

An exploration of community and culture related fire injury risks

Abstract

There can be different types and different levels of fire injury risks relating to different communities and cultures. In this paper we examine the fire injury risks associated with different communities and cultures in the Greater Manchester area within the UK over the period 2010 to 2015. Typically ethnicity data is only recorded for fire injuries rather than fire incidents. In particular, the research reported in this paper examines the fire injury risks relating to age, cooking practices, candle and incense use, alcohol consumption rates, and smoking rates across different communities and cultures. Overall there appeared to be significant differences between the injury risk of alcohol related fires, smoking related fires, and kitchen fires between the different community and cultural groups within the area studied over the given time period. In addition fire injury risk appears significantly higher for elderly individuals in the White British and White Irish community groups.

Keywords: Fire, Injury, Risk, Information, Analysis

1. Introduction

Different communities and cultures can exhibit different levels of fire injury risk, and different types of fire injury risk. The terms communities and cultures are broad terms and typically in terms of fire risk analysis are manifested in ethnicity and nationality data. In this paper we examine the different types and levels of fire injury risk associated with different communities and cultures in the Greater Manchester area within the UK over the period 2010 to 2015. Previous research had indicated that overall, ethnicity does not appear to be a significant predictor of the likelihood of dwelling fires (Corcoran et al, 2011; Chhetri et al, 2010; Asgary et al, 2010; Nilson et al, 2015). However, ethnicity can impact upon some of the causal factors associated with dwelling fires, for example, cooking related fires may be proportionately higher amongst some ethnic groups (Syfire, 2013), whereas alcohol related fires may be proportionately lower amongst some ethnic groups (CWAC, 2013). It is also important to be aware that a community or cultural group consists of individuals, some of whom may align with the cultural norms and practices of the community or cultural group, and some who may not. Therefore it is useful when examining the relationship between ethnicity and fire injury risks to appreciate the social context in which fire injuries occur as well as the statistical analysis of the quantifiable aspects of fire injury incidences. A more thorough understanding of the relationship between ethnicity and accidental dwelling fire risks would support fire and rescue services in making informed decisions regarding fire prevention strategies.

Greater Manchester has a diversity of ethnic groups. The UK 2011 census estimated the population of the Greater Manchester Area to be approximately 2.7 million, and the ethnic breakdown of the area to be: White: 2,248,123, Asian: 246,094, Black: 74,097, Mixed: 60,710, Chinese: 26,079, Other: 27,425 (Nomis, 2016). Therefore, it is worthwhile to examine community and cultural related fire risks for groups that constitute a third of the population of the Greater Manchester area, in order to inform future fire prevention approaches. Overall it is important that any fire and rescue service evolves the manner in which it analyses risks to different population groups (Taylor et al, 2015), and evolves the information systems used to

support fire prevention activities (Higgins et al 2014), in order to transform the process of fire prevention (Higgins et al, 2015).

The research project reported in this paper enhances the existing academic knowledge in the area of accidental dwelling fire risk related to cultural practices. Locally, this is an important area of research given the diverse demographics of Greater Manchester and the recent rapid demographic changes across the county. Although previous research had indicated a potential link between cultural practices and fire risk, this had not really investigated the nature of the relationship and how the presence of the different risk factors could increase the risk of accidental dwelling fire injury. Greater Manchester Fire and Rescue Service have invested significant resource into fire prevention activities, but recognise the need to apply research findings to improve understanding of at risk communities. In particular, Greater Manchester Fire and Rescue Service's prevention strategy stated that they will "*gather data and map where the most hard to reach communities live...leading to more evidence based targeted approaches to our interventions.*" Greater Manchester Fire and Rescue Service's current Equality and Diversity plan also highlighted the need to understand the diverse communities within Greater Manchester. An improved understanding of the links between cultural practices and accidental dwelling fire risk can be practically applied within the organisation.

