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Prevention Assumptions in the Community Work of the UK FRS: Exploring the Association between Mental Health Diagnosis and Incidents of Fire

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Report Authors: Dr Lucy Justice, Dr Rowena Hill, Evie Cogley, Georgina Dare, Bruna Falgueras Vallbona, Nicole Grant and Charlotte Ward.

Technical advisory group: Ged Devereux, Kay Simcox, Linda Hindle.

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1. Executive Summary

A review and analysis was undertaken by academics at Nottingham Trent University to inform, frame, and prioritise discussions at national and strategic level within the prevention portfolio and programmes of the National Fire Chiefs Council (NFCC). This briefing report synthesises findings from the resulting analysis. This analysis contributes to the existing knowledge on the indicative association between the diagnosis of mental health in members of the community and their risk or incidents of fire. The aim of the analysis was to explore the assumption of a relationship between the two in order to provide an evidence base to inform prevention work and community risk programmes across services. The results of this analysis and the learning through the process of accessing relevant datasets have developed recommendations to inform the next stages of the project and to inform other workstreams currently being undertaken within the sector, such as the data and digital programme and the fire standards board.

The findings overall suggest that, using these datasets, there is mixed evidence to support a robust association between mental health and incidents of accidental fire within a community setting. There is however some evidence to suggest a link between mental health and incidents of deliberate fire, however this is not consistent across all analyses of deliberate fires.

Seventeen recommendations have been developed from the process of the data set identification and analysis to inform the next stages of the project and the wider practice and strategic decision making of the NFCC. These are split in to two clusters, recommendations at the more strategic level of the project and recommendations focussed more on a future dataset build.

General Recommendations:

Recommendation 1.1: As part of the programme of work the terminology used by fire and rescue services should align to a shared national definition. Parameters of inclusion and exclusion of that terminology should also be made clear (does this include addiction, alcoholism, dementia, hoarding and other behaviours). The World Health Organisations definition, or that of the British Psychological Society might provide a starting point to develop a shared national definition. This definition should then be clearly communicated with public health partners to achieve a shared understanding for partnership working.

Recommendation 1.2: The National Fire Chiefs Council (NFCC) should continue to review the association between mental ill health and incidents of fire. This is twofold; to try and resolve whether there is an association and also due to the current predictions that rates of mental health within the UK population will increase due to the continuing impacts of the pandemic and the cost-of-living crisis. Health point of contacts should flag any changes in mental health profiles in the general UK population to the NFCC prevention programme.

Recommendation 1.3: Within the Data and Digital workstream, the NFCC and the Home Office should ensure that the data collected and recorded should include prevention work. Data should be collected consistently across services on the prevention work FRSs undertake within communities. This should be scale data wherever possible (as it is the most flexible type of data for analysis), should try to limit the open text free response format, as this is challenging to analyse on a national scale, and should be collected with geographical markers that can be scalable (analysed from LSOA up to national patterns and trends).

Recommendation 1.4: To support further analysis of the association between mental health and incidents of fire, the fire sector should work with the Home Office and the Data and Digital workstream to ensure that prevention activities, including the psychological health of the survivors of incidents of fire, are included in data collected. This should also include collecting data during Home Fire Safety Visits, to better understand the link between fire and mental health. Within this additional set of questions, a record of any contact by partner services at the address or the person concerned should be collated. This should be implemented recognising the need to treat person identifiable data by partner organisations as confidential, if this self-reported data is part of the data collected in Home Safety Visits, it should include the option for the individual not to respond.

Recommendation 1.5: Following the implementation of 1.4, the prevention programme should commission future analysis of this new data set to allow the opportunity for a more comprehensive research report into the association between mental health and incidents of fire.

Recommendation 1.6: Through the Home Office redesign of the data framework, the NFCC should coordinate a national reporting/draw through mechanism from each service to record how many 'safe and well' or Home Safety referrals are received by each FRS which relate to mental health. This framework should align the referral process to reduce variety between each FRS. Following this, future analysis of this data would enable a better understanding of the relationship between mental health and fire risk. This would provide the percentage of referrals at national level that are mental health related, if those individuals were considered high, medium or low risk (aligned to the understandings of levels of risk in such resources as the online home fire safety check tool), and what interventions by the fire and rescue service took place. This is predicated on the referral partner capturing this information and consent for data sharing being agreed locally with the FRS.

Recommendation 1.7: The NFCC and its partnership with Office for Health Improvement and Disparities (OHID) should provide thought leadership (bringing together their expertise to create new solutions and ideas and opinions to positively influence the work in the area) and governance expertise to implement shared databases between each FRS and their Local

Mental Health Teams. For example, when there is a significant fire incident, the local mental health team could be alerted to support the individual following the fire to ensure they have support. This could be through a FRS prompted self-referral to IAPT (Improving Access to Psychological Therapies). This data base should also record whether intervention by the FRS or partners occurred prior to the incident.

Recommendation 1.8: Health partners should be encouraged to share identifiable data to inform the local fire and rescue service of individuals within their communities who are at higher risk, similar to the information shared regarding oxygen users. Specifically, data sharing frameworks and protocols should be developed to facilitate the sharing of data within partnerships in line with sentiments of national data portfolio holders, data ethics and legal frameworks in the UK. This highlights the possibilities to explore with Integrated Care Boards.

Recommendation 1.9: The NFCC should conduct a survey to find out if and how each service currently liaises with mental health services directly. Questions could include whether any contact is formal/informal? What level of data-sharing is in place? Whether these communications/actions are recorded electronically, and can they be measured to find out if they are successful? How many of these processes can be streamlined across the service for future data analyses for measuring the effectiveness of this?

Recommendation 1.10: The NFCC and partnerships with the health economy should look to commission suitable, quality assured training for fire service personnel that has been designed with oversight by mental health professionals. This would ensure fire staff know how to interact effectively and appraise the individual's circumstances both prior to and following an incident to ensure the right support is provided / signposted. This particularly relates to the risk of deliberate fires.

Recommendations relating specifically to future datasets:

Recommendation 2.1: The introduction of Integrated Care Boards and associated coterminosity with non-health partners, should allow a more reliable comparison between health data (mapped at a lower level than regional health entities) and fire related datasets. This would enable each IRS region to obtain more local level intelligence about their community needs.

Recommendation 2.2: If 7.1 is achieved, the NFCC should enable a further segregation of incidences by geographical location in accessible datasets would allow for a higher number of groups. This would make analyses more reliable.

Recommendation 2.3: The NFCC should create guidance to ensure that all FRS services follow an agreed data sharing rule and scalability of geographical aggregation. Open access

to IRS data (or equivalent data sets) online should be facilitated and encouraged, this includes refinement of geographical location into wards, and postcodes.

Recommendation 2.4: For the purposes of future data analysis, the use of checkbox and/or dropdown lists questions within an IRS report should be used wherever possible instead of open ended questions. This ensures a response format that is able to be analysed on a national scale and allows grouping.

Recommendation 2.5: To increase specificity, once an agreed term and definition has been established (see recommendation 1.1), the development of sub questions dependent on the answer would be beneficial. E.g., Do any occupants have a diagnosed mental health condition? If yes, specify the type.

Recommendation 2.6: In future data frameworks and data collection architecture it is imperative that more questions are included regarding the person(s) involved rather than simply fire causation, ignition points and fire behaviour questions. This would enable more learning opportunities to refine and target prevention work, dovetailing with the person-centred approach. People's behaviour frequently causes incidents, respond to incidents and recover from incidents and yet the current question set has a paucity of data relating to human behaviour. There has been an interest throughout the project as to whether the financial status of individuals may have an impact on both mental health and risk of a dwelling fire incidence due to the association of incidents of fire and indices of multiple deprivation. To capture more individual related information about occupation of the person(s) involved should be used to reflect this.

Recommendation 2.7: Some questions about the persons involved are currently included in the IRS data set, such as age, gender, and ethnicity, but the responses are not easily accessible. These variables may not directly associate with mental health, but they should be shared with the appropriate agreements in place in order to link these factors.

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3. Scope

There is currently limited research evidence in the UK on the links between mental health, fire ignitions, fire risks, injuries, and deaths. What exists is largely based on practitioner insights and experiences and some limited analysis of data in small scale geographically based work. Despite the limitations of robust data there is sufficient anecdotal evidence and concern about the potential links between accidental fires, death by suicide, and mental health to have prompted the establishment of a National Fire Chief's Council (NFCC) programme of work to examine this issue, involving representatives from Fire and Rescue Services (FRSs) and the Office for Health Improvement and Disparities (formerly Public Health England). This sits within the Prevention portfolio of work within the NFCC.

Following the Covid-19 pandemic starting in 2019 and the cost-of-living crisis, there are sufficient forecasts (such as the Marmot Studies) which forecast an increase in demand for mental health support across UK communities, with the social and health inequalities continuing to grow across society. Within a national planning context, this has a significant impact for the NFCC prevention work at national and local level.

It is acknowledged by the programme board members that currently there are limited (if any) data which draws on the experience of fire incident survivors (with mental health problems), their families and friends. Such data are important for enabling fire and rescue services (FRSs) to make policy and practice changes to their targeted prevention work within communities alongside partner services to prevent fire incidents within those members of the community associated with poorer psychological health and therefore increased risk. These include:

- Development, targeting and promotion of fire safety messages and assistance delivered by FRS and other services to prevent initial and repeat incidents
- Training the FRS can deliver to partners that support adults and children with psychological health concerns and the link with fire
- Suggested ways in which partnership working can lead to early detection and intervention
- Ways in which FRSs measure success in delivering proactive prevention for those in the community with poorer psychological health conditions.

The questions tasked were:

1. Is there any correlation between any mental health condition and FRS incident related incidents?
2. What person, environmental and occupation factors were involved in the fire incident that occurred?
3. Was there any intervention by FRS or Partners prior to incident?
4. Are there any fatal fire or serious case reviews available for analysis?
5. Has any FRS provided/providing mental health training to their frontline staff to assist with disclosures around mental health?
6. Are services already liaising with mental health services and in what capacity? Is there any evaluation around the effectiveness of this?

This will feed in to the NFCC 'Prevention' Programme which is a national strategic evidence-based programme funded by the Home Office (<https://www.nationalfirechiefs.org.uk/our->

work/Prevention/171401). Establishing if this anecdotal association has any evidence, will consequently impact on the risk profiles and prevention work of every fire and rescue service.

Collaborative Academic and Practitioner Approach

The academic team were supported by a technical advisory group through the Mental Health Research Project Board membership and expertise across this area of prevention. The group met routinely throughout the life of the project and advised on technical or sector specific information. They worked with the academic team on aspects of the research design and on the analysis. They also peer reviewed and collaborated on this report.

Defining Mental Health

The World Health Organisation (WHO) defines mental health as ‘a state of wellbeing in which the individual realises his or her abilities, can cope with the normal stresses of life, work productively and fruitfully, and is able to make a contribution to his or her community’. Within the Mental Health service datasets (MHSDS) used within this report, mental health is defined as anyone receiving care for a suspected or diagnosed mental health and wellbeing need, which also encompasses patients of all ages. It is also used generically to include patients with learning disabilities. The term ‘mental health condition’ covers mental disorders, psychosocial disabilities and other mental states associated with significant distress, impairment in function or risk of self-harm. This includes anxiety, depression, bipolar disorder, PTSD, schizophrenia, eating disorders, disruptive behavior and dissocial disorders, and neurodevelopmental disorders.

Definitions of mental health take a wide scope but from these definitions, and the limitations of the datasets used, the researchers on the project have inferred that mental health refers to one’s emotional, psychological, and social wellbeing. Furthermore, to be deemed mentally well, an individual should have a positive state of mind and body, feel safe and able to cope with day-to-day life and have connections with people, communities, and the wider environment. Those who have received treatment for any of the above characteristics or conditions are encompassed within the research. Consequentially, by default this report has had to assume a focus on mental ill health, where an individual is in contact with mental health or psychological support services.

Recommendation 1.1: As part of the programme of work the terminology used by fire and rescue services has been explored including the term ‘mental health’. This work should continue to progress and work towards a shared national definition of mental health or psychological health. This should include the parameters of what sits within that terminology, does this include addiction, alcoholism, dementia, hoarding and other behaviours which might be associated or included in the terminology. The World Health Organisations definition, or that of the British Psychological Society might be a starting point to develop a shared national phrase and definition. The definition of ‘mental health’ also needs to be agreed with public health partners to enable shared meaning and clarity in partnership working.

Recommendation 1.2: The National Fire Chiefs Council (NFCC) should continue to keep this association under review within the CPO and programmes of work. This is because the current rates of mental health within the UK population are predicted to increase as the

impacts of the pandemic are fully felt and materialise and this intersects with the cost-of-living crisis and the long-term mental health risks begin to impact across the population. Health colleagues should flag any changes in mental health profiles in the general UK population.

Recommendation 1.3: In response to the Data, Digital and Cyber workstream currently under construction between the NFCC and the Home Office, the data collected and recorded should include prevention work. This includes the prevention work FRSs undertake within communities. Data should be collected consistently across services, with scale data wherever possible (as it is the most flexible type of data for analysis), should try to limit the open text free response format as this is challenging to analyse on a national scale and should be collected with geographical markers that can be scalable (analysed from LSOA up to national patterns and trends).

Recommendation 1.4: To support further analysis of the association between mental health and incidents of fire, the fire sector should work with the Home Office and the Data, Digital and Cyber workstream to ensure that prevention activities, including the psychological health of the survivors of incidents of fire, in order to include questions (and record data) about mental health following fire incidents. This should also include collecting data during Home Fire Safety Visits, to better understand the link between fire and mental health. Within this additional set of questions, they could also record if any partner services have contact with the address or the person concerned, such as local mental health teams. This would help to if there are associations between mental health and increased fire risk. This should be implemented recognising the need to treat person identifiable data by partner organisations as confidential, this self-reported data could be part of the data collection in the Home Safety Visits and consequently needs to include the option for an individual to choose not to respond.

Recommendation 1.5: Following the implementation of 1.4, the prevention programme should commission future analysis of this new data set to allow the opportunity for a more comprehensive research report into the association.

4. Method

In order to answer each question within the commissioned work, the research team at Nottingham Trent University (NTU) reviewed each question in turn to determine what data was required to enable a robust analysis to provide findings and inferences. The team then looked for datasets which most closely aligned to these requirements. For questions 1 and 2 a dataset which linked both health and fire data to the level of an individual or address would be ideal. However, through requests to networks, partner organisations and a search of datasets that might contain this information, both the academic team and the NFCC team were unable to identify the existence of such a dataset. Therefore, a recognised, scientifically accepted approach was developed where datasets containing population level data were matched using certain criteria. This enables interrogation of an association between the datasets rather than exploration of the association at individual or address level. There are a healthy number of quality assured datasets held as open-source resources for researchers and policy developers or other professions to use. The academic team reviewed all available datasets across the open-source data (for questions 1-6) and some closed sources (for questions 3,4,5,6). There were five main stages of the project: identification of datasets, data quality assurance and assessment, data transformation, analysis, interpretation.

The research team applied a two-step iterative approach when answering questions 1 and 2. Iteration 1 was designed as a broad scope of the topic, which built an understanding of the type of data available and the related challenges of its analysis, for example determining coterminosity between disparate datasets. Iteration 1 helped build a structured definition of mental health for use in the project (see section 3). Iteration 2 commenced with a clearer understanding of the data discovery process, allowing for a more refined search for relevant variables. Throughout analysis, the outcome of each iteration is denoted as clusters 1 and 2.

4.1 Identification of Datasets

In total, the NTU team reviewed thirty-eight datasets relevant to question 1 and 2. Below we detail the key datasets that we considered for use in the analysis:

Data Set	Year(s)	Details	Data set used?	Iteration	Variables Used
Incident Recording System: Dwelling Fires Data Web Link	2010-2021 2019-2020 used for analysis	Data regarding 28,499 primary dwelling fires incidents attended by FRS. Note that the dataset only contains incidents that occurred in England.	Yes	1 and 2	Calculated: number / percent of incidents Incident type: accidental / deliberate Fire alarm: present / absent Dwelling type Occupancy type
Fire and rescue incident statistics	2017-2022 2019-2020 used for analysis	Obtained 12/09/22 directly from the Home Office Police and Fire Analysis Unit. Statistics are in an aggregated format and only contains incidents that occurred in England. As this dataset was obtained at the end of the project, analysis of variables was limited and unable to be normalised.	Yes	2	Contributing human factor Impairment due to drugs and/or alcohol
Fire related fatalities Web Link Fire related injuries Web Link	2019-2020 used for analysis	The datasets provide information regarding the 245 incidents involving a fatality and 6933 incidents involving a casualty within England. The data was merged for analysis. As this dataset was obtained at the end of the project, analysis of variables was limited and unable to be normalised.	Yes	2	Victim age Victim gender

<p>Regional Fire Service Incident data</p> <p>West Midlands</p> <p>West Yorkshire & Calderdale</p> <p>Shropshire</p>	<p>2016 – 2022</p> <p>2019-2020 used for analysis</p>	<p>We obtained open-source fire incident data from three FRSs (West Midlands, West Yorkshire, and Shropshire). Although these datasets initially looked promising, most variables included were ultimately contained within the larger IRS Dwelling Fires Datasets. Additional data was requested from each FRS, but it was clarified that data was not held beyond that which was included in the IRS dataset.</p>	<p>West Midlands incident data was re-visited and used</p>	<p>Identified during iteration 1. West Midlands incident data applied during iteration 2</p>	<p>Tenure type</p>
<p>NHS Mental Health Dashboard (quarters 1, 2, 3 & 4)</p> <p>Web Link</p>	<p>2019-2020</p>	<p>The NHS Mental Health Dashboard includes information regarding the spend data on:</p> <ul style="list-style-type: none"> • Children and Young Person’s (CYP) mental health services • CYP eating disorder services • IAPT services • Early Intervention in Psychosis services • Specialist Community Perinatal mental health services • A&E liaison services • Crisis resolution home treatment services 	<p>No. The data are typically reported as internal performance metrics and require extensive manual extraction.</p>	<p>1</p>	
<p>NHS digital Mental Health Patient Level Activity and Costing</p>	<p>2019-2020</p>	<p>4,547 observations, aggregated at the level of Clinical Commissioning groups (CCG).</p> <p>Patient activity recorded in the datasets reflects:</p> <ul style="list-style-type: none"> • Complete and incomplete hospital provider spells. This is defined as any continuous stay of a patient using a 	<p>Yes</p>	<p>1</p>	<p>Total number of mental health contacts recorded for patients</p>

<p>Web Link</p>		<p>hospital bed and includes care contacts where patients did not attend</p> <ul style="list-style-type: none"> • Care contacts for non-admitted patients. This describes services provided to patients who do not undergo hospital admission • Mental health learning disability services <p>Dataset does not include any figures from children and adolescent mental health services, drug and alcohol services, mental health specialist teams, secure mental health services or specialist mental health services.</p>			<p>Total cost of all mental health care contact records</p>
<p>Community Services Data Set NHS Digital Mental Health Community Teams Activity (quarters 1, 2 & 3 only)</p> <p>Web Link</p>	<p>2019-2020</p>	<p>17,000 observations, aggregated at the level of providers (NHS Foundation Trusts).</p> <p>This dataset looks at solely the information gathered from patients discharged from the Care Programme and Approach (a package of support through a variety of agencies for those with mental health conditions) and those admitted to the Crisis Resolution Home Treatment teams (this service provides intensive at-home support for those experiencing a mental health crisis).</p> <p>There is no data discussing the spend of these programmes, nor any patient demographic information.</p>	<p>Yes</p>	<p>1</p>	<p>Number of patients discharged after receiving care through the Care Programme Approach (CPA)</p> <p>Number of admissions for Crisis Resolution and Intensive Home Treatment Service (CRHT)</p>

<p>Adult Psychiatric Morbidity Survey (APMS)</p> <p>Web Link</p>	<p>1990 - 2014</p>	<p>Collected every seven years since 1990, the APMS assesses mental illness in a random sample of adults (16+) in the general population of England. The APMS also collects data on individual's demographic, social and economic factors. 7,400 observations.</p>	<p>No. Lacking data dictionary to deanonymise variable names in places. High level of area aggregation, most data presented at national level.</p>	<p>1</p>	
<p>Mental Health Act Statistics</p> <p>Web Link</p>	<p>2014-2020</p> <p>2019-2020 used for analysis</p>	<p>50,893 observations aggregated to Sustainability and Transformation Partnership (STP) areas</p> <p>The dataset provides statistics regarding the uses of the Mental Health Act (1983) in England for patients formally detained in hospitals. This is applied in the interests of their own health or safety, or for the protection of other people.</p>	<p>Yes</p>	<p>2</p>	<p>Number of detentions</p>
<p>Mental Health Bulletin</p> <p>Web Link</p>	<p>2006-2020</p> <p>2019-2020 used for analysis</p>	<p>Over 2.8 million observed contacts aggregated into STP areas.</p> <p>The most detailed publication available of people who used NHS funded secondary mental health, learning disabilities and autism services in England.</p>	<p>Yes</p>	<p>2</p>	<p>Number of people treated through mental health services</p> <p>Number of inpatient admissions</p> <p>Total occupied bed days</p>

<p>Regional Gross Disposable Household Income (GDHI)</p> <p>Web Link</p>	<p>1997-2019</p> <p>2019 used for analysis</p>	<p>Published by the Office for National Statistics, data is produced as estimates and are aggregated to a regional level which can be directly correlated into IRS regions</p> <p>GDHI is the amount of money that individuals have available for spending/saving after they have paid direct/indirect taxes and received any direct benefits.</p>	Yes	2	Gross Disposable household income per head
<p>Households by size, regions of England and GB constituent countries</p> <p>Web Link</p>	<p>2015-2021</p> <p>2019-2020 used for analysis</p>	<p>Published by the Office for National Statistics sourced as an estimate from the Labour Force Survey. This survey is produced quarterly from 41,000 households.</p> <p>Data is rounded to the nearest 1000 and is aggregated into 9 regions in England.</p>	Yes	2	<p>Number of households with one person</p> <p>Calculated: Percentage of population living in a single person household</p>
<p>Fire and Rescue Incident Statistics</p> <p>Resident population by FRA</p> <p>Web Link</p>	<p>1971-2020</p> <p>2019 used for analysis</p>	<p>Resident population by Fire and Rescue Authority</p>	Yes	1 and 2	Resident population for data normalisation

<p>Local authority ageing statistics</p> <p>Web Link</p>	<p>2019-2020</p>	<p>Published by the Office for National Statistics based on annual mid-year population estimates.</p> <p>Data is aggregated into 9 regions in England.</p>	<p>Yes</p>	<p>2</p>	<p>Age group 16 – state pension Age for data normalisation</p> <p>Age group State pension age and over for data normalisation</p>
<p>Dwellings by tenure and district</p> <p>Web Link</p>	<p>2009-2021</p> <p>2019-2020 used for analysis</p>	<p>Published by the Department of Levelling Up, Housing and Communities and the Ministry of Housing, Communities & Local Government.</p> <p>Data is aggregated to lower and single tier authorities, meaning West Midlands data can be correlated with that from the West Midlands incident dataset.</p>	<p>Yes</p>	<p>2</p>	<p>Number of dwellings by tenure for data normalisation</p>

4.2 Data Quality Assurance and Assessment

The datasets were then quality assured against a set of criteria. This criterion included time period of collection, coterminosity of geographical boundaries, ability to scale at the same geographical spatial layer (fire and rescue service boundaries as defined by the Incident Reporting System (IRS) and NHS digital by Strategic Data Collection Service providers) and availability of data dictionaries to understand the context of each variable. Each data set was assessed against these criteria and the commissioned questions to determine its relevance and integrity.

