



Fire Prevention Targeting by Merseyside Fire and Rescue Service in UK

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Abstract. In this article, we examine fire prevention targeting by Merseyside Fire and Rescue Service in the North West of England. We examine social group, spatial, and lifestyle and behaviours targeting, and the targeted use of fire prevention approaches including home fire safety checks, community, and educational engagement events, websites, social media, and home fire safety self-assessment software tools. In particular, we examine the fire prevention approaches used by Merseyside Fire and Rescue Service, the approaches that were used to identify those most at risk of accidental dwelling fire incidents, injuries, and fatalities, and the strategies adopted for the targeting of fire prevention resources.

Keywords: Fire, Prevention, Targeting, Analysis

1. Introduction

Previous research into accidental dwelling fire risk has mainly focussed on socio-economic and demographic classifications of individuals, and on historical analysis of fire incidents [1, 2]. In this article, we examine fire prevention targeting by Merseyside Fire and Rescue Service in the North West of England. In particular, we examine the different approaches to fire prevention, the identification of those most at risk of accidental dwelling fires, and the different approaches to targeting fire prevention activities.

2. Background Information

The Home Fire Safety Check [3] identifies the potential fire risks within a home, informs the householders what to do in order to prevent or reduce such risks, creates an escape plan in case a fire was to break out, and ensures that the home has working smoke alarms. Home fire safety checks can personalize the fire risks for householders and add depth to home fire safety interventions [4]. Typically, the home fire safety check is viewed by UK Fire and Rescue Services as being the

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main approach to accidental dwelling fire prevention [5]. However, due to budgetary restrictions, the numbers of completed home fire safety checks per year have reduced in the UK in recent years. The total number of UK home fire safety checks had declined since 2010/11, by 43%. In contrast, the number of targeted home fire safety checks (people aged 65 and over, and disabled people) had increased [6]. Previous research has suggested that repeat home fire safety checks can be more effective in sustaining longer-term change in householder behaviours than “one-off” home visits [1].

Use of social-media platforms by fire and rescue services across the UK provides a view of the range of services they provide to the public [7]. Typically, UK fire and rescue services use a combination of social media platforms including Facebook, Instagram, and Twitter. Initially UK fire and rescue services mainly used social media for text based fire prevention messages, but more recently content has become more varied through the use of short videos and images, which appears to have increased reach and engagement levels. Recent UK national public sector cost-cutting measures have left UK fire and rescue services working within limited budgets, necessitating the use of innovative strategies to communicate with the public via the most cost-effective means possible. Social media provides the opportunity to engage individuals and gather insight into their preferences and needs, and thereby provide the evidence and intelligence needed to re-design fire prevention services to be more targeted, effective and efficient [8]. Although social media platforms are not a cost-free option for fire and rescue services, such platforms can provide a direct means of communication with the public, allowing fire and rescue services to offer behaviour-changing advice [7].

The online home fire safety check application developed by the UK National Fire Chiefs Council and Safelincs [9, 10] provides a self-assessment software tool that takes the householder through their home one room at a time and asks simple questions to help identify fire risks, and then offers advice on ways to reduce those risks. A personalised fire safety action plan is then provided by the software tool, which caters for different housing types, since different types of property have different fire risks, and in rented accommodation the landlord will have some fire safety responsibilities. Inspections of buildings owned by landlords by a UK fire and rescue service would ensure that the buildings are compliant with fire legislation and would offer remedial advice to the landlord when needed. Targeting of fire inspections of business premises (including landlord owned properties) is undertaken based upon an estimated level of fire risk for the business.

The fire and rescue service inspection in 2021 by HM Inspectorate of Constabulary and Fire and Rescue Services [11] of Merseyside Fire and Rescue Service (MFRS) commented that Merseyside is an effective fire and rescue service that uses a range of information to identify, assess and prevent risk. The extent to which MFRS was effective at keeping people safe from fire risk was rated good, and the extent to which MFRS was efficient at keeping people safe from fire risk was rated outstanding. This compared well to other English fire and rescue services inspected, where a number were rated as requiring improvement. Merseyside Fire and Rescue Service was one of the few English fire and rescue services to be rated as outstanding in terms of efficiency.