2. Literature review

2.1 Community and culture related fire risks

Previous research had examined the variety of causal factors related to accidental dwelling fires (Taylor et al, 2012; Hasofer and Thomas, 2006; Holborn et al, 2003) that included: smoking (Diekman et al, 2008), alcohol intoxication (Bruck et al, 2011), old age (Zhang et al, 2006), living alone (Higgins et al, 2013), and social deprivation (Mulvaney et al, 2009) amongst others. Various researchers had also discussed the relationship between socio-economic characteristics and dwelling fire incidences in different communities (Jennings, 2013; Clark et al, 2014; Higgins et al, 2013). Higgins et al (2013) in particular commented upon the need to understand the fire risk and need present in different communities and the individuals within those communities. Clark et al (2014) commented upon the different levels of fire risks between different communities and areas, and discussed the socio-economic and cultural conditions and contexts such as fire-risk knowledge and practices including socio-cultural norms, routines and practices relating to smoking, cooking and candle use that could affect fire risk. Jennings (2013) emphasised the need to advance research into relationships between fire incidence and socio-economic characteristics. Corcoran et al (2013) advocated the use of neighbourhood classifications to adequately capture what are often complex patterns of fire incidence.

Corcoran et al (2011), Chhetri et al (2010) and Asgary et al (2010) identified a relationship between ethnicity and fire risk, however, ethnicity itself did not appear to be a significant predictor variable. Corcoran et al (2011) also identified that when considering ethnicity in studies of fire risk, it is important to appreciate whether 'ethnicity' is defined in terms of 'race' or 'country of origin'. Matheson (2012) commented upon the relationship that different communities may have with their fire and rescue service. Established UK ethnic minority communities may have a significant profile at a national level, with long-standing relationships with fire and rescue services. However, newer ethnic minority communities may be less likely to be aware of public services in general (NCC, 2012).

In order to attempt to understand differences in dwelling fire risk between different ethnic groups it can be useful to appreciate how the causal factors associated with unintentional dwelling fires identified by previous research vary between different ethnic groups. The UK Office for National Statistics identified significant differences between different UK ethnic groups in terms of smoking rates (ONS, 2011) and alcohol consumption levels (ONS, 2012). There are also different levels of deprivation between different UK ethnic groups (Mistry et al, 2010). In addition there are differences between the age profiles of different UK ethnic groups (Rees et al, 2011). There is a need to understand how different risk factors and practices may intersect to place some ethnic groups more at risk. It is not ethnicity itself that means someone may be at risk, but rather particular practices, some of which may be more common to particular cultural practices and hence ethnic groups that can lead to greater risk. This would imply that it is cultural practice, not demographic characteristic (sometimes reduced to the label ‘cultural group’) that needs to be identified and targeted.

2.2 Alcohol related fire risk and ethnicity

Alcohol consumption can pose a significant accidental dwelling fire risk (Bruck et al, 2011). Baker et al (2013) in a study in Leicestershire in the UK concluded that individuals with an addiction to alcohol are at significant risk of accidental dwelling fires. There can be different alcohol consumption patterns and related fire injury risks between different UK community and cultural groups. A study by Cheshire West and Chester Council and Cheshire Fire and Rescue Service in the UK noted that one in three dwelling fire deaths in the county was alcohol related, and also that males and females from ethnic minorities in the county were less likely to consume alcohol than the general population (CWAC, 2013). The UK drinking habits amongst adults analysis performed by the UK Office for National Statistics (ONS, 2012) indicated significant variation amongst UK ethnic groups. Overall ethnic groups in the UK had lower alcohol consumption rates compared to the general population. The lowest alcohol consumption rates were by Asian or Asian British citizens (18%), followed by Black or Black British (32%), Chinese or any other ethnic group (33%) compared to 62% for White British (ONS, 2012).

2.3 Smoking related fire risk and ethnicity

There can be different smoking rates and related fire injury risks between different UK community and cultural groups. Nilson et al (2015) in study of the determinants of residential fires in Sweden, commented that although smoking rates are typically higher in ethnic groups in Sweden, no increased risk of residential fire was observed with regard to ethnicity or race. The UK Office for National Statistics integrated household survey April 2010 to March 2011 (ONS, 2011) analysed the smoking prevalence between different UK ethnic groups and found significant differences between the different groups. Overall UK ethnic groups had a lower prevalence of smoking compared to the general population. The lowest smoking rates were Asian or Asian British citizens (12%), followed by Chinese (13%), Black or Black British (14%), other ethnic group (18%) compared to 22% for White British and 26% for mixed ethnic group citizens.

