Fire Contaminants Research

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A little bit about me……

- Professor in Fire Chemistry and Toxicity at University of Central Lancashire
- **Specialist** on the **International Agency for Research on Cancer Monographs**, Volume 132 – 'Occupational exposure as a Firefighter', World Health Organization
- **Member** on the National Academies of Sciences, Engineering and Medicine, "The Chemistry of Urban Wildfires", USA
- **Grenfell Inquiry Scientific Expert**: to determine the fire derived toxicants and related deposits present in the Tower and their origins
- **Expert Witness on Environmental Audit Committee**, Toxic Chemicals in Everyday Life, House of Commons, UK Parliament
- **European Parliament**, MEPs Against Cancer (MAC), European Parliament Interest Group: Addressing the rate of cancers amongst firefighters
- UK's designated principal expert on Fire Chemistry to the **ISO Fire Threat to People and the Environment** subcommittee (ISO/TC92/SC3)

Firefighting is one of the most hazardous occupations.

- Widespread use of plastics increases growth and severity of fires.
- Modern materials (plastics etc.) also produce higher concentrations of toxicants.
- Fire smoke is the biggest killer in fires, yet outside mass transport, it is completely unregulated

Firefighters Occupational Cancers and Diseases

USA: California was the first state to pass a firefighter's presumptive illness law in 1982. In 2019, 48 out of 50 states have the health presumption laws for state and local firefighters

Australia: Presumptive cancer law for federal firefighters introduced in 2011.

International Agency for Research on Cancer, **WHO**, classified occupational firefighter exposure as a as carcinogenic (Group 1).

1982

1997

2011

2019

2022

Canada: Introduced presumptive legislation for full-time firefighters diseases and investigators in 1997

Poland: Presumptive legislation for firefighters occupational diseases introduced in 2019

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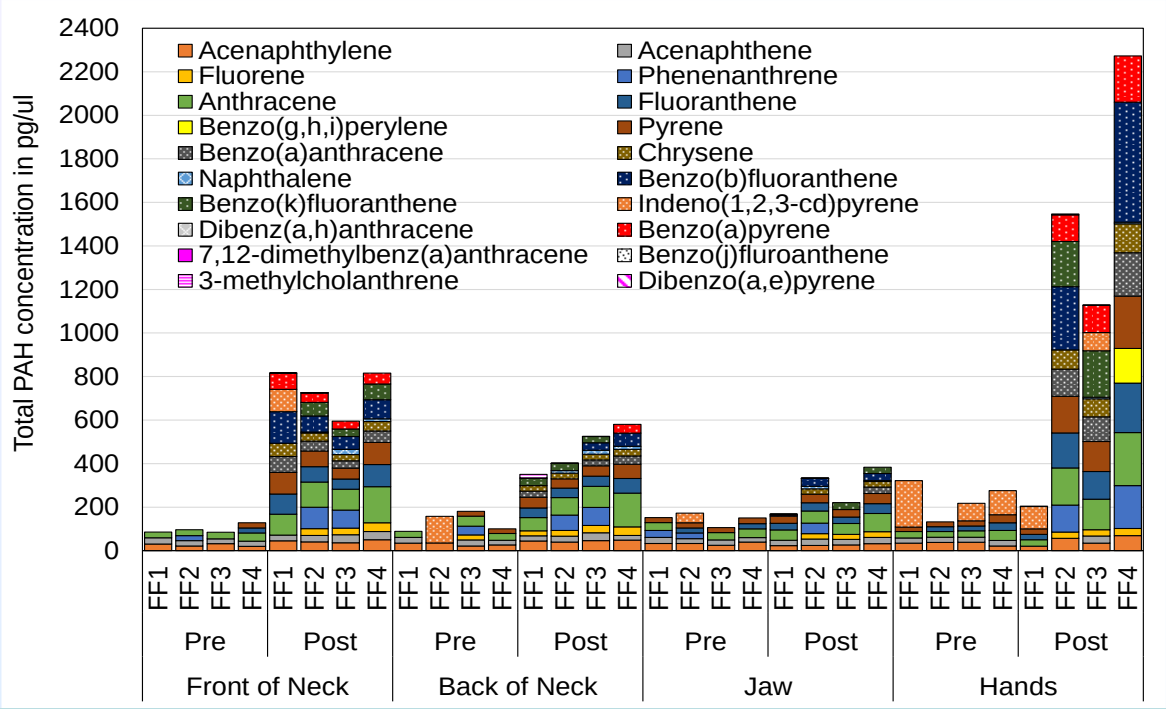
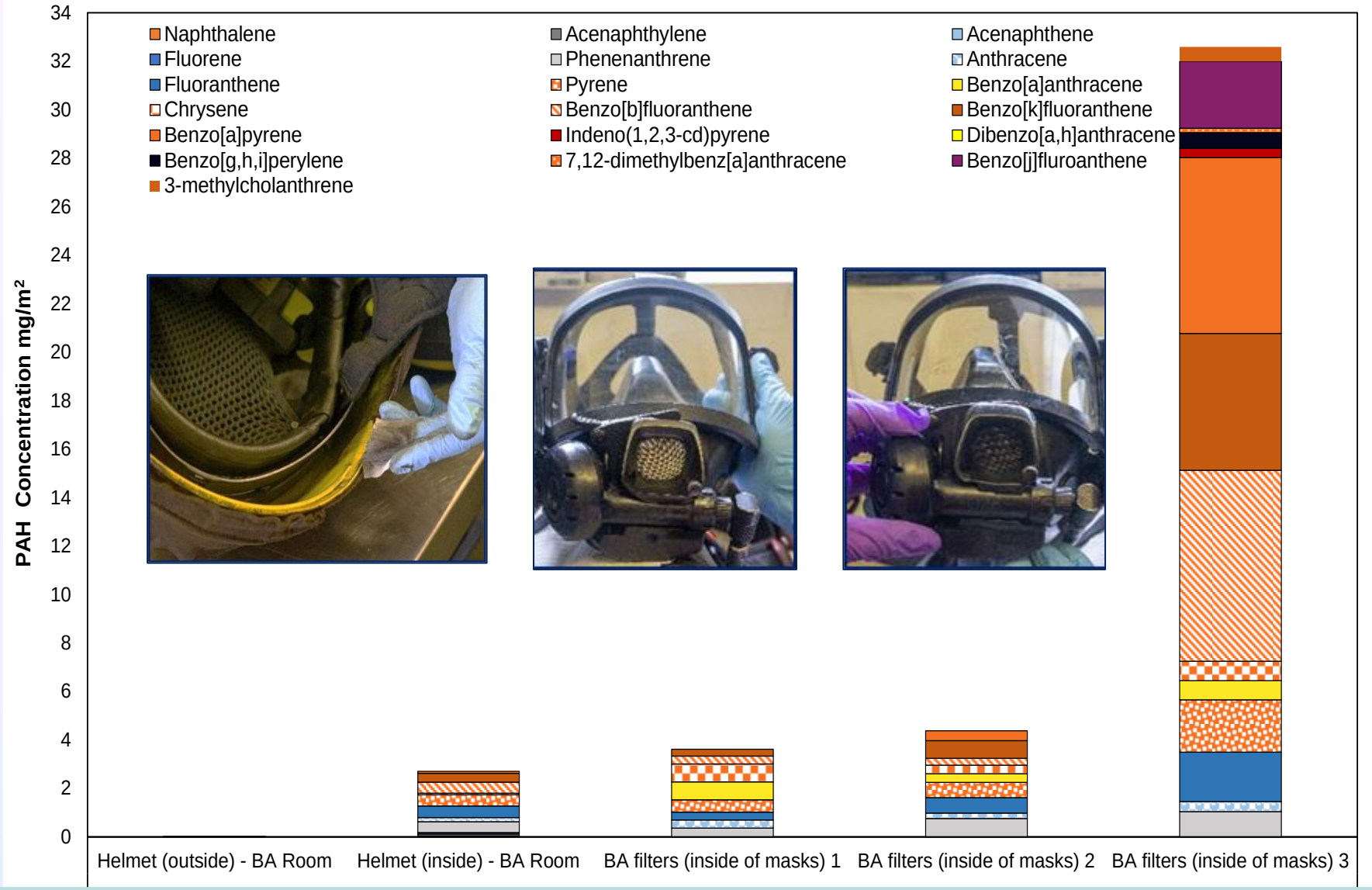
Firefighters and Exposure to Contaminants

- Aproximately 160 fire fighters: skin (face, neck, wrist, hands)
- Fire fighters clothing: SCBA masks, gloves, hood, zipflap
- Fire fighters offices, clothing rooms, fire engines bays and fire engines
- Approximately 600 samples (within 2.5 week) for the analysis of semi- and volatile organic compounds



A A Stec et al., *Scientific Reports* **volume 8**, Article number: 2476 (2018)

Firefighters and Exposure to Contaminants



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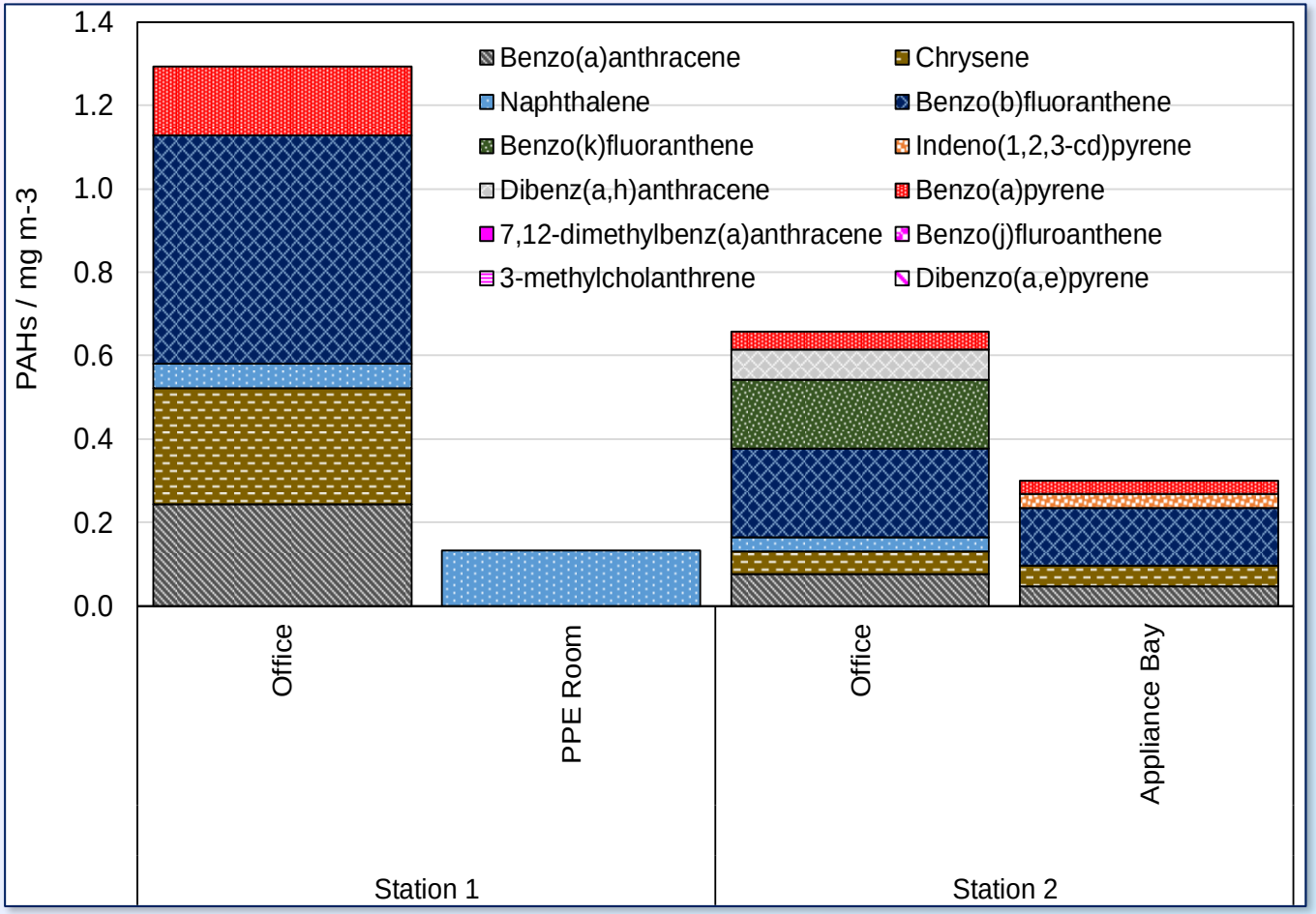
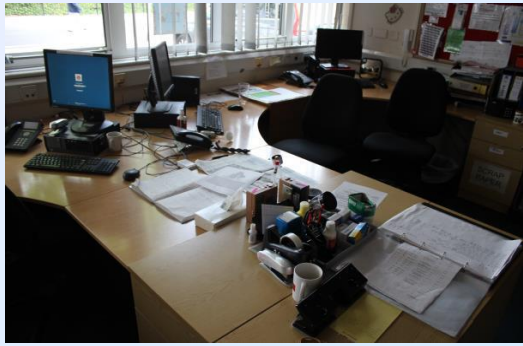
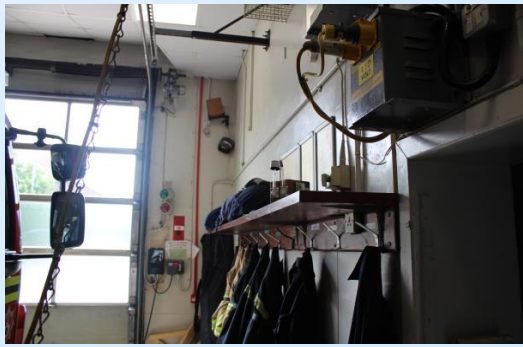
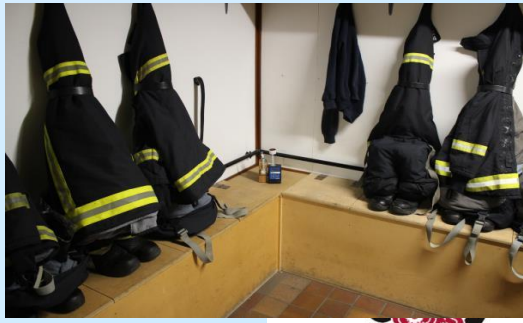
Firefighters Exposure to Contaminants









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Fire Brigades Union – UCLan Research Project

To identify association (if any) between fire toxicants exposures and the increased occurrence of cancers and diseases among firefighters.

