

Investigation of pre- and post- fire conditions in residential buildings during COVID-19 based on English fire statistics

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Aim and Objectives

Aim: To investigate the fire statistics published by the Home Office to understand the pre-, during and post-fire conditions of houses in multiple occupancy (HMO) residential buildings during COVID-19.

Objectives:

1 Write a **literature review** on fire statistics in the UK and abroad.

2 Assess the **collection methods** of the fire statistics.

3 Identify the **variables** relevant to the project by studying the fire statistical dataset.

4 Analyse the **fire statistical variables** that apply to HMOs for the duration of the COVID-19 pandemic.

5 To determine an appropriate **conclusion** with potential **recommendations** and suggestions for future work.

Literature Review

Previous studies

Before COVID-19

- An overall decrease of fire incidents over the years;
 - 2022 in Greece, there was a reduction of dwelling fire incidents by 20% over 20+ years
- In Greece, US, China, Sweden & the UK there was an increased correlation between the presence of the inhabitants and the rise of fire incidents;
 - Less dwelling fires during the weekday
 - Over 25% of fires due to cooking or food as the ignition source
 - Fires recorded more often with 29% of fires related to heating equipment during winter months.

During & post-COVID-19

- Limited studies about the novelty of post-COVID-19 lifestyles
 - Mainly focused on the response to COVID-19 and the impacts it had on fire statistics.
- Increase in home cooking led to an increase in fire risks in Tokyo and San Francisco.

England

Codes and Regulations

International



Builds in England should adhere to the published documents by the **British Standard Institution (BSI)**, notably

- BS PD 9991 (2015)
- BS PD 7974 (2019) - Probabilistic Risk Assessment (PRA)

Alongside

- **Approved Document B: Volume 1 (Dwellings)**



Analysed regulations and collection methods for other countries:

- **ISO/TR 17755:2014 (2014)**
The national fire statistics practices for 10 countries (Australia, Canada, China, France, Japan, Kenya, (Republic of) Korea, Russia, United Kingdom, and the USA)
- **EU FireStat Task 0, 1 & 4**
 - Variation between definitions:
e.g. – The classification of a fire fatality.

Methodology

Fire and Rescue Services (FRS)

Once a fire has been reported, the FRS attend the scene.

The team then follow up by completing the **Incident Reporting System (IRS) form** about the incident.

Incident Reporting System (IRS)

The completed questionnaire is processed by the **IRS**.

Developed by the Home Office the system accumulates all the data incidents collected across Great Britain by FRSs.

Each IRS question corresponds to a variable in the dataset.

Home Office Datasets

Data **quality assurance** and **reliability** are ensured through collection, processing and **monthly monitoring**.

Identifying trends/ unidentified inconsistencies that 'flag the system' to conduct follow-up procedures for additional information.

Data analysis

Dwelling fire incidents dataset by the Home Office.

The variables identified by the IRS were evaluated conforming with **pre-, during and post-fire** conditions of **HMO** residential buildings during **COVID-19**.