3. Fire Prevention Targeting

Different approaches have been used for targeting fire prevention. Historically, fire prevention approaches tended to utilise spatial analysis, based upon the numbers of accidental dwelling fires in different areas, or spatial modelling based upon the numbers or percentages of more at risk individuals such as the elderly, smokers, and binge drinkers in different geographical areas [12–14]. Other approaches to targeting fire prevention have utilised community modelling in order to better understand the different communities in an area, and their level of fire risk [15–17]. Runefors et al. [18] examined the effectiveness of specific fire prevention measures for different population groups in a study in Sweden and concluded that the effectiveness of different fire preventive measures depends upon on age, gender, occupancy type, whether an individual is living alone and whether the individual is a smoker.

Evaluations of the Home Fire Safety Check initiative in England, Wales, and Australia had identified the relationship between the installation of smoke alarms and reductions in dwelling fires and non-fatal casualties, and demonstrated the home fire safety check program's cost effectiveness [19–21]. In addition to fire prevention targeting by fire and rescue services, collaboration between public sector agencies has been viewed as crucial for successful fire prevention for vulnerable groups [22].

4. Research Method

The aspects of the targeting of fire prevention that were examined included the fire prevention approaches available, the identification of those most at risk of fire incidents, and approaches for the targeting of fire prevention. These are important consideration given the health, social, and economic costs of accidental dwelling fires, and the need to target fire prevention activities to those most at risk. Merseyside Fire and Rescue Service had the largest budget reductions of any English fire and rescue service [23]. Accidental dwelling fire incident, injury, and fatality data recorded by Merseyside Fire and Rescue Service between 2006 and 2016 was examined in terms of patterns and trends of fire incidents, injuries, and fatalities. The limitations of the research undertaken were the availability of relevant data, and the generalizability of the results given that each fire and rescue service will cover a different geographic area in terms of size and urban/rural constitution with different local population demographics.

The research questions posed by this research were:

- What fire prevention approaches are available to a UK fire and rescue service?
- How can those most at risk of fire incidents/injuries/fatalities be identified?
- How should targeting of fire prevention be undertaken?

These are important research questions given the health, social, and economic costs of accidental dwelling fires, and the need to target fire prevention activities

to those most at risk. The research concerned the fire prevention approaches utilised, and the targeting of such by the fire and rescue service concerned.

5. Fire Prevention Targeting by Merseyside Fire and Rescue Service

The overall range of fire prevention approaches available to Merseyside Fire and Rescue Service is shown in Fig. 1.

The online home fire safety check application developed by the UK National Fire Chiefs Council and Safelincs [9, 10] was being trialled at a number of UK fire and rescue services, but was not yet available to Merseyside Fire and Rescue Service. Home Fire Safety Checks were viewed as the most useful form of fire prevention by Merseyside Fire and Rescue Service staff, due to the high level of engagement with householders, and since the fire safety advice could be tailored to each individual household, and provided an opportunity for referral to other agencies to address underlying fire risk causal factors such as alcohol consumption and smoking. Community engagement events and educational events provided access to greater numbers of individuals than home fire safety checks, but could not necessarily provide the same level of engagement. Merseyside Fire and Rescue Service’s website and social media provided potential access to a much larger group of individual residents, and provided a means of communicating specific fire safety messages such as cooking safety, and smoking safety, as well as advertising home fire safety checks, and providing specific fire safety advice and support for vulnerable groups such as the deaf or hard of hearing, and those impacted by domestic abuse [24].

Merseyside Fire and Rescue Service had identified the elderly (those aged 65+) as being the most vulnerable population segment in terms of fire risk [20, 25] based upon the number of fire incidences, injuries and fatalities per year within the different population segments within the area covered, and the proportion of individuals within each different population segment per 100,000 of population

