

ACCIDENTAL DWELLING FIRES IN WALSALL & WOLVERHAMPTON (BLACK COUNTRY NORTH)

Analysis of Fire and Casualty data to identify geographical areas and groups of the population most at risk of accidental dwelling fires in the Black Country North Command Area

January 2011 to December 2013

Data Intelligence Hub
March 2014

Introduction

The following document presents the results of the analysis of Accidental Dwelling Fires (ADF) in the Black Country North (Wolverhampton and Walsall). Its aim is to assist in identifying geographical areas and groups of the population which are most at risk of ADF.

Three years of accidental dwelling fire and accidental dwelling fire casualty data were analysed: from January 2011 to December 2013.

In each section of this document, a box summarises the main features highlighted in the section.

Temporal analysis

Table 1 illustrates the temporal distribution of accidental dwelling fires in the Black Country North.

It shows that, over the course of a week, the four hours between 15:00 and 19:00 are the busiest, with 27.5% of ADF occurring during this time frame.

Table 1. Acc Dwell Fires in Black Country North per hour and day – Jan 2011 to Dec 2013

Day / Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Monday	Lowest																							
Tuesday	Lowest																							
Wednesday	Lowest																							
Thursday	Lowest																							
Friday	Lowest																							
Saturday	Lowest																							
Sunday	Lowest																							

Chart 1 is the seasonality chart for accidental dwelling fires in the Black Country North. If the column is a positive number (above the 0) then the number of incidents in that month is higher than expected, if the column is a negative number then the number of incidents in that month is lower than expected (the values on the vertical (y) axis are relative values).

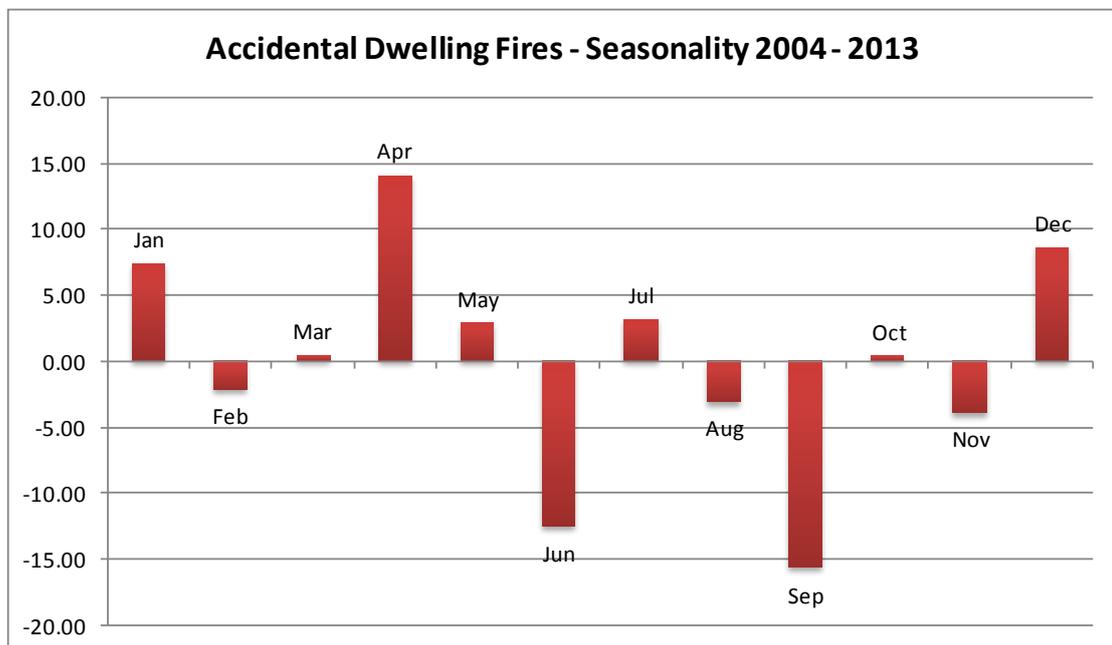
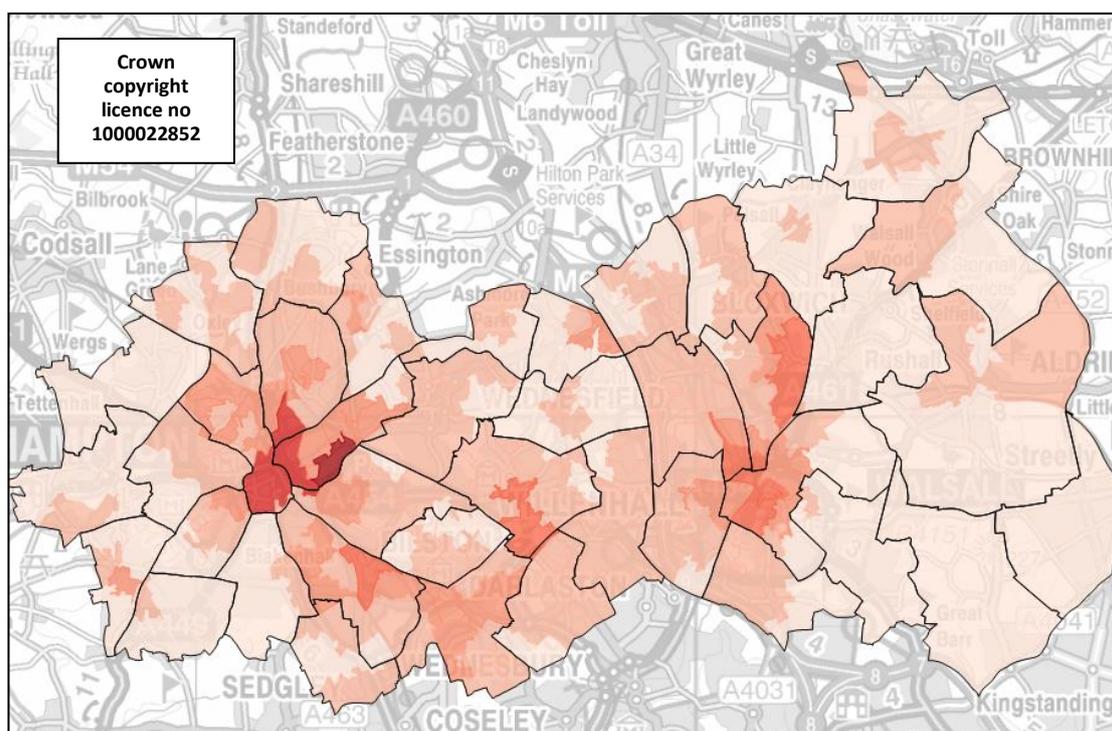