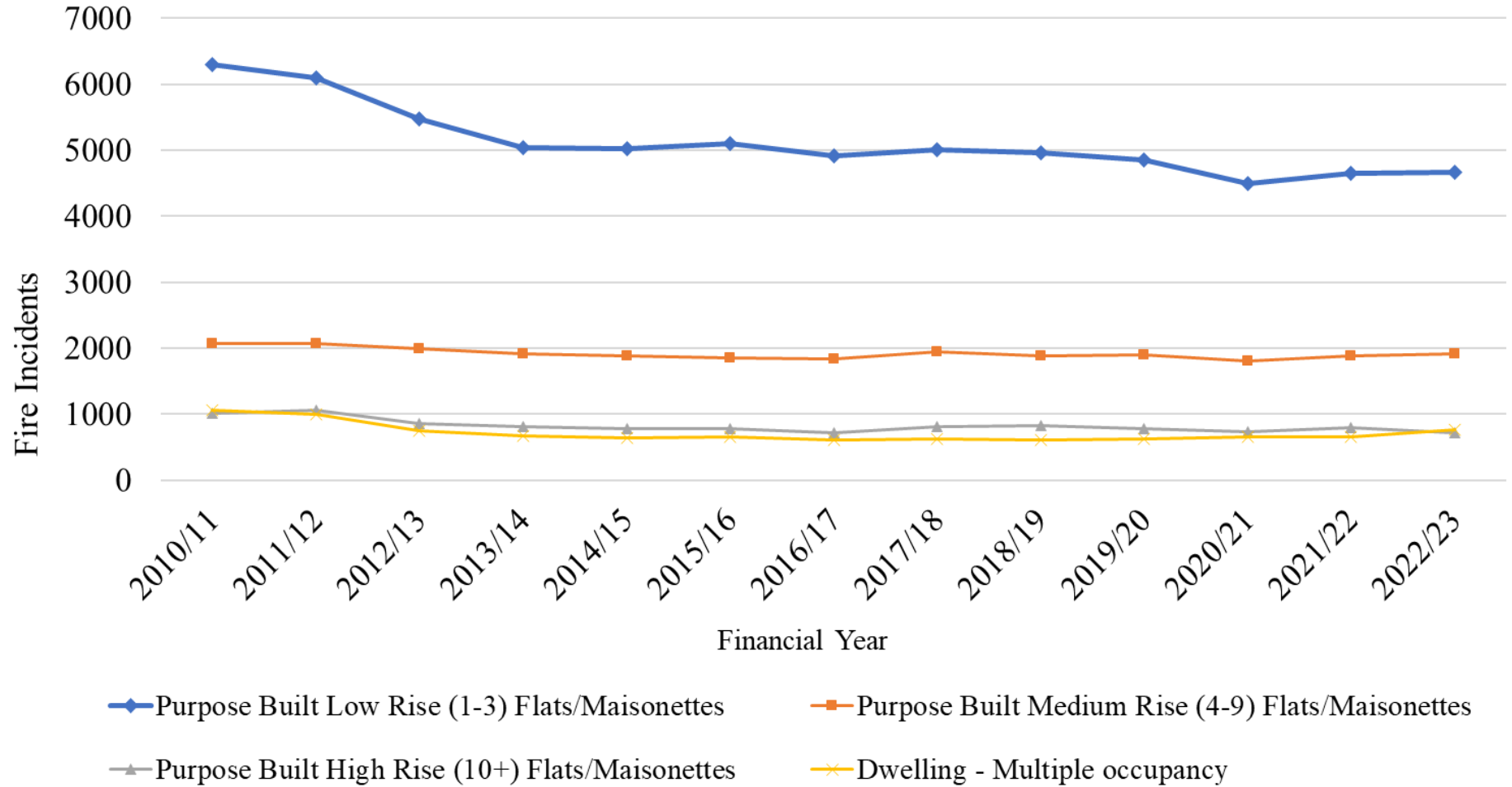
Variable Types	Variables Present in Datasets
Pre-Fire	Cause of Fire
	Fire Start Location
	Item Ignited
	Source of Ignition
	Ignition Power
During-Fire	Fire Size of Arrival
	Other Property Affected on Arrival
	Item Causing Spread
	Rapid Fire Growth
Post-Fire	Fire Damage Extent (with Code)
	Total Damage Extent (with Code)
	Spread of Fire
	Other Property Affected Close
Fire Response	Ignition to Discovery
	Discovery to Call
	Late Call
	Vehicles (with Code)
	Personnel (with Code)
	Response Time (with Code)
	Time at Scene (with Code)

Variable Types	Variables Present in Datasets
Fire Incident Description	FRS Territory
	Emergency Code Territory
	Financial Year
	Weekday or Weekend
	Day or Night
	Dwelling Type
	Building Special Construction Description
	Occupancy Type
	Occupied Normally
	Accidental or Deliberate
Fire Safety measures	Alarm System
	No Alarms
	Alarm System Type
	Alarm Reason for Poor Outcome
	Evacuation (with Code)
Life Safety	Fatality Casualty
	Rescues