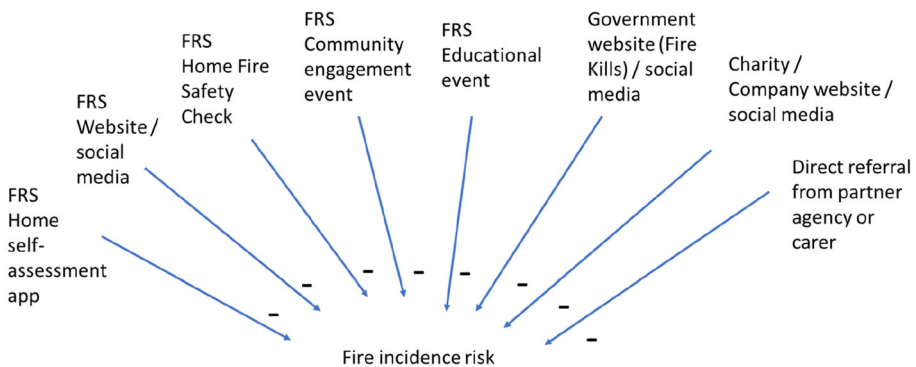


Figure 1. Fire prevention approaches available to Merseyside Fire and Rescue Service.

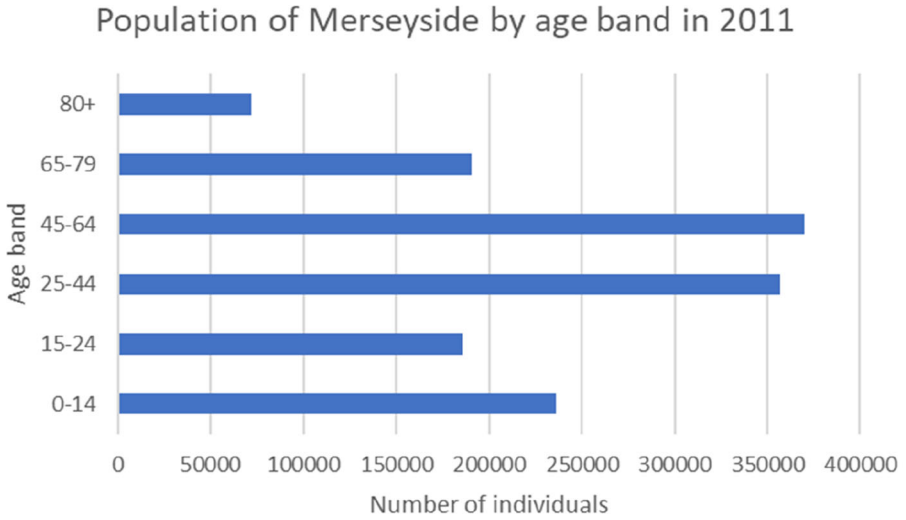


Figure 2. Population of Merseyside by age band in 2011.

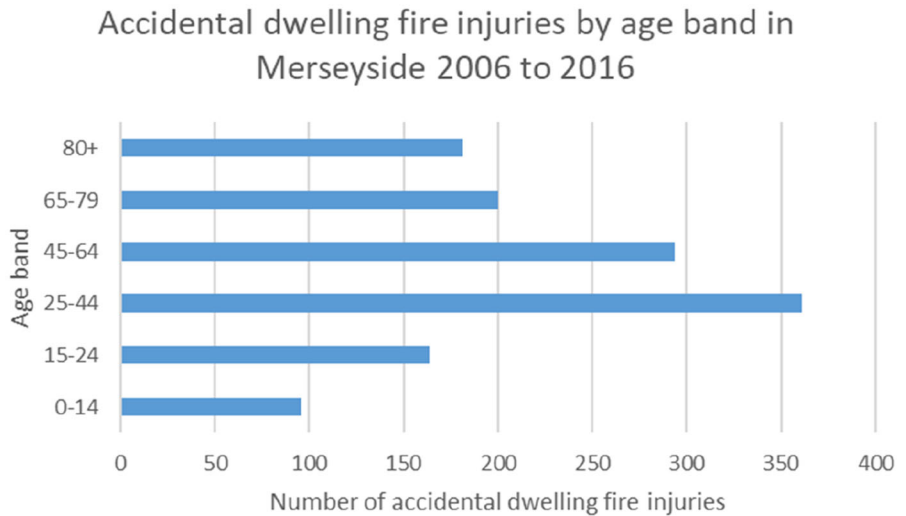


Figure 3. Accidental dwelling fire injuries by age band in Merseyside between 2006 and 2016.

within the area covered involved in a fire incidence, injury and fatality. The population of Merseyside by age band in 2011 is shown in Fig. 2 [26].