Chart 1. Seasonality - Accidental Dwelling Fires in the Black Country North

It shows that, overall, accidental dwelling fires are most likely in April, December and January.

Location

In the map below, LSOAs (Lower Super Output Areas) are highlighted according to a calculated risk score based on the correlation between the number of accidental dwelling fires in each LSOA and various other datasets (please see Appendix A for a list of datasets used): the darker the LSOA, the greater the score and therefore the risk of accidental dwelling fires.



Map 1. Accidental Dwelling Fire calculated risk score in the Black Country North

The map shows that areas of Heath Town, St Peter's and Bushbury South & Low Hill wards in Wolverhampton presented the highest risk.

Correlation analysis suggests that the number of accidental dwelling fires has a strong correlation with the number of residents of **mixed ethnicity**. This link does not emerge when analysing the ethnicity recorded in the ADF data (whether for the person present during the fire/owner occupier or the casualties); this may be due to recording practices, as a mixed ethnicity is only recorded when the person him/herself is describing their ethnicity, not when the person filling in the workbook is.

There is also strong correlation with the number of residents of **black and Afro-Caribbean ethnicities**: in this case analysis of the data does suggest that they are over-represented as a person present/owner occupier compared to the proportion of the population they occupy according to the 2011 Census.

Accidental dwelling fires also show stronger correlations with the **income deprivation index, single person aged under 65 households, and the number of persons not in employment**.

There is also an inverse correlation between the number of accidental dwelling fires and the number of elderly residents (therefore, the greater the number of elderly residents, the smaller the number of accidental dwelling fires). This contrasts with the elderly's over-representation as casualties and rescues.

It should be noted that correlation is only an indicator that two variables fluctuate together; it however does not necessarily imply causation.

Source of ignition

The top three sources of ignition for accidental dwelling fires in the Black Country North are **cooking appliances** (49.2% of accidental dwelling fires), **electricity supply** (12%), and **smoking related (including cigarette lighter)** (10%).

Cooking appliances fires:

Cooking fires accounted for nearly half of accidental dwelling fires, and resulted in nearly half of all accidental dwelling casualties (45.8%), and most of the rescues.

Chart 2 is the seasonality chart for cooking accidental dwelling fires in the Black Country North. If the column is a positive number (above the 0) then the number of incidents in that month is higher than expected, if the column is a negative number (below the 0) then the number of incidents in that month is lower than expected (the values on the vertical (y) axis are relative values).

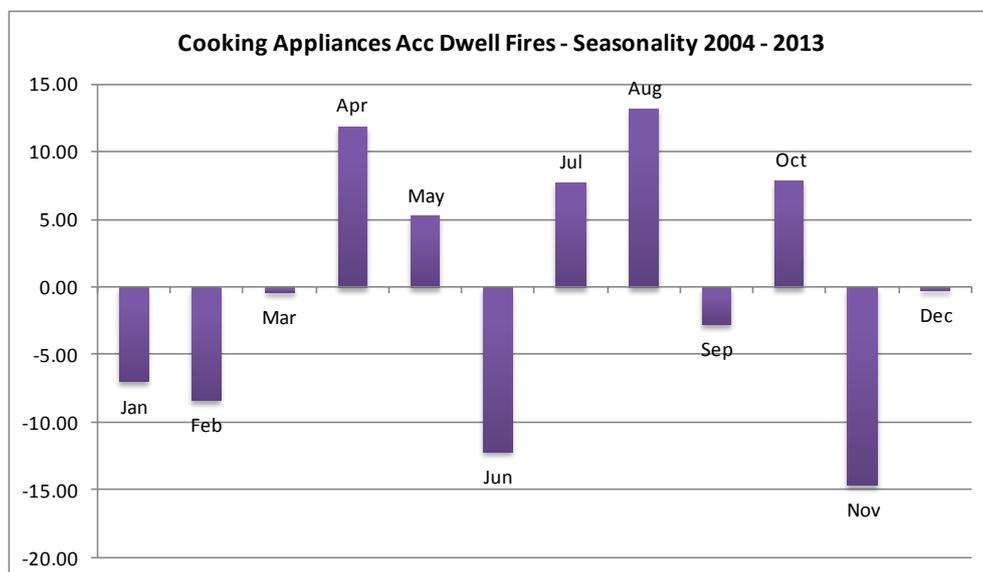


Chart 2. Seasonality - Cooking appliances Accidental Dwelling Fires in the Black Country North

This shows that accidental dwelling fires are most likely to occur in spring and in summer, more particularly in **April** and in **August**.