…so we can offer preventative health monitoring, education and support that is specifically designed to protect firefighter's health…..

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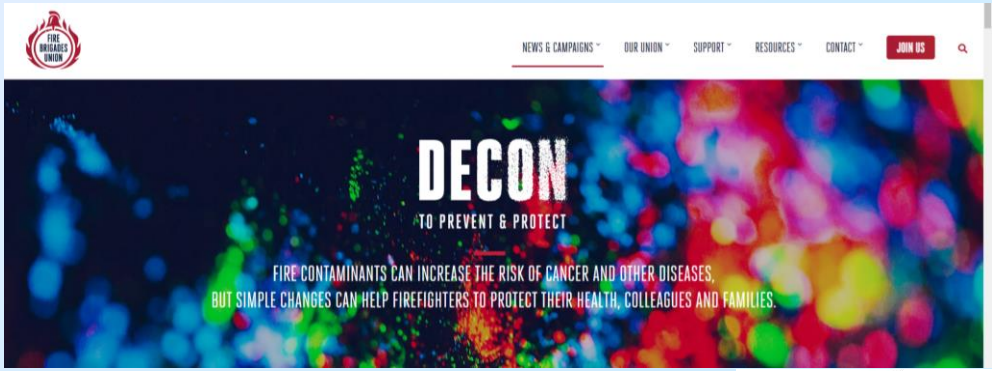
Minimising firefighters' exposure to toxic fire effluents

Interim Best Practice Report

An independent report by uclan with a foreword by FBU General Secretary Matt Wrack

Commissioned by FBU



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UCLan

Minimiziranje izloženosti vatrogasaca otrovnim efluentima

Për minimizimin e ekzpozimit të zjarrfikësve ndaj rrjedhjeve toksike gjatë shuarjes së zjarrit

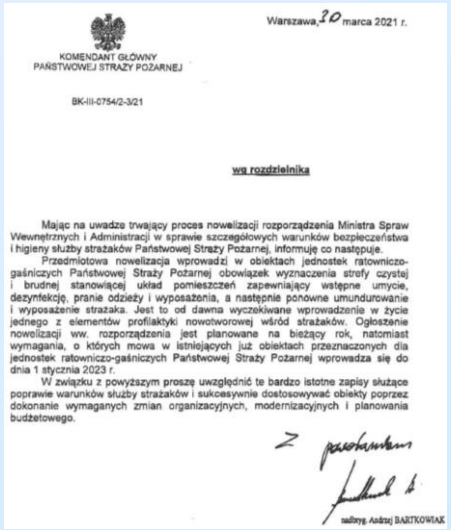
Minimalizacja narażenia strażaków na toksyczne produkty pożarowe

Okresowy Raport Najlepszych Praktyk

Niezależny raport autorstwa uclan z przedmową Sekretarza Generalnego FBU MattaWracka

Na zlecenie FBU

Minimiziranje izloženosti vatrogasaca otrovnim efluentima



KOMENDANT GŁÓWNY
PAŃSTWOWEJ STRAŻY POŻARNEJ

Warszawa, 20 marca 2021 r.

BK-III-0754/2-3/21

ws rozdzielnika

Mając na uwadze trwający proces nowelizacji rozporządzenia Ministra Spraw Wewnętrznych i Administracji w sprawie szczegółowych warunków bezpieczeństwa i higieny służby strażaków Państwowej Straży Pożarnej, informuję co następuje.

Przedmiotowa nowelizacja wprowadzi w obiektach jednostek ratowniczo-gaśniczych Państwowej Straży Pożarnej obowiązek wyznaczenia strefy czystej i brudnej stanowiącej układ pomieszczeń zapewniający wstępne umycie, dezynfekcję, pranie odzieży i wyposażenia, a następnie ponowne umundurowanie i wyposażenie strażaka. Jest to od dawna wyczekiwane wprowadzenie w życie jednego z elementów profilaktyki nowotworowej wśród strażaków. Ogłoszenie nowelizacji ww. rozporządzenia jest planowane na bieżący rok, natomiast wymagania, o których mowa w istniejących już obiektach przeznaczonych dla jednostek ratowniczo-gaśniczych Państwowej Straży Pożarnej wprowadza się do dnia 1 stycznia 2023 r.

W związku z powyższym proszę uwzględnić te bardzo istotne zapisy służące poprawie warunków służby strażaków i sukcesywnie dostosowywać obiekty poprzez dokonanie wymaganych zmian organizacyjnych, modernizacyjnych i planowania budżetowego.

z poważaniem

nadinsp. Andrzej BARTKOWIAK

Minimizar a exposição dos bombeiros aos agentes tóxicos provocados pelos incêndios

Relatório de boas práticas

Um relatório independente apresentado por UCLAN com prefácio do Secretário Geral de FBU, Matt Wrack

Minimalizace expozice hasičů toxickým zplodinám hoření

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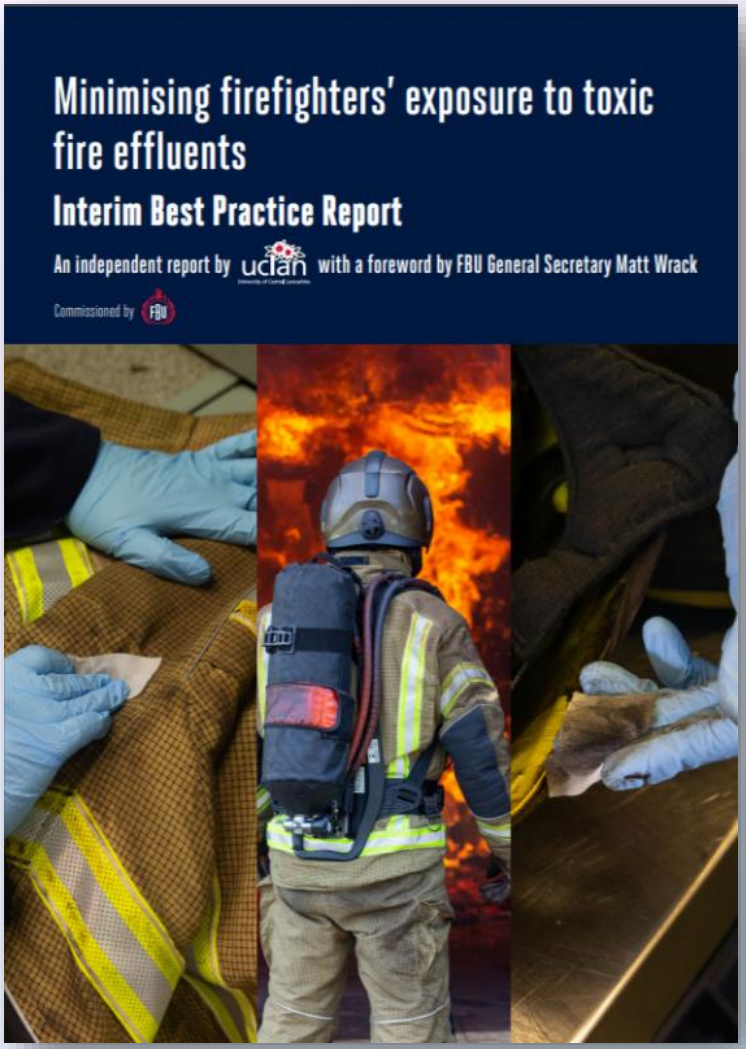
The UK Firefighter Contamination Survey



- Run for 3 months in 2020
- 64 questions
- Open to serving firefighters
- 10, 649 participants
  (~24% of UK's firefighters)

https://www.fbu.org.uk/publications/minimising-firefighters-exposure-toxic-fire-effluents

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The UK Firefighter Contamination Survey

www.nature.com/scientificreports

scientific reports

Check for updates

OPEN

Cancer incidence amongst UK firefighters

Taylor A. M. Wolffe[1], Andrew Robinson[1,2], Kathryn Dickens[1], Louis Turrell[1,2], Anna Clinton[1], Daniella Maritan-Thomson[1], Miland Joshi[3] & Anna A. Stec[1]

www.nature.com/scientificreports

scientific reports

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Culture and awareness of occupational health risks amongst UK firefighters

Taylor A. M. Wolffe[1], Louis Turrell[1,2], Andrew Robinson[1,2], Kathryn Dickens[1], Anna Clinton[1], Daniella Maritan-Thomson[1] & Anna A. Stec[1]

Firefighters are exposed to toxic chemicals not only from the fire incidents they attend, but also from

www.nature.com/scientificreports

scientific reports

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OPEN

Mental health of UK firefighters

Taylor A. M. Wolffe[1], Andrew Robinson[1,2], Anna Clinton[1], Louis Turrell[1,2] & Anna A. Stec[1]

Exposure to trauma, high-stress situations, and disrupted sleep are well known risk factors affecting

scientific reports

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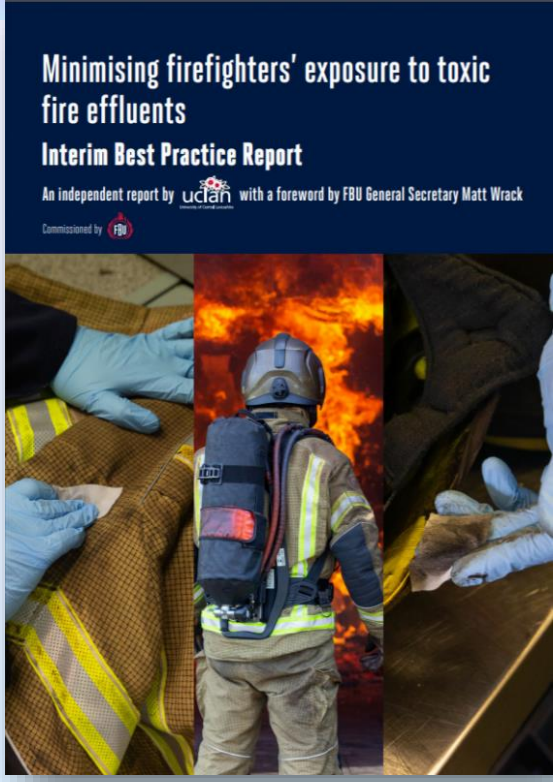
Contamination of UK firefighters personal protective equipment and workplaces

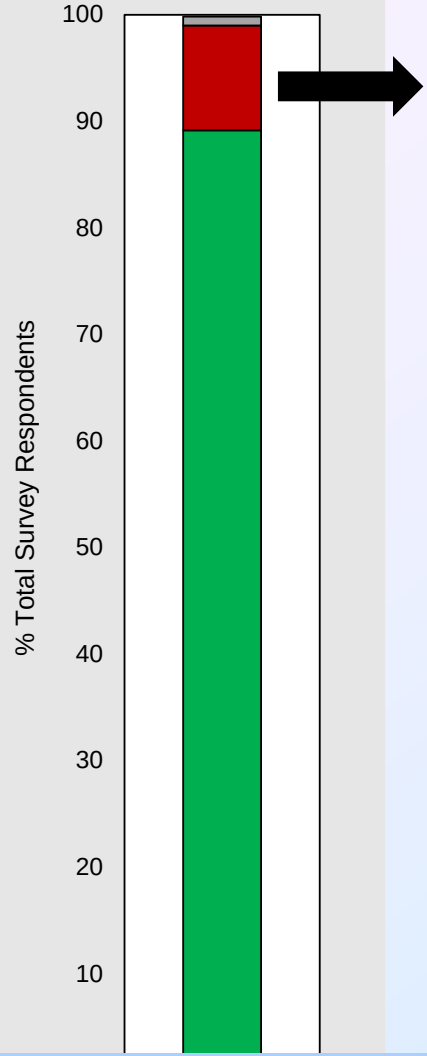
Taylor A. M. Wolffe[1], Anna Clinton[1], Andrew Robinson[1,2], Louis Turrell[1,2] & Anna A. Stec[1]

Firefighters' personal protective equipment (PPE) is a potential source of chronic exposure to toxic



