Food insecurity and affective well-being during COVID-19 in the Middle East and North Africa

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Abstract

Background: The COVID-19 pandemic and climate crises have led to unprecedented food insecurity in the Middle East and North Africa (MENA), with ramifications for people's affective well-being. The aim of the study is to explore the relationship between food insecurity and affective well-being in Jordan, Morocco, Tunisia, and Egypt, considering varied social protection responses across these countries.

Methods: We analyzed data from the COVID-19 MENA Monitor Household Panel Survey (2020–2021) and employed hybrid mixed-effects models to differentiate within-person and between-person associations between food insecurity and affective well-being.

Results: The findings show that higher food insecurity is associated with worse affective well-being, with significant cross-country differences. In Jordan, where extensive social protection was enacted during the pandemic, there is no significant within- or between-person association between food insecurity and affective well-being. Conversely, significant between-person associations are found in Morocco and Egypt, while within- and between-person associations are evidenced in Tunisia. These associations hold strong after controlling for sociodemographic characteristics and individual circumstances.

Limitations: Given COVID-19 restrictions, the sample was limited to the universe of working-age (18–64) mobile phone users, a demographic that often corresponds to higher levels of education and income. Therefore, the results of this study likely provide conservative estimates of the association between food insecurity and affective well-being in the full population.

Conclusions: The findings emphasize the critical role of food security in maintaining affective well-being, particularly in non-Western contexts during global crises. They underline the importance of integrating food security considerations into mental health care strategies and interventions.

Keywords: Affective well-being, COVID-19, cross-national, food insecurity, Middle East, North Africa

INTRODUCTION

Food insecurity, defined as a lack of access to nutritious, sufficient, and high-quality food, poses a formidable challenge to people's basic subsistence across many parts of the world. In the past few years, food insecurity has been exacerbated by a series of global crises. Global climate change has led to an increase in natural disasters, undermining sustainable food production (Hasegawa et al. 2018). The COVID-19 pandemic has not only disrupted global progress toward reducing food insecurity but has also amplified many long-term vulnerabilities in the Middle East and North Africa (MENA). By the end of 2020, around 141 million people in this region had experienced moderate to severe levels of food insecurity—a 7% increase from 2019 (Food Agricultural Organization 2021). Whereas the impact of food insecurity on physical health has been well documented, its implications for mental health have received less attention, particularly in non-Western contexts during the COVID-19 pandemic.

Insufficient quantity and quality of food can impair individuals' affective well-being (Oh et al. 2022; Wen et al. 2022), but such impairments may vary with distinct social protection provisions and responses to the global food crisis during COVID-19 across MENA countries. Among the four countries included in this study, both Morocco and Jordan implemented comprehensive social protection measures to address the needs of their populations during the food crisis. Morocco extended its social safety nets to cover over three quarters of its population, including informal workers who were not previously covered by social protection schemes. The country broadened eligibility for existing programs and provided subsidies for essential food items, which represented a significant expansion of support (Jawad 2020; Sibun 2021). Similarly, Jordan's approach involved a combination of price reductions for food, the distribution of food assistance, and regular cash transfers to sustain households throughout the crisis (Organization for Economic Cooperation and

Development 2020; Sibun 2021). Unlike one-off payments that provide short-term relief, these frequent cast transfers provide consistent support over an extended period, helping recipients make up for lost wages and fight hunger. Under the more fragmented welfare systems in Tunisia and Egypt, measures were introduced as short-term or temporary interventions and were characterized by significant gaps in coverage (Jawad 2020). The allocation of emergency social protection funds in Tunisia and Egypt was less than 0.2% of their respective gross domestic products (Sibun 2021). Social protection in Tunisia during the pandemic was particularly limited, covering only 20% of the population (Sibun 2021).

In the context of multiple global crises, understanding the relationship between food insecurity and affective well-being beyond the usual Western world is of paramount importance. This study, therefore, seeks to offer an up-to-date examination of this relationship in four MENA countries: Jordan, Morocco, Tunisia, and Egypt. We analyze data from the COVID-19 MENA Monitor Household Panel Survey (2020–2021), employing hybrid mixed-effects models to distinguish the within-person and between-person associations between food insecurity and affective well-being. By doing so, we provide new insights into the ways in which food insecurity relates to affective well-being, helping inform policies and interventions to mitigate the detrimental implications of food insecurity for affective well-being.