4.3 Data Transformation

Geographical regions contained within the selected datasets were matched allowing data to be joined at the regional level. Relevant variables within the dataset were then normalised to represent rates per 100,000 inhabitants using 2019 population statistics from the Fire Rescue and Incident Statistics data.

4.4 Analysis

The data were analysed using R Statistical Computing (version 4.1.2). This was selected as it is open source and the code written for the analysis of the data can be shared across any FRS analysis or data teams should they wish to run similar analysis or use the code to adapt and develop the analysis to suit local service level demands. To request the code, please email the lead author using details at the start and end pages of this report.

Although thirty coterminous regions were identified between the IRS and NHS datasets, many regions had missing data across the key variables, meaning that for the analyses presented below, often fewer than 30 data points were used. Small sample sizes can impact on the analytic process, as such, the findings presented below should be interpreted with caution and may not represent the 'true' relationship between the variables. By identifying this fallibility (present in some way or another in all statistical analysis) the academic research team wish to highlight the need for these findings to inform evidence-based decision making and policy development, rather than providing a definitive answer.

Statistical terminology

To provide full transparency and access to our findings we have assumed the broad readership of this report to have limited or no statistical knowledge. By assuming no knowledge, it assures us that any member of the fire sector can access our findings and they are transparent to the readership to interrogate, understand and interpret accordingly. In order to scaffold that access to our findings, we will spend some time here sharing the meaning beneath some terminology we use throughout the rest of this report.

Correlation and *r* values

The first step of the analysis was to create a visualisation of the relationship between variables, followed by a correlational analysis. The correlational analysis allows us to explore the strength of association between two numerical values and is summarised by an *r* value between -1 and 1. A value of -1 tells us that there is a very strong negative relationship between the two variables, such that as one variable increases, the other decreases. Conversely, a value of 1 tells us that there is a very strong positive relationship between the two variables, such that as one variable increases, the other also increases. When an *r* value is close to zero, it tells us that there is a lack of clear relationship between the two variables.

Although correlational analysis tells us about the strength of association between two numerical variables, it does not tell us about the direction of the relationship or about causality. For example, if we find a positive correlation between x and y , it does not tell us that x causes y , just that as x increases so does y , but also that as y increases, so does x .

 p -values

A p -value is used in statistics to understand whether a relationship is statistically reliable or 'significant'. It tells us the probability that we would have observed the given pattern of findings, if in fact there was no true relationship between variables. Typically, in peer-reviewed scientific research, the value of 0.05 is used as a threshold value, with p -values less than 0.05 denoting a statistically reliable relationship. As this is what is used in peer reviewed research, this is also the threshold that we will be using here in this report, to ensure academic and scientific rigour.

Regression

Regression analyses are similar to correlational analyses in that they provide a measure of association between two numerical variables. However, in a regression analysis, we can be more specific about the direction of the relationship – rather than simply asking if x and y are associated, we can ask if changes in x predict changes in y . In this report, we have supplemented statistically reliable correlations (those with p -values less than 0.05, i.e., when there is evidence of a relationship) with regression analysis to further understand the direction and strength of the relationships. This is in line with accepted practice in peer reviewed scientific analysis of datasets such as these.

5. Analysis

The mean and standard deviation for each key variable used in the report are shown below in Table 1. The total number of fire incidents along with deliberate and accidental for each FRS is shown in Table A in the appendix.

Table 1. Mean and standard deviation for key variables after normalisation

Iteration	Variable	Mean (standard deviation)
1	Number of accidental fire incidents	42.8 (7.98)
1	Number of deliberate fire incidents	4.7 (2.3)
1	Number of mental health contacts	24,094.2 (6,318.2)
1	Total cost of mental health services	£5,181,781 (£1,311,296)
1	Total number of patients receiving care through CPA	81.2 (31.9)
1	Total number of admissions to CRHT	70.5 (25.2)
2	Number of detentions under mental health act	78.96 (15.67)
2	Total treated through mental health services	4976.37 (573.89)
2	Number of inpatient admissions	212 (65.51)
2	Number of occupied bed days	15636.93 (3709.19)
2	Gross disposable household income (GDHI)	£20981.16 (£3583.42)

Note: all mental health variables have been normalised to show rates per 100,000 individuals in the population. GDHI has been normalised to show rates per person.

Limitations

After determining coterminosity between datasets, we were able to use eight variables related to mental health. Although this provides a start to understanding the contribution mental health has to fire incidents, it does not represent a comprehensive analysis of the area. Further, we were only able to access data that were aggregated at regional levels – a better understanding of the link between fire incidents and mental health would come from obtaining mental health information of an individual(s) involved in each fire incident. Finally, many regions included in the analysis had missing data across multiple variables meaning that results from the analyses may be unreliable and not representative of the national picture.

Recommendation 1.6: Through the Home Office redesign of the data framework, the NFCC should coordinate a national reporting/draw through mechanism from each service to record how many 'safe and well' or Home Safety referrals are received by each FRS which relate to mental health. Aligning the referral process to reduce variety between each FRS. Analysis of this data would enable a better understanding of the relationship between mental health and fire risk. However, this requires the process to be streamlined and questions exploring the mental health needs of the individual to be recorded, this would help to understand the percentage of referrals at national level that are mental health related, if those individuals were considered high, medium or low risk (aligned to the understandings of levels of risk in such resources as the online home fire safety check tool), and what interventions by the fire and rescue service took place. However, this is predicated on the referral partner capturing this information and consent for data sharing being agreed locally with the FRS.

Recommendation 1.7: The NFCC and its partnership with Office for Health Improvement and Disparities (OHID) should provide thought leadership (bringing together their expertise to create new solutions and ideas and opinions to positively influence the work in the area) and explore the merits and possibilities of establishing the governance frameworks to implement shared databases between each FRS and their Local Mental Health Teams. For example, when there is a significant fire incident, the local mental health team could be alerted to support the individual following the fire to ensure they have support. This could be through a FRS prompted self-referral to IAPT (Improving Access to Psychological Therapies). This data base could also record whether intervention by the FRS or partners occurred prior to the incident.

Recommendation 1.8: Health partners should be encouraged to share identifiable data to inform the fire and rescue service about individuals within their communities who are at higher risk, similar to the information shared regarding oxygen users. Specifically data sharing frameworks and protocols should be shared and developed to facilitate sharing of data within partnerships in line with sentiments of national data portfolio holders, data ethics and legal frameworks in the UK. This highlights the possibilities to explore with Integrated Care Boards.

Impact of COVID-19

Mental health data covers 2019-20 reporting year and may feature the initial impact of the COVID-19 pandemic. However, it is likely that these effects are more evident in later publications as lockdown began on 23 March 2020.

Question 1: Is there any correlation between any mental health condition and FRS incident related incidents?

Cluster 1

To determine if there was a relationship between mental health condition and FRS incident related incidents data regarding mental health was extracted from the NHS Mental Health Dashboard and the IRS Dwelling Fires dataset. The initial NHS dataset was only available from 2019-2020, as such the matching year was extracted from the IRS dataset to allow direct comparison. To link the two datasets, thirty coterminous regions were identified meaning that the information across both datasets could be merged, see Table 2 for coterminous regions. Note all coterminous regions were in England.

Table 2. Coterminous regions between IRS data and NHS Trusts Data

Avon	Isle of Wight
Berkshire	Kent
Cambridgeshire	Lancashire
Cornwall and the Isles of Scilly	Leicestershire
Cumbria/ Tyne and Wear/ Northumberland	Lincolnshire
Derbyshire	Merseyside/ Cheshire
Devon & somerset/ Hampshire	Norfolk/Suffolk
Dorset & Wiltshire	Northamptonshire
East Sussex/ West Sussex	Nottinghamshire
Essex/ Bedfordshire	Oxfordshire/ Buckinghamshire
Gloucestershire	South Yorkshire
Greater London	Staffordshire/ Shropshire
Greater Manchester	Surrey
Hereford & Worcestershire	West Midlands/ Warwickshire
Hertfordshire	West Yorkshire/ North Yorkshire/ Durham/ Humberside/ Cleveland

Cluster 2

To align with previous findings, data obtained during the second iteration of the project was refined to 2019-2020. Rather than NHS trusts, the second group of mental health datasets are granulated into Sustainability and Transformation Partnership (STP) areas which can be geographically correlated with FRS regions to form twenty-seven coterminous regions (see Table 3).

Table 3. Coterminous regions between IRS data and NHS STP area Data

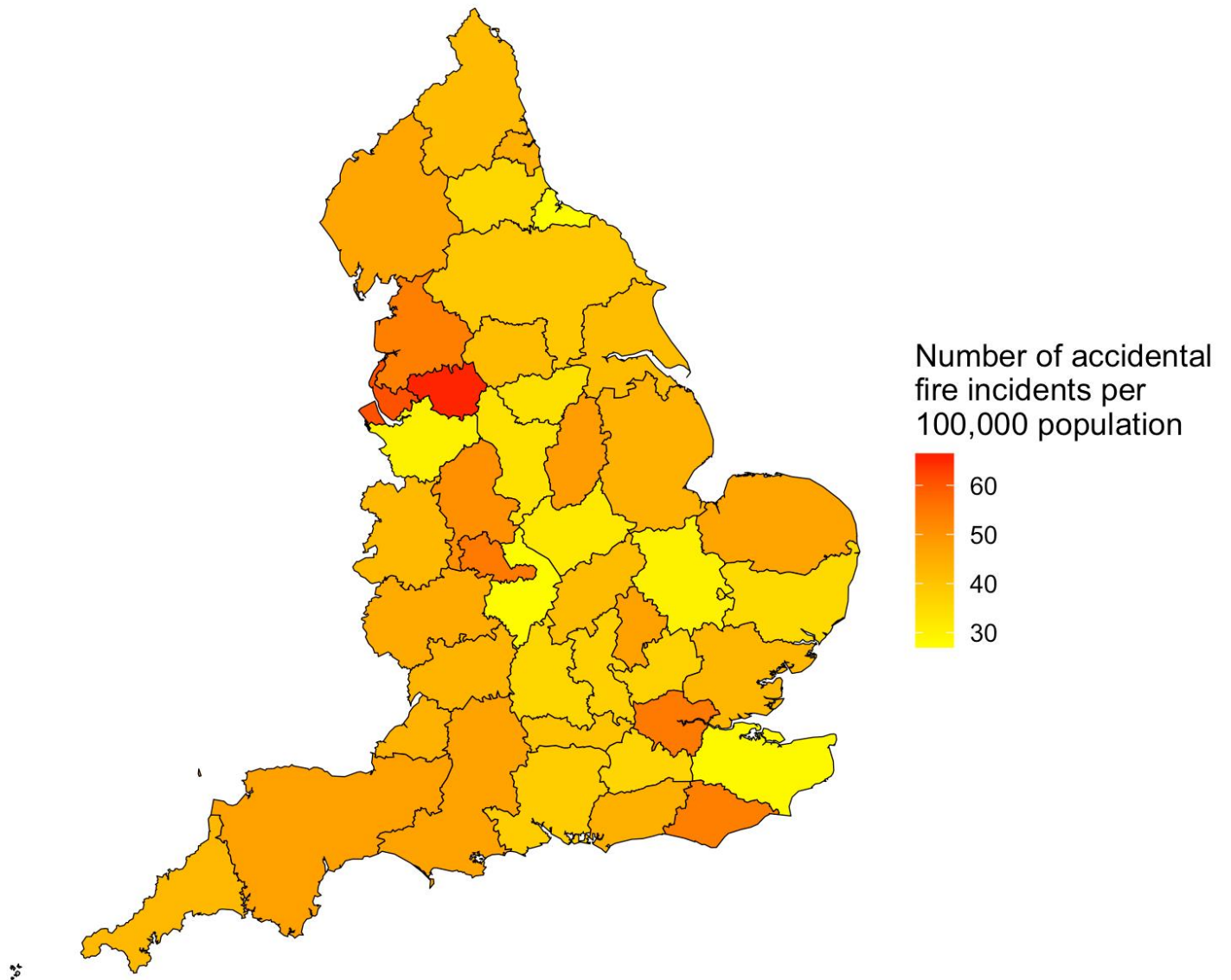
Avon/ Dorset & Wiltshire	Kent
Bedfordshire/ Berkshire/ Buckinghamshire/ Oxfordshire	Lancashire/ Cumbria/ Cleveland/ Durham/ Tyne and Wear/ Northumberland/ North Yorkshire
Cambridgeshire	Leicestershire
Cheshire/ Merseyside	Lincolnshire
Cornwall and the Isles of Scilly	Norfolk
Derbyshire	Northamptonshire
Devon & Somerset	Nottinghamshire
Essex/ Hertfordshire/ Suffolk	Shropshire
Gloucestershire	South Yorkshire
Greater London	Staffordshire
Greater Manchester	West Midlands/ Warwickshire
Hampshire/ Isle of Wight	West Sussex / East Sussex/ Surrey
Hereford & Worcestershire	West Yorkshire
Humberside	

5.1 Accidental Dwelling Fires

5.1.1 Cluster 1

To provide a regional picture of accidental fire incidents, we developed choropleth maps (more commonly referred to as heatmaps) showing the number of accidental fire incidents per 100,000 population in England by FRS region in 2019-2020, see Figure 1. We use the technical terms of choropleth maps as we are aware of the possible interpretation of the wording of heatmaps not being sensitive when applied in the fire sector and relating to life changing events within a member of the community's life. We use the term choropleth maps here simply to align to scientific practice and call it by the identifiable term for transparency.

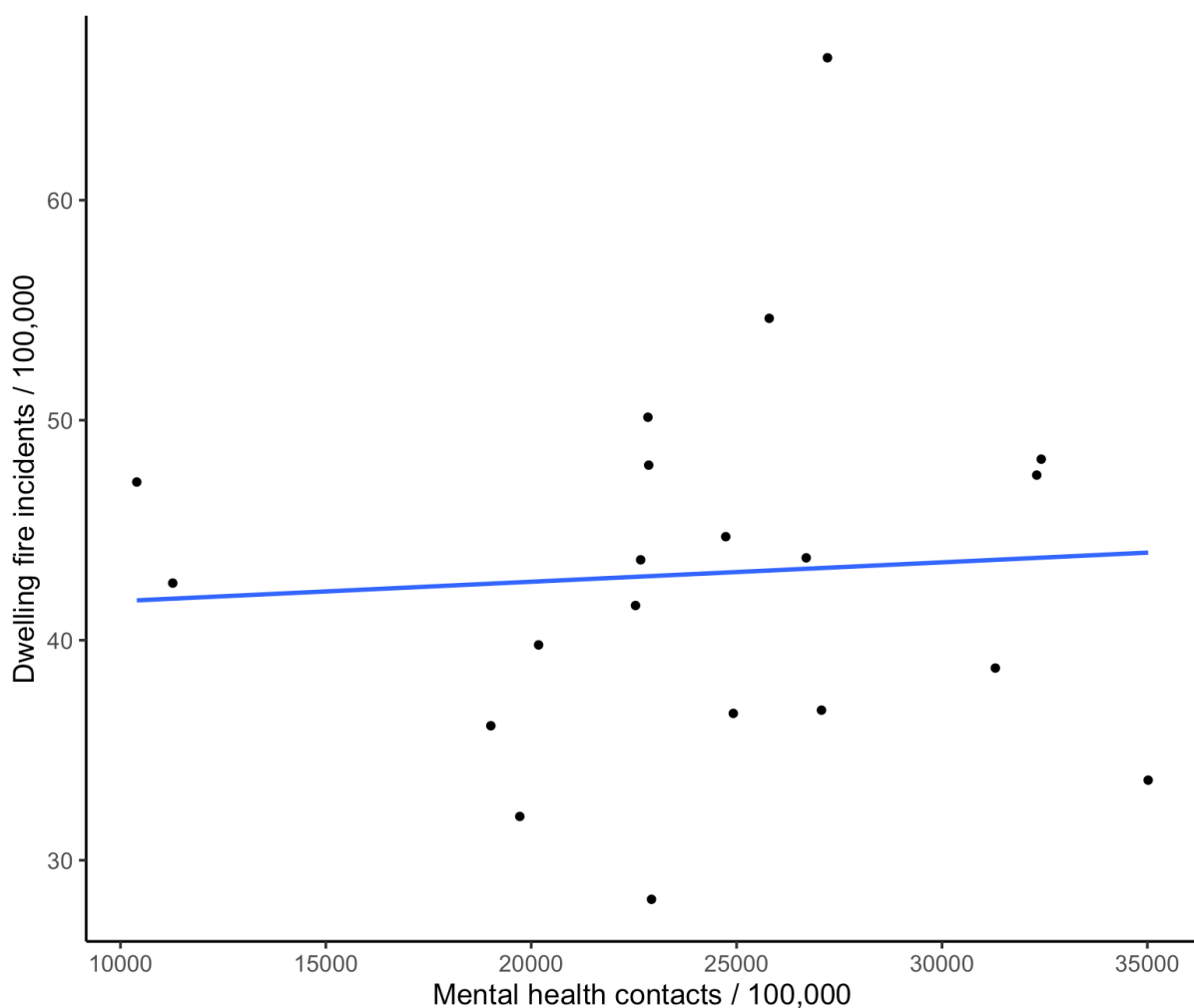
Figure 1. Choropleth map showing the number of accidental fire incidents in England per 100,000 population by FRS region



Accidental dwelling fire incidents and number of mental health contacts per region

We first explored whether there was a relationship between accidental fire incidents per 100,000 individuals and the number of mental health contacts per 100,000 individuals, see Figure 2 in the technical appendices. A correlational analysis showed that there was no statistical evidence of a relationship ($r = 0.06$, $p = 0.79$) suggesting that these two variables are not related.

Figure 2. Relationship between number of mental health contacts and the number of accidental dwelling fire incidents



Accidental dwelling fire incidents and total cost of mental health services

We next explored the relationship between accidental dwelling fire incidents and mental health by examining the total cost of mental health condition per region. Similarly, to the previous analysis, there was no statistical evidence of a relationship between the two variables ($r = 0.04$, $p = 0.87$), see Figure 3 in the technical appendices.

Accidental dwelling fire incidents and total patients discharged after receiving care through Care Programme Approach (CPA)

Another approach we took to investigating the relationship between fire incidents and mental health was to use data relating to the number of individuals who have been discharged after receiving care through the Care Programme Approach. However, we found no evidence of a statistically reliable relationship between the number of individuals discharged after receiving care through the CPA per 100,000 individuals and the number of fire incidents per 100,000 individuals ($r = 0.05$, $p = 0.78$), see Figure 4 in the technical appendices.

Accidental dwelling fire incidents and the number of admissions for Crisis Resolution and Intensive Home Treatment Service (CRHT)

Finally, we investigated if there was a relationship between fire incidents and admissions for Crisis Resolution and Intensive Home Treatment Service (CRHT). We found no statistical evidence of a relationship between admissions for CRHT and accidental fire incidents ($r = 3.2$, $p = 0.1$), see Figure 5 in the technical appendices.

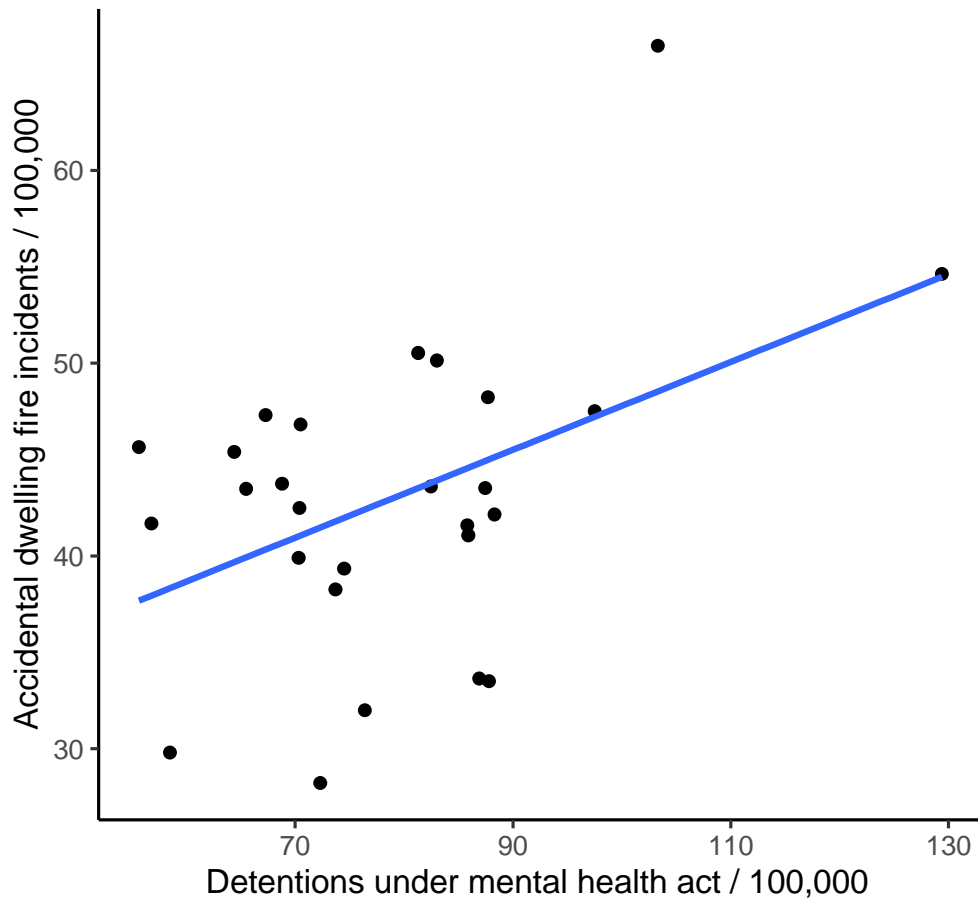
5.1.2 Cluster 2

Accidental dwelling fire incidents and the number of detentions under the mental health act

After obtaining additional datasets, mental health act statistics were used to explore its relationship with the number of dwelling fire incidents. Under the act, people with a mental disorder may be formally detained in hospital in the interests of their own health or safety, or for the protection of others.

