PROTECT

A COVID-19 National Core Study

Work-related risk of Covid-19:

Preliminary findings of the PROTECT study (Theme 3)

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Theme 3 – Sector specific studies

Objectives/WPs

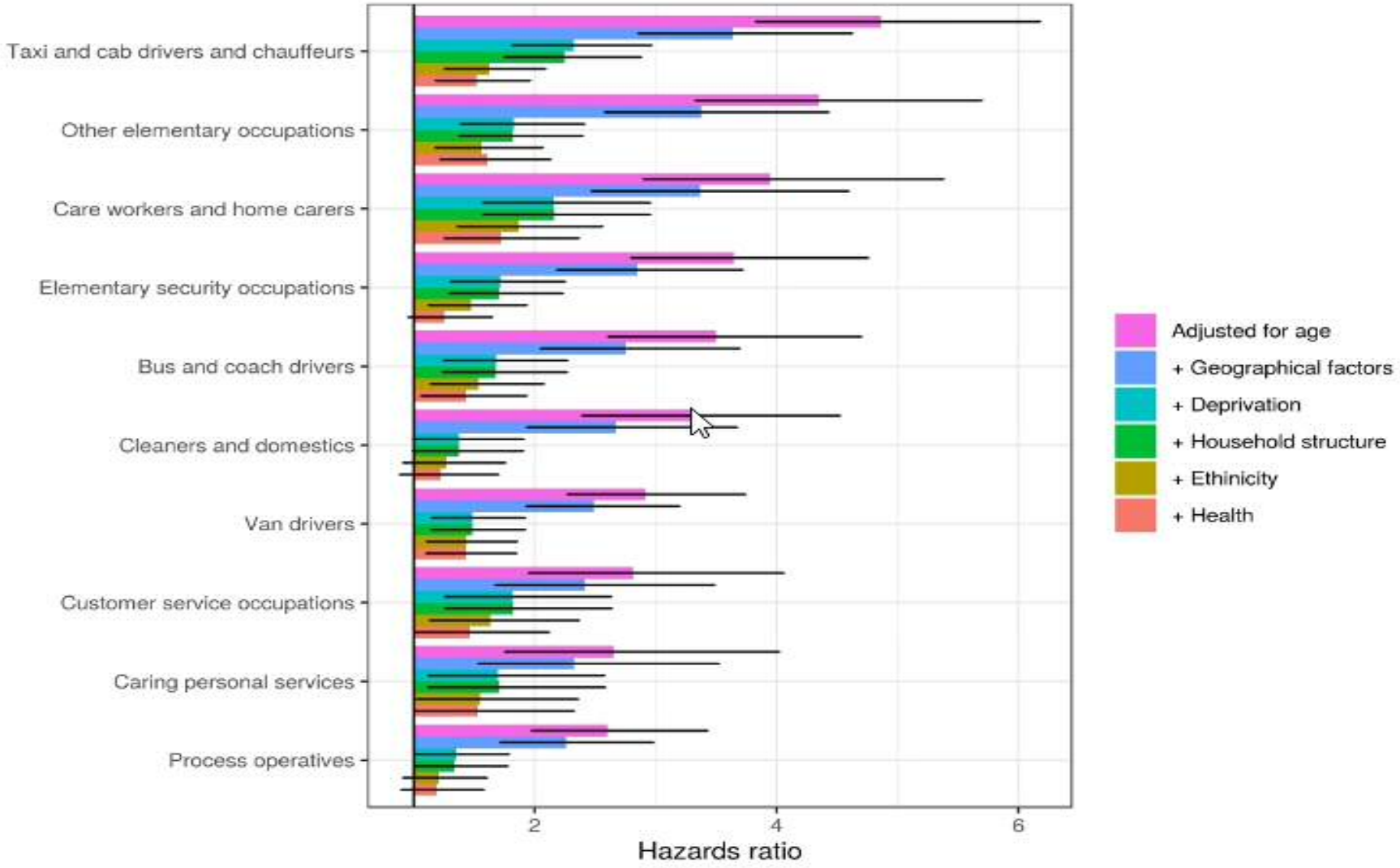
1. Sector - specific (qualitative) deep dives to improve understanding of sector specific of transmission risks, effectiveness of existing risk mitigation strategies identify opportunities for improving control strategies
2. Quantitative surveys in food processing sector on infections and mitigations
3. To review existing data sources in order to harmonise occupational and work-related data collected and to develop tools and technologies for standardised data collection
4. To carry out complementary statistical analyses of available data sources to improve our understanding of the role of occupation in the risk of infection
5. To develop sector specific evidence reports based on data, information, evidence and knowledge from PROTECT and elsewhere.