2.4 Cooking related fire risk and ethnicity

There can be different cooking related fire injury risks between different UK community and cultural groups (Greene, 2012). This mainly relates to the different levels of use of cooking oils and cooking methods e.g. deep frying. A study by South Yorkshire Fire and Rescue Service in the UK (Syfire, 2013) identified that the majority of fires in households for Asian and Black British ethnic groups were cooking related. The East Midlands Fire and Rescue Service in the UK (Emfire, 2011) commented that for members of the community who observe the holy period of Ramadan a lot of cooking takes place before and after sunrise, so kitchen safety during this period is an important issue.

2.5 Candle and incense related fire risk and ethnicity

There can be different cultural and religion usage patterns of candles and incense and related fire injury risks between different UK community and cultural groups. The UK Fire Service commented that as sales of candles have increased in recent years, there have been increasing numbers of candle related fire incidents (FS, 2015). Some UK communities, such as the Indian community use candles and frankincense (the burning of incense with hot charcoal in a clay vase) as part of religious festivals, which can increase fire hazards (MFRS, 2015).

2.6 Community and culture related fire prevention approaches

Fire and Rescue Service in the UK typically use different methods of modelling and understanding risks within their community. Some Fire and Rescue Services use the Fire Services Emergency Cover (FSEC) model of accidental dwelling fire risk (FSEC, 2004), which is based upon data available from previous dwelling fire incidents, resource location and time taken to travel to an incident. Some Fire and Rescue Services use a segmentation modelling toolkit such as Mosaic (Experian, 2015) to understand demographic and lifestyle characteristics within communities. These characteristics may provide an understanding of the types and levels of risk present. Other Fire and Rescue Services have developed their own, bespoke models for identifying and understanding risk, for example, Merseyside Fire and Rescue Service developed their 'Vulnerable Person's Index' (Higgins et al, 2013) and Greater Manchester Fire and Rescue Service have developed their bespoke risk modelling (GMFRS, 2013). All of these tools are in place to assist Fire and Rescue Services with risk identification and appropriate resource deployment.

Fire prevention strategies (Shai, 2006; Parmer et al, 2006; Brussoni et al 2006; Hwang et al, 2006) are increasingly being used by fire and rescue services worldwide in order to attempt to achieve reductions in dwelling fire occurrence. UK fire prevention approaches typically involve the use of the Safe and Well Check (formally the Home Fire Safety Check (HFSC, 2015)), which was introduced into the UK in 1999. A Safe and Well check visit identifies potential fire risks within a dwelling, informs the householders what to do in order to reduce or prevent such fire risks, creates an escape plan in case a fire does break out in the dwelling, and ensures that the dwelling has working smoke alarms. In addition, the Safe and Well check looks holistically at other risks that may be present within the home, such as risk from falls, and provide support, advice and signposting to higher risk or vulnerable individuals. UK fire

prevention approaches typically target social groups presenting a higher risk of fire incidence (Diekman, 2010). Previous approaches to fire risk analysis adopted by UK fire and rescue services typically involved spatial analysis of fire incidence combined with measures of social deprivation (O'Grady, 2014).

The communication of fire safety advice to individuals who may not have English as a first language requires careful consideration. Ethnic minority communities may often also require targeted communications, particularly where English is not their first language (NCC, 2012). Picture cards can be used to help community safety officers give basic fire safety information to residents where English is not spoken (CFRS, 2014). Language is an important factor in fire prevention, but misunderstandings between fire and rescue services and householders about fire prevention and different cultural practices can also be a factor.

In 2005-2006 the UK Office of the Deputy Prime Minister promoted a minority ethnic faith fire safety awareness campaign (ODPM, 2005). In particular, this campaign promoted fire safety engagement activity connected to the festivals of Diwali (Hindu), Eid (Muslim) and Chinese New Year. Fire safety initiatives can be enhanced through the use of advocates who can break down barriers and facilitate inclusion of community groups. Advocates may often be drawn from the community that they serve, so that the target community can identify with them (CALG, 2008). More specifically, bridging cultures co-ordinators may be employed by fire and rescue services to specifically address cultural and community issues with regard to fire safety.

3. Research method

A six month case study was undertaken with Greater Manchester Fire and Rescue Service in the UK involving quantitative statistical analysis of fire injury incidence data to examine the relationship between ethnicity and fire injury risks. Previous research had examined the different causal factors associated with accidental dwelling fires (Taylor et al, 2012; Hasofer and Thomas, 2006; Holborn et al, 2003) including smoking, alcohol intoxication, old age, and social deprivation. In this research project, the researchers examined how these previously identified causal factors varied between community and cultural groups, as well as examining previously identified specific community and culture related fire injury risks such as cooking practices (Syfire, 2013) and candle and incense use (MFRS, 2015). The research reported in this paper involved quantitative analysis of accidental dwelling fire injury data for the period 2010 to 2015 for the Greater Manchester Fire and Rescue Service in order to develop an understanding of the links between ethnicity, culture, and fire injury risk.

