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Examining the Impacts of the Pandemic on Employment for Women

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Abstract

As many employers shifted from the typical workplace to a remote work environment for their employees to limit the spread of the virus under the direction of healthcare and government officials, many others were forced to completely close their doors, drastically changing the structure of the workforce. This research aims to examine the impact of the COVID-19 pandemic on the gender employment gap. We examine the employment participation of women workers as they compare with men workers. In doing so, a nationwide comprehensive and multi-wave survey, i.e., the COVID future survey, was collected, providing information about how the COVID-19 pandemic impacted the lives of individuals. Using this panel data, we show the disparity in the pandemic's employment impacts on women workers compared with their men counterparts. Women's odds of gaining or maintaining employment during the pandemic are less, in some cases significantly less, than their men counterparts.

Keywords

Pandemic, Employment, Women

1. Introduction

The World Health Organization declared the Novel Coronavirus a pandemic on March 11, 2020. Since then, the lives of everyone have been impacted. This is especially true for those in the labor market. Governments swiftly enacted policies to preserve public safety and limit the spread of the virus. Many employers were forced to close, and others shifted work from the typical workplace to

working remotely. Job losses were widespread (Lemieux, Milligan, Schirle, & Skuterud, 2020). The direct and indirect impacts of the pandemic are felt differently by different population groups. For example, for parents of supervision-requiring young children, the closure of daycare facilities and schools added to the challenges. Many others were left with the difficult choice of caring for children and staying in the workforce. The situation was particularly challenging for single mothers in the labor market.

The gender employment gap has been of interest for some time, and the disruption in employment caused by the pandemic warrants an examination of gender inequalities in the labor market. The COVID-19 virus is pervasive, which has led many to argue it's a great equalizer event that economically has impacted everyone similarly regardless of social status (Jones & Jones, 2020).

Contrary to the belief that the pandemic is a great equalizer, in that it impacts everyone on the same economic level regardless of social location (Jones & Jones, 2020), recent research indicates that the pandemic is negatively impacting preexisting inequalities, especially for women, individuals with low educational attainment and low income, and other vulnerable population groups (Lemieux, Milligan, Schirle, & Skuterud, 2020; Kochhar & Barroso, 2020; Kristal & Yaish, 2020; Qian & Fan, 2020).

Therefore, it is critical to understand how the pandemic is impacting the gender employment gap. Adding to the growing body of literature on the impacts of the pandemic, this research examines the impacts of the ongoing pandemic on the gender employment gap in the United States. The authors aim to contribute to understanding the pandemic's impacts on employment and potential contributing factors for women as they compare to men.

2. Survey and Data Collection

The analysis used in this study comprises the first and second waves of the COVID Future survey, i.e., a nationwide comprehensive and multi-wave survey. This survey was collected to provide information on how the COVID-19 pandemic altered the way individuals go about their daily lives. The first wave of the survey collected 8723 responses and was deployed from April to October 2020. The COVID Future survey covered many topics, such as travel behavior, shopping and dining habits, employment, education, and attitudinal and risk perception-related information. The second wave of the survey, which followed up with respondents from the first wave collecting 3093 responses, was deployed from November 2020 to July 2021. The multi-wave nature of the COVID Future survey provides information valuable in understanding how individuals are adapting to the unpredictable circumstances of the ongoing pandemic. The survey was implemented through the Qualtrics survey organization. For more information regarding the data, see Chauhan et al. (Chauhan, Bhagat-Conway, Capasso da Silva, Salon, Shamshiripour, Rahimi, et al., 2021).

This study examines the changes and underlying factors in employment for

women compared with men. As a result, individuals who were not employed and not looking for jobs before or during both waves of the pandemic are excluded from the analysis. The final sample in this study includes 3010 individuals, of which 1078 are men and 1932 are women. From the 3010 considered responses, 1549 responses are repeated across the three time periods, 1126 across two, and 335 provided for one time period.

A descriptive analysis of the data presented below provides insight into some of the impacts of the pandemic on employment for women and men across the three considered periods.

In the pre-pandemic period, 55% (n = 1072) of women were employed. This compares with 59% of men (n = 640). During the first wave of the pandemic, 48% (n = 922) of women and 56% (n = 606) of men were employed. While men exhibited a decrease of 3% in employment numbers, women experienced a more significant decrease of 7%, as seen in Figure 1.

In the second wave of the pandemic, women's employment numbers show a recovery compared with men, whose numbers roughly stayed the same. During wave two, 51% (n = 983) of women were employed compared with 56% (n = 599) of men. It's worth noting that the gender employment gap widened from 4% (59% - 55%) in the pre-pandemic period to 8% (56% - 48%) during the first wave. While it shrunk to 5% (56% - 51%) during the second wave, the gap remains wider than in the pre-pandemic period.

