



NBC Working Paper¹

Analyzing the impacts of the coronavirus pandemic on Cambodian households: Evidence from panel data in 11 rural villages

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Abstract

This paper investigates the impact of the coronavirus pandemic on rural households in Cambodia. Using panel data from pre- and post-pandemic periods, we examine to what extent Cambodian households experienced declines in their income and expenditure related to this event, and also examine how the labor condition and financial condition changed before and after the pandemic. As a result, we find that ID Poor equity card holders experienced less reduction in their income and education expenses, and households with social capital (trust in the village chief) could mitigate the negative impacts on food expenditure, even though those households experienced a decline in gross income. The impact on working conditions depends on occupation. Specifically, garment workers were highly affected in terms of income and expenditure. We further found that there was no strong difference in the impact of the pandemic between female-headed and male-headed households, and between female and male workers. Rather, we show that the decline in income for female workers was smaller than for male workers.

Keyword: COVID-19, pandemic, household, microfinance, social security

1. Introduction

The COVID-19 pandemic has had unprecedented effects on economies around the world—poor, developing and developed alike. In 2020, global gross domestic product contracted by 2 percent year-on-year, affecting global and regional supply chains, businesses, business travel, tourism arrivals and a range of other economic activities. The pandemic reversed years-long efforts in the fight against global poverty, pushing millions of people back into poverty and vulnerability (Lakner et al. 2022). Global and country poverty rates are projected to increase, so is inequality.

The impact of this pandemic on Cambodia's economy affected almost all economic and export activities. The negative effects were further fueled by Cambodia's significant

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reliance on foreign markets for exports and its high degree of trade liberalization. The economy has particularly been impacted by domestic lockdowns, disruption of regional and global value chains and sluggish external demand. The pandemic has also had disproportionate effects on individuals, households, and firms, depending on the sector in which these entities work and operate. Women, low-skilled, and vulnerable workers are being impacted probably the hardest, bearing a lot more burden than men in several ways—one of which lies in the additional unpaid tasks of childcare and household chores. The Asian Development Bank (2015) reported that Cambodian women owned 65% of all private enterprises in Cambodia, and most of these businesses were highly informal. Thus, women might be susceptible to the risks of losing insecure jobs and lack of social protection during lockdowns and business disruptions. The previous studies also found that the coronavirus pandemic seems to increase the gender wage gap further, particularly in female-dominated sectors such as garments and textiles, and tourism and hospitality.²

In Cambodia, the spread of the coronavirus was moderate in 2020, but there was large-scale outbreak beginning from late February 2021. In that outbreak, the number of infections increased rapidly, and remained at high-level until October 2021. Cambodia's government has been quick and proactive in mitigating the shock, while facing challenges in the tight fiscal space environment. Specifically, the government has implemented a range of policy and program responses targeting both businesses and households. For instance, there were 12 rounds of supporting measures, including direct cash transfers to households, particularly those with IDPoor equity cards, and tax incentives to businesses, particularly to small and medium-sized firms in priority sectors and sub-sectors. Importantly, the government announced a new sub-decree on March 31, 2021, that provided provincial governments with broad authority to impose curfews as well as restrictions on some activities, and then Phnom Penh and some other provinces were put under curfew and other lockdown measures between April 2021 and May 2021. This shows that the impact of the corona pandemic was serious during this period in the case of Cambodia.

Our study evaluates the impact of the coronavirus pandemic on rural Cambodian households by using panel data of households from the pre-pandemic to the post-pandemic period. In addition, we also assess which types of households were seriously impacted by the corona pandemic crisis. The major challenge in the empirical studies is the limitation on data availability that would allow researchers to understand household living conditions both before and after the pandemic. Our study employs the panel data of 1183 households from 11 rural villages in 2020 collected by the Cambodia Development Resource Institute (CDRI), and our study additionally carried out two waves of phone surveys in July and November 2021 to track the identical (1183) household sample in the CDRI panel data. Using these panel data we estimate the impact of the corona pandemic crisis on household socio-economic conditions.

Globally, independent research institutes as well as government ministries and agencies have conducted numerous studies to better understand the impact of the COVID-19 pandemic on policy design and implementation (UNDP 2022; Bundervoet et al. 2021; Brodeur et al. 2021; Shimizutani and Yamada 2021). In many studies, the crisis has been shown to most severely hurt female, contingent, and low skilled workers engaged in social and non-flexible jobs, and is likely to have exacerbated income inequality in the short run. Using the multiple countries' harmonized household data, Bundervoet et al. (2021) analysed the short-term impact of the pandemic in developing countries and found that the pandemic

² In addition to existing challenges at home and with movement restrictions, women and girls are likely to encounter domestic abuse or violence and the possibility of sexual abuse and exploitation (UN 2020).

impacted low-income households who have limited means to mitigate the shock relatively more than the richer ones in low-income countries. In addition, they documented that most of the working-age adults of these households are likely to be employed in labour-intensive industries that were significantly impacted. The impact of the pandemic on the labour market is also similar in developed countries. Kikuchi et al. (2021) show that contingent workers in Japan have been affected more than regular workers, and younger workers more than older workers.

There are existing studies on the COVID-19 pandemic impact in Cambodia. Karamba et al (2021) investigated the impact of the pandemic on Cambodian households using high-frequency data from a phone survey. Eight waves of this phone survey were conducted from May 2020 to December 2021 targeting the households with ID Poor cards. Based on the survey results (until March 2021), the authors reported that the enrollment of children at school had declined overall, but returned to the level of the pre-pandemic period in March 2021. Using three waves of the household survey in December 2020, March 2021, and June 2021, Narith and Alissar (2022) estimated the impact of the government cash transfer program by comparing ID Poor card holders and non-ID Poor card holders, using a propensity score matching approach. They found that the government cash transfer program mitigated the virus's negative impact on income, expenditure, and also school enrollments.³

However, those prior studies in the context of Cambodia used data obtained after the pandemic started, and it should be pointed out that there is a scarcity of studies using panel data from the pre-pandemic and post-pandemic periods in Cambodia. In addition, the most serious domestic outbreak happened after April 2021 in Cambodia, and there has been a nation-wide economic halt after the lockdown announcement since then. The impact of the most serious domestic economic crisis was not fully investigated in the prior studies. Our study complements the prior studies, investigating the situation after the most severe outbreak in Cambodian households by using the panel data of both pre- and post-pandemic periods.

In our study, we found that the impact of the world-wide COVID-19 pandemic on Cambodian households was small in March 2020,⁴ so that the data of 2020 can be used as baseline for evaluating the long-term impact of the coronavirus pandemic in Cambodia using data from July and November 2021. We found that there was a decline in gross income and a decline in food expenditure by Cambodian households in July 2021, while the decline in total expenditure was not seriously pronounced. These negative impacts were not persistent. Even though there were negative impacts found in July 2021, these diminished in November 2021, suggesting that the Cambodian households had recovered from the shocks as the Cambodian economy went back to normal.

However, we found that there were some persistent impacts on some socio-economic variables for a certain group of households. For example, if households have a member working in the garment sector, they were likely to experience the decline in wage income and food consumption in July 2021, compared to households which did not have members working in the garment sector. Wage income recovered in this industry by November 2021, but there were still declines in food consumption at that time for those households with

³ Since Narith and Alissar (2022) use the data from the pandemic period, their identification of causal impact relies on propensity score matching. The possibility cannot be removed that their result might reflect the general difference between ID poor card holders and non-ID poor card holders, not the effect of COVID-19.

⁴ One of the reasons that our sample households were not severely affected in March 2020 could be that the pandemic first affected the exporting activities and tourism flows, while our sample households were all living in rural villages. In addition, as shown in the analysis of the Google Mobility Report in Section 2.2, the decline in the mobility started in late March in the case of Cambodia. Thus, the impact of the world-wide pandemic lagged in rural Cambodian households.

garment-worker members. Thus, even though most Cambodian households experienced positive economic recovery, there is still a need for some assistance particularly for certain types of households.

Furthermore, our empirical analysis provides evidence that households distant from large cities were less likely to experience the negative impact of the coronavirus pandemic. It is generally assumed that households in rural villages suffered serious damage, and the government cash transfer program mainly targeted rural households. However, our result casts doubt on whether the selection of households in the cash transfer program was optimal.

Our study is the first to use data of pre- and post-pandemic periods to investigate the impact of the unprecedented coronavirus pandemic in the context of Cambodia. Thus, our study provides an insightful analysis of what types of households were prone to the negative shocks during the pandemic-driven economic crisis, including the economic shut-down resulting from government non-pharmaceutical measures, such as lockdowns. We believe that the findings in this study could be useful in developing a design for social protection and the strategy to enhance the resilience of economic systems against a pandemic situation.

The rest of the paper is organized as follows: Section 2 includes an overview of the COVID-19 pandemic in Cambodia from 2020 to 2021, and also describes the government response to the resulting economic crisis. Section 3 describes the data used for our study and our empirical methodology. Section 4 provides the results of the empirical analysis, and we discuss the implications of the results of our estimation in Section 5. Section 6 concludes the paper.