Figure 3 shows the number of accidental dwelling fire injuries by age band in Merseyside between 2006 and 2016.

In addition to those social groups most at risk of fire incidents, Merseyside Fire and Rescue Service had also identified those most at risk of fire incidents in rela-

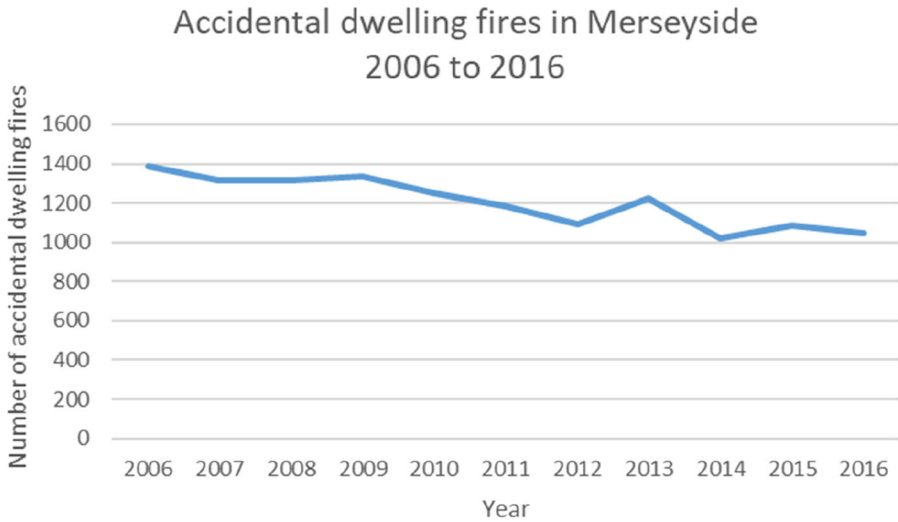


Figure 4. Accidental dwelling fires in Merseyside between 2006 and 2016.

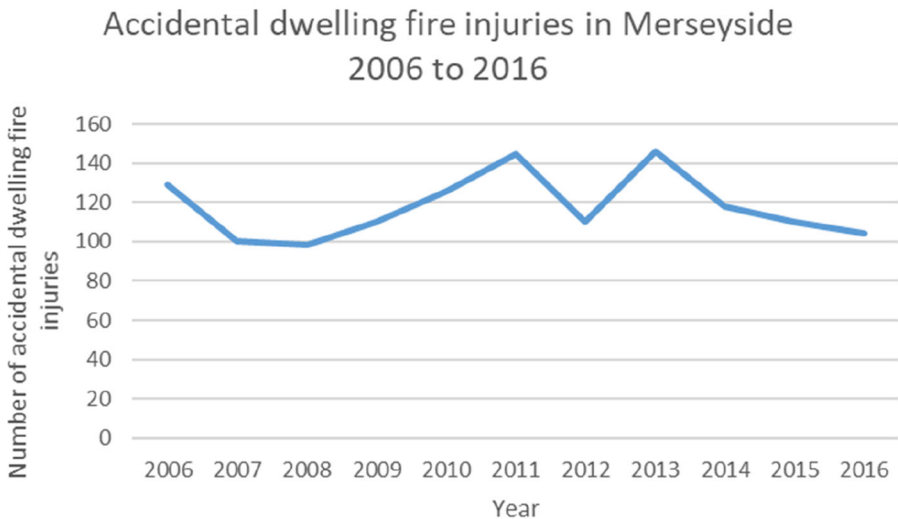


Figure 5. Accidental dwelling fire injuries in Merseyside between 2006 and 2016.

tion to lifestyles and behaviours. For example, between 2006 and 2016, alcohol/drug consumption was involved in 13% of accidental dwelling fire injuries, and injuries sustained by householders fighting accidental dwelling fires accounted for 19.5% of accidental dwelling fire injuries in Merseyside. Figures 4, 5, and 6 show the number of accidental dwelling fires, injuries, and fatalities in Merseyside

