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Behavioural trends and accidental dwelling fires

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ABSTRACT

Changes in household domestic behaviours over time may have associated changes in accidental dwelling fire incidence that can impact fire and rescue services. In this article the effects of changing household domestic behaviours during the period 2013/14 to 2023/24 on accidental dwelling fires in England is examined. Overall, changes in cooking habits in England including more microwave and air fryer use appear to have contributed to a decrease in cooking fires over the period, which was the largest element in the overall reduction of accidental dwelling fire incidence and injury. A reduction in smoking rates in England may have contributed to a reduction in accidental dwelling fire fatalities. Although smoking related accidental dwelling fires constituted a small proportion of the overall numbers of incidents, they appeared to be the largest cause of accidental dwelling fire fatality in England.

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KEYWORDS Fire; prevention; behavioural trends

1. Introduction

English fire and rescue services provide advice on reducing the likelihood of domestic fire incidence with regard to cooking safety (GMFRS, 2025; MFRS, 2025), smoking (CFRS, 2025; DSFRS, 2025), candle use (LFB, 2025; LFRS, 2025), domestic heater use (SFRS, 2025; WYFRS, 2025), and domestic appliances (CFRSWG, 2025; MFRSES, 2025). Household domestic behaviours such as cooking, smoking, candle, heater and domestic appliance use can have associated accidental dwelling fire risks (Jones, 2022; Taylor et al, 2024). How such household domestic behaviours may change over time can impact the associated levels of accidental dwelling fire risk, and can be used to inform fire prevention strategies used by fire and rescue

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services. In this article the effects of changing household domestic behaviours during the period 2013/14 to 2023/24 on accidental dwelling fires, injuries and fatalities in England is examined.

The research approach involved examining patterns and trends in accidental dwelling fire incidents, injuries, and fatalities across different types of accidental dwelling fires over the period 2013/14 to 2023/24 in England using UK Home Office data concerning dwelling fires attended by English fire and rescue services (FireGov, 2025), and UK Office for National Statistics data ONSAS (2024). The types of accidental dwelling fires were categorised by the source of the fire. Data regarding domestic behaviours relating to cooking, smoking, heating, candle, and domestic appliance use in England was obtained from a variety of sources. Although there were detailed analyses provided by the UK Office for National Statistics regarding smoking rates, similar data regarding cooking habits, and candle use is not routinely collected. Although the UK Office for National Statistics records data regarding heating types, it does not routinely collect data regarding heating use. Similarly, although data is collected by the UK Office for National Statistic regarding household expenditure on domestic appliances, data regarding appliance age is not routinely collected. The English housing survey (EHS, 2025) does not routinely publish domestic appliance ages but concentrates more on energy efficiency.

The originality and contribution to knowledge provided by the research reported in this paper concerns the detailed examination of changes in household domestic behaviours involving cooking, smoking, heating, candle, and domestic appliance use with respect to associated changes in the numbers and percentages of accidental dwelling fire incidences, injuries and fatalities for different types of accidental dwelling fires (categorised by the source of the fire) in England over the period 2013/14 to 2023/24.

2. Literature review

2.1. Accidental dwelling fire incidence

Fire is one of the main causes of death and disability worldwide and fire-related burns are the fourth most common source of unintentional trauma (Rahman et al, 2023; Tang et al, 2025). The estimated total economic and social cost of fire in England in 2020 was £12.0 billion. The UK National Health Service costs from physical harms caused by dwelling fires was £14.1 m and the costs of physical harms to dwellings caused by fire was £23.7 m in England in 2020 (ESCF, 2023). Understanding the underlying causes of accidental dwelling fires is important in order to reduce the frequency of domestic fire deaths, injuries, and property damage (Xiong et al, 2017). Previous research had indicated that accidental dwelling fires are not evenly distributed throughout society, with social groups affected by poverty and deprivation experiencing disproportionate numbers of fire incidents (Hastie and Searle, 2016; Untadi, et al, 2023). Cooking fires had

been identified as a leading cause of accidental dwelling fire injuries, whilst smoking-related accidental dwelling fire accounted for the majority of domestic fire fatalities (Bryant and Preston, 2017; Xiong et al, 2017).

In order to reduce accidental dwelling fire incidents, injuries, and fatalities, fire and rescue services can use a variety of fire prevention approaches such as home fire safety checks (Tannous et al, 2018; Waring et al, 2024), websites designed to raise awareness of fire safety precautions, and social media, community engagement events and educational events (Reinhardt and Chatsiou, 2020; Taylor et al, 2022a).