CONTAMINATION OF UK FIREFIGHTERS PERSONAL PROTECTIVE EQUIPMENT AND WORKPLACES

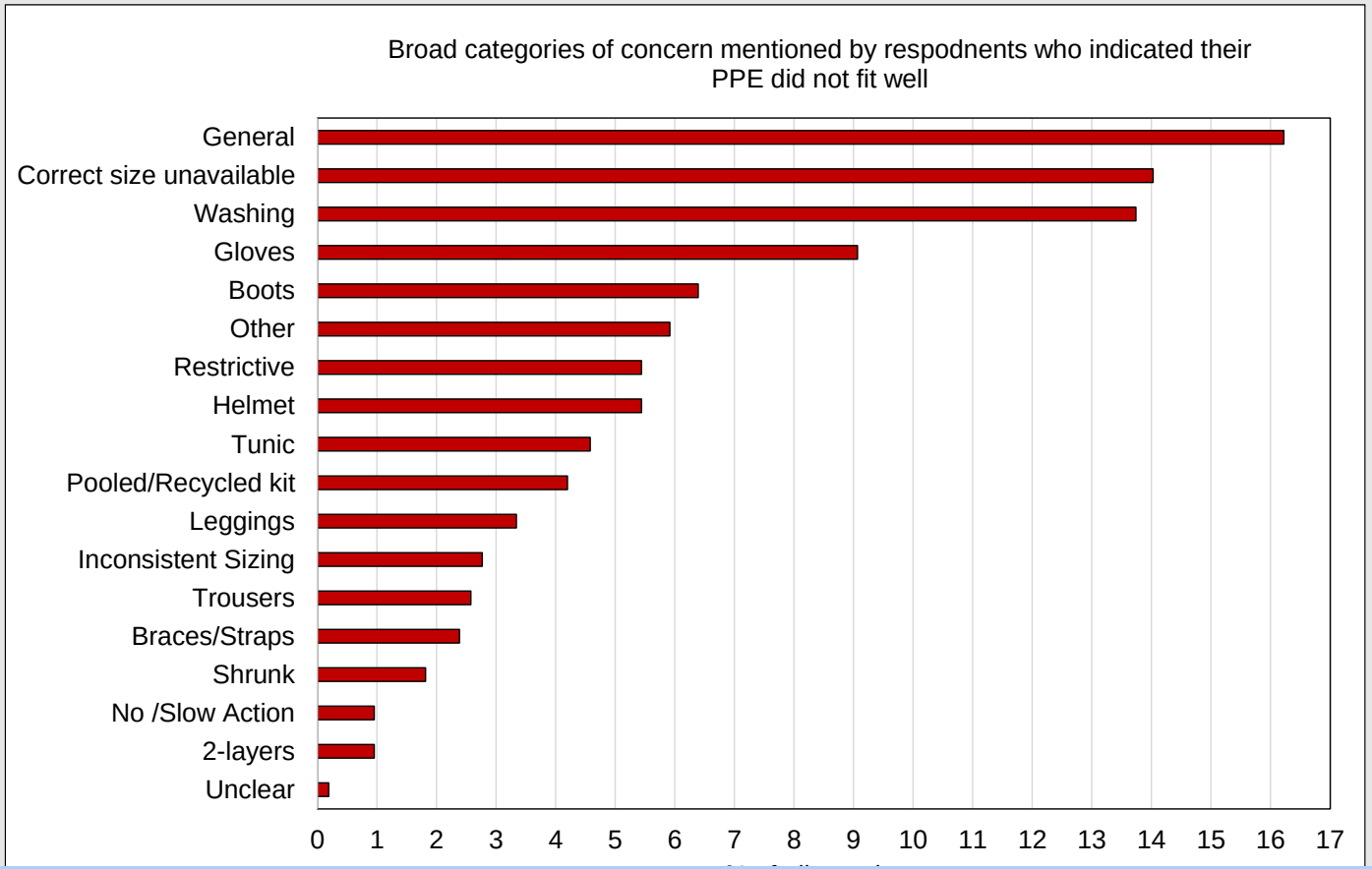
Does your PPE fit well?



Do you have concerns about the fit of your PPE?

70% of respondents who indicated that their PPE did not fit well provided free text answers to this question

1048 mentions of issues were recorded in **739 answers***



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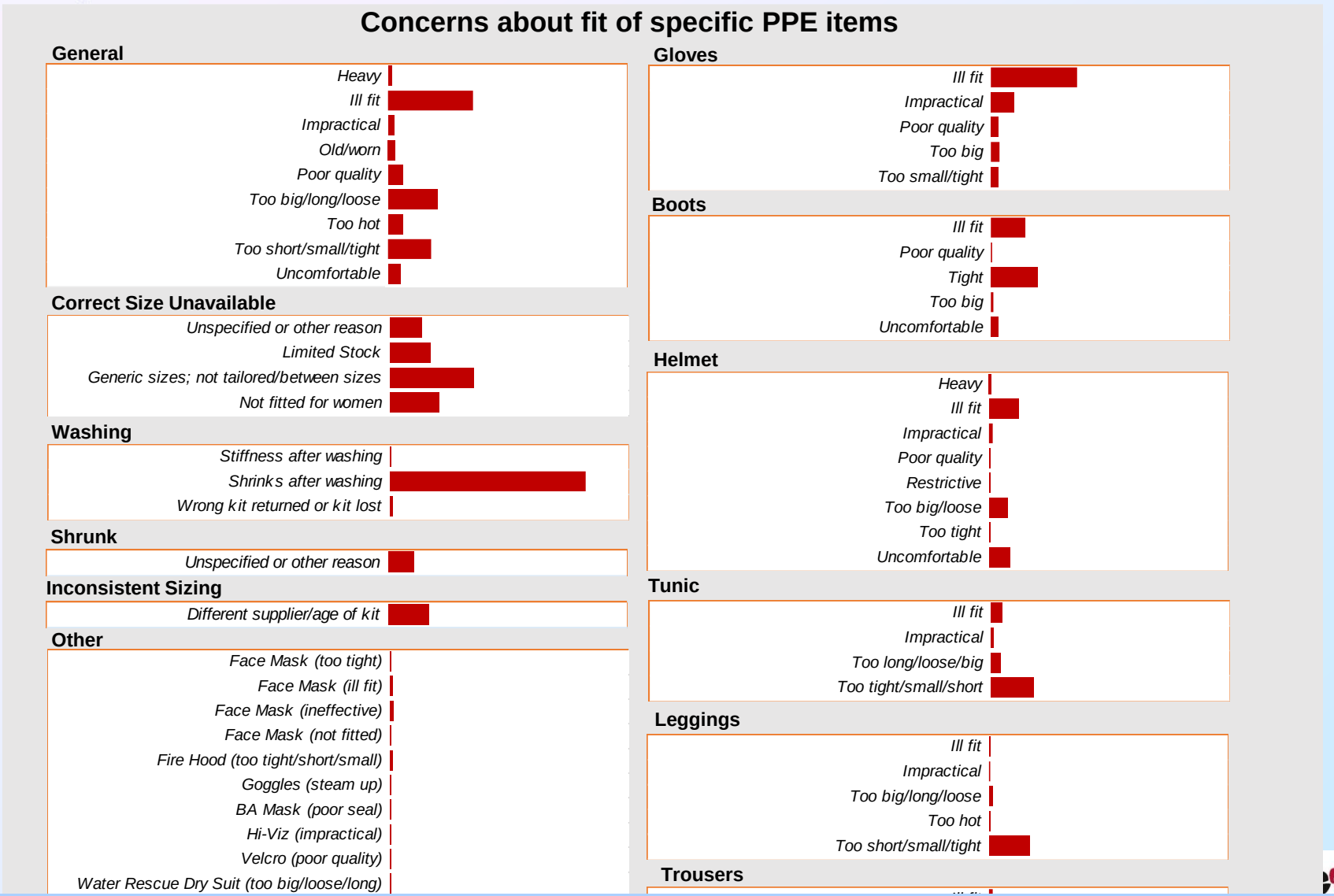

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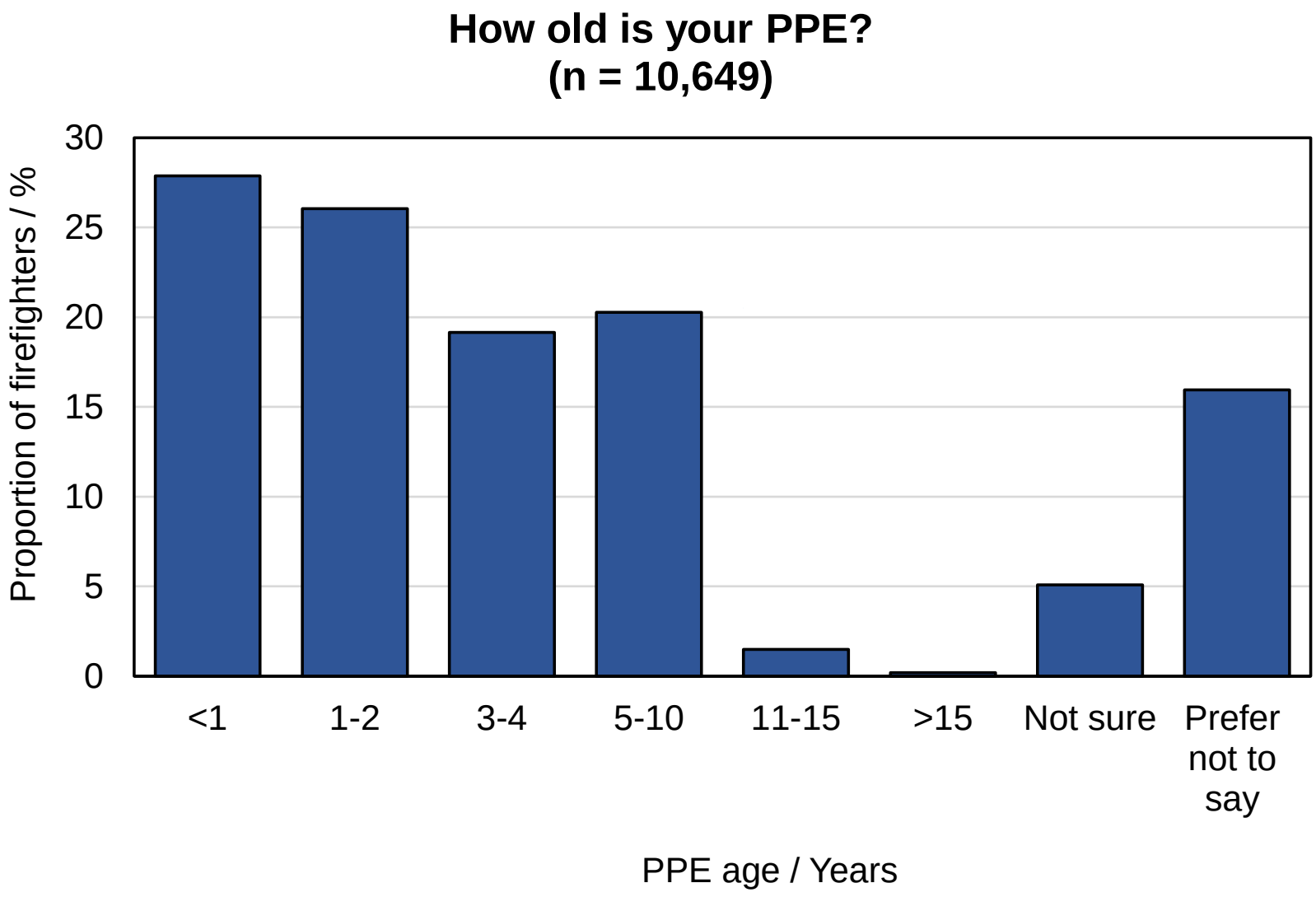

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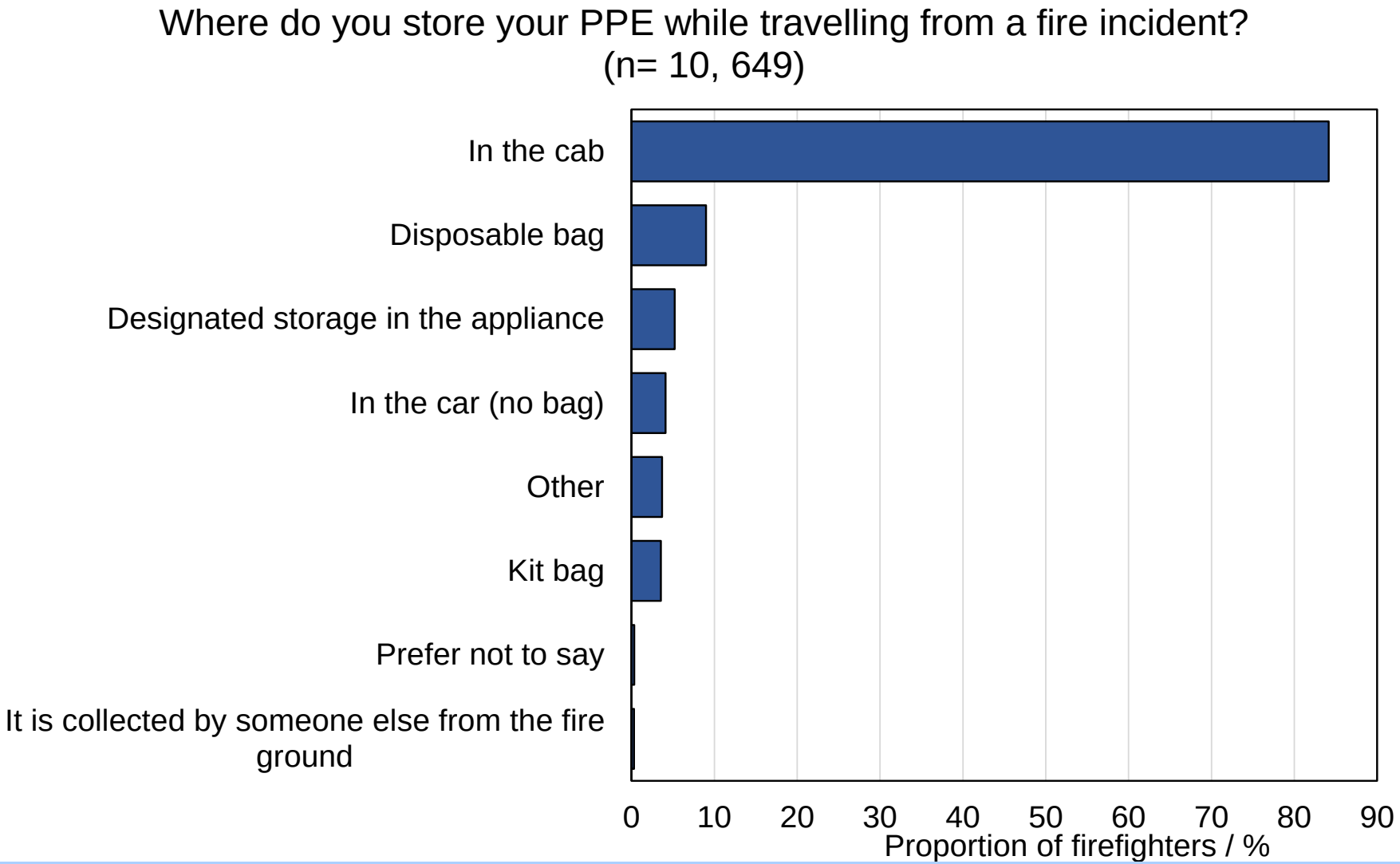