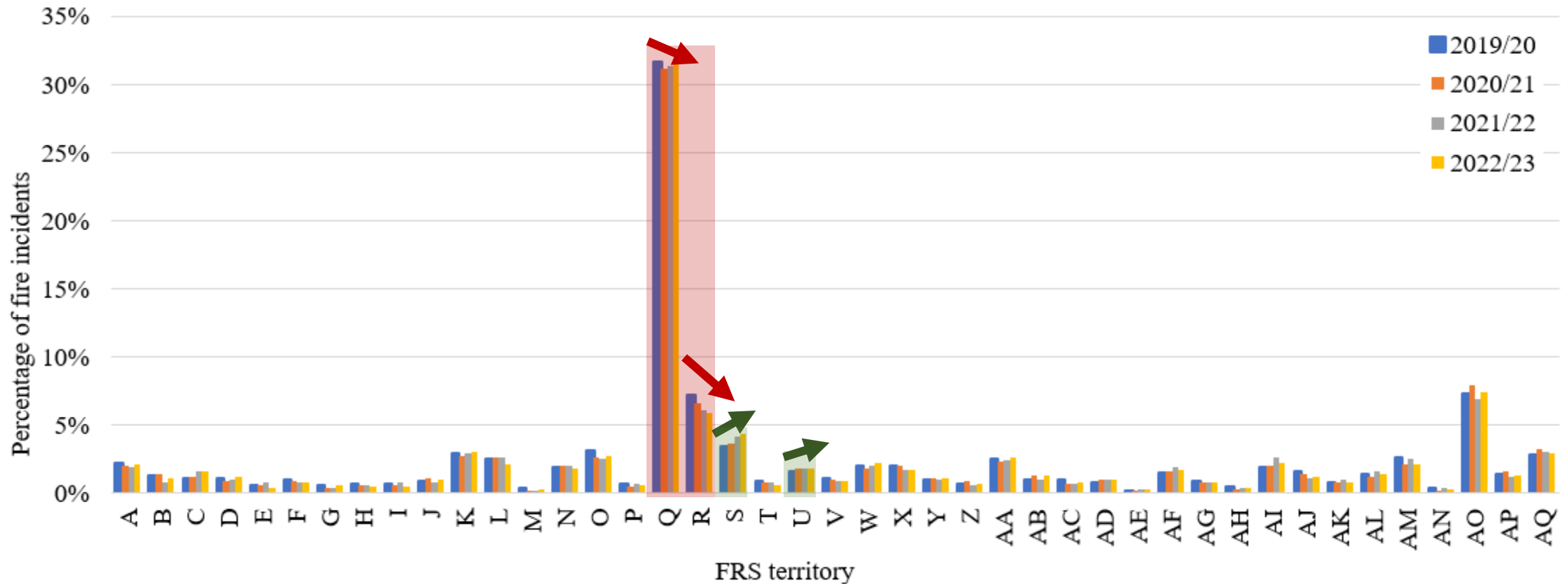
- Financial year:
 - 2019/20
 - 2020/21
 - 2021/22
 - 2022/23
- HMO property types:
 - Multiple occupancy
 - Purpose-built low-rise (1-3) flats/maisonette
 - Purpose-built medium-rise (4-9) flat/maisonette
 - Purpose-built high-rise (10+) flat/maisonette