2.2. Behavioural factors in accidental dwelling fire incidence

Population behaviours including cooking habits, smoking, heating, domestic appliance and candle use are associated with differing levels of accidental dwelling fire risk (Corcoran et al, 2013; Dean et al, 2016; Jones, 2022; Taylor et al, 2024). Different community groups may also exhibit different behaviours in terms of smoking rates and cooking practices (Clemons et al, 2021; Dean et al, 2016; Nilson et al, 2015). Previous research had indicated that changes in specific domestic behaviours may affect domestic fire incidence, for example, reduced numbers of chip pan fires resulting from decreasing use of chip pans (AgeUK, 2025; Bryant and Preston, 2017). As well as domestic behaviours relating to accidental dwelling fire incidence, householders' responses to accidental dwelling fires may affect the likelihood of fire injury or fatality (Mytton, et al, 2017; Runefors et al, 2021; Taylor et al, 2022b; Thompson and Wales, 2015).

Although previous research had considered household domestic behaviours associated with accidental dwelling fire incidence, injury and fatality, there has been little analysis of how changes in such behaviours over time may relate to changes in accidental dwelling fire incidence, injury and fatality figures. The originality of the research presented in this article is the detailed analysis of changes in domestic household behaviours in relation to changes in accidental dwelling fire incidences, injuries and fatalities for different types of accidental dwelling fires in England over the period 2013/14 to 2023/24.

3. Research method

Based upon a literature review of domestic behavioural factors associated with accidental dwelling fire incidence, accidental dwelling fire data for England for the period 2013/14 to 2023/24 (FireGov, 2025) and UK Office for National Statistics data (ONSAS, 2024) was examined in order to attempt to understand the effect of household domestic behavioural trends with regard to accidental dwelling fire incidence, injury and fatality in England. The research approach involved examining patterns and trends in the numbers and percentages of accidental dwelling fire incidents, injuries,

and fatalities across different types of fires categorised by the source of the fire over the period studied.

The research questions addressed by this research were:

- How can the effect of domestic behavioural trends on accidental dwelling fire incidence be assessed?
- How can the effect of domestic behavioural trends on accidental dwelling fire injury be assessed?
- How can the effect of domestic behavioural trends on accidental dwelling fire fatality be assessed?

These are important research questions since it is necessary for fire and rescue services to understand how changing household domestic behaviours may affect the likelihood of accidental dwelling fire incidence, injury and fatalities for different types of fires. This can then support more targeted fire prevention activities.

The research approach involved analysis of patterns in the overall numbers of accidental dwelling fire incidents, injuries and fatalities in England over the period studied, and in the numbers of incidents, injuries, and fatalities associated with the different types of accidental dwelling fires (categorised by the source of the fire), and in the relative proportions of the different types of fires, and how these changed over time. Graphs were used to visually present the changing patterns over time, and percentage decreases (or increases) were used to analyse the changing patterns associated with the different fire types. Data from the English Fire Incident Recording System regarding fires that were attended by English fire and rescue services was used for the analysis (FireGov, 2025). Data and information from other sources, such as smoking rate changes over time from the UK Office for National statistics (ONSAS, 2024), UK Home Office analyses of fire incidence (Bryant and Preston, 2017), fuel poverty analyses (EFPC, 2024), UK domestic energy prices (UKP, 2024), UK electrical safety analyses (UKPE, 2018), and UK insurance company household fire claim analyses (Zurich, 2022) was used to add context and interpretation of contributory factors that might underly the identified changes in accidental dwelling fire incidence, injuries and fatalities over the time period studied. A limitation of the research is that with regard to trends in behavioural factors that may affect accidental dwelling fire incidence, injury, and fatality numbers per year over time, time series data was only available for smoking rates. Therefore, it is only with regard to smoking related fire incidence, injury, and fatality that the level of correlation can be quantitatively measured. The possible relationship between other behavioural factor trends such as changes in cooking habits with accidental dwelling fire incidence, injury, and fatality numbers per year over time can only be examined in a qualitative manner due to the lack of available time series data relating to these factors. In addition, the research examines potential relationships between behavioural trends and accidental dwelling

fire incidence, injury, and fatality trends, however any relationship or correlation between such does not necessarily imply causality.

4. Results

Figure 1 shows the number of accidental dwelling fire incidents, injuries and fatalities in England 2013/14 to 2023/24 (FireGov, 2025).