The presence of children in a household shows a widening gender employment gap, especially during the first wave of the pandemic. This is magnified for women with children ages 0 - 4 compared with ages 5 - 12. In the pre-pandemic period, 70% (n = 105) of women with children ages 0 - 4 were employed compared with 88% (n = 43) of men with children of the same age group. For women, those proportions were 60% (n = 91) during the first wave and 68% (n =103) during the second wave. This compares with an unchanged proportion of 88% for men across both waves. The gap grew from 18% (88% - 70%) in the pre-pandemic period to 27% (88% - 60%) during the first wave, retracting to 20% (88% - 68%) during the second wave leaving it wider by 2% compared with
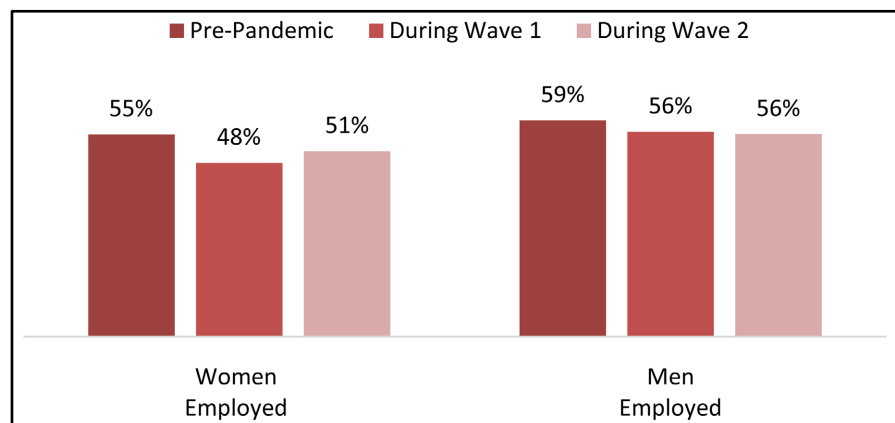

Figure 1. Employment.

the pre-pandemic level, as can be seen in **Figure 2**.

The gender employment gap decreased slightly for women with children ages 5 - 12, on the other hand. In the pre-pandemic period, 72% (n = 171) of women with children ages 5 - 12 were employed compared with 89% (n = 110) of men. For women, those proportions were 64% (n = 154) during the first wave and 71% (n = 169) during the second wave. This compares with 89% (n = 110) during the first wave and 86% (n = 107) during the second wave for men, as can be seen in **Figure 3**. Despite growing to 24% (89% - 64%) during the first wave, the gap retracted to 16% (86% - 71%) during the second wave leaving it 1% lower than in the pre-pandemic period.

The data shows a widening gender employment gap associated with lower educational levels. In the pre-pandemic period, 41% (n = 360) of women with an educational level below a bachelor's degree were employed compared with 45% (n = 156) of men, as can be seen in **Figure 4**. The pre-pandemic gap of 5% (45% - 41%) widened to 8% (41% - 33%) during the first wave retracting back to 6% (41% - 35%), leaving it 1% wider than in the pre-pandemic period.

Looking at employment and household income, the gender employment gap widened the most for individuals with low and high household incomes. In the
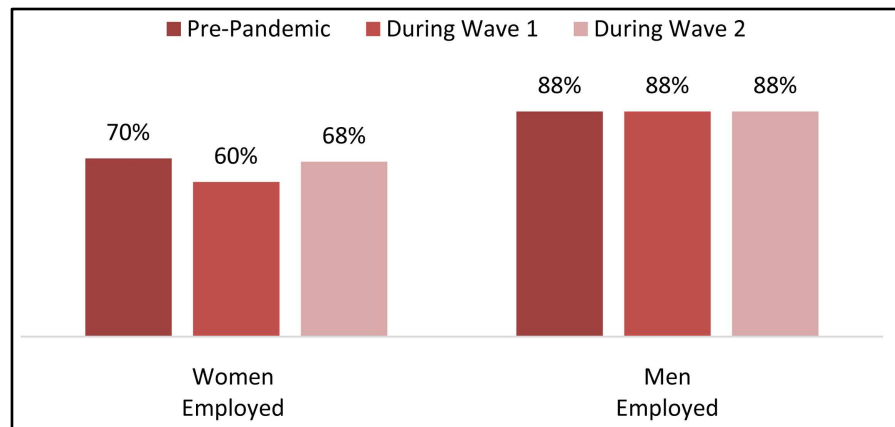

