

## **Assessing the Impact of the COVID-19 Pandemic on Household Food Security in Indonesia**

**Rodhiah Umaroh**

*Departement of Economics, Faculty of Economics and Business,  
Universitas Pembangunan Nasional*

*“Veteran” Yogyakarta, Special Region of Yogyakarta, Indonesia*

*Corresponding author: rodhiah.umaroh@upnyk.ac.id*

### **Abstract**

The COVID-19 pandemic has led to a significant impact on global food security, particularly in developing and low-income countries. Therefore, this study investigates the implications of the COVID-19 pandemic on household food security in Indonesia, using national longitudinal data from the survey of High-Frequency Monitoring of the Impacts 2020. The result shows a reduction in food insecurity in 2021, and panel-ordered logistic regressions demonstrate that households with younger heads, lower education levels, female heads, larger sizes, rural residency, and lower income levels have a higher probability of experiencing the decline. Furthermore, the study highlights the role of remittances and safety-net programs in mitigating food insecurity. It provides a baseline analysis of the food security situation to improve targeted policies and deliver safety net programs to the poor and vulnerable groups directly impacted.

**Keywords:** food insecurity, COVID-19, pandemic, safety net

## **1. Introduction**

The global outbreak of the COVID-19 pandemic since late 2019 has resulted in profound implications for food security (FAO & WFP, 2020). The pandemic has caused both health and economic crises, prompting the implementation of measures, such as widespread lockdowns, isolation, and social distancing policies in nearly all countries to curb the spread of the virus. These policies have simultaneously impacted the deceleration of the economy on the supply and demand sides (Fang, 2021). Meanwhile, the unprecedented shock has caused numerous businesses to cease operations, resulting in significant job and income losses (Khamis et al., 2021). The crisis has also resulted in increased food prices due to disruptions in the supply chain (Ikhsan & Virananda, 2021). Consequently, the loss of jobs and income and the high cost have made access to food even more complex, exacerbating insecurity.

Before the onset of the pandemic, the global population of food-insecure individuals was estimated to exceed 820 million, out of which approximately 135 million were classified under the crisis or emergency category (FAO et al., 2019). However, the ongoing pandemic has exacerbated the situation, with predictions suggesting that over 270 million individuals could fall into these categories due to the compounding effects of the virus. The long-term impact could be severe when prompt and coordinated actions are not taken to address the disruption in food security (Béné et al., 2021; World Food Program, 2020).

Numerous studies have been conducted to assess the food security situation during the pandemic, particularly in developing and low-income countries. Food security and dietary quality were reported to deteriorate in Kenya and Uganda as measured by the insecurity experience scale and the consumption of nutritionally rich food frequency. The impact is more prominent for poor-income households and those dependent on labor income (Kansiime et

al., 2021). Ouoba and Sawadogo (2022) showed that the COVID-19 pandemic has increased the likelihood of food insecurity among small urban trader households due to a major loss of income in Burkina Faso. Even though social security did not serve as a mitigating factor, households with adaptive capacity were better equipped to handle the shock. Recently, Gaitán-Rossi et al. (2021) confirmed a significant association between the COVID-19 lockdown and a decline in food security, particularly among households with children, from 38.9% in 2018 to 24.9% in June 2020. The impact of income reductions and high unemployment on household food security has been felt in both urban and semi-urban areas (Yulia et al., 2021).

The semi-structured qualitative interviews conducted by Singh et al. (2021) in Nepal showed that most participants from low socioeconomic families and individuals relying on daily wages and remittance had an increase in food insecurity. Using the Food Insecurity Experience Scale (FIES) in Malaysia, Tan et al. (2022) found that the prevalence was 43.2% in association with ethnicity, employment status, and low income among adults. Erokhin and Gao (2020) assessed food security among 45 developing countries in a macroeconomic setting. The results highlight that upper-middle-income nations were more visible in food security than the least developing nations.

In response to the pandemic, safety nets have been delivered to support vulnerable households. The previous studies confirmed that these programs play a substantial role in compensating for lost income and maintaining food security (Dasgupta & Robinson, 2022; Mnyanga et al., 2022). During the pandemic, the Indonesian government employed several safety net programs, including cash and in-kind transfers, food staple assistance, electricity bill reduction, loan deferment, and pre-employment cards (Yumna et al., 2020). The literature presents diverse findings regarding the efficacy of cash and in-kind transfers in

mitigating food insecurity. Notably, food-based assistance has been confirmed to play a pivotal role in sustaining consumption, easing impoverished households susceptible to food deficits (Brown & Gentilini, 2007). Another finding suggests that cash safety nets are more effective than food, specifically in households with female-head (Dasgupta & Robinson, 2022). However, both cash and food assistance reduce food insecurity and highlight the importance of joint safety net programs (Schmidt, 2013).

Similar to other developing nations, Indonesia has experienced a decline in food security as a result of the COVID-19 pandemic. This is largely attributable to income shocks and a reduction in purchasing power (Ikhsan & Virananda, 2021; Syafiq et al., 2022). Studies assessing the impact on the household level using the latest extensive data in the pandemic setting is still limited. Therefore, this study determines the food security situation in Indonesian households using a large micro longitudinal data survey concerned with the impact of the COVID-19 pandemic on socio-economic aspects at the national level. Studying the topic of food security can provide references for policymakers to design and decide on better policies in a current or future health crisis.

## **2. Materials and Methods**

This study uses data from the High-Frequency Monitoring of the COVID-19 Impacts 2020 (HiFy) collected by the World Bank (2022). The HiFy is a phone-monitoring survey of households that provides insight into the effects of the pandemic on socioeconomic aspects. Overall, the household sample covers 27 provinces; the longitudinal panel survey started from round 1 in May 2020 to round 6 in October 2021. The total sample in the first round was 4,338 households, and the subsequent surveys reported high response rates. In rounds

2, 3, 4, 5, and 6, about 4,119 (95%), 4,067 (94%), 3,953 (91%), 3,86 (85%), and 3,471 (80%) of households are successfully interviewed, respectively.

