Hospital years lived with disability
3,000
2,500
2,000
1,500
1,000
500
0
Years
00-14
15-24
25-59
60-84
85+
Age band
Females
Years of life lost
Non hosp years lived with disability
Hospital years lived with disability
00-14
15-24
25-59
60-84
85+
Age band

14 Injuries by Health Board

Health Board level analyses provide useful comparison for targeting injury prevention efforts, but are subject to the limitations highlighted earlier around factors that affect likelihood of seeking treatment.

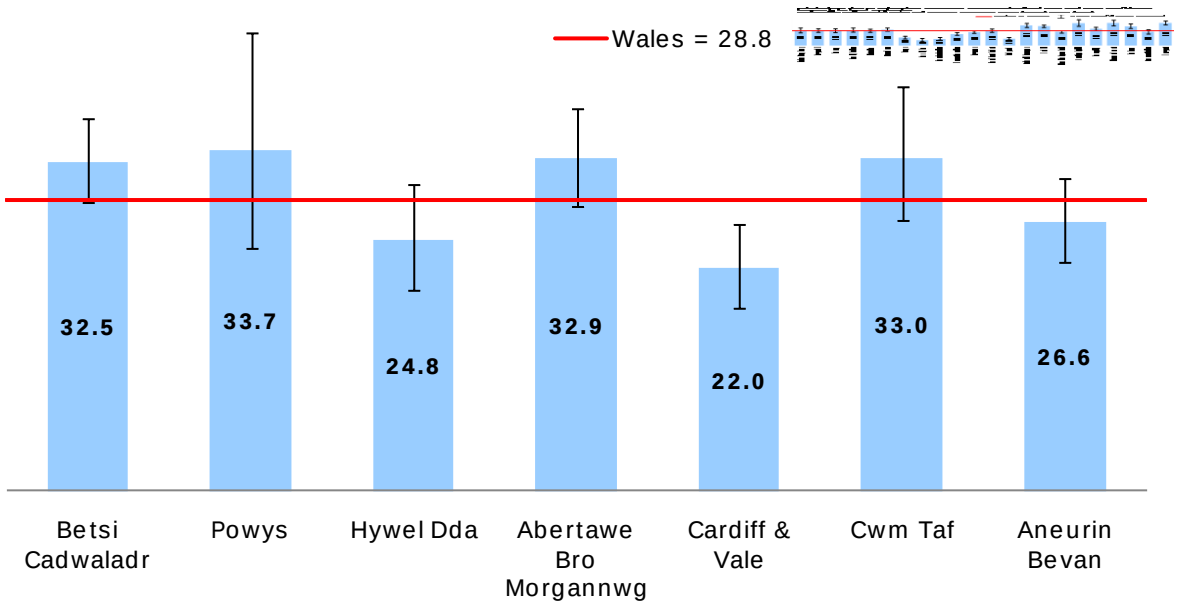
14.1 Epidemiology

Death rates are similar in HBs across Wales, showing no significant differences to the overall Wales rate, with the exception of Cardiff and the Vale where rates are significantly lower than all Wales (n=130, 22.0; Figure 44, Appendix 16).

Figure 44

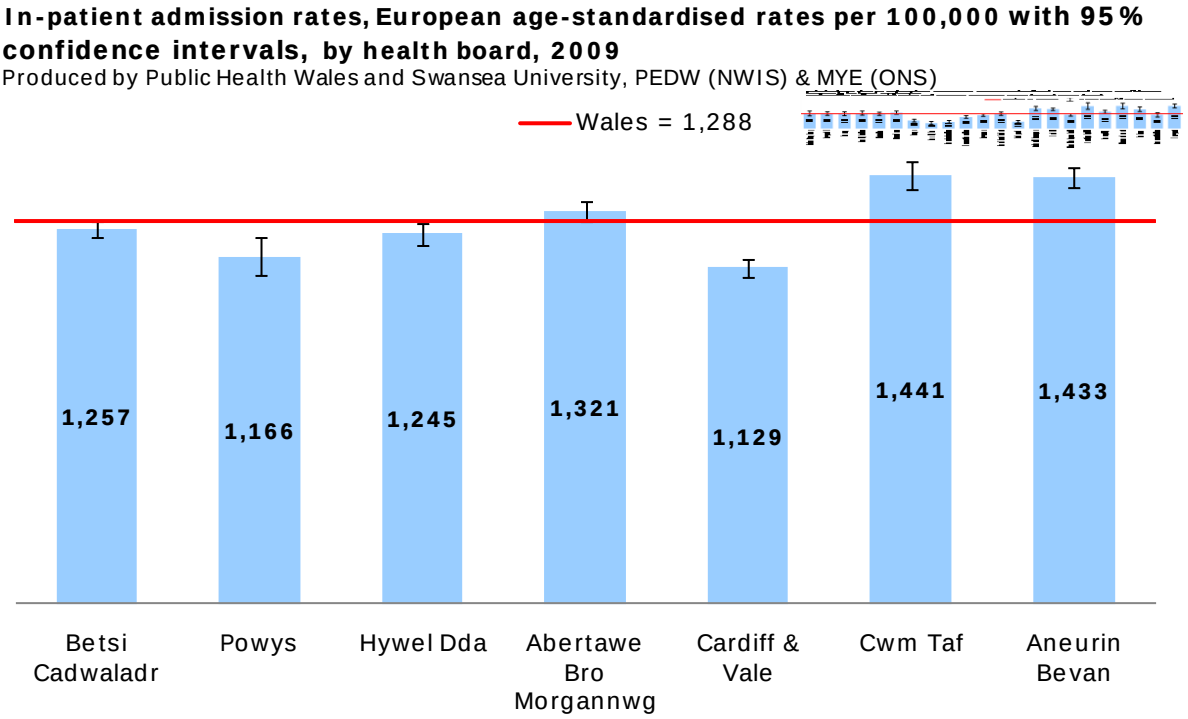
Injury death rates, European age-standardised rates per 100,000 with 95% confidence intervals, by health board, 2009

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)



Inpatient admission rates were highest in Cwm Taf (n=4334, rate 1441.5, Figure 45) and Aneurin Bevan (n=8600, rate 1432.6), with both significantly greater than all Wales and with Cardiff and the Vale again significantly below all Wales (n=5590, rate 1129.0).

Figure 45



Emergency department data are more difficult to analyse and interpret in geographical terms; they are susceptible to variations and biases in reporting that are compounded by geographical level analyses. For example, there is considerable evidence of distance decay in attendance at ED for less severe injuries. This means that the location of an ED can affect attendance rates for surrounding areas (Lyons et al, 2006). For these reasons, these data are not presented at HB level.

14.1.1 Age and sex - deaths

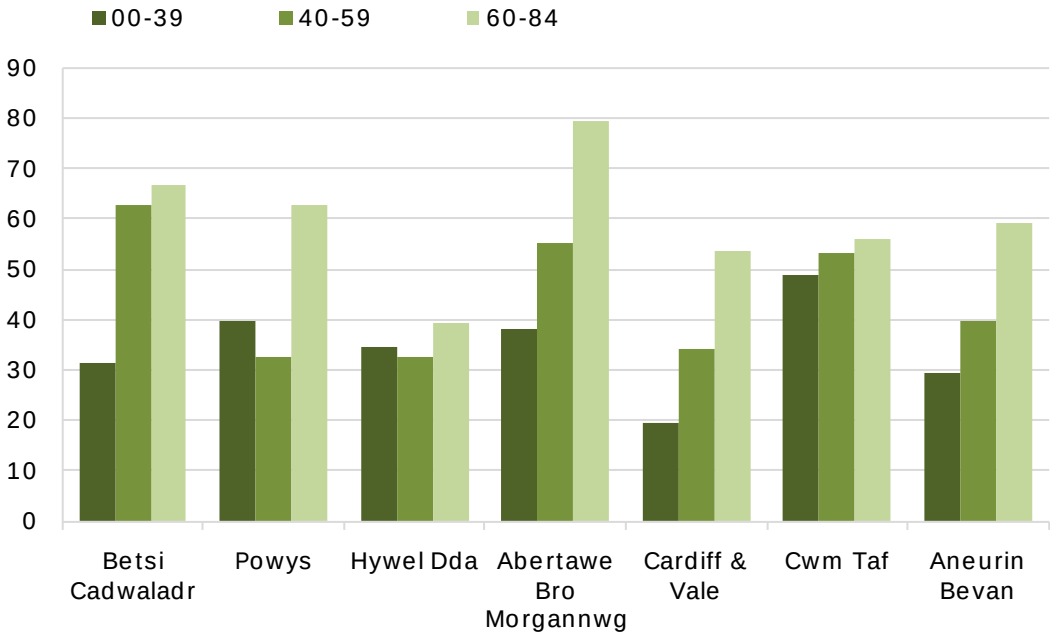
Analysis of deaths by age and sex can be susceptible to issues of small numbers, so the age groups analysed here have been aggregated down to just three.

In all HB areas, deaths, not unexpectedly, generally increase with increasing age (Figure 46), the obvious exception being Powys, where death rates for male and female 40 to 59 year olds were lower than those for 0 to 39 year olds. Cwm Taf is notable for have similar, and relatively high death rates amongst all under 84 year olds. Amongst the over 85 year group, Abertawe Bro Morgannwg again had the highest male rates (463.4, Figure 47), Betsi Cadwaladr the highest female rates (419.4). Interestingly though, there was no consistency in relation to gaps between males and females or whether male rates were higher than female or vice versa.

Figure 46

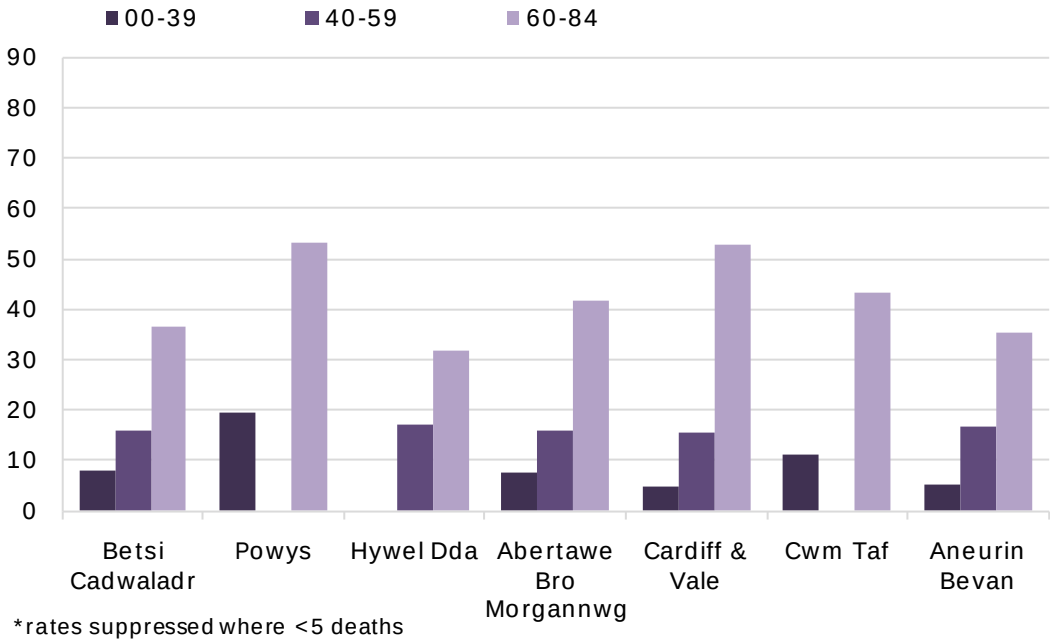
Age-specific injury death rates per 100,000 population, by sex and health board, males, 2009

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)



Age-specific injury death rates* per 100,000 population, by age, sex and health board, females, 2009