METHODS

Data and sample

Our analysis draws on secondary data from the COVID-19 MENA Monitor Longitudinal Household Survey, collected and harmonized by the Economic Research Forum (ERF). The survey provides rare harmonized cross-national data on both affective well-being and food insecurity status, along with other sociodemographic characteristics, in the MENA region

during the pandemic. The survey targeted working-age (18–64) mobile phone users living in Morocco, Tunisia, Egypt, and Jordan. Mobile phone users in the MENA region tend to be better educated with higher income levels than non-users. Fewer women than men own mobile phones; and women are more likely to share or borrow a device instead. Specifically, the reported gender gap in mobile phone ownership in the MENA region is 9% in favor of men (Global System for Mobile Communications Association 2021). Because mobile phone access differs significantly by gender and socioeconomic status, our results are representative of the universe of mobile phone users in MENA. As those who do not have access to mobile phones tend to be more disadvantaged socioeconomically, our results represent conservative estimates of vulnerabilities in terms of food insecurity and affective well-being.

Participants in the study were selected through a random-digit-dial sampling method. Up to three attempts were made to contact each selected individual mobile phone user if the dialed number was not initially answered, was disconnected, or if the respondent could not complete the interview at that time (ERF 2021). All interviews were then conducted over the phone due to social distancing restrictions during the pandemic (ERF 2021). A total of four waves of data were collected in Morocco and Tunisia, each separated by a two-month interval. Wave 1 interviews were conducted in November 2020, wave 2 in February 2021, wave 3 in April 2021, and wave 4 in June 2021. In Egypt and Jordan, two waves of data collection took place: wave 1 in February 2021 and wave 2 in June 2021. While the survey attempted to re-interview all respondents across the waves, a refresher sample was added to each follow-up wave to compensate for sample attrition (ERF 2021). Approximately 2,000 individuals participated in each country–wave.

To enable the estimation of within-person effects, the sample was first restricted to respondents who were observed at least twice in Morocco and Tunisia, and respondents who were observed in both waves in Egypt and Jordan. Next, we deleted 9 person–waves (< 1%)

with missing data on covariates, such as changes in household income since February 2020. The final analytic samples contain 3,106 person–wave observations of 1,553 participants in Jordan, 4,877 person-wave observations of 1,902 participants in Morocco, 6,766 person–wave observations of 2,118 participants in Tunisia, and 1,762 person–wave observations of 881 participants in Egypt.

Measures

Dependent variable: Affective well-being

Our dependent variable is the World Health Organization Well-being Index (WHO-5). The WHO-5 is a widely used and validated instrument for measuring subjective well-being, including screening for depressive symptoms (Krieger et al. 2014; Omani-Samani et al. 2019). Respondents were asked about the frequency at which they experienced different emotions or behaviors in the two weeks before the survey: (1) "I have felt cheerful and in good spirits," (2) "I have felt calm and relaxed," (3) "I have felt active and vigorous," (4) "I woke up feeling fresh and rested," and (5) "My daily life is filled with things that interest me." The responses were recorded on a five-point scale ranging from 0 ("all of the time") to 5 ("at no time"). The five items were summed to give a final score ranging between 0 and 25, with higher scores indicating poorer affective well-being.