Analysis showed a statically reliable positive correlation ($r = 0.45$, $p = 0.018$) between these variables. Subsequent linear regression analysis showed a statistically reliable result ($t = 2.52$, $p = 0.018$). This means that for every additional 100 detentions under the mental health act, we would expect the number of accidental dwelling fires to increase by approximately 22.8, per 100,000 population, see figure 6.

Figure 6. Relationship between the total number of detentions under the mental health act and the number of accidental dwelling fire incidents

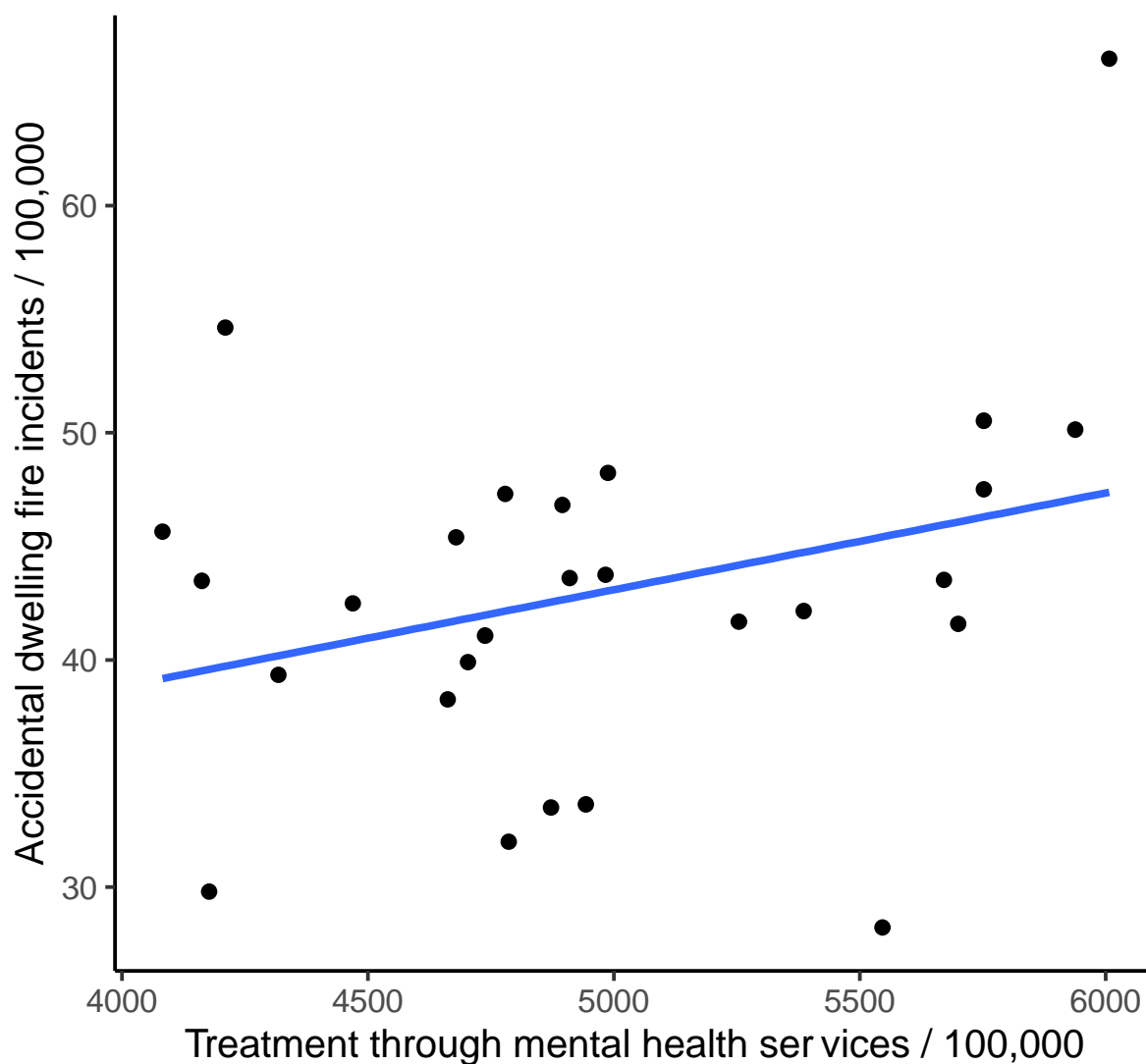


Accidental dwelling fire incidents and treatment through mental health services

Data from the mental health bulletin was used to examine the relationship between the number of mental health cases and dwelling fire incidents. Treatment through mental health services describes the number of people in contact with mental health services including learning disability and autism services.

Correlation analysis found no evidence of a statistically reliable relationship ($r = 0.31$, $p = 0.12$) between the number of accidental dwelling fires and treatment through mental health services.

Figure 7. Relationship between the number of individuals treated through mental health services and the number of accidental dwelling fire incidents



Accidental dwelling fire incidents and the number of inpatient admissions

The number of inpatient admissions to mental health services was analysed against accidental dwelling fire incidents in each region.

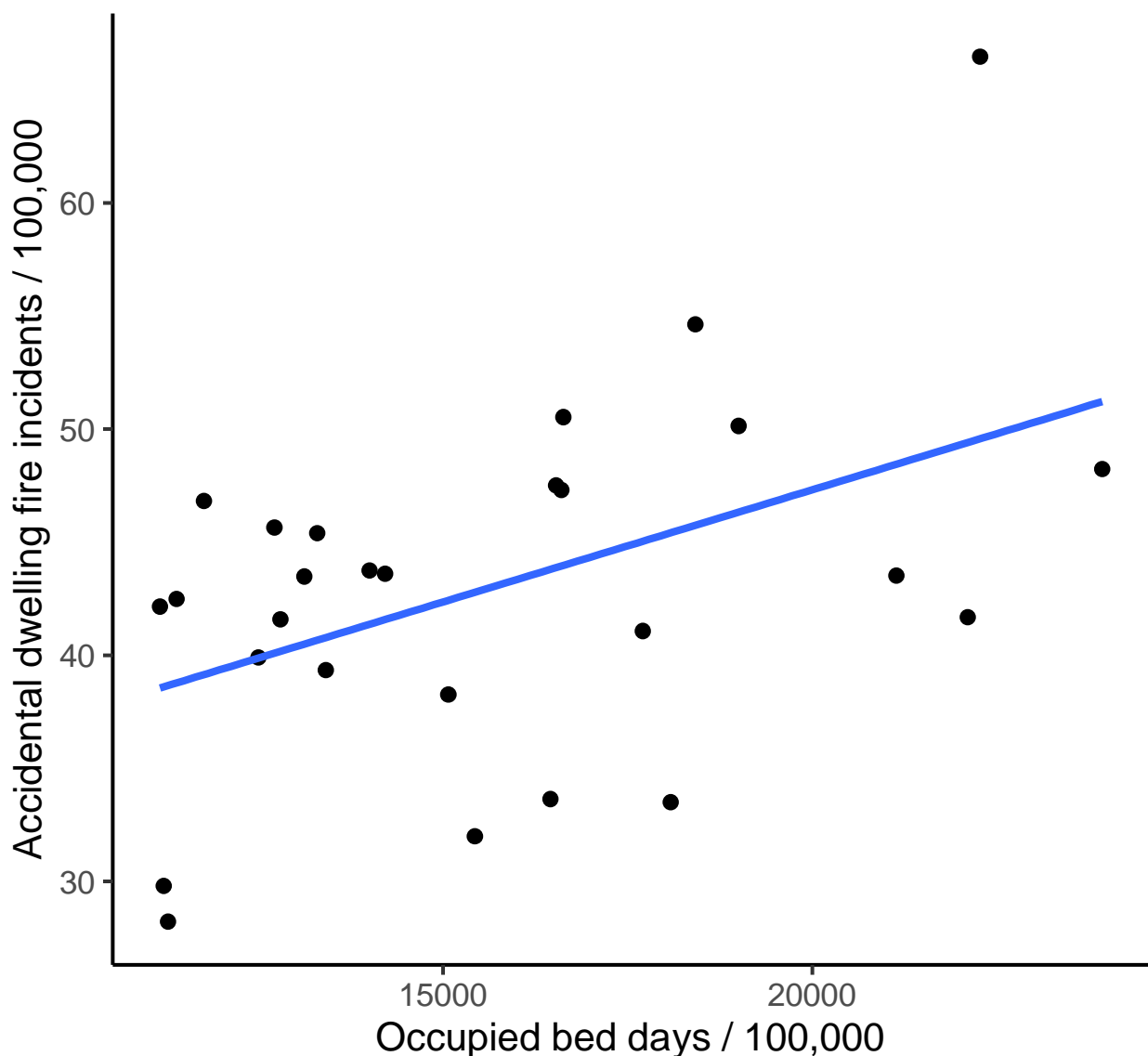
Similarly, statistical analysis suggested no evidence of a reliable relationship between these two variables ($r = 0.33$, $p = 0.088$), see figure 8 in the technical appendices.

Accidental dwelling fire incidents and the number of occupied bed days

To further explore any correlation, the number of mental health occupied bed-days was assessed against accidental dwelling fire incidents in each grouped region. Correlation analysis found a statically reliable positive relationship between these variables ($r = 0.46$, $p = 0.015$).

Regression analysis also showed a statistically reliable result ($t = 2.52$, $p = 0.018$). Such that for every additional 10,000 mental health associated bed days, we would expect the number of accidental dwelling fire incidents to increase by approximately 9.9 per 100,000 individuals, see figure 9.

Figure 9. Relationship between the number of occupied bed days and the number of accidental dwelling fire incidents

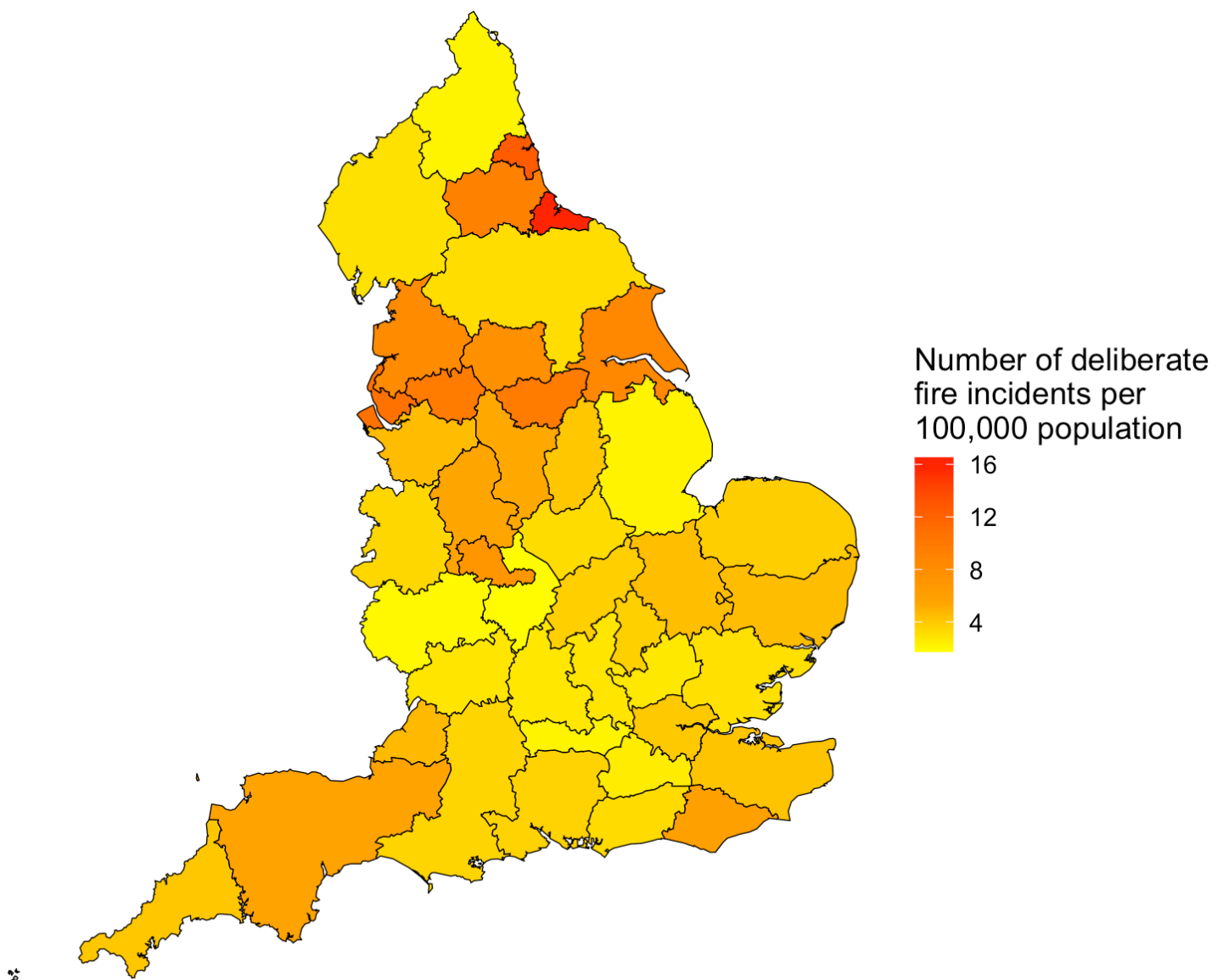


5.2 Deliberate dwelling fires

5.2.1 Cluster 1

The following choropleth map (Figure 10) shows a national picture of the number of deliberate dwelling fires per 100,000 population in England across FRS regions. The highest areas of deliberate fire incidents are predominantly found in the North of England.

Figure 10. Choropleth map showing the number of deliberate dwelling fire incidents per 100,000 population in England by FRS region

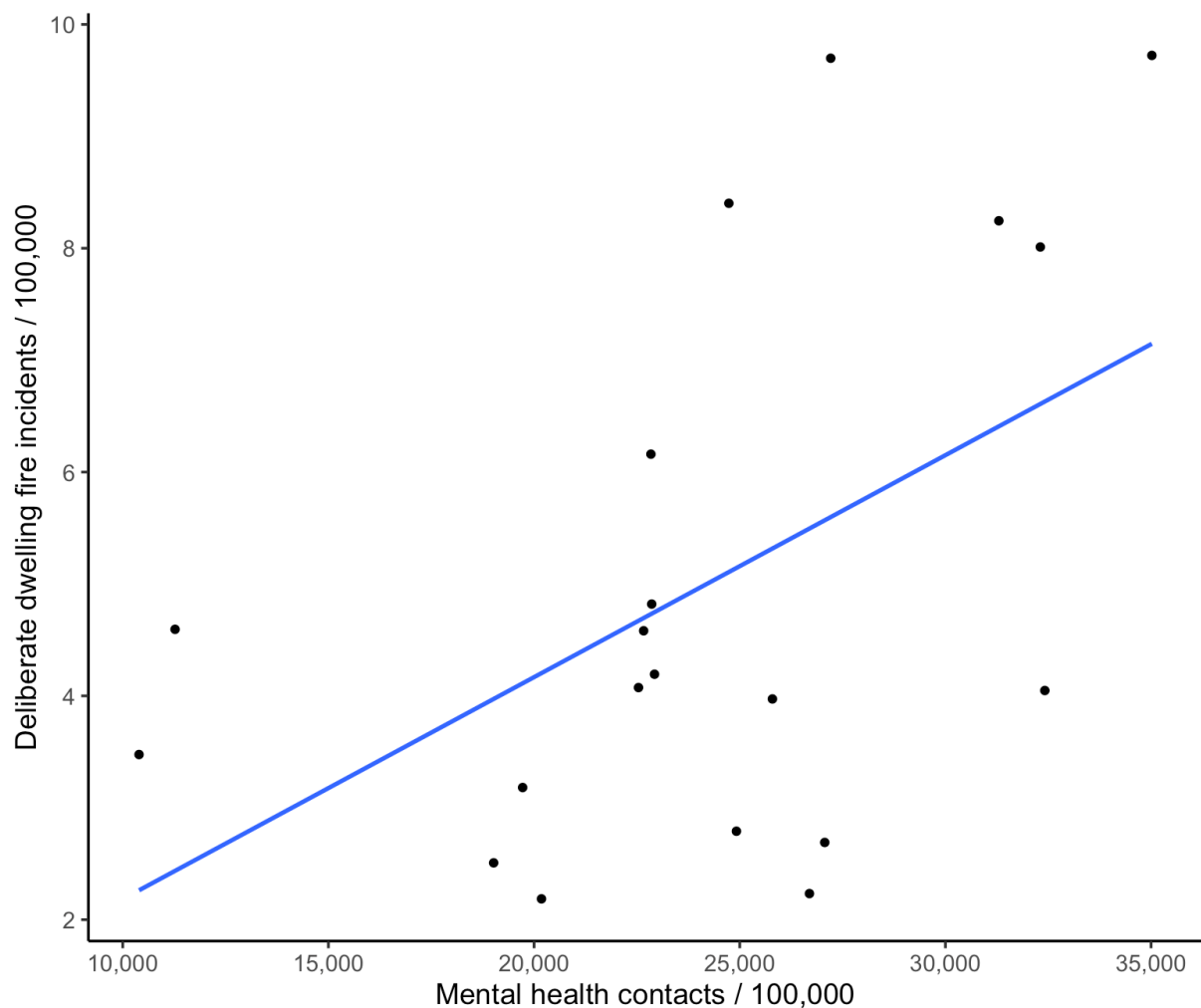


Deliberate dwelling fire incidents and number of mental health contacts per region

We found a different pattern of results when exploring the number of deliberate dwelling fire incidences with the number of mental health contacts per 100,000 individuals, with the results showing evidence of a statistically reliable positive correlation ($r = 0.50$, $p = 0.02$), see Figure 11.

To further explore this relationship, a linear regression was conducted to understand if the number of mental health contacts predicted the number of deliberate dwelling fire incidences. Results showed a statistically reliable result ($t = 2.46$, $p = 0.02$), such that for every additional 10,000 mental health contacts, we would expect the number of deliberate dwelling fire incidents to increase by approximately 1.9 per 100,000 individuals.

Figure 11. Relationship between number of mental health contacts and the number of deliberate dwelling fire incidents



Deliberate dwelling fire incidents and total cost of mental health services

There was no evidence of a statistically reliable relationship between the deliberate dwelling fire incidents and total costs of mental health services ($r = 0.04$, $p = 0.86$), see Figure 12 in the technical appendices.

Deliberate dwelling fire incidents and total patients discharged after receiving care through Care Programme Approach (CPA)

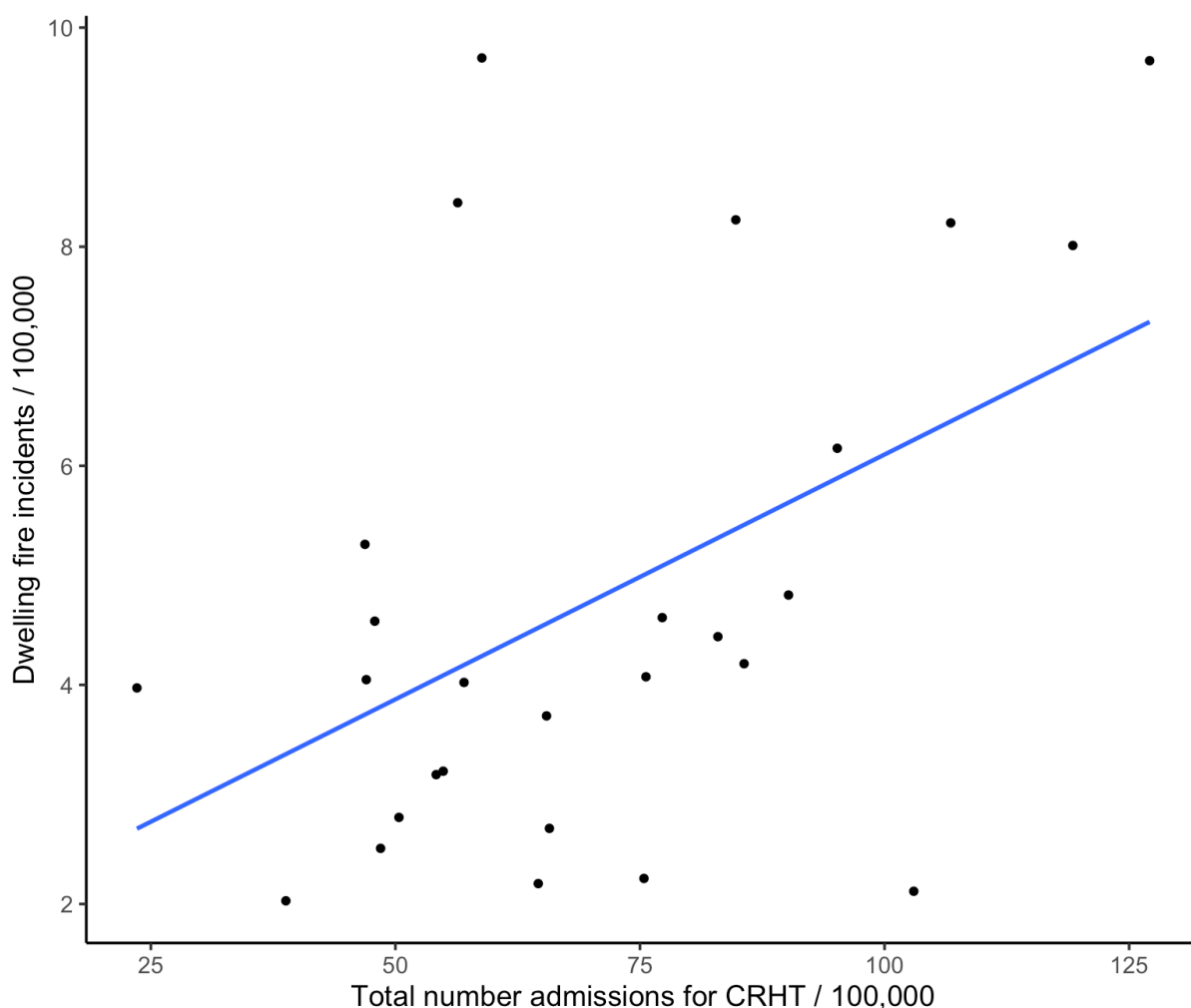
There was no evidence of a statistically reliable relationship between Deliberate dwelling fire incidents and total patients discharged after receiving care through Care Programme Approach ($r = 0.2$, $p = 0.3$), see Figure 13 in the technical appendices.