Table 2 shows that the temporal distribution of cooking fires is less spread out than accidental dwelling fires in general:

Table 2. Cooking Acc Dwell Fires in Black Country North per hour and day – Jan 2011 to Dec 2013

Day/Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Monday	Green																							
Tuesday	Green																							
Wednesday	Green																							
Thursday	Green																							
Friday	Green																							
Saturday	Green																							
Sunday	Green																							

A quarter of incidents took place between **15:00 and 18:00**. Sunday had the greatest number of incidents: 8.4% took place between **12:00 and 18:00 on Sunday**.

10.4% of cooking fires were alcohol- or drug-related, which is higher than the average of 7.9% for all accidental dwelling fires in the Black Country North.

Cooking fires casualties and rescues are more likely to be **aged 25 to 34** (21% of cooking fires), or **75 and over** (16.9%).

Compared to the 2011 Census, where they represent 4.6% of the Black Country North population, people of **black and Afro-Caribbean ethnicities** were over-represented both as the owner occupier or person present during accidental dwelling fires (14.4%) and as a casualty or rescue (11.3%). People of **white ethnicity** were also over-represented as casualties/rescues: 82.3% compared to 73.7% of the population.

In 39.7% of incidents **distraction** was recorded as human factor.

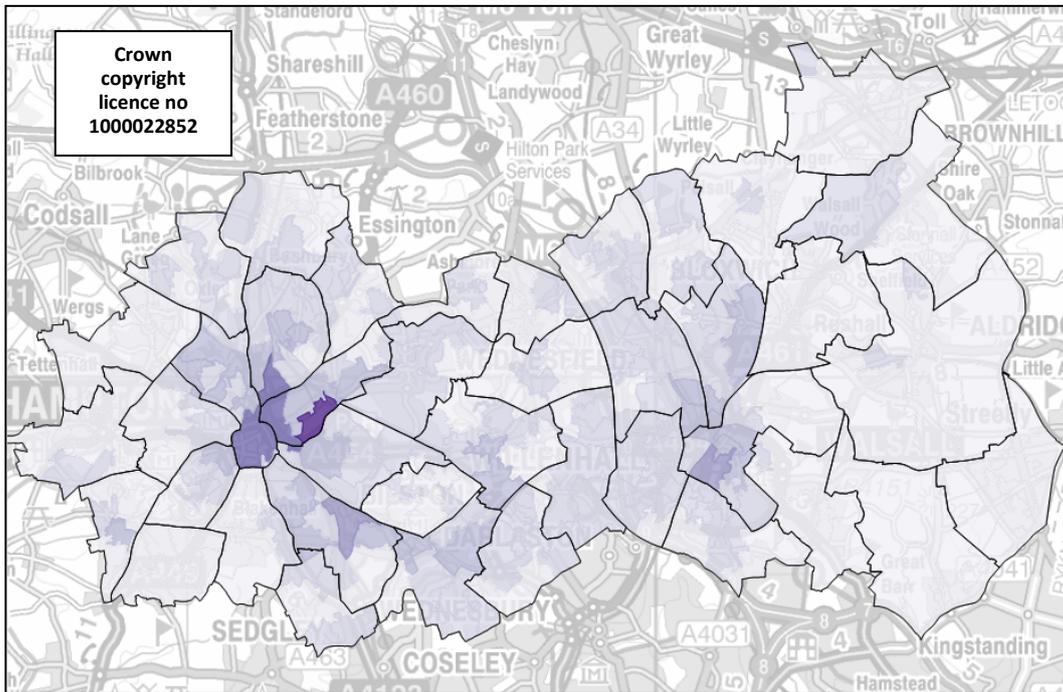
Mental health issues were only a factor in 6.2% of cooking ADF, but in 60.7% of incidents mental health is involved those aged over 65 were the person present during the fire or owner occupier.

Analysis also showed that the proportion of **single person households** was slightly higher for cooking fires (41.9%) than accidental dwelling fires overall (34.5%).

Properties **rented from the council** accounted for 35.7% of accommodation type where a cooking ADF occurred.

Cooking fires tended to be **caused by adults** aged 18-64 (67% of incidents) and the **elderly** (22.6%).

