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Flu Vaccination due to COVID 19 as a Risk-Aversion Health Measure among Low-Risk Populations

Generalised Regression Analysis of Australian COVID19 Household Impact Survey Data on Flu Vaccination Due to COVID19

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Abstract

Fear, social responsibility, or vulnerability - which is the main driver of seasonable influenza vaccination in times of the pandemic? Our study using first-hand survey data from the Australian Bureau of Statistics shows that none of these factors explains conclusively Australians who had the flu vaccination in 2020 due to COVID19 only. It was Australians who had higher education, without chronic health conditions, those in employment, fully covered by health insurance, living with families who reported statistically higher rates of flu vaccination due to COVID19 only.

By contrast, people with one or more chronic health issues, single people without support reported statistically lower rates of seasonal influenza immunisation. Similar results are reported in the study of flu vaccination in countries like Canada, where among Canadians aged over 65, it was populations of higher education, married, in better health conditions (non-smokers), higher household income who reported consistently, statistically higher rates of flu vaccination between 2000-2019.

The Australian survey data collected during the pandemic provided further evidence of flu vaccination as a risk-aversion health measure by low-risk populations - a social behavioural phenomenon observed across countries, ages, in normal circumstances or health crises. We interpreted our finding from the hypothesized human propensity to be risk-averse (chose to be vaccinated) when the perceived probability of an improvement over their status quo after vaccination was high (the certainty effect); and human tendency to be risk-seeking (chose not to be vaccinated) when the perceived probability of an improvement post-immunisation was low (the possibility effect).

The higher rates of risk-averse behaviours (chose to be vaccinated) among people in better education, socio-economic and health conditions, and the lower rates of risk-seeking behaviours (chose not to be vaccinated) among people with chronic health issues and those living alone suggest that flu vaccination was perceived by low-risk populations as an effective risk-aversion measure leading to better outcomes of higher certainty; by contrast, flu vaccination was perceived by high-risk populations as a health measure of higher uncertainty, not aiding in improving their status quo as the implicit reference point, according to the Prospect Theory as applied in the study of people's health behaviours.

Introduction

Decisions and actions regarding vaccination is one of the most divisive and impactful human behaviours (Stanley, 2014). The stake of such decisions is high for the prosperity of human societies, cultures, and communities (Baicus, 2012, Snowden, 2019). We take human communities as a dynamic, complex system that has multiple self-organized networks (Yeung, 2000). A society is the aggregation of multiple overlapping networks determined by demographic attributes (such as socioeconomic status, geography, residence, etc.) as well as personal attributes (health status, education, age, gender). We looked at the patterns of the fabrics that weave the complex society, during a period of external changes and threats. We look at not only the different motivations and decisions, but also how different population segments react differently or similarly to changes of the health environment. As most of the world's population are facing the critical decision on COVID-19 vaccination. Empirical studies of behavioural patterns of vaccination will help ensure best decisions and policy planning.

We studied vaccination data from the Australian Bureau of Statistics (ABS) between April to November 2020. Before the roll-out of COVID-19 vaccines in 2021, flu vaccination provided a practical, convenient protective measure to the Australian public. ABS has been conducting since April 2020 periodical surveys of the household impacts of COVID-19. The survey statistics covered Australians who had flu vaccination due to COVID19 only. Using generalised regression analysis, we also studied demographic attributes of Australians who reported flu vaccination due to COVID-19 only between April and November 2020 that aligns with the flu vaccination season in countries of the southern hemisphere.

A range of preventative measures were taken by Australians during the pandemic. How these collective behaviours correlated with each other remained unknown. We examined flu vaccination due to COVID19 only in relation to other health measures. We also studied the populations who reported statistically higher rates of flu vaccination, in contrast with those reported statistically lower or insignificant changes in flu vaccination during the pandemic, and before the actual COVID vaccines became available. Our study aimed to understand differences among Australians in terms of the actual flu vaccination instead of having an intention to be vaccinated during the pandemic, as our study focuses on actual behavioural changes.

We collected 14 waves of surveys of the household impact of COVID19 published by the ABS (O'Sullivan, et al 2020; Chang, et al. 2020); and applied the generalised regression analysis to explore social and health behaviours and population attributes which explained the variations in Australians who had flu vaccination due to COVID19 only. It was found that before the actual vaccine of COVID19 became available in early 2021 in Australia, there were two large types of health behaviours which had statistically significant correlations with flu vaccination due to the spread of COVID19 only: spontaneous self-protective measures such as self-imposed social isolation, household supplies hoarding, mask wearing; and evidence-based protective measures including seeking medical advice and practising social distancing instead of self-isolation to reduce the odds of infection.