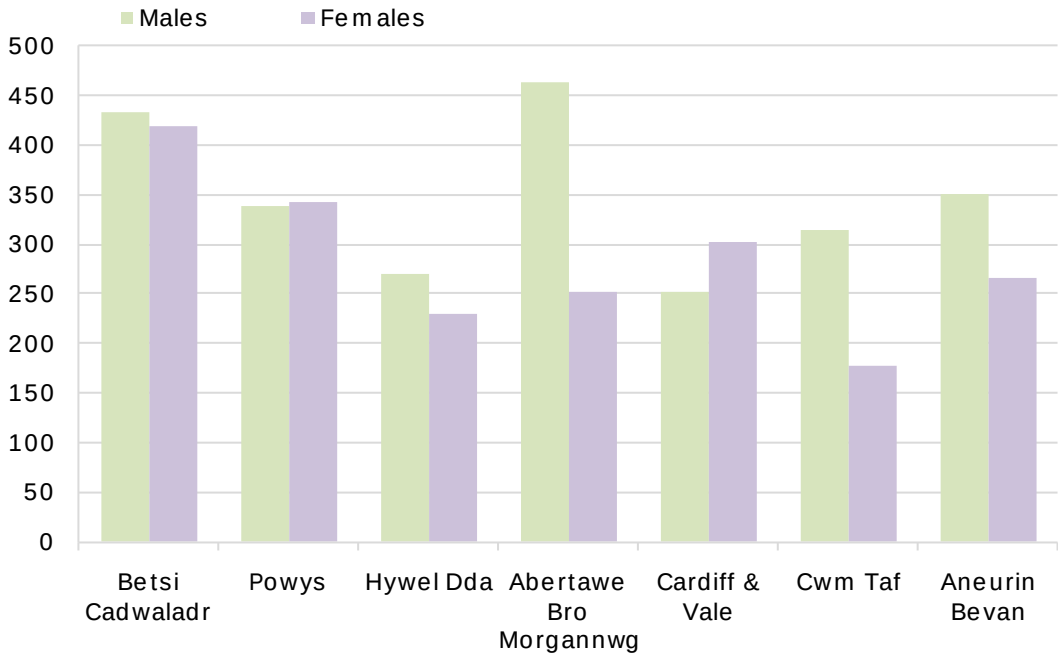
Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)



*rates suppressed where <5 deaths

Figure 47

Age-specific injury death rates per 100,000 population for persons aged 85 and over, by sex and health board, 2009
Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)



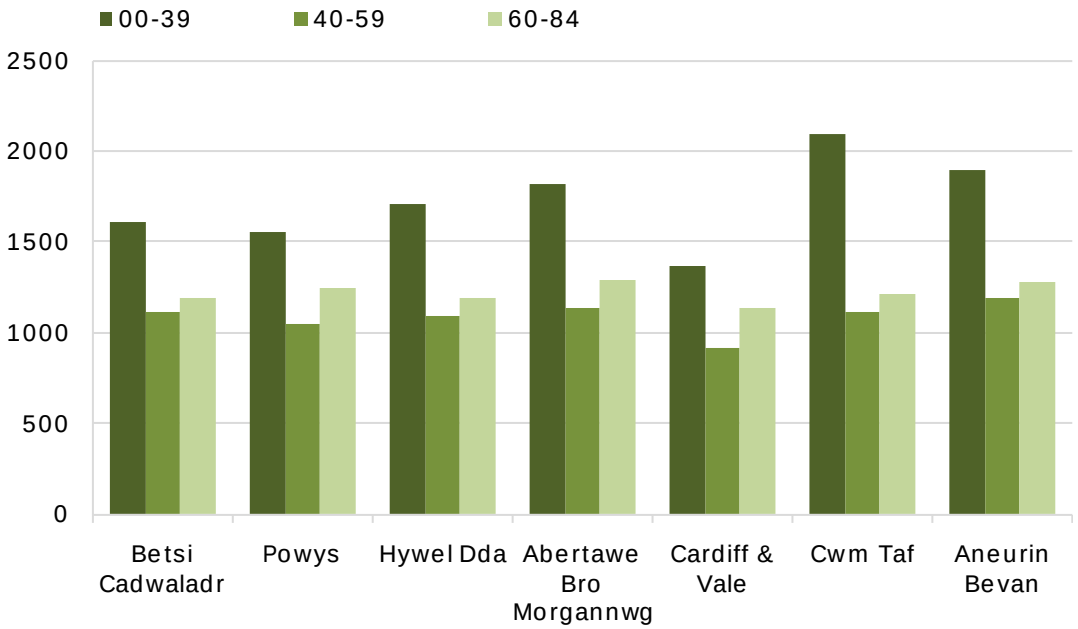
14.1.2 Age and sex Inpatient

In all HBs, female IP injury rates for the 85+ year group were considerably higher than those for males, but IP rates for over 85 year olds were considerably higher than for any other age group (Figure 48, Figure 49). Across all HBs the next highest admission rates were under 39 year olds for males and 60 to 84 year olds for females. In terms of patterns of admission; Cwm Taf had highest IP injury rates for both males and females aged 0 to 39 (2096 and 1200 respectively), Abertawe Bro Morgannwg have highest IP injury rates for males aged 40 to 84 (1139 and 1294 respectively), whilst Aneurin Bevan have the highest injury rates for females aged 40 to 84 (916 and 1833 respectively).

Figure 48

Age-specific in-patient admission rates per 100,000, by health board, males, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)



Age-specific in-patient admission rates per 100,000, by health board, females, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)

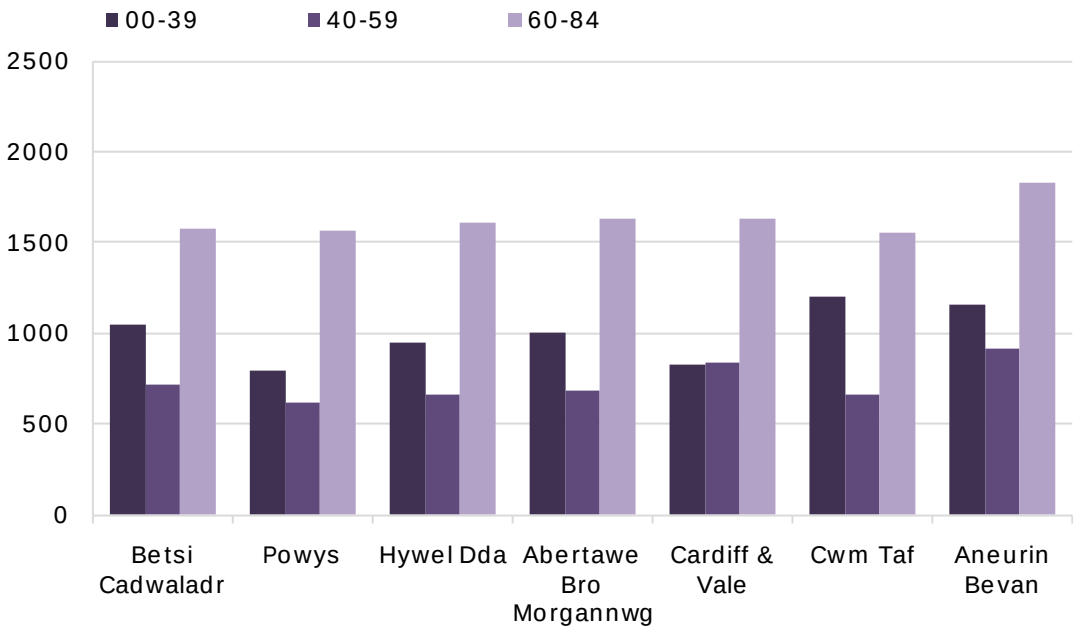
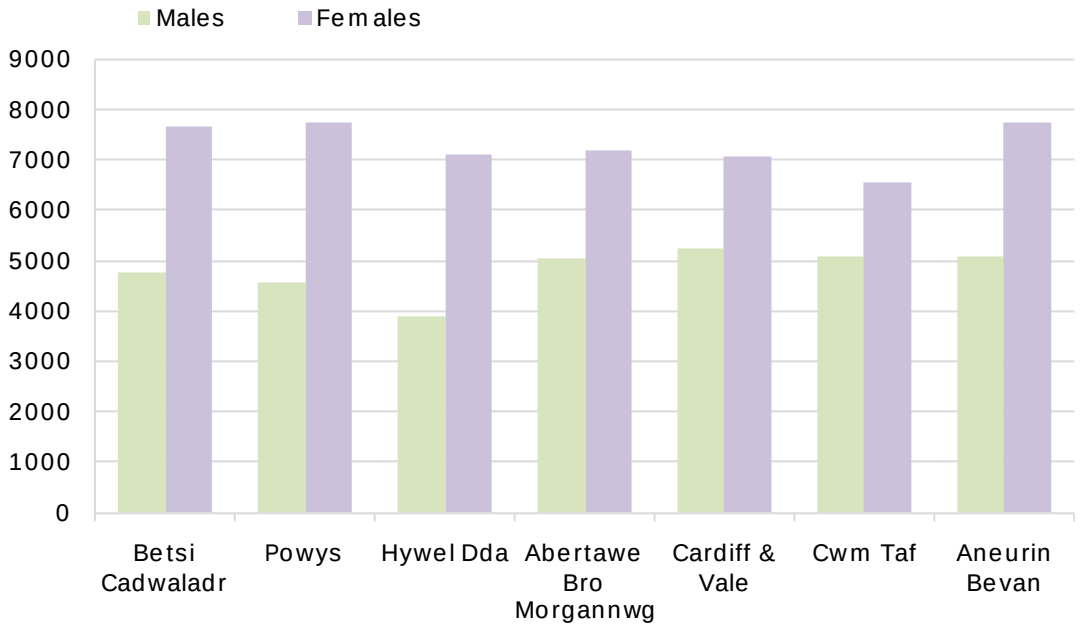


Figure 49

Age-specific in-patient admission rates per 100,000, by sex and health board, persons aged 85+, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)



14.2 Burden

The burden of injuries overall, in terms of YLDs and YLLs is highest in Betsi Cadwaladr (14,096.4), with the total DALYs 7 times higher than those in Powys (2024.6, Figure 50, Table 19). Obviously, this is linked to population size and calculation of the rate of DALYs demonstrates that ABMU have the highest rate (24.9 per 1000 population), followed by Cwm Taf (22.7). Reducing the DALY rate to that of Powys, would reduce the burden of injuries in ABMU by almost 40% and in Cwm Taf by one third. There are limitations to using Powys as the comparator, because of the lack of ED data, but the general problems with ED data and the similarity between the DALY rates of Powys, Cardiff and the Vale and Aneurin Bevan makes use of this target more acceptable.

