



COVID-19 vaccination uptake and hesitancy reasons in food production workers

Gordon Haire^{1,2} · Deirdre Gleeson¹ · Alex Reid³

Received: 24 November 2022 / Accepted: 9 March 2023 / Published online: 22 March 2023
© The Author(s), under exclusive licence to Royal Academy of Medicine in Ireland 2023

Abstract

Background Food production sites have been a high-risk location for SARS-CoV-2 outbreaks worldwide since early in the COVID-19 pandemic. Ireland has a high population rate of COVID-19 vaccination, but reports from food production sites suggest uptake is lower amongst workers despite prior outbreaks at these workplaces.

Aims To study COVID-19 vaccination rates, intent to undertake future vaccination and hesitancy reasons in food production workers.

Methods Data regarding vaccination status was collected via an online survey from workers at 8 food production sites in Ireland; those who were unvaccinated were asked for reasons for being unvaccinated and likelihood to future vaccination. Respondents were also asked for their usual trusted source of medical information.

Results $N=355$ responses were received. The crude vaccination rate is 86% ($N=306$). Those employed in the general operative class are more likely to be unvaccinated ($N=30$; 18%) when compared to unvaccinated in all other job classes ($N=16$; 9%; $p<0.01$). The rate of vaccination is lower in those not born in Ireland compared to those born in Ireland ($N=110$, 73% vs $N=192$; 98%; $p<0.001$). $N=35$ (76%) of unvaccinated workers report they are very unlikely or unlikely to undertake vaccination in the future.

Conclusions There is an observed lower-than-national vaccination rate in food production workers. Rates are lowest amongst those workers born overseas; targeting these groups with information responding to their concerns may increase uptake and reduce current and future health inequalities.

Keywords Occupational groups · Occupational health · Vaccination · Vaccination hesitancy

Introduction

Food production sites have been a high-risk location for SARS-CoV-2 outbreaks worldwide since early in the COVID-19 pandemic [1, 2]; this was seen in Ireland with early outbreaks resulting in escalating local epidemiological situations with the instigation of increased suppression mechanisms in relevant local communities by public health authorities there [3]. During the period March 2020 to December 2021, there were 289 outbreaks linked to meat and other food production facilities in Ireland with 4983 linked confirmed laboratory cases [4]. Subsequent research has shown that environmental and work practices in these settings can facilitate SARS-CoV-2 transmission, necessitating the instigation of additional and novel control measures to manage and prevent further outbreaks at such workplaces [5–7]. The advent of efficacious vaccination against SARS-CoV-2 has heralded a new phase in the

Key points

- What is already known on the subject
 - Food production sites have been high-risk workplaces for COVID-19 outbreaks and transmission
 - Low-skilled workers have experienced worse outcomes during the COVID-19 pandemic
- What this study adds
 - It is the first study looking specifically at vaccination rates and hesitancy reasons in this occupational cohort in Ireland
 - It shows lower than average uptake rates in particular amongst those workers born overseas
- What impact this may have on policy or practice
 - Targeting these groups with specific relevant information that responds to their concerns may increase uptake and reduce current and future health inequalities

✉ Gordon Haire
gordon.haire@icloud.com

Extended author information available on the last page of the article

pandemic with a significant associated reduction in severe disease [8].

Ireland has a very high general population rate of COVID-19 vaccination, but anecdotal reports from food production sites suggest uptake is lower amongst food production workers despite the prevalence of significant outbreaks during the pandemic [9]. We as such sought to undertake a cross-sectional assessment of COVID-19 vaccination rates, intent to undertake future vaccination and hesitancy reasons in food production workers.

Methods

A cross-sectional study of COVID-19 vaccination rates, intent and hesitancy reasons was undertaken at food production sites where we provide occupational health services in the Republic of Ireland. Full ethical approval for the study was obtained in advance from St James Hospital/Tallaght University Hospital Research Ethics Committee (submission number: 550).

Data was collected by way of a survey hosted on a commercial survey platform (SurveyMonkey). Access was gained via a QR code on posters left in common areas, a link via email or a link via text messaging sent out by management or on-site occupational health staff at relevant sites. Data collection was undertaken at 8 sites with approximately 3500 total staff. Inclusion criteria were employment at a food production site of interest. Access to a patient information leaflet (PIL) was also provided; participation was voluntary and the initial survey page advised consent to participation by way of continued completion of the online survey. Following consultation with sites, the following language translations were undertaken by way of a professional medical translation service: Lithuanian, Polish, Portuguese, Romanian and Russian. All answers were collected anonymously.

Following the collection of demographic and job data, information with regard to vaccination status was collected. Those who were unvaccinated were asked for reasons for not being vaccinated and likelihood to future vaccination on a Likert scale. Additional information regarding prior participation in seasonal influenza vaccination campaigns and self-reported usual source of medical information was also collected. Data was collected during Q1 and Q2 2022.