The HiFy provides information related to food security indicators during the pandemic in rounds 1,3, 5, and 6. In addition, rounds 1, 3, 5, and 6 started in May 2020, July 2020, March 2021, and October 2021, respectively. To conduct an in-depth analysis of food security on the HiFy questionnaire, the present study examines five key indicators. This approach is consistent with prior analyses conducted by Amare et al. (2020) and Dasgupta and Robinson (2021), which also delved into similar indicators, namely:

1. Insufficient availability of food in households due to inadequate financial or other resources (Food Shortage);
2. Reduced food consumption among household members due to inadequate financial or other resources (Eat Less);
3. Instances where adults in households experienced hunger due to insufficient financial or other resources to purchase food (Hungry);
4. Cases where adults in households were unable to consume any food for an entire day due to insufficient financial or other resources (Went Without Eat).

The survey questionnaire comprises four alternative answers, scaled from 1 to 4 in answering all the questions. Specifically, the first, second, third, and fourth options denote "Yes, often," "Yes, sometimes," "Yes, seldom," and "No." The third and fourth response alternatives are solely available in rounds 3 and 5, and the estimated sample is adjusted for each indicator. In addition, the HiFy dataset also contains other pertinent information, including individual and household characteristics. The variables are obtainable in rounds 1, 3, 5, and 6 of the datasets. Therefore, these four rounds of the HiFy dataset were solely used for this study.

The quantitative data were subjected to analysis using descriptive statistics as a preliminary step to gain initial insights into the study. Subsequently, panel-ordered logit regression was employed to estimate the factors that determined each indicator during the pandemic. The ordered logistic model was more suitable than Ordinary Least Squares (OLS) or multinomial logistic regression since food insecurity outcomes were a discrete and ordered variable. Meanwhile, the panel-ordered logit regression can be expressed in the following manner:

$$Y_{it}^* = \alpha_{0it} + \beta_1 X_{it} + \gamma_1 Working_{it} + \delta_3 Z_{it} + \theta_4 Working * Z_{it} + \varepsilon_{it} \quad (1)$$

where  $Y_{it}^*$  is an ordered response outcome for four indicators of food insecurity (1 = Food shortage; 2 = Eat less; 3 = Hungry; and 4 = Went without eat) in households  $i$  and round  $t$ , with a value of 1 representing the highest/lowest food security and a value of 4 means better than 1.  $\beta_1 X_{it}$  is a vector of household socioeconomic and demographic characteristics including characteristics of household head (age, square of age, education level, and gender), number of members, region or urban-rural area, the classification of household welfare status based on the national framework SUSENAS 2019 classified into bottom 40%, middle 40%, and top 10% groups, and remittance status.

$\gamma_1 Working_{it}$  pertains to the employment status of household breadwinner and is represented by three categories, namely (1) employed during the pandemic, (2) unemployed for reasons other than the pandemic shock, which include being furloughed, retired, acting as a caregiver, and a seasonal worker, or experiencing a non-farming season, and (3) unemployed due to the pandemic shock, which includes business closure due to legal restrictions, movement restrictions preventing travel to farms, and being ill or quarantined. Furthermore,  $\delta_3 Z_{it}$  represents safety net programs received from the central

government to mitigate the pandemic impact, including (1) Bantuan Langsung Tunai (BLT)/cash transfers), (2) Program sembako/staple food, (3) cash for work (cash-intensive provided to the beneficiary through empowering rural communities), (4) electricity bill reduction for low voltage households, and (5) family hope program/PKH (conditional cash transfers). All safety net programs are represented in a dummy variable, with a value of 1 indicating their presence and 0 indicating their absence. Meanwhile,  $\theta_4 Working * Z_{it}$  refers to the interaction term between the employment status of household breadwinners and a dummy variable representing the presence of safety net programs. The purpose of this term is to measure the effectiveness of safety net programs on food security for each employment status during the pandemic.

### 3. Results and Discussion

#### 3.1 Data Description

The distribution of food insecurity levels in each indicator during the COVID-19 pandemic in Indonesia is illustrated in Figure 1. The data showed that approximately 34% and 27% of households experienced food insecurity in the form of inadequate intake and shortages, respectively. Furthermore, the prevalence of food insecurity was higher among households with occasional or frequent experience. According to the survey data, other indicators, such as experiencing hunger and going without eating, accounted for a relatively small percentage of 6%. The survey rounds suggested a general decline in food insecurity throughout Indonesia, even during the COVID-19 pandemic. However, the indicator "Went without eat" recorded an increase from July 2020 to March 2021, as illustrated in Figure. 2. The most significant reduction was observed in the "Eat less" indicator, which decreased from 40% to 29% in the latest survey. In addition, another indicator of "Food shortage" only found a slight decrease from 32% to 35%, 6% to 7%, and 5% to 7% for "Food shortage",

"Hungry", and "Went without eat", respectively. During the initial phase of the pandemic, households had to adjust to numerous changes in their daily lives. The shock generated uncertainty on many fronts, leading to the closure of businesses and economic deterioration. However, households began to adapt to the flow, and the government also provided social assistance to mitigate the negative impact, resulting in a decrease in food insecurity.