There was a marked decrease in the number of accidental dwelling fires per year from 28,615 in 2013/14 to 23,008 in 2023/24 a 19.6% decrease. There was a similar level of decrease in accidental dwelling fire injuries, from 5,433 in 2013/14 to 4,116 in 2023/24, a 24.2% decrease. However, there was not a similar level of decrease in accidental dwelling fire fatalities, from 178 in 2013/14 to 157 in 2023/24, an 11.8% decrease. With regard to the decrease in the number of accidental dwelling fires per year reported to fire authorities this could be due to increased safety measures in properties, for example legislation requiring smoke detectors in all rental properties. England first introduced a legal requirement for smoke alarms in all private rented homes in October 2015 with the Smoke and Carbon Monoxide Alarm (England) Regulations 2015 (SCMA, 2015) which required at least one smoke alarm on every storey of any private

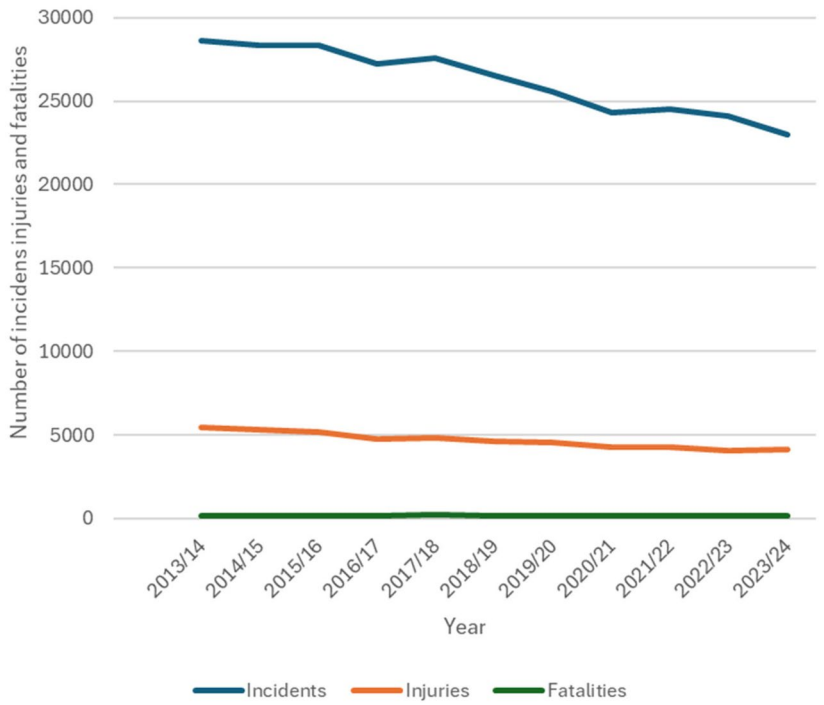

Figure 1. Accidental dwelling fire incidents, injuries and fatalities in England 2013/14 to 2023/24.

rented property used as living accommodation. In 2022, Amendment Regulations extended the rules on smoke detectors to include social housing (SCMAR, 2022). In England, building regulations had required smoke alarms in newly built homes since 1992, but 2015 was the first time all private rented homes, regardless of age, were legally required to have them. In addition, the UK Electrical Equipment (Safety) Regulations 2016 (EESR, 2016) introduced legislation governing the safety of electrical equipment sold in England which requires domestic electrical appliances to be safe.

Figure 2 shows the number of accidental dwelling fire cooking incidents, injuries and fatalities in England 2013/14 to 2023/24 (FireGov, 2025).

There was a decrease in the number of accidental dwelling cooking fires per year from 14,366 in 2013/14 to 10,176 in 2023/24 a 29.2% decrease, and a similar decrease in the number of accidental dwelling cooking fire injuries per year from 2,804 in 2013/14 to 1,740 in 2023/24 a 37.9% decrease, and a larger decrease in accidental dwelling cooking fire fatalities from 22 in 2013/14 to 9 in 2023/24 a 59.1% decrease. Overall, the decrease in accidental dwelling cooking fire incidences, injuries, and fatalities accounted for 74.7%, 80.8%, 61.9% of the reduction in the overall numbers of accidental dwelling fire incidences, injuries and fatalities over the period studied.