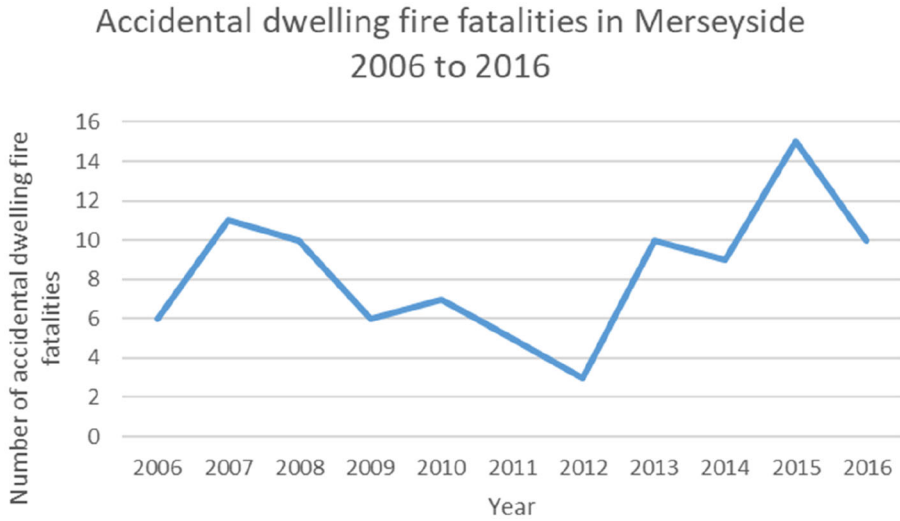


Figure 6. Accidental dwelling fire fatalities in Merseyside between 2006 and 2016.

between 2006 and 2016. Against a background of declining budgets, the number of accidental dwelling fires had shown a marked decline over the period studied. However, similar levels of reduction did not occur in the numbers of accidental dwelling fire injuries and fatalities during the period studied.

Figure 7 shows that the number of accidental dwelling fire fatalities per thousand fires in Merseyside had fluctuated between 2006 and 2016. This needs however, to be viewed in the context of the very small numbers of accidental dwelling fire fatalities that occurred during the period.

The three main targeting approaches for fire prevention relevant to Merseyside Fire and Rescue Service were community segment targeting, spatial targeting, and lifestyle and behaviours targeting. Community segment fire prevention targeting aimed to apply fire prevention resources to the community segments most at risk from accidental dwelling fire. For Merseyside, the 65 + age group had the highest proportion of accidental dwelling fire incidents, and fire fatalities, and the second highest proportion of fire injuries. Due to budgetary reductions, the community segment targeting was further refined to specifically cover those over 65, living alone, and with complex health needs. Spatial fire prevention targeting was applied via identification of those output area level [27] geographic areas that predominantly contained the most at risk community segment (those aged over 65). The majority of output areas in England are between 110 and 139 households in size. Lifestyle and behaviour fire prevention targeting aimed to identify and inform those most at risk of accidental dwelling fires from their lifestyles and behaviours. This included individuals consuming alcohol and drugs, smoking, and the use of candles.

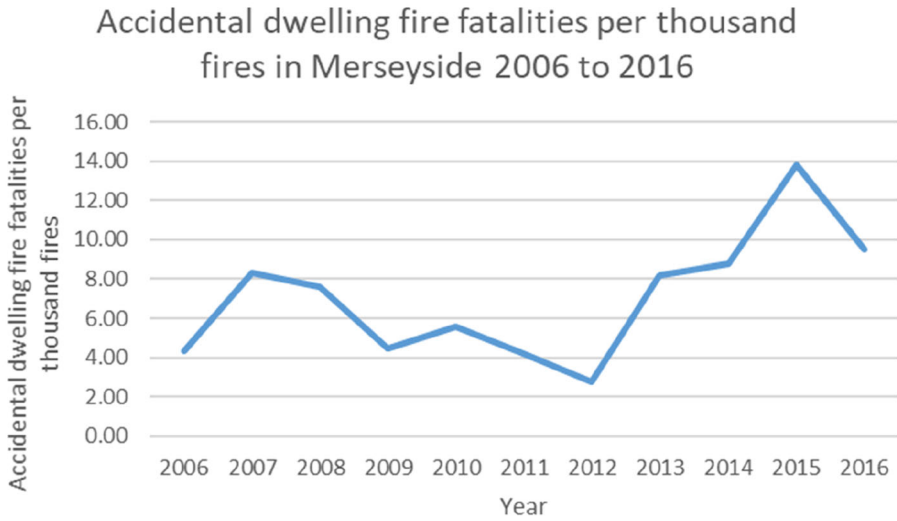


Figure 7. Accidental dwelling fire fatalities per 1 000 fires in Merseyside between 2006 and 2016.