Results & Discussion

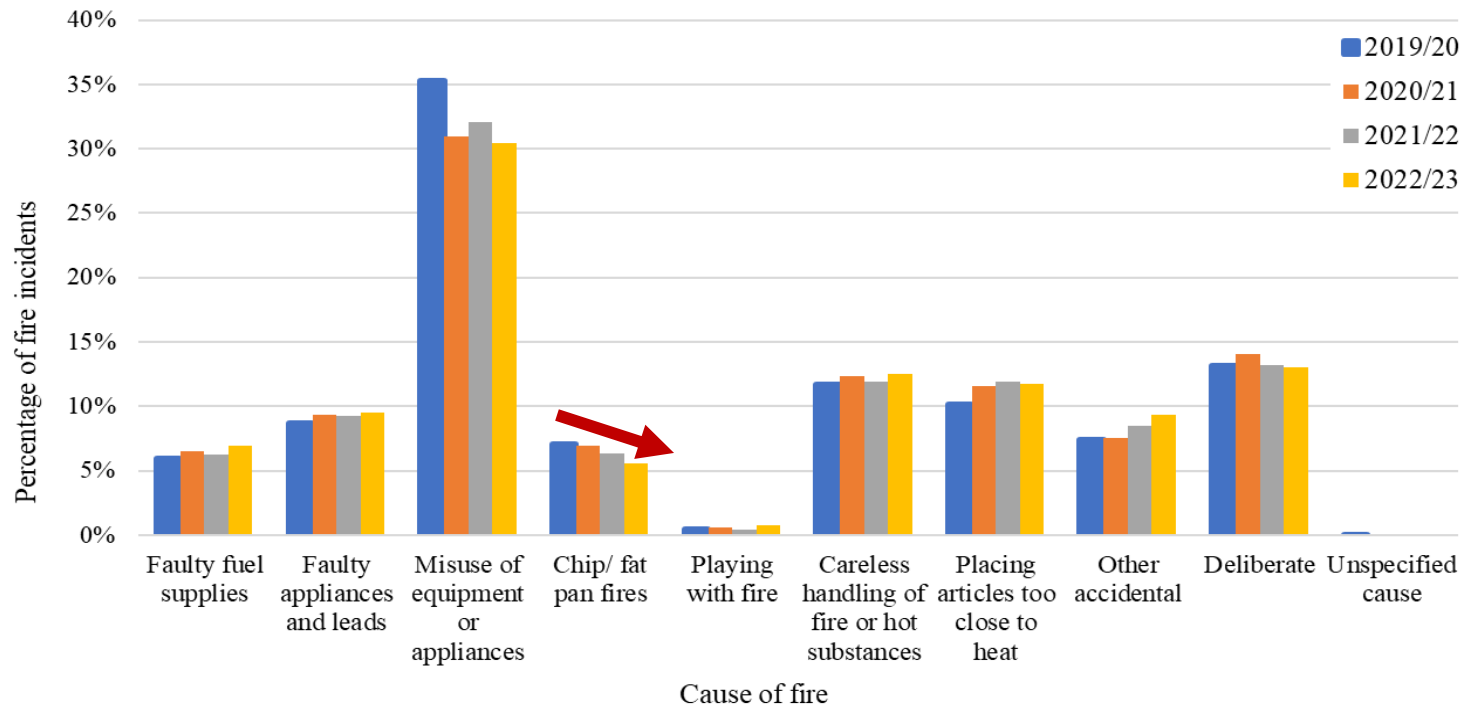
- Consistent decrease of dwelling fire incidents 29% average in HMOs
- Registered HMOs 1.5% reduction in the 2021 census
- 2010/11 - 2022/23, 22.6% decrease of HMO fires.



- High population density areas experience a decline in fire incidents - Greater London (consistently 30%+ of fires) and Greater Manchester (more than 5% of fires)
- Juxtaposing trends for many low-density areas (Hampshire and the Isle of Wight).