Figure 1. Summary of food insecurity

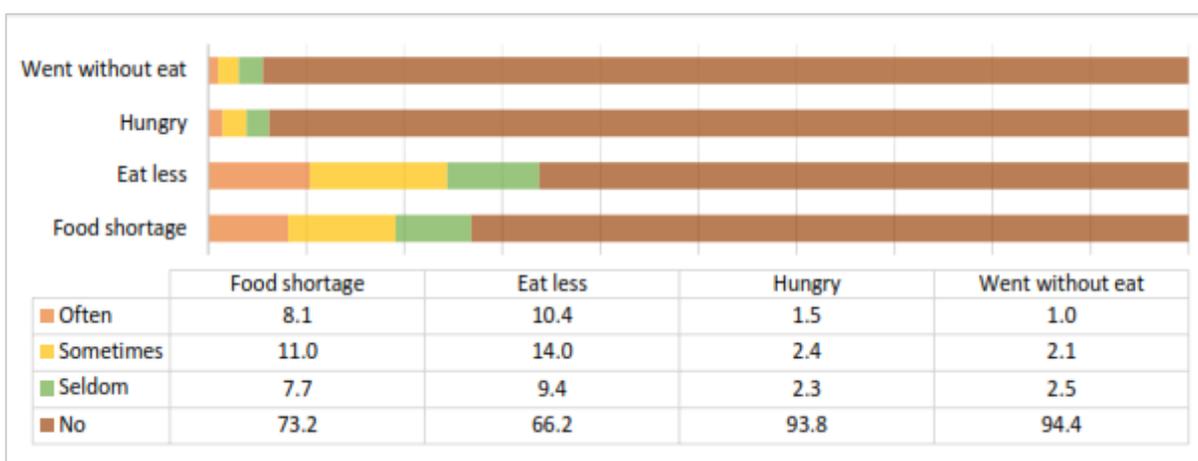
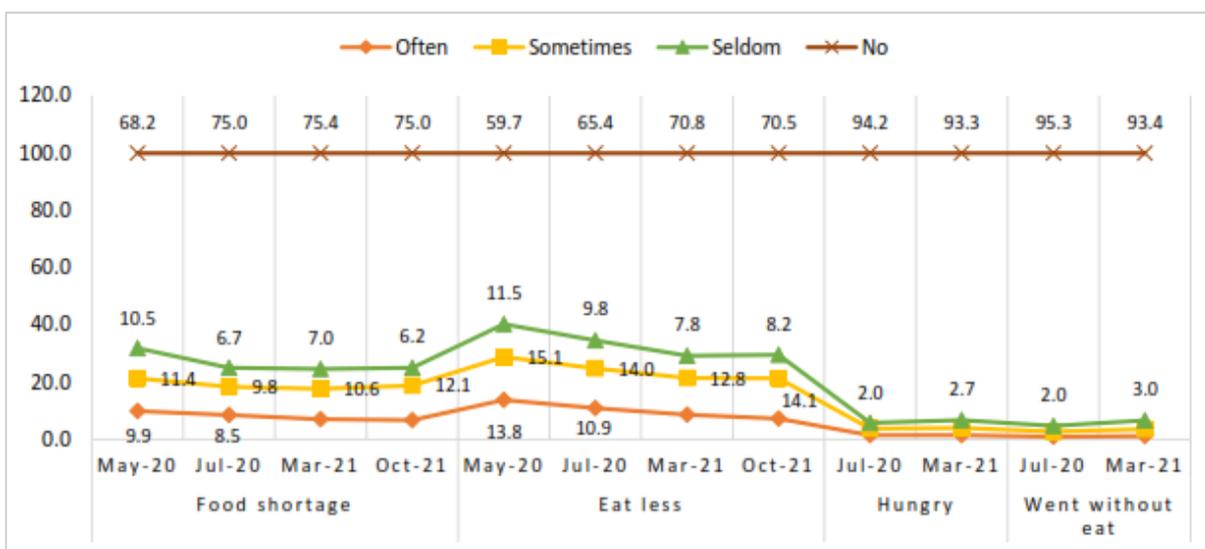


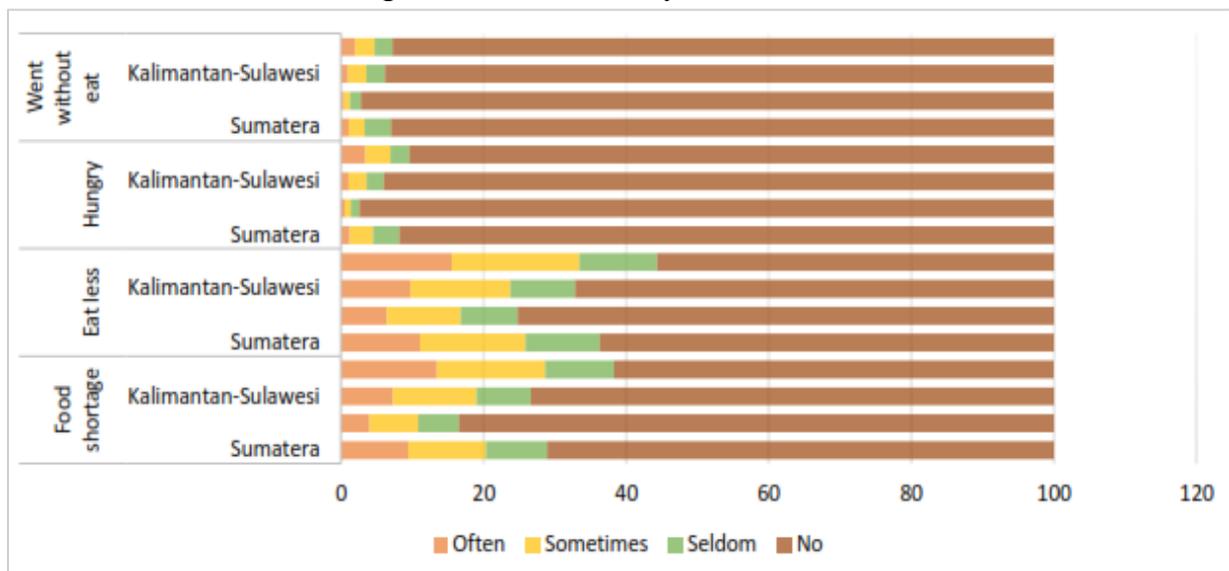
Figure 2. Food insecurity across rounds



The study presented responses for each food insecurity indicator, aggregated by region, as depicted in Figure 3. This figure displayed the heterogeneous outcomes in the prevalence of each indicator across every region.

Households residing in the eastern region, specifically the Maluku-Papua region, reported the highest proportion of each indicator, followed by the Sumatera and Kalimantan-Sulawesi regions. In contrast, the Java region exhibited the lowest prevalence of food insecurity indicators as the most food-secured region in the country during the pandemic. There was a significant disparity in economic growth and development, primarily concentrated on the Java island and western regions. The eastern parts of Indonesia lagged, resulting in considerable differences in food security across regions. This outcome was not unexpected, as households in the eastern part experienced a lower level of indicator, even in the absence of the pandemic and economic crises. There were various reasons why achieving food security in these regions posed a significant challenge. These included limited human resources and inadequate infrastructure, resulting in low levels of food security awareness and uneven distribution (Rachmaningsih & Priyarsono, 2012). During the pandemic, food security in this region may have worsened further as households faced general problems, economic crises, and disruptions to the food supply chain (Anwar & Nasrudin, 2021).