Key predictor: Food insecurity

Food insecurity was assessed using five questions with dichotomous responses that asked whether, in the past seven days, the respondent or other household members had experienced any of the following: (1) "Difficulties in going to food markets due to mobility restrictions imposed by government/closures;" (2) "Unable to buy the amount of food we usually buy because of shortages of food in markets;" (3) "Unable to buy the amount of food we usually

buy because the price of food increased;" (4) "Unable to buy the amount of food we usually buy because our household income has dropped;" and (5) "Had to reduce the number of meals and/or the portion of each meal we would usually eat." Although items (1) to (4) measure people's access to food rather than food consumption itself, they are all closely correlated with the final item on food consumption (5). Further tests showed that there is a good level of internal consistency between the five items across the four countries (Cronbach's alpha scores range between 0.65 to 0.75), and they load evenly on one factor. Thus, the five items were summed up to create a food insecurity scale. Although established measures of food insecurity exist globally, the measures utilized in this study have been carefully tailored to the MENA region in the context of the COVID-19 pandemic (Assaad et al. 2022; ERF 2021; Marouani et al. 2022), which reflect the distinctive food challenges presented by the COVID-19 pandemic, including mobility restrictions and food prices spikes (Assaad et al. 2022; Marouani et al. 2022).

Control variables

We controlled for a set of covariates that may confound the relationship between food insecurity and affective well-being, including government support, COVID-19 and economic-related worries, labor market status, change in household income since February 2020, whether the household included children below the age of 6 years, age, and sex (Gyasi et al. 2020; Ke et al. 2023; Oh et al. 2022). To capture respondents' socioeconomic status, the models also accounted for the respondents' level of education and whether they reside in a rural or urban area. Detailed information on the control variables, the rationale for their inclusion, and their operationalization can be found in the online supplementary material. Table 1 presents the descriptive statistics for all variables used in our analysis by country.

[Insert Table 1 here]

Statistical analyses

We used hybrid models, also known as within-between random effects models, to analyze the data (Allison 2009). An advantage of hybrid models is that they can differentiate within- and between-person effects (Allison 2009). Specifically, hybrid models control for time-constant unobserved individual heterogeneity, while also allowing for the inclusion of time-invariant predictors. To achieve this, two sets of predictors are included in the models: a person-level mean value for each predictor across all waves and wave-specific deviations from this person-level mean for all time-varying predictors (Schunck 2013). The within-effect in this study shows how within-person changes in food insecurity over time relate to affective well-being, whereas the between-effect compares how affective well-being varies across individuals experiencing different levels of food insecurity. The within-person estimates are therefore equivalent to those obtained from fixed-effects models, controlling for time-invariant characteristics for an individual.

RESULTS

The results, based on responses from 1,553 individuals in Jordan, 1,902 in Morocco, 2,118 in Tunisia, and 881 in Egypt, reveal a high prevalence of food insecurity across all four countries. A substantial proportion of the respondents – 72% in Jordan, 73% in Morocco, 85% in Tunisia, and 69% in Egypt – reported encountering at least one out of the five measured obstacles in accessing sufficient and quality food in at least one wave of the survey during the COVID-19 pandemic.

Figure 1 depicts the predicted levels of affective well-being corresponding to distinct levels of food insecurity In Jordan, Morocco, Tunisia, and Egypt. The full regression results can be found in Supplementary Table S1. Notably, in Jordan, where social protection was comprehensively enforced during COVID-19, we found little statistically significant within-

or between-person association between food insecurity and affective well-being. Changes in food insecurity experienced by Jordanians were not associated with their affective well-being, and affective well-being did not differ significantly between Jordanians who had secure and insecure food access.

[Insert Figure 1 Here]

By contrast, there is a consistent negative association between food insecurity and affective well-being in Morocco, Tunisia, and Egypt, despite the varying strength of the association across these countries. In Morocco and Egypt, those who were food-insecure had significantly worse affective well-being, compared with those who were food-secure (between-effect). However, individuals' affective well-being did not vary with within-person changes in the level of food insecurity across survey waves during COVID-19 in Morocco and Egypt.

In Tunisia, where social protection and interventions in food insecurity were short-lived, patchy, and scarce during the pandemic, both within- and between-person effects were statistically significant. As Tunisians experience an increase in food insecurity, their affective well-being declines considerably (within-effect); and compared with those who were food-secure, those who experienced food insecurity had much worse affective well-being (between-effect). These associations hold strong even after controlling for sociodemographic characteristics and household circumstances.