Deliberate dwelling fire incidents and the number of admissions for Crisis Resolution and Intensive Home Treatment Service (CRHT)

There was evidence of a statistically reliable relationship between deliberate dwelling fire incidents and the number of admissions for Crisis Resolution and Intensive Home Treatment Service ($r = 0.5$, $p = 0.01$), see Figure 14.

To explore this relationship further, a linear regression was conducted to understand if the number of admissions for CRHT predicted the number of deliberate dwelling fire incidences. Results showed a statistically reliable result ($t = 2.67$, $p = 0.01$), such that for every additional 100 admissions for CRHT, we would expect the number of deliberate dwelling fire incidents to increase by approximately 4.5 per 100,000 individuals.

Figure 14. Relationship between the total number of admissions for CHRT and the number of deliberate dwelling fire incidents



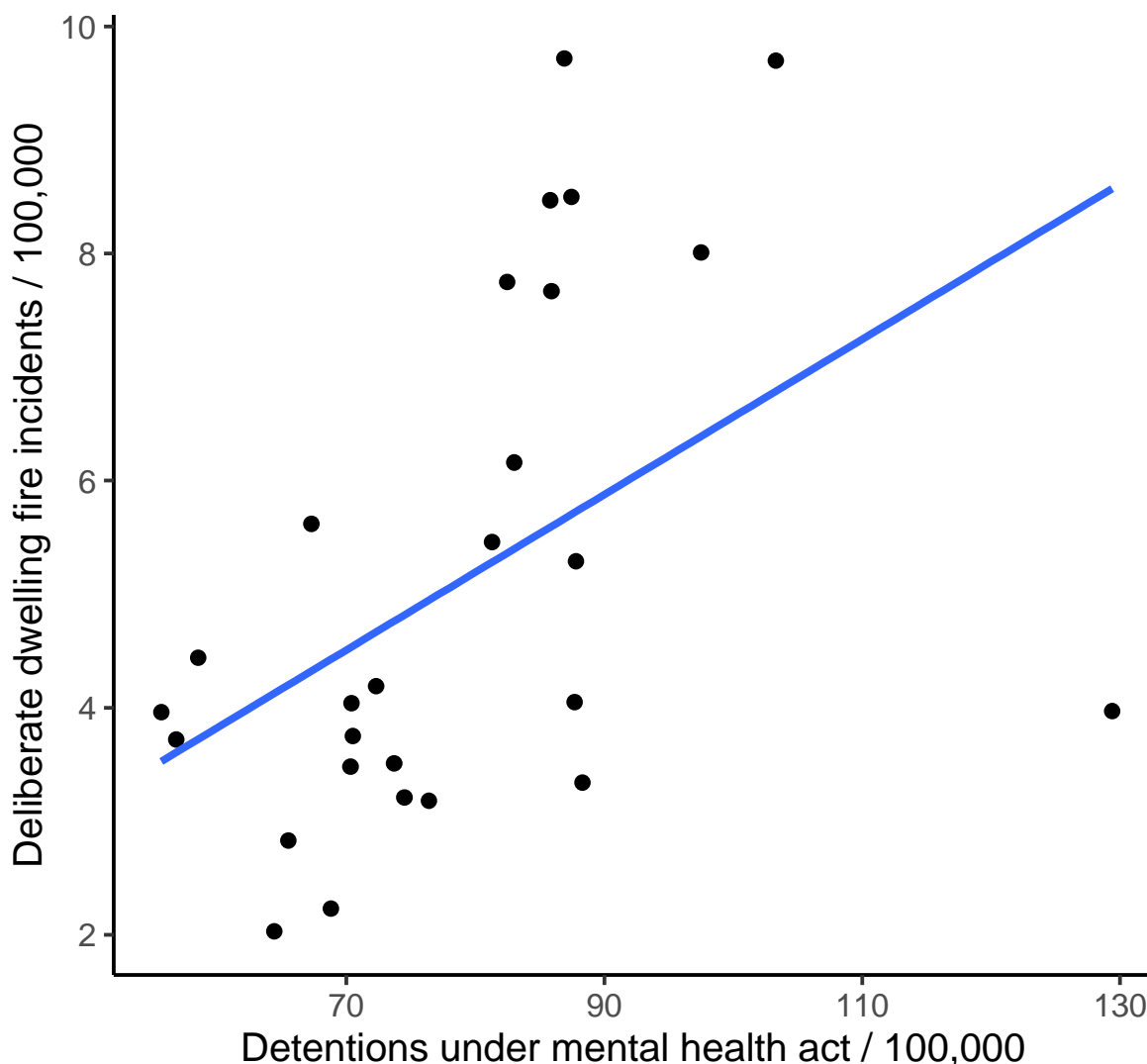
5.2.2 Cluster 2

Deliberate dwelling fire incidents and the number of detentions under the mental health act

Additional variables selected to represent mental health prevalence were then analysed against deliberate dwelling fire incidents in each coterminous region.

Similarly, to that of accidental dwelling fires, results showed a reliable correlation between deliberate dwelling fire incidents and the number of detentions under the mental health act ($r = 0.47$, $p = 0.014$). Linear regression analysis also found a statistically reliable result ($t = 2.64$, $p = 0.014$), such that that for every additional 100 detentions under the mental health act, we would expect the number of deliberate dwelling fire incidents to increase by approximately 6.8 per 100,000 individuals, see figure 15.

Figure 15. Relationship between the number of detentions under the mental health act and the number of deliberate dwelling fire incidents

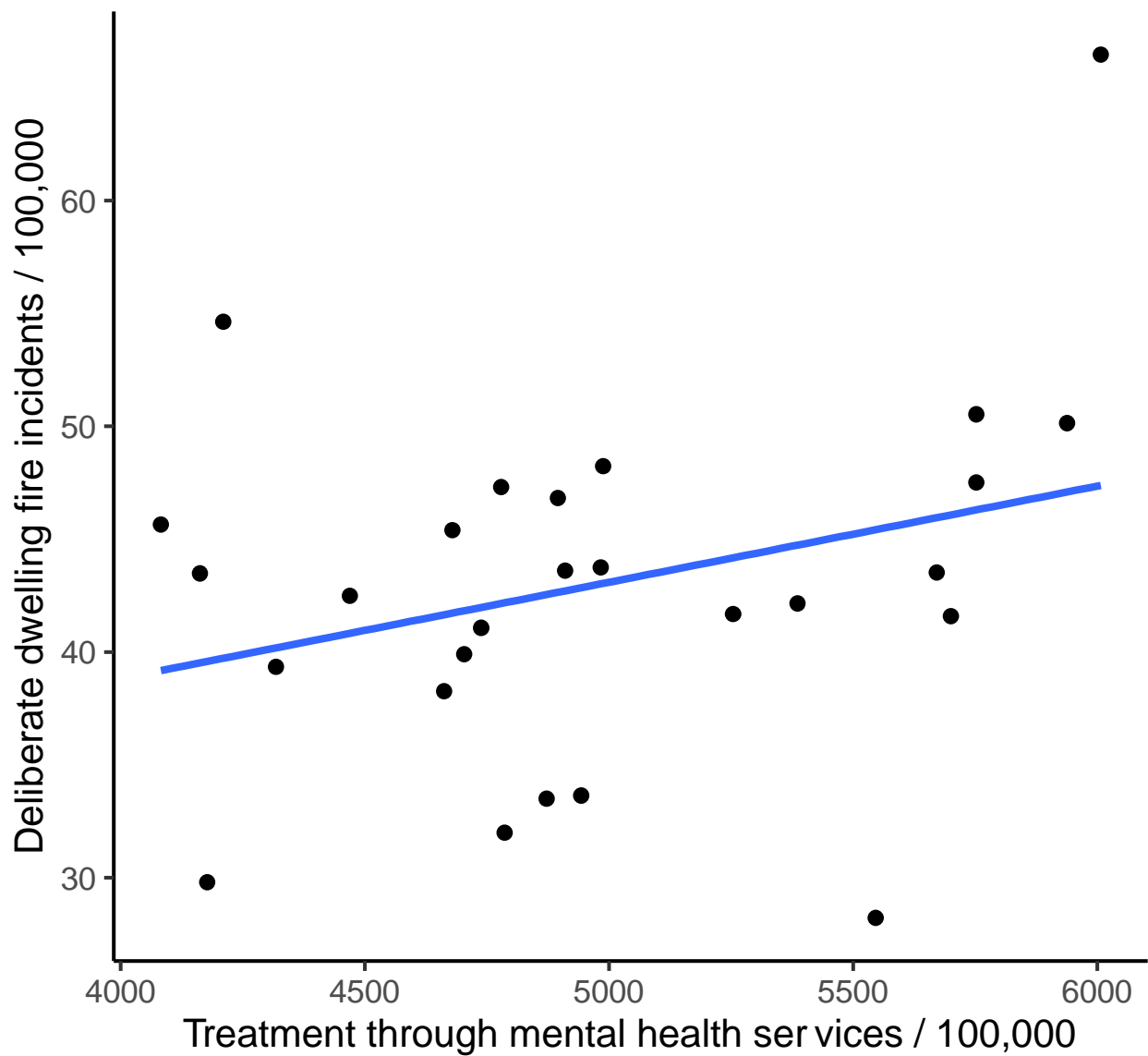


Deliberate dwelling fire incidents and treatment through mental health services

Deliberate dwelling fire incidents were then analysed against the number of people treated through mental health services. Unlike that for accidental dwelling fire incidents, correlation analysis found a statistically reliable positive relationship between these variables ($r = 0.55$, $p = 0.003$).

Subsequent linear regression analysis also found a statistically reliable result ($t = 3.27$, $p = 0.003$). This suggests that as the number of individuals treated through mental health services increases by 1,000, we would expect the number of deliberate dwelling fire incidents to increase by approximately 2.2 per 100,000 individuals, see figure 16.

Figure 16. Relationship between the number of individuals treated through mental health services and the number of deliberate dwelling fire incidents



Deliberate dwelling fire incidents and the number of inpatient admissions

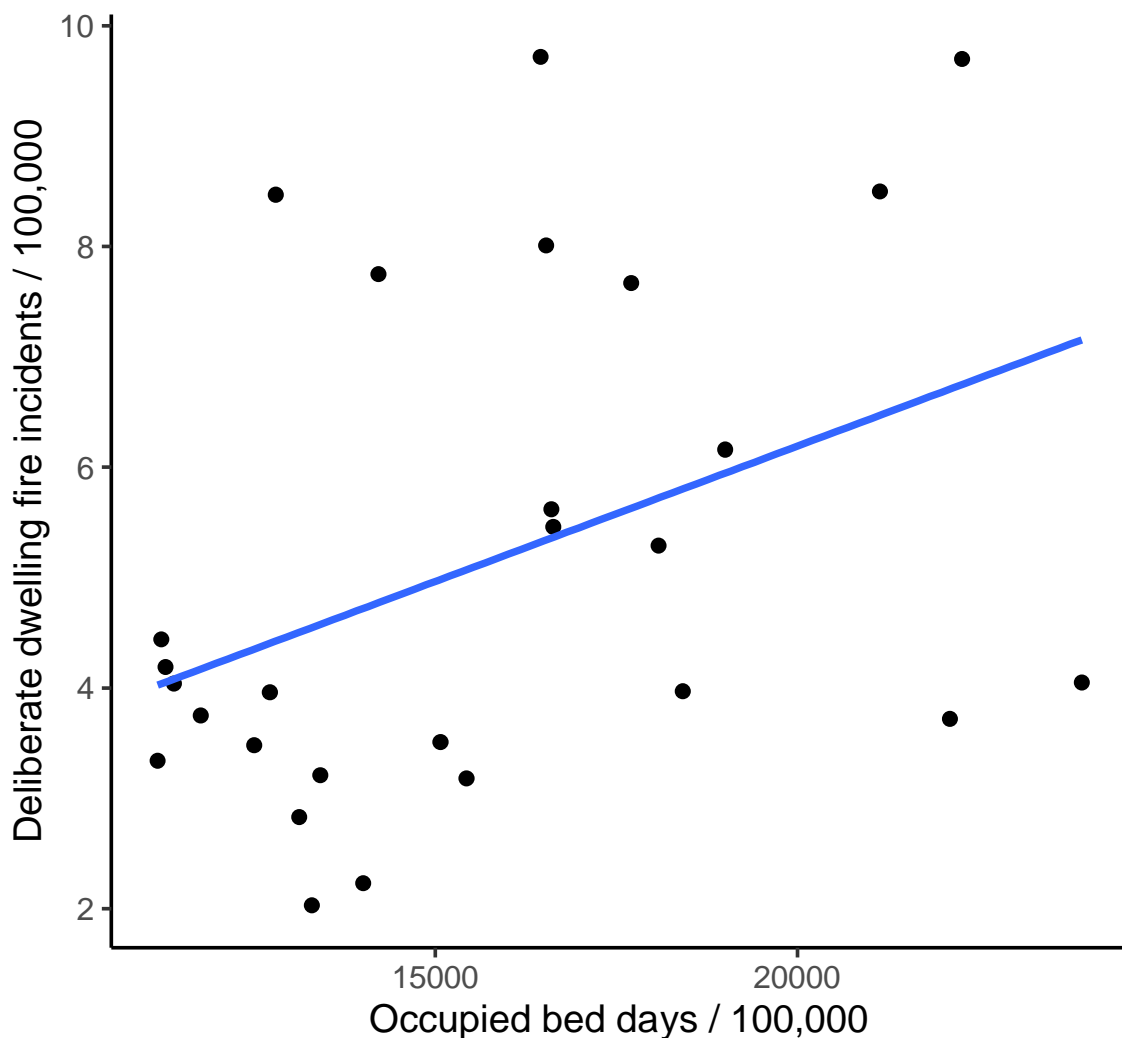
The relationship between the number of deliberate dwelling fire incidents and inpatient admissions to mental health services was also assessed. Similarly, to accidental dwelling fire incidents, statistical analysis found no reliable relationship between these two variables ($r = 0.106$, $p = 0.6$), see figure 17 in the technical appendices.

Deliberate dwelling fire incidents and the number of occupied bed days

Finally, the number of mental health occupied bed days was also assessed against deliberate dwelling fire incidents in each region. Statistical analysis showed a reliable correlation between these variables ($r = 0.4$, $p = 0.04$).

Regression analysis was carried out to further explore this relationship. This showed a statistically reliable result ($t = 2.16$, $p = 0.04$), such that for every additional 10,000 bed days, we would expect the number of deliberate dwelling fire incidents to increase by approximately 2.5 per 100,000 individuals, see figure 18.

Figure 18. Relationship between the number of occupied bed days and the number of deliberate dwelling fire incidents



5.3 Question 2: What person, environmental and occupation factors were involved in the fire incident that occurred?

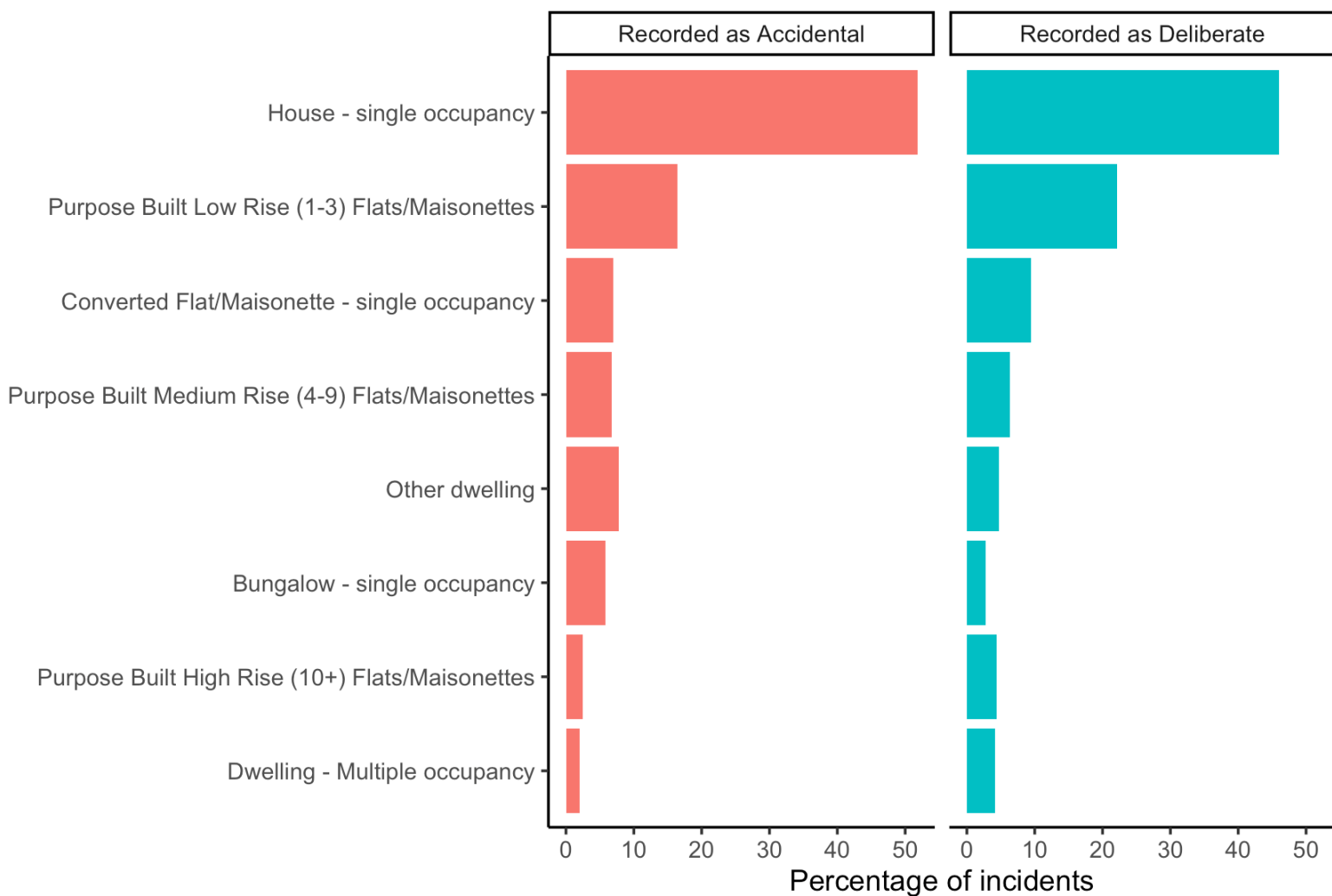
5.3.1 Cluster 1

The open-source IRS dataset contained few variables relating to question two, however three key variables have been examined here.

Dwelling Type

The majority of accidental and deliberate fire incident occurred in houses of single occupancy, see Figure 19.