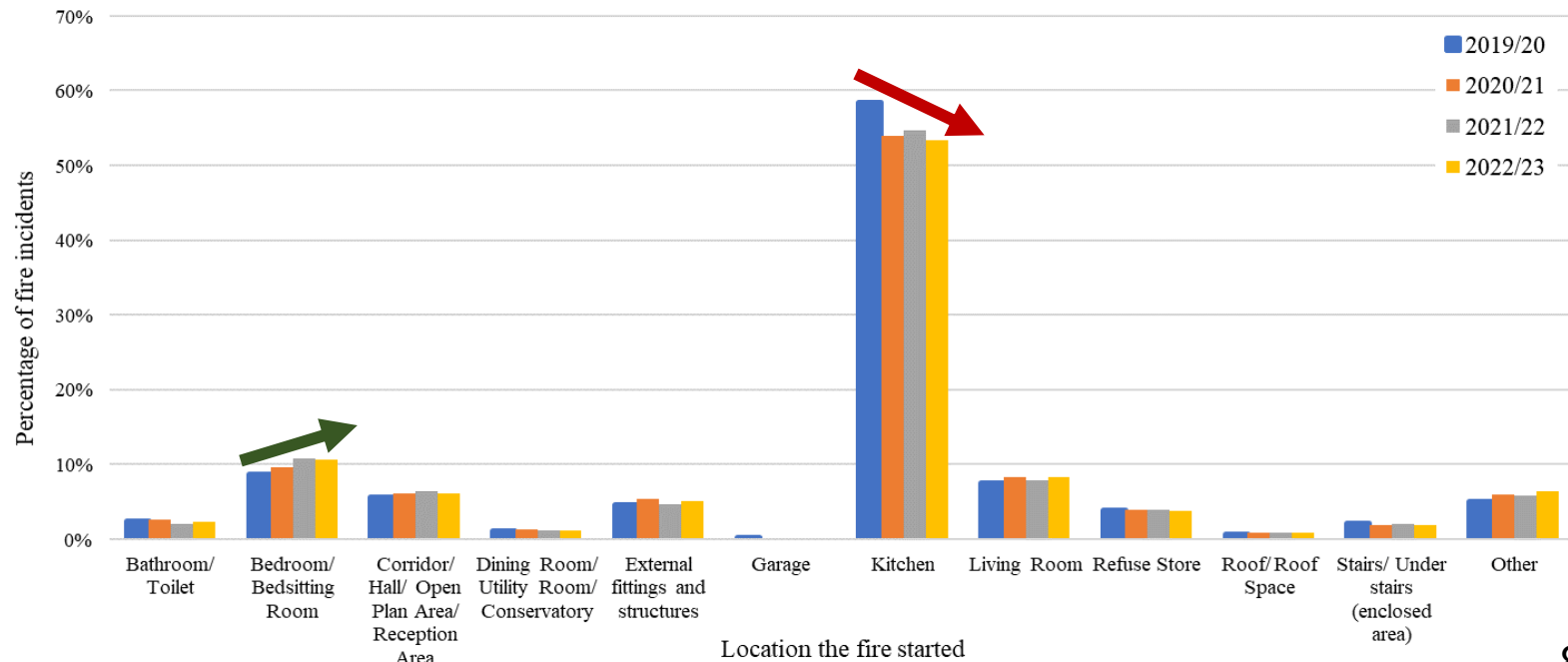


A. Avon; B. Bedfordshire; C. Berkshire; D. Buckinghamshire; E. Cambridgeshire; F. Cheshire; G. Cleveland; H. Cornwall and Isles of Scilly; I. Cumbria; J. Derbyshire; K. Devon and Somerset; L. Dorset and Wiltshire; M. Durham; N. East Sussex; O. Essex; P. Gloucestershire; Q. Greater London; R. Greater Manchester; S. Hampshire and Isle of Wight; T. Hereford and Worcester; U. Hertfordshire; V. Humberside; W. Kent; X. Lancashire; Y. Leicestershire; Z. Lincolnshire; AA. Merseyside; AB. Norfolk; AC. North Yorkshire; AD. Northamptonshire; AE. Northumberland; AF. Nottinghamshire; AG. Oxfordshire; AH. Shropshire; AI. South Yorkshire; AJ. Staffordshire; AK. Suffolk; AL. Surrey; AM. Tyne and Wear; AN. Warwickshire; AO. West Midlands; AP. West Sussex; AQ. West Yorkshire.