Figure 3. Food insecurity across rounds



### 3.2 Statistic Descriptive

Table 1 shows descriptive statistics of the variable related to the risk and protective factors. The average head of household was aged 47 years old or still in a productive age, with a minimum of 16 years old and 94 years old maximum. About 30% and 35% of the heads earned education until primary or senior high school, respectively. Most household heads, at 88%, were male, and the average family size was four members for a typical nuclear family. About 62% lived in urban areas, and most households (62%) were considered a bottom 40% group according to household economic well-being. In the vulnerable group, 27% were in the middle 40% classification, while 11% were in the top 20% of welfare status. About 86% were reported not to receive remittances, and many of these households depend solely on their income. Furthermore, 1% of households had experienced an increase in remittances since the pandemic. The percentage was higher for households with similar or smaller remittance amounts at 4%. The highest increase was observed among households that stopped receiving or had no income from remittances, with a rate of 6%.

About 83% of household breadwinners continued working during the pandemic. Meanwhile, the proportion that stopped working because of business closure and other reasons was roughly 5% or 11%, respectively. Almost half of the households received safety net programs from the government, including staple food at 43% and the reduction of electricity bills at 44%. One-quarter of households received conditional PKH and cash transfers at 21% and 17% amidst the pandemic. However, households that received cash for work programs were reported in a small proportion at 1%.

Table 1. Descriptive statistics of socioeconomics and demographic characteristics

<b>Variables</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. dev.</b>	<b>Min</b>	<b>Max</b>
Age HH head	15,562	46.7	11.02	16	94
Education of HH head					
Until primary school	15,562	0.3	0.46	0	1
Junior high school	15,562	0.19	0.39	0	1
Senior high school	15,562	0.35	0.48	0	1
University	15,562	0.16	0.37	0	1
Male HH head	15,562	0.88	0.32	0	1
HH Size	15,562	4.41	1.73	1	16
Urban households	15,562	0.62	0.49	0	1
Household welfare status					
Bottom 40%	15,562	0.62	0.49	0	1
Middle 40%	15,562	0.27	0.44	0	1
Top 20%	15,562	0.11	0.31	0	1
Remittance status during the pandemic					
Did not receive remittance	15,562	0.86	0.35	0	1
Higher than usual	15,562	0.01	0.08	0	1
The same as usual	15,562	0.04	0.19	0	1
Less than usual	15,562	0.04	0.2	0	1
No income/stop	15,562	0.06	0.23	0	1
Working status					
Currently working	15,562	0.83	0.37	0	1
Unemployed	15,562	0.11	0.32	0	1
Unemployed due to the COVID-19 pandemic	15,562	0.05	0.23	0	1
Safety net					
Cash transfers/BLT	15,562	0.17	0.38	0	1
Staple food/sembako program	15,562	0.43	0.5	0	1
Cash for work	15,562	0.01	0.1	0	1
Electricity bill reduction	15,562	0.44	0.5	0	1
PKH	15,562	0.21	0.41	0	1

### 3.3. Determinants of Food Insecurity in Indonesia

Table 2 reports the results of the determinant influencing each food insecurity indicator during the COVID-19 pandemic examined using panel-ordered logistic regression estimation. Certain characteristics of households affect the likelihood of food insecurity, and that is related to the age of household heads. This result resonates with the previous studies obtained (Kansiime et al., 2021; Ouoba & Sawadogo, 2022) before the pandemic (Abdullah et al., 2019; Ali et al., 2016; Mose & Mukami, 2020). These incomes were likely higher following the lifecycle hypothesis assumptions as accumulation from a long working time (Arene, 2008). The inclination toward risk aversion and sound decision-making practices have been observed to shield individuals from various household-related predicaments (Ouoba & Sawadogo, 2022). However, the age square of household heads was negative and significant, particularly in the "Food shortage" and "Went without eat" categories. This implies that there is a non-linear relationship between the age of household heads and food insecurity. The increase in age is consistent with better food security, but the probability can decrease at a certain period. This trend was reasonable because as individuals pass through the productive age, their financial resources may become limited due to the reduction in income and savings (Ruhjana et al., 2020).

Furthermore, it has been observed that when a male assumes the position of household head, the likelihood of experiencing food insecurity is comparatively lower than a female as the head of household. This outcome suggests that households led by females are more susceptible to food insecurity, particularly in the indicators of "Food shortage", "hunger", and "eat less". The finding is consistent with the prevailing literature on food security in developing and low-income nations. In Indonesia, female household heads typically lack

husbands and are often widows or single parents. Additionally, they may be single mothers who bear the sole responsibility of managing their households (PEKKA & SMERU, 2014) with a decreased number of earners. Females are confronted with a dual challenge of a gender-based wage gap and restrictions, limiting their participation in the labor force, attributable to sociocultural factors. Therefore, the incidence of poverty and food insecurity is more prevalent among this gender due to limited access to resources (Dasgupta & Robinson, 2021; Mallick & Rafi, 2010; Negesse et al., 2020).

In the present study, education plays a critical role in ensuring food security. Specifically, a higher level of education among household heads correlates with a greater likelihood of improved food security, especially during the pandemic. This effect is particularly pronounced among individuals with a high school or university education when compared to those who have completed only primary education. These findings hold across all indicators studied. Furthermore, education is known to be closely linked to productivity and efficiency, leading to increased income growth and improved decision-making. By pursuing educational pathways, individuals can gain access to a wider range of job opportunities, particularly among household heads, and also improve their access to technology and information. Additionally, these pathways can provide essential knowledge about dietary diversity for ensuring adequate nutrition and food security (Kara & Kithu, 2020; Sileshi et al., 2019).

The likelihood of achieving food security is greater in households with smaller sizes compared to those with more family members, particularly in "Eat less" category. This finding is statistically significant at the 1% level, and the number of household members is a critical factor. This correlates with the challenge of distributing limited food within households. A previous study has yielded similar results, where this behavior serves as a strategy to meet basic

needs by reducing food consumption and allocation, resulting in a lower dietary intake (Drammeh et al., 2019; Ihab et al., 2013).