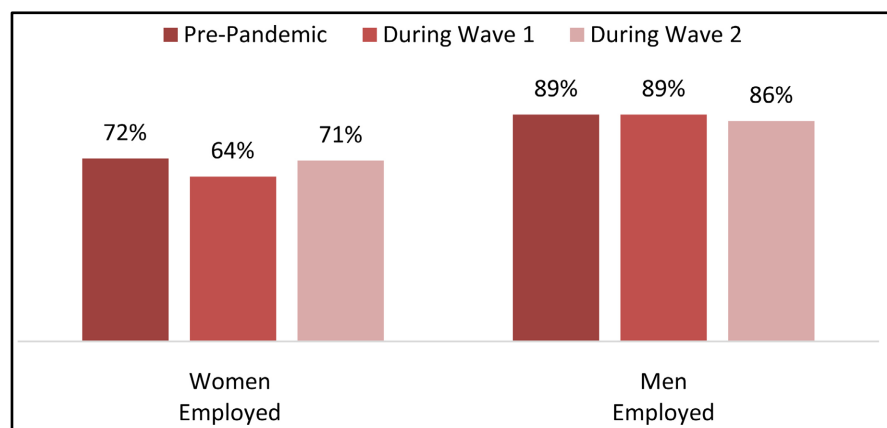**Figure 2.** Employment and presence of children ages 0 - 4.

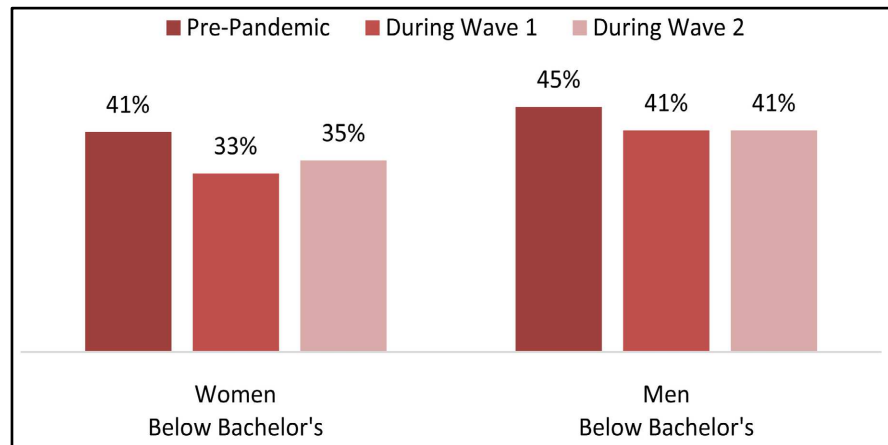**Figure 3.** Employment and presence of children ages 5 - 12.

Figure 4. Educational attainment.

pre-pandemic period, 33% (n = 94) of women with household incomes below $25,000 were employed compared with 31% (n = 34) of men with the same household income. For women, those proportions were 23% (n = 66) during the first wave and 29% (n = 82) during the second wave of the pandemic. This compares with 28% (n = 31) during the first wave and 31% (n = 34) during the second wave for men, as can be seen in Figure 5. The gap, while in favor of women at 2% (31% - 33%) in the pre-pandemic period, grew to 5% (28% - 23%) during the first wave and retracting to 2% (31% - 29%) during the second wave, leaving women at a disadvantage.

For household income above $150,000, 69% (n = 163) of women were employed in the pre-pandemic period compared with 77% (n = 153) of men. For women, those proportions were 62% (n = 146) during the first wave and 64% (n = 151) during the second wave of the pandemic. This compares with 76% (n = 152) and 75% (n = 149) during the second wave for men, as can be seen in Figure 7. The gap of 8% (77% - 69%) in the pre-pandemic period grew to 14% (76% - 62%) during the first wave retracting to 11% (75% - 64%) during the second wave leaving it wider by 3% compared with the pre-pandemic level as can be seen in Figure 6.

They survey asked respondents about changes in their household income, i.e., increase or decrease. During the first wave of the pandemic, 8% (n = 147) of women reported an increase in household income compared with 11% (n = 117) of men, as seen in Figure 7. Those proportions are 14% (n = 261) and 15% (n = 158) during the second wave for women and men, respectively. The 3% (11% - 8%) gap shrunk to 1% (15% - 14%) during the second wave. Following the same pattern, 31% (n = 598) of women, compared with 25% (n = 273) of men, reported a decrease in household income during the first wave. During the second wave, those proportions are 25% (n = 492) for women and 24% (n = 255) for men. The 4% (31% - 25%) gap shrunk to 1% (25% - 24%).

Private vehicle usage was also examined through the survey. A significant drop in usage is shown during the first wave of the pandemic among women and

Figure 5. Household income $10,000 - $74,999.