2. Overview of COVID-19 pandemic in Cambodia

2.1 Spread of the coronavirus and government measures

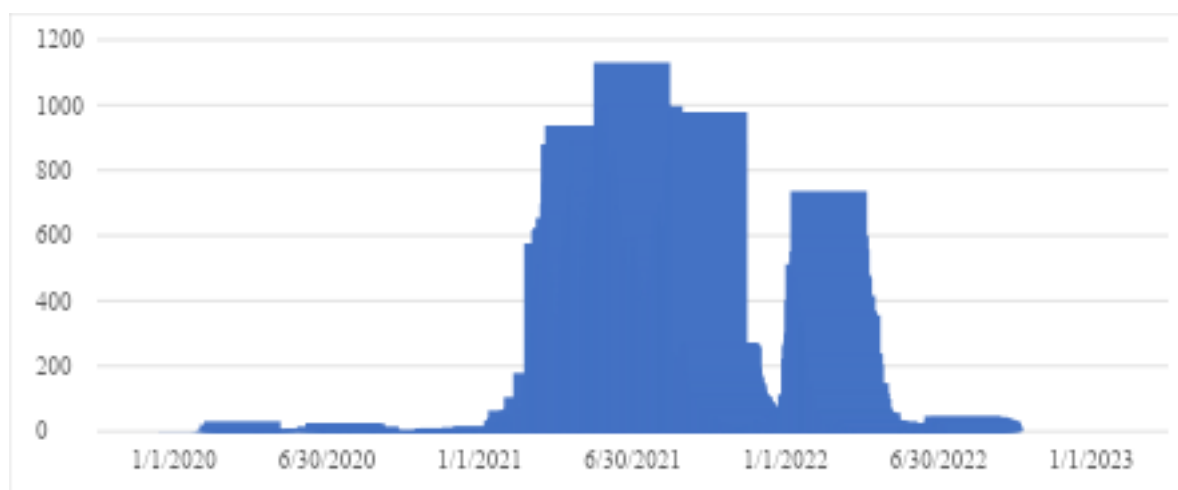
Cambodia has been considered as one of the successful countries in managing the spread of Covid-19. However, the country was affected by some waves of the outbreaks of Covid-19 following the events of 02 and 28 November 2020, and most severely on 20 February 2021, which led to the imposing of a curfew and the lockdown of the capital city and some provinces. For instance, on the 14th of April 2021, Prime Minister Hun Sen announced a two-week lockdown of Phnom Penh and Ta Khmau Town to take effect from 15th of April to 5th of May 2022. The second lockdown was imposed for 8 provinces along the border with Thailand and a night curfew in Phnom Penh from 29th July to 12th August 2021, which included Koh Kong, Pursat, Battambang, Pailin, Banteay Meanchey, Oddar Meanchey, Preah Vihear, and Siem Reap.

According to the Ministry of Health (MoH), Cambodia has had 137,581 confirmed cases of Covid-19 of which 134,373 have recovered and 3,056 died.⁵ Figure 1 shows the number of confirmed cases from 3rd January 2020 to 26th August 2022. The Covid-19 outbreaks, particularly during the lockdown had significant effects on the socio-economic state and health of the population. To mitigate the impact of Covid-19 on the poor and vulnerable sectors in the economy, the government introduced 10 rounds of Covid-19 relief measures with an out-turn amount of USD 824 million in 2020, USD 1,291 million in 2021, around USD 989 million in 2022, and plans to spend around USD 1,005 million in 2023,⁶ respectively. On October 5, 2022, the government announced that the supports provided to the Covid-19 effected families would continue at least until the end of 2022.

⁵ Ministry of Health, Press Release on the Covid-19 Situation in Cambodia, 29 August 2022.

⁶ Ministry of Economy and Finance.

Figure 1: Confirmed COVID-19 cases by date of report



Source: WHO (2022) “COVID-19 Joint WHO-MOH Situation Report 83.”

Note: As of September 30 2021, only RT-PCR test results are being reported in the case numbers.

This sub-section provides information about the brief supporting measures of the ten rounds of Covid-19 relief measures.⁷ The measures have been introduced to target priority and vulnerable sectors and citizens including tourism, the garment, textile, footwear and bag sector, aviation, and the transportation and logistics sector.

Tourism and aviation sector

The adopted measures are to maintain stability of businesses and livelihoods of workers and employees. The measures provided to help the most vulnerable sector, tourism and the airlines included: 1. providing tax exemptions on all types of monthly taxes payment for hotels, guesthouses, restaurants and travel agents that are registered with the General Department of Taxation and have business activities in Phnom Penh, Siem Reap, Sihanoukville, Kep, Kampot, Bavet and Poipet; 2. allowing the suspension of monthly contributions to the National Social Security Fund (NSSF) during the business shutdown; 3. Exempting the renewal fees for all types of tourism licenses for year 2021; 4. hotels and guesthouses in Siem Reap did not have to conduct a comprehensive audit in 2020; 5. offering skilling and upskilling training to those who lost jobs in the tourism sector, as well as a decent salary; and 6. offering a \$40 subsidy. Tourism businesses are encouraged to contribute voluntarily.

In addition to the mentioned measures, to help the airline sector the government extended minimum tax exemption to all the airline companies registered in Cambodia, postponed the payment of the civil aviation charge for 6 months, and allowed debt payment via settlement after the extension period.

Garment, textile, footwear and bag sector

⁷ The detail of each round of supporting measures is available upon request.

The government provided aid to suspended employees that serve in the garment, textile, footwear, travel goods, and bag sectors and are registered with the Ministry of Labour and Vocational Training (MLVT), the Ministry of Commerce (MOC), and the General Department of Taxation Cambodia (GDT). After factories, enterprises and businesses in the aforementioned sectors obtained a permit to suspend employment contracts and/or a permit to extend the suspension of the employment contract from the MLVT after meeting the criteria and conditions and matching the conditions applied in the previous round, the Royal Government of Cambodia: 1. provided subsidies of 40 USD per month to each suspended worker, while the owners of factories and enterprises in this sector are obligated to provide an additional USD 30 per month to each of those suspended workers (amounting to a total of USD 70 per month for each worker); 2. allowed the suspension of monthly contributions to the National Social Security Fund (NSSF) during the business suspension; and 3. helped the laid-off workers to find a new job and provided short course training with a monthly allowance of USD 120 for 6 months for selected workers.

Business financing measures

The government revised the special financing scheme of USD 50 million provided via the Agriculture and Rural Development Bank (ARDB) by expanding its scope and adjusting the following credit terms: 1. reduced interest rates for working capital from 6% to 5% and for investment capital from 6.5 percent to 5.5 percent free of charge; 2. increased the maximum loan period from 5 years to 7 years for investment capital while keeping the maximum loan period for 2 years for working capital; 3. continued to allow clients who received loans in this special program to use the loan for refinancing; 4. introduced flexible registration conditions, in which small and medium-sized enterprises that have not yet been officially registered can apply for a loan by completing the following registration conditions within one month after receiving the loan; 5. revised the requirements for small and medium enterprises that create more than 5 new job opportunities to encourage small and medium enterprises that obtained credits to strive to create new job opportunities; and 6. expanded the provision of loans in this project to small and medium enterprises (SME Cluster) by encouraging those that were interested to use the technical services of the Center (Khmer Entrepreneur) in order to qualify for the loans.

In addition, the government also revised the US \$ 100 million special co-financing program between small and medium enterprises and financial institutions by expanding its scope and coverage and adjusting credit terms as follows: 1. allowing loan restructuring of the loans in progress; 2. allowing clients who received loans in this special program to use the funds for refinancing; 3. providing flexible repayment by changing from monthly to quarterly or semi-annual repayments with intervals of not more than 12 months for principal and interest; 4. adjusting the loan period from 4 years to 7 years and allowing the financial institutions (PFIs) to do Self-Assessment on the loan period for working capital and investment loans; 5. expanding the scope of loans to enterprises in the medical equipment and medicine production sectors in addition to the priority sectors stated in Sub-decree No. 124 S.E., dated October 2, 2018, on “Tax Incentives for Small and Medium Enterprises in Priority Sectors;” and 6. revising the requirement for the small and medium enterprises that create more than 5 job opportunities to provide better general working conditions to encourage those who have obtained the loan to create new job opportunities.

Besides these actions, the Ministry and Economy and Finance (MEF) and the National Bank of Cambodia have jointly considered the possibility of relaxing and adjusting certain conditions applicable to the banking sector to increase liquidity in the banking system.

The Ministry of Economy and Finance established a USD 200 million credit guarantee fund. The fund is used as a loan guarantee via banks and microfinance institutions by using market principles to ease the cash flow and working capital pressures on businesses in all sectors that are worth at least USD2,000 million. The MEF had also reserved an additional 300 million in financing to support and act as a catalyst for growth in key sectors during and after the crisis. Additionally, the government has eased the implementation of the withholding tax on domestic and foreign lenders for the following types of loans.

For new loans: (1) a reduction in the withholding tax rate on loans from banks and microfinance institutions from both domestic and offshore sources to 5% (including those from both Double Taxation Agreements countries and non-DTA countries) for 2020 and 10% for 2021; (2) an adjustment in the withholding tax rate for banks and microfinance institute loans, from both domestic and offshore, to the normal level in accordance with the laws and regulations in force in 2022. For existing loans, (3) a reduction in the withholding tax rate on loans from banks and microfinance institutions from both domestic and offshore sources to 10% (including those from both Double Taxation Agreements countries and non-DTA countries) for 2020; and (4) adjustment in the withholding tax rate on banks and microfinance institutes loans, from both domestic and offshore to the normal level in accordance with the laws and regulations in force in 2021.