Figure 50

Burden of injuries by health board, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)

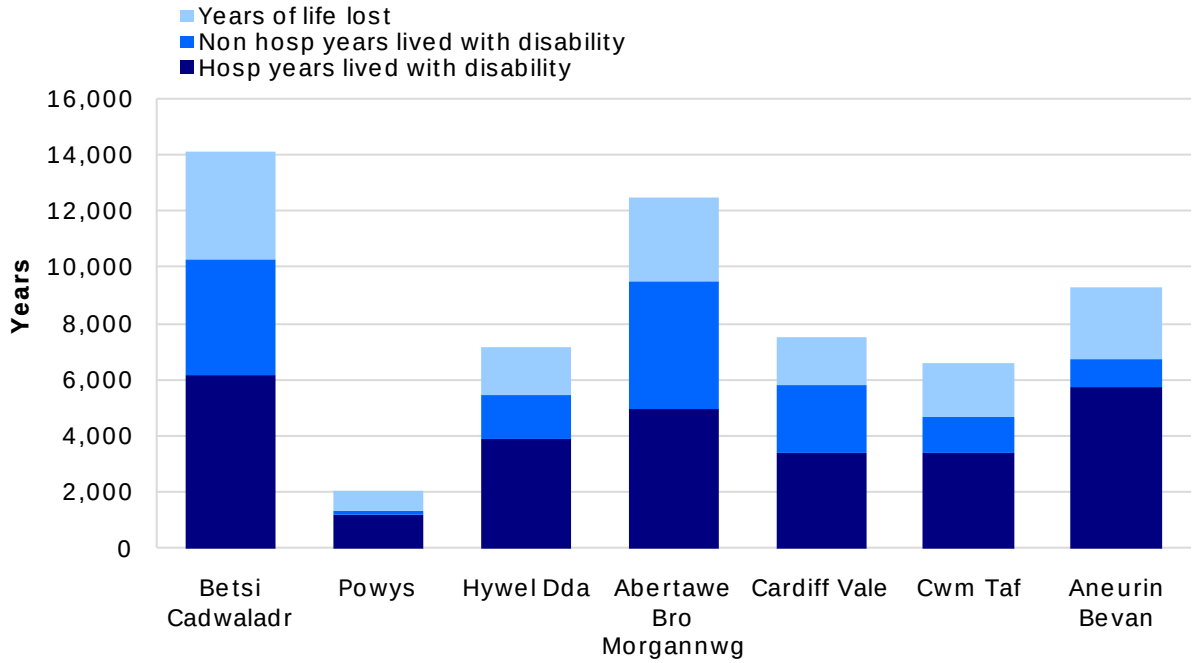


Table 19

Rate of disability adjusted life years (DALYs) by health board population and savings if inequalities were reduced to lowest level

	DALYs	Population	DALYs per 1,000 population	DALYs at Powys rate	DALYs saved	% decrease
Betsi Cadwaladr	14,096	679,000	20.8	10,438	3,658	26.0%
Powys	2,025	131,700	15.4	2,025	-	-
Hywel Dda	7,136	374,800	19.0	5,762	1,374	19.3%
Abertawe Bro Morgannwg	12,492	502,300	24.9	7,722	4,770	38.2%
Cardiff Vale	7,521	461,000	16.3	7,087	434	5.8%
Cwm Taf	6,595	290,500	22.7	4,466	2,129	32.3%
Aneurin Bevan	9,315	560,600	16.6	8,618	697	7.5%
Total	**59,180**	**2,999,900**	**19.7**	**46,117**	**13,063**	**22.1%**

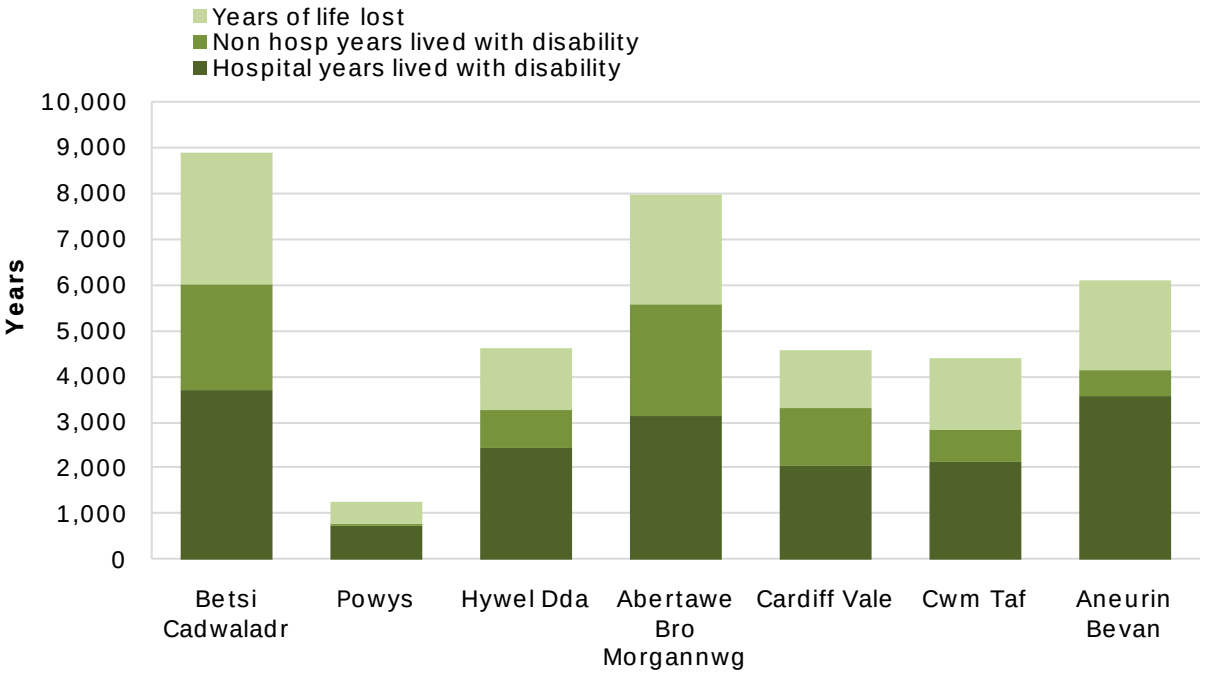
Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)

Not unexpectedly, the HB patterns of burden for males and females strongly reflect the overall burden of injury (Figure 51), with Betsi Cadwaladr having highest burden for both males and females, Powys the lowest in both cases. However, in terms of the DALY rate AMBU was again highest for both males (32.4 DALYs per 1000; Table 20) and females (17.6 DALYs per 1000). There is, of course, also the possibility that some of these high rates are associated with better data quality artificially increasing the size of the injury problem.

Figure 51

Burden of injuries by sex and health board, males, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & ADDE (ONS)



Burden of injuries by sex and health board, females, 2009

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & ADDE (ONS)

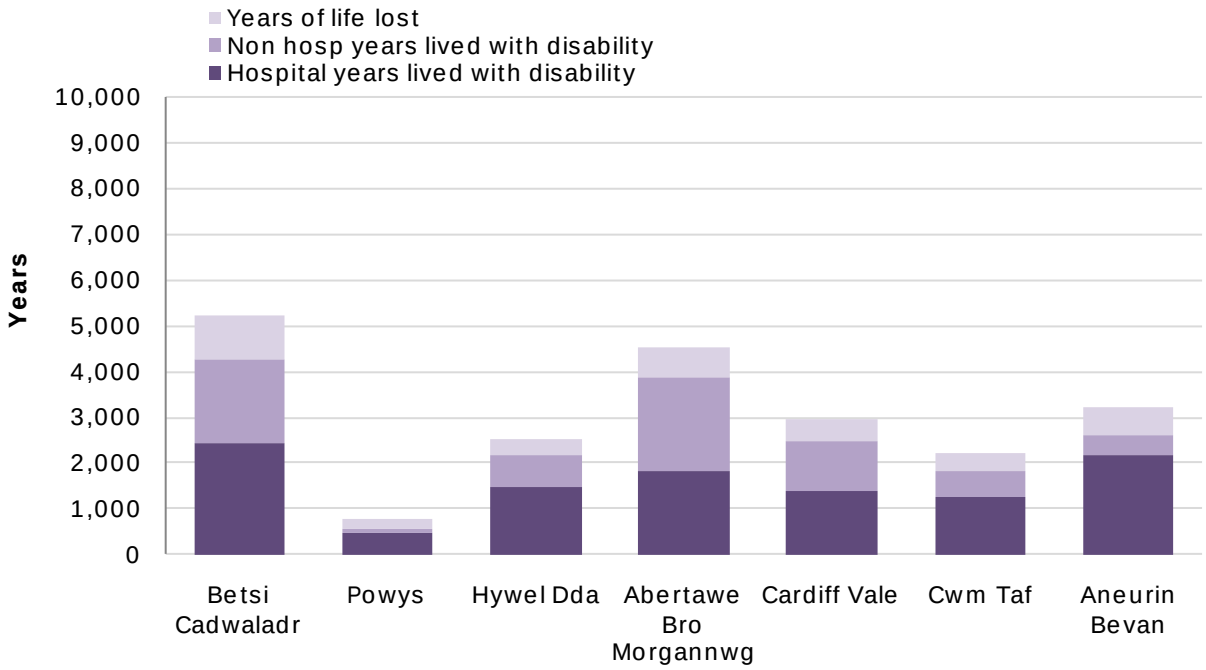


Table 20

Rate of disability adjusted life years (DALYs) by health board population and sex, with savings if inequalities were reduced to lowest level

	Males					
	DALYs	Population	DALYs per 1000 population	DALYs at Powys rate	DALYs saved	% decrease
Betsi Cadwaladr	8,884	331,200	26.8	6,342	2,542	28.6%
Powys	1,252	65,400	19.1	1,252	-	-
Hywel Dda	4,605	182,100	25.3	3,487	1,118	24.3%
Abertawe Bro Morgannwg	7,973	246,200	32.4	4,715	3,258	40.9%
Cardiff Vale	4,549	224,800	20.2	4,305	245	5.4%
Cwm Taf	4,398	141,700	31.0	2,713	1,685	38.3%
Aneurin Bevan	6,112	273,700	22.3	5,241	871	14.2%
Total	**37,774**	**1,465,100**	**25.8**	**28,055**	**9,718**	**25.7%**

	Females					
	DALYs	Population	DALYs per 1000 population	DALYs at Aneurin Bevan rate	DALYs saved	% decrease
Betsi Cadwaladr	5,212	347,800	15.0	3,883	1,329	25.5%
Powys	772	66,300	11.6	740	32	4.2%
Hywel Dda	2,531	192,700	13.1	2,151	380	15.0%
Abertawe Bro Morgannwg	4,519	256,100	17.6	2,859	1,660	36.7%
Cardiff Vale	2,972	236,200	12.6	2,637	335	11.3%
Cwm Taf	2,197	148,800	14.8	1,661	536	24.4%
Aneurin Bevan	3,203	286,900	11.2	3,203	-	-
Total	**21,406**	**1,534,800**	**13.9**	**17,134**	**4,272**	**20.0%**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)

15 Injuries by local authority

As with the HB data, LA level information is useful for more effective targeting of injury prevention efforts, however, it is even more prone to the data collection problems highlighted previously.

15.1 Epidemiology

Injury death rates at the LA level ranged from 20.9 per 100,000 in the Vale of Glamorgan to 42.9 in Merthyr Tydfil (Figure 52, Appendix 17). Merthyr Tydfil also saw the highest IP injury rates, significantly above those of all Wales (1711.8, Figure 53).

Figure 52

Injury death rates, European age-standardised rates per 100,000 by local authority, 2009

Produced by Public Health Wales and Swansea University, ADDE & MYE (ONS)