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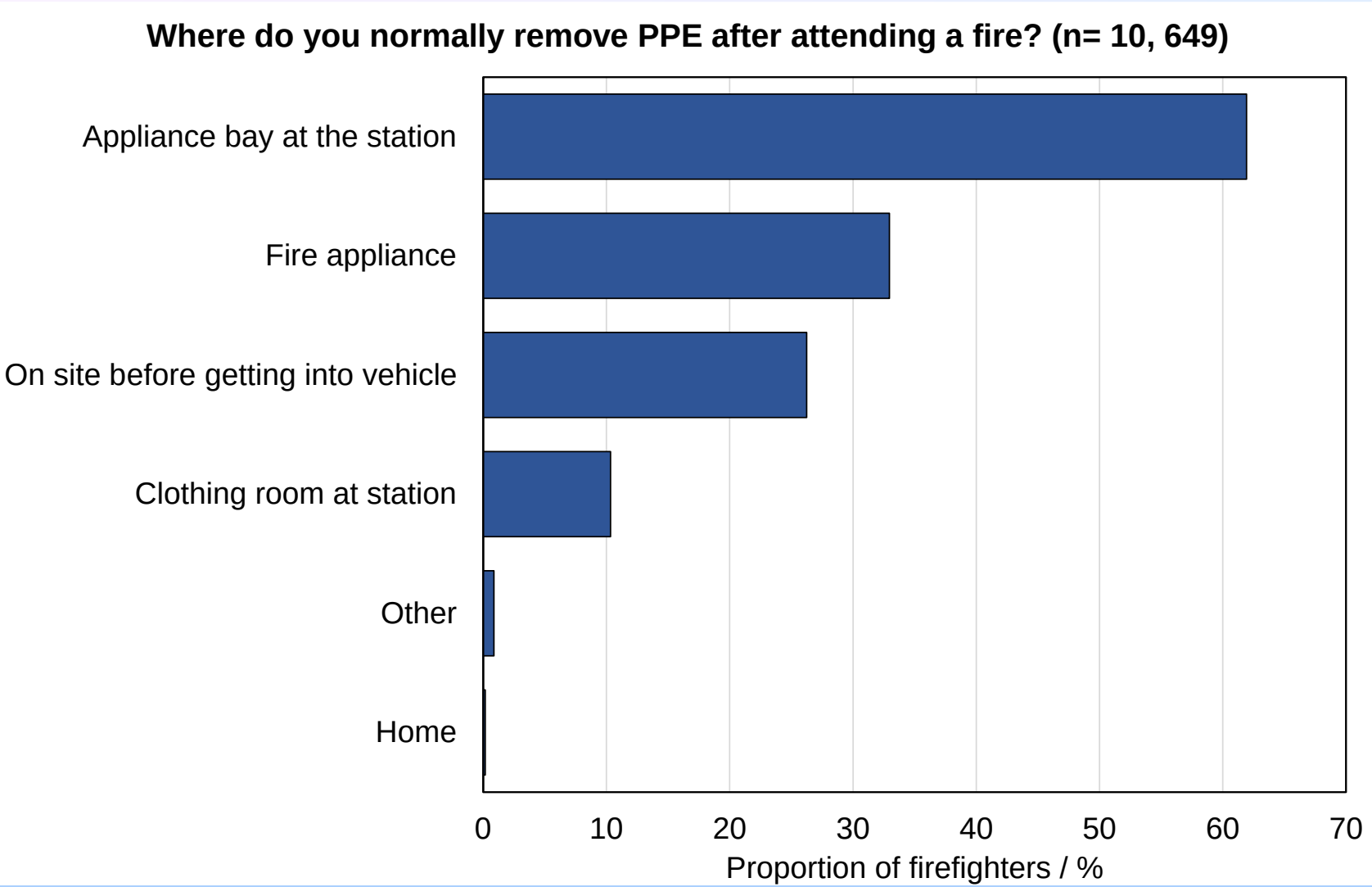

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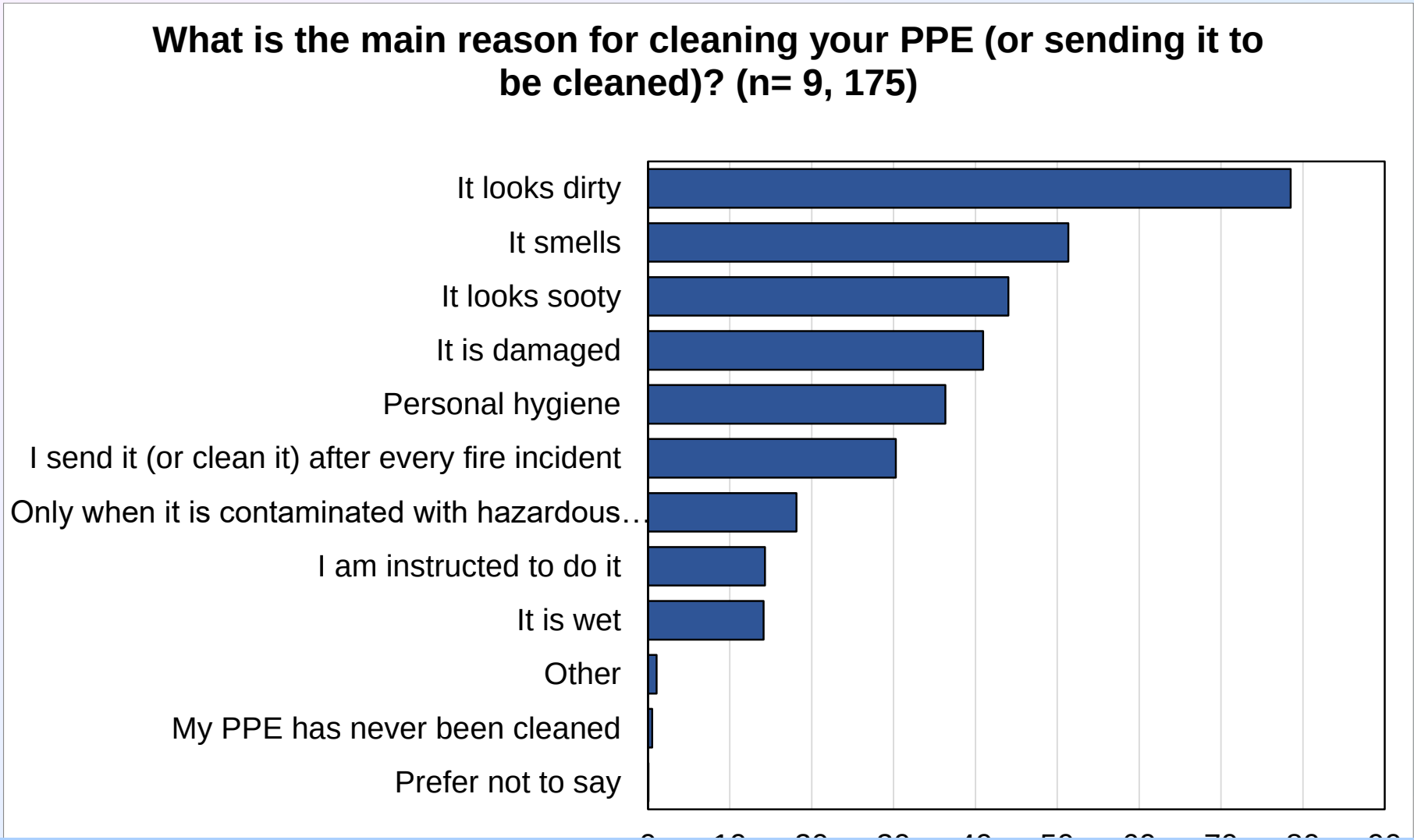

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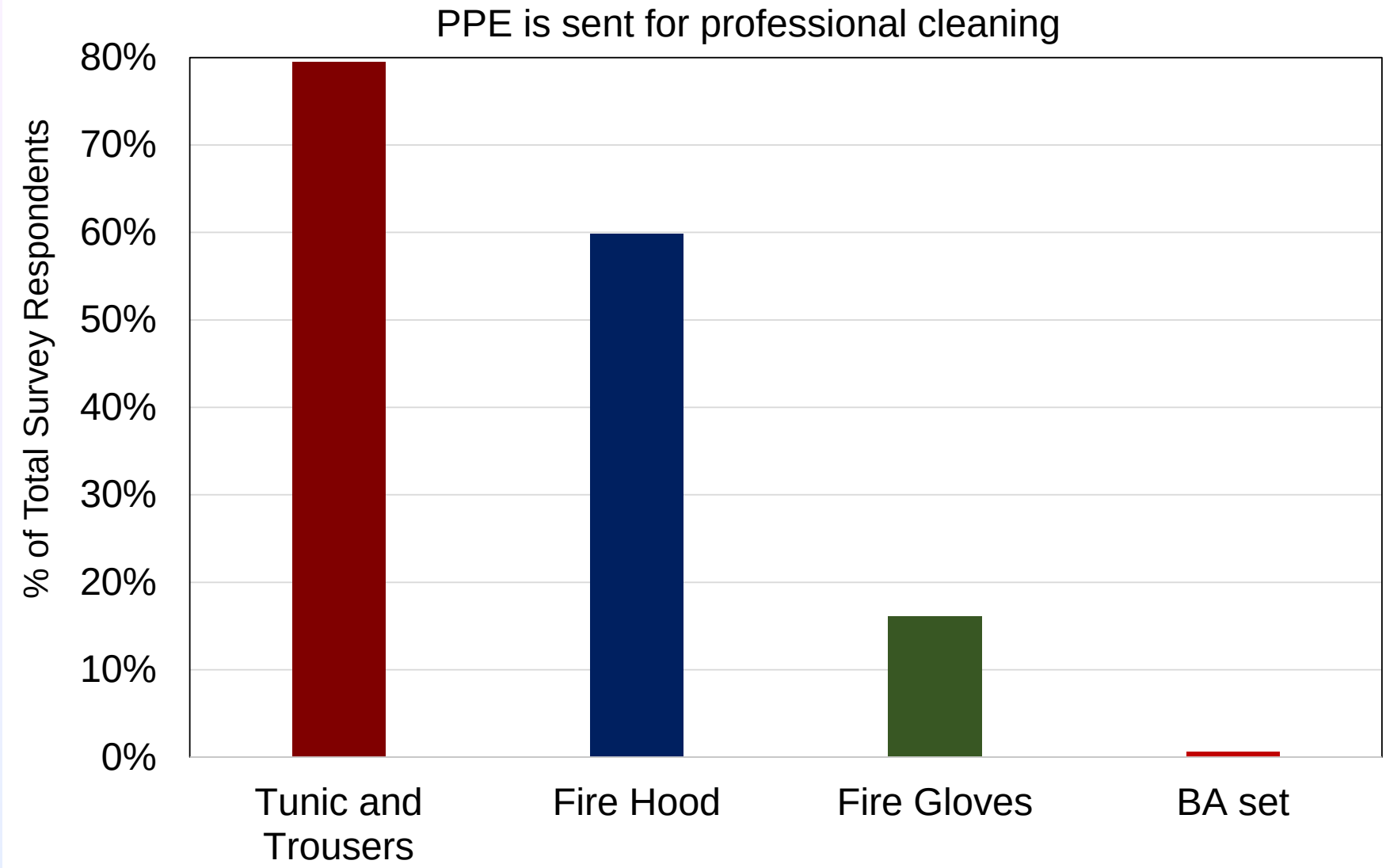