Social assistance measures

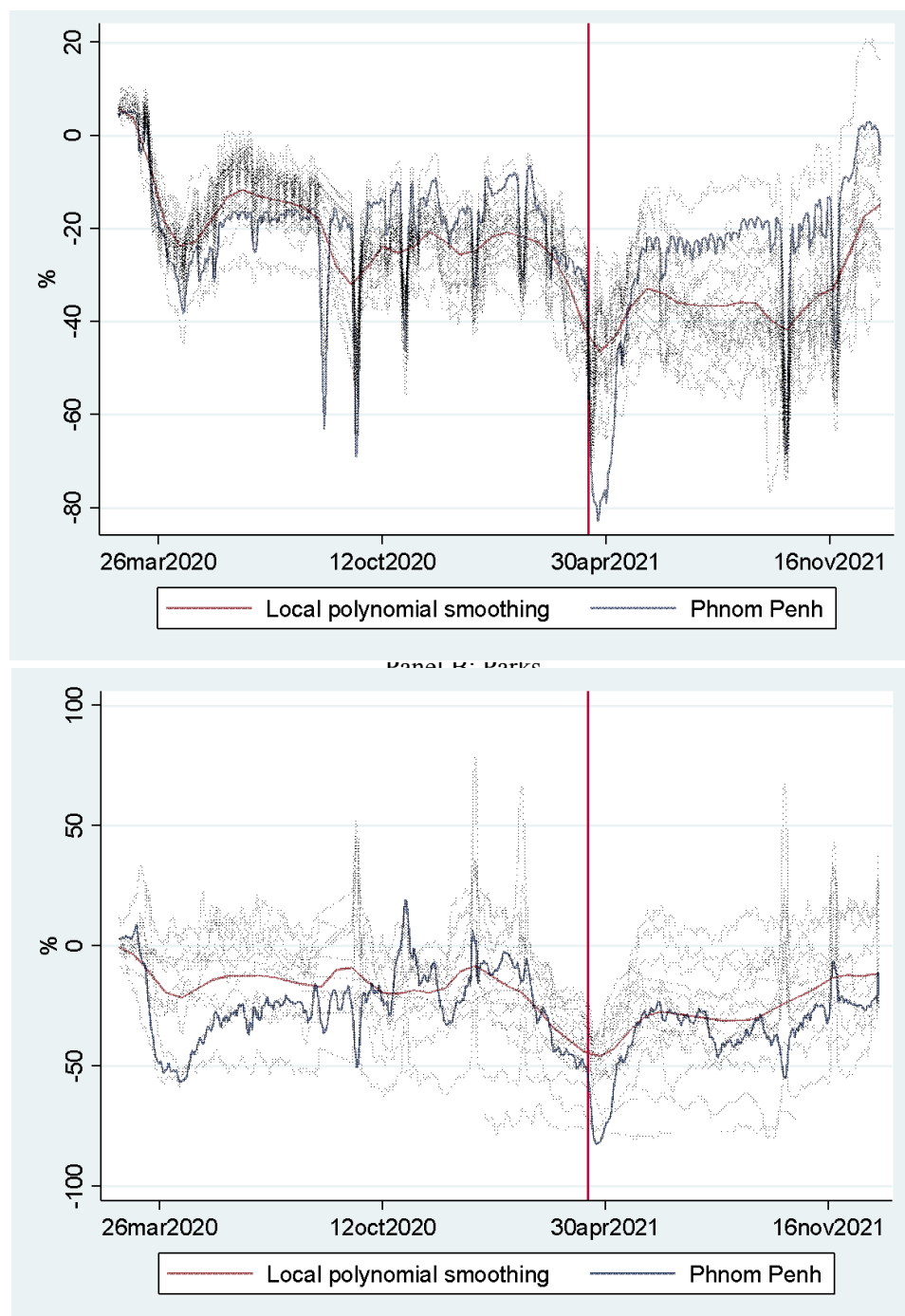
The government increased the budget for the “Cash for Work Program” for the year 2020 to USD 100 million to provide assistance to unemployed factory/enterprise workers and workers returning home from abroad, as well as to support the livelihoods of local people in general and to create socio-economic achievements through the implementation of small-scale physical infrastructure projects at the local level to promote agriculture and other sectors of the economy. With a commitment to continue to implement all existing social protection programs, the government launched in June 2020 a social assistance program to facilitate daily life during the Covid-19 crisis which was given to the families of the poor and vulnerable people with ID Poor cards throughout the country, and included extra care for children under 5, the disabled, the elderly over 60, and people living with the AIDS virus in those poor families as well.⁸

2.2 Mobility of local people

The “Google Community Mobility Reports” aggregate anonymous data from users’ mobile-device-location histories. They show how visits to, or length of stay at, different types of locations change over time compared to a baseline period. The reports have six locational categories: (i) retail and recreation, (ii) grocery and pharmacy, (iii) parks, beaches, etc., (iv) transit stations (subway, bus, train stations), (v) workplaces, and (vi) residential areas. Mobility

Figure 2. Changes of Mobility in Phnom Penh and Other Provinces
Panel A: Work places

⁸ For the detail, see Narith and Alissar (2022).



Source: Google Mobility Report.

data are the proxy for time spent in different locations, and do not allow one to determine the situational context of the contacts, which is needed to understand whether the spread of COVID-19 occurred in workplaces or other places (Brodeur et al. 2021). However, mobility data is still useful when trying to understand changes in people's behavior in the response to the announcement and implementation of social distancing measures by governments for example. Mobility data are available by provinces in Cambodia, while there are missing observations in some provinces. We show the changes of mobility in workplaces and parks, since those variables have fewer missing values than other variables in the province-level

analysis. In Figure 2, we calculated the 5-day moving average of workplaces (Panel

A) and parks (Panel B) for each province.

In the case of Cambodia, the mobility of people in workplaces and parks both dropped significantly twice: (1) after mid-March 2020, and (2) after the implementation of the lockdown measures on April 15. Compared to the first drop after mid-March 2020, the second drop after April 15 was on average severe, and the drop in mobility remained for a long period of time.

It is noteworthy that the decline of mobility started before the implementation of travel constraints in some provinces. In addition, it is also observed that the changes in mobility were different from province to province, suggesting that the impacts of social distancing measures and spread of coronavirus were different from province to province. The largest decline in mobility was observed in Phnom Penh, and the second largest decline was in Kandal. Shihanoukville experienced the third largest decline. In the border areas, such as Banteay Meanchey, Battambang, and Oddar Meanchey, the drop in mobility persisted for several months. For example, there was a significant drop on April 15 in Banteay Meanchey that remained at a low level and only went back to the previous level at the end of 2021. However, most provinces experienced a quick recovery in mobility. After one and half months, mobility was back to the previous level on average. This suggests that economic activity in Myanmar was gradually back to normal by June 2021.

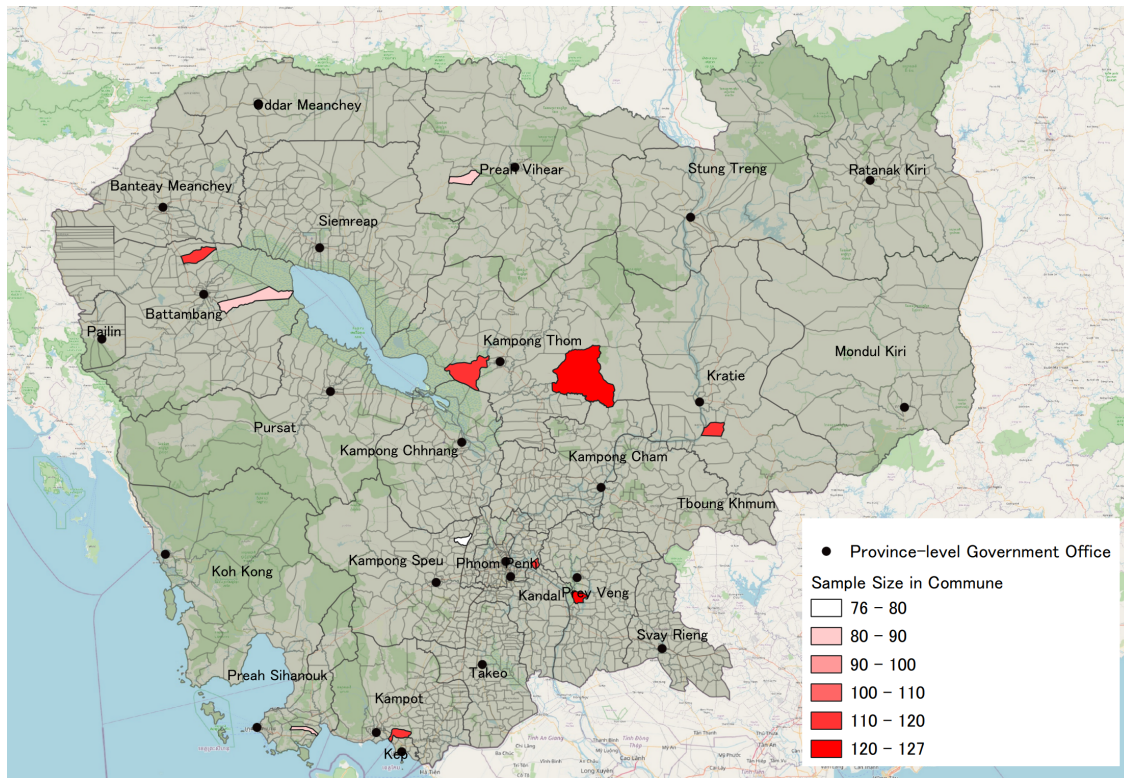
3. Data Description

One of the biggest challenges in the analysis of the impact of the coronavirus pandemic on Cambodian households is the lack of data to estimate the difference in household socio-economic variables between pre-pandemic and post-pandemic periods. To address this challenge, we employ CDRI data from 1,183 households collected in March 2020 as the pre-pandemic period. In addition, we collected additional household data through phone-based interviews in July and November 2021. By comparing the difference in household socio-economic variables between March 2020 and June and November 2021, we are able to examine the impact of the coronavirus pandemic on Cambodian households.