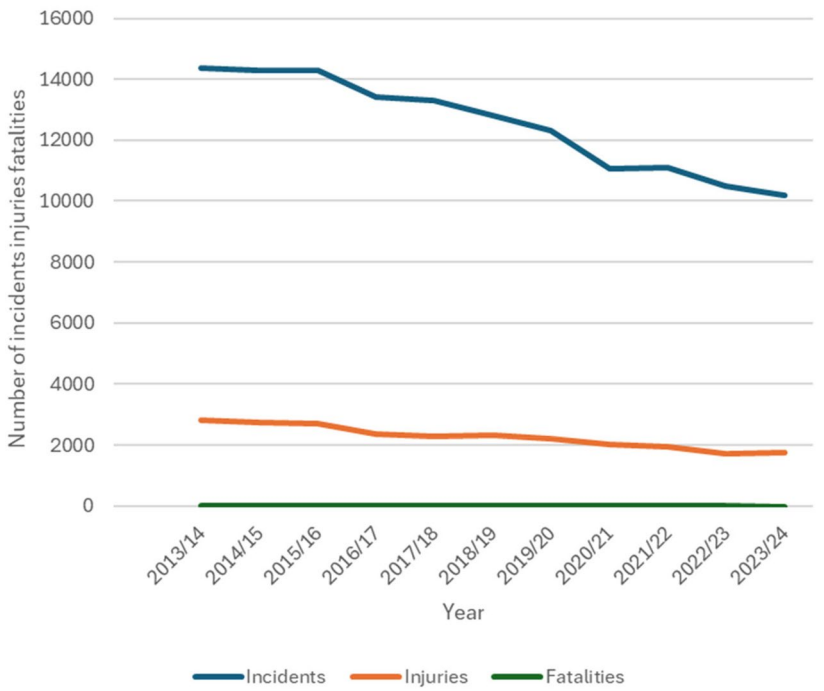

Figure 2. Accidental dwelling fire cooking incidents, injuries and fatalities in England 2013/14 to 2023/24.

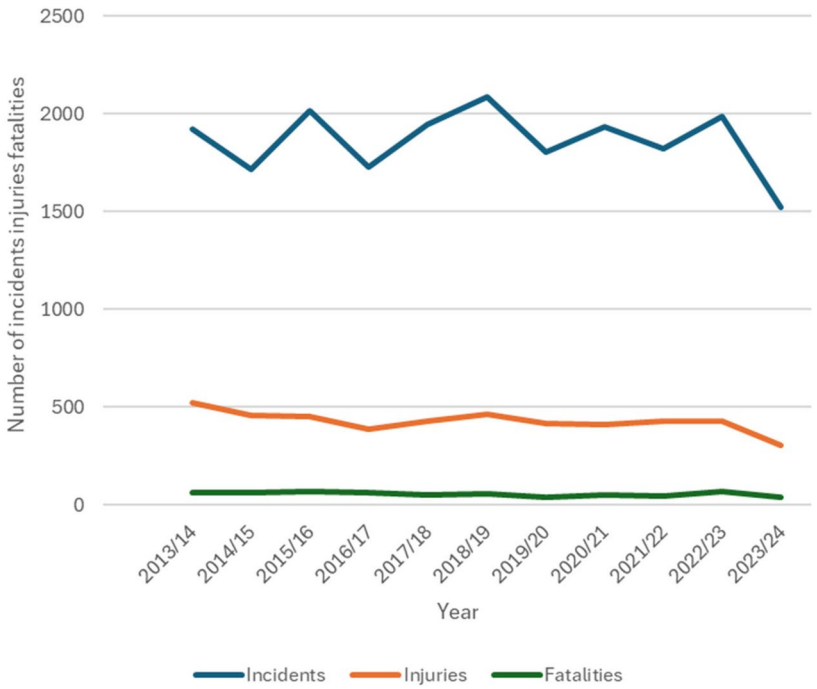

Figure 3. Accidental dwelling smoking fire incidents, injuries and fatalities in England 2013/14 to 2023/24.

The decrease in accidental dwelling fire cooking incidence in England may to some extent be accounted for by changing cooking habits, which have shifted towards microwave and air fryer use (Patel and Snow, 2025) which would typically present lower accidental fire risk compared to traditional stovetop or oven cooking. Unfortunately, data regarding the household ownership and use of microwave cookers and airfryers is not available in England. In particular, in England there has been a decrease in the use of chip pans alongside increasing consumption of oven chips (Bryant and Preston, 2017), and households are increasingly cooking with microwave ovens to save money as food prices and fuel costs increase (EFPC, 2024; Thomas, 2023; UKP, 2024). In addition, modern hobs and cookers may often include built-in safety features such as automatic shut-offs, temperature limiters, and child locks, which can reduce the likelihood of accidental fire (GMFRS, 2025).