Urban households have a lower likelihood of food insecurity than rural, especially in "Food shortage" and "Eat less" indicators. Following the pre-pandemic setting, this finding stated that urban households have higher knowledge and awareness related to dietary diversity, macronutrients, and highly nutritious food (Umaroh & Pangaribowo, 2020). In the context of the pandemic, numerous studies have also confirmed this result where urban households have better access to coping mechanisms and become more resilient (Akim et al., 2021; Giacomani et al., 2021; Kent et al., 2022; Simmet & Stroebele-Benschop, 2021).

Furthermore, households from low-income groups are more vulnerable to shocks from the pandemic, resulting in severe food insecurity. These results confirm that poor households are vulnerable to food security problems, as found in other studies (Kansiime et al., 2021; Ouoba & Sawadogo, 2022). Even though households with a larger number of family members tend to have suboptimal dietary intake, they exhibit greater resilience in adopting food-based coping strategies when faced with shocks. It is also important to provide cash food assistance and education to these households.

Receiving remittances in a higher proportion or at the same rate as before the pandemic has been linked to an increased likelihood of better food security for households. In contrast, households that received fewer remittances than usual experienced worse food security. This result underscores the crucial role of remittances in maintaining food security, particularly during crises. According to available evidence, households receiving remittances have experienced less food insecurity and have identified employment shock as a key factor in the short run (Akim et al., 2021). Similarly, Stampini et al. (2021) found that the

receipt of remittances in Venezuela has a positive correlation with increased daily caloric intake, improved access to a wider range of food groups, and greater accessibility for households lacking remittances. Additionally, remittances play a crucial role in supporting families, particularly in times of financial crises, aiding in poverty alleviation and enhancing food security (Dhungana & Pandit, 2016). Remittances can effectively increase the quantity and quality of household food expenditure and encourage people to consume more varied macronutrients, particularly in developing countries (Ebadi et al., 2018). According to Singh et al. (2021), families relying on remittance as their main source of income tended to experience food insecurity and hunger during the pandemic.

The households in which the breadwinner was unemployed due to the COVID-19 pandemic were more prone to experiencing food insecurity. Unemployed breadwinners, due to the pandemic shock and other reasons, exhibited negative associations with a higher probability of achieving food security. However, the magnitude of the coefficient is generally greater for those unemployed due to the pandemic. This virus led to disruptions in the economic and labor market, resulting in job losses and a surge in unemployment rates. Job losses pose a considerable risk to food security, resulting in lower dietary intake, inadequate food supplies, and decreased consumption (Milovanska-Farrington, 2021; Raifman et al., 2020).

Meanwhile, safety nets had a stimulating effect in reducing the likelihood of household food insecurity during the pandemic. The finding is significant for cash transfers and staple food assistance. Households that received cash transfer programs were more likely to be food secure, notably decreasing the probability of "Food shortage" and "Eat less" groups. However, the contribution is found to be broader for staple food assistance due to the positive impact on mitigating

households suffering from "Food shortage", "Hungry", and "Went without eat" groups. Despite these positive findings of cash transfers and staple food assistance, an adverse result is found in the PKH negatively associated with food security.

Other safety net programs include electricity bill reduction and cash for work, which are found to be insignificant results. Furthermore, the existing safety net does not possess sufficient strength to influence household food security. Even though food assistance does have a considerable impact on the number of food security indicators, the effect is comparatively more significant for cash transfers. The "Food shortage" indicator is substantially affected by the two safety net programs mentioned above. Previous findings showed that cash transfers are more effective in mitigating food insecurity in developing countries (Dasgupta & Robinson, 2021, 2022; Rahman et al., 2022). This is probably because the target of food assistance programs in Indonesia is relatively low at 47.46 percent (Dewi et al., 2022). In contrast, this current study indicates that both cash transfers and staple food assistance were equally effective in enhancing food security during the COVID-19 pandemic. This outcome reinforces the need for the government to design a more focused assistance program, which incorporates the two variables, considering local productivity context and providing aid to more vulnerable households.

The analysis includes the interaction terms between the safety net program and the employment status of the breadwinner to capture the effectiveness of the safety net in different work situations. Even though the reduction in electricity bills and the Family of Hope program did not yield favorable results in increasing food security, the outcome changed after considering the employment status of the individual. The subsidized electricity bill program for low-voltage households, known as the Electricity Bill

Reduction program, demonstrated efficacy in reducing the incidence of food insecurity for the indicators of "Food shortage" and "Eat less." This is particularly true for households with breadwinners who had to stop working due to the relative shock of the pandemic. Moreover, households enrolled in the Family of Hope/PKH program, which offers conditional cash transfers, and whose breadwinners were unemployed due to the pandemic, were less likely to experience food insecurity related to indicators such as "Hungry" and "Went without eat." This is in contrast to households with unemployed breadwinners for other reasons who did not receive conditional cash transfers. The reported coefficient shows that these transfers are more effective in increasing food security for households directly affected. Therefore, expanding the safety net in a more targeted and efficient direction is recommended to overcome the negative impacts of the pandemic. The magnitude of conditional cash transfers is also high, with limited effectiveness on food security (Flaminiano, 2021; Suwardi, 2021).

Table 2. The panel-ordered logit estimation of factors determining food security during the COVID-19 pandemic

Variables	(1)	(2)	(3)	(4)
	Food shortage	Eat less	Hungry	Went without eat
Age of household head	0.0558*** (2.64)	0.0366* (1.77)	0.0803* (1.95)	0.0932** (2.41)
Age of household head square	-0.000482** (-2.22)	-0.000257 (-1.21)	-0.000567 (-1.33)	-0.000706* (-1.76)
Education of household head (Ref: Until Primary school)				
Junior high school	0.144 (1.39)	0.171* (1.69)	0.626*** (3.06)	0.186 (0.99)
Senior high school	0.396***	0.389***	0.864***	0.645***