**Table 1
Fire Prevention Approaches and Their Level of Suitability for Different Types of Fire Prevention Targeting**

Fire prevention approach	Community segment targeting	Spatial targeting	Lifestyle and behaviour targeting
Home fire safety check	High	High	Low, but can support referrals to partner agencies
Community engagement event	Medium	High	Low
Educational event	Medium	High	Low
Direct referral from agency/carer	High	High	Low, unless referral specifically relates to lifestyle or behaviour
Website/social media	Medium	Low	High

In terms of the different fire prevention approaches available to Merseyside Fire and Rescue Service, Table 1 presents their level of suitability for fire prevention targeting.

The suitability of the different approaches for fire prevention targeting was rated based upon analysis of how the approaches were used in operational practice. For example, Merseyside Fire and Rescue Service used home fire safety checks to target specific vulnerable community groups within specified geographical areas. In comparison, alcohol related fires affected all adult age groups, and therefore website and social media fire prevention approaches were used for

addressing this lifestyle and behaviour based risk across a wider audience. The methods of engagement chosen for fire prevention by Merseyside Fire and Rescue Service were based upon evidence from accidental dwelling fire incident, injury and fatality numbers following fire prevention activities [20]. Overall, home fire safety checks provided the most appropriate means of targeting those most vulnerable to fire risk, in terms of community segment targeting, and targeting the geographical areas where such groups predominantly lived in terms of spatial targeting. Community and educational events could target those areas with higher levels of fire incidence in terms of spatial targeting, but were less useful in terms of targeting specific vulnerable groups in terms of fire risk. Website and social media based fire prevention activities were more useful for targeting lifestyles and behaviours associated with increased fire risk, such as alcohol consumption and smoking. Websites and social media may assist in disseminating fire safety messages to the public, in terms of increasing the reach of such messages, however, they may not necessarily convince the public to follow the advice in such messages. In addition, use of social media and websites for fire prevention may be less effective among the over 65's, who may be less connected than the younger population. If elderly individuals are not on social media or unable to access the internet, this avenue of fire prevention would be less effective than other options for the elderly age group.

6. Conclusions

In this article we have examined the fire prevention approaches available to Merseyside Fire and Rescue Service, the approaches used for identifying those most at risk of fire incidents, and the approaches for the targeting of fire prevention. Fire prevention targeting may be undertaken via social group, spatial, and lifestyle and behaviours targeting. Different fire prevention approaches including home fire safety checks, community, and educational engagement events, websites, social media, and home fire safety self-assessment software tools can support different levels of social group, spatial, and lifestyle and behaviour targeting.

Overall, the targeting of home fire safety checks to those social groups most vulnerable to accidental dwelling fire appeared to be the most appropriate means of targeted fire prevention, due to the higher level of engagement and personalisation of fire safety advice. Community and educational events can be targeted to geographical areas with higher accidental dwelling fire incidence. Websites and social media can provide the greatest reach in terms of fire prevention advice dissemination, however, these appeared more appropriate to targeting specific lifestyles and behaviours associated with increased fire risk such as alcohol consumption and smoking.

Fire and rescue services will cover different types of geographical areas and different types of populations. Each fire and rescue service would need to analyse its patterns of fire incidents, injuries and fatalities, in order to understand the types of risks relevant to different social groups. For example, in Merseyside, there were significant numbers of fire injuries related to alcohol and drug consumption,

which might not be so relevant to other areas, and other fire and rescue services. This can then inform decisions regarding appropriate fire prevention approaches based upon a detailed understanding of the fire risks for the relevant population.

It is hoped that the analysis of fire prevention targeting presented in this paper may be of use to other fire and rescue services in terms of understanding what fire prevention approaches are available, how identification of those most vulnerable to fire risk can be achieved in order to support targeting of fire prevention, and how the actual targeting of fire prevention via the different approaches may be undertaken.

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