As cooking fires make up such a large proportion of ADF, the geographical distribution of the risk of cooking fires is very similar to that of ADF overall, with areas of Heath Town, Bushbury South and Low Hill, and St Peter's wards presenting the most risk:



Map 2. Cooking Acc Dwell Fire calculated risk score in the Black Country North

The box below summarises the main features of cooking accidental dwelling fires in the Black Country North:

COOKING FIRES:

- August and April
- Cooker - attached ring / hot plate and Grill
- Cooking oil or fat
- 15:00 to 18:00 and Sunday
- Caused by Adults (18-64) or the Elderly (65+)
- Distraction
- Casualties and rescues:
 - > aged 25-34 and 75+
 - > Black Afro-Caribbean and White ethnicities
- 10.4% alcohol/drug related
- Single person households
- Rented from the council

Electricity supply

Between January 2011 and December 2013, accidental dwelling fires caused by electricity supply accounted for 12% of all acc dwell fires, and resulted in 13 casualties and one rescue (5.7% of all casualties and rescues, but 3.6% of serious injuries and fatalities).

The seasonality chart below shows that electricity supply accidental dwelling fires are most likely in the **winter months**, which is consistent with more electricity being used for lighting or heating, as daylight diminishes and the weather becomes colder.

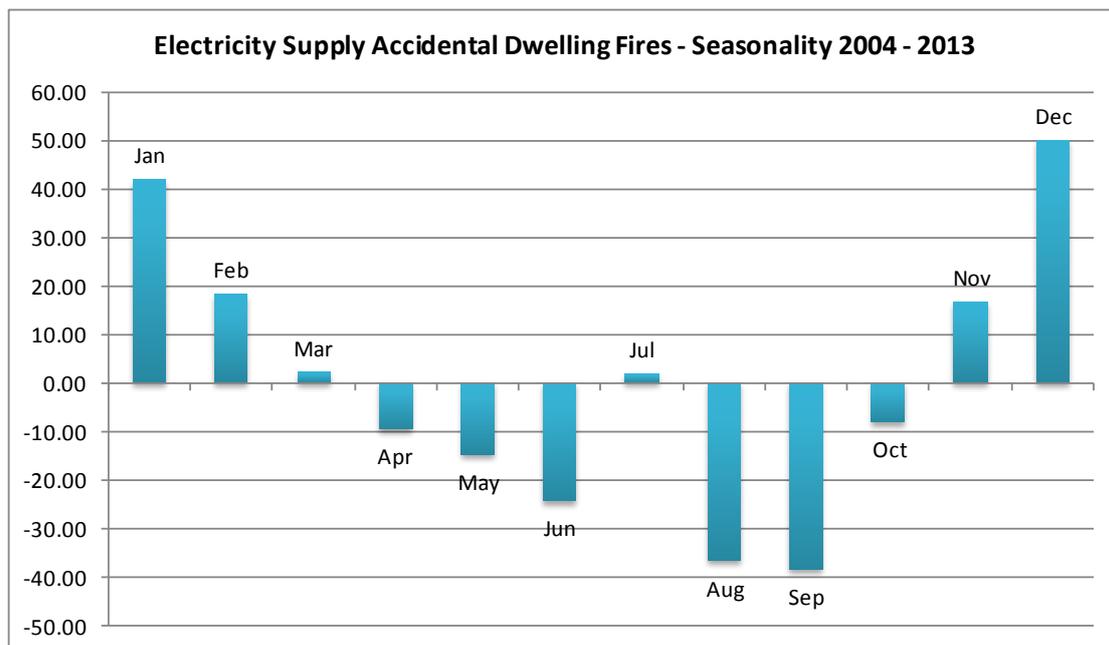


Chart 3. Seasonality - Electricity Supply Accidental Dwelling Fires in the Black Country North

Table 3 shows that electrical fires tend to be highest in the afternoon, particularly on Tuesdays and Saturdays:

Table 3. Electricity supply Acc Dwell Fires in Black Country North per hour and day – Jan 2011 to Dec 2013

Day/hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Monday	Green																							
Tuesday	Green																							
Wednesday	Green																							
Thursday	Green																							
Friday	Green																							
Saturday	Green																							
Sunday	Green																							

Wiring, cabling and plugs were responsible for 90% of electricity supply fires. Current recording practices do not allow for analysis of the type of appliances the wiring, cable and plugs were connected to, although wiring insulation was recorded as the item mainly responsible in over half of incidents.

Those incidents are highest in **rented properties**, with 54.5% of electricity supply incidents at this type of accommodation. Properties rented from the council and privately each accounted for over 20% of electricity supply ADF.

Electricity supply accidental dwelling fires were most likely to start in a **bedroom** (13.6%) or in the **kitchen** (12.7%).

42.8% of the owner occupier or person present during the fire were within the **45-64 years old** age bracket, which is higher than accidental dwelling fires in general (36.5%).

Correlation analysis did not result in strong enough correlations to enable a calculated risk score and an illustrative map, but the box below summarises the main features of electricity supply accidental dwelling fires in the Black Country North:



Smoking related (including cigarette lighter)

Between January 2011 and December 2013, smoking related accidental dwelling fires accounted for 10% of all accidental dwelling fires, and resulted in 34 casualties – including three fatalities – and two rescues (14.6% of all casualties and rescues, and 20% of serious injuries and fatalities).

Temporal analysis did not identify any pattern in the day or time smoking related accidental dwelling fires occur, although **Friday night** showed a slightly higher concentration than the rest of the week.

Chart 4 is the seasonality chart for smoking related dwelling fires in the Black Country North. It shows that, in the Black Country North, these types of incidents are more likely in the **second quarter of the year**.