Mortality study

- Data source: ONS Public Health Data Asset:
  - 2011 Census in England
  - Primary care records (General Practice Extraction Service (GPES)
  - Mortality records
- Outcome: death involving COVID-19 (until 28th Dec 2020)
- Exposure: hybrid classification based on SOC 2010 Sub major groups Confounders/mediators:
  - Geographical factors
  - Socio-demographic characteristics
  - Pre-pandemic health
- Sample: individuals aged 40-64 living in private households (~ 14M)

https://www.medrxiv.org/content/10.1101/2021.05.12.21257123v1

Mortality study



- Figure shows Hazard Ratios compared to corporate managers and directors
- Incremental inclusion of confounders
- Initial large HRs are reduced following correction for confounders

Mortality study

Essential vs non-essential workers

	Men		Women	
Occupation	Age-adjusted	Fully adjusted	Age-adjusted	Fully adjusted
Essential workers	1.45 [1.34 - 1.56]	1.22 [1.13 - 1.32]	1.16 [1.05 – 1.28]	1.06 [0.96 – 1.17]
Taxi and cab drivers and chauffeurs	3.08 [2.56 - 3.70]	1.39 [1.14 - 1.70]	3.94 [1.634 - 9.48]	2.45 [1.014 - 5.92]
Support staff	2.39 [1.68 - 3.41]	1.74 [1.22 - 2.49]	0.95 [0.673 - 1.34]	0.78 [0.550 - 1.10]
Bus and coach drivers	2.33 [1.81 - 3.00]	1.11 [0.85 - 1.45]	2.95 [1.226 - 7.12]	1.73 [0.716 - 4.18]
Sanitary workers	1.84 [1.46 - 2.32]	1.18 [0.93 - 1.50]	1.78 [1.473 - 2.16]	1.09 [0.892 - 1.33]
Social care	1.83 [1.51 - 2.20]	1.27 [1.04 - 1.53]	1.62 [1.390 - 1.89]	1.18 [1.010 - 1.39]
Van drivers	1.81 [1.48 - 2.22]	1.26 [1.03 - 1.55]	1.59 [0.661 - 3.84]	1.27 [0.526 - 3.06]
Health associate professionals	1.65 [1.26 - 2.16]	1.86 [1.41 - 2.46]	0.92 [0.746 - 1.15]	1.22 [0.969 - 1.54]
Food retail & distribution	1.41 [1.22 - 1.63]	1.14 [0.98 - 1.32]	1.39 [1.187 - 1.63]	1.02 [0.867 - 1.20]
Other transport workers	1.21 [1.02 - 1.43]	1.10 [0.93 - 1.30]	0.36 [0.115 - 1.11]	0.31 [0.098 - 0.95]
Health professionals	1.21 [0.82 - 1.78]	1.45 [0.97 - 2.15]	0.25 [0.079 - 0.76]	0.45 [0.145 - 1.42]
Food production	1.12 [0.86 - 1.45]	1.15 [0.89 - 1.50]	1.48 [0.968 - 2.26]	1.15 [0.750 - 1.77]
Education	0.63 [0.47 - 0.84]	0.91 [0.68 - 1.23]	0.56 [0.446 - 0.70]	0.83 [0.653 - 1.05]
Police & Protective Services	0.45 [0.31 - 0.67]	0.60 [0.40 - 0.88]	0.38 [0.123 - 1.19]	0.50 [0.160 - 1.54]

Note: Fully adjusted Cox regression models include geographical factors (region, population density, urban/rural classification), ethnicity, socio-economic characteristics (Index of Multiple Deprivation decile group, household deprivation, educational attainment, social grade, household tenancy, type of accommodation, household size, multigenerational household, household with children), health (body mass index, chronic kidney disease (CKD), learning disability, cancer or immunosuppression, other conditions). See Supplementary Tables S1 for more details.