3.1 Household Interview and CDRI Panel Data

The CDRI has collected and maintained panel data on households in rural Cambodia. The work started in 1996-97 when CDRI conducted a benchmark survey of three villages. In 2002, the households in the three villages were re-surveyed in addition to 6 villages, totalling 9 villages in 9 provinces covering Phnom Penh, Mekong Plain, Tonle Sap, Plateau and Coastal areas. CDRI conducted the survey again in 2011 by adding households in 2 more villages, resulting in a total of 11 villages. In 2014, 2017, and 2020, CDRI conducted the survey to track the same households in the 11 villages. The survey locations are visualized in Figure 3.

Figure 3. Map of Survey Locations and Sample Sizes by Locations



In this research, we employ the CDRI panel data of March 2020 as the data of the pre-pandemic period. Table 1 highlights the population, number of households and sample households by village in the 2017 and 2020 survey. The proportion of the sample size in the data is about 5 percent of the total population in all target villages.

For the data of the post-pandemic period, the CDRI conducted an additional survey on the same household sample in July and December 2021. Due to the stringent measures of lockdown after April 2021, the survey was conducted on a phone basis. However, the attrition rates were moderate in the survey. Table 2 provides each sample size of four waves by villages. The attrition rate between rounds is within an acceptable range—less than 10% of the total sample size. For each of the waves, we replaced drop-out households for a new household sample to keep the sample size of 1,183 households the same in each round.

Table 1: Sample distribution for the 2020 survey

	Population in the commune	Number of households	Sample households
Tonle Sap			
Andong Trach Commune	1,564	247	85
Tuol Krasaing Commune	1,548	341	120
Khsach Chiros Commune	2,319	510	120
Mekong Plain			
Prek Khmeng Commune	2,414	562	120
Babaong Commune	2,882	594	127
Plateau			
Kanhchor Commune	1,816	390	120
Dang Kdar Commune	2,905	644	125
Trapeang Prey Commune	572	115	76

Bos Commune			85
Coastal			
Kompong Thnaot Commune	2,757	525	120
Prey Nobmuy Commune	1,594	373	85
Total	22,013	4,690	1,183

Source: Author's calculations.

3.4 Data Description of Cambodian Household Socio-Economic Variables

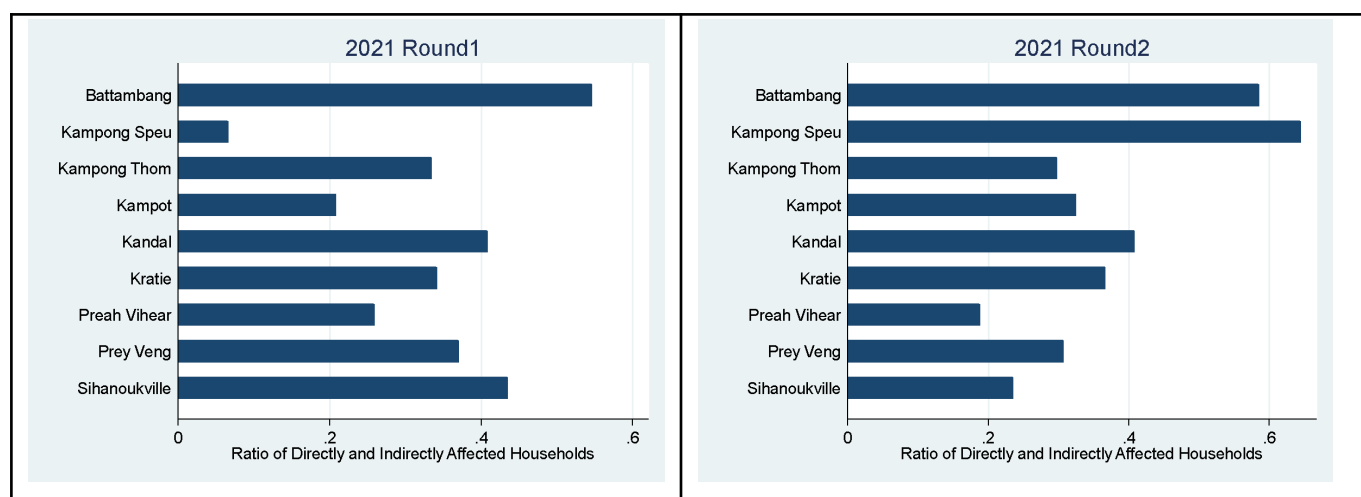
We present the household perception about the impact of the coronavirus pandemic. The coronavirus pandemic could directly impact the household welfare through the infection, but also could indirectly impact household through the changes in regional economic situations by the lockdown. In Figure 4, we present the proportion of the households who answered as they were affected by the corona pandemic directly and indirectly. In the first round of the survey in 2021 (in July), we found that the proportion of the households were different from province to province. In Battambang, the rate of answering “yes” was highest among the sample households, while it was the lowest in Kampong Speu. However, in the second round of the survey in 2021, the rate of answering “yes” increased to about 70% of the sample households in Kampong Speu. It suggests that there might be a time difference in the impact of the pandemic.

Table 2: Sample size of panel data, and attrition rate

	March 2017	March 2020	2021		Balanced panel (base = 2020)	Attrition (%)
			Round 1 (July)	Round 2 (November)		
Tonle Sap						
Andong Trach	85	85	85	85	83	2.4
Tuol Krasaing	120	120	120	120	111	7.5
Khsach Chiros	120	120	120	120	116	3.3
Mekong Plain						
Prek Khmeng	120	120	120	120	113	5.8
Babaong	127	127	127	127	123	3.1
Plateau						
Kanhchor	120	120	120	120	110	8.3
Dang Kdar	125	125	125	125	123	1.6
Trapeang Prey	76	76	76	76	75	1.3
Bos	85	85	85	85	85	0.0
Coastal						
Kompong Thnaot	120	120	120	120	117	2.5
Prey Nub Mouy	85	85	85	85	80	5.9
Total	1,183	1,183	1,183	1,183	1,136	4.0

Source: Author's calculations.

Figure 4: Proportion of Households which are affected by Coronavirus Pandemic



Source: Author's calculations.

The more specific answers about the impacts of the coronavirus pandemic are presented in Table 3. The most frequent answer was “income declined” and “household members lost their job,” suggesting that the coronavirus pandemic affected the incomes of Cambodian households. There also seemed to be a negative impact on the expenditure sides of households, while the directions of the impact were different from household to household. Some households answered as “daily expenses decreased,” while others answered as “daily expenses increased.” The number of infection cases in our household sample seems to be small, as only 23 households answered “members were infected by the coronavirus” in Round 1, and it was 22 in Round 2.

Table 3: How were households affected by coronavirus pandemic?

	Round 1	Round 2
Household member was infected by the corona	23	22
Income decreased	333	341
Household member lost jobs	61	39
Own business went bankrupt	5	6
There were emergency expenses for health care	2	3
Daily expenses increased	33	53
Daily expenses decreased	36	19
Family member is in quarantine	1	35
Afraid to go outside and feeling stress	1	10
	495	528

Source: Author's calculations.

In Table 4, we further investigate how households coped with the negative impact of the coronavirus pandemic. In Round 1, most households answered that they coped with the negative impact by reducing consumption. In Round 2, the reduction of consumption is one of the most common answers, while there were increases in the answers of “spent saving” and “got help from relatives and friends.” This suggests that the reduction of consumption is not a sustainable strategy, and some households faced the need to raise consumption to the previous level in the long term.

Even though no household explicitly answered that they sold land due to the coronavirus crisis, 18 of the sample households sold land between August and November 2021, according to the data of Round 2. The reasons for selling land are different from household to household. The most common reason was for debt repayment.

In the CDRI survey of 2021R1 and 2021R2, we asked a question about whether households received the cash transfer from June 2020 to July 2021, and from August 2021 to November 2021. Since June 2020, the Cambodian government implemented a cash transfer program for households which had IDPoor equity card holders (Narith and Alisser 2022; World Bank 2022). From when the program started, the eligible households received the cash transfer on a monthly basis until December 2022. According to the World Bank (2022), each eligible household received 80,000KHR-120,000KHR depending on their location in rural or urban areas, and received an additional allocation ranging from 16,000KHR to 52,000KHR for each household member. The eligible household can further receive additional allocation for each less-than-5-year-old member, more-than-60-year-old member, disabled member, and member with HIV/AIDS.