Figure 6. Household income above $75,000.

Figure 7. Change in household income.

men. Such use recovered slightly during the second wave but remained significantly lower than in the pre-pandemic period. In the pre-pandemic period, 51% (n = 994) of women reported using a private vehicle daily. This compares with 53% (n = 570) of men. Those proportions are 18% (n = 343) and 18% (n = 198) for women and men during the first wave. A slight retraction to 22% (n = 417)

for women and 24% (n = 256) for men was exhibited during the second wave, as seen in **Figure 8**.

Survey respondents were asked about their perception of social interactions found in the typical workplace. While more men reported enjoying such interactions compar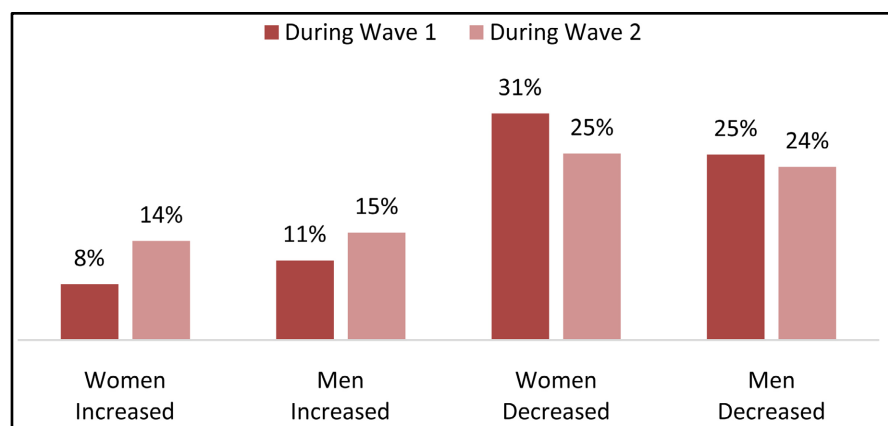ed with women, both population groups show a decrease in numbers between the first and second waves of the pandemic. During the first wave, 60% (n = 1166) of women and 64% (n = 695) of men reported enjoying social interactions in the typical workplace. Those proportions are 57% (n = 1096) for women and 61% (n = 655) for men during the second wave, as seen in **Figure 9**. Interestingly, fewer men reported feeling neutral during the second wave than women.

During the first wave of the pandemic, 18% (n = 352) of women and 20% (n = 216) of men reported work-from-home as the change they like to continue when the pandemic is no longer a threat. Those proportions are at 24% (n = 468) and 29% (n = 316) during the second wave for women and men, respectively. This can be seen in **Figure 10**.

Looking at the closure of businesses as a restrictive measure, the number of individuals who reported the closure of non-essential businesses in their region
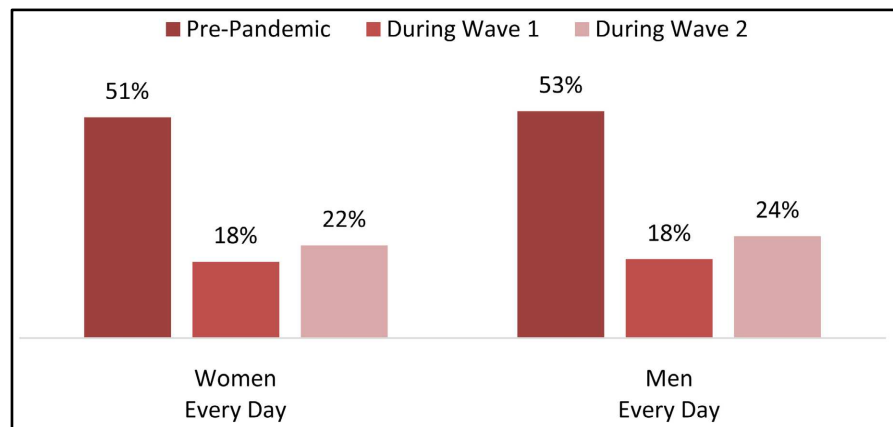