Transport Sector

- Evidence from studies on infection, disease and mortality in Transport workers
- Literature review on transmission in ground based public transport
- Qualitative Deep dive

Covid-19 Mortality in Transport

- Public transport workers at increased risk of Covid-19 mortality (based on data from March – December 2020)
- Other transport workers similar risk of C19 death as all working age men

Occupation	COVID-19 deaths	Rate	All cause mortality	Rate
Large goods vehicle drivers	118	39.7	1006	332.4
Van drivers	97	39.7	769	332.2
Bus and coach drivers	83	70.3	367	333.6
Taxi and cab drivers and chauffeurs	209	101.4	739	357.1
All men aged 20-64 years	5,128	31.4	42,082	256.0

https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/causesofdeath/bulletins/coronaviruscovid19relateddeathsbyoccupationenglandandwales/deathsregisteredbetween9marchand28december2020#related-links

Covid-19 Mortality Transport – Linked census study

	Men		Women	
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Essential workers	1.45 [1.34 - 1.56]	1.22 [1.13 - 1.32]	1.16 [1.05 – 1.28]	1.06 [0.96 – 1.17]
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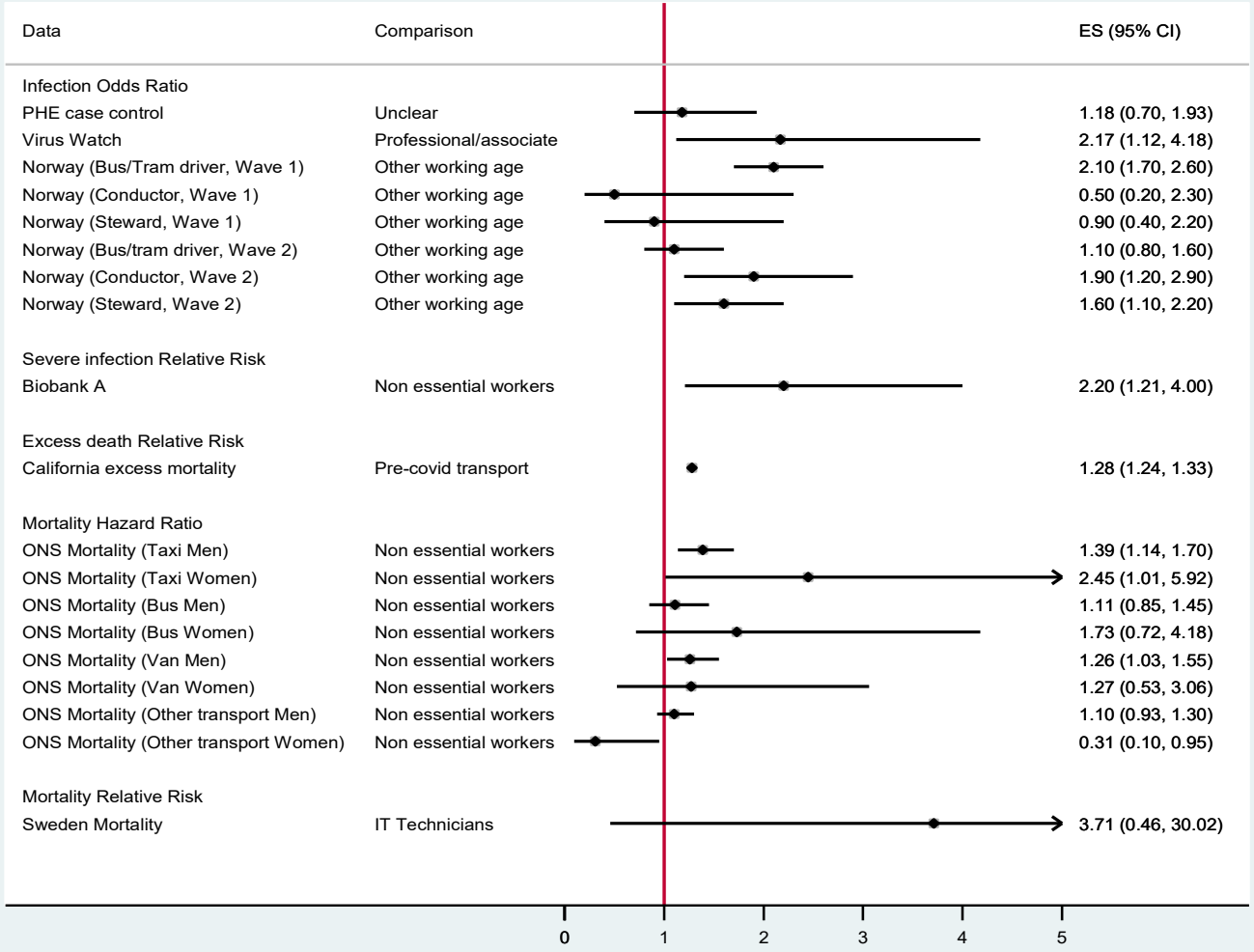
Literature – Transport