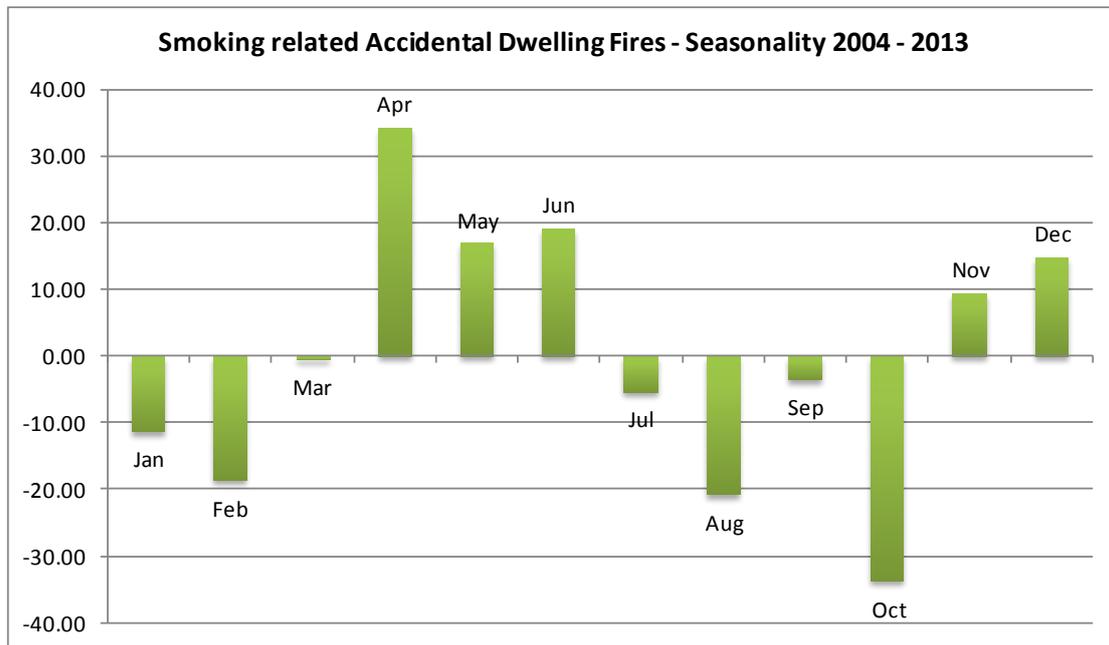


Chart 4. Seasonality - Smoking related Accidental Dwelling Fires in the Black Country North

Smoking related fires had the highest proportion of **alcohol / drug related** incidents, with 15.2% recorded as believed to be linked to alcohol or drug consumption, almost double the proportion of overall ADF.

There were also 10.9% of smoking related ADF where **falling asleep** was a contributory factor.

Smoking related ADF also had the highest proportion of properties recorded as **single person households**, which accounted for 43.5% of incidents.

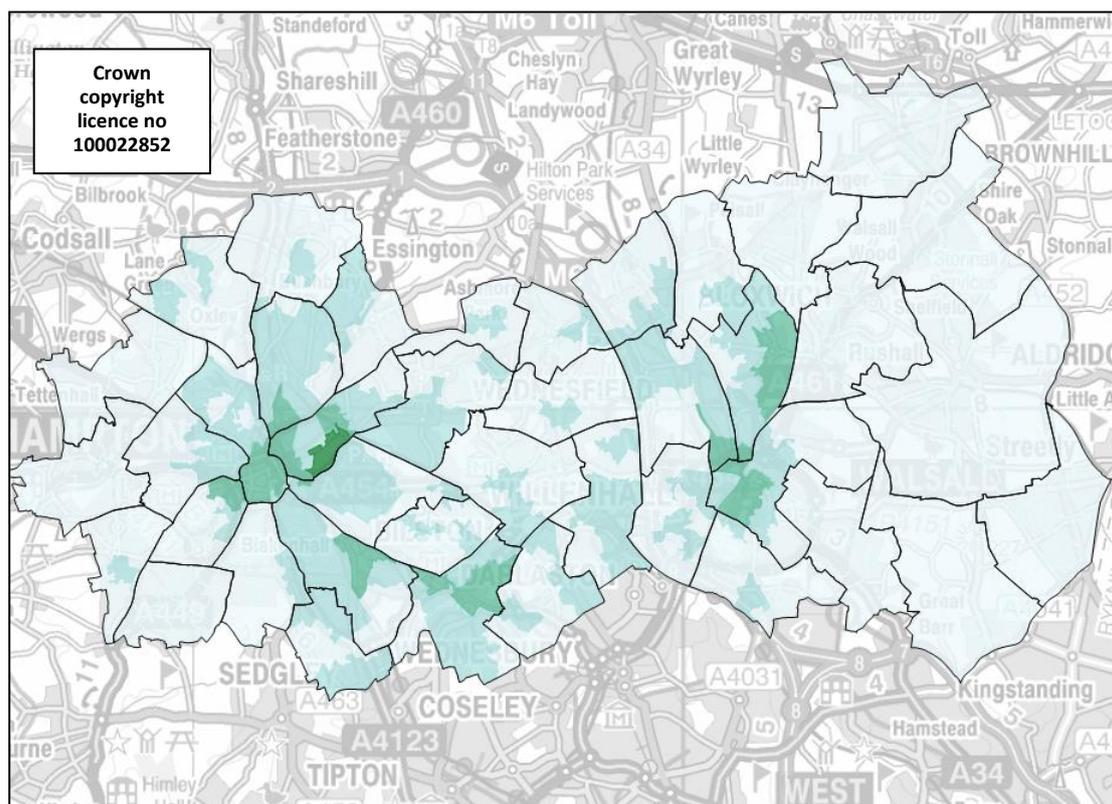
Over half of smoking related ADF started either in the **living room** (28.3%) or **bedroom** (25%).