Collected data was exported to *Microsoft Excel* and cleaned before import for analysis to *IBM SPSS v28.0*. This was used to yield descriptive statistics. Further analysis was performed using chi-squared testing or non-parametric testing with Kruskal–Wallis as applicable. Statistical significance was set at the 0.05 level. Binary logistic regression was used to control for potential confounding.

Results

$N = 355$ responses were received giving a response rate of 10%.

The crude vaccination rate is 86% (vaccinated $N = 306$; 86%; unvaccinated $N = 46$; 13%; unanswered $N = 3$; 1%). Demographic data by vaccination status can be seen in Table 1.

Of note, the rate of vaccination is significantly lower in those not born in Ireland compared to those born in Ireland ($N = 110$, 73% vs $N = 192$; 98%; $p < 0.001$).

Those employed in the general operative class are less likely to be vaccinated when compared to all other job classes (general operative unvaccinated $N = 30$; 18% versus other job class unvaccinated $N = 16$; 9%; $p < 0.01$).

Binary logistic regression was used to analyse the relationship between country of origin, job grade and vaccination status. It was found that in this model, the odds of being unvaccinated was 13.89 for those not born in Ireland compared to those born in Ireland (95% CI OR 5.13–38.46); the odds for those in the general operative grade compared to other higher skilled job grades was 1.005 (95% CI OR 0.49–2.07).

Those who are younger are less likely to be vaccinated; in particular, those who are under 50 are significantly more likely to be unvaccinated versus those over 50 (unvaccinated under 50 $N = 42$; 16% vs unvaccinated over 50 $N = 3$; 3%; $p < 0.01$).

Table 1 Demographic data by vaccination status

	Unvaccinated ($N = 46$) N (%)	Vaccinated ($N = 306$) N (%)
Age		
<25	7 (16)	19 (6)
25–49	35 (78)	197 (65)
50–59	3 (7)	79 (26)
60–69	0 (0)	10 (3)
>69	0 (0)	0 (0)
Unanswered	1	1
Gender		
Female	11 (24)	113 (37)
Male	33 (75)	191 (63)
Other	1 (2)	1 (0)
Unanswered	1	1
Job class		
General operative	30 (65)	134 (44)
Skilled operative	4 (9)	43 (14)
Manager	6 (13)	82 (27)
Other	6 (13)	46 (15)
Unanswered	0	1
Country of birth		
Ireland	5 (11)	192 (63)
Outside Ireland	40 (89)	110 (36)
Unanswered	1	4

Table 2 Self-reported reasons for vaccine hesitancy in those unvaccinated

Hesitancy reasons in the unvaccinated cohort	N (%)
Reason for not getting vaccinated	
Efficacy concerns	11 (24)
Side effect concerns	9 (20)
Concerns about vaccination in general	6 (13)
Other	6 (13)
Have had COVID before so do not think necessary	5 (11)
Long-term safety concerns	4 (9)
Believe COVID is not a risk to them	4 (9)
Unanswered	1

$N=35$ (76%) of those who are unvaccinated report they are very unlikely or unlikely to undertake vaccination in the future. The distribution of likelihood to undertake future vaccination is similar across job classes ($p=0.341$). Self-reported reasons for hesitancy to date are shown in Table 2. There is no significant difference in the distribution of self-reported source of medical information by job category ($p=0.214$).

Discussion

To our knowledge, this is the only study examining COVID-19 vaccination uptake and associated hesitancy reasons specifically in food production workers in Ireland. We observed a lower rate of COVID-19 vaccination in food production workers versus the general population (86% observed vaccination rate versus national over 18 any dose COVID-19 vaccination rate of 96%) [9]; we note a particularly low vaccination rate amongst those not born in Ireland. Those who are younger and in less skilled job categories are more likely to be unvaccinated. This latter associated is likely explained by higher proportions of Irish individuals employed in more skilled job categories. Population-based studies in both the USA and the UK suggest that COVID-19 vaccination update rates are lower in food production workers than in the general population there. Lower-skilled occupations are also less likely to have completed COVID-19 vaccination in these studies [10, 11]. In addition, lower-skilled workers have in general experienced worse outcomes in the pandemic compared to higher-skilled workers [12].

Migrant populations may exhibit low health-related behaviour and vaccine uptake specifically for a variety of reasons. In addition to language and cultural considerations, precarious immigration or occupational status and a lack of understanding of how local health systems function likely contribute to lower uptake rates in this cohort [13, 14].

Study participants gave a variety of reasons for remaining unvaccinated with safety and efficacy concerns predominant; a majority of those unvaccinated self-reported as very unlikely or unlikely to undertake COVID vaccination in the future. Our study did not show a significant difference in the primary reported source of medical information according to job class; a high proportion of respondents included those unvaccinated state official sources and medical professionals as primary sources of medical information. Given the predominant stated hesitancy reasons here and the lowest rates seen in migrant worker populations, information specific to concerns regarding safety and efficacy may increase uptake here. Interventions would need to be language specific and culturally sensitive. Workplace interventions including onsite vaccination and paid time off to attend and facilitate vaccination in addition to protected leave in the event of vaccine-related side effects may further increase uptake.