Infection, COVID-19, mortality

Relative effect of working in transportation on Covid-19 outcomes



- Suggestive of increased risk of infection, Covid-19 morbidity and mortality in Transport workers
- However, results vary between and within studies

Literature review Public Transport

Research Questions:

1. What is the evidence for the presence of SARS-CoV-2 in air and on surfaces in ground public transport?
2. What do empirical studies of Covid-19 transmission on public transport show?
3. What evidence is there for the effectiveness of control measures in public transport?
4. What does risk modelling for Covid-19 transmission rates on ground public transport show?

28 papers for inclusion in the review

- 11 modelling studies / 17 empirical studies
- 17 peer reviewed / 11 pre-prints, reports, conference publications
- 7 contamination studies / 10 transmission studies / 11 control studies
- 2 studies conducted in the UK

- Current published literature is **sparse** in relation to Covid-19 and public transport.
- **Empirical studies** provided some evidence for the transmission of SARS-CoV-2 transmission on public transportation and highlighted important factors that moderate transmission such as **proximity and duration** of co-travel.
- Studies which measured **surface and air contamination** in public transport settings reported mixed findings. Methodologies to detect SARS-CoV-2 RNA are being developed; however, further research is needed to determine if/when detected viral RNA is capable of infecting others.
- **Modelling** approaches need real world data to best inform their utility. Variations in the estimation of the probability of infection.

Qualitative study in Public Transport

Type of respondent	Number
Expert - Research	5
Expert - Government / policy	7
Expert - Industry / regulator	5
Org leader / union	13
Workers – rail / bus	5
Passengers	12 Mix of current and lapsed users for all modes PT (rail, bus, taxi, tube, tram)
Total	47

Perceptions of risk on PT generally low, across all response groups.
But this is within the context of low passenger numbers, and with current mitigations in place.

Mitigations were seen as effective at reducing transmission, when all used together.
Trust: this is reliant on behavioural compliance by many, which is not always followed.
Enforcement of social distancing and mask wearing is an issue at present.

We **are lacking objective data** about the effectiveness of different mitigations, in isolation and together.
As passenger numbers rise, social distancing will reduce and it is unknown what impact this may have on transmission even with other mitigations in place.
How to manage the enforcement of mask wearing as rules are relaxed and more passengers travel.

Food Sector Deep dive

Objective

Within the food production sector which workplace factors and workforce characteristics are associated with risk of Covid-19 infection among the workers?

- Literature review
- Covid@Work Survey: across sector
- Qualitative Stakeholder interviews: Overview of risks and controls
- Plant level outbreaks studies: COVID-OUT study (Theme 1)
- National analyses of Data on COVID e.g. ONS

Sector reports:

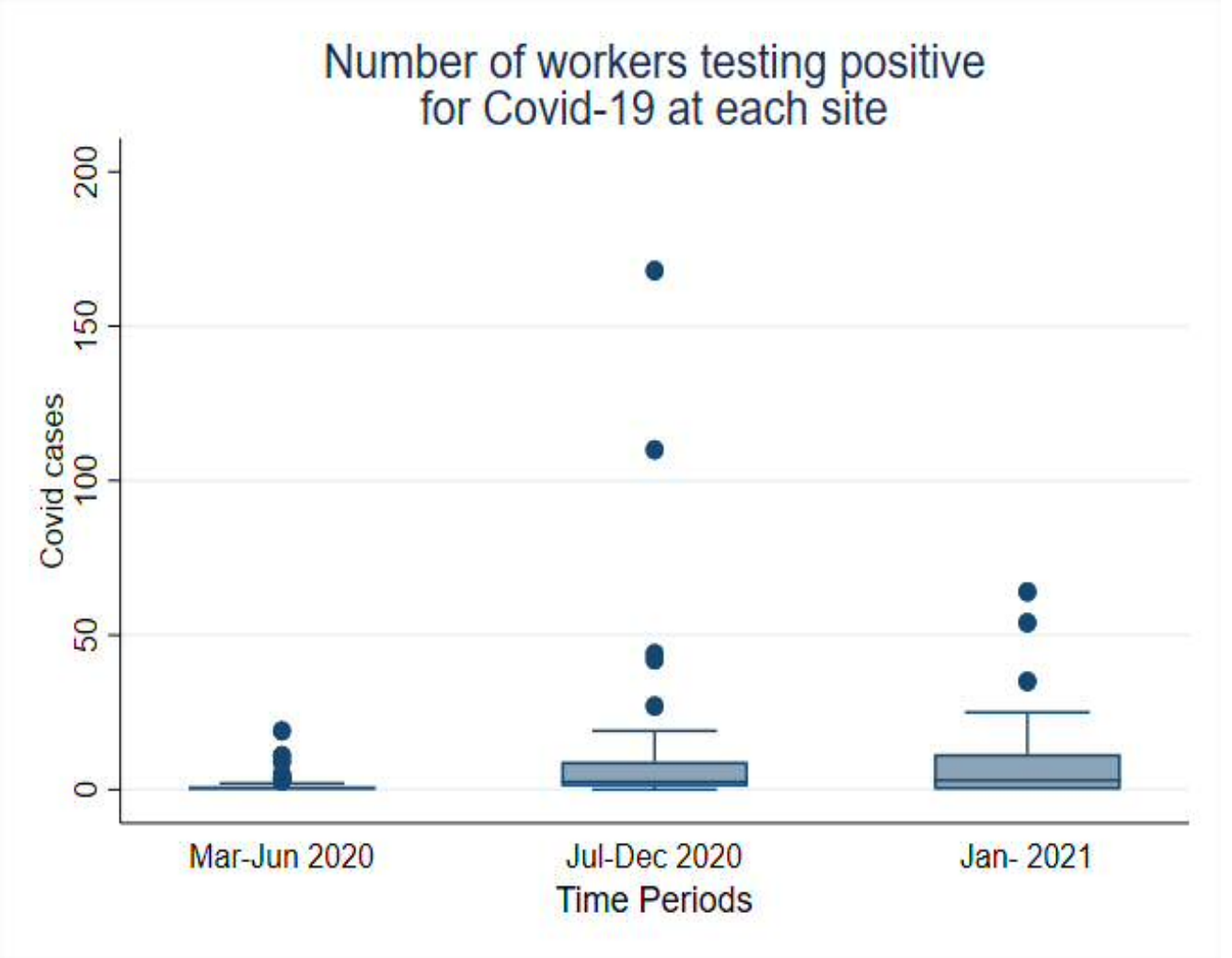
- Risk factors
- Mitigation
- Feedback to food industry stakeholders and workplaces

Food Sector Studies

Covid@Work Survey:

- Stage 1: Baseline survey (short online) recruited through trade associations. Completed.
- Stage 2: Follow-up in-depth tel. survey on incidence and risks factors. Starting soon
- Stage 3: Stakeholder interviews across sector. Starting soon
- Stage 4: Workplace based stakeholder interviews in subsample