DISCUSSION

This study provides a crucial extension of research on the link between affective well-being and food insecurity during COVID-19 to an understudied non-Western setting (Gyasi et al. 2020; Ke et al. 2023; Oh et al. 2022). In general, we find that the relationship between food insecurity and affective well-being does not appear to be consistent, with significant

variations observed across different analytical levels (i.e., within and between individuals) and contexts in the MENA region.

Our findings highlight differences in the implications of food insecurity for affective well-being in the four MENA countries studied. In Tunisia, our results revealed both within- and between-person effects of food insecurity on affective well-being. This indicates that both the uneven distribution of food insecurity across the population and its temporal changes are closely linked to the affective well-being of individuals. This contrasts with people's experiences in Morocco and Egypt, where only a between-person effect was observed. These results suggest that inequality in food access, rather than short-term changes, plays a prominent role in configuring affective well-being in these contexts.

The absence of a statistically significant relationship between food insecurity and affective well-being in Jordan suggests that the country's comprehensive social protection measures and potentially resilient food system may have helped mitigate the negative implications of food insecurity for affective well-being during the pandemic. Jordan's approach to addressing food insecurity, distinct from the other countries in this study, included not just immediate interventions, but also a long-term relief strategy. This may have provided Jordanians with a sense of stability and predictability, which is crucial to sustaining affective well-being.

These cross-national differences highlight the importance of contextual and structural factors in shaping the food insecurity and affective well-being association. Cultural aspects such as differences in societal values, norms, and coping mechanisms may influence the psychological impact of food insecurity. Economic factors, including the stability of the job market and the effectiveness of social protection measures, may also play a role. This suggests the need for further systematic cross-national comparison as well as country-specific

interventions, rather than a “one size fits all” approach, to address food insecurity and enhance affective well-being during times of crisis.

CONCLUSION

Our findings emphasize the critical role of sufficient, high-quality food in helping sustain individuals’ mental health. Although it is beyond our scope to systematically assess the underlying explanations for the observed cross-national variations, the findings nonetheless point toward the potential role of social protection and adequate interventions in food insecurity in sustaining population mental health, particularly during global crises such as the COVID-19 pandemic and beyond a Western context. Future research could systematically examine the efficacy of distinct types of social protection and interventions. Our findings have ongoing relevance and far-reaching implications. As MENA countries rely heavily on grain import from Ukraine, the ongoing Ukraine war further exacerbates food insecurity in this region; and current developments in the Gaza region may further worsen food insecurity in MENA countries, with crucial implications for people’s affective well-being. Thus, national policies and interventions alone are insufficient, and international coordination and aid are imperative.