Flu vaccination due to COVID19 only had statistically significant positive correlation with the first set of health measures – the less rational, more spontaneous self-protective measures underlined by heightened concern levels; and statistically significant negative correlations with the second set of health measures – the more rational, and evidence-based self-protective measures. Further, we found that flu vaccination due to COVID19 only had statistically significant correlations with populations with better education, better self-health assessment (excellent/good), without chronic health conditions, better socioeconomic status (in employment, and covered by health insurance) and living in Australian states of very low or null infections. Flu immunisation due to COVID19 only was statistically lower among high-risk populations such as people with chronic health conditions, and single people living alone. The statistical analysis indicates that flu vaccination due to COVID 19 was found as a health risk-aversion measure among populations of low-risk profiles, consistent with the certainty effect of Prospect Theory (Kahneman and Tversky, 1979, 1992).

Statistical Analysis

Table 1 Co-variates and the dependent variable

	Continuous Variables	Mean (%)	Std.
Dependent Variable	Had a flu vaccination due to COVID19 only	17.728	7.873
Covariates	Concerned about personal health	60.122	8.467
	Behaviour changed	98.373	1.274
	Washed hands regularly or more	86.797	8.220
	Touched face less than usual	42.102	8.994
	Wore a face mask	37.143	22.821
	Sought advice from a medical professional	9.805	4.162
	Avoided public transport	62.561	16.044
	Avoided public spaces and events	69.697	9.467
	Kept distance from people	89.949	6.544
	Avoided or cancelled social gatherings	70.211	10.922
	Changed or cancelled travel plans	51.016	8.146
	Worked from home	32.733	17.701
	Stopped working	9.168	4.687
	Kept children home from school or childcare	25.169	17.015
	Purchased additional household supplies	28.402	10.295
	Purchased additional medical supplies	15.697	7.480
Self-isolated or stayed at home	52.309	12.684	
Disinfecting surfaces before using them	63.027	6.264	

We collected and analysed 14 waves of ABS survey data on the household impacts of COVID19 from April to November 2020. The original dataset contained as many as 26 health measures taken by Australians including Concerned about personal health; behaviour changed; washed Hands Regularly or More; touched face less than usual; had a flu vaccination; had a flu vaccination due to spread of COVID-19 only; intends to have a flu vaccination this year; wore a facemask; sought advice from a medical professional; avoided public transport; avoided public spaces and events; kept distance from people; avoided or cancelled social gatherings; changed/cancelled travel plans; worked from home; stopped working; kept children home from school/childcare; purchased additional household supplies; purchased additional medical supplies; self-isolated (stayed at home); disinfecting surfaces before using them; getting home deliveries; avoid to attend a social gathering of more than 10 people; shopping in physical retail stores; going to a gym, boot camp or swimming pool; using public recreational areas (including beaches, parks, playgrounds and skate parks). These were all continuous variables which reported the percentages of the survey populations who took these preventative measures, together with their demographic attributes: age groups (18-64 years; 65 or above), gender, birth place (Australia; overseas); with or not with a long-term health condition (yes; no); employment (yes; no); with or without health insurance (yes, no); highest educational attainment (below Year 12; Year 12 or above); family status (single; couple with/without children); and residence (New South Wales; Victoria; the rest of Australia). An important feature of these different waves of survey data is that they did not have a uniform survey design. The ABS collected data for different survey questions across the waves which reflected the government's varying prioritised areas of social policy interventions. This increased the difficulty to develop statistical models using complete and consistent datasets. Variables of more than 50% missing data were excluded to reduce the hypothetical nature of the study. Multiple imputations were applied on variables with less than 40%

missing data. We used predictive mean matching instead of linear regression to scale continuous variables, as any negative values generated in the imputation process were not deemed meaningful in this study. As a result, we retained 18 sets of behavioural data (Table 1) related to preventative health measures taken by Australians due to COVID19 during the survey periods between April and November (Appendix 1).

Figure 1 Scatter boxplot and error bars (concerns about personal health %)