Table 4: How did affected households cope with negative shocks from the coronavirus pandemic?

	Round 1	Round 2
Spent savings	106	141
Reduced consumption	185	114
Borrowed money (including gold)	54	47
Sold cattle	9	4
Sold transport, farm or household equipment	4	1
Rented out land	1	2
Sold residential land/house	0	0
Sold agricultural land	0	0
Got help from relatives/friends	58	103
Got help from NGOs	3	1
Household member(s) migrated to look for jobs	10	8
Placed children in labour service	3	1
Delayed loan payment	9	2
Participated in the government cash transfer programs	93	59
Participated in food-for-work or cash-for-work programs	3	1
Received government's in-kind assistance	9	3
Others	2	0
Received assistance from religious communities (pagoda/mosque)	3	2
Selling chickens	1	3

Source: Author's calculations.

We present the summary of answers about the government cash transfer in Table 5. We found that 95% of the ID Poor card holders had received the cash transfer. This finding is consistent with Narith and Alisser (2022), who reported that some households did not receive it, even though all the IDPoor equity card holders were eligible. Karamaba et al (2021) reported that 5 to 10% of eligible households did not receive the cash transfer as of March 2021. We further found that the rate of households receiving the cash transfer decreased to about 80% in the period of August-November 2021. This finding suggests that there might have been a problem in information transmission to the eligible households in late 2021, and households needed to be encouraged to receive cash transfers until the program ends.

We found that the average monthly amount of the cash transfer was 137,500KHR-177,500KHR during the coronavirus pandemic. Karamaba et al (2021) reported that Cambodian households had received cash transfers a maximum of 9 times by March 2021, and the average monthly amount was 45USD (about 180,000KHR) per household. Given that the sample in our survey is of households in rural regions, the answers about the government cash transfer in our survey are consistently wild (Karamaba et al 2021).

Table 5: HHs receiving government cash transfers

	2021R1	2021R2
Number of HHs with ID poor which received cash transfer	343	315
Number of HHs without ID poor which received cash transfer	0	1
Total Number of HHs with ID Poor	360	342
Average Amount of Cash Transfer per Month (Moeun Riels)	13.75	17.25

Source: Author's calculations

Taking advantage of the panel data study, we empirically demonstrate how the economic situation of the households changed between the pre-pandemic period and the post-pandemic period. However, there is a caveat that the difference between the surveys of different periods might also reflect the changes in the survey methodology from a face-to-face interview to a phone-based interview, not just the impact of coronavirus pandemic.

In Table 6, we present the sample average of household socio-economic variables for each period. At the beginning of 2020, the coronavirus pandemic already started being severe in China, and it stopped the trade and tourist flows between China and the rest of the world. However, there is no significant negative changes in most Cambodian household socio-economic variables between March 2017 and March 2020. This suggests that the impact of the stoppages in China's trades and tourist flows was small initially for Cambodian households.

Table 6: The changes in socio-democratic characteristics of the Cambodian households

	Mar-17	Mar-20	Jul-21	Nov-21
Total Expense (Moeun Riel)	N/A	208.5	204.5	215.9
Food Expenses (Moeun Riel)	70.1	56.5	49.3	45.9
Own Consumption (Moeun Riel)	29.8	15.7	17.9	18.7
Non Food Expense (Moeun Riel)	N/A	152.0	155.3	170.0
Education Expenses (Moeun Riel)	6.5	14.9	2.2	2.1
Health Care Expense	7.6	13.2	7.9	11.1
Ceremony Expenses	12.3	61.73	4.96	5.34
Gross Income (excluding Agricultural Income)	269.6	421.2	341.8	390.4
Income from Migrants (Moeun Riel)	144.5	223.3	175.7	209.5
Sales of Livestocks and Vegetables (Moeun Riel)	57.0	68.8	71.3	47.2
Wage Income (Moeun Riel)	36.7	70.5	56.4	67.5
Charity Income (Moeun Riel)	5.5	6.1	8.1	8.7
Government Support (Moeun Riel)	N/A	N/A	4.0	4.6
Agricultural Production (Moeun Riel)	69.3	84.7	72.9	31.6
Work Hour within 1 week (Per family member)	16.3	18.2	15.1	16.7
Work Days within 1 month	36.5	33.1	28.6	32.8
Seeking Work within 1 month	7%	5%	11%	7%
New Loans (Took out loans in past 3month)	25%	21%	26%	20%
New Loans from Informal Sources (Took out loans in past 3month)	11%	3%	7%	5%
Hardship (Difficulty in buying foods)	N/A	N/A	19%	16%

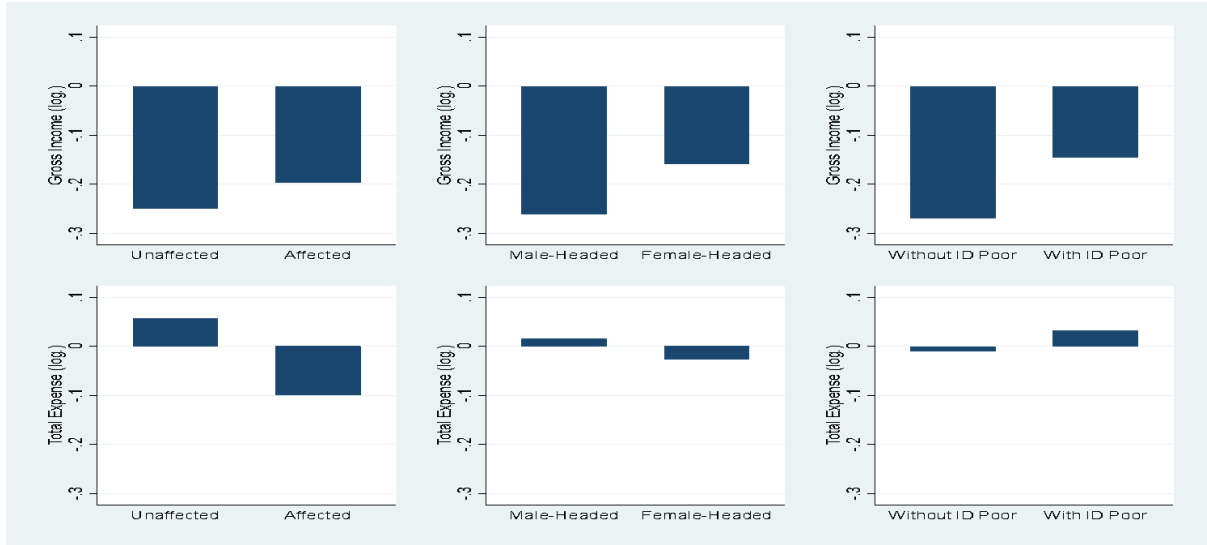
Note: We calculated the sample average of 1183 households.

Source: Author's calculations

We found that there were negative changes in the socio-economic variables between March 2020 and July 2021. Food expenses declined significantly after the coronavirus pandemic period, while home grown food consumption increased significantly. In fact, during the lockdown, there was difficulty in selling and purchasing foods in the markets. Finally, we also found that there was a decrease in agricultural production between July 2021 and November 2021. While seasonality could explain this decline, the decreases in agricultural production in this period might be also due to the decline in the market price of food.

Next, we divided the household sample by their characteristics. Figure 5 shows the log difference between March 2020 and July 2021. Interestingly, the IDPoor equity card holders experienced small decreases in gross income, and large increases in total expenditure, compared to the non-IDPoor equity card holders. The finding is similar to Narith and Alissar (2022) and might support their argument as the government cash transfer programs helped ID Poor equity card holders escape the negative impact shocks during the pandemic period.

Figure 5: Changes by household characteristics



Source: Author's calculations

4. Empirical Analysis on the Factors of Corona Pandemic Impact

4.1 Methodologies

Using the data introduced in previous section, we investigate which household factors are associated to the impact of coronavirus pandemic. The focus of our analysis is on identifying the factors that mediate the impact of the pandemic on households. We employ the fixed-effect difference-in-differences approach using the following specification

$$y_{it} = \alpha + \beta X_i * I(t \geq 1) + \delta W_{it} + v_i + \mu_t + e_{it} \quad (1)$$

where y_{it} represents the household i 's socio-economic variables, such as income and expenditure at time t . In the estimation, we set time t equal to 0 for the sample in March 2020, equal to 1 for the sample in July 2021, and equal to 2 for the sample in November 2021. In the estimation, we include the time-invariant household characteristics X_i and time-variant household and village characteristics W_{it} . In the estimation, we include the interaction terms of household's characteristics and the after-coronavirus-pandemic dummy ($\beta X_i * I(t \geq 1)$).

We assume that difference in outcome between base period and the post-corona periods capture the overall impact of corona pandemic. Thus, the β captures the difference in the corona pandemic impact across households. Particularly, our study has interest in whether there is difference in terms of the gender of household head, accessibility to government support (possession of ID Poor card), financial accessibility, social capital, gender difference, and job occupation. For the gender of household head, we include female-headed dummy. For the accessibility to government support, we include dummy for households with a ID poor card. As shown in previous subsection, most of the households with a IDPoor equity card accessed to the government support during the corona pandemic period. Thus, the dummy of IDPoor households captures whether the government cash transfer program works

as safety net in response to the pandemic-related economic downturn.