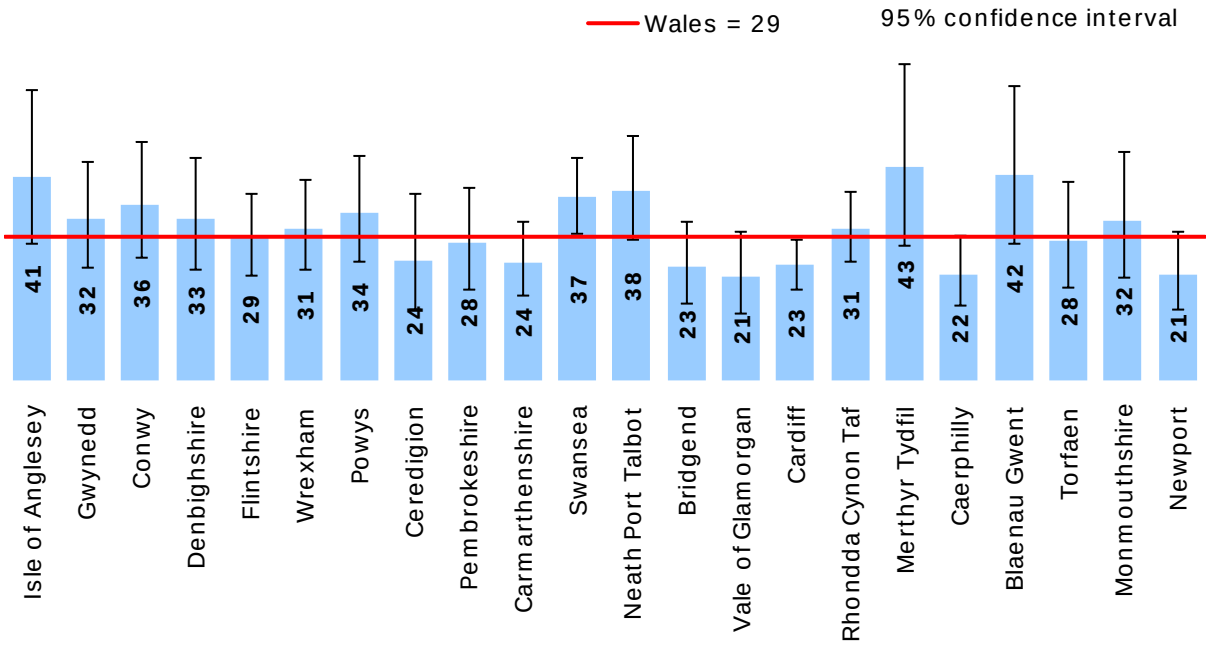
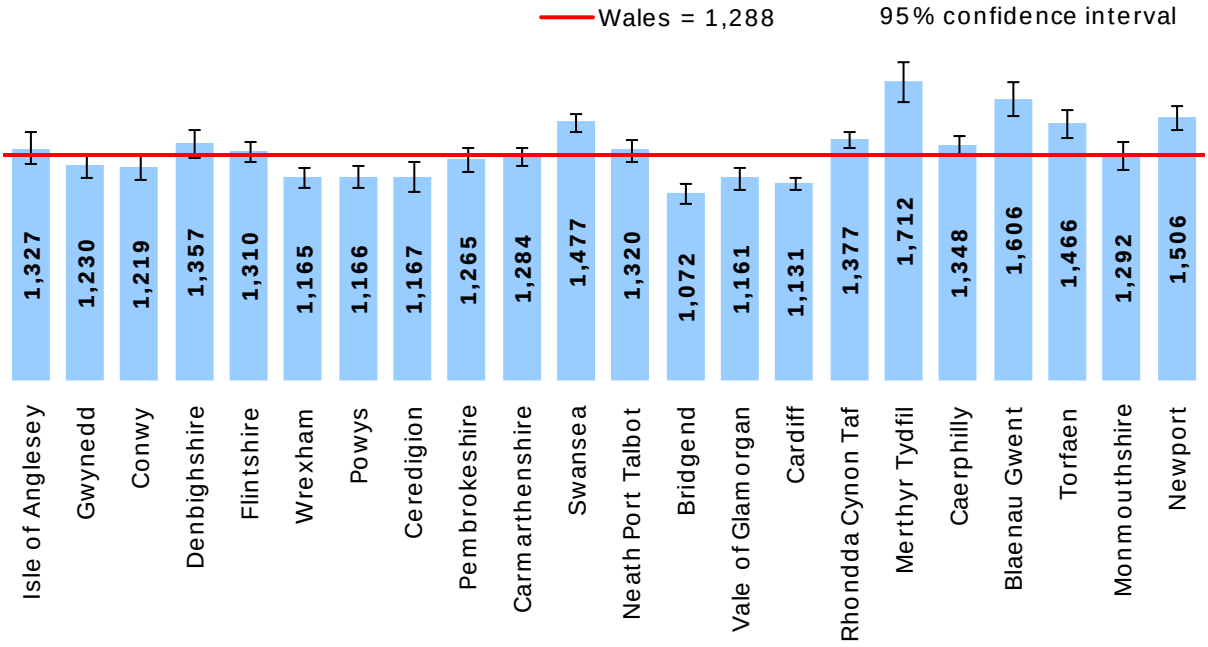


Figure 53

Injury in-patient admission rates, European age-standardised rates per 100,000 by local authority, 2009
Produced by Public Health Wales and Swansea University, PEDW (NWIS) & MYE (ONS)



15.1.1 Local authority injury rates by age and sex

In the under 40 year group, male death rates in Merthyr Tydfil were far higher than those of any other LA (64.7, Table 21) and four times higher than the lowest rates (Cardiff, 16.1), but female death rates were too low to be recorded here; highlighting substantial inequalities in injury related death in one relatively small area of Wales. Anglesey and Denbigh report the highest death rates for over 40 year old males and females, respectively.

Table 21

Death rates* per 100,000 by age, sex and local authority, 2009

	Male		Female	
	0 to 39	40+	0 to 39	40+
Isle of Anglesey	39.5	93.4	-	63.7
Gwynedd	38.7	61.4	-	45.5
Conwy	46.6	69.1	-	51.0
Denbighshire	37.2	70.9	-	71.9
Flintshire	19.4	79.8	-	38.7
Wrexham	21.0	90.3	-	44.8
Powys	39.4	58.7	19.4	49.4
Ceredigion	-	65.3	-	41.7
Pembrokeshire	42.8	44.6	-	34.3
Carmarthenshire	34.7	33.9	-	37.5
Swansea	37.1	91.9	-	52.3
Neath Port Talbot	46.9	83.6	-	43.7
Bridgend	30.9	53.9	-	21.5
Vale of Glamorgan	30.4	29.5	-	42.7
Cardiff	16.1	58.2	6.1	50.7
Rhondda Cynon Taf	45.3	60.0	8.6	30.8
Merthyr Tydfil	64.7	68.2	-	-
Caerphilly	27.6	46.1	-	24.2
Blaenau Gwent	48.8	82.8	-	48.4
Torfaen	36.7	53.8	-	59.5
Monmouthshire	31.7	62.0	-	59.7
Newport	16.6	55.6	-	24.5

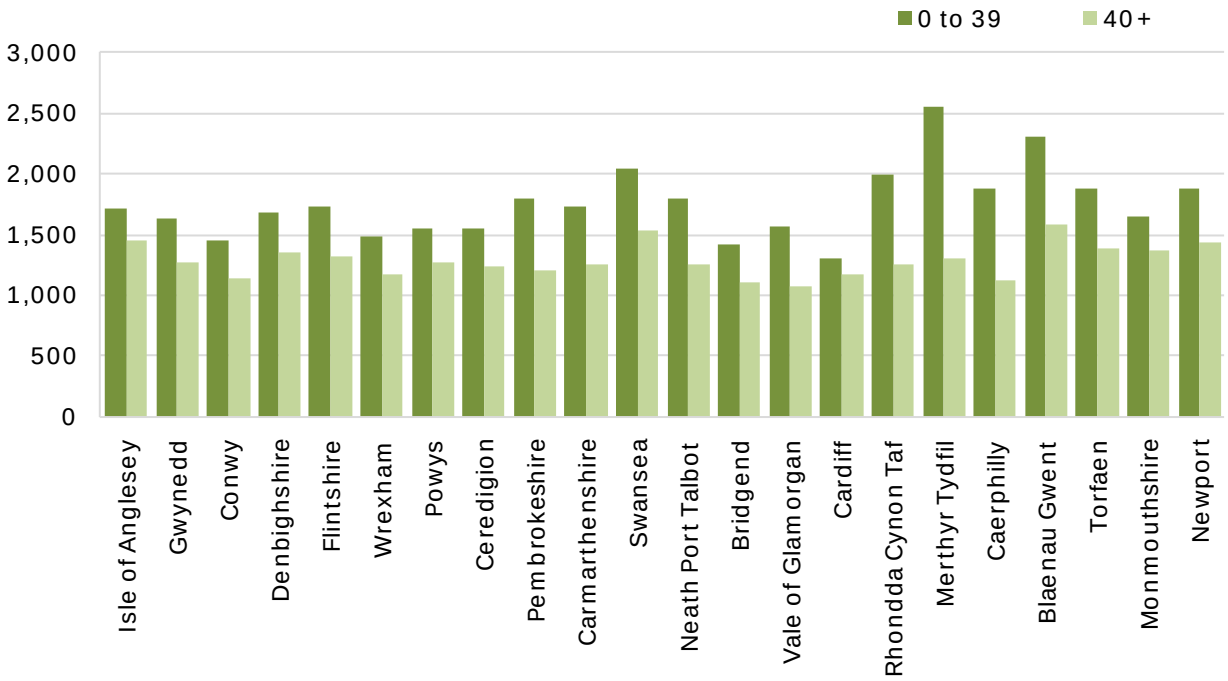
Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)

*rates have been supressed where number of deaths <5

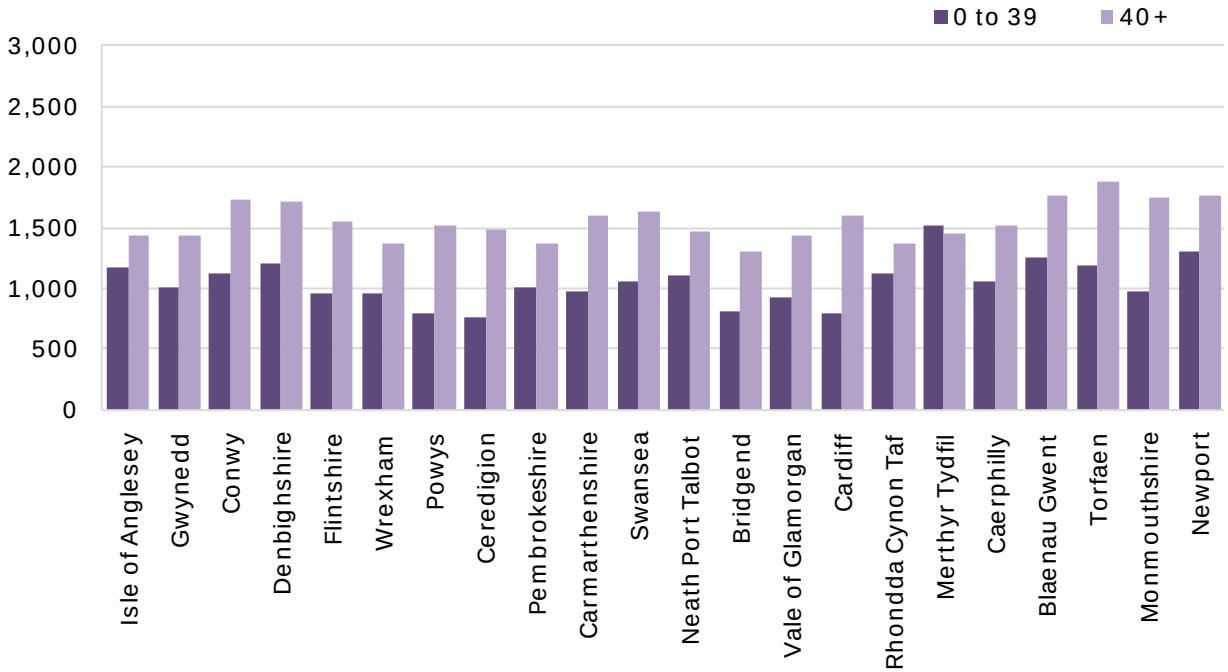
Merthyr Tydfil also has the highest male 0 to 39 year IP rates (2,547, Figure 54, Appendix 17); almost double those of Cardiff, with the lowest rates (1,310). Blaenau Gwent (1,585) has the highest rates for the older males. For females, Merthyr Tydfil again has the highest under 40 year old IP rates (1,518, Figure 54), with Torfaen highest in the over 40 group (1,881). In all LA areas, male IP rates are higher in the under 40 year old group, female IP rates higher in the over 40 group, with the exception of Merthyr Tydfil.

Figure 54

Injury in-patient admission rates per 100,000 by age and local authority, males, 2009
Produced by Public Health Wales and Swansea University, PEDW (NWIS) & MYE (ONS)



Injury in-patient admission rates per 100,000 by age and local authority, females, 2009
Produced by Public Health Wales and Swansea University, PEDW (NWIS) & MYE (ONS)



15.2 Burden

The greatest burdens of injuries are, unsurprisingly, in the largest LA areas in population terms, namely Cardiff, Swansea and Rhondda Cynon Taf (Figure 55). As with the HBs, calculation of a DALY rate is informative and shows that with 30.7 DALYs per 1000 population, Merthyr Tydfil has the highest burden of injury per population, but with Swansea on 29.2 and Pembrokeshire on 27.5.

Calculating the effect if all DALY rates were reduced to those of the lowest LA (Monmouthshire, rate 14.5) would reduce the burden of injury by a quarter, with Swansea, Merthyr Tydfil and Pembrokeshire seeing their burden of injury halved. This would have a significant impact on health and health services in these areas.