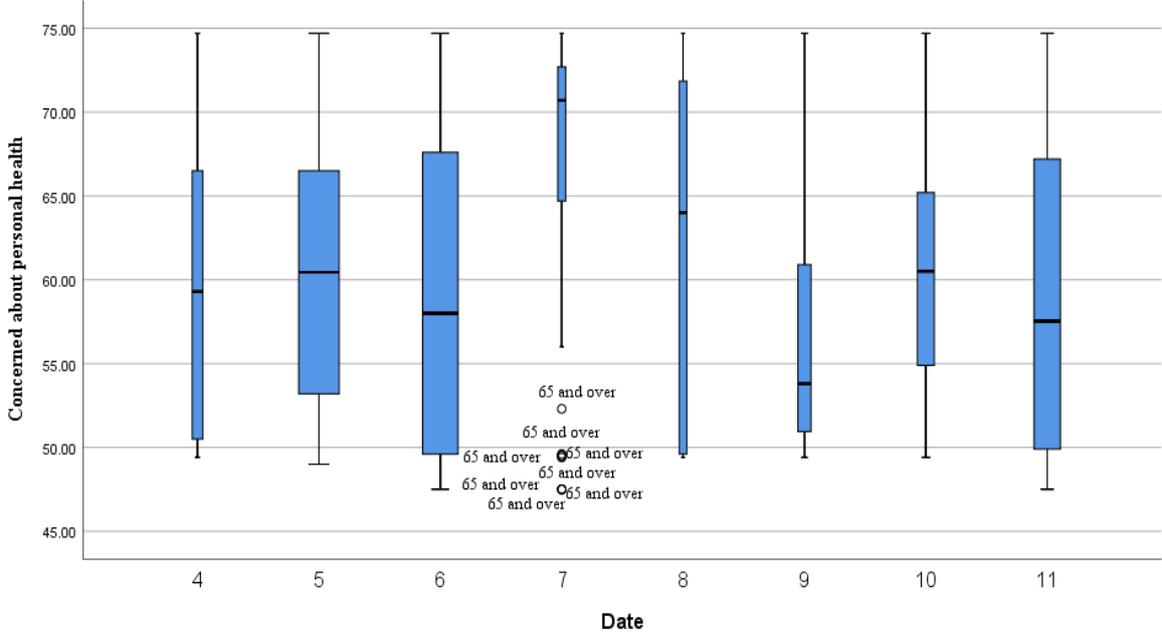
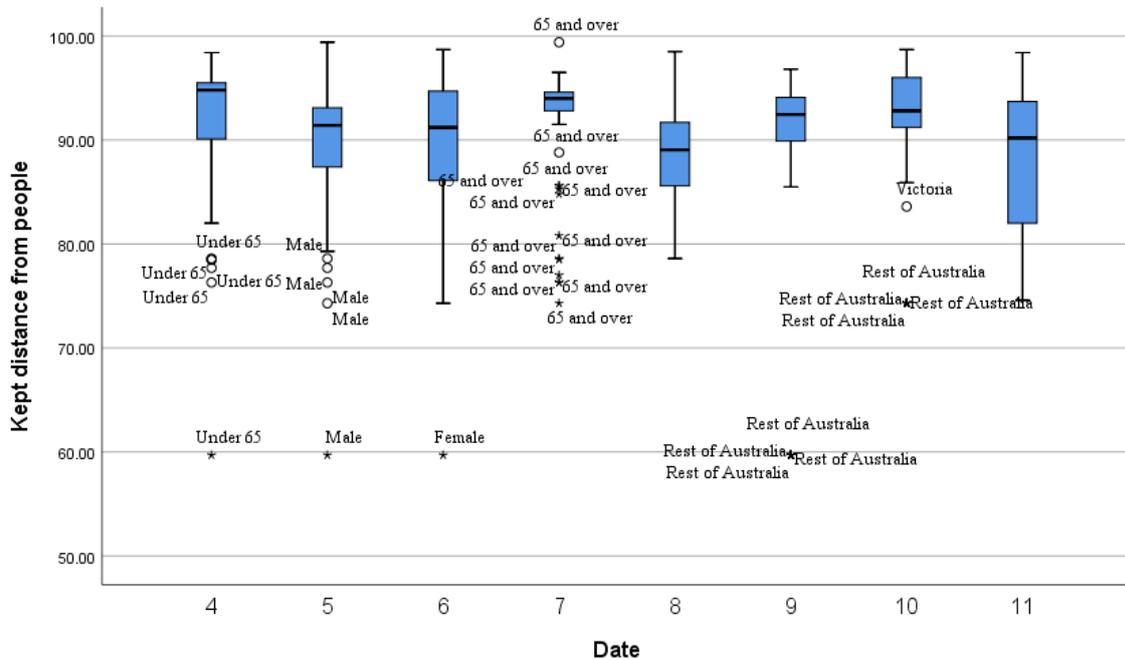


Figure 1 shows the variations in the survey populations who reported personal concerns over the developing pandemic situation (mean = 60.122%, std = 8.467). The July period reported the highest median value of populations concerned about their personal health, which preceded the worst outbreaks of the pandemic in Australia in Victoria. Some elderly populations (65 years or above) represented outliers on the graph, as the percentage of this population who reported concerns over the pandemic were much lower (between 48%-53%) than the median (70.7%).