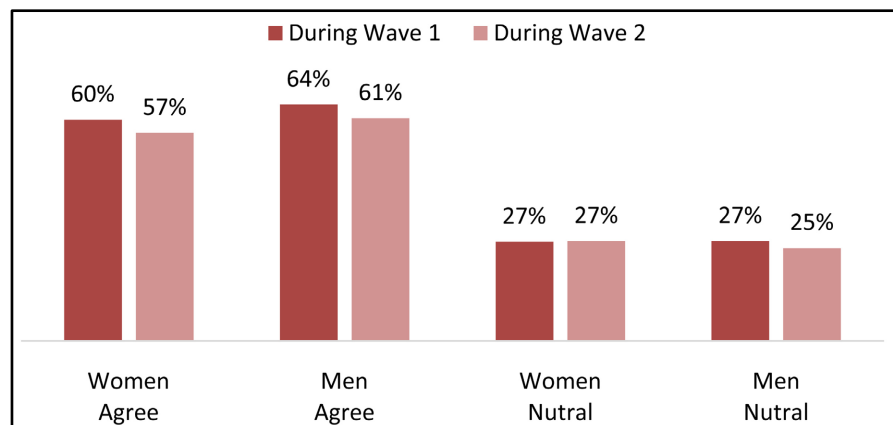**Figure 8.** Private vehicle usage.

Figure 9. Enjoy social interactions at typical workplace.

increased during the second wave of the pandemic. This is more evident for men. During the first wave, 69% (n = 1330) of women and 60% (n = 643) of men reported such closure. This compares with 73% (n = 1418) of women and 70% (n = 751) of men, as seen in Figure 11.

3. Methods

This research aims to model individuals' workforce participation. The Mixed Logit model is selected for its high flexibility that can be applied to any model of random utility. The advantages of the application of the Mixed Logit model in comparison with the standard Logit model are threefold, 1) relaxing the assumption that individuals share the same coefficients, 2) allowing for flexible substitution patterns, and 3) incorporating of the panel structure of the data. The use of the Mixed Logit model will allow for estimating the distribution parameters that are allowed to vary randomly across studied individuals.

A Mixed Logit model is implemented in this research. In this model, participation in the workforce is used as a binary response variable denoting whether an individual is or is not in the workforce. The model structure is defined using a linear utility function with variables explaining the probability of whether an
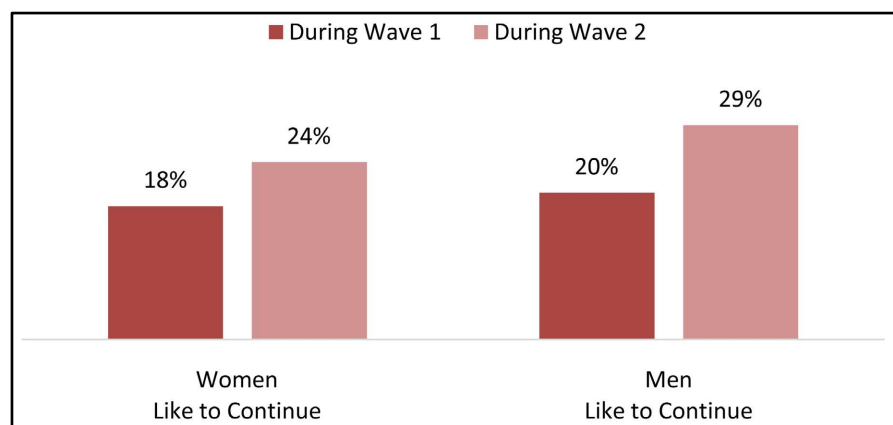

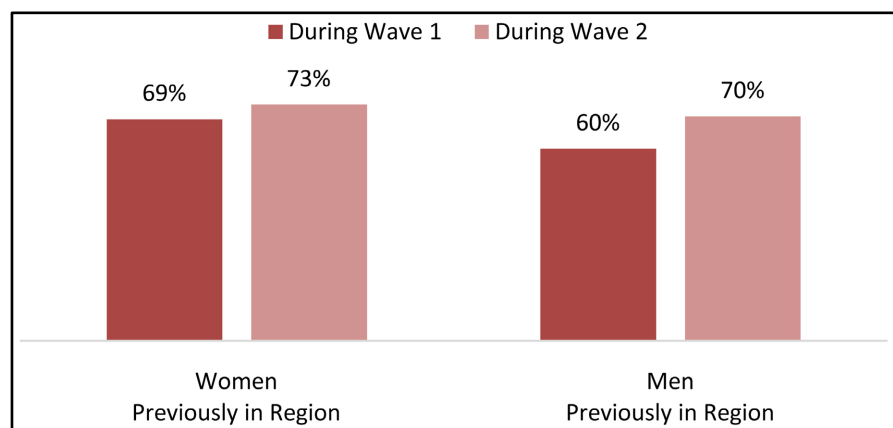
Figure 10. Work-from-Home post-pandemic.

Figure 11. Closure of nonessential business.

individual participates in the workforce.

For panel data where repeated choices by a study participant over different periods are to be incorporated, the model specification will treat the coefficients resulting from draws as varying across study participants but constant across choice situations for each study participant.