Figure 55

Burden of injuries by local authority, 2009
Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)

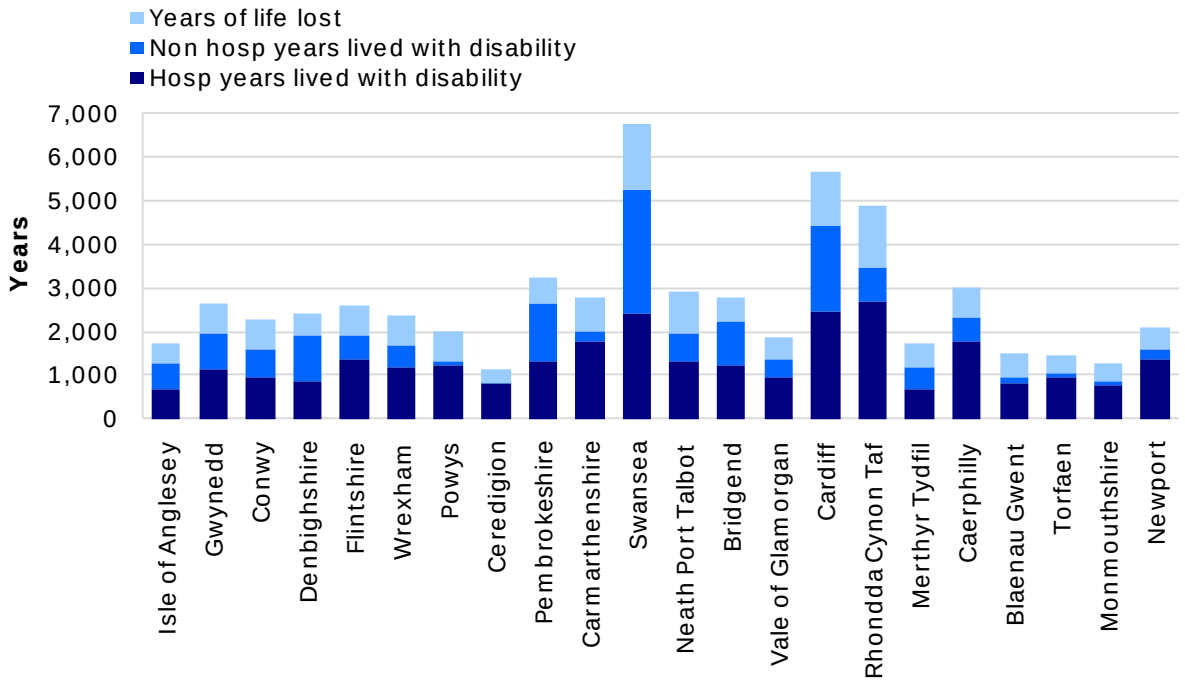


Table 22

Disability adjusted life years (DALYs) rates per 1,000 population by local authority, 2009

	DALYs	Population	DALYs per 1000 population	DALYs at Monmouthshire rate	DALYs saved	% decrease
Isle of Anglesey	1,722	68,600	25.1	994	728	42.3%
Gwynedd	2,656	118,900	22.3	1,723	933	35.1%
Conwy	2,298	111,800	20.6	1,620	679	29.5%
Denbighshire	2,437	96,800	25.2	1,402	1,034	42.4%
Flintshire	2,618	149,800	17.5	2,170	448	17.1%
Wrexham	2,365	133,100	17.8	1,928	437	18.5%
Powys	2,025	131,700	15.4	1,908	117	5.8%
Ceredigion	1,129	76,600	14.7	1,110	19	1.7%
Pembrokeshire	3,229	117,300	27.5	1,699	1,530	47.4%
Carmarthenshire	2,780	180,900	15.4	2,621	159	5.7%
Swansea	6,750	231,100	29.2	3,348	3,402	50.4%
Neath Port Talbot	2,938	137,000	21.4	1,985	953	32.4%
Bridgend	2,804	134,200	20.9	1,944	859	30.7%
Vale of Glamorgan	1,846	124,600	14.8	1,805	41	2.2%
Cardiff	5,675	336,400	16.9	4,874	802	14.1%
Rhondda Cynon Ta	4,885	234,700	20.8	3,400	1,484	30.4%
Merthyr Tydfil	1,711	55,800	30.7	808	902	52.7%
Caerphilly	2,996	172,800	17.3	2,503	492	16.4%
Blaenau Gwent	1,483	68,600	21.6	994	490	33.0%
Torfaen	1,468	90,600	16.2	1,313	155	10.6%
Monmouthshire	1,275	88,000	14.5	1,275	-	-
Newport	2,093	140,600	14.9	2,037	56	2.7%
Total	**59,183**	**2,999,900**	**19.7**	**43,461**	**15,722**	**26.6%**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)

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17 Appendices

17.1 Appendix 1 Methods for calculating burden of injuries

The formula for calculating YLLs is:

$$YLL = \frac{KCe^{ra}}{(r+\beta)^2}\ [e^{-(r+\beta)(L+a)}[-(r+\beta)(L+a)-1] - e^{-(r+\beta)a}[-(r+\beta)a-1]] + \frac{1-K}{r}(1-e^{-rL})$$

Where *r* is the discount rate, β is the parameter from the age weighting function, *K* is the age-weighting modulation factor, *C* is a constant, *a* is the age at death and *L* is the standard expectation of life at age *a*. For standard *YYLs* used in the GBD, *r* is 0.03, β is 0.04, *K* is 1, and *C* is 0.1658. For this report, due to the number of ED attendances, inpatient admissions and deaths being presented in 5 year age ranges, the value of *a* was chosen to be the mid-point of each age range (i.e. for the age range 0 to 4 *a* was 2.5, for 5 to 9 *a* was 7.5, and so on up to *a* = 82.5 being used for the age range 80 to 84 and *a* = 90 being used for the age range 85+).

The general formula for YLDs from a single disabling event is:

$$YLD = DW\ \{\frac{KCe^{ra}}{(r+\beta)^2}\ [e^{-(r+\beta)(L+a)}[-(r+\beta)(L+a)-1] - e^{-(r+\beta)a}[-(r+\beta)a-1]] + \frac{1-K}{r}(1-e^{-rL})\}$$

where *a* is the age of onset of the disability, *L* is the duration of disability, *r* is the discount rate (*r*=0.03), is the age-weighting parameter (β=0.04), *K* is the age-weighting modulation factor (*K*=1), *C* is the adjustment constant necessary because of unequal age-weights (*C*=0.1658) and *D* is the disability weight. For this report the disability weights used were those derived as part of the UK BOI study[8].

[8] Lyons RA, Kendrick D, Towner EM, Christie N, Macey S, Coupland C and Gabbe B. (2011). Measuring the population burden of injuries – implications for global and national estimates. A multi-centre prospective longitudinal study. *PLoS Med,* 8(12).

17.2 Appendix 2 Injury rates and rate ratios by age and sex

Injury rate per 100,000 persons and rate ratios by age and sex

	Attendance to emergency dept			In-patient admissions			Deaths		
	Male	Female	Rate ratio*	Male	Female	Rate ratio*	Male	Female	Rate ratio*
00-04	21,116	17,821	1.18 (1.16-1.21)	1,948	1,683	1.16 (1.08-1.24)	3.4	3.6	0.95 (0.19-4.71)
05-09	14,465	11,873	1.22 (1.19-1.25)	1,287	959	1.34 (1.22-1.47)	1.2	1.3	0.94 (0.06-15.09)
10-14	21,754	16,195	1.34 (1.32-1.37)	1,522	920	1.65 (1.52-1.80)	4.3	0.0	n/a
15-19	22,524	17,416	1.29 (1.27-1.32)	1,908	1,309	1.46 (1.36-1.56)	40.6	6.1	6.62 (2.81-15.56)
20-24	23,984	18,748	1.28 (1.26-1.30)	2,059	866	2.38 (2.20-2.57)	43.6	8.8	4.98 (2.44-10.16)
25-29	22,267	16,044	1.39 (1.36-1.42)	1,802	875	2.06 (1.89-2.24)	56.7	10.2	5.58 (2.75-11.32)
30-34	19,075	13,961	1.37 (1.34-1.40)	1,566	761	2.06 (1.87-2.27)	51.6	10.2	5.06 (2.37-10.81)
35-39	15,807	11,937	1.32 (1.29-1.35)	1,485	775	1.92 (1.75-2.09)	54.8	14.4	3.79 (2.10-6.86)
40-44	13,798	10,736	1.29 (1.26-1.32)	1,310	742	1.77 (1.62-1.93)	50.4	17.4	2.89 (1.71-4.88)
45-49	12,529	10,300	1.22 (1.19-1.25)	1,137	766	1.49 (1.36-1.62)	56.2	16.6	3.39 (2.00-5.75)
50-54	11,160	9,736	1.15 (1.12-1.18)	1,015	739	1.37 (1.25-1.51)	46.2	10.3	4.50 (2.26-8.95)
55-59	9,437	8,789	1.07 (1.04-1.10)	909	754	1.21 (1.09-1.33)	33.4	12.4	2.69 (1.38-5.24)
60-64	9,001	8,599	1.05 (1.02-1.08)	869	832	1.04 (0.95-1.15)	27.4	17.7	1.55 (0.86-2.82)
65-69	9,368	9,283	1.01 (0.98-1.04)	837	993	0.84 (0.76-0.93)	53.3	19.8	2.69 (1.51-4.80)
70-74	11,042	10,567	1.04 (1.01-1.08)	1,091	1,374	0.79 (0.72-0.88)	46.7	36.2	1.29 (0.76-2.20)
75-79	14,541	13,568	1.07 (1.04-1.10)	1,734	2,394	0.72 (0.66-0.79)	99.9	47.7	2.09 (1.31-3.34)
80-84	18,406	18,209	1.01 (0.98-1.04)	2,738	3,953	0.69 (0.64-0.75)	150.7	118.2	1.28 (0.87-1.87)
85+	27,339	28,551	0.96 (0.93-0.98)	4,812	7,344	0.66 (0.61-0.70)	361.8	297.1	1.22 (0.93-1.59)

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

*Rate ratios - male to female

17.3 Appendix 3 Burden of injury by age and sex

Burden of injury in Wales by age and sex, 2009

	Male				Female			
	Hosp years lived with disability (YLD)	Non hosp years lived with disability (YLD)	Years of life lost (YLL)	Disability Adjusted Life Years (DALY)	Hosp years lived with disability (YLD)	Non hosp years lived with disability (YLD)	Years of life lost (YLL)	Disability Adjusted Life Years (DALY)
00-04	1,458	225	105	1,788	1,173	195	106	1,473
05-09	1,200	409	37	1,647	798	418	37	1,253
10-14	1,853	1,298	149	3,300	816	945	0	1,761
15-19	2,385	1,364	1,513	5,263	933	862	217	2,012
20-24	2,268	1,278	1,591	5,137	699	873	307	1,878
25-29	1,671	960	1,587	4,218	525	643	283	1,451
30-34	1,078	625	1,123	2,826	499	440	227	1,166
35-39	1,155	530	1,246	2,931	562	479	354	1,395
40-44	1,034	457	1,130	2,621	528	422	422	1,371
45-49	857	359	1,081	2,297	516	362	345	1,223
50-54	605	219	673	1,497	493	267	163	923
55-59	544	148	398	1,090	488	217	162	868
60-64	478	130	275	883	546	194	197	937
65-69	310	77	320	707	442	123	138	703
70-74	259	58	166	483	437	88	161	686
75-79	231	41	188	460	501	69	128	699
80-84	188	28	128	345	503	52	173	728
85+	148	22	112	283	591	56	230	877
Total	**17,723**	**8,229**	**11,821**	**37,774**	**11,049**	**6,705**	**3,650**	**21,404**

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE (ONS)

17.4 Appendix 4 Deaths (rates only), inpatient admissions (n and rates) and emergency department attendances (n and rates) by age and sex

Number of events

In-patient admissions (totals)