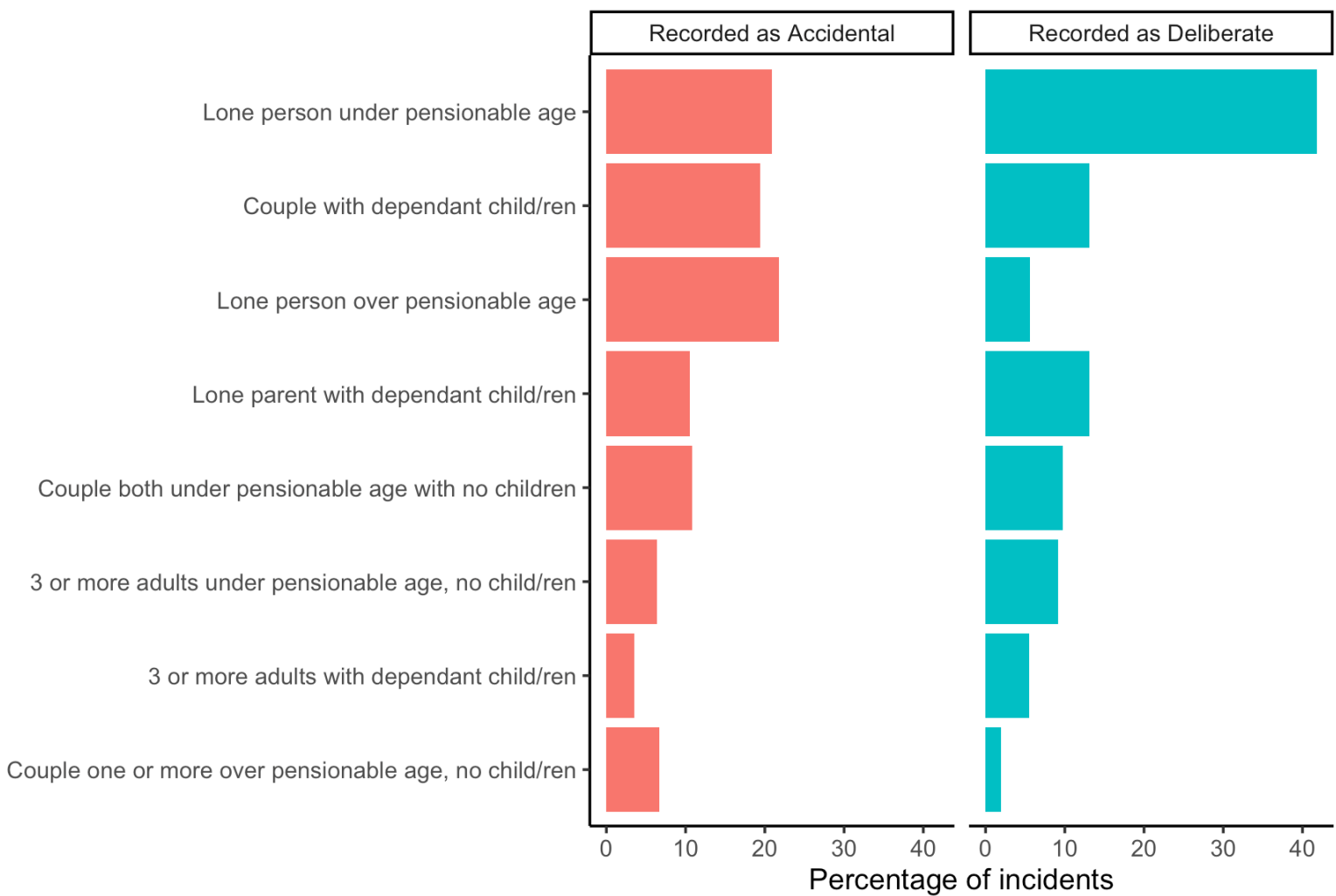
Figure 19. Percentage of accidental and deliberate incidents by dwelling type



Occupancy type

As shown in Figure 20, most accidental fires in 2019-2020 occurred within households with lone individuals (both under and over pensionable age) and within households comprised of a couple with dependent children. Deliberate fires were found to occur predominantly in households comprised of a lone person under pensionable age.

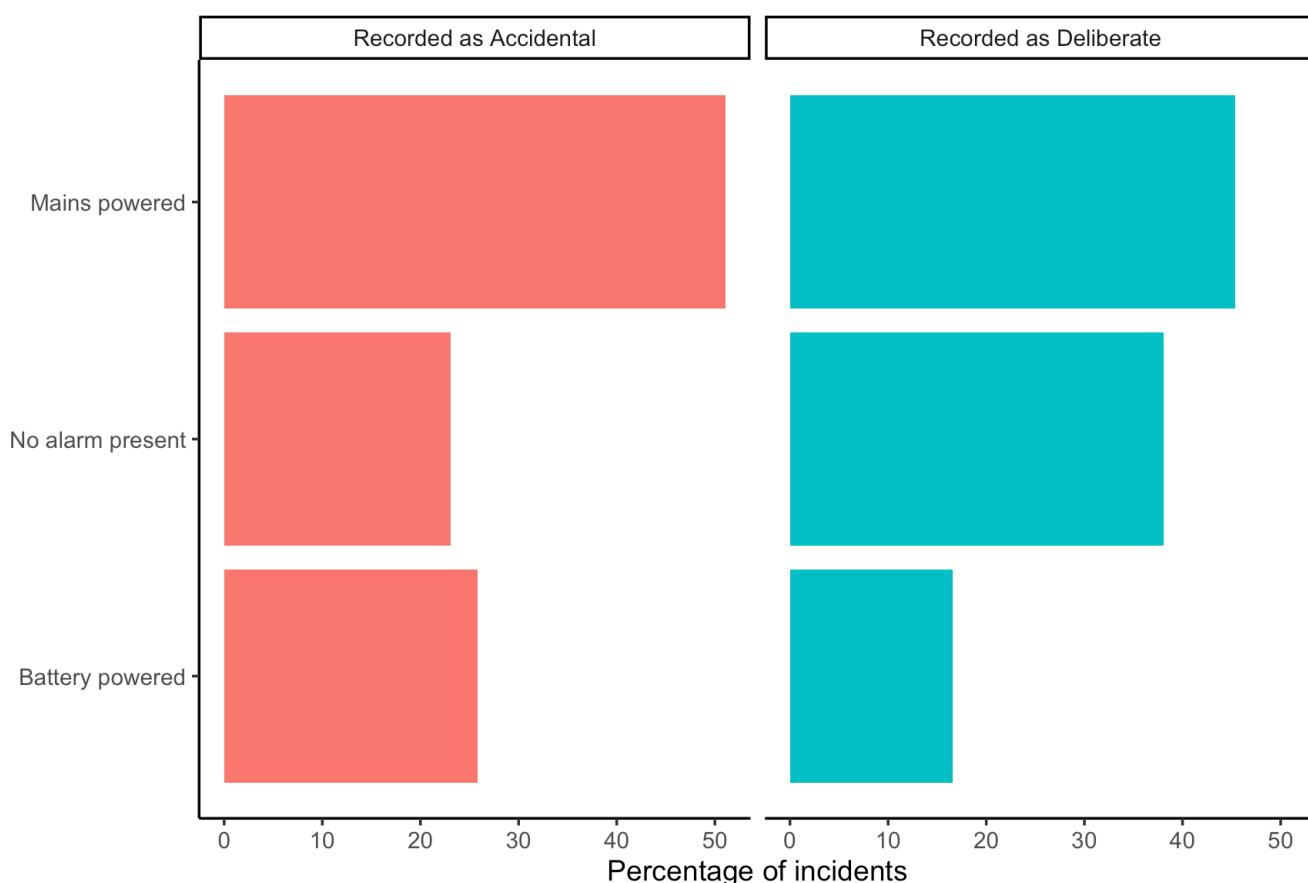
Figure 20. Percentage of accidental and deliberate incidents by occupancy type



Fire alarms

Understanding patterns in the presence of fire alarms following dwelling fire incidences may be useful when comparing the design and targeting of prevention practices of fire regions within England. Figure 21 shows that around 20% accidental fire incidents did not have an alarm present. This was higher for deliberate fire incidents at around 40%.

Figure 21. Percentage of accidental and deliberate incidents by fire alarm status



Recommendation 1.9: The NFCC should conduct a survey to find out if and how each service currently liaises with mental health services directly. Questions could include whether any contact is formal/informal? What level of data-sharing is in place? Whether these communications/actions are recorded electronically, and can they be measured to find out if they are successful? How many of these processes can be streamlined across the service for future data analyses for measuring the effectiveness of this?

Recommendation 1.10: The NFCC and partnerships with the health economy should look to commission suitable, quality assured training for fire service personnel which has been designed with oversight by mental health professionals. This would ensure fire staff know how to interact effectively and appraise the individual's circumstances both prior to and following an incident to ensure the right support is provided / signposted. This particularly relates to the risk of deliberate fires.

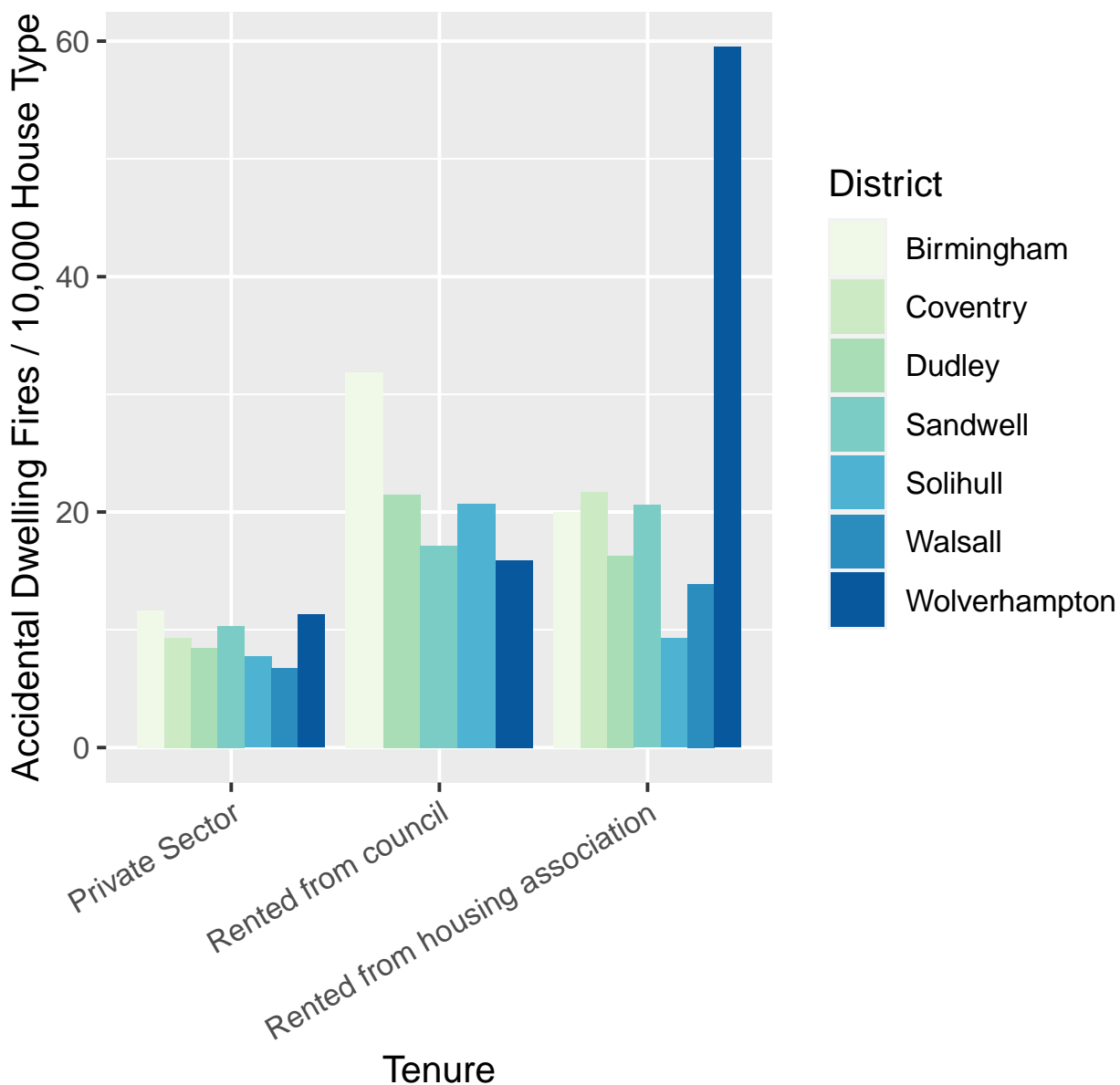
5.3.2 Cluster 2

Accidental dwelling fire incidents and the tenure type within districts of the West Midlands

Known datasets were firstly revisited in effort to identify more person factors related to dwelling fire incidents. This includes dwelling fire incidents in each tenure type for each district of the West Midlands, as found in the West Midlands IRS dataset. Private sector describes dwellings both privately rented and owner occupied.

Figure 22 shows that across the West Midlands, accidental fires occurred less frequently in private sector dwellings when compared to other tenure types.

Figure 22. The number of accidental dwelling fires within the West Midlands by tenure type

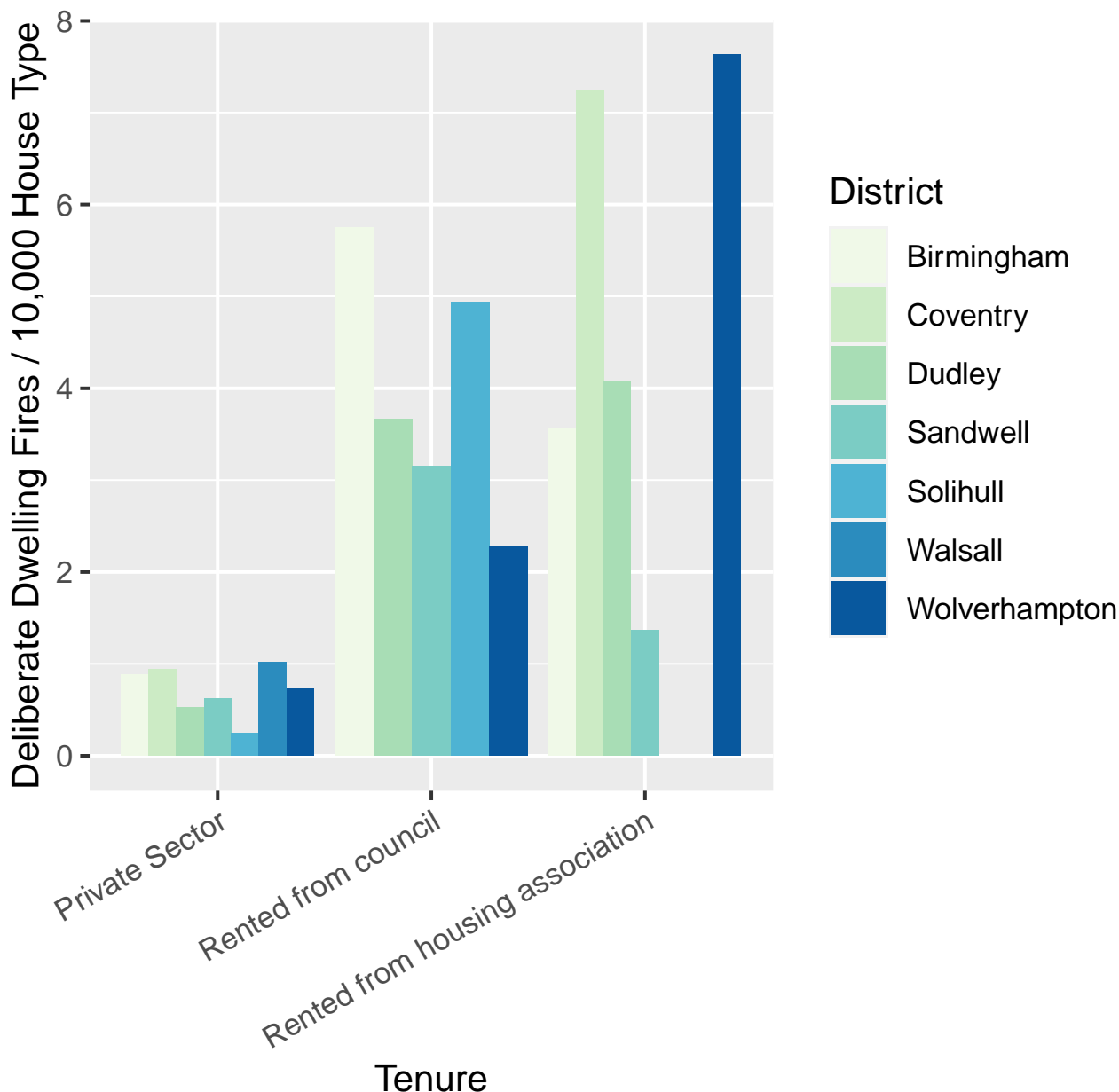


Deliberate dwelling fire incidents and the tenure type within districts of the West Midlands

The number of deliberate dwelling fire incidents in each tenure type for each district of the West Midlands was then examined after normalisation. Similarly to previous analysis, findings showed that private sector dwellings experience less frequent deliberate dwelling fires, see figure 23.

Solihull and Walsall were found to had no deliberate dwelling fires in properties rented from the housing association.

Figure 23. The number of deliberate dwelling fires within the West Midlands by tenure type

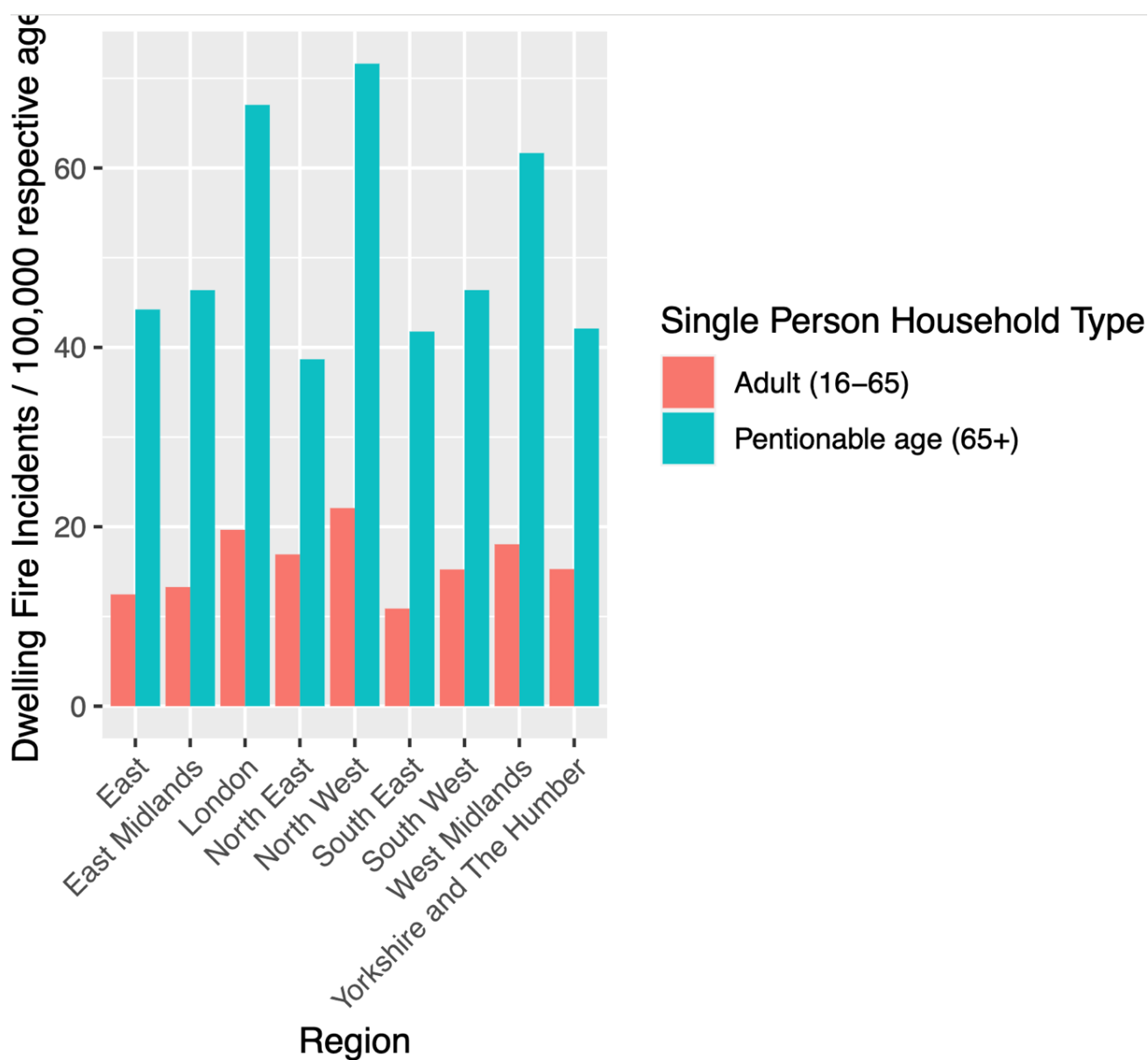


Dwelling fire incidents and single person household age group

To further expand household types associated with dwelling fires, the age of individuals within a single person household was explored to identify those at higher risk.

Local authority aging statistics allowed for the normalisation of fire incidents in a single person household by age. Findings showed that within all 9 regions of England, dwelling fires predominantly occur in single person dwellings with adults at or above a pensionable age, when compared to those under a pensionable age, see figure 24.

Figure 24. Lone-household dwelling fire incidents by occupant age



Note: Data for incidents in single person households for Shropshire, Staffordshire and West Midlands missing within the IRS dataset. Groups removed from analysis and population data revised.

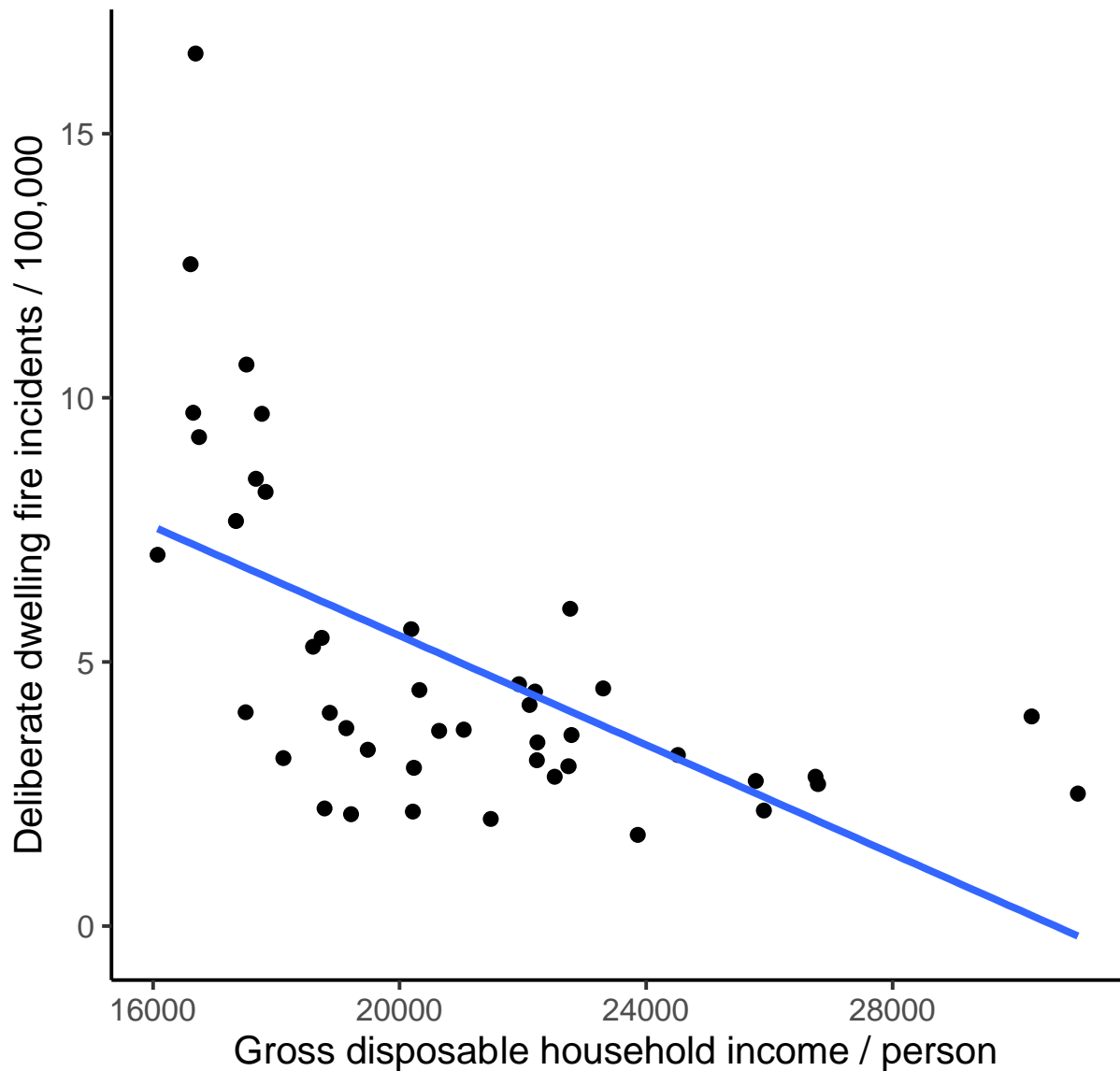
Accidental dwelling fire incidents and the average gross disposable household income (GDHI) per region

By obtaining the average GDHI per person in each FRS region, the relationship between GDHI and accidental dwelling fire incidents could be assessed. Results showed no statistical evidence of a relationship between these variables ($r = -0.2$, $p = 0.2$), see figure 25 in the technical appendices.