The research questions posed by the research reported in this paper were:

- How does fire injury risk vary between different ethnic groups?
- How do the types of fire injury incidence vary between different ethnic groups?
- What are the main causal factors associated with fire injury incidence for different ethnic groups?
- How can fire prevention be targeted for different specific ethnic groups?

This is an important research topic since the continuing reductions in fire and rescue service budgets in the UK necessitate the adoption of increasingly targeted fire prevention approaches in order to more effectively and efficiently deploy fire prevention resources. In addition, rapid demographic changes within the UK generally, and within the Greater Manchester area in particular, imply that community and culture related fire risks are to become increasingly relevant to effective fire prevention strategies.

3.1 Data Collection

Accidental dwelling fire injury data for the period 2010 to 2015 within the Greater Manchester area was collected with regard to kitchen fires, alcohol related fires, smoking related fires, candle and incense related fires, and age profiles, since these had been identified as significant causal factors by previous research.

Data relating to fire injuries resulting from kitchen fires was obtained from the “Location of fire start – dwelling” question on the UK Fire and Rescue Services incident recording system (IRS, 2012) for each fire attended – Code 10 – Kitchen.

Data relating to fire injuries resulting from alcohol consumption as a contributory factor was obtained from the “Was impairments due to suspected drugs / alcohol a contributory factor in the fire?” question on the UK Fire and Rescue Services incident recording system for each fire attended – Code 3 – suspected under influence of alcohol.

Data relating to fire injuries resulting from smoking, candle or incense use was obtained from the “What was the source of ignition?” question on the UK Fire and Rescue Services incident recording system for each fire attended – Code 46 – smoking materials, code 47 – candles, code 75 – oil / incense burners.

Age related fire injury incidence data was obtained from the “Fire Caused by” question on the UK Fire and Rescue Services incident recording system for each fire attended – these included the age categories of Elderly (65 plus), Adult (18 - 64), Youth (10 - 17), and Child (0 - 9). The reason for including age related fire injury incidence data was to examine if there might be age differences with regard to fire injuries across different ethnic groups.

3.2 Data Analysis

The accidental dwelling fire injury data for the period 2010 to 2015 within the Greater Manchester Area was analysed by examining the different causal factors associated with accidental dwelling fires that had been identified by previous research. This involved frequency analysis of accidental dwelling fire injury data relating to kitchen fires, alcohol related fires, smoking related fires, candle and incense related fires, and age of the person who caused the fire (where known and recorded). The analytical approach taken involved firstly examining the total number of accidental dwelling fire injuries associated with each generic community and cultural group, and then examining the numbers and types of accidental dwelling fire injuries associated with the different community and cultural sub-groups within the Greater Manchester Area over the period studied (2010 to 2015).

4. Results

4.1 Fire injury variation by ethnic group

Overall the number of fire injuries for the different ethnic groups and different fire types over the period 2010 to 2015 in the Greater Manchester Area are shown in Table 1.

Ethnicity	Total number of fire injuries	Number of alcohol related fire injuries	Number of smoking related fire injuries	Number of candle related fire injuries	Number of oil or incense burner related fire injuries	Number of cooking related fire injuries
White British / Irish / Other	3025	747	326	122	3	2086
Black or Black British	154	18	6	3	1	121
Asian or Asian British	196	10	6	2	1	111
Chinese	13	0	0	0	0	11
Mixed	33	5	1	1	0	24
Other Ethnic group	37	3	4	2	0	26
Totals	3458	783	343	130	5	2379

Table 1. Number of fire injuries by ethnic groups and fire types over the period 2010 to 2015 in the Greater Manchester Area

Table 2 shows the fire injuries by ethnic groups and fire types per 1000 members of each ethnic group between 2010 and 2015 in the Greater Manchester Area.