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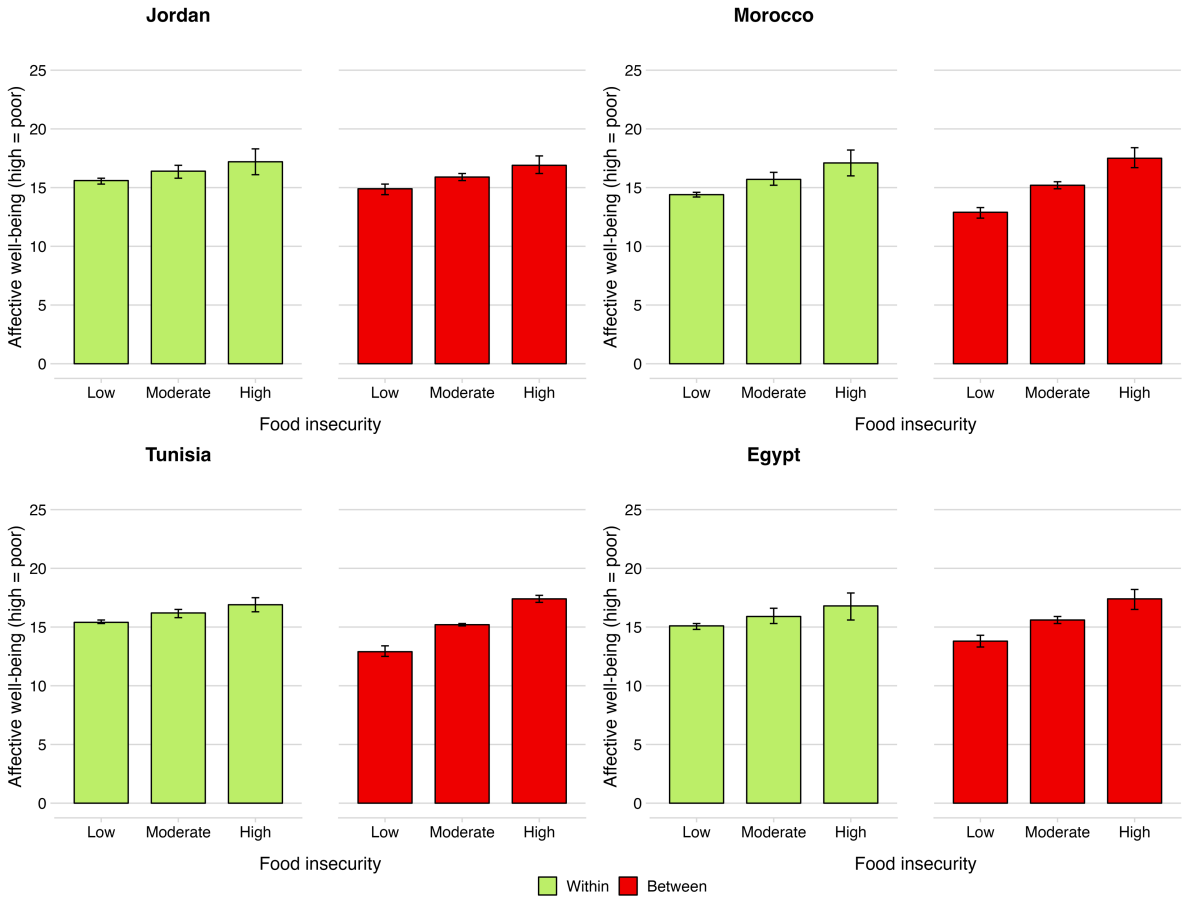
Table 1. Characteristics of analytical samples for Jordan, Morocco, Tunisia, and Egypt.

	Jordan	Morocco	Tunisia	Egypt
	Mean/% (SD)	Mean/% (SD)	Mean/% (SD)	Mean/% (SD)
Key variables				
Affective well-being (0–25, higher = poorer)	15.6 (5.6)	14.4 (7.4)	15.4 (5.4)	15.1 (1.5)
Food insecurity (0–5; higher = more insecure)	1.6 (1.5)	1.6 (1.4)	2.7 (1.6)	1.7 (1.5)
Covariates				
Age (18–64)	37.1 (11.7)	37.9 (11.9)	39.9 (12.6)	35.5 (11.2)
Women (ref: men)	48.7	34.2	39.6	36.4
Child < 6 (ref: no child < 6)	44.5	58.2	70.6	47.4
Government support received				
None	45.7	82.4	87.3	19.8
1 scheme	37.1	7.6	3.9	67.2
> 1 scheme	17.1	9.9	8.6	13.0
Education				
< Basic	13.5	43.1	26.8	20.3
Basic	27.4	18.6	16.6	13.1
Secondary	33.4	16.5	35.5	46.5
Higher education	25.6	21.7	20.9	20.1
Rural (ref: urban)	19.9	32.1	31.3	49.7
Covid-19 worries (1–4)	2.5 (1.2)	2.1 (1.2)	2.1 (1.5)	2.4 (1.2)
Economic worries (1–4)	3.2 (.9)	2.8 (1.2)	3.2 (1.0)	2.9 (1.2)
Labor market status				
Employed	39.1	50.6	54.7	54.5
Unemployed	26.7	21.1	25.3	20.2
Out of the labor force	34.1	28.2	19.9	25.2
Household income since February 2020				
Decreased	52.4	67.1	46.2	48.3
Same	40.4	27.2	45.5	43.9
Increased	7.1	5.5	8.2	7.7
Wave				
1 (November 2020)	0.0	18.6	20.2	0.0
2 (February 2021)	50.0	29.8	27.4	50.0
3 (April 2021)	0.0	30.6	27.2	0.0
4 (June 2021)	50.0	21.0	25.0	50.0
N (persons)	1,553	1,902	2,118	881
N (person-wave observations)	3,106	4,877	6,766	1,762