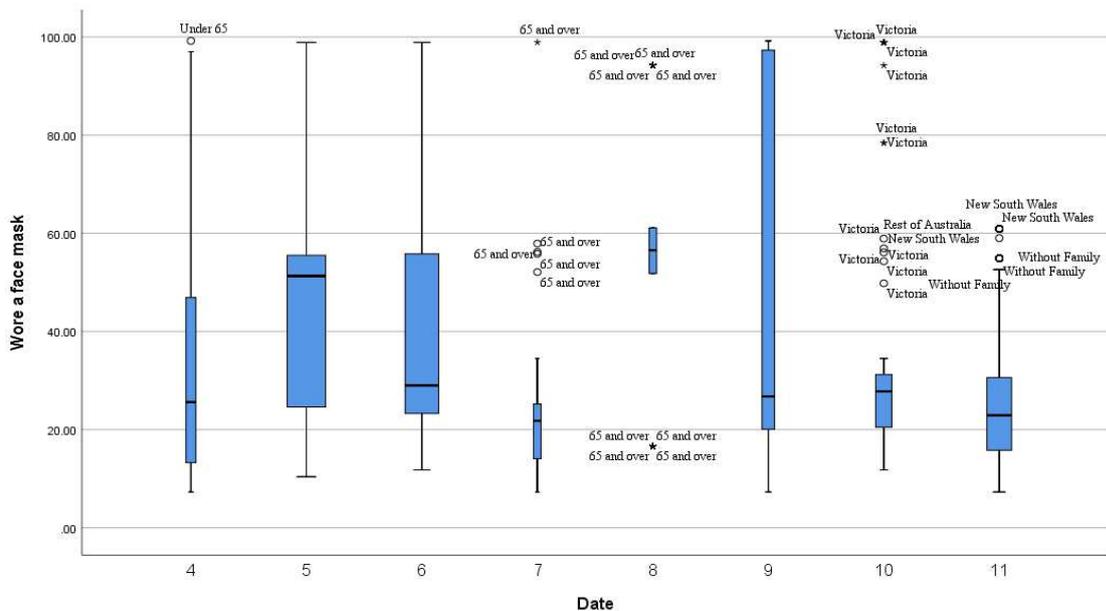
Figure 2 shows that the level of social distancing between April and November was largely stable. Except for August which reported the median value of populations who practiced social distancing (89.05%), during all other months, as high as more than 90% of Australians adhered to the medical advice of social distancing. However, outliers did exist across the survey periods, prominently elderly Australians, especially during July when metropolitan Melbourne reported surges in infections. In comparison, at the early stage of the pandemic, for example, working age populations (under 65 years) represented outliers in April (lowest percentages between 59.7% and 78.5%). Males were outliers in May (lowest percentages between 59.7% and 78.6%). There were very few outliers in August, despite overall relatively low median value. Between September and October, outliers were mostly residents living in the rest of Australia (except for the two states with the highest infections: Victoria, New South Wales). It is worth noting that at no time of 2020, the survey populations reported less than 60% of maintaining social distancing, which might help explain the relatively successful story of the pandemic control in Australia.

Figure 2 Scatter boxplot and error bars (kept distance from people – social distancing %)



Mask wearing is the health measure with the largest standard deviation in Table 1 (22.82%), despite the relevantly high mean (37.143%). Figure 3 shows that between April and November, the highest median of facial cover use was reported in May (51.3%) – more than half of the survey populations used mask. Given that this was the early stage of the pandemic in Australia, the effectiveness of this preventative measure may help explain the very low infection rates in Australia during the remaining months of 2020. In contrast to their low levels of concerns and social distancing, elderly Australians (65 and above) used mask very actively (represented by outliers of highest values) in July-August when outbreaks took place in Victoria. In October and November, residents in the two largest states at the highest risk of outbreaks: Victoria, New South Wales were still active users of masks contributing to the stabilisation of the situation.

Figure 3 Scatter boxplot and error bars (mask wearing %)



Generalised Linear Regression Analysis

Generalised linear regression (GLR) was used to explore the relations between different types of health measures taken by the survey populations, as well as rates of flu immunisation among different populations between April and November 2020. The dependent variable was flu vaccination due to COVID19 only (%), and the continuous covariates were people concerned about personal health (%); behaviour changed (%); washed hands regularly or more (%); touched face less than usual (%); wore a face mask (%); sought advice from a medical professional (%); avoided public transport (%); avoided public spaces and events (%); kept distance from people (%); avoided or cancelled social gatherings (%); changed or cancelled travel plans (%); worked from home (%); stopped working (%); kept children home from school or childcare facilities (%); purchased additional household supplies (%); purchased additional medical supplies (%); self-isolated or stayed at home (%); disinfecting surfaces before using them (%). The mean and standard deviations of these health measures taken were given in Table 2. The model goodness of fit was measured by Log Likelihood (-3795.468); Akaike's Information Criterion (AIC) (7696.936); Finite Sample Corrected AIC (AICC) (7701.887); Bayesian Information Criterion (BIC) (7967.150).