Ethnicity	Total fire injuries per 1000 members of ethnic group	Number of alcohol related fire injuries per 1000 members of ethnic group	Number of smoking related fire injuries per 1000 members of ethnic group	Number of candle related fire injuries per 1000 members of ethnic group	Number of oil or incense burner related fire injuries per 1000 members of ethnic group	Number of cooking related fire injuries per 1000 members of ethnic group
White British / Irish / Other	1.4	0.3	0.2	0.1	0.001	0.9
Black or Black British	2.1	0.2	0.1	0.04	0.01	1.6
Asian or Asian British	0.8	0.04	0.02	0.01	0.004	0.5
Chinese	0.5	0	0	0	0	0.4

Mixed	0.5	0.1	0.02	0.02	0	0.4
Other Ethnic group	1.4	0.1	0.2	0.1	0	1.0

Table 2 Fire injuries by ethnic groups and fire types per 1000 members of each ethnic group between 2010 and 2015 in the Greater Manchester Area.

Table 3 shows a breakdown of the age group classification of the person causing the accidental dwelling fire that resulted in injury (where such data was available) by ethnicity.

Ethnicity	Elderly (65+)	Adult (18 – 64)	Youth (10 – 17)	Child (0 – 9)
White British / Irish / Other	885	1581	77	68
Black or Black British	15	102	3	2
Asian or Asian British	11	109	6	21
Chinese	1	7	1	0
Mixed	0	21	1	4
Other Ethnic group	4	27	1	3
Totals	916	1847	89	98

Table 3 Age group classification of person causing accidental dwelling fire resulting in injury across ethnic groups for the period 2010 to 2015 in the Greater Manchester Area.

4.2 Fire injury risk variation by community and ethnic group

From the cross tabulation analysis of the numbers of different accidental dwelling fire types by community and cultural groups over the period 2010 to 2015 within the Greater Manchester area it appeared that:

Overall the Black or Black British ethnic group had the highest likelihood of fire injury risk, followed by the White British / Irish / Other and Other Ethnic groups.

Alcohol related accidental dwelling fire injuries were most prevalent amongst the White British / Irish / Other (approximately 25% of fire injuries for this group), and Mixed (approximately 15% of fire injuries for this group) ethnic groups. For all the other community and cultural groups the percentage of fire injuries for that group associated with alcohol were significantly lower.

Smoking related accidental dwelling fire injuries were most prevalent amongst the Other (approximately 11% of fire injuries for this group), and White British / Irish / Other (approximately 11% of fire injuries for this group) ethnic groups. For all the other community

and cultural groups the percentage of fire injuries for that group associated with smoking were significantly lower.

Rates of candle related and oil / incense related accidental dwelling fire injuries did not appear to differ significantly between the different cultural and community groups over the period studied.

There appeared to be significantly higher rates of kitchen fire injuries amongst Chinese (approximately 85% of fire injuries for this group), and Black or Black British (approximately 79% of fire injuries for this group) ethnic groups. For all the other community and cultural groups the rate of kitchen fire injuries for that group was significantly lower.

With regard to the age profiles of individuals in the different community and cultural groups who were recorded as having caused the fire leading to a fire injury (where this was known) it appeared that fires caused by elderly individuals were more likely amongst the White British / Irish / Other groups, whereas fires caused by children were more likely amongst the Asian or Asian British group. This could possibly be explained through cultural practices, for example that more White British / White Irish will live alone when older, or live with a spouse / partner in older age in empty-nester households.

5. Conclusions

In this paper we have examined a six month case study with Greater Manchester Fire and Rescue Service in the UK that involved quantitative statistical analysis of accidental dwelling fire injury data to examine the relationship between community and cultural groups and fire injury risks over the period 2010 to 2015. Overall there appeared to be significant differences between the injury risk of alcohol related fires, smoking related fires, and kitchen fires between the different community and cultural groups within the area studied over the given time period. In addition fire injury risk appears significantly higher for elderly individuals in the White British and White Irish community groups. This could possibly be explained through the higher likelihood of living alone or just with a spouse or partner in older age for this group.

The information provided by this research can inform community and cultural group specific fire prevention approaches targeted to the specific types of fire injury risk relevant to the different community and cultural groups within the Greater Manchester area. It is hoped that the results of this research may be of use to other fire and rescue services both in the UK and elsewhere in terms of developing strategies for analysing and addressing community and cultural group fire risks. The analysis reported in this paper is the first stage in unravelling the intersection between the demographic (ethnicity) and cultural (practices) aspects of fire injury risk.

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