Note. Range for continuous variables presented in brackets after variable names. SD = standard deviation. For dummy variables, 0 = No and 1 = Yes. > = greater than, < = less than. Ref = reference group. Mean values reported for continuous variables and percentages reported for dummy and categorical variables. Percentages may not add up to 1 due to rounding. Unweighted statistics with unweighted sample size.

Figure 1. Within-person and between-person associations between food insecurity and affective well-being in Jordan, Morocco, Tunisia, and Egypt.



Note: The cut-off points for low, moderate, and high levels of food insecurity are 0, 2.5, and 5, respectively, on the food insecurity scale ranging from 0 to 5. Affective well-being was measured using the World Health Organization Well-being Index (WHO-5), with a higher value indicating poorer affective well-being. Predicted affective well-being based on within-between hybrid models controlling for economic and COVID-19 risk perceptions, labor force status, change in household monthly income, access to government support, gender (between-effect only), age (between-effect only), education (between-effect only), rural-urban residence (between-effect only), presence of children aged less than 6 years (between-effect only), and survey wave dummies. See Supplementary Table S1 for full model results.

Supplementary material

for

Food insecurity and affective well-being during COVID-19 in the Middle East and North Africa

This file includes further information on:

- Measurement of control variables
- Full model results (Table S1)
- References

Measurement of control variables

We incorporated into every model a set of covariates that may confound the association between food insecurity and affective well-being.

Government support. Access to social safety nets can mitigate the negative impact of food insecurity and offer some protection from mental health disorders (Ke et al. 2023; Radey McWey and Cui 2020). We used a categorical variable to capture whether a respondent was (1) not in receipt of any form of government assistance, (2) on one government assistance scheme, and (3) on more than one government assistance scheme. These included, for example, subsidized health insurance (RAMED), a cash transfer programme for widows and their dependent children, and the Tayssir cash transfer program for rural families with children aged 6–15 in Morocco; the National Programme of assistance to needy families (PNAFN) and reduced rate health insurance (AMGII) in Tunisia; the Takaful and Karama cash transfer program targeting low-income families with children under 18, food ration cards, and Islamic social financing (Zakat) in Egypt; and finally, in Jordan, UN cash-based interventions for the most economically vulnerable households (UNHCR, UNWRA), food aid through the World Food Programme, the Tkiyet Um Ali food program that distributes monthly food parcels to families living below the poverty line, and a bread subsidy system.

COVID-19 and economic-related worries. Fears of contracting the virus (Quadros et al. 2021) and the economic impact of the pandemic on people's livelihoods (Kämpfen et al. 2020) have both been associated with declining affective well-being. Our measures of COVID-19 and economic-related concerns were based on the following two questions: (1) "How worried are you about being infected with COVID-19?" and (2) "How worried are you about the economic situation?" The four response categories were (1) not at all worried, (2) a little worried, (3) rather worried, and (4) very worried. Both measures were included as continuous variables. A small percentage of the sample (1%) had responded to the COVID-19 question with "I had it already." As previous research shows, the perceived risk of reinfection is higher among people who have had direct contact with the virus than those who have not had direct contact (Dryhurst et al. 2020), so those who indicated they had previously contracted COVID-19 were grouped with the "very worried" category. A robustness check that drops those who had already contracted COVID-19 does not change the substantive results.

Finally, we also controlled for other socio-demographic variables, including age (for the first observation of each respondent), labor market status (employed, unemployed, out of the labor force), self-reported change in household income since February 2020 (decreased, same, increased), education (less than basic, basic, secondary, higher education), urban residence (urban, rural), sex (male, female), whether the household included children below the age of 6 years, and survey wave number (1, 2, 3, 4).

Full model results

Table S1. Hybrid model predicting affective well-being in Jordan, Morocco, Tunisia, and Egypt.