There was a decrease in the number of accidental dwelling smoking fires per year from 1923 in 2013/14 to 1522 in 2023/24 Figure 3, a 26.3% decrease, and a pronounced decrease in the number of accidental dwelling smoking fire injuries per year from 519 in 2013/14 to 301 in 2023/24 a 72.4% decrease, and a decrease in accidental dwelling fire smoking fatalities from 64 in 2013/14 to 40 in 2023/24 a 60.0% decrease. Overall, the decrease in accidental dwelling smoking fire incidences, injuries, and

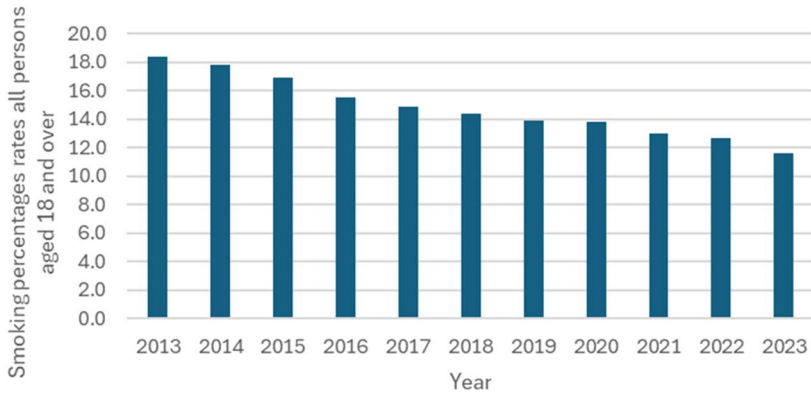

Figure 4. Smoking percentage rates for those aged 18 and over in England 2013 to 2023.

fatalities accounted for 7.2%, 16.6%, 114.3% of the reduction in the overall numbers of accidental dwelling fire incidences, injuries and fatalities over the period studied.

Figure 4 shows the smoking percentage rates for all people aged 18 and over in England between 2013 and 2023, which showed a 37.0% decrease (ONSAS, 2024).

The decrease in accidental dwelling fire smoking injuries may to some extent be accounted for by the decrease in the percentage of people smoking in England over the study period (ONSAS, 2024), and the move to vaping instead of smoking, especially amongst younger people in England (Jackson et al, 2024). Pearson Product Moment Correlation analysis identified that although there was only a 0.23 correlation (p-value 0.498) between smoking rates and smoking accidental dwelling fires over the period, there was a 0.74 correlation (p-value 0.009) between smoking rates and smoking accidental dwelling fire injuries, and a 0.60 correlation (p-value 0.053) between smoking rates and smoking accidental dwelling fire fatalities.

4.1. Domestic behavioural trends and accidental dwelling fire incidence

Figure 5 shows the percentages of accidental dwelling fire incidents by type of fire (categorised by the source of the fire) in England between 2013/14 and 2023/24 (FireGov, 2025).

Over the period studied, cooking fires were the most common type of accidental dwelling fire. There was a decrease in the percentage of accidental dwelling fires due to cooking from 50.2% of accidental dwelling fires in 2013/14 to 44.2% in 2023/24. There was a decrease in the number of accidental dwelling cooking fires per year from 14,366 in 2013/14 to 10,176 in 2023/24, a 29.2% decrease. There was a smaller decrease in domestic