<b>Variables</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
	<b>Food shortage</b>	<b>Eat less</b>	<b>Hungry</b>	<b>Went without eat</b>
	(4.24)	(4.28)	(4.66)	(3.63)
University	0.857***	0.875***	1.019***	1.178***
	(6.76)	(7.20)	(3.94)	(4.47)
Gender of household head (1=Male)	0.255**	0.171	0.388*	0.358*
	(2.31)	(1.58)	(1.82)	(1.76)
Household size	-0.026	-0.0580***	0.024	-0.021
	(-1.19)	(-2.71)	(0.54)	(-0.47)
Region (1=Urban)	0.341***	0.237***	-0.034	-0.001
	(4.18)	(2.98)	(-0.21)	(-0.00)
Household welfare status (Ref: Bottom 40%)				
Middle 40%	0.604***	0.469***	0.667***	0.300*
	(6.57)	(5.30)	(3.57)	(1.72)
Top 20%	1.303***	0.941***	1.809***	0.992***
	(8.72)	(6.84)	(5.14)	(3.22)
Remittance status during the pandemic (Ref: did not receive remittance)				
Higher than usual	0.144	0.507*	18.28	0.953
	(0.47)	(1.73)	(0.00)	(0.84)
The same as usual	0.522***	0.747***	1.074**	0.714*
	(3.11)	(4.61)	(2.25)	(1.65)
Less than usual	-0.383***	-0.414***	-0.731**	-0.852***
	(-2.79)	(-3.12)	(-2.37)	(-2.94)
No income/stop	-0.389***	-0.334***	-0.144	-0.053
	(-3.07)	(-2.72)	(-0.55)	(-0.21)
Working status (Ref: Currently working)				
Unemployed	-0.623***	-0.868***	-1.349***	-1.420***
	(-4.98)	(-7.49)	(-4.03)	(-4.47)

<b>Variables</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
	<b>Food shortage</b>	<b>Eat less</b>	<b>Hungry</b>	<b>Went without eat</b>
Unemployed due to the COVID-19 pandemic	-1.057*** (-6.86)	-1.225*** (-8.54)	-1.422*** (-2.79)	-0.978* (-1.84)
Safety net (1=Yes)				
Cash transfers/BLT	0.200*** (2.73)	0.313*** (4.56)	-0.067 (-0.37)	0.143 (0.79)
Staple food/sembako program	0.150** (2.57)	0.053 (0.98)	0.585*** (3.81)	0.300** (2.03)
Cash for work	-0.335 (-1.44)	-0.060 (-0.26)	1.459 (1.27)	1.413 (1.27)
Electricity bill reduction	0.0138 (0.21)	-0.0568 (-0.90)	0.0770 (0.49)	-0.2300 (-1.52)
PKH	-0.108 (-1.25)	0.025 (0.30)	-0.329* (-1.65)	-0.025 (-0.13)
Unemployed #BLT	0.041 (0.21)	0.005 (0.03)	0.468 (0.97)	0.319 (0.69)
Unemployed due to the COVID-19 #BLT	0.1420 (0.49)	0.1590 (0.58)	0.9860 (1.31)	-0.0713 (-0.10)
Unemployed #Staple food	-0.089 (-0.60)	0.023 (0.16)	0.316 (0.80)	0.489 (1.27)
Unemployed due to the COVID-19 # Staple food	-0.012 (-0.06)	-0.018 (-0.10)	-1.049* (-1.77)	-0.403 (-0.66)
Unemployed #Cash for work	-0.221 (-0.33)	0.555 (0.84)	17.18 (0.00)	19.13 (0.00)
Unemployed due to the COVID-19 # Cash for work	-0.04 (-0.03)	0.326 (0.28)	18.08 (0.00)	18.85 (0.00)
Unemployed # Electricity bill reduction	0.127 (0.84)	0.161 (1.14)	0.661* (1.69)	0.743* (1.96)

Variables	(1)	(2)	(3)	(4)
	Food shortage	Eat less	Hungry	Went without eat
Unemployed due to the COVID-19#Electricity bill reduction	0.324*	0.341*	0.664	0.476
	(1.66)	(1.87)	(1.10)	(0.76)
Unemployed #PKH	0.125	-0.0179	-0.0747	0.0738
	(0.67)	(-0.10)	(-0.16)	(0.16)
Unemployed due to the COVID-19 #PKH	0.0991	0.234	1.731**	2.163*
	(0.40)	(0.98)	(1.97)	(1.74)
Constant	3.042***	3.128***	4.004***	3.045***
	(18.90)	(20.36)	(6.74)	(5.98)
<i>N</i>	15562	15562	7753	7753

Note: *t* statistics in parentheses \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

#### 4. Conclusions

In conclusion, this study provides insights into food security in Indonesian households during the COVID-19 pandemic, using micro-sample longitudinal data in 2020–2021. The results show a decline in food insecurity in 2021 compared to the early pandemic in 2020 due to households adjusting to the situation and the implementation of government safety net programs. However, food insecurity indicators remain higher outside Java Island, particularly in the eastern part of Indonesia. The determinants have been analyzed using panel-ordered logistic regression, showing that younger household heads, lower levels of education among household heads, female-headed households, larger-sized families, living in rural areas, and low-income households contribute to food insecurity. The receipt of remittances by households from other family members plays a critical role in sustaining food security. The analysis indicates that households with remittances, in a proportion equal to or greater than before the COVID-19 pandemic, tend to exhibit better

indicators. Safety net programs are crucial in mitigating food insecurity, with both cash transfers and staple food assistance proving equally effective. According to the findings, electricity bill reduction and cash transfers are more practical to support food security in households with unemployed breadwinners who have to stop working due to the shock. These provide a valuable baseline analysis of the situation in Indonesia, enabling the government to improve targeted policies and deliver safety net programs in a more focused manner while addressing the needs of the poor and vulnerable groups impacted by the pandemic.

### **Acknowledgment**

The author is grateful for the invaluable comments and suggestions from the reviewers and editors in improving this paper.