Table 6: Definition of variables used for estimation

	Mar-17	Mar-20	Jul-21	Nov-21
Total Expense (Moeun Riel)	N/A	208.5	204.5	215.9
Food Expenses (Moeun Riel)	70.1	56.5	49.3	45.9
Own Consumption (Moeun Riel)	29.8	15.7	17.9	18.7
Non Food Expense (Moeun Riel)	N/A	152.0	155.3	170.0
Education Expenses (Moeun Riel)	6.5	14.9	2.2	2.1
Health Care Expense	7.6	13.2	7.9	11.1
Ceremony Expenses	12.3	61.73	4.96	5.34
Gross Income (excluding Agricultural Income)	269.6	421.2	341.8	390.4
Income from Migrants (Moeun Riel)	144.5	223.3	175.7	209.5
Sales of Livestocks and Vegetables (Moeun Riel)	57.0	68.8	71.3	47.2
Wage Income (Moeun Riel)	36.7	70.5	56.4	67.5
Charity Income (Moeun Riel)	5.5	6.1	8.1	8.7
Government Support (Moeun Riel)	N/A	N/A	4.0	4.6
Agricultural Production (Moeun Riel)	69.3	84.7	72.9	31.6
Work Hour within 1 week (Per family member)	16.3	18.2	15.1	16.7
Work Days within 1 month	36.5	33.1	28.6	32.8
Seeking Work within 1 month	7%	5%	11%	7%
New Loans (Took out loans in past 3month)	25%	21%	26%	20%
New Loans from Informal Sources (Took out loans in past 3month)	11%	3%	7%	5%
Hardship (Difficulty in buying foods)	N/A	N/A	19%	16%

Note: We calculated the sample average of 1183 households.

For accessibility to finance, we include the distance from the nearest financial institution. The variable captures the distance from the city center to the nearest financial institution in kilometers. In the case financial institutions are in the village, the variable takes zero. In the survey, this information is collected through the interview with village chief. We employ availability of financial infrastructure as the proxy of financial accessibility, rather than current debt condition. Some households do not always have loans even though they are able to access to the financial institutions. Thus, using dummy of having debt could cause misleading results. In this study, we use the proximity of households to financial infrastructure.

For household occupation, we set a migration dummy variable to take one for the household with at least one member migrating in March 2020, and otherwise take the value zero. For occupation we also set dummy variables for households with at least one member working as small shop seller, and a dummy of having a member at garment sector in March 2020, respectively.

An assumption of the above models is that they have internally valid estimates is that nothing affects the outcome variables other than the COVID-19-related incidence during the

observed periods that was mainly the disruption of economic activities. While we can reasonably say this with the proposed data, one thing that we need to account for is seasonality across survey cycles. Households, for instance, might be forced to diversify income sources in response to the reduced income due to the pandemic. They, nonetheless, could have done that had the pandemic not happened, as this might be attributable to the seasonality of agricultural and non-agricultural activities. We have in the data the advantage of surveying households during the post-harvest season in most, if not all, sample villages. Thus, we do not expect significant changes to household consumption or income across survey periods due to seasonality.

In the CDRI panel data, some variables related to labor condition and income are available at household-level. We take advantage of this feature of our datasets, and extend our analysis for the household's member level as follow.

$$y_{jit} = \alpha + \beta X_{ji} * I(t \geq 1) + \delta W_{jit} + v_i + \mu_t + e_{jit} \quad (2)$$

where y_{jit} represents the labor outcome of household member j in the household i . By extending the model to capture the variables of individual household members, we examine the difference in impacts across gender, age and education levels. In the regression, we also control the household fixed-effect, and use cluster-robust standard errors at village level.

4.2 Estimation Results of the Mediating Impact of Corona Pandemic

We present the estimation results on several household income sources, expenditure items, and labor and financial outcome in Table 7. In addition, we present the results of the estimation for the labor outcome at household member levels in Table 8. In these estimations the cluster-robust standard deviations at village-level are calculated.

For the dummy of ID Poor, we found that there was a positive and statistically significant association with changes in gross income (Table 7). The estimated coefficient was 0.202, meaning that the IDPoor households mitigated the decline in income by 20.2% compared to non-IDPoor households. In addition, the dummy for IDPoor households was also positively associated with own food consumption income (Table 7), while it was negatively associated with sales of livestock (Table 7). Furthermore, in Table 8, we show that working hours are statistically lower for people from IDPoor households. Those results seem to suggest that the IDPoor households successfully mitigated the damage on income and food consumption during the pandemic, even though their working times decreased during the pandemic. In the meantime, the non-IDPoor households might be urged to sell livestock due to the shocks of the pandemic.

For the female-headed household dummy, we found that there were insignificant results about the gender difference in the impacts on most of the outcome variables. However, the female-headed dummy was positively associated (statistically significant) with the dummy of taking out a new loan (Table 6). Regarding gender difference, in the household-member-level analysis, we found that the female dummy is not significantly associated with the job seeking dummy and working times, while the female dummy was positively associated with income after the coronavirus pandemic, suggesting that the reduction in income was smaller for women than for men. Furthermore, the female-headed

dummy was positively associated with the dummy of having income. This suggests that the impact of coronavirus pandemic is rather less pronounced for female member and female-headed households.

Regarding social capital, we did not find a strong statistical significance in most of the outcome variable results. We only found that the dummy of trusting a village chief is negatively associated with migration income, and with the dummy of seeking a job, at 10% statistical significance.

Table 7: Estimation of the Factors in Impact of Corona Pandemic (on Income Side)

	Gross Income (log)	Agricultural Production (log)	Sales of Livestock (log)	Migration Income (log)	Wage Income (log)	Charity Income (log)	Total Expenditure (log)	Food Expense (log)	Own Consumption (log)	Non-Food Consumption (log)	Education Expense (log)	Health Care Expense	Work Days (log)	Work Hour (log)	Seeking a Job	New Loan	New informal loan
After Corona X ID Poor Card	0.202* (0.088)	0.455*** (0.108)	0.116 (0.104)	-0.151 (0.135)	-0.082 (0.179)	-0.233 (0.176)	0.011 (0.060)	0.011 (0.057)	0.267*** (0.059)	0.060 (0.092)	0.243** (0.082)	-0.007 (0.147)	0.200 (0.187)	0.210 (0.201)	0.013 (0.033)	-0.014 (0.030)	0.012 (0.028)
After Corona X Female Head Dummy	0.082 (0.084)	0.187** (0.076)	0.183 (0.169)	0.097 (0.167)	-0.003 (0.180)	-0.054 (0.114)	0.002 (0.036)	0.020 (0.039)	-0.001 (0.077)	0.003 (0.064)	0.074 (0.102)	0.012 (0.075)	-0.005 (0.071)	-0.030 (0.090)	0.001 (0.031)	0.074** (0.023)	-0.002 (0.015)
After Corona X Village Chief Trust	-0.099 (0.073)	-0.026 (0.142)	-0.006 (0.170)	-0.322* (0.169)	-0.002 (0.198)	-0.026 (0.165)	0.069 (0.079)	0.110 (0.073)	-0.178 (0.144)	0.049 (0.082)	0.244 (0.151)	0.160 (0.156)	-0.027 (0.080)	-0.037 (0.082)	-0.046* (0.021)	-0.021 (0.037)	-0.002 (0.030)
After Corona X Distance from FI	0.019*** (0.004)	0.003 (0.008)	0.040*** (0.009)	0.027* (0.013)	0.022** (0.007)	0.004 (0.016)	0.013* (0.006)	0.010 (0.010)	0.032** (0.011)	0.015*** (0.004)	0.025*** (0.005)	0.010 (0.009)	-0.001 (0.010)	-0.007 (0.011)	-0.009*** (0.002)	0.003*** (0.001)	0.000 (0.001)
After Corona X Having a Migrated HH Men	-0.029 (0.040)	-0.047 (0.097)	-0.067 (0.121)	-0.946*** (0.177)	0.168 (0.143)	0.234 (0.140)	-0.061* (0.029)	0.033 (0.042)	0.004 (0.101)	-0.087 (0.050)	0.020 (0.082)	0.115 (0.087)	0.042 (0.077)	0.075 (0.091)	0.036 (0.027)	-0.081** (0.030)	-0.007 (0.015)
After Corona X Garment Worker	0.003 (0.085)	-0.181 (0.177)	0.302 (0.186)	0.137 (0.312)	-0.559* (0.268)	-0.140 (0.223)	-0.115 (0.075)	-0.352*** (0.072)	-0.160 (0.101)	0.030 (0.069)	0.085 (0.194)	0.275 (0.173)	0.266*** (0.058)	0.287*** (0.059)	0.002 (0.022)	-0.045 (0.047)	0.006 (0.033)
After Corona X Small Shop Seller	-0.103 (0.056)	0.077 (0.108)	0.142 (0.126)	-0.911** (0.280)	0.629** (0.267)	-0.154 (0.091)	-0.072 (0.048)	-0.016 (0.050)	0.177* (0.092)	-0.103* (0.045)	-0.166 (0.106)	-0.079 (0.083)	-0.039 (0.076)	-0.099 (0.085)	-0.026 (0.020)	-0.026 (0.033)	-0.012 (0.012)
After Corona X Farming Times	-0.060* (0.029)	-0.229*** (0.065)	-0.210*** (0.060)	0.037 (0.061)	-0.024 (0.039)	-0.041 (0.026)	0.002 (0.010)	-0.012 (0.017)	0.021 (0.030)	-0.002 (0.014)	0.016 (0.045)	0.013 (0.031)	-0.007 (0.033)	-0.001 (0.035)	0.007** (0.003)	0.030** (0.009)	0.003 (0.004)
After Corona Dummy	-0.325*** (0.086)	-0.578** (0.218)	-0.573*** (0.119)	0.084 (0.445)	-0.397 (0.236)	0.174 (0.218)	-0.124 (0.160)	-0.301* (0.152)	-0.057 (0.130)	-0.061 (0.149)	-1.657*** (0.236)	-0.636*** (0.188)	-0.284*** (0.077)	-0.191* (0.090)	0.147*** (0.032)	-0.016 (0.045)	0.036 (0.032)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HH Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared Adjusted	0.130	0.149	0.079	0.078	0.069	0.014	0.045	0.102	0.069	0.038	0.384	0.042	0.037	0.028	0.020	0.016	0.011
R-Squared	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211	3211
Average of Outcome Variables																	
Before (2020)	5.408	2.542	2.190	2.537	2.350	0.766	4.858	3.904	2.595	4.365	1.448	1.627	2.357	2.800	0.057	0.229	0.050
After (2021R1 & 2021R2)	5.265	1.605	1.622	2.049	2.530	0.884	4.893	3.611	2.534	4.485	0.603	1.507	2.234	2.696	0.088	0.229	0.059