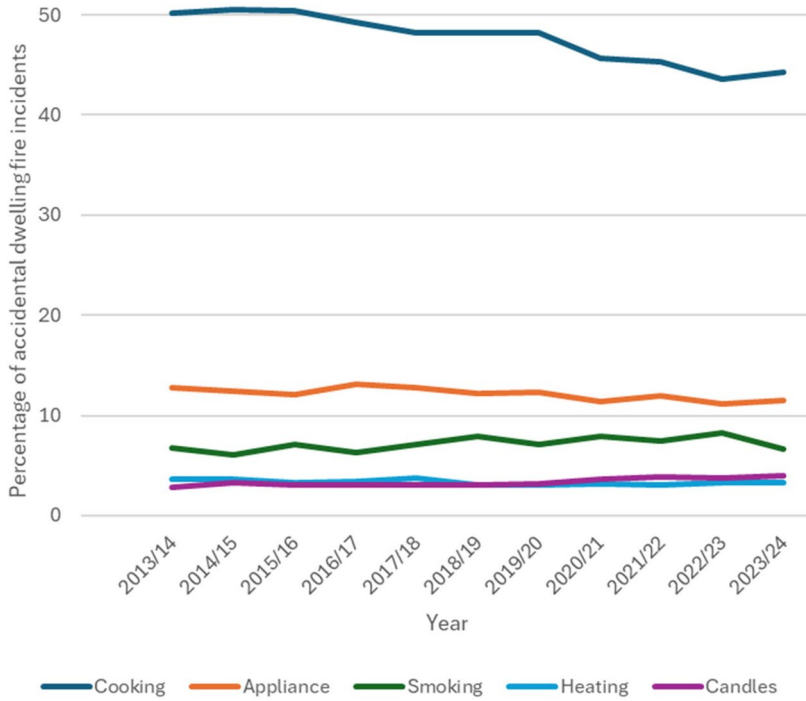

Figure 5. Percentage of accidental dwelling fire incidents by type of fire in England between 2013/14 and 2023/24.

appliance accidental dwelling fires of 27.4% (from 3662 in 2013/14 to 2658 in 2023/24). Due to financial issues, English households may use older and less energy efficient domestic appliances for longer (UKDECC, 2013), and may not keep them appropriately maintained (CFRSWG, 2025) which may present more of a fire risk, offsetting improvements in technology and an evolving regulatory regime in England (UKPE, 2018). For example, millions of English households contain appliances such as electric ovens, washing machines, tumble driers, and refrigerators that are over ten years old (UKDECC, 2013).

Accidental dwelling fire incidence numbers for all the different type of fire decreased over the study period apart from candle fires which showed a 16.2% increase (from 797 in 2013/14 to 926 in 2023/24). Candle use in England over the period studied may have changed due to economic influences relating to steep increases in fuel prices (EFPC, 2024; UKP, 2024). Previously candles were mainly used for decorative or ambiance purposes, however, recently there had been a resurgence in practical use of candles as householders utilised candles as a cost-saving measure in response to dramatic increases in energy costs in England (Zurich, 2022).

4.2. Domestic behavioural trends and accidental dwelling fire injury

Figure 6 shows the percentages of accidental dwelling fire injuries by type of fire (categorised by the source of the fire) in England between 2013/14 and 2023/24 (FireGov, 2025).

Over the study period the numbers of accidental dwelling fire injuries per year decreased across all the different types of fire apart from candle fire injuries which showed a 0.3% increase (316 in 2013/14 to 317 in 2023/24). The largest percentage decrease in accidental dwelling fire injuries was for smoking which decreased by 72.4% (from 519 injuries in 2013/14 to 301 in 2023/24), followed by cooking fire injuries which decreased by 61.1% (from 2804 injuries in 2013/14 to 1740 in 2023/24). Heating accidental dwelling fire injuries decreased by 45.8% (from 262 injuries in 2013/14 to 142 in 2023/24). The reduction in accidental dwelling heating fire injuries may be partly accounted for by the reduction in heating system use by English households due to increasing energy costs (EFPC, 2024; UKP, 2024), and the wider adoption of central heating systems over gas and electric fires (UKH, 2024). However, increasing energy costs may prompt some households to use less safe means of heating, for example portable heaters, camping stoves (SFRS, 2025), and electric blankets (MFRSES, 2025). Unfortunately, data is not available in England concerning the domestic ownership and use of portable heaters, camping stoves, and electric blankets.