## References

- Abdullah, Zhou, D., Shah, T., Ali, S., Ahmad, W., Din, I. U., & Ilyas, A. (2019). Factors affecting household food security in rural northern hinterland of Pakistan. *Journal of the Saudi Society of Agricultural Sciences*, 18(2), 201–210. <https://doi.org/10.1016/j.jssas.2017.05.003>
- Akim, A., Ayivodji, F., & Kouton, J. (2021). Do remittances mitigate COVID-19 employment shock on food insecurity? Evidence from Nigeria. In *SSRN Electronic Journal* (Issue April). <https://doi.org/10.2139/ssrn.3833558>
- Ali, S., Noor, M. T., & Alam, K. J. (2016). The determinants of food security among households in Rangpur City, Bangladesh: A logistic regression approach. *IOSR Journal of Economics and Finance*, 07(04), 51–56. <https://doi.org/10.9790/5933-0704035156>
- Anwar, M., & Nasrudin, R. (2021). The household food insecurity amidst the Covid-19 pandemic in Indonesia. *Jejak*, 14(2), 244–260. <https://doi.org/10.15294/jejak.v14i2.28511>
- Arene, C. J. (2008). *Agricultural economics: A functional approach*. Prize Publishers.
- Béné, C., Bakker, D., Chavarro, M. J., Even, B., Melo, J., & Sonneveld, A. (2021). Global assessment of the impacts of COVID-19 on food security. *Global Food Security*, 31. <https://doi.org/10.1016/j.gfs.2021.100575>
- Brown, L., & Gentilini, U. (2007). On the edge: The role of food-based safety nets in helping vulnerable households manage food insecurity. *Food Insecurity, Vulnerability and Human Rights Failure, February*, 82–105. [https://doi.org/10.1057/9780230589506\\_4](https://doi.org/10.1057/9780230589506_4)
- Dasgupta, S., & Robinson, E. J. Z. (2021). Food insecurity, safety nets, and coping strategies during the COVID-19 pandemic: Multi-country evidence

- from sub-saharan Africa. *International Journal of Environmental Research and Public Health*, 18(19). <https://doi.org/10.3390/ijerph18199997>
- Dasgupta, S., & Robinson, E. J. Z. (2022). Impact of COVID-19 on food insecurity using multiple waves of high frequency household surveys. *Scientific Reports*, 12(1), 1–15. <https://doi.org/10.1038/s41598-022-05664-3>
- Dewi, M. M., Sukamdi, & Pangaribowo, E. H. (2022). The effectiveness of targeting food assistance program in Indonesia. *Southeast Asian Journal of Economics*, 10(1), 37–72.
- Dhungana, A., & Pandit, D. (2016). Socio-economic impact of remittance on households in Lekhnath Municipality, Kaski, Nepal. *Economic Literature*, 12, 39–49.
- Drammeh, W., Hamid, N. A., & Rohana, A. J. (2019). Determinants of household food insecurity and its association with child malnutrition in Sub-Saharan Africa: A review of the literature. *Current Research in Nutrition and Food Science*, 7(3), 610–623. <https://doi.org/10.12944/CRNFSJ.7.3.02>
- Ebadi, N., Ahmadi, D., Sirkeci, I., & Melgar-Quiñonez, H. (2018). The impact of remittances on food security status in the Global South. *Remittances Review*, 3(2), 135–150. <https://doi.org/10.33182/rr.v3i2.543>
- Erokhin, V., & Gao, T. (2020). Impacts of COVID-19 on trade and economic aspects of food security: Evidence from 45 developing countries. *International Journal of Environmental Research and Public Health*, 17(16), 1–28. <https://doi.org/10.3390/ijerph17165775>
- Fang, H. (2021). *COVID-19: The impact on the economy and policy responses- A Review* (ADB Working Paper, Issue 1236).

- FAO & WFP. (2020). Impacts of COVID-19 on food security and nutrition: developing effective policy responses to address the hunger and malnutrition pandemic. In *HLPE issues paper* (Issue September). <https://doi.org/10.4060/cb1000en> [www.fao.org/cfs/cfs-hlpe](http://www.fao.org/cfs/cfs-hlpe)
- FAO, IFAD, UNICEF, WFP, & WHO. (2019). The state of food security and nutrition in the world 2019. In *Safeguarding against economic slowdowns and downturns*. FAO. <https://doi.org/10.4060/ca9692en>
- Flaminiano, J. P. (2021). Cash transfers, shocks, and temptation goods: Evidence from the Philippines. *Southeast Asian Journal of Economics*, 9(2), 1–38.
- Giacoman, C., Herrera, M. ., & Ayala Arancibia, P. (2021). Household food insecurity before and during the COVID-19 pandemic in Chile. *Public Health*, 198, 332–339.
- Ihab, A. N., Rohana, A. J., Wan Manan, W. M., Wan Suriati, W. N., Zalilah, M. S., & Mohamed Rusli, A. (2013). Nutritional outcomes related to household food insecurity among mothers in rural Malaysia. *Journal of Health, Population and Nutrition*, 31(4), 480–489. <https://doi.org/10.3329/jhpn.v31i4.20031>
- Ikhsan, M., & Virananda, I. G. S. (2021). *How COVID-19 affects food security in Indonesia*. In *LPEM-FEB UI Working Paper* (No. 061; LPEM-FEBUI Working Paper, Issue June). [https://www.lpem.org/wp-content/uploads/2021/07/WP-LPEM-061\\_How\\_COVID-19\\_Affects\\_Food\\_Security\\_in\\_Indonesia.pdf](https://www.lpem.org/wp-content/uploads/2021/07/WP-LPEM-061_How_COVID-19_Affects_Food_Security_in_Indonesia.pdf)
- Kansiime, M. K., Tambo, J. A., Mugambi, I., Bundi, M., Kara, A., & Owuor, C. (2021). COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment. *World*

*Development*, 137, 105199. <https://doi.org/10.1016/j.worlddev.2020.105199>

Kara, A. M., & Kithu, L. M. (2020). Education attainment of head of household and household food security: A case for Yatta Sub-County, Kenya. *American Journal of Educational Research*, 8(8), 558–566. <https://doi.org/10.12691/education-8-8-7>

Kent, K., Alston, L., Murray, S., Honeychurch, B., & Visentin, D. (2022). The impact of the COVID-19 pandemic on rural food security in high income countries: A systematic literature review. *International Journal of Environmental Research and Public Health*, 19(6). <https://doi.org/10.3390/ijerph19063235>

Khamis, M., Prinz, D., Newhouse, D., Palacios-Lopez, A., Pape, U., & Weber, M. (2021). The early labor market impacts of COVID-19 in developing countries. In *The Early Labor Market Impacts of COVID-19 in Developing Countries* (Issue 58). <https://doi.org/10.1596/35044>