Deliberate dwelling fire incidents and the average gross disposable household income (GDHI) per region

GDHI per person was then further assessed against deliberate dwelling fires in each FRS region. This showed a statistically reliable result with a negative correlation between these variables ($r = -0.59$, $p = 0.0003$). Linear regression also showed a statistically reliable result ($t = -4.7$, $p = 0.0003$). Such that for every £10,000 decrease in the average GDHI per person, we would expect the number of deliberate dwelling fire incidents to increase by approximately 5.2 per 100,000 individuals, see figure 26.

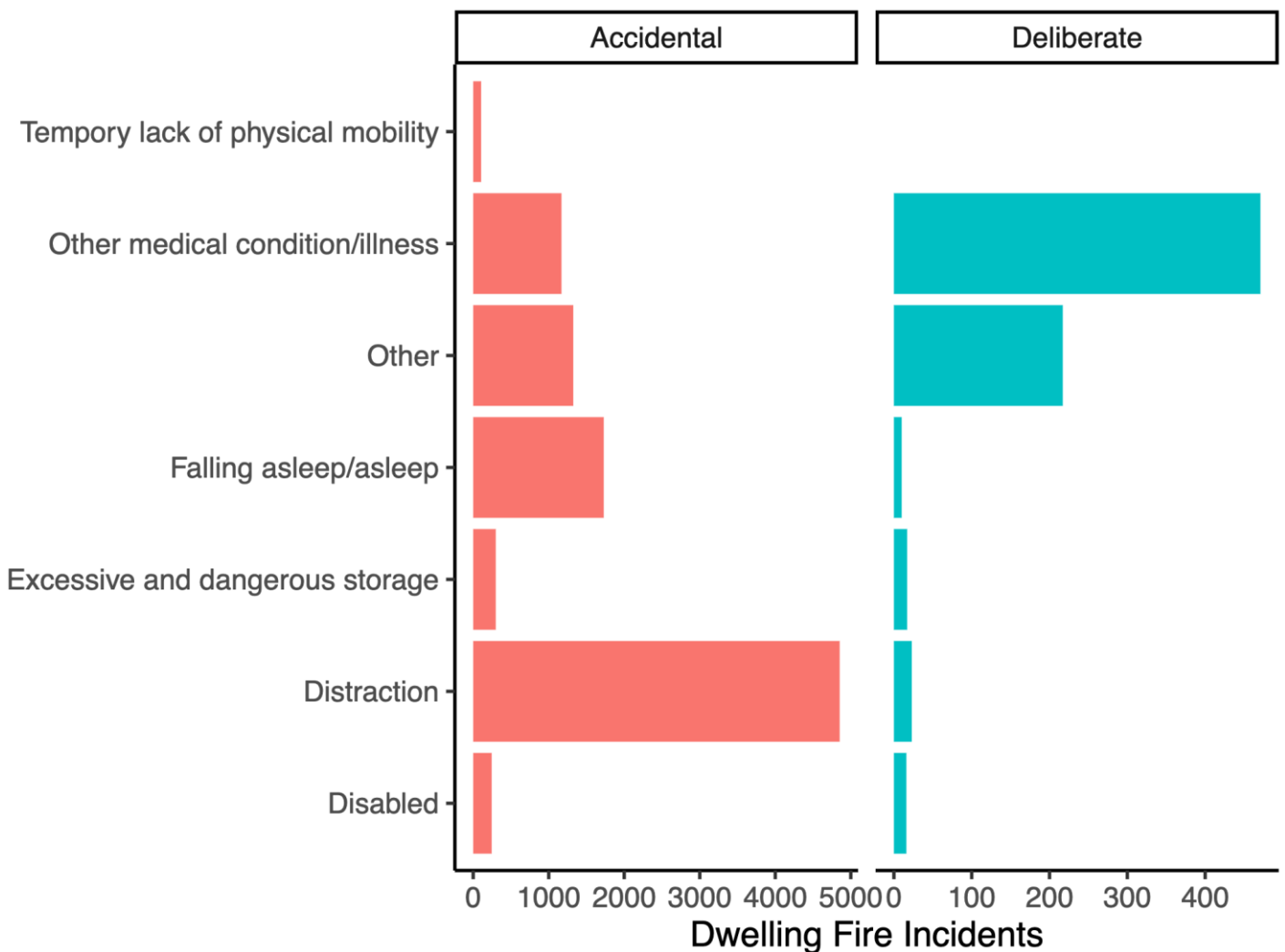
Figure 26. Relationship between the average gross disposable household income per person and the number of deliberate dwelling fire incidents



Human factors associated with dwelling fire incidents

After acquiring IRS data from the Home Office, accidental and deliberate dwelling fire incidents were assessed against contributing human factors. Figure 27 shows that distraction is the most common human factor causing accidental dwelling fires while other medical condition/illness is the most contributing human factor linked with deliberate dwelling fires. The latter therefore has a potential association with mental health illness although this cannot be determined from this data.

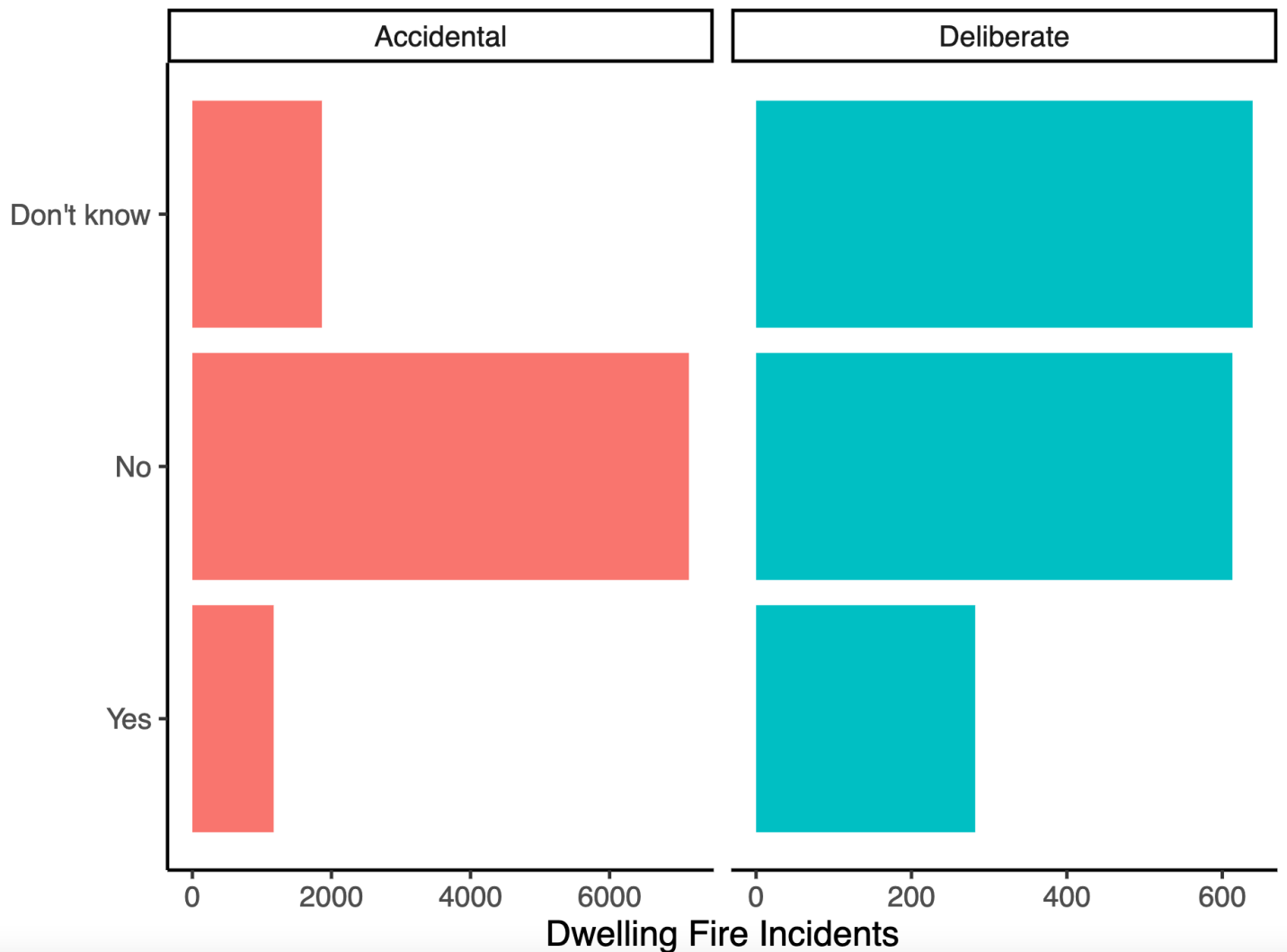
Figure 27. Contributing human factors associated with accidental and deliberate dwelling fire incidents.



Dwelling fire incidents and the involvement of drugs and/or alcohol

As shown in figure 28, accidental dwelling fires predominantly did not involve the presence of drugs or alcohol. There is a higher prevalence of an unknown presence of drugs and alcohol in deliberate dwelling fire incidents, although the definite involvement is still the least prevalent.

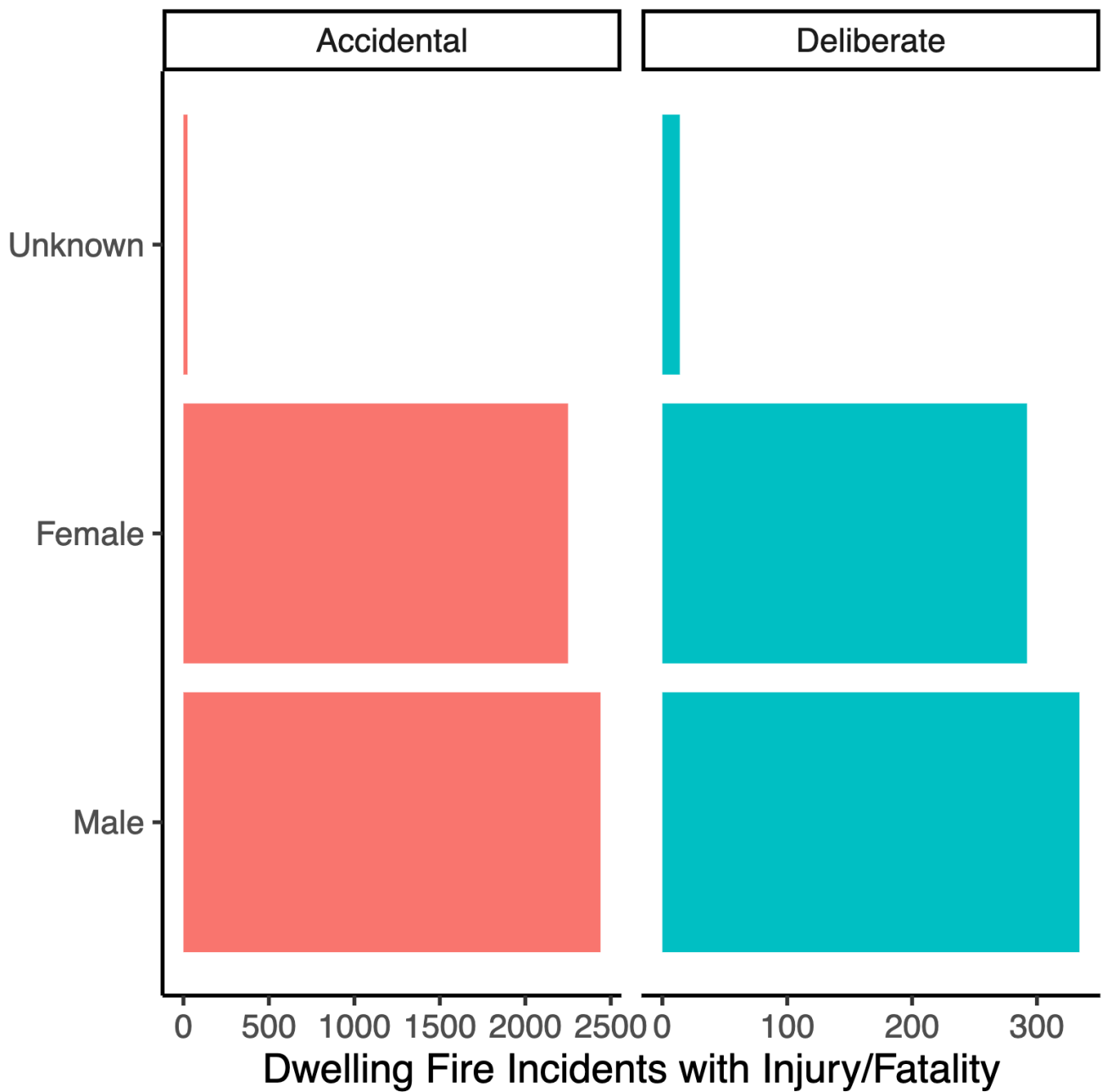
Figure 28. Accidental and deliberate dwelling fire incidents by the involvement of drugs and/or alcohol.



Dwelling fire incidents and the gender of victims

We then investigated the person factors of injury/fatality victims involved in dwelling fire incidents. As seen in figure 29, there is a slightly higher prevalence of male victims for both accidental and deliberate dwelling fire incidents.

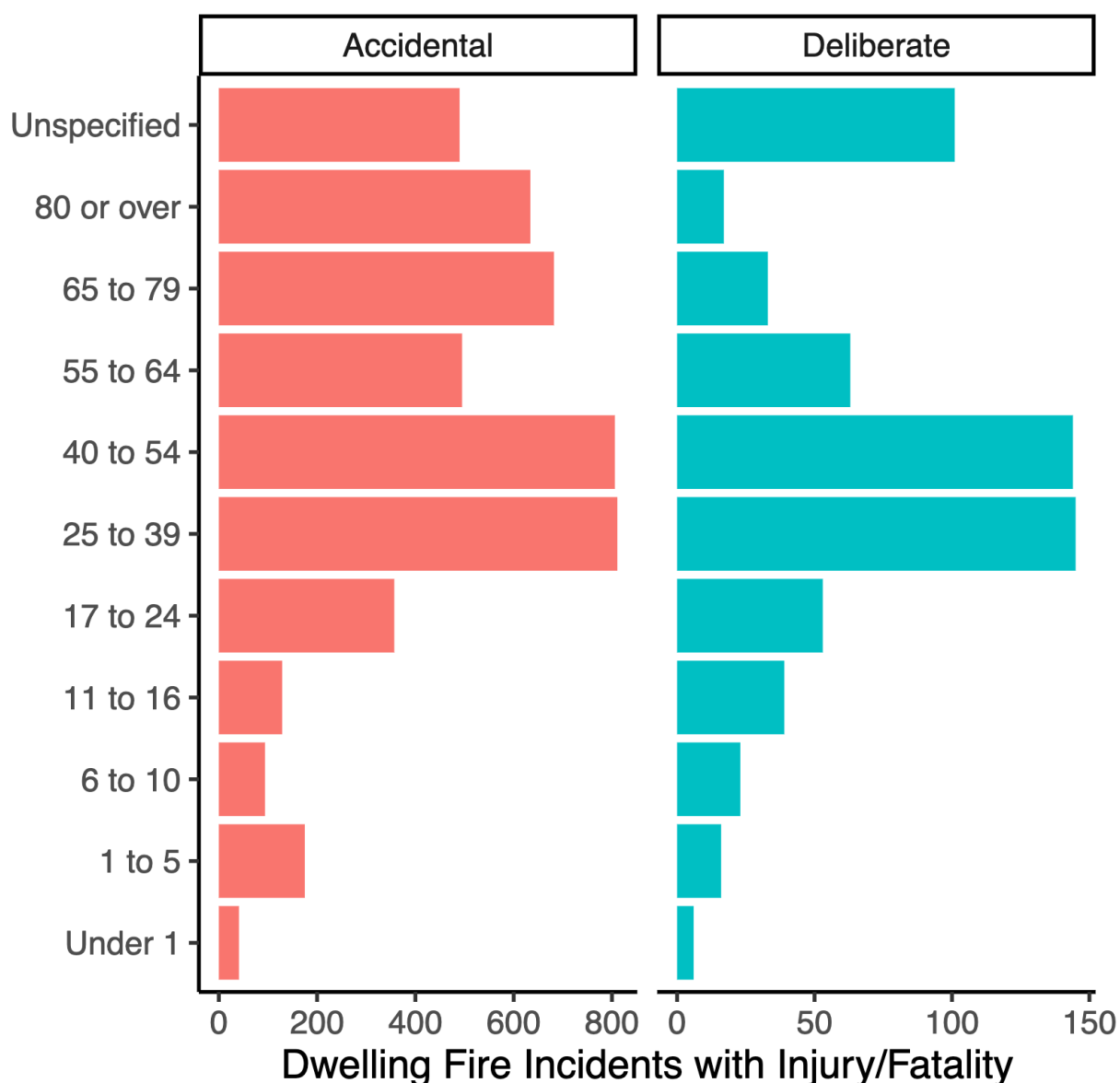
Figure 29. Injury/fatality victims of accidental and deliberate dwelling fires by gender.



Dwelling fire incidents and the age of victims

We also investigated the age of victims, as seen in figure 30. For accidental and deliberate dwelling fire incidents, the most prevalent ages are 25 – 39 and 40 – 54. However, a large proportion of accidental dwelling fires are also found to be associated with those over 65, whereas this is not the case when considering deliberate dwelling fire incidents.

Figure 30. Injury/fatality victims of accidental and deliberate dwelling fires by age.



Recommendations relating specifically to future datasets:

Recommendation 2.1: With the recent introduction of Integrated Care Boards and the associated different boundaries to enhance coterminosity with non-health partners, this hopefully affords a new opportunity for a more reliable comparison between health data mapped at a lower level than regional health entities and fire related datasets. This would also mean that each IRS region could obtain a more personalised outcome from this report if it were to be replicated in the future, rather than some being grouped with other regions for the purposes of analysis.

Recommendation 2.2: If 7.1 is achieved, a further segregation of incidences by geographical location in accessible datasets would allow for a higher number of groups. This would make analyses more reliable.

Recommendation 2.3: Some FRS services, such as West Midlands, have open access to their IRS data online while the majority of other services do not. Within the West Midlands data, this included a further refinement of geographical location into wards, and in some datasets postcodes. All FRS services should follow an agreed data sharing rule and scalability of geographical aggregation.

Recommendation 2.4: For the purposes of future data analysis, the use of checkbox and/or dropdown lists questions within an IRS report would be more useful than open ended questions. Ensuring where possible a response format is able to be analysed on a national scale. This is to allow grouping.

Recommendation 2.5: To increase specificity once an agreed term and definition has been established, it would also be useful if some questions involved sub questions depending on the answer. E.g., Do any occupants have a diagnosed mental health condition? If yes, specify the type.

Recommendation 2.6: In future data frameworks and data collection architecture it is imperative that more questions are included regarding the person(s) involved rather than simply fire causation, ignition points and fire behaviour questions. This would enable more learning opportunities to refine and target prevention work, dovetailing with the person-centred approach. People's behaviour frequently causes incidents, respond to incidents and recover from incidents and yet the current question set has a paucity of data relating to human behaviour. There has been an interest throughout the project as to whether the financial status of individuals may have an impact on both mental health and risk of a dwelling fire incidence due to the association of incidents of fire and indices of multiple deprivation. To capture more individual related information about occupation of the person(s) involved could be used to reflect this.

Recommendation 2.7: Some questions about the persons involved are already within the IRS data set (requested from the Home Office), such as age, gender, and ethnicity, but the

responses to which are not easily accessible. Although these variables may not directly associate with mental health, they could have been used as a bridge to link these factors.

6. Findings and Recommendations

The findings are briefly summarised in this section before a full list of recommendations for consideration by the mental health and fire programme board. As stated earlier in this report, some of the findings by region are low in numbers and therefore should be interpreted with caution. Also, the inability to access a dataset that matches an individual's health and fire data, did not allow us to explore this through an individual paired basis. The matching of health and fire data by region is a legitimate and widely accepted approach but does not match individual or address level data. With this in mind the findings should be interpreted with caution and not taken as absolute conclusive conclusions.

The findings overall suggest that, using these datasets, there is mixed evidence to support a robust association between mental health and incidents of accidental fire within a community setting. There is however some evidence to suggest a link between mental health and incidents of deliberate fire, however this is not consistent across all analyses of deliberate fires.