Results

Flu Vaccination due to COVID19 only correlated strongly with spontaneous risk-aversion measures.

We identified two types of concurrent health behaviours of flu vaccination due to COVID19 only. First, behaviours contributing to significant increase (p between 0.04 - 0.000) in flu vaccination due to COVID-19 was characteristic of early public reactions to the pandemic: household supplies hoarding, elevated health concerns, home-based lifestyle. These health behaviours were more spontaneous than based on medical evidence. At the early stages of the pandemic, the ABS data show that Australians were more risk averse trying to minimise the potential health risks of the virus. The second type of health behaviours contributing to significant decrease (p between 0.03 – 0.000) in flu vaccination was more based on medical advice such as social distancing, less facial touch, purchase of additional household medical supplies such as personal hygiene products.

Specifically, behaviours contributing to statistically higher rates of flu vaccination due to COVID10 only included: purchasing additional household supplies (B coefficient: 0.430, $p < 0.000$, 95% CI for Exp (B): 1.424-1.659); self-isolation (B coefficient: 0.242, $p < 0.000$, 95% CI for Exp (B): 1.186-1.367); worked from home (B coefficient: 0.106, $p < 0.000$, 95% CI for Exp (B): 1.051-1.175); concerned about personal health (B coefficient: 0.09, $p = 0.012$, 95% CI: 1.02-1.174); wore a mask (B coefficient: 0.087, $p < 0.000$, 95% CI: 1.047-1.136); avoid public transport (B coefficient: 0.075, $p = 0.04$, 95% CI: 1.004-1.158); kept children at home from schools or childcare (B coefficient: 0.074, $p < 0.000$, 95% CI: 1.040-1.115). Research shows statistically significant correlation between heightened concern levels and these spontaneous risk prevention methods (Cotrin, et. al, 2020) including mask use (Schünemann, et al. 2020) or keeping children from childcare facilities (Macartney, et al. 2020) which are of less conclusive COVID risk prevention effectiveness.

By contract, behaviours contributing to statistically significant lower rates of flu vaccination included: people sought advice from medical professionals (B coefficient: -0.409, $p < 0.000$, 95% CI for Exp (B): 0.564-0.782); purchased additional medical supplies (B coefficient: -0.367, $p < 0.000$, 95% CI for Exp (B): 0.614-0.782); kept distance from people (B coefficient: -0.334, $p < 0.000$, 95% CI for Exp (B): 0.621-0.825) and touched face less than usual (B coefficient: -0.124, $p = 0.003$, 95% CI for Exp (B): 0.815-0.958).

Flu vaccination due to COVID19 only correlated strongly with Australians of low-risk profiles (better health, higher education, and socioeconomic status), but was statistically lower among people of high-risk profiles (with chronic health conditions, and those living alone). This suggests that flu vaccination due to COVID was a typical risk aversion health measure taken by low-risk populations, according to Prospect Theory.