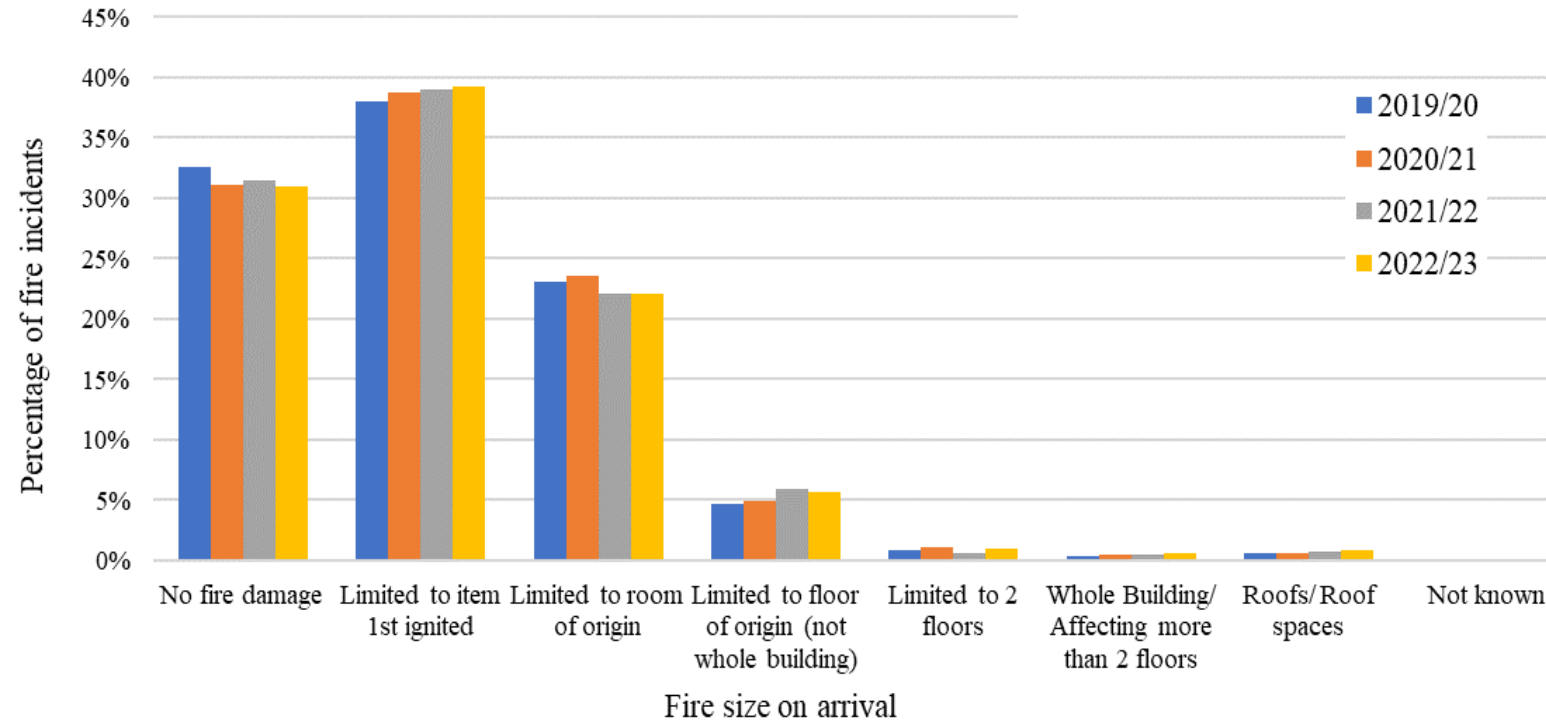
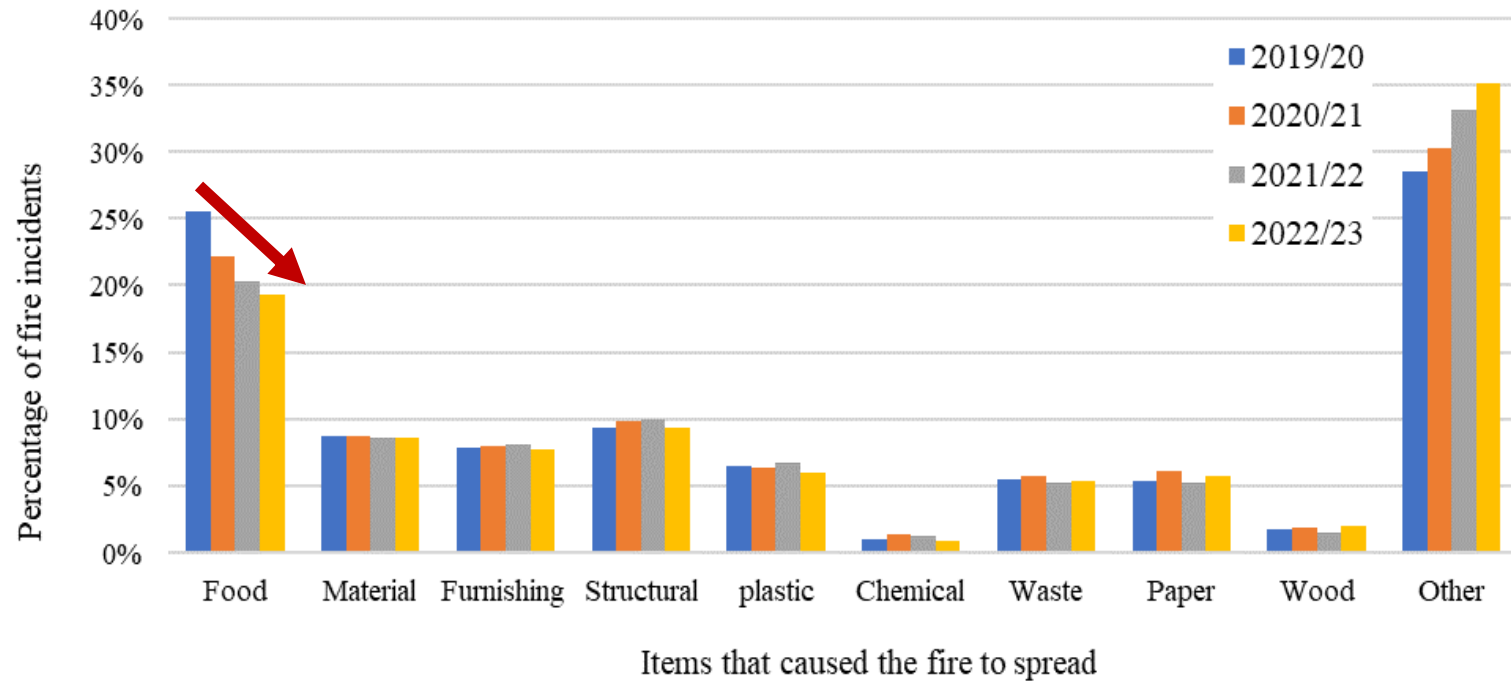