Note: ***, **, and * represent the significance level at 1%, 5%, and 10%, respectively. After Corona represents a dummy variable taking the value one for the sample of 2021R1 and 2021R2.

Table 8: Regression of labor outcome at HH member level

	Seeking a Job (Dummy)	Work Hour (log)	Work Days (log)	Income (log)	Having Income (Dummy)
After Corona X Female Dummy	0.001 (0.006)	-0.015 (0.054)	0.047 (0.043)	0.277** (0.099)	0.017 (0.021)
After Corona X HH Head Dummy	0.007 (0.008)	-0.083* (0.038)	0.003 (0.051)	-0.015 (0.117)	-0.035 (0.022)
After Corona X Age (log)	-0.011 (0.013)	0.060 (0.070)	-0.015 (0.091)	-0.183 (0.180)	-0.054* (0.026)
After Corona X School Year	-0.000 (0.001)	-0.001 (0.003)	-0.000 (0.001)	-0.004 (0.003)	0.001 (0.001)
After Corona X Farming Times	0.003* (0.001)	-0.014 (0.032)	-0.033 (0.033)	0.032 (0.026)	0.001 (0.007)
After Corona X Garment Worker	-0.005 (0.009)	0.011 (0.071)	0.059 (0.070)	-0.160 (0.112)	-0.167** (0.056)
After Corona X Small Shop Seller	-0.003 (0.008)	-0.084 (0.076)	-0.074 (0.106)	-0.175 (0.103)	-0.169*** (0.031)
After Corona X ID Poor Card	-0.002 (0.016)	-0.154** (0.060)	-0.125** (0.047)	-0.040 (0.065)	-0.004 (0.040)
After Corona X Female Head Dummy	0.006 (0.012)	0.035 (0.047)	0.044 (0.035)	0.009 (0.101)	0.033** (0.013)
After Corona X Village Chief Trust	-0.004 (0.014)	0.037 (0.075)	0.028 (0.093)	-0.005 (0.145)	0.006 (0.014)
After Corona X Distance from FI	-0.003** (0.001)	-0.004 (0.007)	0.005 (0.007)	0.012** (0.005)	0.001 (0.002)
After Corona Dummy	0.080 (0.048)	-0.133 (0.254)	-0.052 (0.300)	0.433 (0.518)	0.113 (0.091)
Work Hour (log)				0.376*** (0.066)	
HH Fixed-Effect	Yes	Yes	Yes	Yes	Yes
Other Household Control	Yes	Yes	Yes	Yes	Yes
R-Squared Adjusted	0.095	0.322	0.456	0.600	0.275
Observations	9358	4975	4976	4721	9358
Average of Outcome Variables					
Before (2020)	0.015	3.574	3.037	3.904	0.423
After (2021R1 & 2021R2)	0.026	3.578	2.935	3.799	0.380

Note: ***, **, and * represent the significance level at 1%, 5%, and 10%, respectively. After Corona represents a dummy variable taking the value one for the sample of 2021R1 and 2021R2.

We found that distance from financial institutions is positively associated with gross income, total expenditure, own food consumption, non-food expenses, and also education expenses (Table 7). The results suggest that those households distant from the financial institutions were less affected by the coronavirus pandemic than households near the financial institutions. In addition, we found that distance from financial institutions is negatively associated with the dummy of seeking a job and is positively associated with income (Table 8). The household-member-level analysis also suggests that the negative shocks on labor conditions are smaller for households distant from financial institutions.

4.3 Dynamics in the impact of coronavirus pandemic

We further investigate the dynamic effect of coronavirus pandemic. As shown in Table 6, we observed a recovery from the negative shocks in some variables on average in 2021R2. And in Figure 4, we found that the timing of perception of impact pf coronavirus pandemic were different from province to province. In this subsection, we attempt to examine the dynamic aspect of the coronavirus pandemic impacts using the following specification.

$$y_{it} = \alpha + \beta_1 X_i * I(t = 1) + \beta_2 X_i * I(t = 2) + \delta W_{it} + v_i + \mu_t + e_{it} \quad (4)$$

where y_{it} represents the outcome variables of household i in the period t . We extend Equation to the event-study DID approach. β_1 and β_2 capture the mediate effect of coronavirus pandemic through the household time-invariant characteristics X_i . Again, we include the time-variant household characteristics W_{it} , and unobservable household fixed effect in the model. We estimate the model using fixed-effect estimation and use the cluster-robust standard errors at village-level. The results of the estimation using household-level sample are presented in Table 9, 10, and 11. In addition, the results of estimation using household-member-level sample are presented in Table 12.

In the estimation results there were both temporal and persistent impacts of the coronavirus pandemic, depending on outcome variables. In particular, we found that the garment worker dummy was negatively associated with wage income in 2021R1, but the correlation had become small by 2021R2. This means that the garment workers experienced negative shocks in income through the reduction in wage income, while the negative shocks were temporal. However, the garment worker dummy was negatively associated with food expenses and own food consumption, and those negative correlations with food consumption were still pronounced and statistically significant in 2021R2.

Regarding social capital, we found that the dummy of trusting a village chief was negatively associated with gross income and migration income in 2021R1, while it was positively associated with food expenses in 2021R1. This seems to suggest that social capital works to mitigate the negative shocks of the decline of income on food consumption for rural households. The dummy of trusting a village chief is further positively associated with a new

Table 9: Estimation of factors of corona pandemic impact (Income Sources)

	Gross Income (log)	Agricultural Production (log)	Sales of Livestock (log)	Migration Income (log)	Wage Income (log)	Charity Income (log)
After Corona R1 X ID Poor Card	0.166** (0.070)	0.149 (0.100)	-0.077 (0.077)	-0.124 (0.130)	-0.024 (0.204)	-0.072 (0.184)
After Corona R2 X ID Poor Card	0.250* (0.134)	0.774*** (0.152)	0.326* (0.143)	-0.196 (0.203)	-0.152 (0.197)	-0.398* (0.185)
After Corona R1 X Female Head Dummy	0.087 (0.069)	0.028 (0.073)	0.074 (0.176)	0.055 (0.198)	-0.020 (0.218)	-0.109 (0.116)
After Corona R2 X Female Head Dummy	0.073 (0.130)	0.351** (0.123)	0.277 (0.195)	0.144 (0.174)	0.017 (0.185)	-0.009 (0.140)
After Corona R1 X Village Chief Trust	-0.146* (0.068)	0.140 (0.127)	-0.166 (0.133)	-0.367* (0.177)	-0.032 (0.206)	-0.221 (0.182)
After Corona R2 X Village Chief Trust	-0.032 (0.110)	-0.310 (0.194)	0.320 (0.397)	-0.244 (0.310)	0.048 (0.244)	0.352* (0.168)
After Corona R1 X Distance from FI	0.026*** (0.006)	0.022** (0.007)	0.058*** (0.009)	0.040*** (0.011)	0.018 (0.012)	-0.015 (0.031)
After Corona R2 X Distance from FI	0.012 (0.009)	-0.017 (0.022)	0.022 (0.017)	0.014 (0.018)	0.027** (0.010)	0.024*** (0.006)
After Corona R1 X Having a Migrated Memel	-0.072 (0.057)	-0.117** (0.049)	-0.152 (0.135)	-0.857*** (0.213)	0.217 (0.156)	0.275 (0.183)
After Corona R2 X Having a Migrated Memel	0.014 (0.046)	0.036 (0.167)	0.021 (0.145)	-1.043*** (0.202)	0.117 (0.135)	0.188 (0.130)
After Corona R1 X Garment Worker	-0.120 (0.082)	-0.098 (0.062)	0.126 (0.203)	0.141 (0.325)	-0.721** (0.264)	-0.418* (0.197)
After Corona R2 X Garment Worker	0.128 (0.115)	-0.257 (0.355)	0.458* (0.204)	0.127 (0.374)	-0.398 (0.286)	0.124 (0.360)
After Corona R1 X Small Shop Seller	-0.220*** (0.056)	-0.030 (0.071)	0.068 (0.145)	-1.062*** (0.297)	0.533** (0.190)	-0.094 (0.074)
After Corona R2 X Small Shop Seller	0.018 (0.114)	0.185 (0.179)	0.220 (0.195)	-0.760** (0.323)	0.724* (0.374)	-0.215 (0.138)
After Corona R1 X Farming Times	-0.002 (0.020)	-0.049*** (0.012)	-0.007 (0.053)	-0.014 (0.054)	-0.034 (0.052)	-0.008 (0.034)
After Corona R2 X Farming Times	-0.119** (0.042)	-0.418** (0.136)	-0.422*** (0.071)	0.088 (0.078)	-0.014 (0.031)	-0.073** (0.028)
After Corona R1 Dummy	-0.294** (0.096)	-0.176 (0.135)	-0.181 (0.153)	0.038 (0.373)	-0.310 (0.252)	0.317 (0.414)
After Corona R2 Dummy	-0.376** (0.139)	-0.886** (0.357)	-1.116*** (0.252)	0.109 (0.595)	-0.502 (0.352)	-0.132 (0.089)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
HH Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared Adjusted	0.173	0.459	0.291	0.083	0.070	0.051
Observations	3211	3211	3211	3211	3211	3211
Average of Outcome Variables						
2020	5.573	2.459	2.097	2.588	2.596	0.777
2021R1	5.336	2.391	2.193	2.016	2.537	0.759
2021R2	5.194	0.819	1.051	2.081	2.523	1.009