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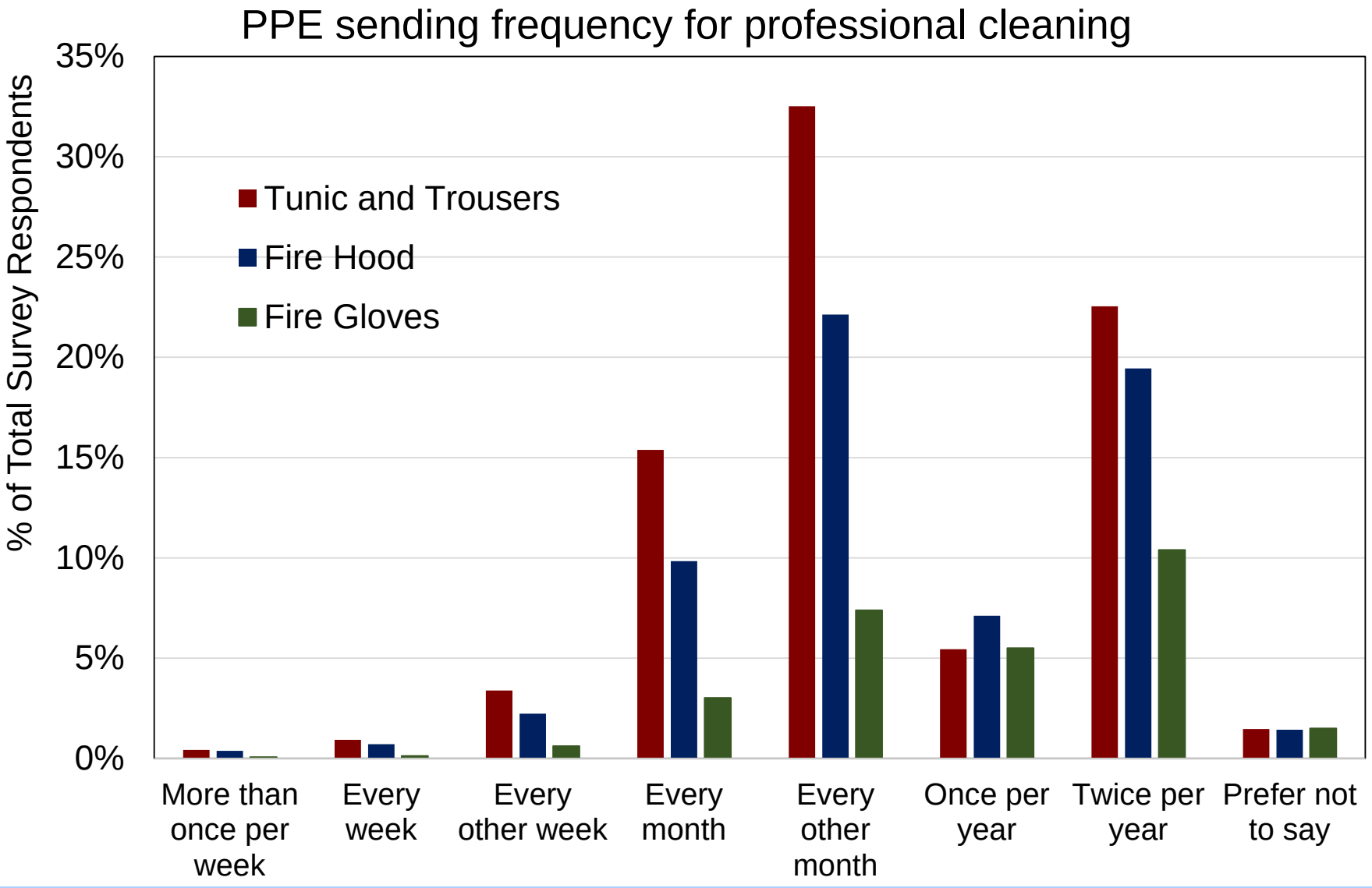

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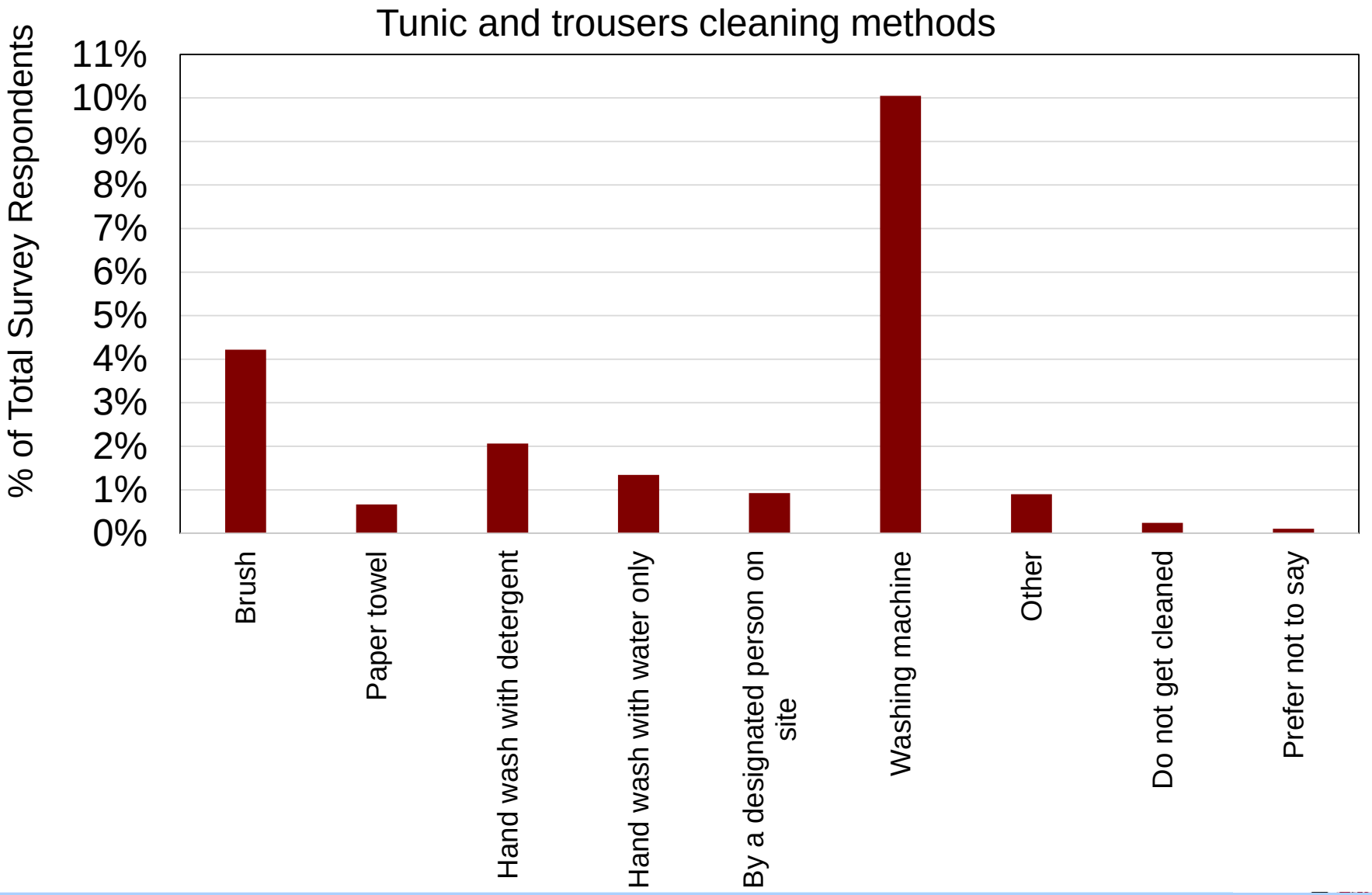

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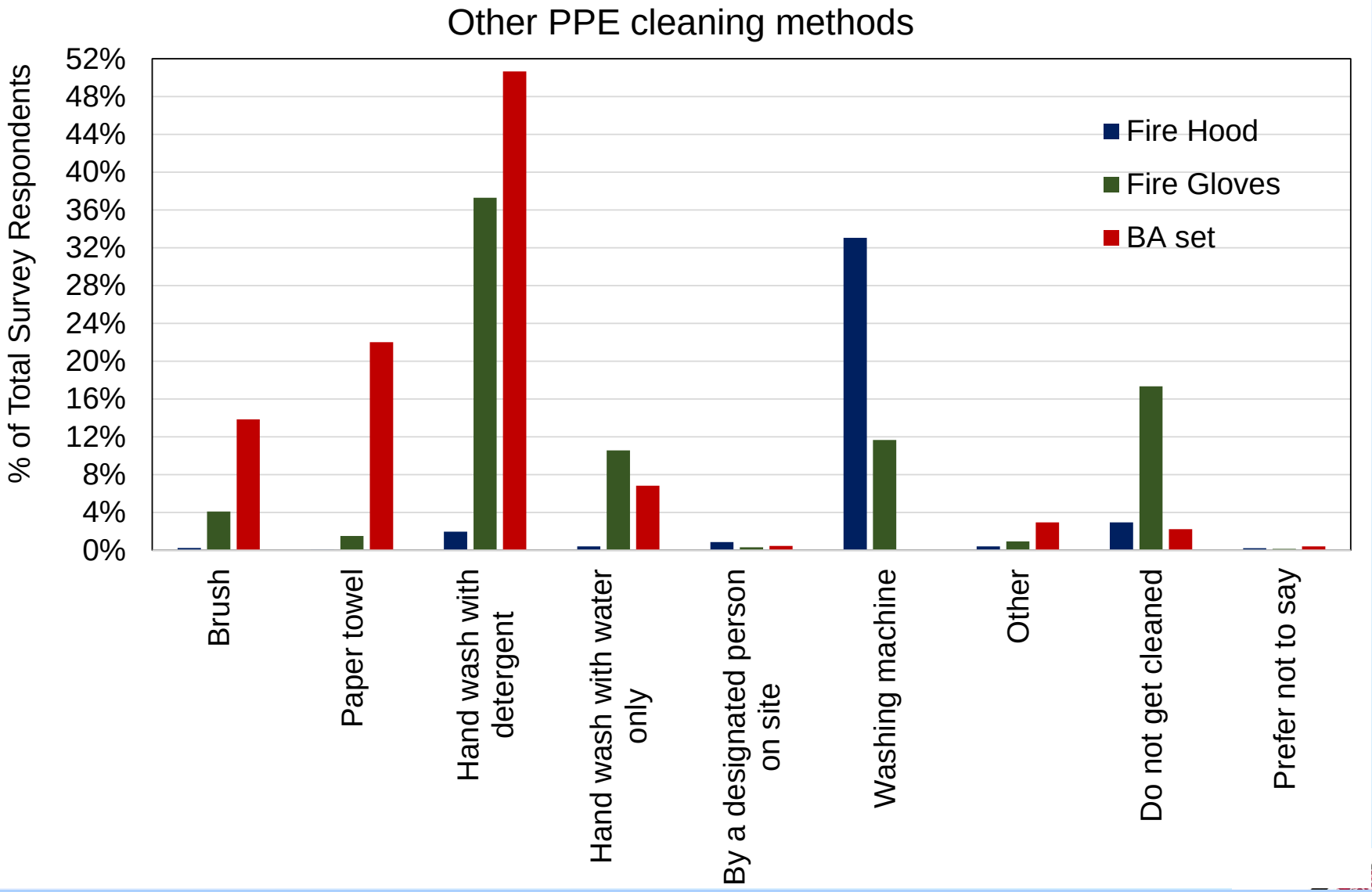

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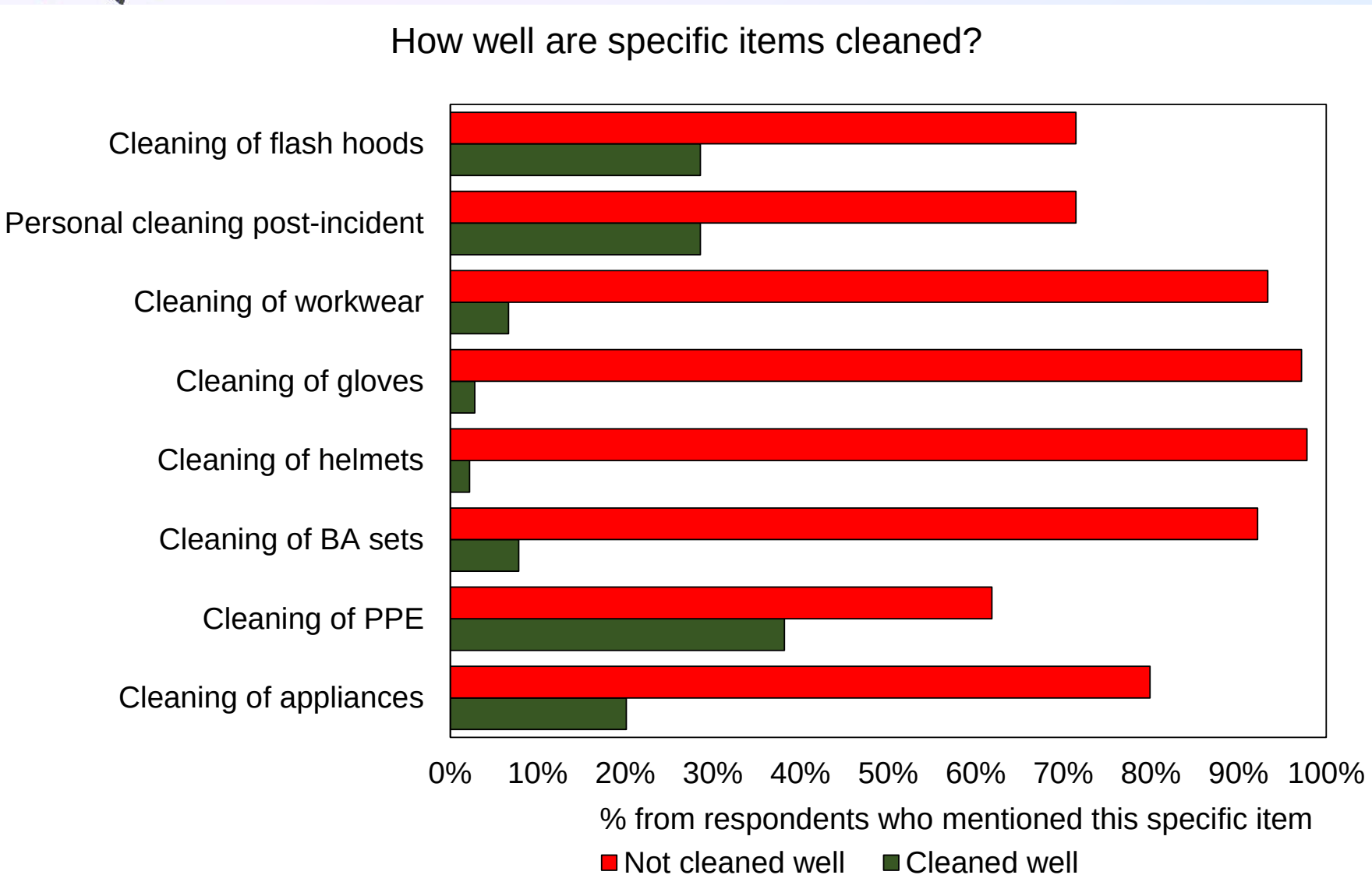