The probability is simulated using simulated-maximum-likelihood-estimation, where a logit formula is calculated per period for each individual, the products of such procedures are taken, and the results are averaged. For more information on the Mixed Logit model, see McFadden (McFadden & Train, 2000).

4. Results

This research considered two choice alternatives: being employed and not being employed. Two random parameters, i.e., Mixed Logit, models are estimated, one for a population group comprised of women and one for men. Both population groups exclude survey respondents who indicated not being employed and not looking for a job. The outcome of the model selection process includes statistically significant variables that capture helpful information in five important avenues: sociodemographic characteristics, socioeconomic characteristics, travel behavior attributes, attitudinal attributes, and restrictive policy. The estimated models incorporate the panel structure of the data encompassing pre-pandemic, during wave one, and during wave two periods. A combination of fixed and random variables is included in the developed models, and the resulting coefficients are estimated at or above the 90% confidence interval. Normal distributions are assumed for all random variables as they can logically take a negative or a positive sign. The mean and standard deviation of such distributions are estimated. Simulation is performed utilizing one thousand draws for each sampled individual. The model results from the women and men population models can be seen in Table 1 and Table 2 and are described in detail in the following subsections.

4.1. Sociodemographic Characteristics

Age, the presence of children under five, and ages 5 - 12 are considered sociodemographic characteristics in the estimated models. The variable representing the presence of children under five is omitted from the population model for men due to statistical insignificance.

Age is estimated as a random variable, and its mean coefficient is found to be negative and significant. The standard deviation for this coefficient is also significant, indicating that this variable indeed varies in the population. However, the population models for men and women suggest that a negative coefficient represents almost all individuals. The odds ratio for age is 0.87 in the population model for women and 0.76 for men, indicating that a unit increase in age decreases the odds of being employed by a factor of 0.87 and 0.76 for women and men, respectively.

Table 1. Estimation results of women's employment status for periods pre, during wave 1, and wave 2 of the pandemic.

Categories	Independent Variables	Coefficients		Std. Dev. of Random	
		Fixed	Random	Coefficient	Std. Error
Constant		4.37	-	-	0.47
Sociodemographic	Age	-	−0.14	0.05	0.01
	Children Ages 0 - 4	-	−0.85	−4.33	0.43
	Children Ages 5 - 12	-	0.92	2.62	0.37
Socioeconomic	Household Income	-	0.51	−0.54	0.05
	Income Change (Increased)	0.66	-	-	0.05
	Educational Attainment	-	−2.35	4.41	0.24
Travel Behavior Attributes	Vehicle use Frequency	2.60	-	-	0.23
	Like Social Interaction at Typical Workplace	1.70	-	-	0.21
Attitudinal Attributes	Like to Continue Work-from-Home Post Pandemic	-	5.01	4.54	0.53
Restrictive Measures	Non-essential Business Closure	−1.36	-	-	0.20
R^2		0.45			
Log-Likelihood		−1757.7			
Chi-Square		2859.9			

Evidence from the literature makes it clear that as an individual gets older, their employment chances decrease (Axelrad, Malul, & Luski, 2018). While the findings from the estimated models are consistent with the literature, they indicate that with the increase in age, women are more likely to be employed than men. This may be due to the lack of childcare needs, which were significantly disrupted because of school and daycare facility closures, which may have otherwise resulted in a parent quitting their job, most likely the mother (Woolf, Chapman, & Lee, 2021).

The presence of children under five in a household is included only in the women's population model. It is estimated as a random variable, and its mean coefficient is found to be negative and significant. Its standard deviation is also significant, indicating variation in the population. A negative coefficient represents approximately 42% of women. The odds ratio for this variable is 0.43. Compared with those who don't have children or have children in an older age group, the odds of being employed decreased by a factor of 0.43 for women. For those with a negative coefficient, this may be due to the heavier childcare load women carried compared with men (Woolf, Chapman, & Lee, 2021).

Table 2. Estimation results of men's employment status for periods pre, during wave 1, and wave 2 of the pandemic.