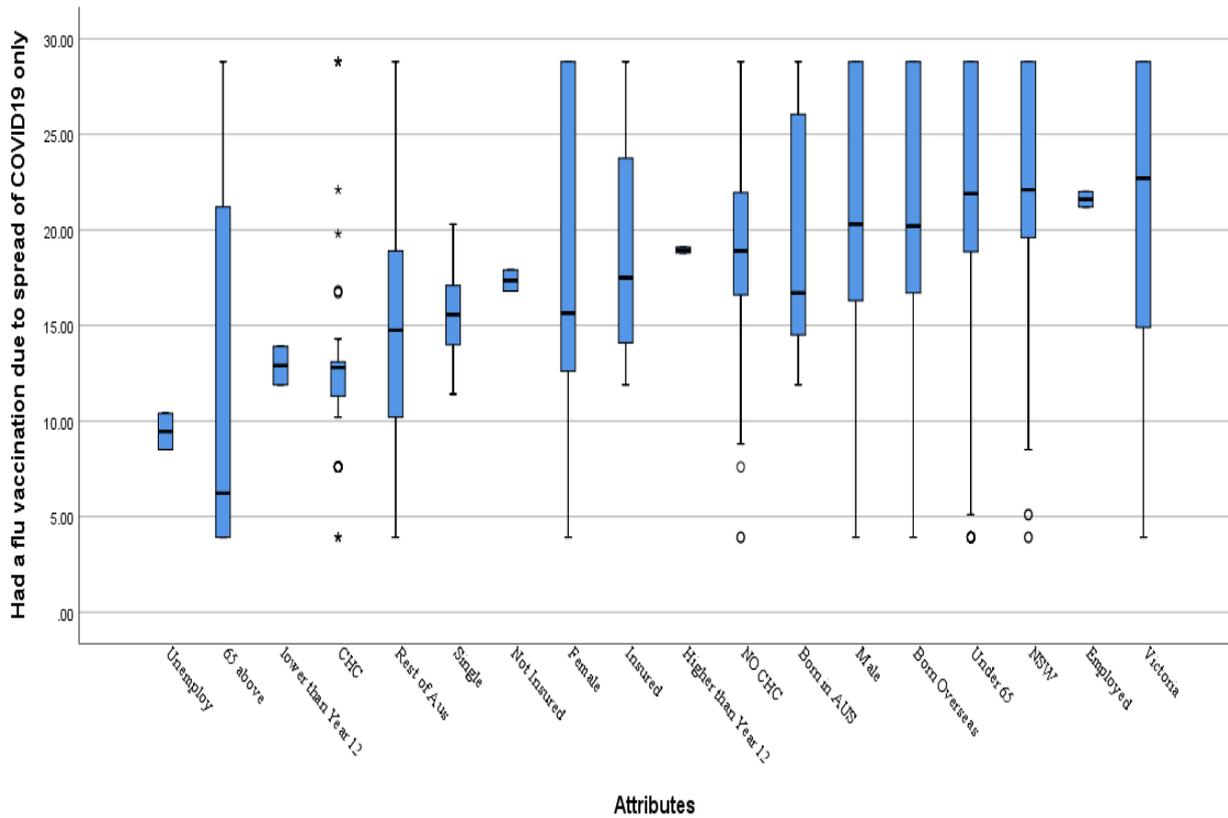
Existing studies reported the social disparity and health inequality caused by the pandemic between people with affluent and disadvantaged socio-economic status (SES). However, few studies have explored the different reactions taken by people from different SES. We explored the demographic, health profiles of Australians who chose to have or not to have flu vaccination as a COVID19 health measure. Statistically higher rates of flu vaccination were found among populations with better education, socio-economic and health status and living in low-risk states. This finding, contrary to intuitions that people of low risks would report lower rates of flu vaccination due to COVID19, may be explained by the certainty effect of Prospect Theory: the perceived higher certainty of the health benefits of flu vaccination was prevalent among populations who were more risk averse.

Australians who reported statistically higher rates of flu vaccination due to COVID19 were people born in Australia (B coefficient: 3.94, $p=0.006$); people born overseas (B coefficient: 4.162, $p=0.016$); people in employment (B coefficient: 10.931, $p<0.000$); females (B coefficient: 3.35, $p=0.046$); people with health insurance (with hospital or extra or both) (B coefficient: 3.876, $p=0.012$); residents of the rest of Australia (not in New South Wales or Victoria) (B coefficient: 4.852, $p<0.000$) which reported very low or no infections; Australians without a chronic health condition (B coefficient: 6.367, $p<0.000$); and Australians with Year 12 or above education (B coefficient: 6.808, $p<0.000$)

Populations who reported statistically lower flu vaccinations were people with chronic health conditions, and single people in less supportive environments. For these high-risk populations, the perceived higher uncertainty of the health benefits of flu vaccination could have been the reason for their very low rates of flu vaccination. Specifically, Australians reporting statistically lower flu vaccination rates were single people not living in a family environment (B coefficient: -6.368, $p<0.000$); people with a chronic health condition (B coefficient: -4.609, $p=0.002$). Populations who reported statistically insignificant rates of flu vaccination due to COVID 19 only were those aged 18-64 (B coefficient: 3.613, $p=0.256$); males (B coefficient: -1.130, $p=0.422$); people not in employment (B coefficient: -2.077, $p=0.06$).

Our study shows that in health emergencies like the COVID pandemic, different social groups took distinct approaches to self-protection. This includes those took more spontaneous, self-initiated protection among low-risk populations. Flu vaccination due to COVID 19 was characteristic of this type of self-protection, prevalent among populations with better education, employment, socioeconomic and health status. By contrast, vulnerable populations such as those with pre-existing long-term health conditions; single people without family support reported statistically lower rates of flu vaccination due to the pandemic. People under 65 and males reported insignificant changes in COVID motivated flu vaccination, in contrast to significant increases among females, possibly due to the perceived self-vulnerability (Leung, et. al. 2020; González-Olmo, et, al, 2020).