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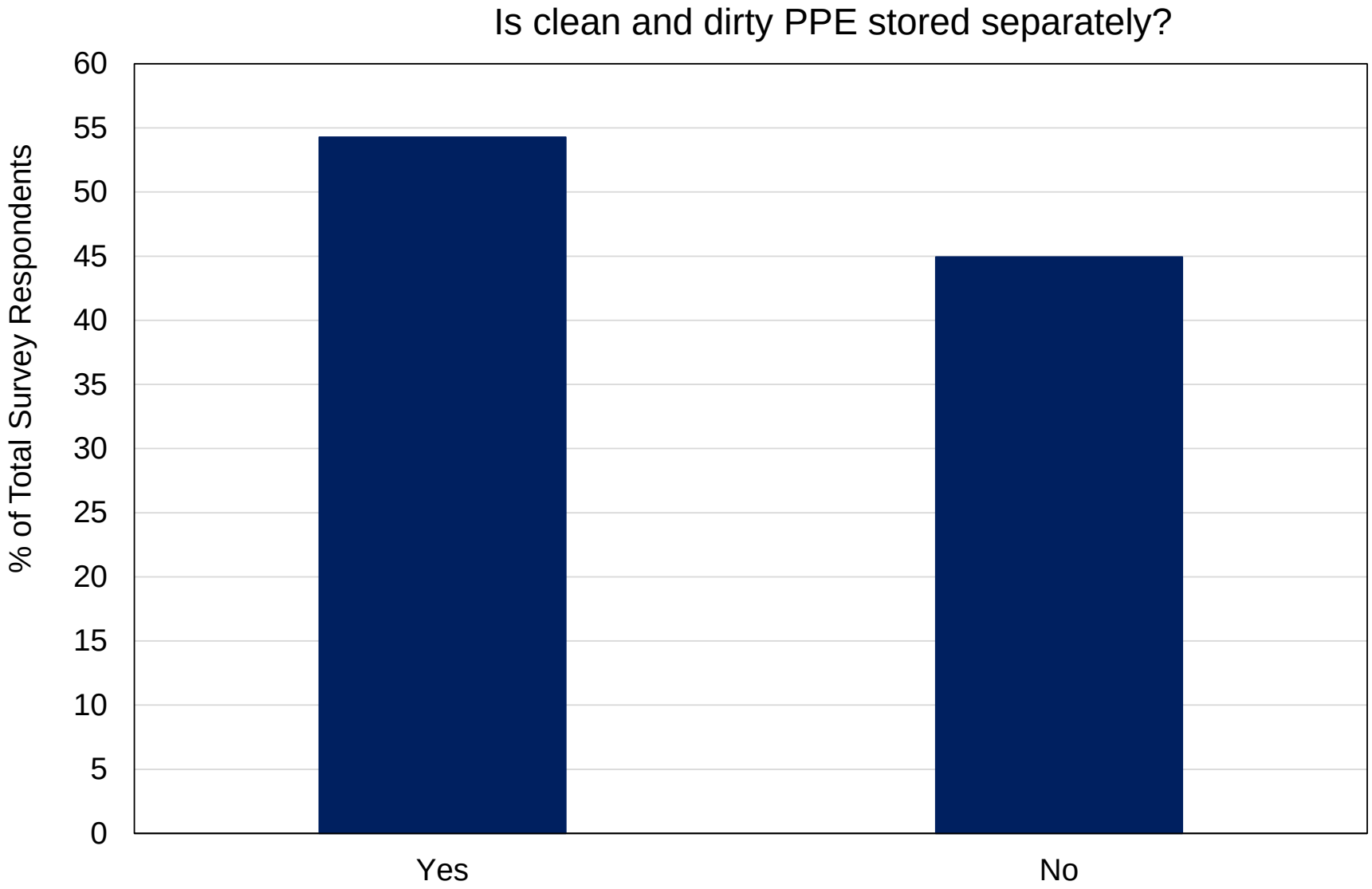

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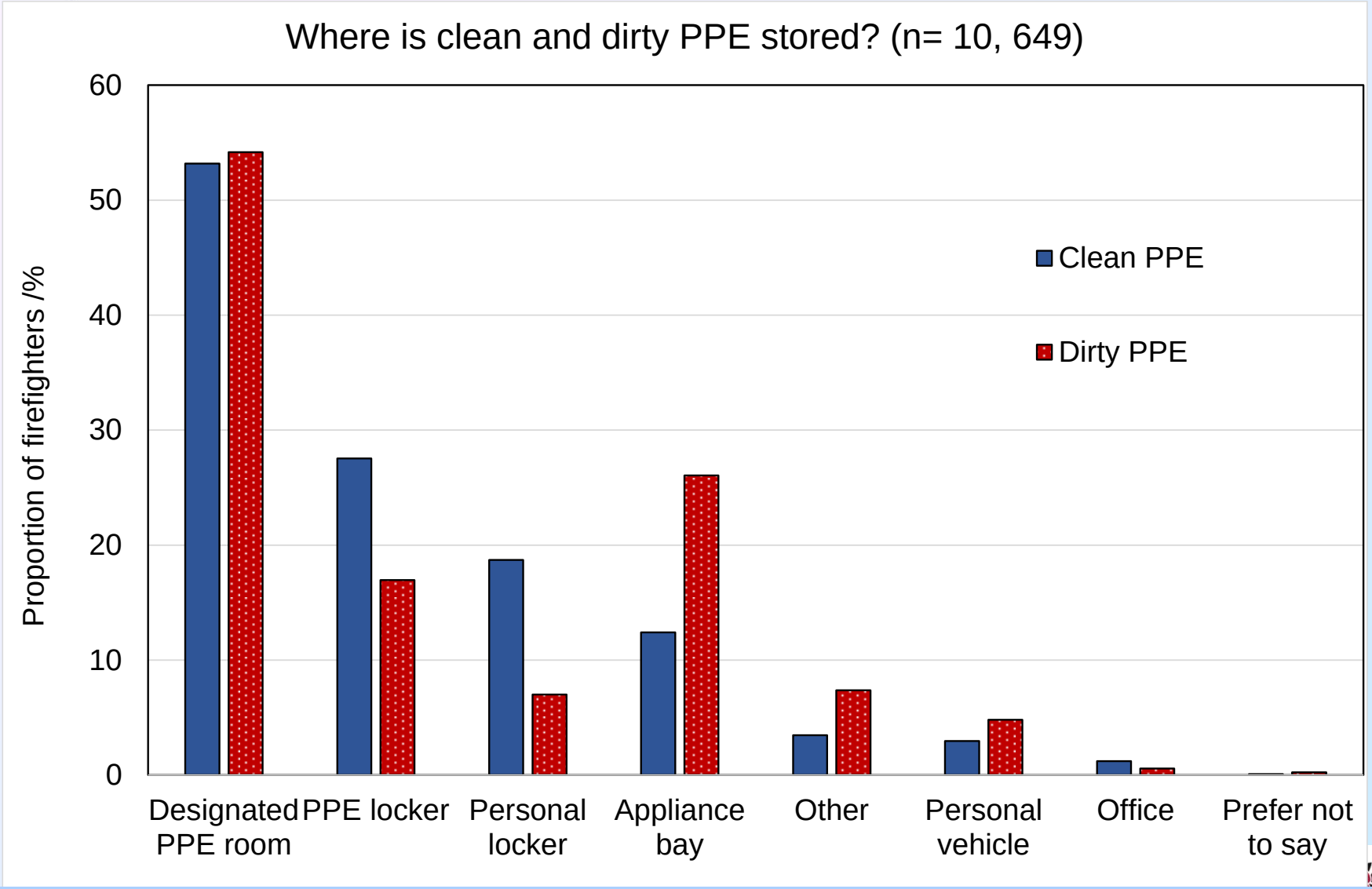

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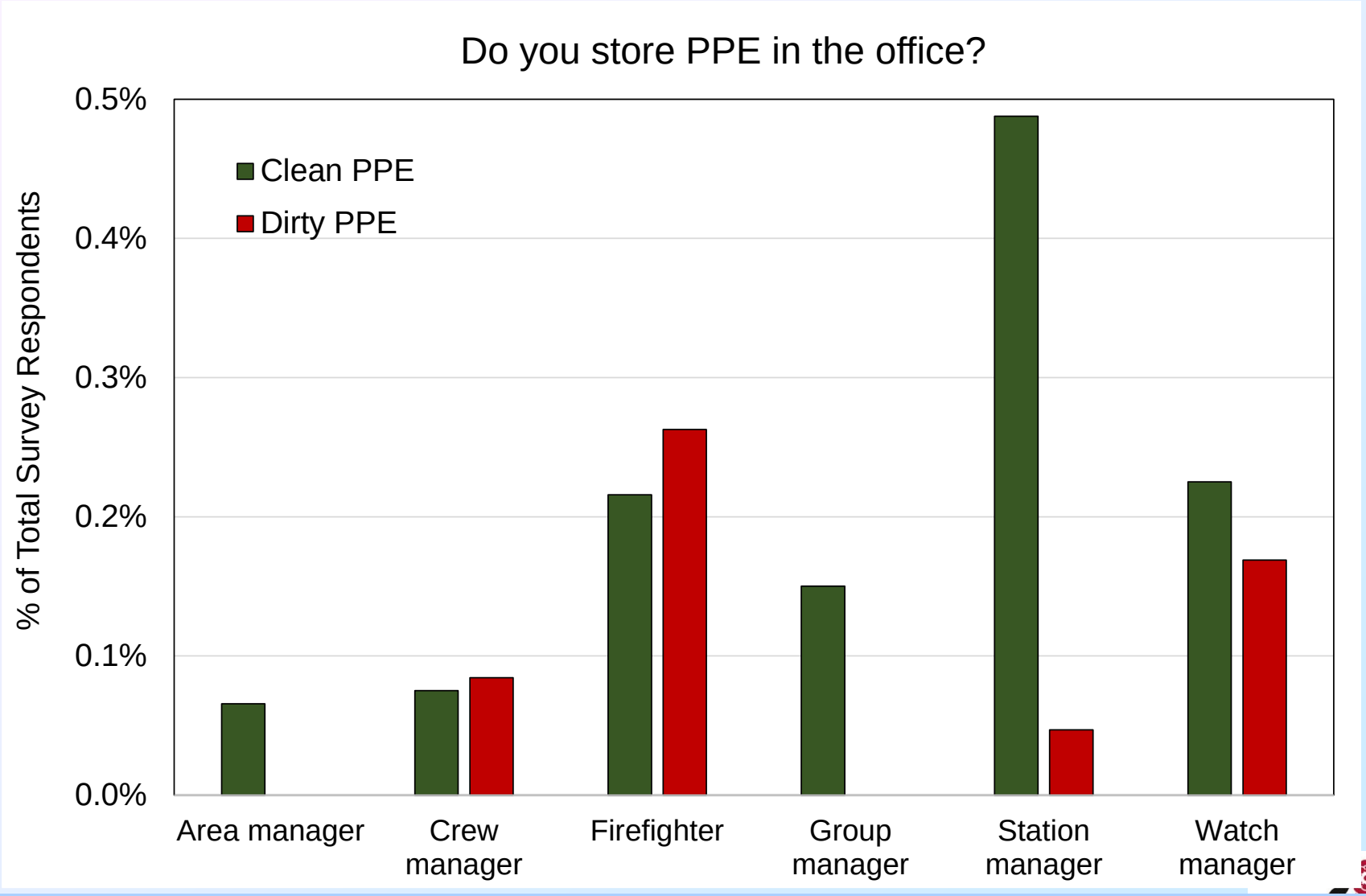