Categories	Independent Variables	Coefficients		Std. Dev. of Random	
		Fixed	Random	Coefficient	Std. Error
Constant		8.42	-	-	1.29
Sociodemographic	Age	-	−0.27	0.10	0.04
	Children Ages 0 - 4	-	-	-	-
	Children Ages 5 - 12	-	5.02	4.69	1.72
Socioeconomic	Household Income	-	1.18	0.50	0.16
	Income Change (Increased)	1.42	-	-	0.55
	Educational Attainment	-	−2.48	−6.87	0.45
TravelBehavior Attributes	Vehicle use Frequency	3.23	-	-	0.50
	Like Social Interaction at Typical Workplace	0.79	-	-	0.36
Attitudinal Attributes	Like to Continue Work-from-Home Post Pandemic	-	5.47	5.93	0.94
Restrictive Measures	Non-essential Business Closure	−1.25	-	-	0.36
R^2		0.52			
Log-Likelihood		−828.39			
Chi-Square		1772.3			

On the other hand, the variable for the presence of children ages 5 - 12 is included in both models. It results in a positive and significant random coefficient that varies in both populations. The models indicate that a positive coefficient represents 64% of women and 86% of men. The odds ratio for this variable is 2.5 for women and 152 for men. The odds of being employed increased by a factor of 2.5 for women and 152 for men with school-aged children compared with those who don't or have children of a different age group.

Unlike the negative sign of the coefficient for the presence of children ages 5 - 12, this may be related to the increased independence of children in this age group compared with younger children occupying less of their caregivers' time.

4.2. Socioeconomic Characteristics

Household income, change in household income, and educational attainment are considered socioeconomic characteristics in the estimated models.

Household income is estimated as a random variable in both models with a positive and significant mean coefficient. A significant standard deviation for this coefficient indicative of its variation in the population shows 17% of women

and almost 99% of men are represented with a positive coefficient. The odds ratio for household income is 1.66 for women and 3.25 for men, indicating that a unit increase in household income increases the odds of being employed by a factor of 1.66 for women and 3.25 for men.

Individuals with lower incomes suffered more significant job losses and pay cuts than those with middle- or higher-income levels (Parker, Minkin, & Bennett, 2020).

The modest increase in household income is considered a random variable in the model selection process. However, the standard deviation of its coefficient was found to be insignificant in both models. It is therefore estimated as a fixed variable. Its coefficient is found to be positive and significant. The odds ratio for this variable is 1.94 for women and 4.12 for men. The odds of being employed increased by a factor of 1.94 for women and 4.12 for men indicating a slight increase in their household income compared with those who reported a significant increase, decrease, and no change in household income.

Educational attainment is estimated as a random variable in both models. Its coefficient is found to be negative and significant for individuals with an academic level below a bachelor's degree. The standard deviation of its coefficient is also significant. The model indicates that a negative coefficient represents 70% of women and 36% of men. The odds ratio for this variable is 0.10 for women and 0.08 for men. The odds of being employed decreased by a factor of 0.10 for women and 0.08 for men with an educational level below a bachelor's degree compared with those with higher academic levels.

Recent research in Canada suggests that individuals with lower education levels experienced more pronounced negative impacts of the pandemic on employment than their counterparts with higher education (Beland, Brodeur, & Wright, 2020). Research also shows that women with children and a lower education level were significantly less likely to be employed than men. Conversely, women and men with the same characteristics and demographics but with higher education levels experienced a much smaller gap in the probability of being employed during the pandemic (Qian & Fuller, 2020).

4.3. Travel Behavior Attribute

The daily use of a private vehicle is considered a travel behavior attribute in the estimated models. It enters both models as a fixed variable resulting in a positive and significant coefficient. The odds ratio for this variable is 13.4 for women and 25.2 for men. The odds of being employed increased by a factor of 13.4 for women and 25.2 for men who reported using a private vehicle daily compared with those who reported lower frequency usage.

4.4. Attitudinal Attributes

Whether an individual likes the social interaction found at a typical workplace and whether they want to continue working from home when the pandemic is

no longer a threat are considered attitudinal attributes in the estimated models.

Similar to the variables representing the change in household income and daily use of a private vehicle, the variable representing enjoying the social interaction found at a typical workplace enters both models as a fixed variable due to the statistical insignificance of its standard deviation when considered as a random variable. Its coefficient is found to be positive and significant in both models. The odds ratio for this variable is 5.29 for women and 2.19 for men. The odds of being employed increased by a factor of 5.29 for women and 2.19 for men who reported enjoying social interaction in a typical workplace compared with those who reported not enjoying or being neutral about such social interaction.

The literature suggests that women and men form their social networks differently. For example, women create smaller social networks than men, and women's networks have fewer and stronger links than men's networks (Booth, 1972; Moore, 1990; Benenson, 1993; Baumeister & Sommer, 1997; Friebel & Seabright, 2011). The weaker links present in women's social networks are more beneficial in the context of employment search. The literature also indicates that women and men utilize their networks differently; as a result, they realize different work-related benefits (Mengel, 2020). Taken together, differences between women's and men's social networks may provide valuable information explaining the gender employment gap.