Adults **between the ages of 45 and 64** were the most likely **person present during the fire/owner occupier** for smoking related ADF, and those in **the 45 to 54 age range** were more likely to be **casualties** in smoking related ADF.

While **adults (aged 18-64)** are most likely to cause smoking related ADF, the past three years have seen a reduction of the elderly as a cause of smoking related ADF and an increase of under-18s in general, and more particularly of **youths (aged 10-17)**.

Rented properties were over-represented compared to ADF overall and to the area's tenure distribution according to the Census 2011, accounting for 71.8% of smoking related fires, compared to 61.6% of all ADF, and 38.4% of households in the Black Country North (Census 2011).

Map 4 shows the geographical distribution of the risk of smoking related fires. The darker the area, the higher the risk of smoking-related accidental dwelling fire:



Map 3. Smoking Acc Dwell Fire calculated risk score in the Black Country North

The box below summarises the main features of smoking related accidental dwelling fires in the Black Country North:

SMOKING RELATED FIRES:

- April to June
- Friday night
- 15.2 % Alcohol/drug related
- Rented properties (especially from the council)
- Single person households
- Owner/occupier or person present aged 45-64 years old
- Casualty aged 45-54 years old
- Caused by Youths and Adults
- Falling asleep
- Living room / Bedroom

Place the fire started

Kitchen fires accounted for 57.3% of all ADF in BCN, which is consistent with cooking appliance being the greatest source of ignition.

Bedroom fires were the second largest place where ADF started (9.7%) and have increased by 13.8% since 2011; they are also more likely to result in larger burn damage than kitchen fire.

Living room and bedroom fires resulted in a disproportionate large percentage of casualties, while kitchen fires and the resulting proportion of casualties were reversed:

Place where fire started	% of ADF	% of Casualties
Kitchen	57.31%	52.19%
Bedroom	9.72%	14.91%
Living room	8.95%	21.05%

It can be inferred that the above was due to more alarms operational and raising the alarm in kitchen fires (44.8% of incidents) than bedroom or living room fires (31.5% and 31.7%).

Nevertheless, the proportion of non-operational alarms was higher for kitchen fires (22.3% of incidents) than for bedroom and living room fires (19.1% and 15.9%).

Property

61.6% of accidental dwelling fires in the Black Country North occurred in **rented properties**, while representing only 38.4% of households according to Census data¹.

Table 4. Tenure types in the Black Country North: Accidental Dwelling Fire and Census 2011

Tenure type	% of total households (Census 2011)	% of total ADF	% Cooking ADF	% Smoking Related ADF	% Electricity supply ADF
Owner occupied	60.0%	36.4%	29.3%	21.7%	44.5%
Rented from the council	16.0%	29.0%	35.7%	30.4%	22.7%
Rented privately	12.4%	17.9%	14.9%	19.6%	20.9%
Rented from housing association	10.0%	13.4%	17.3%	20.7%	9.1%
Rented, landlord not known		1.2%	1.1%	1.1%	1.8%
Not known		2.1%	1.8%	6.5%	0.9%

¹ Tenure Census data also includes a “living rent free” category which is not included above as it is not found in ADF data for the Black Country North. Tenure Census data does not contain categories for unknown tenure type or “rented, landlord not known”.

Properties **rented from the Council** in particular were over-represented when comparing accidental dwelling fires and Census data. This is likely to be linked to the correlations between ADF and the income and employment deprivation indices.

Semi-detached properties accounted for the greatest proportion of accidental dwelling fires, with 33%. Alcohol or drug related incidents tended to be higher in flat/maisonettes.

Demographics

Person present during the fire/owner occupier

There was no great disparity between men and women with regards to the person present at the fire or owner occupier for accidental dwelling fires as a whole, with 48.9% and 46% respectively.

However, some types of ADF showed differences in the distribution (please note the percentages in the table may not add up to 100% due to incidents where the gender is “unknown” or was left blank):

Table 5. Gender distribution of person present during fire / owner occupier for Accidental Dwelling Fires in the Black Country North

Gender	Cooking appliance	Electric Lighting	Electricity supply	Heating equipment	Matches, candles, incense burners etc.	Smoking Related (incl. cigarette lighters)	TOTAL
Male	42.6%	58.8%	54.5%	42.3%	61.5%	59.8%	48.9%
Female	55.0%	23.5%	35.5%	53.8%	38.5%	29.3%	46.0%

In general, the person present at the fire / owner occupier was more likely to be **aged between 25 and 44**.

7.9% of accidental dwelling fires were believed to be linked to alcohol or drug use; 68.1% of those took place in single person household.

In 34.5% of accidental dwelling fires the owner occupier or person present during the fire was recorded as “lone person”, while Census data shows that in 2011 30.3% of households in BCN were **single person households**, suggesting that people living on their own are slightly more at risk of accidental dwelling fires.