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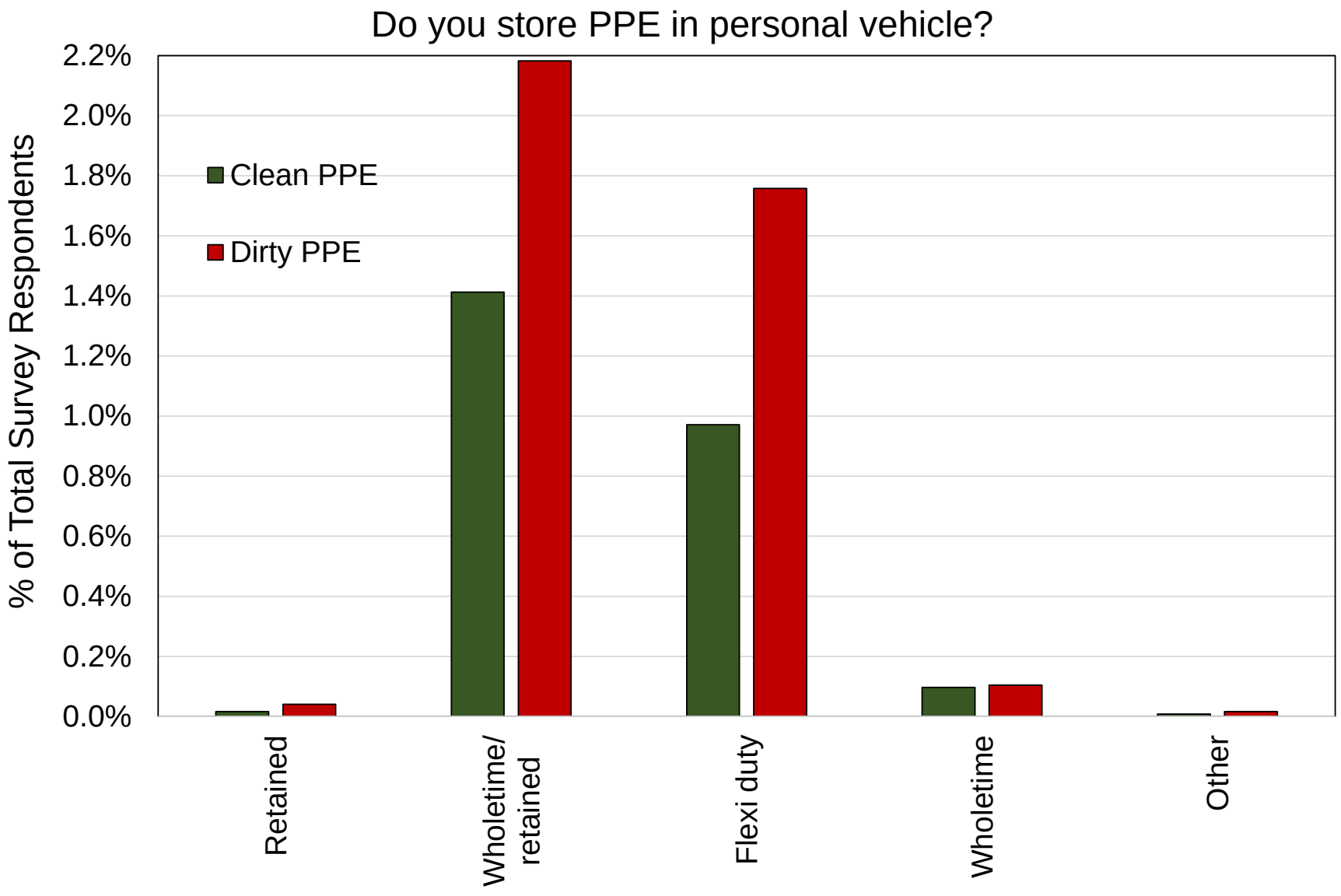

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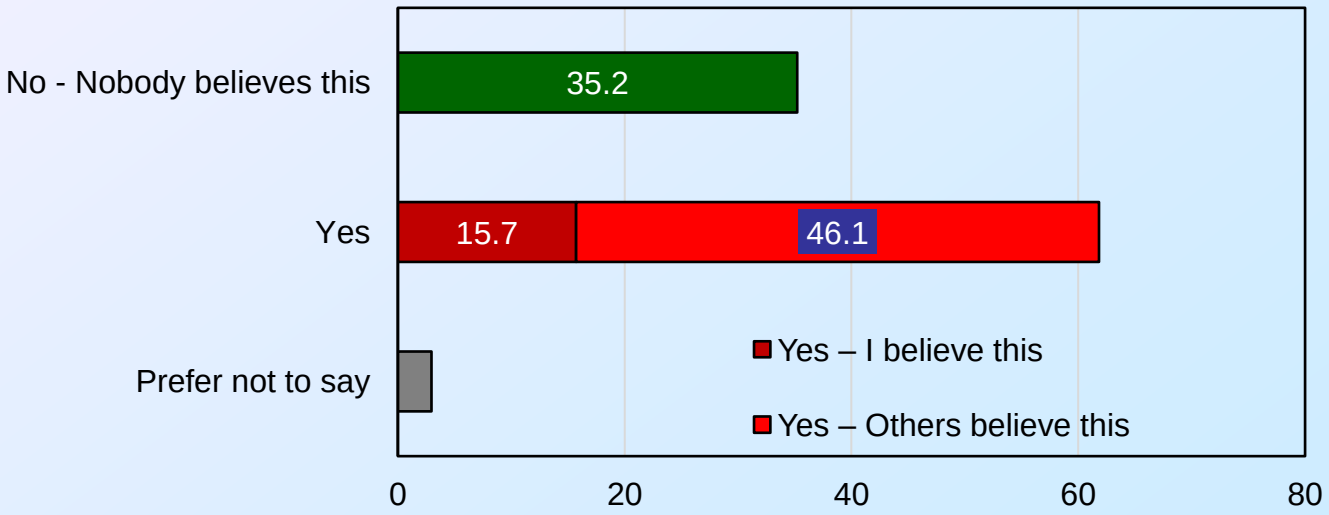
Culture and Awareness

“Badge of honour” associated with practices leading to contaminant exposure:

- Never cleaning PPE
- Work in a station without designated clean/dirty areas
- Lack of training on fire contaminants (only 36% firefighters had received it)

Do you think the “badge of honour” attitude exists within the fire service?



Wolffe, et al., *Culture and awareness of occupational health risks amongst UK firefighters*, Scientific Reports, 2023

PART 1: CONTAMINATION OF UK FIREFIGHTERS PERSONAL PROTECTIVE EQUIPMENT AND WORKPLACES

Results revealed that:

- Significant decreasing tendency to send PPE for cleaning after every incident with increasing length of service, and fire attendance frequency.
- Only 1/3rd of firefighters clean PPE after every incident.
- A number of issues arise through external professional cleaning services, e.g. shrinkage, fit, turn-around time, and stock of reserve/pooled PPE.
- Almost half of firefighters (45%) indicating clean and dirty PPE is not stored separately.
- More than half of firefighters (57%) store fire gloves within other items of PPE such as helmets, boots and tunic/trouser pockets.

PPE and Workplace Contamination

- **84%** firefighters often/sometimes attend fires without RPE

Wolffe, et al., *Contamination of UK firefighters personal protective equipment and workplaces*, Scientific Reports, 2023

PPE and Workplace Contamination

- **84%** firefighters often/sometimes attend fires without RPE

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PPE and Workplace Contamination

- **84%** firefighters often/sometimes attend fires without RPE
- **82%** eat while in PPE
- **63%** eat with sooty hands
- **Only 58%** change workwear on return to the station

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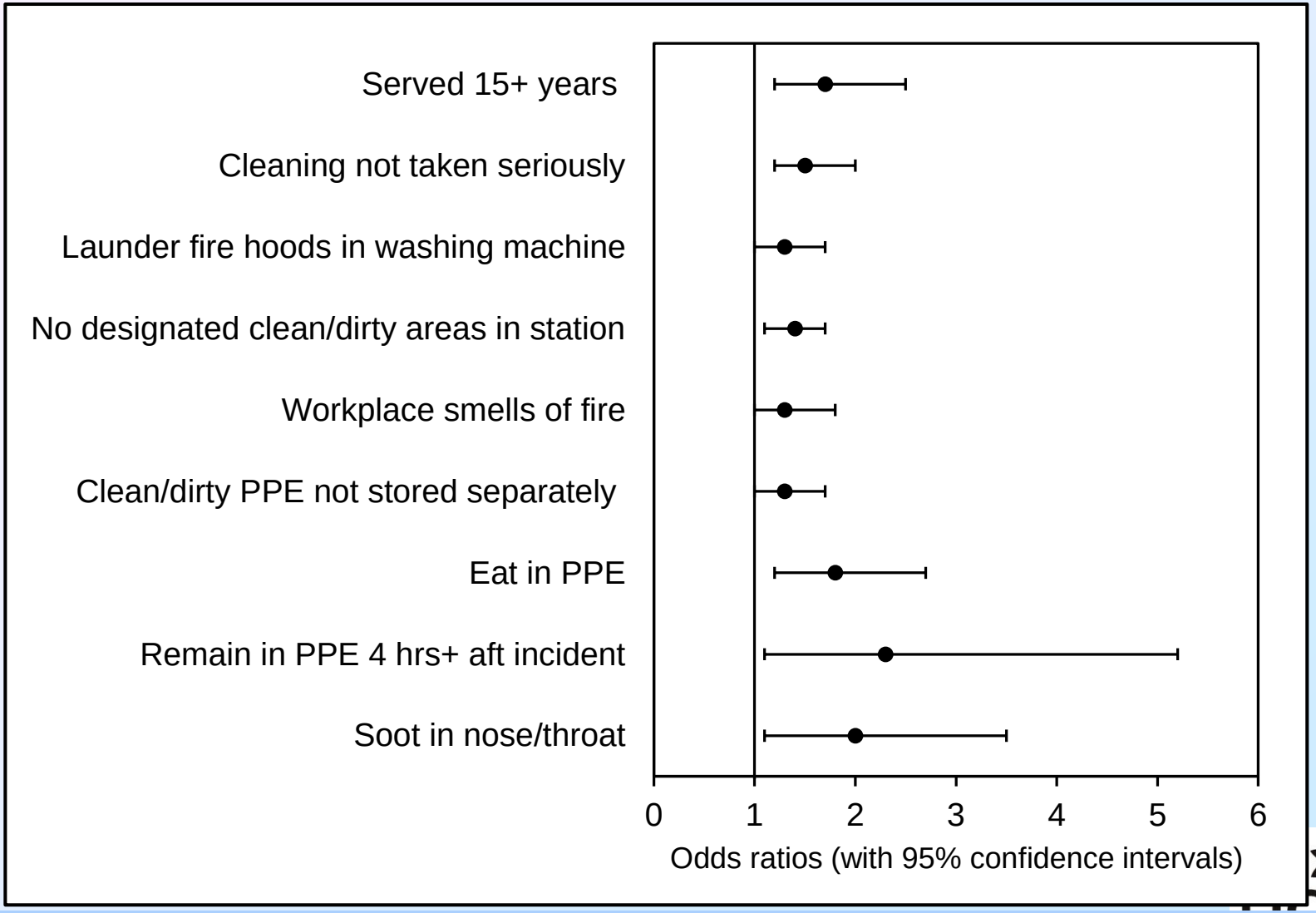
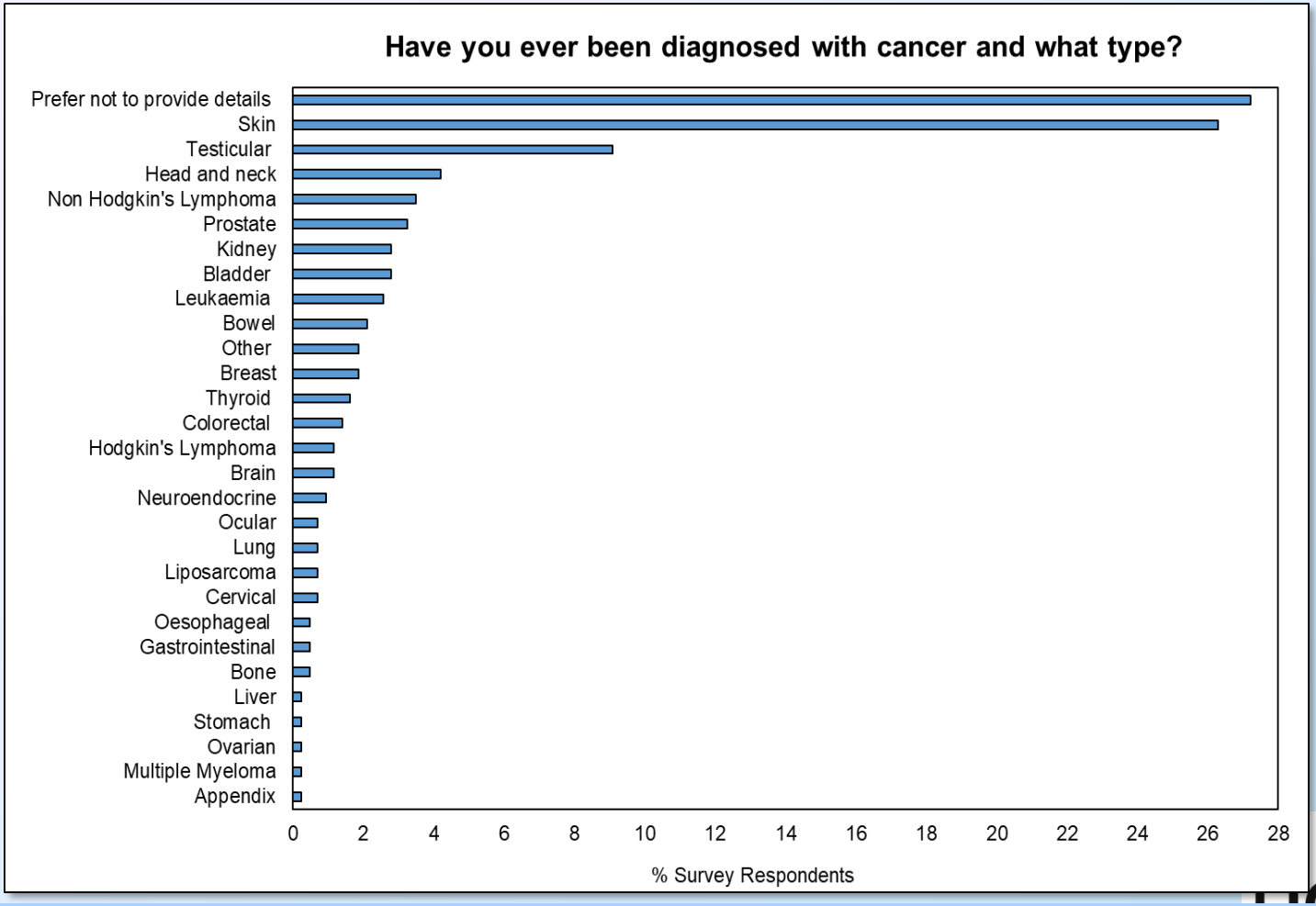
Contaminant exposure and increased likelihood of cancer diagnosis



Wolffe, et al., *Cancer incidence amongst UK firefighters*, Scientific Reports, 2023

Cancer Incidence-Survey Results

Over 4% of UK serving firefighters who responded to the survey have already been diagnosed with cancer.