	Least deprived		Next least deprived		Middle		Next most deprived		Most deprived	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0 to 14	639	423	681	459	820	608	869	615	1,171	855
15 to 24	547	307	687	385	790	359	960	459	1,210	661
25 to 59	1,023	687	1,416	821	1,630	954	1,913	1,221	2,525	1,528
60 to 84	702	1,083	800	1,211	848	1,195	747	1,159	768	1,231
85+	252	770	240	804	238	779	214	736	201	621
Total	**3,163**	**3,270**	**3,824**	**3,680**	**4,326**	**3,895**	**4,703**	**4,190**	**5,875**	**4,896**

Attendance to emergency department (totals)

	Least deprived		Next least deprived		Middle		Next most deprived		Most deprived	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0 to 14	9,736	7,321	7,812	5,922	9,249	6,751	10,418	8,058	13,375	10,282
15 to 24	8,876	6,387	7,639	5,553	9,172	6,810	10,596	7,715	12,869	9,833
25 to 59	16,145	13,982	14,731	11,961	18,066	14,416	20,747	16,641	25,894	20,588
60 to 84	7,915	9,238	6,202	6,783	6,963	7,816	6,712	7,582	7,837	8,740
85+	1,787	3,573	1,052	2,563	1,271	2,765	1,115	2,572	1,274	2,942
Total	**44,459**	**40,501**	**37,436**	**32,782**	**44,721**	**38,558**	**49,588**	**42,568**	**61,249**	**52,385**

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), MYE (ONS), WIMD 2008 (WG)

Age specific rates per 100,000 persons

Deaths

	Least deprived		Next least deprived		Middle		Next most deprived		Most deprived		Rate ratio*			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male		Female	
0 to 14	2.0	0.0	0.0	2.1	1.9	0.0	9.3	3.9	1.7	1.8	0.86	(0.05-13.78)	-	
15 to 24	18.5	7.6	28.7	5.1	42.3	5.1	46.4	5.0	74.7	14.3	4.00	(1.84-8.70)	1.86	(0.47-7.44)
25 to 59	34.6	9.0	33.3	13.3	43.5	13.7	54.6	15.5	87.1	15.3	2.55	(1.80-3.61)	1.73	(0.85-3.54)
60 to 84	47.1	40.6	53.9	34.1	56.4	36.7	73.6	46.8	72.0	40.8	1.52	(0.95-2.43)	1.00	(0.59-1.69)
85+	234.0	278.8	395.0	330.6	369.1	384.7	469.2	208.8	270.1	231.1	1.17	(0.53-2.62)	0.81	(0.46-1.41)
Total	**33.4**	**24.8**	**38.5**	**26.6**	**45.0**	**29.4**	**55.2**	**25.4**	**67.3**	**24.5**	2.02	(1.58-2.58)	0.99	(0.72-1.37)

In-patient hospital admissions

	Least deprived		Next least deprived		Middle		Next most deprived		Most deprived		Rate ratio*			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male		Female	
0 to 14	1,292	909	1,377	967	1,578	1,243	1,613	1,209	2,031	1,553	1.58	(1.44-1.74)	1.72	(1.54-1.94)
15 to 24	1,262	773	1,645	988	1,856	923	2,228	1,141	2,914	1,579	2.28	(2.06-2.52)	2.00	(1.75-2.29)
25 to 59	788	515	1,072	606	1,223	689	1,450	900	2,075	1,171	2.67	(2.48-2.87)	2.31	(2.11-2.52)
60 to 84	1,034	1,418	1,106	1,531	1,195	1,514	1,278	1,749	1,456	2,009	1.40	(1.27-1.55)	1.40	(1.30-1.52)
85+	4,536	7,156	4,514	7,595	4,393	6,969	4,781	7,319	4,935	6,834	1.11	(0.92-1.33)	0.93	(0.84-1.03)
Total	**1,068**	**1,066**	**1,270**	**1,181**	**1,422**	**1,232**	**1,612**	**1,383**	**2,116**	**1,644**	1.99	(1.90-2.07)	1.55	(1.48-1.62)

Attendance to emergency department

	Least deprived		Next least deprived		Middle		Next most deprived		Most deprived		Rate ratio*			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male		Female	
0 to 14	19,679	15,726	15,801	12,482	17,800	13,805	19,333	15,836	23,195	18,680	1.18	(1.16-1.21)	1.20	(1.17-1.23)
15 to 24	20,479	16,078	18,293	14,254	21,544	17,518	24,593	19,174	30,997	23,492	1.50	(1.46-1.53)	1.43	(1.39-1.47)
25 to 59	12,429	10,479	11,150	8,829	13,550	10,418	15,726	12,271	21,276	15,777	1.73	(1.70-1.77)	1.53	(1.50-1.56)
60 to 84	11,660	12,093	8,572	8,575	9,812	9,902	11,483	11,441	14,859	14,263	1.27	(1.23-1.31)	1.17	(1.14-1.20)
85+	32,169	33,206	19,786	24,211	23,459	24,736	24,911	25,577	31,279	32,376	0.99	(0.93-1.05)	0.95	(0.91-0.99)
Total	**15,012**	**13,199**	**12,438**	**10,521**	**14,699**	**12,191**	**16,992**	**14,046**	**22,056**	**17,593**	1.47	(1.46-1.49)	1.34	(1.32-1.35)

17.5 Appendix 5 Disability Adjusted Life Years (DALYs) by age, sex and deprivation fifth

Burden of injury disability adjusted life years (DALYs) by age, sex and deprivation fifth, 2009

	Least Deprived		Next Least Deprived		Middle		Next Most Deprived		Most Deprived		Rate Ratio*	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0 to 14	1,115	658	1,129	758	1,419	939	1,416	916	1,656	1,217	1.5	1.8
15 to 24	1,365	721	1,606	686	2,209	689	2,278	740	2,942	1,057	2.2	1.5
25 to 59	2,378	1,272	2,702	1,501	3,331	1,773	3,935	1,829	5,134	2,023	2.2	1.6
60 to 84	506	718	588	783	625	772	596	713	562	768	1.1	1.1
85+	54	178	61	193	63	200	59	163	46	144	0.9	0.8
Total	**5,418**	**3,546**	**6,085**	**3,921**	**7,647**	**4,372**	**8,285**	**4,360**	**10,340**	**5,207**	1.9	1.5

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), WIMD 2008 (WG)

* Rate ratios - most deprived to least deprived

17.6 Appendix 6 Burden of injury by cause

Burden of injury by cause, Wales, 2009

	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years (DALYs)
MVTC	3,203	1,658	2,704	7,566
Fall	14,731	1,073	1,594	17,398
Drowning	31	0	595	626
Burns	43	7	302	352
Firearm	32	0	89	121
Cut / pierce	1,462	14	180	1,656
Struck by / against	3,179	132	26	3,338
Poisoning	280	17	3,558	3,854
Other / unspecified	6,178	12,033	6,423	24,633
Total	**29,139**	**14,934**	**15,471**	**59,544**

Produced by Public Health Wales Observatory, using PEDW (NWIS) & ADDE (ONS)

17.7 Appendix 7 Motor vehicle traffic crash rates by age and sex and by local authority

MVTCs rates per 100,000

	Deaths		In-patient admissions		Attendance to emergency dept	
	Male	Female	Male	Female	Male	Female
00-04	1.1	1.2	37.7	25.2	167.8	167.9
05-09	1.2	1.3	42.1	38.3	192.5	167.1
10-14	2.2	0.0	53.1	35.4	200.4	213.7
15-19	15.5	4.1	162.3	76.7	887.9	790.4
20-24	12.1	0.0	135.6	45.8	1155.1	1100.3
25-29	3.3	4.5	102.3	35.0	1040.0	876.8
30-34	9.0	2.5	86.5	25.5	878.7	648.4
35-39	6.6	0.0	97.5	24.8	706.5	533.5
40-44	4.8	1.8	90.0	26.6	566.3	400.9
45-49	7.8	0.9	70.7	22.1	465.1	356.4
50-54	4.3	2.1	69.8	32.9	335.1	304.9
55-59	3.2	2.1	42.0	23.8	230.6	209.9
60-64	4.1	1.0	43.7	19.6	174.8	143.3
65-69	9.1	2.5	35.1	35.8	120.9	129.8
70-74	4.8	4.3	27.4	42.0	128.8	117.2
75-79	12.7	6.8	36.1	61.4	144.4	105.8
80-84	6.3	4.2	78.6	73.8	128.9	88.6
85+	8.4	4.0	75.6	67.3	109.2	45.5
Total	**6.3**	**2.2**	**74.8**	**37.2**	**476.8**	**387.7**

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), MYE (ONS)

MVTC in-patient admission rates per 100,000

	No. Superspells	Crude Rate	EASR	(95% confidence intervals)
Isle of Anglesey	56	81.4	78.7	(58.4-103.6)
Gwynedd	64	53.9	56.6	(43.3-72.7)
Conwy	62	55.7	55.2	(41.4-71.9)
Denbighshire	59	61.0	65.0	(48.6-85.0)
Flintshire	80	53.4	54.0	(42.5-67.7)
Wrexham	70	52.5	54.5	(42.2-69.1)
Powys	84	63.8	65.8	(51.4-82.7)
Ceredigion	54	70.7	69.6	(50.9-92.6)
Pembrokeshire	99	84.3	92.6	(74.5-113.5)
Carmarthenshire	123	68.0	67.2	(55.3-80.8)
Swansea	140	60.5	61.4	(51.3-72.9)
Neath Port Talbot	69	50.2	51.3	(39.5-65.4)
Bridgend	61	45.5	46.6	(35.4-60.2)
Vale of Glamorgan	45	36.1	34.6	(24.8-46.8)
Cardiff	114	33.9	33.2	(27.2-40.1)
Rhondda Cynon Taf	114	48.6	50.1	(41.1-60.3)
Merthyr Tydfil	41	73.7	79.1	(56.6-107.5)
Caerphilly	103	59.6	60.9	(49.5-74.1)
Blaenau Gwent	53	77.2	84.4	(62.8-111.0)
Torfaen	60	66.1	64.5	(48.6-83.8)
Monmouthshire	32	36.4	42.8	(28.3-61.7)
Newport	83	59.1	60.1	(47.7-74.8)
Wales	**1,666**	**55.5**	**55.5**	**(52.8-58.3)**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), MYE (ONS)

17.8 Appendix 8 Burden of motor vehicle traffic crash injuries by age and sex

Relative burden of MVTC injuries in Wales, by sex and age, 2009

	Male				Female			
	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years
00-04	47.0	1.7	35.1	83.8	31.8	5.1	35.2	72.1
05-09	84.3	11.4	37.2	132.9	45.8	15.4	37.4	98.6
10-14	94.9	16.3	74.6	185.8	79.5	23.8	0.0	103.3
15-19	470.8	134.6	576.4	1181.8	246.0	130.3	144.9	521.2
20-24	393.4	192.4	440.0	1025.8	135.1	192.6	0.0	327.7
25-29	243.0	162.5	93.3	498.8	75.5	139.8	125.6	340.9
30-34	134.1	101.5	196.6	432.2	60.6	68.8	56.8	186.2
35-39	178.9	76.1	149.5	404.6	50.1	78.0	0.0	128.1
40-44	183.4	60.0	108.7	352.0	66.5	49.7	44.4	160.6
45-49	135.1	48.8	149.0	332.9	53.2	37.2	19.2	109.5
50-54	89.2	24.9	62.6	176.7	54.1	22.4	32.5	109.1
55-59	33.9	16.2	38.5	88.5	27.2	14.9	27.0	69.2
60-64	52.8	8.3	40.8	101.8	17.6	10.6	11.0	39.2
65-69	21.6	3.4	54.6	79.6	25.7	4.3	17.2	47.2
70-74	8.1	2.1	17.1	27.4	17.3	2.0	19.4	38.7
75-79	4.3	0.8	24.0	29.1	15.8	1.6	18.4	35.7
80-84	6.2	0.5	5.4	12.0	10.8	0.4	6.2	17.3
85+	2.8	0.1	2.6	5.6	6.6	0.0	3.1	9.7
Total	**2183.9**	**861.5**	**2105.9**	**5151.3**	**1019.3**	**796.9**	**598.1**	**2414.2**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)