The variable representing having a pleasant experience working from home and the desire to continue doing so when the pandemic is no longer a threat is estimated as a random variable in both models. With a significant standard deviation, its mean coefficient is found to be positive and significant. The models indicate that a positive coefficient represents 87% of women and 82% of men. The odds ratio for this variable is 150.44 for women and 237.22 for men. The odds of being employed increased by a factor of 150.44 for women and 237.22 for men who reported having a pleasant experience working from home and the desire to continue doing so when the pandemic is no longer a threat compared with those who did not report such attitudinal attribute.

A larger proportion of women who reported work-from-home as the change they like to continue post-pandemic are more likely to be employed than men. This may indicate that women who had the opportunity to work from home during the pandemic performed well and had a pleasant experience; hence managed to gain or maintain employment. The added flexibility from working from home could benefit those with additional responsibilities outside of work, such as mothers. This could potentially contribute to reducing the gender employment gap.

4.5. Restrictive Measures

Closure of non-essential business is considered a restrictive measure in the estimated models. As a fixed variable, its coefficient is found to be negative and sig-

nificant. The odds ratio for this variable is 0.26 for women and 0.29 for men. The odds of being employed decreased by a factor of 0.26 for women and 0.29 for men who reported the closure of non-essential businesses in their region compared with those who did not report such restrictive measures.

The initial restrictive measures enacted to preserve public safety affected industry sectors predominantly women-occupied; therefore, women were more vulnerable to losing jobs than men (Albanesi & Kim, 2021; Adams-Prassl, Boneva, Golin, & Rauh, 2020). The results of the models show odds ratios of a similar magnitude for men and women, however.

5. Conclusion

Many argue that the COVID-19 pandemic is a disruptive equalizer because it impacts most people similarly. This research suggests that the pandemic has exacerbated some preexisting inequalities. It adds to the growing literature on the impact of the pandemic on gender inequality and employment. A comprehensive-nationwide panel data is used to understand how the pandemic impacted women's probability of employment. The analysis incorporates information about how individuals went about their lives in the pre-pandemic world and during two subsequent waves of the pandemic.

While many people suffered job losses resulting from the pandemic, women were disadvantaged in gaining or maintaining employment during the pandemic compared with men. The analysis in this research indicates that women's odds of being employed are, in some cases, significantly less than men across all considered explanatory variables, except variables representing age, the social interaction found at the typical workplace, and work-from-home as a change desired to be continued in a post-pandemic world.

This research indicates that, during the pandemic, women with children under the age of five are less likely to be employed than those with no or older children. This variable was not included in the men's population model due to the lack of statistically significant explanatory power. While women and men with children ages 5 - 12 are more likely to be employed than those with younger children, a smaller proportion of women experienced this likelihood increase compared with men. Moreover, the odds of being employed for women with children in such an age group are lower than for men.

As household income increases, women and men are more likely to be employed during the pandemic. A considerably smaller proportion of women, however, experienced this increase in likelihood than men. The odds of being employed for women are also lower than for men. Similarly, the odds of being employed for women who reported an increase as a change in their household income are lower than for men.

Women and men with lower educational attainment became less likely to be employed during the pandemic. Although the difference in odds ratio is relatively small for women and men with an academic level below a bachelor's de-

gree, a considerably larger proportion of women exhibit a decrease in such odds compared with men.

Women and men who reported closures of non-essential businesses in their region were less likely to be employed during the pandemic. The decrease in odds of being employed was of the same magnitude, relatively, with a slight advantage for men.

The results of this research highlight the importance of government support services in the care sector in the advent of disruptive events such as the ongoing pandemic. Even though care services were always vital, in the context of a pandemic, they become essential to ensure peoples' livelihood, especially for disproportionately impacted women. Such services should be prioritized in planning and funding to ensure equitable access to all who need them. Another policy implication deserving of attention and reform is job leave policies. Despite the government and employer-enacted job leaves in the wake of the pandemic, in many jurisdictions, such leave policies expired or were terminated before the sufficient reopening of care services, leaving caregivers, primarily employed mothers, more vulnerable. Furthermore, providing more flexible leave for parents outside that needed to cover closures of school and daycare facilities may help with unpredictable parenting demands that are more prevalent in less-educated parents who are predominantly employed in on-site jobs with little scheduling flexibility (Fuller & Hirsh, 2019).

Extended leave policies may have ramifications that could potentially widen the gender employment gap if not considered carefully. Research shows that if extended leave is utilized more by women than men, it may negatively impact gender inequalities, potentially further widening the gender employment gap (Budig, Misra, & Boeckmann, 2016; Mari & Cutuli, 2021). This highlights the need for adequate and carefully considered leave policies that consider both parents, allowing more opportunities for sharing co-parenting responsibilities.

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Conflicts of Interest

The authors declare no conflicts of interest related to the publication of this paper.

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