Naturally, this study had certain limitations. The response rate is low. 2016 Census data shows that of the 12,000 individuals working directly in meat processing in Ireland, 52% are Irish nationals and 48% are non-nationals; 77% are male, and 23% are female [15]. This is in line with the demographics of study participants here with respect to nationality (Irish $N=198$ (56.7%), non-Irish $N=151$ (43.3%)), while our participants showed an overrepresentation of females in comparison to the demographics of the population as a whole (male $N=225$ (63.9%), female $N=125$ (35.5%), other $N=2$ (0.6%)). Concerning methodology, such a data collection method is prone to selection or volunteer bias. It is possible that those who are unvaccinated are less likely to partake in such a study, and as such, the vaccination rate may be overestimated. Due to practical considerations, our study was accessible to those speaking six languages; those speaking other languages are as such likely under-represented in the study.

It is interesting to note a lower-than-national vaccination rate in an occupational cohort who have been particularly impacted by the pandemic. This observational study informs the need for more in-depth ascertainment of the reasons for vaccine hesitancy in those workers not born in Ireland; a qualitative study here may be particularly informative. Targeting these groups with specific relevant information that responds to their concerns may increase vaccination uptake and reduce current and future health inequalities.

Acknowledgements All staff at food production sites studied in particular those who aided with study dissemination. Dr. Donal Sammin for assistance with medical translation services.

Declarations

Competing interests The authors declare no competing interests.

References

- Waltenburg MA (2020) Update: COVID-19 among workers in meat and poultry processing facilities — United States, April–May 2020. *MMWR Morb Mortal Wkly Rep* [Internet]. [Cited 2023 Feb 22]; 69. Available from: <https://www.cdc.gov/mmwr/volumes/69/wr/mm6927e2.htm>
- Middleton J, Reintjes R, Lopes H (2020) Meat plants—a new front line in the covid-19 pandemic. *BMJ* 370:m2716
- Covid-19 -The Irish public health experience (2020) *Irish Medical Journal* [Internet]. [cited 2023 Feb 22]. Available from: <https://imj.ie/covid-19-the-irish-public-health-experience/>
- Health Protection and Surveillance Centre (2021) Epidemiology of COVID-19 Outbreaks/Clusters in Ireland Weekly Report Week 50 2021. HPSC Dublin
- Donaldson AI (2020) Coronavirus: aerosols in meat plants as possible cause of COVID-19 spread. *Vet Rec* 187(1):34
- van Doremalen N, Bushmaker T, Morris DH et al (2020) Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med* 382(16):1564–1567
- Walshe N, Fennelly M, Hellebust S et al (2021) Assessment of environmental and occupational risk factors for the mitigation and containment of a COVID-19 outbreak in a meat processing plant. *Front Public Health* [Internet]. [Cited 2023 Feb 22] 9. Available from: <https://doi.org/10.3389/fpubh.2021.769238>
- Watson OJ, Barnsley G, Toor J et al (2022) Global impact of the first year of COVID-19 vaccination: a mathematical modelling study. *Lancet Infect Dis* [Internet]. [Cited 2023 Feb 22] 22(9). Available from: <https://pubmed.ncbi.nlm.nih.gov/35753318/>
- Health Protection and Surveillance Centre (2022) COVID-19 vaccination uptake in Ireland weekly report week 25 2022. HPSC Dublin
- Sokale I, Alvarez J, Rosales O et al (2022) COVID-19 vaccine uptake among US adults according to standard occupational groups. *Vaccines* 23;10(7):1000
- Nafilyan V, Dolby T, Finning K et al (2022) Differences in COVID-19 vaccination coverage by occupation in England: a national linked data study. *Occup Environ Med* 79(11):758
- Mutambudzi M, Niedzwiedz C, Macdonald EB et al (2020) Occupation and risk of severe COVID-19: prospective cohort study of 120 075 UK Biobank participants. *Occup Environ Med* [Internet]. [Cited 2023 Feb 22] 78(5). Available from: <https://pubmed.ncbi.nlm.nih.gov/33298533/>
- Appoh L, Felix F, Pedersen PU (2020) Barriers to access of healthcare services by the immigrant population in Scandinavia: a scoping review protocol. *BMJ Open* 10(1):e032596
- Refugee and migrant health [Internet] (2022) [Cited 2023 Feb 27]. Available from: <https://www.who.int/news-room/fact-sheets/detail/refugee-and-migrant-health>
- Central Statistics Office Census (2016) Nationality - NACE 1010 Production, processing and preserving of meat, meat products and poultry. CSO Dublin. Special tabulation Accessed 27 Feb 2023

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Authors and Affiliations

Gordon Haire^{1,2}  · Deirdre Gleeson¹ · Alex Reid³

¹ Medwise Occupational Health Services, Unit 32 Naas Town Centre, Naas, Kildare, Ireland

² Faculty Occupational Medicine, RCPI, Kildare Street, Dublin 2, Ireland

³ Occupational Health Department, Tallaght University Hospital, Dublin 24, Ireland