Mallick, D., & Rafi, M. (2010). Are female-headed households more food insecure? Evidence from Bangladesh. *World Development*, 38(4), 593–605. <https://doi.org/10.1016/j.worlddev.2009.11.004>

Milovanska-Farrington, S. (2021). Job loss and food insecurity during the COVID-19 pandemic. In *SSRN Electronic Journal* (Issue 14273). <https://doi.org/10.2139/ssrn.3823640>

Mnyanga, M., Chirwa, G. C., & Munthali, S. (2022). Impact of safety nets on household coping mechanisms for COVID-19 pandemic in Malawi. *Frontiers in Public Health*, 9(February), 1–10. <https://doi.org/10.3389/fpubh.2021.806738>

Mose, O. R., & Mukami, K. L. (2020). Social predictors of food insecurity: The

- case of Yatta Constituency, Machakos County, Kenya. *Current Research Journal of Social Sciences and Humanities*, 3(1), 85–94. <https://doi.org/10.12944/crjssh.3.1.08>
- Negesse, A., Jara, D., Temesgen, H., Dessie, G., Getaneh, T., Mulugeta, H., ..., & Negesse, Y. (2020). The impact of being of the female gender for household head on the prevalence of food insecurity in Ethiopia: A systematic-review and meta-analysis. *Public Health Reviews*, 41(1), 1–14. <https://doi.org/10.1186/s40985-020-00131-8>
- Ouoba, Y., & Sawadogo, N. (2022). Food security, poverty and household resilience to COVID-19 in Burkina Faso: Evidence from urban small traders' households. *World Development Perspectives*, 25(April 2021). <https://doi.org/10.1016/j.wdp.2021.100387>
- PEKKA, & SMERU. (2014). *Menguak Keberadaan dan Kehidupan Perempuan Kepala keluarga*.
- Rachmaningsih, T., & Priyarsono, D. S. (2012). Ketahanan Pangan di Kawasan Timur Indonesia. *Jurnal Ekonomi Dan Pembangunan Indonesia*, 13(1), 1–18. <https://doi.org/10.21002/jepi.v13i1.225>
- Rahman, M. T., Akter, S., Rana, M. R., Sabuz, A. A., & Jubayer, M. F. (2022). How COVID-19 pandemic is affecting achieved food security in Bangladesh: A perspective with required policy interventions. *Journal of Agriculture and Food Research*, 7, 100258. <https://doi.org/10.1016/j.jafr.2021.100258>
- Raifman, J., Bor, J., & Venkataramani, A. (2020). Unemployment insurance and food insecurity among people who lost employment in the wake of COVID-19. *MedRxiv: The Preprint Server for Health Sciences*, 1–22. <https://pub.med.ncbi.nlm.nih.gov/32766606/>

- Ruhyana, N. F., Essa, W. Y., & Mardianis. (2020). Sociodemographic factors affecting household food security in Sumedang regency West Java province. *Agraris*, 6(1), 38–51. <https://doi.org/10.18196/agr.6189>
- Schmidt, L. (2013). *The effect of safety net programs on food insecurity*. In *NBER Working Paper* (Vol. 19558).
- Sileshi, M., Kadigi, R., Mutabazi, K., & Sieber, S. (2019). Analysis of households' vulnerability to food insecurity and its influencing factors in East Hararghe, Ethiopia. *Journal of Economic Structures*, 8(1). <https://doi.org/10.1186/s40008-019-0174-y>
- Simmet, A., & Stroebele-Benschop, N. (2021). Food bank operations during the COVID-19 pandemic in Germany. *J. Hunger Environ. Nutr.*, 16.
- Singh, D. R., Sunuwar, D. R., Shah, S. K., Sah, L. K., Karki, K., & Sah, R. K. (2021). Food insecurity during COVID-19 pandemic: A genuine concern for people from disadvantaged community and low-income families in Province 2 of Nepal. *PLoS ONE*, 16(July), 1–20. <https://doi.org/10.1371/journal.pone.0254954>
- Stampini, M., Londoño, D., Robles, M., & Ibarrarán, P. (2021). Effect of remittances on food security in Venezuelan households. *Inter-American Development Bank*, June.
- Suwardi. (2021). Indonesian food security during the Covid-19 pandemic Indonesian food security during the Covid-19 pandemic. *IOP Conference Series: Earth and Environmental Science*, 756 012037. <https://doi.org/10.1088/1755-1315/756/1/012037>
- Syafiq, A., Fikawati, S., & Gemily, S. C. (2022). Household food security during the COVID-19 pandemic in urban and semi-urban areas in Indonesia. *Journal of Health, Population, and Nutrition*, 41(1), 4.

<https://doi.org/10.1186/s41043-022-00285-y>

Tan, S. T., Tan, C. X., & Tan, S. S. (2022). Food security during the COVID-19 home confinement: A cross-sectional study focusing on adults in Malaysia. *Human Nutrition & Metabolism*, 27, 200142. <https://doi.org/10.1016/j.hnm.2022.200142>

Umaroh, R., & Pangaribowo, E. H. (2020). Determinants of rural household food security in Indonesia: The case of protein-based food consumption. *IOP Conference Series: Earth and Environmental Science*, 451(1). <https://doi.org/10.1088/1755-1315/451/1/012038>

World Bank. (2022). *Indonesia - high-frequency monitoring of COVID-19 impacts (HIFY), Rounds 1-6 2020-2021*. World Bank. <https://microdata.worldbank.org/index.php/catalog/3938>

World Food Program. (2020). WFP global update on COVID-19: November 2020. In *Wfp* (Issue November 2020).

Yulia, R., Syafiq, A., Pratomo, H., & Sulastri, N. E. (2021). The impact of Covid-19 pandemic on maternal and child health (MCH) services in Depok City. *Jurnal Ilmu Kesehatan Masyarakat*, 17(2 September), 87–95. <https://doi.org/10.4314/rejhs.v8i3.9>

Yumna, A., Arfyanto, H., Bima, L., & Bachtiar, P. P. (2020). *Jaring Pengaman Sosial Dalam Krisis Covid 19: Apa Yang Saat Ini Perlu Dilakukan Oleh Pemerintah?* (Issue 3). [www.smeru.or.id](http://www.smeru.or.id).