	Jordan	Morocco	Tunisia	Egypt
	B (SE)	*B (SE)*	*B (SE)*	*B (SE)*
Within effects				
Food insecurity	.32**	.54***	.28***	.33**
	(.10)	(.11)	(.05)	(.11)
Covid-19 worries	.04	.24*	.13	.15
	(.12)	(.12)	(.07)	(.15)
Economic-worries	.31*	.37***	.26***	.38*
	(.14)	(.11)	(.07)	(.15)
Labor force status (ref: employed)				
Unemployed	.88*	1.38***	.64**	.19
	(.42)	(.42)	(.21)	(.45)
Out of the labor force	1.18**	.98*	.07	.25
	(.46)	(.46)	(.29)	(.54)
Change in income (ref: decreased)				
Same	–.18	–1.02**	–.42**	–.63
	(.30)	(.35)	(.15)	(.33)
Increased	–.22	–1.14*	–.76**	–.45
	(.48)	(.55)	(.24)	(.58)
Gov. support received (ref: none)				
1 scheme	1.38	–.28	–.10	.75
	(.72)	(.66)	(1.30)	(1.27)
> 1 scheme	.65	.83	–2.42	.71
	(.91)	(1.82)	(2.56)	(1.44)
Wave (ref: wave 1/2)				
Wave 2		–.58	.56***	
		(.31)	(.15)	
Wave 3		–.92**	.36*	
		(.35)	(.16)	
Wave 4	–.06	1.45***	.94***	–.11
	(.16)	(.38)	(.16)	(.19)
Between effects				
Food insecurity	.41***	.93***	.85***	.71***
	(.11)	(.13)	(.07)	(.12)
Covid-19 worries	–.20	.28*	.34**	.20
	(.11)	(.14)	(.10)	(.14)
Economic-worries	1.39***	1.23***	.59***	.57***
	(.15)	(.14)	(.11)	(.16)
Labor force status (ref: employed)				
Unemployed	–.15	1.70***	.67*	.36
	(.35)	(.40)	(.29)	(.48)
Out of the labor force	–.14	.24	–.49	.62
	(.37)	(.37)	(.30)	(.50)
Change in income (ref: decreased)				
Same	–.42	–.75*	–.35	–1.11**
	(.31)	(.36)	(.26)	(.39)
Increased	–3.01***	–.12	–2.19***	–1.79**
	(.61)	(.76)	(.48)	(.73)
Gov. support received (ref: none)				
1 scheme	.26	.53	1.04*	–.30
	(.27)	(.51)	(.45)	(.36)

> 1 scheme	.13	–.90*	–.31	–.82
	(.36)	(.39)	(.31)	(.53)
Wave (ref: wave 1/2)				
Wave 2		–.46	–1.05	
		(1.48)	(1.20)	
Wave 3		.55	.38	
		(.81)	(.95)	
Wave 4		.59	–.72	
		(1.31)	(1.14)	
Women (ref: men)	–.19	.64*	–.82***	–.39
	(.28)	(.30)	(.20)	(.39)
Age	.01	–.01	.03***	.01
	(.01)	(.01)	(.01)	(.01)
Education (ref: < basic)				
Basic	–.57	–.26	–.32	.18
	(.37)	(.32)	(.27)	(.50)
Secondary	–.99**	–.25	–.20	.37
	(.39)	(.34)	(.24)	(.38)
Higher education	–1.50***	.26	–.22	.82
	(.42)	(.34)	(.29)	(.46)
Child < 6 (ref: no)	–.08	–.01	.16	–.06
	(.23)	(.23)	(.19)	(.28)
Rural (ref: urban)	–.02	–.19	–.27	–.38
	(.28)	(.26)	(.19)	(.28)
Intercept	11.58***	8.70***	10.34***	11.87***
	(.77)	(1.08)	(.83)	(.86)
N (respondents)	1,553	1,902	2,118	881
N (person-wave observations)	3,106	4,877	6,766	1,762

Note. SE = standard error. Ref. = reference. > = greater than, < = less than.
* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed).

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