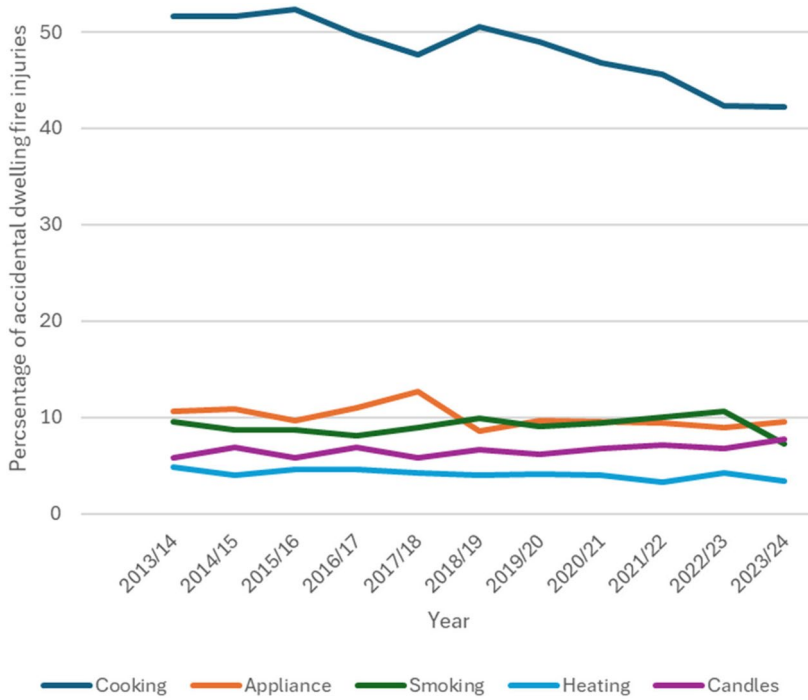

Figure 6. Percentage of accidental dwelling fire injuries by type of fire in England between 2013/14 and 2023/24 (FireGov, 2025).

4.3. Domestic behavioural trends and accidental dwelling fire fatality

Figure 7 shows the percentages of accidental dwelling fire fatalities by type of fire (categorised by the source of the fire) in England between 2013/14 and 2023/24 (FireGov, 2025).

Over the period studied, accidental dwelling fire fatalities per year were mainly due to smoker's materials (including cigarettes, cigars, pipes, matches, lighters, ashtrays with hot embers) ranging between 20.7% and 37.0% of accidental dwelling fire fatalities, although the percentage of accidental dwelling fire incidences due to smoker's materials ranged between just 6% and 8% of accidental dwelling fire instances. The decline in smoking related accidental dwelling fire fatalities may be partly due to a decrease in smoking rates in England between 2013 to 2023 (ONSAS, 2024) and a move amongst smokers to vaping (inhaling and exhaling aerosol produced by an electronic cigarette or similar device) instead. In England between 2013 and 2024, the proportion of ex-smokers who reported currently vaping rose from 1.9% to 20.4%. In 2024, amongst 18-year-olds who had quit smoking, 59% reported vaping, compared to

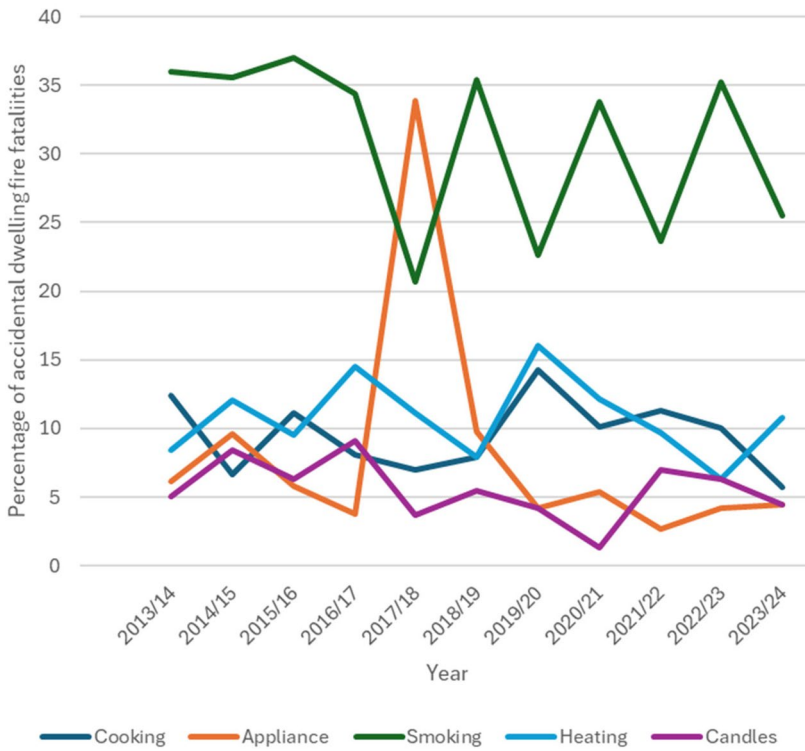

Figure 7. Percentages of accidental dwelling fire fatalities by type of fire in England between 2013/14 and 2023/24 (FireGov, 2025).

11% amongst 65-year-olds, suggesting that vaping has become a dominant alternative to smoking for younger people in England (Jackson et al, 2024).