Figure 4 Scatter boxplot and error bars (flu vaccination due to COVID19 only in April to November 2020).



CHC: chronic health condition

Figure 4 shows that contrastive patterns of Australians using flu vaccination as a preventative health measure. The graph was sorted in the ascending order of the statistics, that is, the mean of flu immunisation due to COVID19 among different population segments. Towards the right of the horizontal axis, people reported much higher rates of flu vaccination due to COVID. It shows that flu vaccination due to COVID19 was more prevalent among people from better health, education, socioeconomic status and with better health conditions. Disadvantaged people reported much lower rates of flu vaccination due to COVID: unemployed (median: 9.45%, 95% confidence interval: 8.99%, 9.90%); elderly people aged above 65 (median: 6.23%, 95% CI: 10.58%, 14%); people with a chronic health condition (median: 12.8%, 95% CI: 11.70%, 14.7%); people with lower than Year 12 education (median: 12.9%, 95% CI: 12.42%; 13.38%); single people (medium: 15.57%, 95% CI: 15.02%, 16.24%); people without any health insurance (medium: 17.35%, 95% CI: 17.09%, 17.61%). Those towards the right of x-axis reported higher rates of using flu vaccination were Australians from better education background, with better health, socioeconomic, health status, and in employment. Given their better backgrounds, they were more risk-averse, that is, more likely to take vaccination to maximise its health benefits and avoid potential losses. Specifically, these were people with health insurance (hospital and/or extra covers) (medium: 17.5%, 95% CI: 16.92%, 20.93%); people with Year 12 or above education (medium: 18.95%, 95% CI: 18.88%, 19.02%); people without any long-term health conditions (medium: 18.9%; 95% CI: 17.86%, 20.26%); working age people (under 65 years) (medium: 21.9%, 95% CI: 19.25%, 22.2%); and people in employment (medium: 21.6%, 95% CI: 21.4%, 21.79%).

Table 2 Pairwise comparisons of estimated marginal means based on the original scale of dependent variable of flu vaccination due to COVID only.

(I) Attributes	(J) Attributes	Mean Difference (I-J)	Std. Error	Sig.	95% Wald Confidence Interval for Difference	
					Lower	Upper
65 and over	Under 65	-2.137	2.268	0.346	-6.582	2.309
Born in Australia	Born Overseas	-0.223	1.022	0.828	-2.225	1.780
Employed	Unemployed	13.0079 ^a	1.367	0.000 **	10.329	15.687
Female	Male	4.4801 ^a	1.293	0.001 **	1.946	7.015
Has a chronic health condition	Without chronic health condition	-10.9758 ^a	1.356	0.000 **	-13.633	-8.318
Insured	Not Insured	-0.880	1.246	0.480	-3.322	1.562
Year 12 above	Year 12 or below	6.8076 ^a	0.757	0.000 **	5.324	8.291

a. The mean difference is significant at the .05 level.

Table 2 shows the result of pairwise comparisons of the estimated marginal means of the contrasting population features. Differences were statistically significant at $p < 0.05$ level. It was found that employment status ($p < 0.000$), gender ($p = 0.001$), health conditions ($p < 0.000$) and education ($p < 0.000$) were some of the most significant discriminators of populations taking flu vaccination due to the pandemic only. People in employment, female, people without any chronic health condition and people with better education attainment reported statistically higher rates of flu immunisation when compared to their counterparts, i.e., people not employed, male, people with chronic health conditions and people with limited education (below Year 12).

Discussions

Principal findings

Based on survey data from the Australian Bureau of Statistics on the household impacts of COVID19, we identified and analysed two types of preventative health behaviours of Australians: the first set of health behaviours was characterised by spontaneous, self-initiated protective measures such as mask wearing, household supplies hoarding, self-isolation, flu vaccination due to COVID19 only, working from home, together with elevated health concerns. The second set of health behaviours aligned better with health and medical advice of social distancing, less face touch and necessary household medical supplies purchase such as alcoholic detergent, personal hygiene items. It was found that flu vaccination due to COVID19 had statistically significant correlations with self-protective measures such as mask use (B coefficient: 0.087, $p < 0.000$, 95% CI: 1.047-1.136); normal household supplies hoarding (B coefficient: 0.430, $p < 0.000$, 95% CI for Exp (B): 1.424-1.659); self-isolation (B coefficient: 0.242, $p < 0.000$, 95% CI for Exp (B): 1.186-1.367); keeping children from schools/childcare facilitates (B coefficient: 0.074, $p < 0.000$, 95% CI: 1.040-1.115). Flu vaccination due to COVID19 was in decline from April to November 2020 as the medical and scientific knowledge of the pandemic increased. Health behaviours based on medical advice such as social distancing (B coefficient: -0.334, $p < 0.000$, 95% CI for Exp (B): 0.621-0.825), less face touch (B coefficient: -0.124, $p = 0.003$, 95% CI for Exp (B): 0.815-0.958), personal hygiene practices (implied by increased household medical supplies) (B coefficient: -0.367, $p < 0.000$, 95% CI for Exp (B): 0.614-0.782) contributed to the decrease in flu vaccination due to COVID19 in later months of 2020.