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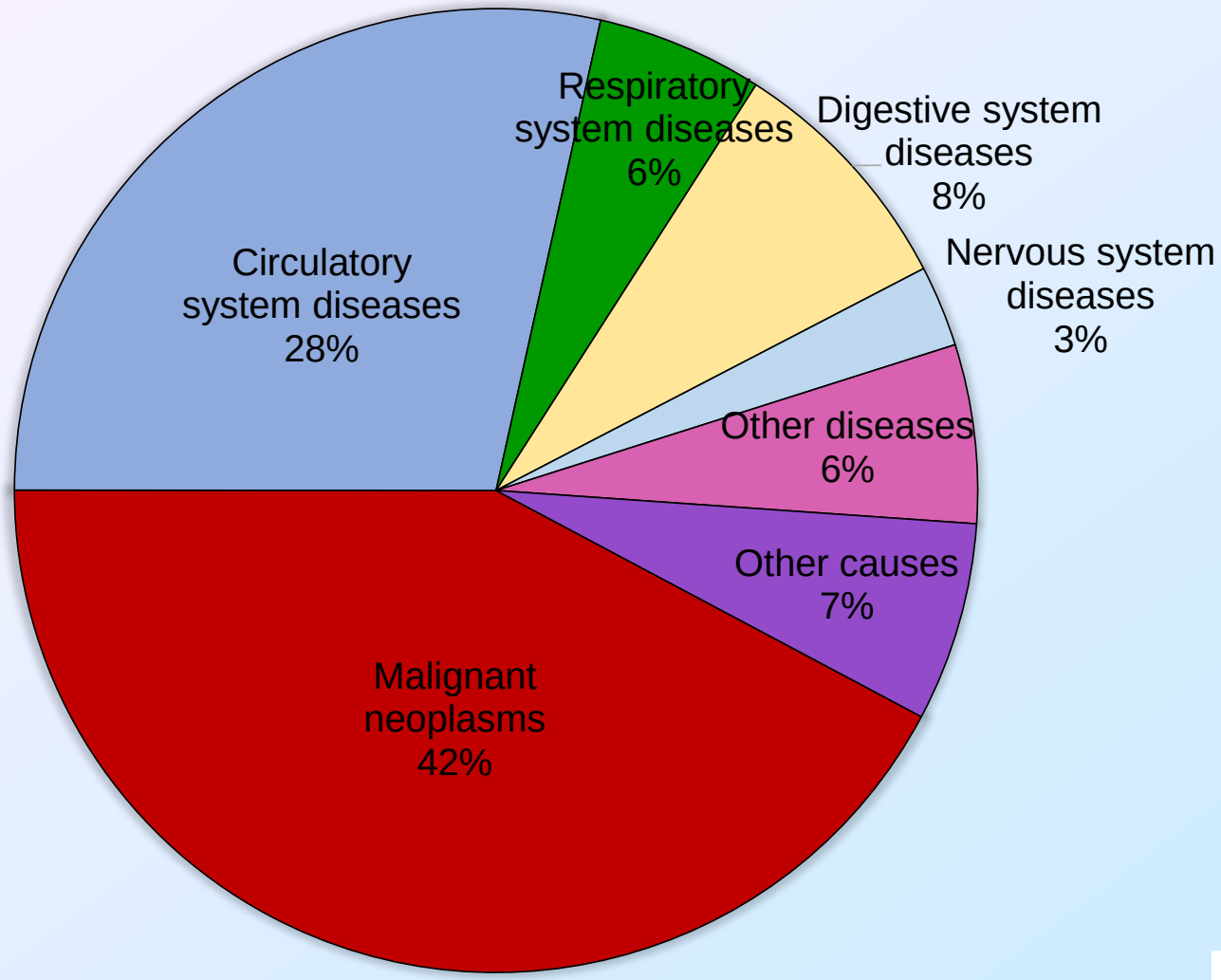
Scottish male firefighter deaths for 2000-2020.

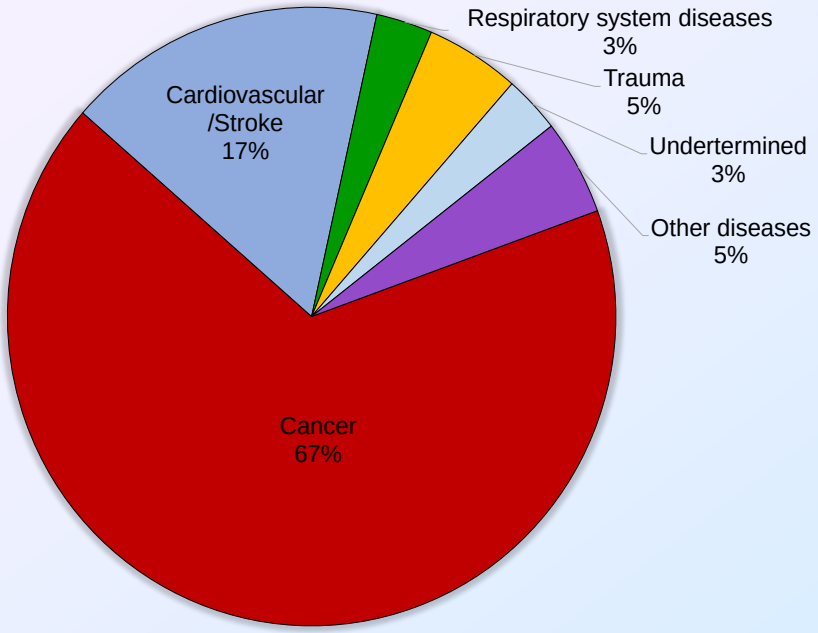


Stec et al., Scottish Firefighters Occupational Cancer and Disease Mortality Rates: 2000-2020, Occupational Medicine, 2023

Firefighters Cancer Mortality Rates

USA

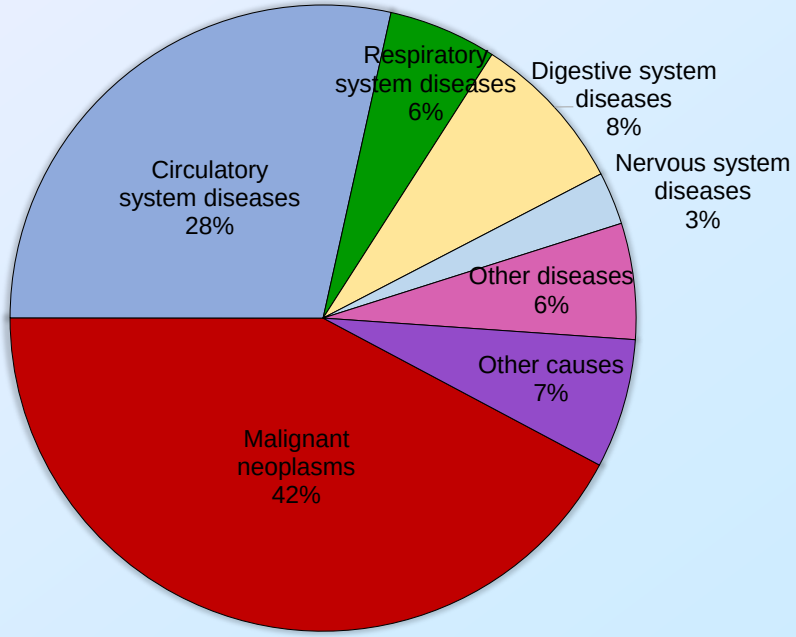
Line of Duty Firefighters Deaths
2002-2020



International Association of Firefighters, https://www.iaff.org/
2023

UK

Scottish Male Firefighter Deaths
2000-2020



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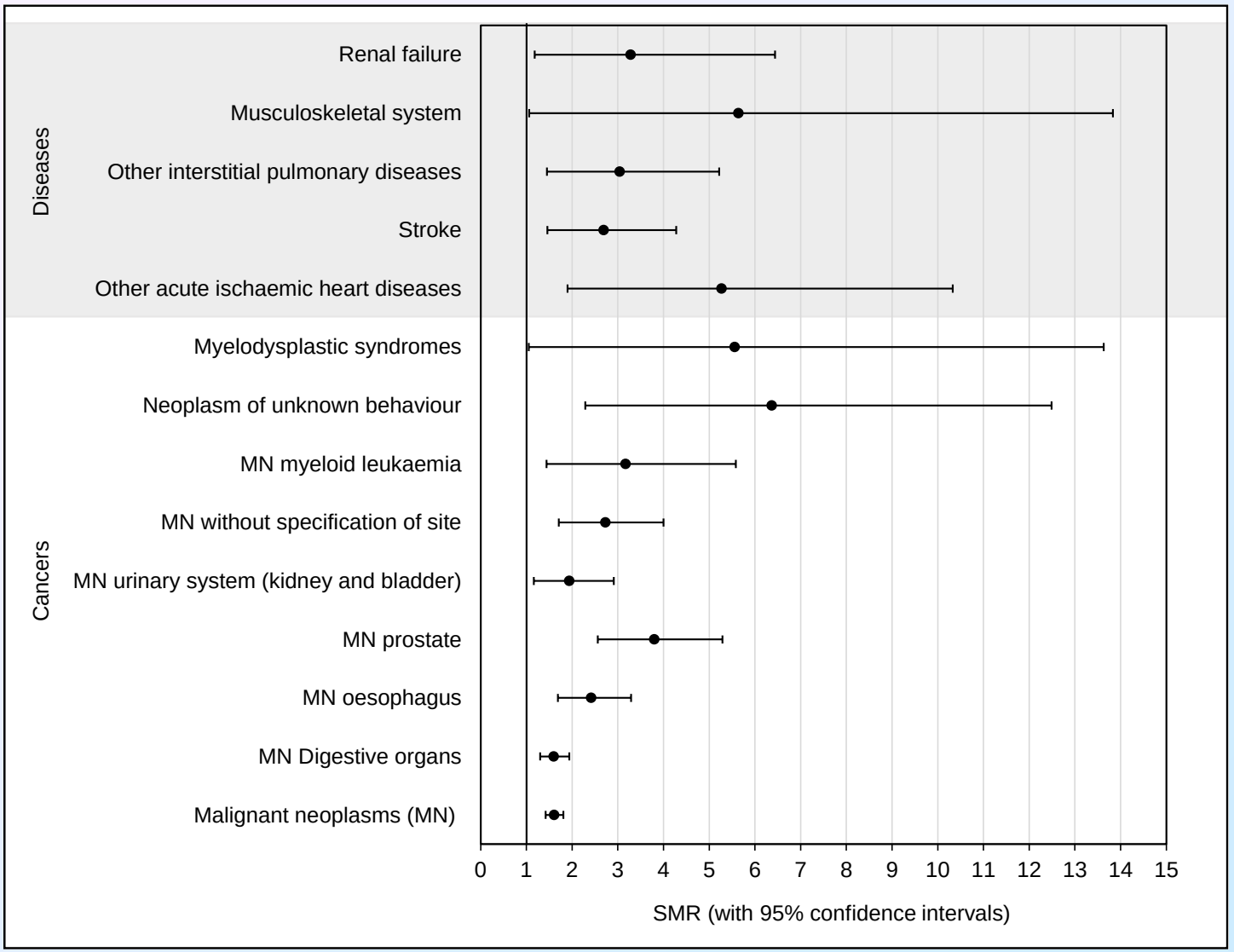
Scottish male firefighter deaths for 2000-2020.

- Multiple exposures and routes of exposure cause likely more than one type of cancer.



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Firefighters and Cancers

- Firefighters get these cancers earlier in life.
- Multiple exposures and routes of exposure cause likely more than one type of cancer.

	Peak Mortality Age	
	Scottish Firefighters	Scottish Population
Cancer of Unknown origin	**60**-64	75-79
Bladder	**70**-74	85-89
Oesophageal	**60**-64	75-79
Kidney	**55**-59	80-84
Leukaemia	**65**-69	85-89
Mesothelioma	**60**-64	85-89
Multiple myeloma	**65**-69	85-89
Cardiac Arrest	**60**-64	80-84

Stec et al., Scottish Firefighters Occupational Cancer and Disease Mortality Rates: 2000-2020, Occupational Medicine, 2023

What's next?

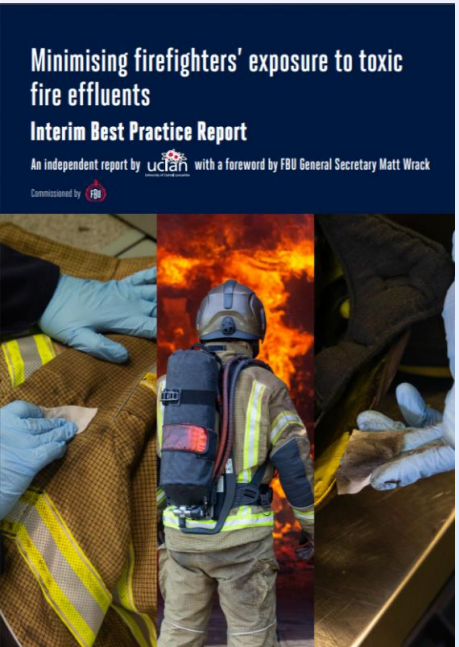
Health Monitoring

Conclusions

- **Firefighters deserve the best preventative medical care, education, and support to reduce the risk of cancer.**
  - Better decontamination policies needed
  - Training and Awareness
  - Preventative health monitoring

Percival Pott: First to demonstrate scrotal cancer caused by soot
First preventative Legislation!

Thank you for your attention



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