- 6.i There appears to be a mixed relationship between the variables relating to mental health and accidental fire incidents at the regional level.
- 6.ii There is some evidence that there is a relationship between the variables relating to mental health and deliberate fire incidents at the regional level – specifically those variables relating to mental health spend, acute crisis care (CRHT), detentions under the mental health act, treatment through mental health services, and occupied bed days. Since this relationship was not found consistently across all variables relating to deliberate fires, this finding should be interpreted with caution.
- 6.iii Most accidental fire incidents occur in lone person households and households comprised of a couple with dependent children. Deliberate fires are more likely to occur in households comprised of a lone adult under pensionable age.
- 6.iv Dwelling fires in the West Midlands occurred in private sector housing compared to those rented from the council/housing association. There is evidence of a correlation between low GDHI and deliberate dwelling fire incidents. Distraction is the most common human factor causing accidental dwelling fires, while other medical condition/illness is the most contributing human factor linked with deliberate dwelling fires.

Some findings relating to fire data are clustered at regional rather than service level, as previously discussed this is because the health data available only went to region level and so the fire data had to be aggregated up. However, we have supplied summary statistics of fire data in the technical appendix for services, although it is widely recognised that this data has likely been produced by services themselves previously.

The findings present a contrast to the current assumptions underlying many threads of work and workstreams within prevention work and community risk planning across the fire sector. However, we strongly caution against making any immediate policy decisions based on these findings alone. This is because the datasets and the findings provide a partial understanding of the association, as more personalised linked datasets were not available to

use. With this in mind, the programme seeks to contextualise these findings with more data from within the fire sector. Making any changes to policy at this stage would be premature and would potentially put individuals at higher risk of unsafe behaviours or a reduction in contact points with public services.

These findings are still to be synthesised with data analysis of fire investigations, which could provide a more detailed context to this association. With more information from a reasonable number of case studies across England and Wales, we aim to try and identify possible alternative explanations for the anecdotal understanding of an association. In other words, if it is not an association of mental health diagnosis/conditions and incidents of fire, the next steps to investigate are whether there are other factors that offer an explanation for this widely held assumption, such as comorbid factors (factors which frequently present alongside a primary mental health diagnosis), self-medication through alcohol or drugs, a sudden change in circumstances which compound an existing situation for someone already at risk or another factor as yet unidentified.

Recommendations

Following on from this initial phase of the programme of work we suggest the following recommendations, however these will need to be revised and possibly rewritten after the next stage of the programme of work.

General Recommendations:

Recommendation 1.1: As part of the programme of work the terminology used by fire and rescue services has been explored including the term 'mental health'. This work should continue to progress and work towards a shared national definition of mental health or psychological health. This should include the parameters of what sits within that terminology, does this include addiction, alcoholism, dementia, hoarding and other behaviours which might be associated or included in the terminology. The World Health Organisation's definition, or that of the British Psychological Society might be a starting point to develop a shared national phrase and definition. The definition of 'mental health' also needs to be agreed with public health partners to enable shared meaning and clarity in partnership working.

Recommendation 1.2: The National Fire Chiefs Council (NFCC) should continue to keep this association under review within the CPO and programmes of work. This is because the current rates of mental health within the UK population are predicted to increase as the impacts of the pandemic are fully felt and materialise and this intersects with the cost-of-living crisis and the long-term mental health risks begin to impact across the population. Health colleagues should flag any changes in mental health profiles in the general UK population.

Recommendation 1.3: In response to the Data, Digital and Cyber workstream currently under construction between the NFCC and the Home Office, the data collected and recorded should include prevention work. This includes the prevention work FRSs undertake within communities. Data should be collected consistently across services, with scale data wherever possible (as it is the most flexible type of data for analysis), should try to limit the open text free response format as this is challenging to analyse on a national scale and should be collected with geographical markers that can be scalable (analysed from LSOA up to national patterns and trends).

Recommendation 1.4: To support further analysis of the association between mental health and incidents of fire, the fire sector should work with the Home Office and the Data, Digital and Cyber workstream to ensure that prevention activities, including the psychological health of the survivors of incidents of fire, in order to include questions (and record data) about mental health following fire incidents. This should also include collecting data during Home Fire Safety Visits, to better understand the link between fire and mental health. Within this additional set of questions, they could also record if any partner services have contact with the address or the person concerned, such as local mental health teams. This would help to if there are associations between mental health and increased fire risk. This should be implemented recognising the need to treat person identifiable data by partner organisations as confidential, this self-reported data could be part of the data collection in the Home Safety Visits and consequently needs to include the option for an individual to choose not to respond.

Recommendation 1.5: Following the implementation of 1.4, the prevention programme should commission future analysis of this new data set to allow the opportunity for a more comprehensive research report into the association.

Recommendation 1.6: Through the Home Office redesign of the data framework, the NFCC should coordinate a national reporting/draw through mechanism from each service to record how many 'safe and well' or Home Safety referrals are received by each FRS which relate to mental health. Aligning the referral process to reduce variety between each FRS. Analysis of this data would enable a better understanding of the relationship between mental health and fire risk. However, this requires the process to be streamlined and questions exploring the mental health needs of the individual to be recorded, this would help to understand the percentage of referrals at national level that are mental health related, if those individuals were considered high, medium or low risk (aligned to the understandings of levels of risk in such resources as the online home fire safety check tool), and what interventions by the fire and rescue service took place. However, this is predicated on the referral partner capturing this information and consent for data sharing being agreed locally with the FRS.

Recommendation 1.7: The NFCC and its partnership with Office for Health Improvement and Disparities (OHID) should provide thought leadership (bringing together their expertise to create new solutions and ideas and opinions to positively influence the work in the area) and explore the merits and possibilities of establishing the governance frameworks to implement shared databases between each FRS and their Local Mental Health Teams. For example, when there is a significant fire incident, the local mental health team could be alerted to support the individual following the fire to ensure they have support. This could be through a FRS prompted self-referral to IAPT (Improving Access to Psychological Therapies). This data base could also record whether intervention by the FRS or partners occurred prior to the incident.

Recommendation 1.8: Health partners should be encouraged to share identifiable data to inform the fire and rescue service about individuals within their communities who are at higher risk, similar to the information shared regarding oxygen users. Specifically data sharing frameworks and protocols should be shared and developed to facilitate sharing of data within partnerships in line with sentiments of national data portfolio holders, data ethics and legal frameworks in the UK. This highlights the possibilities to explore with Integrated Care Boards.

Recommendation 1.9: The NFCC should conduct a survey to find out if and how each service currently liaises with mental health services directly. Questions could include whether any contact is formal/informal? What level of data-sharing is in place? Whether these communications/actions are recorded electronically, and can they be measured to find out if they are successful? How any of these processes can be streamlined across the service for future data analyses for measuring the effectiveness of this?

Recommendation 1.10: The NFCC and partnerships with the health economy should look to commission suitable, quality assured training for fire service personnel which has been designed with oversight by mental health professionals. This would ensure fire staff know how to interact effectively and appraise the individual's circumstances both prior to and following an incident to ensure the right support is provided / signposted. This particularly relates to the risk of deliberate fires.

7. Suggestions for Creating Suitable Datasets in the Future

This report has presented the evidence surrounding each of these 17 recommendations that have been developed from the learning of this research project. As we have used and curated the available data within the fire data, we have developed insights on possible principles the NFCC and Home Office may wish to consider in the future when designing future datasets.

Recommendations relating specifically to future datasets:

Recommendation 2.1: With the recent introduction of Integrated Care Boards and the associated different boundaries to enhance coterminosity with non-health partners, this hopefully affords a new opportunity for a more reliable comparison between health data mapped at a lower level than regional health entities and fire related datasets. This would also mean that each IRS region could obtain a more personalised outcome from this report if it were to be replicated in the future, rather than some being grouped with other regions for the purposes of analysis.

Recommendation 2.2: If 7.1 is achieved, a further segregation of incidences by geographical location in accessible datasets would allow for a higher number of groups. This would make analyses more reliable.

Recommendation 2.3: Some FRS services, such as West Midlands, have open access to their IRS data online while the majority of other services do not. Within the West Midlands data, this included a further refinement of geographical location into wards, and in some datasets postcodes. All FRS services should follow an agreed data sharing rule and scalability of geographical aggregation.

Recommendation 2.4: For the purposes of future data analysis, the use of checkbox and/or dropdown lists questions within an IRS report would be more useful than open ended questions. Ensuring where possible a response format is able to be analysed on a national scale. This is to allow grouping.

Recommendation 2.5: To increase specificity once an agreed term and definition has been established, it would also be useful if some questions involved sub questions depending on the answer. E.g., Do any occupants have a diagnosed mental health condition? If yes, specify the type.

Recommendation 2.6: In future data frameworks and data collection architecture it is imperative that more questions are included regarding the person(s) involved rather than simply fire causation, ignition points and fire behaviour questions. This would enable more learning opportunities to refine and target prevention work, dovetailing with the person-centred approach. People's behaviour frequently causes incidents, respond to incidents and recover from incidents and yet the current question set has a paucity of data relating to human behaviour. There has been an interest throughout the project as to whether the financial status of individuals may have an impact on both mental health and risk of a dwelling fire incidence due to the association of incidents of fire and indices of multiple deprivation. To capture more individual related information about occupation of the person(s) involved could be used to reflect this.

Recommendation 2.7: Some questions about the persons involved are already within the IRS data set (requested from the Home Office), such as age, gender, and ethnicity, but the responses to which are not easily accessible. Although these variables may not directly associate with mental health, they could have been used as a bridge to link these factors.

These last two sections of the report have presented 17 recommendations developed from the learning of this research project. We advocate to the NFCC that they are considered by the Mental Health Research Project and Prevention governance structures and triaged to other NFCC workstreams if applicable, in order to be considered for adoption into future policy and practices.

8. Summary and Next Steps

Summary

This report has summarised the project designed to answer the following six questions:

1. Is there any correlation between any mental health condition and FRS incident related incidents?
2. What person, environmental and occupation factors were involved in the fire incident that occurred?
3. Was there any intervention by FRS or Partners prior to incident?
4. Are there any fatal fire or serious case reviews available for analysis?
5. Has any FRS provided/providing mental health training to their frontline staff to assist with disclosures around mental health?
6. Are services already liaising with mental health services and in what capacity? Is there any evaluation around the effectiveness of this?

The project is yet to analyse questions 3-6 and that will be captured shortly. However, this report has shared the analysis and findings of questions 1 and 2 and shared the learning for future stages of the prevention work across the NFCC and within fire and rescue services. More analysis is needed with data entries where individual level analysis can be conducted to explore the association between mental health and incidents of fire.

Next Steps

The research team continue to work on questions 3-6 and build on these findings to broaden and deepen the understanding of activity and other data sources available within this area of prevention work.

The recommendations from this report have been shared with the NFCC Mental Health Research Project Board and other governance structures as seen fit by the NFCC lead for mental health in society.

9. Appendix

Table A. Number of fire incidents, accidental and deliberate per 100,000 population by FRS region in 2019-2020.

Region	Total incidents per 100,000	Accidental incidents per 100,000	Deliberate incidents per 100,000
Avon	48.24	43.65	4.58
Bedfordshire	50.96	47.26	3.70
Berkshire	41.97	39.79	2.19
Buckinghamshire	40.08	37.25	2.83
Cambridgeshire	34.24	29.80	4.44
Cheshire	34.31	29.81	4.50
Cleveland	43.57	27.06	16.52
Cornwall	46.53	42.49	4.04
Cumbria	49.60	46.60	3.00
Derbyshire	38.77	33.49	5.28
Devon & Somerset	52.92	47.31	5.62
Dorset & Wiltshire	50.67	47.19	3.48
Durham	45.22	35.96	9.26
East Sussex	59.66	53.65	6.01
Essex	45.65	42.62	3.03
Gloucestershire	46.31	43.48	2.83
London Fire and Emergency Planning Authority	58.60	54.63	3.97
Greater Manchester	76.17	66.47	9.70
Hampshire	41.73	38.11	3.62
Hereford & Worcester	47.43	45.40	2.03

Region	Total incidents per 100,000	Accidental incidents per 100,000	Deliberate incidents per 100,000
Hertfordshire	39.51	36.82	2.69
Humberside	50.06	41.59	8.47
Isle Of Wight	42.32	40.21	2.12
Kent	32.42	28.22	4.19
Lancashire	62.03	53.81	8.22
Leicestershire	35.17	31.99	3.18
Lincolnshire	45.98	43.75	2.23
Merseyside	71.33	60.70	10.63
Norfolk	50.56	46.82	3.75
North Yorkshire	42.24	39.10	3.14
Northamptonshire	45.40	41.68	3.72
Northumberland	44.04	41.87	2.17
Nottinghamshire	52.28	48.23	4.05
Oxfordshire	38.75	36.00	2.75
Shropshire	45.53	42.15	3.38
South Yorkshire	43.36	33.64	9.72
Staffordshire	55.99	50.53	5.46
Suffolk	39.80	35.33	4.47
Surrey	38.62	36.11	2.51
Tyne and Wear	57.21	44.68	12.53
Warwickshire	28.72	26.99	1.73
West Midlands	61.74	54.70	7.03
West Sussex	47.34	44.10	3.24
West Yorkshire	48.75	41.07	7.67

10. Technical Appendix

Figure 3. Relationship between total cost of mental health cases and the number of accidental dwelling fire incidents

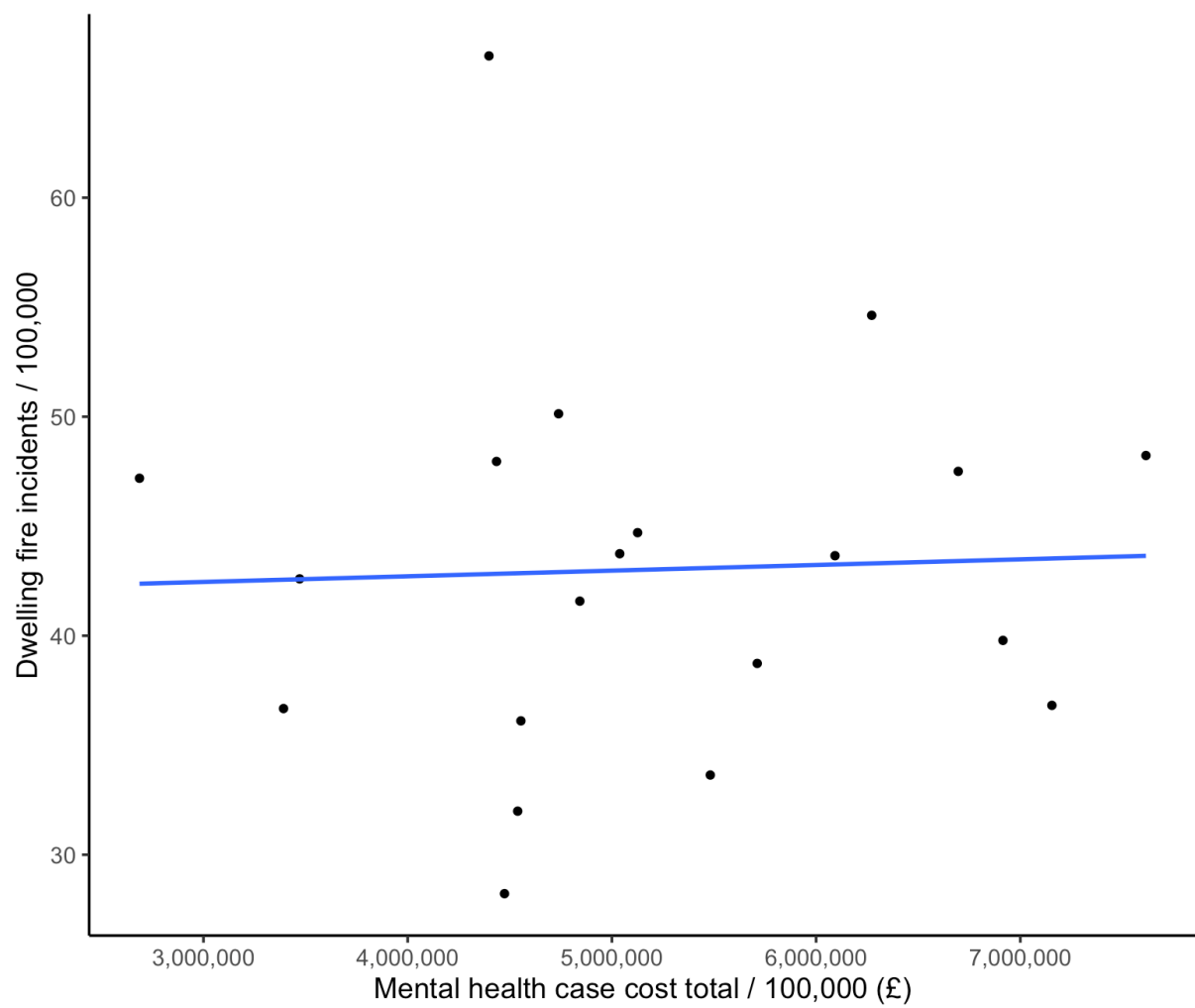


Figure 4. Relationship between the total number of patients discharged from CPA and the number of accidental dwelling fire incidents

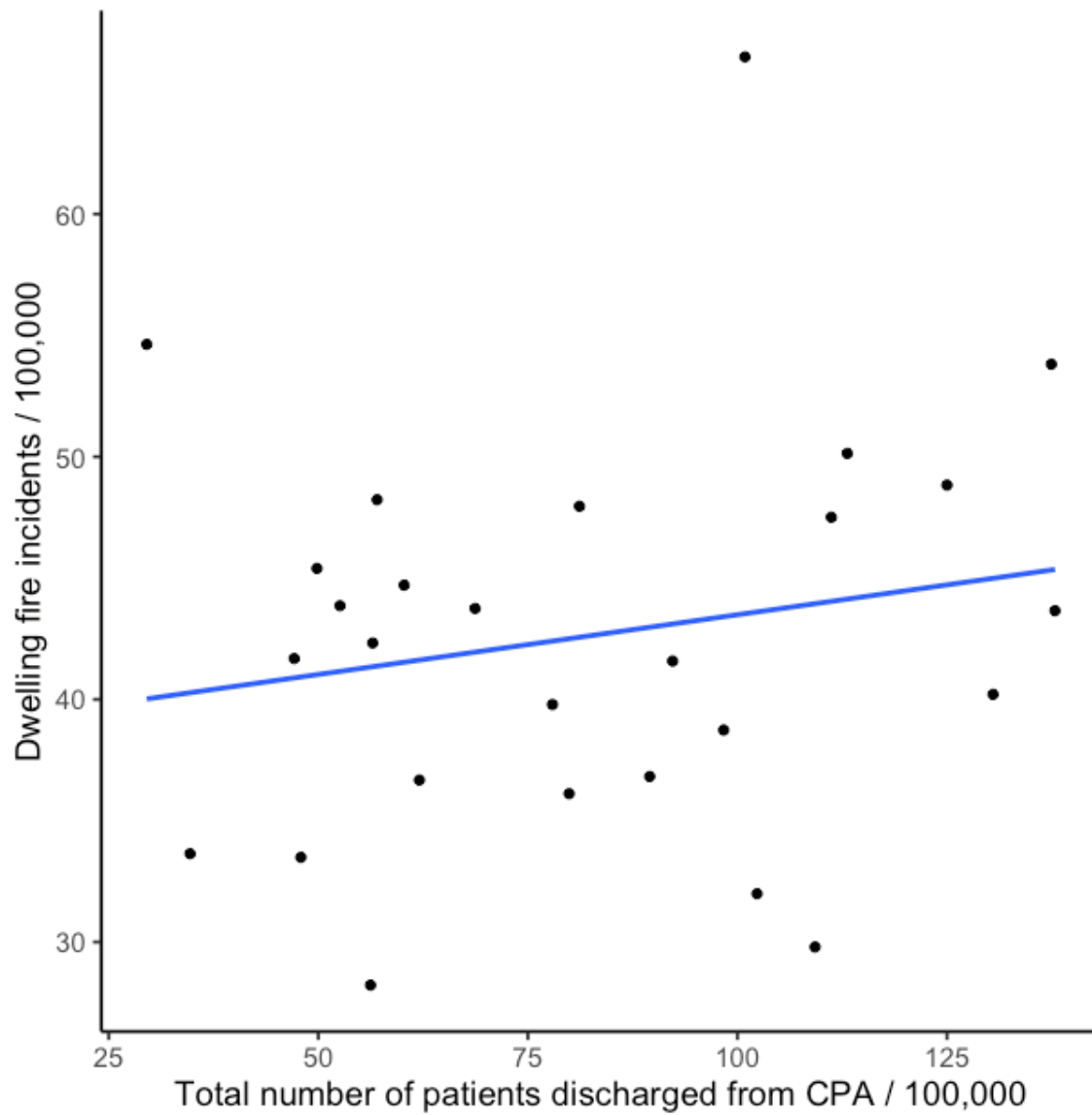


Figure 5. Relationship between the total number of admissions for CHRT and the number of accidental dwelling fire incidents