17.9 Appendix 9 Fall rates by age and sex

Falls rates per 100,000 by age and sex, Wales, 2009

	Deaths		In-patient admissions		Attendance to emergency department	
	Male	Female	Male	Female	Male	Female
00-04	0.0	0.0	876.7	784.2	2,587.9	2,158.3
05-09	0.0	0.0	640.2	487.2	1,776.2	1,623.7
10-14	0.0	0.0	641.4	310.9	2,507.0	1,957.7
15-19	1.0	0.0	435.7	153.4	1,652.2	1,380.4
20-24	1.9	0.0	366.8	134.4	1,653.7	1,519.0
25-29	3.3	0.0	362.6	149.2	1,609.6	1,393.2
30-34	2.6	0.0	320.0	168.2	1,361.3	1,239.5
35-39	0.0	2.1	327.5	194.0	1,043.8	1,006.2
40-44	1.0	3.7	307.8	202.8	971.9	961.5
45-49	6.8	3.7	330.4	241.3	875.0	1,073.7
50-54	8.6	2.1	364.1	308.0	885.1	1,110.9
55-59	9.7	4.1	390.1	443.6	719.8	1,127.2
60-64	3.0	4.9	441.1	564.3	776.4	1,077.5
65-69	6.5	7.4	525.4	739.2	798.4	1,218.8
70-74	9.7	7.2	806.8	1,125.9	1,027.4	1,431.3
75-79	38.2	18.8	1,352.4	2,005.1	1,335.5	1,936.9
80-84	78.6	52.7	2,248.4	3,491.6	2,128.9	2,966.2
85+	138.7	120.8	4,176.5	6,655.4	3,836.1	5,431.7
Total	**8.4**	**8.4**	**590.7**	**743.4**	**1,408.3**	**1,540.0**

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), ADDE & MYE (ONS)

Falls, in-patient admissions per 100,000, Wales, 2009

	Admissions	Crude Rate	EASR	(95% confidence intervals)
Isle of Anglesey	480	698	513	(462-569)
Gwynedd	777	654	499	(460-540)
Conwy	816	733	491	(451-534)
Denbighshire	717	741	521	(477-567)
Flintshire	975	650	513	(479-549)
Wrexham	798	599	477	(442-514)
Powys	939	713	478	(442-515)
Ceredigion	553	724	561	(507-619)
Pembrokeshire	823	701	538	(497-580)
Carmarthenshire	1,300	719	528	(496-561)
Swansea	1,675	724	577	(547-608)
Neath Port Talbot	878	639	492	(456-529)
Bridgend	831	619	487	(452-524)
Vale of Glamorgan	735	590	455	(419-492)
Cardiff	1,710	509	453	(431-477)
Rhondda Cynon Taf	1,608	686	572	(543-603)
Merthyr Tydfil	423	760	678	(612-750)
Caerphilly	1,140	660	557	(523-592)
Blaenau Gwent	527	768	600	(546-659)
Torfaen	663	731	559	(513-608)
Monmouthshire	687	781	537	(491-585)
Newport	1,006	717	582	(544-622)
Wales	**20,061**	**669**	**520**	**(513-528)**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS)

17.10 Appendix 10 Burden of falls by age and sex

Relative burden of falls in Wales, by age and sex, 2009

	Male				Female			
	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years
00-04	842.5	21.5	0.0	864.0	680.6	18.1	0.0	698.7
05-09	617.8	34.1	0.0	651.9	413.6	41.0	0.0	454.6
10-14	902.9	81.7	0.0	984.6	430.2	85.1	0.0	515.3
15-19	731.5	65.4	36.0	832.9	278.6	66.8	0.0	345.4
20-24	713.0	67.1	67.7	847.7	266.8	67.5	0.0	334.3
25-29	593.8	57.2	93.3	744.4	234.0	46.0	0.0	280.0
30-34	401.3	37.6	56.2	495.1	231.5	32.6	0.0	264.1
35-39	440.0	30.4	0.0	470.4	295.2	36.9	50.6	382.7
40-44	393.7	27.3	21.7	442.8	297.0	31.7	88.8	417.5
45-49	377.3	21.8	130.4	529.6	330.6	35.9	76.6	443.1
50-54	303.7	13.3	125.2	442.2	319.5	25.2	32.5	377.1
55-59	323.0	10.1	115.4	448.6	382.9	22.3	54.1	459.4
60-64	283.9	9.7	30.6	324.1	451.3	21.7	54.8	527.9
65-69	231.9	6.5	39.0	277.4	372.8	13.5	51.6	437.9
70-74	212.5	4.6	34.3	251.3	389.0	8.8	32.3	430.0
75-79	202.9	3.7	72.0	278.6	448.4	7.5	50.5	506.4
80-84	165.7	2.7	66.9	235.3	470.0	7.0	77.1	554.1
85+	139.6	3.0	43.0	185.6	561.5	8.0	93.5	663.0
Total	**7,877.2**	**497.6**	**931.7**	**9,306.5**	**6,853.5**	**575.7**	**662.4**	**8,091.6**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS), ADDE (ONS)

17.11 Appendix 11 Numbers, rates and burden of burn injuries by age and sex

Burns, totals

	In-patient admissions		Attendance to emergency department	
	Male	Female	Male	Female
0 to 14	100	70	144	141
15 to 24	34	9	103	83
25 to 59	79	39	164	212
60 to 84	31	27	19	37
85+	5	11	4	2
Total	**249**	**156**	**434**	**475**

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS)

Burns, age-specific rate per 100,000

	In-patient admissions		Attendance to emergency department	
	Male	Female	Male	Female
00-14	38.0	28.1	54.8	56.6
15-24	16.1	4.5	48.8	41.4
25-59	12.1	5.8	25.2	31.4
60-84	9.8	7.5	6.0	10.3
85+	21.0	21.8	16.8	4.0

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS), MYE (ONS)

Relative burden of burns in Wales, 2009

	Male				Female			
	Hosp YLDs	Non hosp YLDs	YLLs	DALYs	Hosp YLDs	Non hosp YLDs	YLLs	DALYs
00-14	8.0	0.6	0.0	8.6	4.3	0.7	0.0	5.0
15-24	11.8	1.1	0.0	12.9	0.4	0.9	0.0	1.3
25-59	12.0	1.4	97.3	110.7	3.4	1.9	79.0	84.4
60-84	2.2	0.1	87.9	90.2	0.7	0.2	33.7	34.6
85+	0.0	0.0	2.6	2.7	0.3	0.0	1.5	1.9
Total	**34.1**	**3.2**	**187.8**	**225.1**	**9.2**	**3.7**	**114.2**	**127.1**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & ADDE (ONS)

17.12 Appendix 12 Poisoning rates by age and sex

Poisoning rates per 100,000, by age and sex, 2009

	Deaths		In-patient admissions		Attendance to emergency department	
	Male	Female	Male	Female	Male	Female
00-04	0.0	0.0	245.4	190.6	37.7	32.4
05-09	0.0	0.0	20.5	31.9	7.2	6.4
10-14	0.0	0.0	53.1	280.0	20.6	16.0
15-19	4.8	0.0	320.8	775.1	50.2	77.7
20-24	10.2	3.9	426.2	469.3	67.8	66.2
25-29	21.1	5.6	424.9	489.3	57.8	63.3
30-34	16.8	2.5	388.4	345.2	51.6	38.2
35-39	20.8	3.1	403.1	351.9	48.2	42.3
40-44	14.5	3.7	351.4	327.5	39.7	45.0
45-49	11.6	7.4	251.0	353.6	30.0	36.8
50-54	6.4	1.0	179.4	239.2	12.9	14.4
55-59	8.6	2.1	105.6	154.1	6.5	15.5
60-64	3.0	1.0	75.2	112.9	7.1	9.8
65-69	3.9	2.5	55.9	86.5	7.8	9.9
70-74	0.0	2.9	46.7	65.1	4.8	11.6
75-79	4.2	0.0	76.4	71.7	6.4	1.7
80-84	9.4	2.1	59.7	65.4	15.7	0.0
85+	8.4	2.0	96.6	81.2	8.4	7.9

Produced by Public Health Wales and Swansea University, using EDDS & PEDW (NWIS) & ADDE (ONS)

17.13 Appendix 13 Burden of poisoning by age and sex

Realitve burden of poisoning in Wales, 2009

	Male				Female			
	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years
00-04	4.4	0.1	0.0	4.5	1.5	0.4	0.0	1.9
05-09	3.2	0.9	0.0	4.2	3.3	0.0	0.0	3.3
10-14	0.5	0.7	0.0	1.2	12.2	0.9	0.0	13.0
15-19	16.9	0.6	180.1	197.6	35.8	1.5	0.0	37.3
20-24	26.2	3.3	372.3	401.8	11.1	2.0	136.3	149.4
25-29	26.1	2.0	591.2	619.2	30.2	0.3	156.9	187.5
30-34	22.4	0.8	365.0	388.3	8.6	0.3	56.8	65.7
35-39	9.6	0.3	473.4	483.2	9.9	0.8	75.9	86.6
40-44	15.7	0.7	326.0	342.4	12.8	0.2	88.8	101.7
45-49	4.1	0.2	223.6	227.8	12.1	0.2	153.3	165.5
50-54	0.6	0.1	93.9	94.5	3.8	0.0	16.3	20.1
55-59	2.6	0.1	102.6	105.3	1.7	0.1	27.0	28.8
60-64	2.2	0.0	30.6	32.8	0.0	0.0	11.0	11.0
65-69	0.0	0.0	23.4	23.4	0.8	0.0	17.2	18.0
70-74	0.0	0.0	0.0	0.0	0.7	0.0	12.9	13.6
75-79	0.1	0.0	8.0	8.1	0.0	0.0	0.0	0.0
80-84	0.3	0.1	8.0	8.4	0.8		3.1	3.9
85+	0.0		2.6	2.6	0.3		1.5	1.9
Total	**134.9**	**9.9**	**2800.7**	**2945.4**	**145.3**	**6.7**	**757.0**	**909.0**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & ADDE (ONS)

17.14 Appendix 14 Injury rates by intent, age and sex

Age-specific in-patient admission rates per 100,000, Wales, 2009

	Self-harm		Assault		Unintentional		Other / unspecified	
	Male	Female	Male	Female	Male	Female	Male	Female
00-04	2.3	2.4	21.7	25.2	1,924.7	1,657.1	3.4	6.0
05-09	1.2	3.8	18.1	7.7	1,263.5	949.0	4.8	0.0
10-14	29.3	214.9	47.7	18.3	1,441.0	684.6	5.4	8.0
15-19	258.0	650.3	288.9	54.2	1,372.0	612.5	7.7	3.1
20-24	348.2	391.4	403.0	41.9	1,316.6	439.1	12.1	1.9
25-29	330.4	433.9	268.1	30.5	1,211.3	418.1	8.9	1.1
30-34	285.2	298.1	197.4	24.2	1,087.7	443.3	14.2	2.5
35-39	302.3	331.3	161.0	27.9	1,021.9	429.3	7.7	2.1
40-44	279.8	292.7	112.3	20.2	922.6	437.6	3.9	0.0
45-49	204.5	295.6	83.3	12.9	848.8	461.3	3.9	1.8
50-54	135.3	197.1	72.0	11.3	813.1	533.9	1.1	1.0
55-59	78.7	118.9	29.1	3.1	802.8	632.9	1.1	1.0
60-64	56.9	85.4	10.2	1.0	803.9	743.9	2.0	2.0
65-69	33.8	55.6	11.7	1.2	789.3	933.3	0.0	2.5
70-74	24.2	46.3	4.8	1.4	1,062.8	1,328.5	3.2	1.4
75-79	36.1	34.1	8.5	0.0	1,685.8	2,361.8	2.1	0.0
80-84	25.2	33.8	0.0	2.1	2,713.8	3,917.7	6.3	0.0
85+	37.8	11.9	4.2	4.0	4,764.7	7,324.8	12.6	2.0
	156.7	216.7	114.3	17.5	1,224.9	1,068.6	5.4	2.1

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)