All types of accidental dwelling fires studied showed a decrease in the number of fatalities per year apart from heating which showed a 13.3% increase from 15 in 2013/14 to 17 in 2023/24. Steep rises in energy costs over the period studied may have led to some households using less safe means of heating, such as portable heaters and camping stoves (SFRS, 2025), and electric blankets (MFRSES, 2025). The percentage of accidental dwelling fire fatalities due to domestic appliances was higher than usual in 2017/18 due to the Grenfell Tower fire on 14 June 2017 in London England that started due to an electrical fault in a refrigerator (Bonner et al, 2024).

5. Discussion

The English Fire Incident Recording System includes data regarding fires that were attended by English fire and rescue services, and therefore it is the only data regarding fires that were attended that is available for analysis. In England, the majority of household fires go out by themselves, or are extinguished by householders, and do not involve attendance by a fire and rescue service (ESCF, 2023). In addition, the primary source of accidental dwelling fire incidence data recorded in the English Fire Incident recording system is from fire crews attending the incidents. This relies upon the judgement of the individual officer in charge when completing a report, as well as those reviewing the data in the fire and rescue service's internal quality assurance team. Reporting practices and methods of data collection may vary between different English fire and rescue service which may impact the consistency of recorded data, even after data quality assurance checks by the UK Home Office such as monthly monitoring for unusual patterns or data gaps, variance checks against previous years' data and reconciliation exercises where individual fire and rescue services confirm incident counts and casualty figures. In addition to behavioural factor trends potentially affecting the trends in the numbers of accidental dwelling fire incidents, injuries, and fatalities per year there may also be latent variables that may be affecting the accidental dwelling fire incident, injury and fatality trends. These may include improving fire safety in rented accommodation in England resulting from legislation regarding smoke detector installation, and more generic trends in electrical safety resulting from legislation governing the safety of electrical equipment in England which requires home electrical appliances to be safe.

6. Conclusions

Between 2013/14 and 2023/24 in England there was a 19.6% decrease in the number of accidental dwelling fires per year, and a slightly larger 24.2% decrease in accidental dwelling fire injuries per year. However, there only was a relatively smaller 11.8% decrease in accidental dwelling fire fatalities per year. Previous research had identified that cooking fires were

a main cause of accidental dwelling fire injuries, and that accidental dwelling fire fatalities were mainly due to smoking (Xiong et al, 2017). Over the study period, the number of accidental dwelling cooking fires per year decreased by 29.2%, the number of accidental dwelling cooking fire injuries per year decreased by 37.9%, and accidental dwelling cooking fire fatalities per year decreased by 59.1%. Overall, the decrease in accidental dwelling cooking fire incidences, injuries, and fatalities accounted for 74.7%, 80.8%, 61.9% of the reduction in the overall numbers of accidental dwelling fire incidences, injuries and fatalities in England over the period studied. Changes in domestic cooking behaviours in terms of less use of chip pans, and more use of microwaves appeared to be a contributory factor to these decreases. There was also a 26.3% decrease in accidental dwelling smoking fire incidences per year, a large 72.4% decrease in accidental dwelling smoking fire injuries per year, and a 60.0% decrease in accidental dwelling fire smoking fatalities per year. Reductions in smoking rates and moves to vaping in England over the period studied appeared to be a contributory factor to these decreases. Accidental dwelling fire incidences across all types of fires (categorised by the source of the fire) decreased over the study period apart from candle fires which showed a 16.2% increase. Recent resurgence in the practical use of candles for lighting as a cost-saving measure due to large increases in energy costs in England appeared to be a contributory factor to this increase.

This research has enhanced knowledge in the area of accidental dwelling fire instances, injuries and fatalities by examining the trends in the different types of accidental dwelling fire incidences, injuries and fatalities (categorised by the source of the fire) over a ten-year period in England and associated underlying domestic behavioural changes. The originality of the research reported in this paper is the detailed examination of changes in the rates of accidental dwelling fire incidences, injuries and fatalities in relation to changes in householder behaviours over the period 2013/14 to 2023/24 in England. It is hoped that the research may be of use to fire and rescue services internationally, in terms of understanding how changes in domestic behaviours over time may contribute to changes in accidental dwelling fire incidence, injury and fatality rates. Further research could examine the potential impact of behavioural trends over longer time periods, especially with regard to behavioural trends such as smoking rates, and changes to smoking habits such as vaping, for which UK data is collected and analysed.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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