Compared to accidental dwelling as a whole, incidents where the owner occupier or the person present during the fire was recorded as a lone person were more likely to:

- be due to cooking appliances, heating equipment or smoking material
- involve someone aged 65 or over
- be related to alcohol or drug

Analysis shows that, in the Black Country North, the aspects of deprivation which align most with the risk of accidental dwelling fires are **income and employment deprivation**.

Cause of the fire

Overall, **adults (18 – 64)** were the greatest cause of the fire, with 50.2% of accidental dwelling fires in the Black Country North caused.

Table 6. Cause of Accidental Dwelling Fires in the Black Country North

Caused by	% of total ADF
Adult (18 - 64)	50.2%
Faults in system or appliance	21.9%
Elderly (65 plus)	15.1%
Youth (10 - 17)	3.3%
Other	2.9%
Person, unknown age	2.3%
Child (0 - 9)	2.1%
Not known	1.4%
Natural occurrences (e.g. lightning strikes)	0.5%
Animal	0.2%

Over the three years analysed, **children and youths** were most likely to cause fires when using 'matches, candles, incense burners etc'. However, 2013 saw a decrease in the proportion of 'matches, candles, incense' ADF caused by children and youths (from 20% in 2011 to 7.1% in 2013), and an increase of those caused by **the elderly** (from 6.7% in 2011 to 14.3% in 2013).

Overall, the **elderly (65+)** were more likely to be responsible for **cooking** (22.6% of all ADF) and **smoking** related (19.6%) fires. However, over the three years analysed there was also an increase in cooking fires caused by the elderly (from 17.2% in 2011 to 27.4% in 2013), and a reduction for smoking fires (from 25.6% in 2011 to 10.7% in 2013).

Proportionally, accidental dwelling fires caused by the elderly or children aged 0 to 9 tended to result in a greater number of casualties:

Caused by	% of casualties
Adult (18 - 64)	54.39%
Elderly (65 plus)	21.49%
Faults in system or appliance	13.16%
Child (0 - 9)	5.70%
Youth (10 - 17)	2.19%
Other	1.32%
Not known	1.32%
Person, unknown age	0.44%

The most common human factor recorded as believed to have been contributory to the cause, spread or resulting injuries from the fire was **distraction**, with 22.9% of accidental dwelling fires in the Black Country North.

Mental health was only recorded as a factor in 4% of accidental dwelling fires overall. It was a human factor in 13.3% of naked flame ADF, 7.6% of smoking related ADF, and 6.2% of cooking ADF.

Half of incidents where mental health was a contributory factor were caused by the elderly.

Casualties and rescues

Casualties and rescues were more likely to result from **cooking and smoking related** fires:

Source of Ignition	% of ADF	% of casualties and rescues	% of PI injuries
Cooking appliance	49.2%	50.2%	36.2%
Smoking Related (incl. cigarette lighters)	10.0%	14.6%	17.0%
Other domestic style appliance	9.2%	9.7%	17.0%
Matches, candles, incense burners etc.	4.3%	9.7%	12.8%
Heating equipment	5.7%	6.5%	6.4%
Electricity supply	12.0%	5.7%	4.3%
Naked flame	1.6%	1.6%	6.4%
Chimney	0.3%	0.8%	0.0%
Other	1.2%	0.4%	0.0%
Spread from secondary fire	2.2%	0.4%	0.0%
Not known	0.8%	0.4%	0.0%

Smoking related fires resulted in more fatal casualties than any other types, with three (two in 2011 and one in 2013).

Accidental dwelling fires from **matches, candles or incense burners** only accounted for 4.3% of incidents, yet resulted in 9.7% of all casualties and rescues, including one fatal casualty.

The elderly (65+) accounted for 22.7% of casualties and rescues from accidental dwelling fires, while they made up 16.7% of the Black Country North population according to the 2011 Census.

Those **aged 75 to 84** in particular were over-represented as casualties and rescues, accounting for 10.5% of casualties and rescues but 5.8% of the population. This part of the population was most at risk of being a casualty or rescue in fires due to other domestic style appliances (non-cooking) and to heating equipment.

Those **aged 25 to 34** were also more likely to be a casualty or rescue, accounting for 15.8% of casualties and 21.1% of rescues.

In contrast with the person present at the fire / owner occupier, men and women were unequal as casualties and rescues, with **men** accounting for 60.7% of casualties and rescues and women 39.3%. Only in the **55-64 and 85-94 age brackets** were there more **female** than male casualties and rescues:

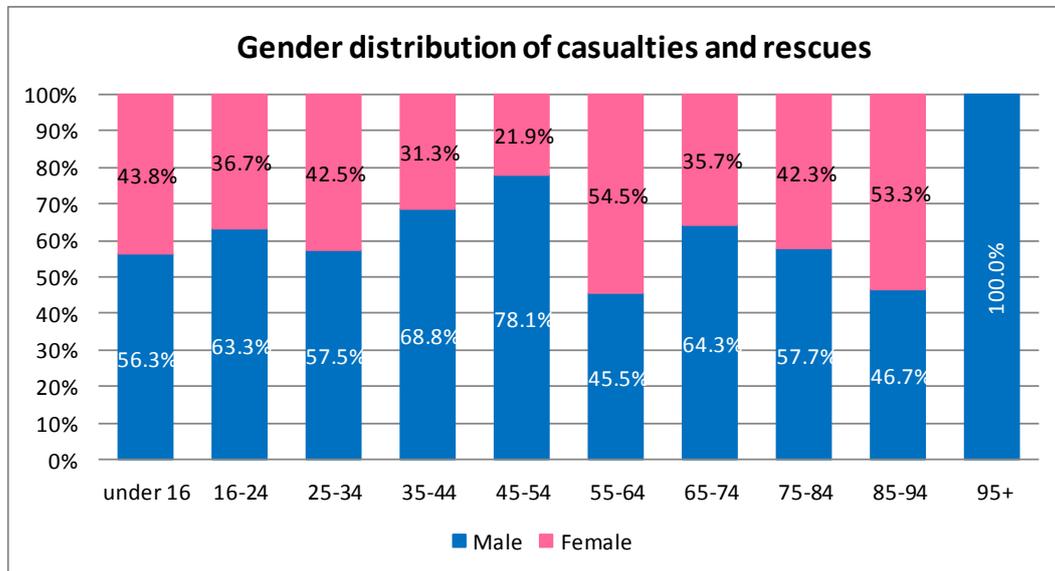


Chart 5. Gender distribution of casualties and rescues of Accidental Dwelling Fire in the Black Country North

Although the majority of casualties and rescues were of **white ethnicities** (81.4%), residents of **black and Afro-Caribbean ethnicities** were over-represented compared to Census data, making up 9.3% of all casualties and rescues, compared to 4.6% of the population.

Alcohol or drug was a factor in 7.9% of accidental dwelling fires, yet resulted in 19.4% of casualties and rescues. In particular, 25% of fatalities and 21.3% of PI injuries resulted from fires where alcohol or drug was a factor.

The box below summarises the main features of casualties and rescues of accidental dwelling fires in the Black Country North:

CASUALTIES:

- Cooking, smoking, domestic appliances, matches/candles/incense burners
- Elderly (particularly 75 to 84 year olds) and 25-34
- Males of all ages
- Females aged 55-64 and 85-94
- White and Black & Afro-Caribbean ethnicities
- Fire caused by adults, the elderly and children (0-9)
- Alcohol/drug related incidents

APPENDIX A – Correlation analysis: datasets used

The datasets used for this analysis were as follows (all were broken down into LSOAs):

- The number Accidental Dwelling Fires (Jan 2011 to Dec 2013)
- The number of households (Census 2011)
- Income Deprivation Index
- Employment Deprivation Index
- The number of children aged 0 to 16 (Census 2011)
- The number of elderly residents (aged 65 and over) (Census 2011)
- The number of single parent households (Census 2011)
- The number of households socially renting (Census 2011)
- The number of Disability Living Allowance claimants (as of May 2013, NOMIS)
- The number of people not in employment (Census 2011)
- The number of Accidental Dwelling Fires casualties, both fatal and non-fatal (Jan 2011 to Dec 2013)
- The number of Incapacity Benefit/Severe Disability Allowance (as of August 2013, NOMIS)
- The number of single person households where the resident is aged under 65 (Census 2011).
- The number of residents of all Black and Afro-Caribbean ethnicities (Census 2011)
- The number of residents of all mixed ethnicities (Census 2011)

All of the above were included in the overall Accidental Dwelling Fires calculated risk score; other datasets were also included in the initial correlation analysis, but showed weak or no correlation, and so were not included in the risk scoring.

Correlation analysis showed a moderate to strong correlation between Accidental Dwelling Fires and all other datasets, although the number of elderly residents showed a negative correlation:

	ADF
ADF	1
Households	0.301113021
Income deprivation index	0.501455194
Employment deprivation index	0.475147461
Children 0-16	0.378303645
Elderly 65+	-0.32388495
Single parent households	0.47181899
Socially rented households	0.45691072
Disability allowance claimants	0.319034788
Persons not in employment	0.491422208
IB/SDA claimants	0.313999301
Single person aged <65 households	0.496406238
Ethnicity: Afro/Caribbean	0.50678148
Ethnicity: Mixed	0.582767869

Strong correlations are highlighted in dark orange, moderate correlations in light orange, and negative moderate correlations in blue.

Please note, the 'number of people not in employment' dataset differs from Employment deprivation in that it refers to the count of people who were not in employment at the time of the Census, while the Employment Deprivation index measures employment deprivation in an area conceptualised as involuntary exclusion of the working age population from the labour market.

Cooking fires showed no or weak correlation to the number of households, the number of benefit claimants, the number of Disability Living Allowance claimants, or the number of elderly residents, and so these datasets were not included in the scoring for this type of accidental dwelling fires.

Smoking-related fires showed no correlation to the number of single person aged under 65 households, the number of children aged 0 to 16, the number of households, or the number of elderly residents, so these datasets were not included in the scoring for this type of accidental dwelling fires. They however showed a moderate correlation to the number of rented households overall, so this dataset was added to the scoring.

Electricity supply fires only showed weak correlations to any of the datasets used.

It should be noted that correlation analysis is only intended as an indicator that two variables fluctuate together; it does not imply causation and may in some instances show no correlation where analysis of fire data demonstrates a link.