- Fires caused by the Misuse of equipment/appliances, decreased 4% over the 4 years
- An annual 1-2% increase by faulty fuel supplies & faulty appliances and leads
- Increase of fires due to heated appliances & hot substances reflecting the increased presence of occupants.

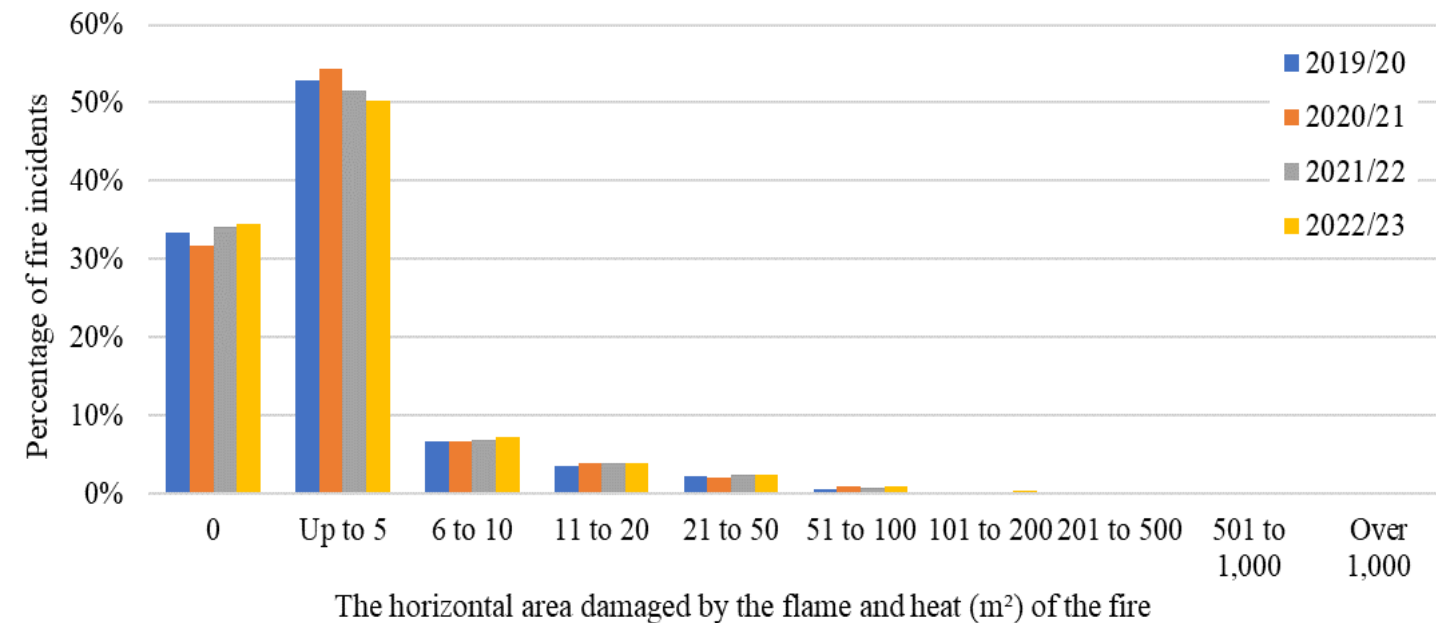
- Kitchen is the leading fire location
 - From 2019/20 to 2022/23, 5% decrease in fires starting in the kitchen
 - 8% decrease in incidents with food as the ignited item
- Increase of bedroom originated fires for each financial year from 9% in 2019/20 to 11% in 2021/22.