It was revealing to find that flu vaccination due to COVID19 was in most cases not explained by vulnerability or higher exposure to health risks of the survey populations, rather it had statistically significant associations with population attributes such as better education (above Year 12) (B coefficient: 6.808, $p < 0.000$), in employment (B coefficient: 10.931, $p < 0.000$), covered by health insurance (with hospital and extra covers) (B coefficient: 3.876, $p = 0.012$); without a long-term health condition (B coefficient: 6.367, $p < 0.000$); and living in Australian states of very low or no infection (B coefficient: 4.852, $p < 0.000$). Two large groups of vulnerable populations reported statistically lower rates of flu vaccination during the survey periods of April to November including: single people not living in a family environment (B coefficient: -6.368, $p < 0.00$); people with a long-term health condition (B coefficient: -4.609, $p = 0.002$). Populations reported statistically insignificant changes in flu vaccination during the pandemic survey periods were those not in employment (B coefficient: -2.077, $p = 0.06$); working-age people (18-64 years) (B coefficient: 3.613, $p = 0.256$) and males (B coefficient: -1.130, $p = 0.422$).

Our findings may be explained in the light of Prospect Theory (Ruggeri, et al. 2020, Van Bavel, et al 2020, Savage, et al 2020; Zinn 2008). Compared to the handling of the pandemic of many countries, Australia is a very successful example. The risks of infections were much lower than many countries. Australians, especially those from better education, health, socio-economic backgrounds exhibited tendency to pursue, maximise the health benefits of any available health measures – at the start of the pandemic, the first set of spontaneous health measures, and later, with the increase medical knowledge of the virus spread, more evidence-based measures. This stands in contrast with countries where the risks of infection were high, which according to Prospect Theory, explained the risk-seeking behaviours of people attempting to reverse potentially large losses posed by worsening situation.

Flu immunisation due to COVID19 only, provided further evidence of the loss-aversion human propensity in situations when the perceived health benefits of flu vaccination were of higher probability (the certainty effect of Prospect Theory). It is suspected that our study is hardly replicable in countries where the risks of infections are very high, dampening the public confidence of the probability of the health benefits of additional health measures like flu vaccination. Latest research also shows that risk-averse attitudes are more prevalent in Western European and Asian cultures, in contrast with the more prevalent risk-seeking attitudes in Africa and the Middle East (Chan, et. al. 2020; Naoyuki, et al. 2020)

The social and health policy implication of our study is that amidst social crises or health emergencies, governments have the responsibility to create, build a safe, supportive social and health environment to facilitate the risk-averse human nature. In safer environments, people are more likely to proactively pursue health and personal benefits through all possible means – be them rational, evidence-based such as social distancing, personal hygiene exercises, less physical touch; or more spontaneous, less evidence-based such as household supplies hoarding, self-imposed isolation, flu vaccination before the actual COVID vaccines became available. A collective, stronger public tendency towards greater personal and community health benefits among Australians, as shown by the ABS data, has contributed to the successful story of Australia in the 2020 pandemic.

Appendix 1 Data Sources

<https://www.abs.gov.au/statistics/people/people-and-communities/household-impacts-covid-19-survey>

Household Impacts of COVID-19 Survey, November 2020

Household Impacts of COVID-19 Survey, October 2020

Household Impacts of COVID-19 Survey, September 2020

Household Impacts of COVID-19 Survey, August 2020

Household Impacts of COVID-19 Survey, Detailed Release, June 2020

Household Impacts of COVID-19 Survey, Detailed Release, May 2020

Household Impacts of COVID-19 Survey, 6-10 July 2020

Household Impacts of COVID-19 Survey, 24-29 June 2020

Household Impacts of COVID-19 Survey, 10-15 June 2020

Household Impacts of COVID-19 Survey, 26-29 May 2020

Household Impacts of COVID-19 Survey, 12-15 May 2020

Household Impacts of COVID-19 Survey, 29 Apr - 4 May 2020

Household Impacts of COVID-19 Survey, 14-17 Apr 2020

Household Impacts of COVID-19 Survey, 1-6 Apr 2020

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