17.15 Appendix 15 Burden of injury by intent, age and sex

Relative burden of injury in Wales by intent, 2009

	Males				Females			
	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years	Hosp years lived with disability	Non hosp years lived with disability	Years of life lost	Disability adjusted life years
Self harm								
00-14	4.3	0.9	0.0	5.2	22.5	0.3	0.0	22.8
15-24	129.7	7.3	654.0	791.0	112.0	4.6	102.2	218.8
25-59	172.1	7.5	2470.3	2649.8	177.9	7.2	559.8	744.9
60-84	10.3	0.3	201.9	212.5	2.4	0.2	86.4	89.1
85+	0.1	0.0	3.9	4.0	0.2	0.0	0.0	0.3
Assault								
00-14	70.6	245.9	0.0	316.5	33.6	217.2	0.0	250.8
15-24	512.0	452.2	0.0	964.2	102.4	374.8	0.0	477.2
25-59	543.5	650.2	31.1	1224.8	107.4	534.5	0.0	641.9
60-84	11.1	57.8	0.0	68.9	3.0	61.9	3.1	68.0
85+	0.3	5.0	0.0	5.2	0.2	9.9	1.5	11.6
Unintentional								
00-14	4444.4	1678.8	291.7	6414.9	2756.4	1335.9	143.0	4235.4
15-24	4066.6	2172.3	2204.2	8443.1	1465.9	1341.6	421.8	3229.3
25-59	6314.4	2615.4	4240.4	13170.2	3418.0	2267.5	1242.7	6928.3
60-84	1470.8	265.9	847.3	2584.0	2464.8	451.9	641.1	3557.8
85+	155.6	15.8	104.2	275.6	607.1	43.2	226.8	877.1

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & ADDE (ONS)

17.16 Appendix 16 Death and Inpatient admission rates by Health Board

Death rates by health board

Death rates* per 100,000 by health board, 2009

	Betsi Cadwaladr		Powys		Hywel Dda		Abertawe Bro Morgannwg		Cardiff Vale		Cwm Taf		Aneurin Bevan	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0 to 39	31.6	7.8	39.4	19.4	34.7	-	38.0	7.6	19.4	4.7	49.0	11.1	29.3	5.2
40 to 59	62.7	15.9	32.4	-	32.5	17.1	55.5	15.9	34.3	15.5	53.2	-	39.7	16.5
60 to 84	66.8	36.4	62.9	53.2	39.2	31.7	79.3	41.7	53.8	52.9	55.9	43.2	59.2	35.3
85+	423.7	419.4	333.3	346.2	264.7	228.6	463.4	253.0	250.0	303.0	300.0	177.8	341.5	269.7
Total	**55.3**	**31.9**	**50.5**	**37.7**	**39.5**	**22.8**	**58.5**	**25.8**	**32.0**	**24.6**	**55.0**	**20.8**	**43.1**	**23.4**

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)

*rates suppressed where <5 deaths

In-patient admission rates by health board

In-patient admission rates per 100,000

	Betsi Cadwaladr		Powys		Hywel Dda		Abertawe Bro		Cardiff Vale		Cwm Taf		Aneurin Bevan	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0 to 39	1,610.0	1,042.5	1,552.0	790.7	1,710.5	939.5	1,818.9	1,005.9	1,368.2	828.3	2,096.6	1,199.7	1,901.2	1,159.5
40 to 59	1,119.8	714.6	1,043.2	617.8	1,099.6	665.4	1,139.4	687.4	909.7	841.4	1,117.0	655.8	1,189.4	916.1
60 to 84	1,188.9	1,567.7	1,245.7	1,569.1	1,187.4	1,611.1	1,294.0	1,637.7	1,142.5	1,639.1	1,216.8	1,561.7	1,280.5	1,832.6
85+	4,644.1	7,677.4	4,466.7	7,846.2	3,823.5	7,071.4	5,024.4	7,216.9	5,218.8	7,075.8	4,850.0	6,577.8	4,951.2	7,809.0
Total	**1,433.0**	**1,322.6**	**1,393.0**	**1,238.3**	**1,453.0**	**1,263.1**	**1,578.0**	**1,269.0**	**1,272.7**	**1,155.4**	**1,698.0**	**1,295.7**	**1,620.4**	**1,451.7**

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)

17.17 Appendix 17 Death and Inpatient rates by local authority

Death rates per 100,000 by local authority, Wales, 2009

	No. Deaths	Crude Rate	EASR	(95% confidence intervals)
Isle of Anglesey	37	53.8	41.2	(27.7-58.6)
Gwynedd	47	39.6	32.5	(23.0-44.2)
Conwy	53	47.6	35.5	(25.0-48.5)
Denbighshire	47	48.6	32.6	(22.6-45.2)
Flintshire	56	37.4	28.8	(21.3-38.0)
Wrexham	54	40.5	30.7	(22.6-40.6)
Powys	58	44.0	33.7	(24.0-45.5)
Ceredigion	26	34.0	24.4	(14.5-37.7)
Pembrokeshire	39	33.2	27.7	(18.6-39.2)
Carmarthenshire	51	28.2	23.9	(17.2-32.1)
Swansea	107	46.3	36.8	(29.7-45.1)
Neath Port Talbot	65	47.3	38.1	(28.8-49.3)
Bridgend	38	28.3	23.0	(15.8-32.2)
Vale of Glamorgan	33	26.5	20.9	(13.8-30.2)
Cardiff	97	28.8	23.3	(18.6-28.7)
Rhondda Cynon Taf	84	35.8	30.6	(24.1-38.3)
Merthyr Tydfil	25	44.9	42.9	(27.2-64.1)
Caerphilly	44	25.5	21.5	(15.3-29.3)
Blaenau Gwent	32	46.6	41.6	(27.8-59.4)
Torfaen	35	38.6	28.3	(18.9-40.3)
Monmouthshire	39	44.3	32.2	(21.1-46.4)
Newport	35	24.9	21.5	(14.7-30.3)
Wales	**1,102**	**36.7**	**28.8**	**(27.0-30.7)**

Produced by Public Health Wales and Swansea University, using ADDE & MYE (ONS)

In-patient admissions per 100,000 by local authority, Wales, 2009

	Admissions	Crude Rate	EASR	(95% confidence intervals)
Isle of Anglesey	988	1,436.7	1,327.4	(1,238.4-1,420.6)
Gwynedd	1,592	1,340.4	1,230.4	(1,165.9-1,297.3)
Conwy	1,548	1,390.2	1,219.4	(1,151.2-1,290.3)
Denbighshire	1,456	1,505.2	1,357.0	(1,280.8-1,436.2)
Flintshire	2,096	1,398.1	1,309.6	(1,251.3-1,369.9)
Wrexham	1,667	1,251.4	1,165.4	(1,107.7-1,225.2)
Powys	1,732	1,314.8	1,165.6	(1,103.8-1,229.7)
Ceredigion	973	1,273.6	1,166.6	(1,083.8-1,253.3)
Pembrokeshire	1,573	1,339.6	1,265.4	(1,198.3-1,335.1)
Carmarthenshire	2,534	1,401.8	1,284.2	(1,230.3-1,339.6)
Swansea	3,642	1,574.5	1,477.2	(1,426.5-1,529.1)
Neath Port Talbot	1,929	1,403.7	1,320.5	(1,258.6-1,384.5)
Bridgend	1,564	1,165.5	1,071.7	(1,016.2-1,129.4)
Vale of Glamorgan	1,566	1,256.8	1,160.8	(1,100.5-1,223.5)
Cardiff	4,024	1,196.8	1,130.8	(1,094.5-1,168.0)
Rhondda Cynon Taf	3,382	1,442.8	1,377.2	(1,329.2-1,426.5)
Merthyr Tydfil	952	1,710.5	1,711.8	(1,601.4-1,827.6)
Caerphilly	2,425	1,403.9	1,347.8	(1,292.8-1,404.5)
Blaenau Gwent	1,186	1,728.1	1,606.2	(1,511.3-1,705.2)
Torfaen	1,448	1,596.1	1,465.8	(1,386.9-1,547.8)
Monmouthshire	1,287	1,463.0	1,291.8	(1,213.3-1,373.6)
Newport	2,254	1,605.9	1,506.3	(1,442.3-1,572.3)
Wales	**41,818**	**1,394.2**	**1,287.6**	**(1,274.5-1,300.7)**

Attendance to emergency department per 100,000 by local authority, Wales, 2009

	Attendances to emergency dept	Crude Rate	EASR	(95% confidence intervals)
Isle of Anglesey	15,988	23,249.2	24,111.3	(23,717.7-24,509.7)
Gwynedd	22,742	19,148.4	19,605.1	(19,338.7-19,874.2)
Conwy	18,947	17,015.3	16,810.7	(16,548.0-17,076.3)
Denbighshire	23,263	24,048.9	24,767.6	(24,430.6-25,107.9)
Flintshire	12,592	8,399.0	8,421.9	(8,270.1-8,575.6)
Wrexham	12,920	9,699.2	10,106.0	(9,928.8-10,285.5)
Powys	3,775	2,865.6	2,975.1	(2,871.9-3,080.7)
Ceredigion	467	611.3	656.2	(591.9-725.1)
Pembrokeshire	16,640	14,170.7	15,446.4	(15,201.6-15,694.0)
Carmarthenshire	4,217	2,332.8	2,541.5	(2,462.4-2,622.5)
Swansea	53,428	23,098.3	23,000.2	(22,797.1-23,204.6)
Neath Port Talbot	16,782	12,211.8	12,132.3	(11,940.9-12,325.8)
Bridgend	35,409	26,385.8	26,832.1	(26,544.1-27,122.3)
Vale of Glamorgan	19,161	15,377.4	15,647.4	(15,418.2-15,879.1)
Cardiff	85,876	25,540.2	24,984.0	(24,810.5-25,158.4)
Rhondda Cynon Taf	23,604	10,069.8	10,375.5	(10,241.1-10,511.2)
Merthyr Tydfil	6,963	12,510.6	13,027.8	(12,717.7-13,343.4)
Caerphilly	19,735	11,424.9	11,731.7	(11,565.3-11,899.9)
Blaenau Gwent	10,092	14,704.9	15,313.6	(15,008.0-15,623.6)
Torfaen	11,593	12,778.9	13,372.1	(13,122.9-13,624.7)
Monmouthshire	9,230	10,492.6	11,289.9	(11,044.4-11,539.1)
Newport	20,823	14,836.0	15,172.8	(14,963.4-15,384.3)
Wales	**444,247**	**14,811.6**	**14,996.9**	**(14,951.3-15,042.6)**

17.18 Appendix 18 Inpatient rates by age, sex and local authority

In-patient admission rates per 100,000 by age, sex and local authority, 2009

	Male		Female	
	0 to 39	40+	0 to 39	40+
Isle of Anglesey	1,711	1,445	1,169	1,431
Gwynedd	1,630	1,270	1,007	1,433
Conwy	1,445	1,135	1,116	1,731
Denbighshire	1,688	1,358	1,198	1,712
Flintshire	1,729	1,324	957	1,552
Wrexham	1,485	1,171	956	1,373
Powys	1,552	1,275	791	1,523
Ceredigion	1,545	1,241	760	1,486
Pembrokeshire	1,802	1,197	1,012	1,369
Carmarthenshire	1,725	1,256	973	1,605
Swansea	2,049	1,533	1,055	1,634
Neath Port Talbot	1,791	1,251	1,115	1,470
Bridgend	1,426	1,099	808	1,298
Vale of Glamorgan	1,564	1,079	918	1,436
Cardiff	1,310	1,175	801	1,595
Rhondda Cynon Taf	1,992	1,258	1,125	1,371
Merthyr Tydfil	2,547	1,311	1,518	1,447
Caerphilly	1,880	1,124	1,063	1,520
Blaenau Gwent	2,311	1,586	1,257	1,769
Torfaen	1,881	1,390	1,192	1,881
Monmouthshire	1,646	1,368	978	1,746
Newport	1,886	1,432	1,302	1,766

Produced by Public Health Wales and Swansea University, using PEDW (NWIS) & MYE (ONS)