- Food is one of the items that causes the most fires, decreasing by 7%
- 'Other' category increased by 500+ equating to 6% over the 4 years
 - Indicating the potential increase of fire risk by animals/ decorations/ celebrations/ vegetation.



- Over a 1/3 of fires were limited to the primary ignited item
- Decrease of fires with no damage across the 4 years
 - May reflect the residents' awareness of fire safety to reduce sources that could influence the spread of a fire.



- 50% of fires with up to 5 m² horizontal fire damage
- Decrease of fires with damage up to 5 m², 2020/21 spike may reflect repercussions of lockdowns
 - Potential reservations regarding FRS entering residents' houses during the restrictions.
 - Impacts on the dynamics of an HMO?

- Average of 97% fires not affecting any adjacent properties
- Annual 1% increase of other properties being affected on the arrival of the FRS for Low-rise purpose-built dwellings
 - May reflect the property type's typical demographic harbouring a higher fire risk compared to other HMO types.



Whether an adjacent property was affected by the fire in relation to the property type

A. Purpose Built Low Rise (1-3) Flats/Maisonettes; B. Purpose Built Medium Rise (4-9) Flats/Maisonettes; C. Purpose Built High Rise (10+) Flats/Maisonettes; D. Dwelling - Multiple occupancy.

Conclusions

This research study identifies HMO fire incidents in England over the COVID-19 global pandemic

- **Cooking-related incidents** still account for a large proportion of fires, though since COVID-19 this **declined**.
- Contradicting the expected increase of dwelling fires, due to the positive correlation between the presence of occupants to the risk of a fire occurring, due to lockdown measures in COVID-19. Highlighting **the social implications that COVID-19** may have had upon the fire statistics.
 - New hobbies & altering spaces to accommodate for working/ learning from home increasing potential misuse of equipment.

Limitations

- The annual increase in fire incidents were the class of “**other**” describes the incident.
 - Lack of information gathered or available during the fire incidents
 - Constant development of material and technology potentially being the cause of fires?
- Brief **time scale** may not reflect trends that occurred specifically in response to the global pandemic.
- Terminology used to define HMOs is not internationally acknowledged or applied in the dwelling dataset.
- Solely depends upon the information in the Home Office dwelling fire incidents dataset.

Future Work

- Explore all **variables** in the IRS/dataset.
 - For instance, if there was an increase in the time taken to report the fire and why?
- Investigate further into **post-COVID-19**.
 - Did COVID-19 create an **everlasting** impact on fire statistics concerning HMOs in England?
- The **social impact** that the pandemic inflicted
 - Increased stress due to lockdown measures
 - Potential movement of residents from urban to rural settings.

Thank you for listening

Questions?