Stage 1 – COVID rates per site



Food Sector

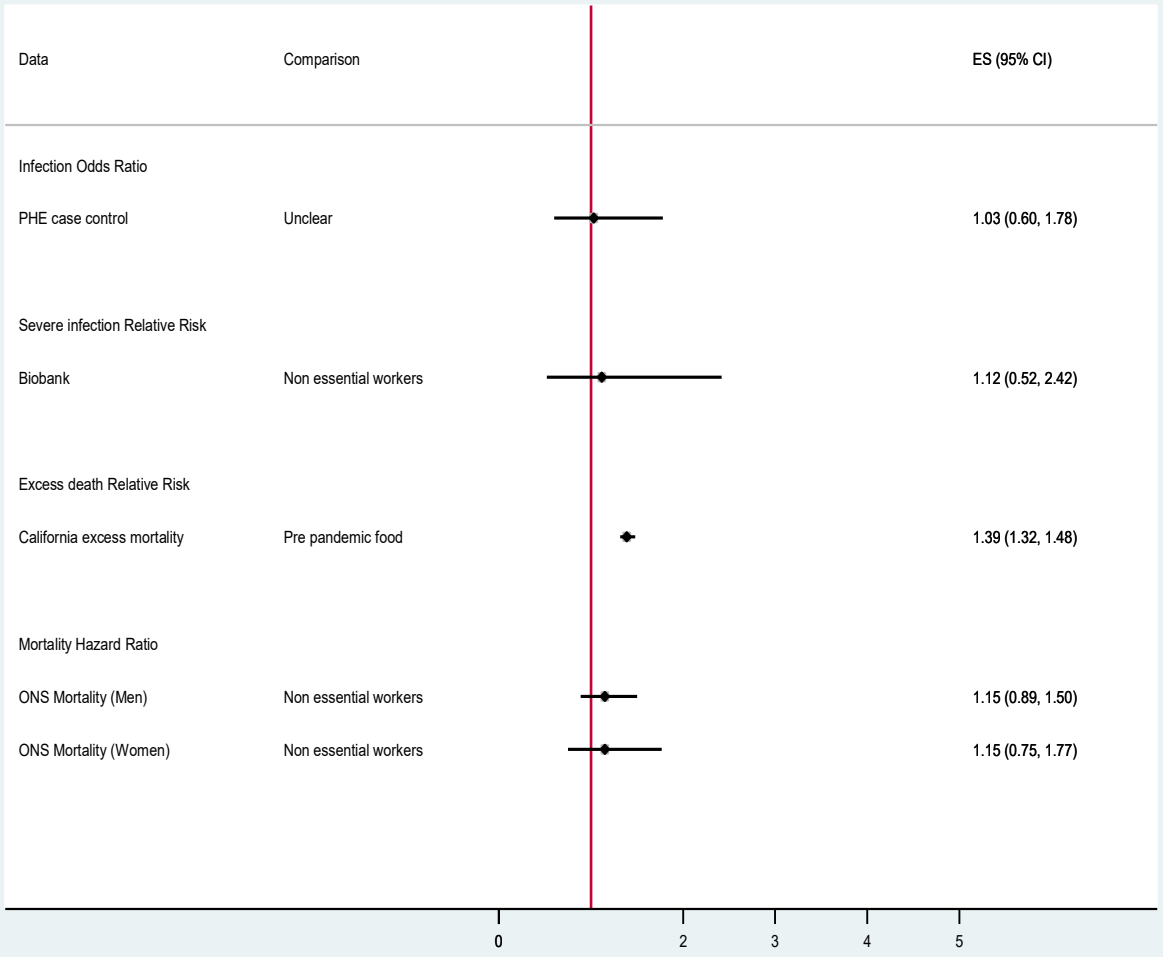


Table 6 Number and rate of workplace outbreaks by sector in England, May-Oct 2020

Workplace Setting Type (from HPZone)	Number of Outbreaks	Number of Workplaces (England)	*Outbreak Rate* (per 100,000)
Manufacturers and packers of food	117	6,998	1,672
Warehouses	58	15,058	385
Manufacturers and packers of non-food	195	63,312	308
Retailers	219	195,025	112
First responders/Military sites	57	67,257	85
Distributors and transporters	84	125,414	67
Restaurants and caterers	53	117,836	45
Offices	193	721,351	27
Close contact services	13	52,866	25
No setting type assigned	54	511,071	11
Primary producers	8	93,086	9
Other	266	-	-
Total	1,317	1,969,274	67

Chen et al COVID-19 outbreak rates and infection attack rates associated with the workplace: a descriptive epidemiological study. medRxiv preprint doi: https://doi.org/10.1101/2021.05.06.21256757

Food Sector Studies

Summary

- There have been a number of reports of food production COVID-19 outbreaks, mainly in the US, with meat featuring strongly.
- According to Chen et al, food sector had the highest rate outbreak rate of any sector in England
- Published studies of mortality and infection from ONS, Biobank etc. on the other hand generally do not show an increased risk.
- This apparent inconsistency may have several explanations – the outbreak rate did not take size of workplace or cluster into account, the collection of outbreak data may be inconsistent between sectors.
- The PROTECT sector studies are planning to shed light on this, and explain this apparent inconsistency by a) more detailed analyses of the HSE outbreak database taking size of workplace into account and b) a sector wide survey; c) further analyses of existing data sources (such as ONS, Biobank, etc.)

Some observations

- Transmission is a continuous risk.
- Work-related exposure is important, but exposure is not contained to workplace
- Non-workplace factors can explain large parts of differences in risk between occupations (and *vice versa*)
- Results vary between and within studies, depending on design, timing and inclusion of confounders…
- Sector specific studies help and support sectors to mitigate risk of transmission and outbreaks
- Further work will include
  - Continue studies in sectors such as Transport, Food Processing and Construction,
  - Develop sector specific evidence reports
  - Qualitative study involving DPH in Places of Enduring Prevalence in UK
  - Further analyses and triangulation of existing data sets (ONS, Longitudinal Linkage collaboration, Virus Watch…)

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sites.manchester.ac.uk/covid19-national-project

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