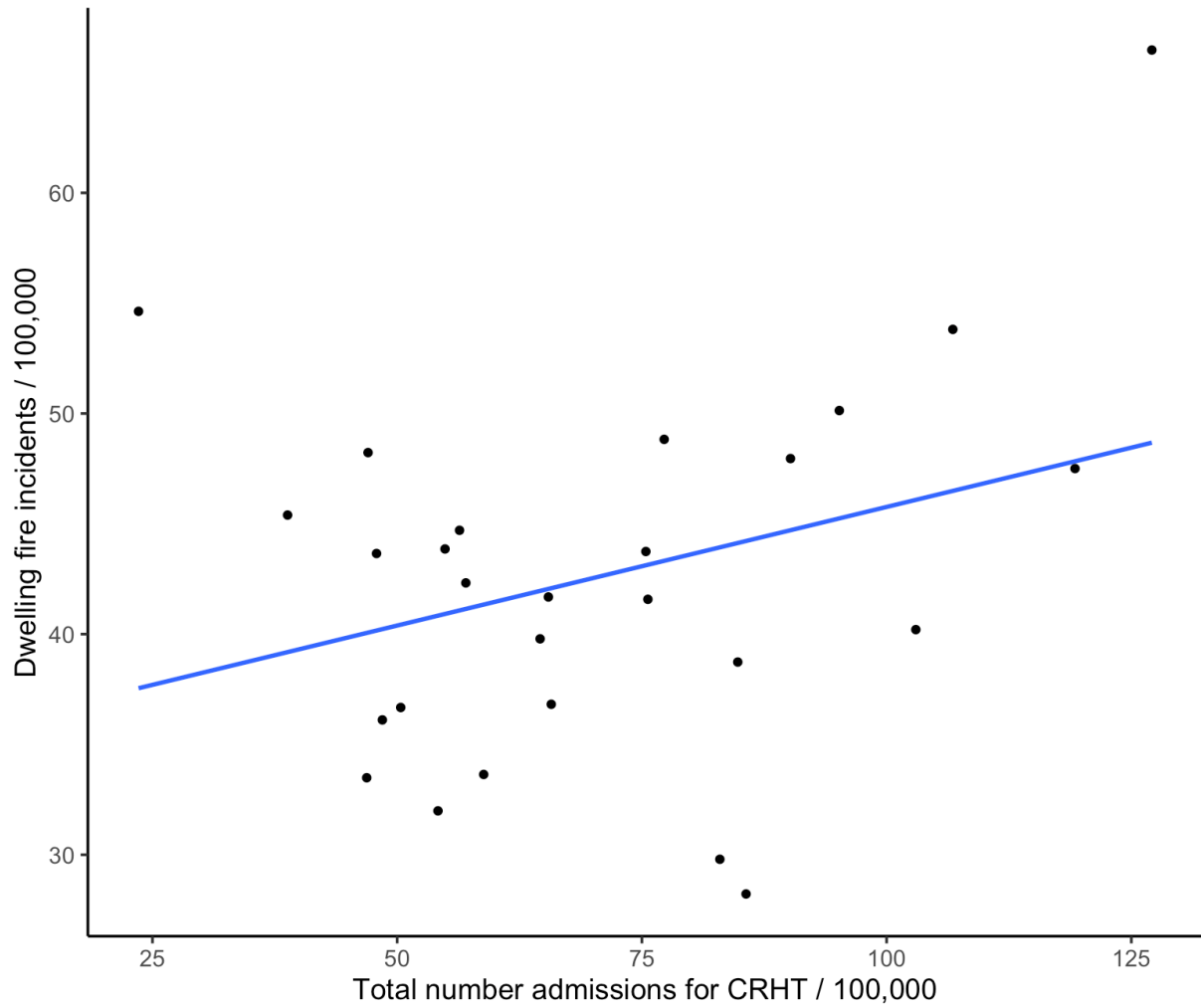


Figure 8. Relationship between the number of mental health inpatient admissions and the number of accidental dwelling fire incidents

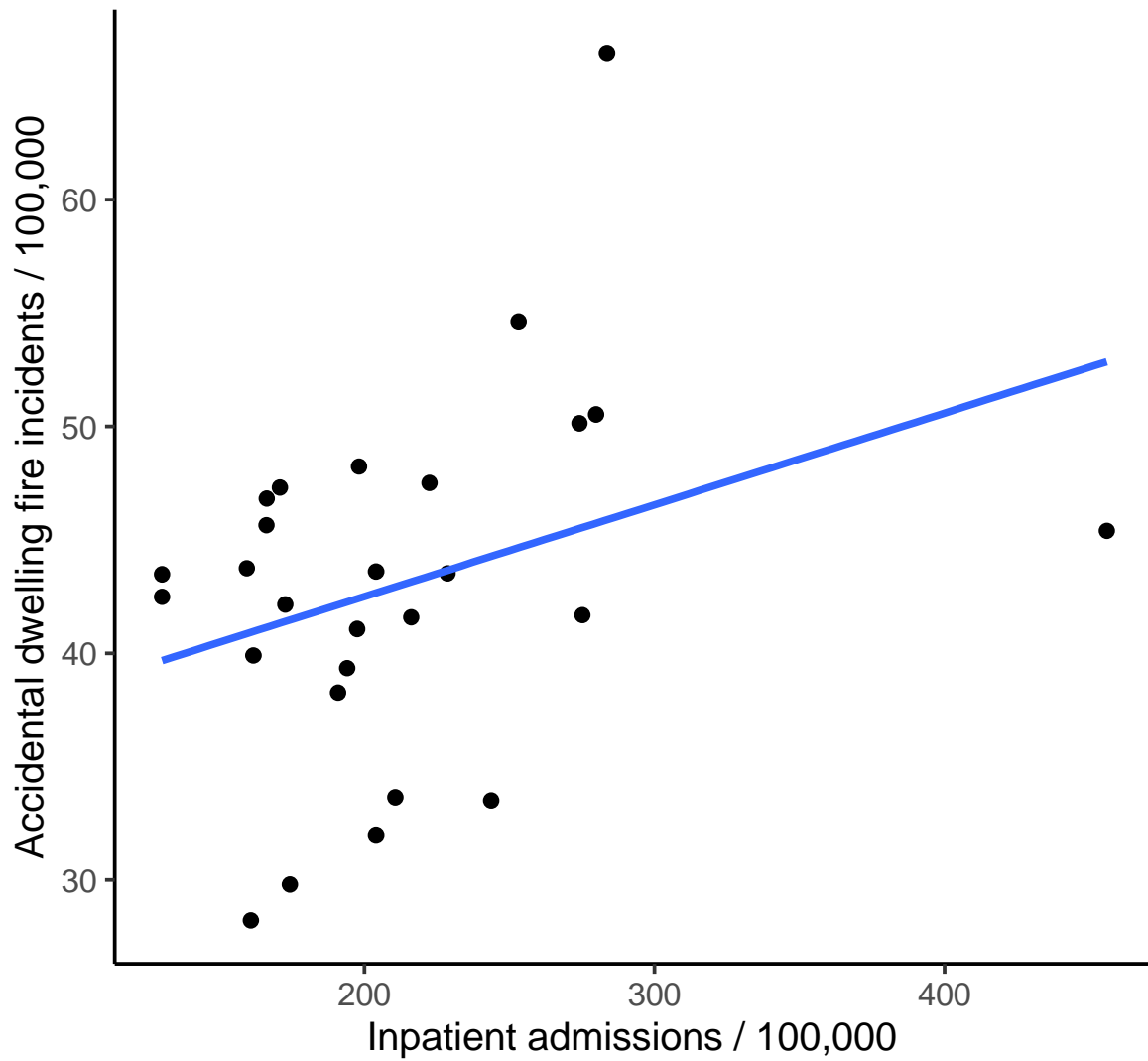


Figure 12. Relationship between total cost of mental health cases and the number of deliberate dwelling fire incidents

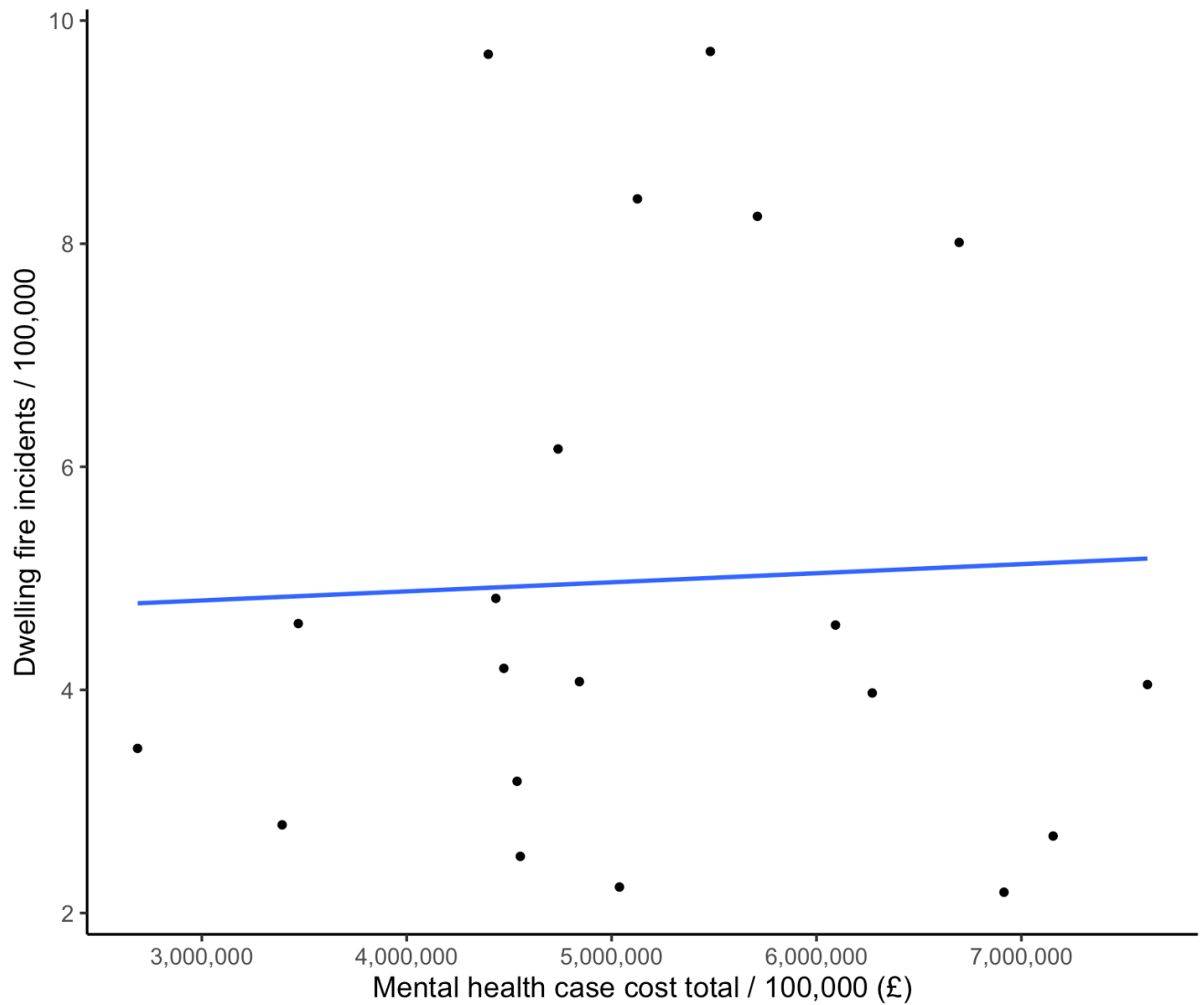


Figure 13. Relationship between the total number of patients discharged from CPA and the number of deliberate dwelling fire incidents

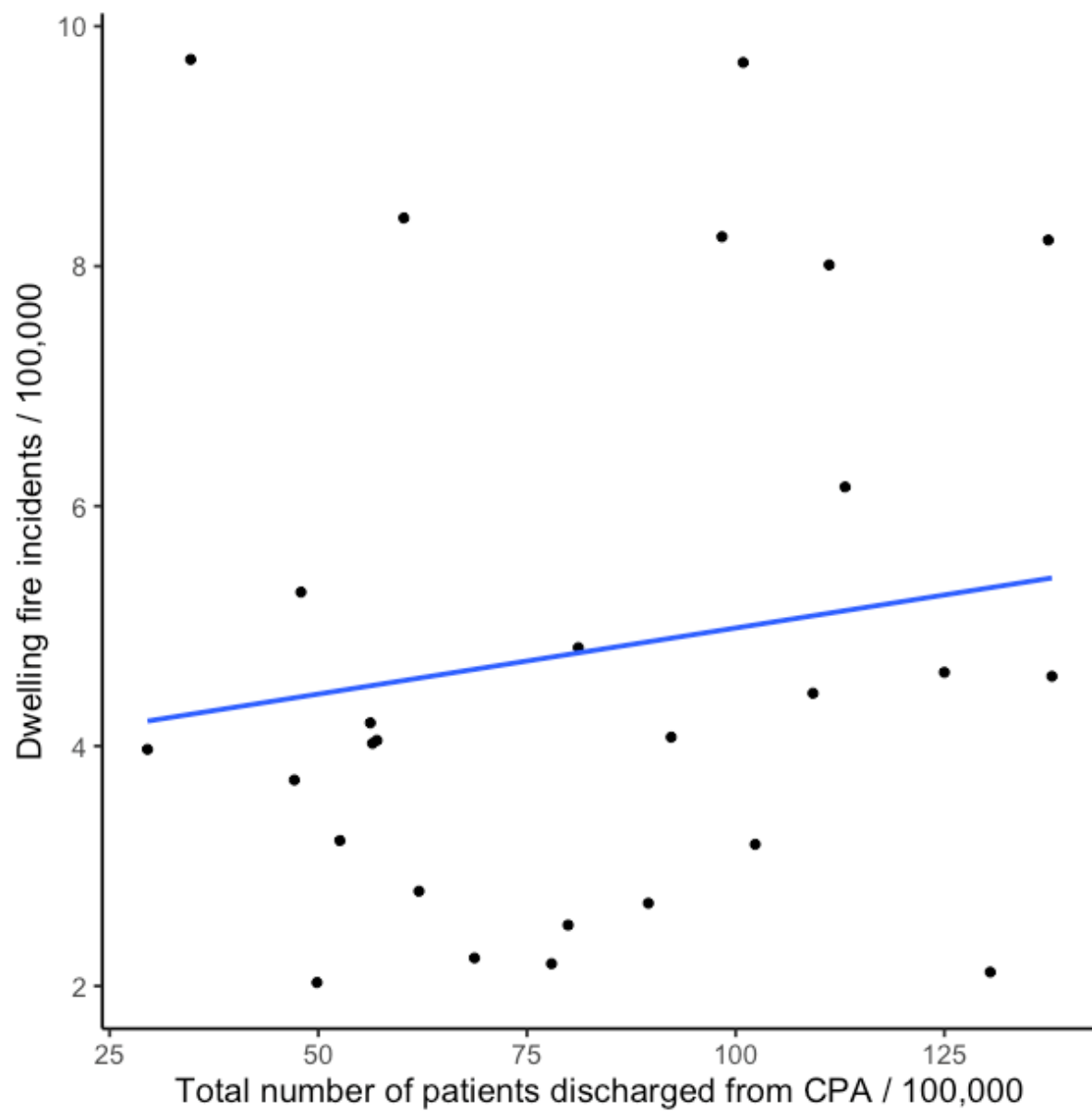


Figure 17. Relationship between the number of mental health inpatient admissions and the number of deliberate dwelling fire incidents

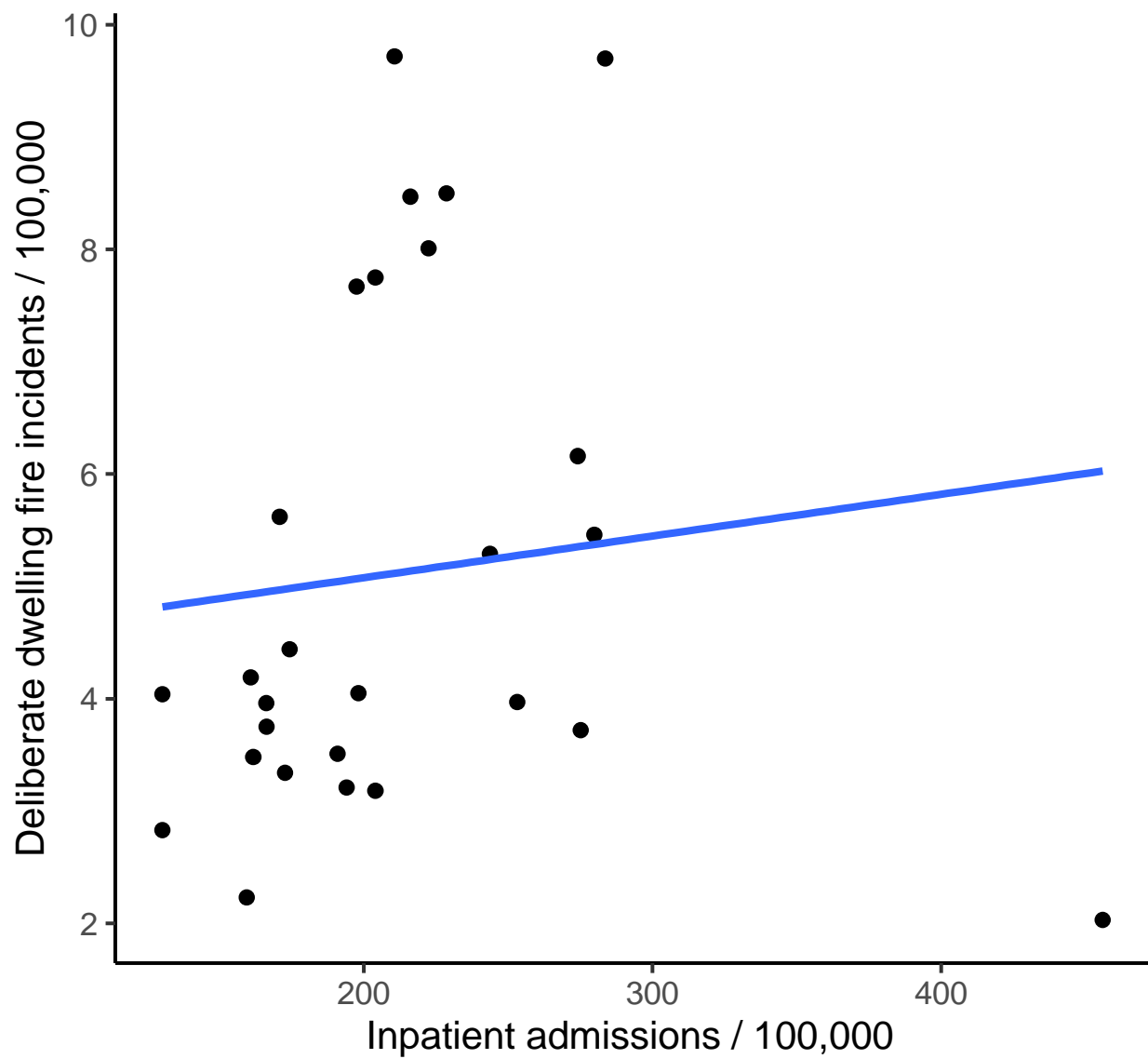
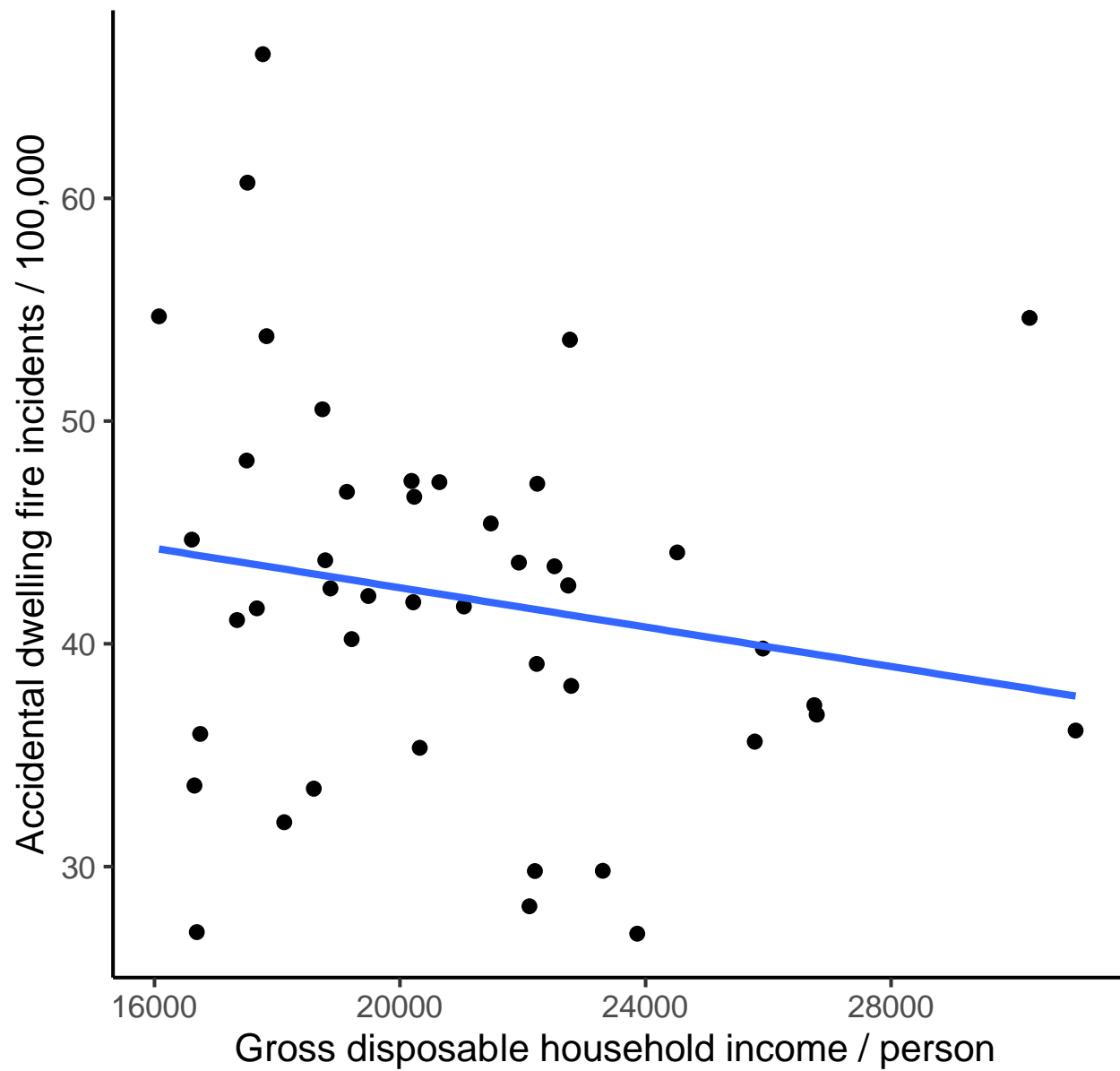


Figure 25. Relationship between the average gross disposable household income per person and the number of accidental dwelling fire incidents





Contact

Dr Rowena Hill for more information: rowena.hill@ntu.ac.uk

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