Note: ***, **, and * represent the significance level at 1%, 5%, and 10%, respectively. After_Corona_R1 represents a dummy variable taking one for the sample of 2021R, and After_Corona_R1 represents a dummy variable taking the value one for 2021R2.

Table 10: Estimation of factors of corona pandemic impact (Expenditure Items)

	Total Exp enditure (log)	Food Exp ense (log)	Own Consumptio n (log)	Non-Food Exp ense (log)	Education Exp ense (log)	Health Care Exp esnse
After Corona R1 X ID Poor Card	0.032 (0.055)	0.022 (0.055)	0.227** (0.075)	0.078 (0.085)	0.220** (0.082)	0.010 (0.143)
After Corona R2 X ID Poor Card	-0.014 (0.069)	-0.007 (0.073)	0.324*** (0.082)	0.041 (0.101)	0.257** (0.095)	-0.021 (0.153)
After Corona R1 X Female Head Dummy	-0.027 (0.036)	0.023 (0.032)	0.062 (0.074)	-0.042 (0.060)	0.059 (0.107)	0.005 (0.092)
After Corona R2 X Female Head Dummy	0.032 (0.057)	0.021 (0.059)	-0.074 (0.088)	0.049 (0.084)	0.092 (0.112)	0.019 (0.094)
After Corona R1 X Village Chief Trust	0.021 (0.085)	0.127* (0.066)	-0.152 (0.136)	-0.014 (0.088)	0.193 (0.144)	0.179 (0.155)
After Corona R2 X Village Chief Trust	0.152 (0.096)	0.069 (0.106)	-0.213 (0.168)	0.152 (0.112)	0.337 (0.226)	0.119 (0.165)
After Corona R1 X Distance from FI	0.014** (0.006)	0.016 (0.010)	0.030*** (0.009)	0.016*** (0.004)	0.035*** (0.008)	0.010 (0.010)
After Corona R2 X Distance from FI	0.012 (0.007)	0.003 (0.012)	0.033** (0.014)	0.015** (0.005)	0.016** (0.005)	0.010 (0.009)
After Corona R1 X Having a Migrated Meme	-0.088** (0.032)	0.011 (0.029)	0.016 (0.113)	-0.121** (0.052)	-0.002 (0.102)	0.116 (0.116)
After Corona R2 X Having a Migrated Meme	-0.034 (0.038)	0.056 (0.061)	-0.009 (0.104)	-0.054 (0.055)	0.040 (0.072)	0.113 (0.069)
After Corona R1 X Garment Worker	-0.175* (0.089)	-0.373*** (0.073)	-0.039 (0.131)	-0.061 (0.093)	0.080 (0.195)	0.335 (0.233)
After Corona R2 X Garment Worker	-0.059 (0.082)	-0.330*** (0.090)	-0.279** (0.111)	0.118 (0.078)	0.082 (0.202)	0.219 (0.138)
After Corona R1 X Small Shop Seller	-0.079 (0.059)	0.004 (0.062)	0.123 (0.116)	-0.120* (0.060)	-0.165 (0.117)	-0.056 (0.101)
After Corona R2 X Small Shop Seller	-0.064 (0.051)	-0.038 (0.048)	0.234** (0.087)	-0.086 (0.047)	-0.170 (0.119)	-0.101 (0.084)
After Corona R1 X Farming Times	-0.000 (0.010)	-0.006 (0.017)	0.043 (0.039)	-0.006 (0.013)	-0.000 (0.052)	-0.009 (0.034)
After Corona R2 X Farming Times	0.004 (0.012)	-0.018 (0.018)	-0.002 (0.027)	0.003 (0.017)	0.031 (0.040)	0.036 (0.031)
After Corona R1 Dummy	-0.076 (0.164)	-0.313* (0.155)	-0.136 (0.187)	-0.006 (0.150)	-1.628*** (0.241)	-0.721** (0.220)
After Corona R2 Dummy	-0.204 (0.165)	-0.270 (0.146)	0.030 (0.135)	-0.151 (0.173)	-1.719*** (0.244)	-0.532** (0.176)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
HH Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared Adjusted	0.046	0.129	0.075	0.044	0.387	0.051
Observations	3211	3211	3211	3211	3211	3211
Average of Outcome Variables						
2020	4.858	3.753	2.305	4.365	1.652	1.779
2021R1	4.882	3.671	2.513	4.444	0.631	1.419
2021R2	4.904	3.552	2.554	4.526	0.574	1.595

Note: ***, **, and * represent the significance level at 1%, 5%, and 10%, respectively. After_Corona_R1 represents a dummy variable taking one for the sample of 2021R, and After_Corona_R1 represents a dummy variable taking the value one for 2021R2.

Table 11: Estimation of factors of corona pandemic impact (Labor and Finance Outcome)

	Total Exp enditure (log)	Food Expense (log)	Own Consumptio n (log)	Non-Food Expense (log)	Education Expense (log.)	Health Care Expesnse
After Corona R1 X ID Poor Card	0.032 (0.055)	0.022 (0.055)	0.227** (0.075)	0.078 (0.085)	0.220** (0.082)	0.010 (0.143)
After Corona R2 X ID Poor Card	-0.014 (0.069)	-0.007 (0.073)	0.324*** (0.082)	0.041 (0.101)	0.257** (0.095)	-0.021 (0.153)
After Corona R1 X Female Head Dummy	-0.027 (0.036)	0.023 (0.032)	0.062 (0.074)	-0.042 (0.060)	0.059 (0.107)	0.005 (0.092)
After Corona R2 X Female Head Dummy	0.032 (0.057)	0.021 (0.059)	-0.074 (0.088)	0.049 (0.084)	0.092 (0.112)	0.019 (0.094)
After Corona R1 X Village Chief Trust	0.021 (0.085)	0.127* (0.066)	-0.152 (0.136)	-0.014 (0.088)	0.193 (0.144)	0.179 (0.155)
After Corona R2 X Village Chief Trust	0.152 (0.096)	0.069 (0.106)	-0.213 (0.168)	0.152 (0.112)	0.337 (0.226)	0.119 (0.165)
After Corona R1 X Distance from FI	0.014** (0.006)	0.016 (0.010)	0.030*** (0.009)	0.016*** (0.004)	0.035*** (0.008)	0.010 (0.010)
After Corona R2 X Distance from FI	0.012 (0.007)	0.003 (0.012)	0.033** (0.014)	0.015** (0.005)	0.016** (0.005)	0.010 (0.009)
After Corona R1 X Having a Migrated Meme	-0.088** (0.032)	0.011 (0.029)	0.016 (0.113)	-0.121** (0.052)	-0.002 (0.102)	0.116 (0.116)
After Corona R2 X Having a Migrated Meme	-0.034 (0.038)	0.056 (0.061)	-0.009 (0.104)	-0.054 (0.055)	0.040 (0.072)	0.113 (0.069)
After Corona R1 X Garment Worker	-0.175* (0.089)	-0.373*** (0.073)	-0.039 (0.131)	-0.061 (0.093)	0.080 (0.195)	0.335 (0.233)
After Corona R2 X Garment Worker	-0.059 (0.082)	-0.330*** (0.090)	-0.279** (0.111)	0.118 (0.078)	0.082 (0.202)	0.219 (0.138)
After Corona R1 X Small Shop Seller	-0.079 (0.059)	0.004 (0.062)	0.123 (0.116)	-0.120* (0.060)	-0.165 (0.117)	-0.056 (0.101)
After Corona R2 X Small Shop Seller	-0.064 (0.051)	-0.038 (0.048)	0.234** (0.087)	-0.086 (0.047)	-0.170 (0.119)	-0.101 (0.084)
After Corona R1 X Farming Times	-0.000 (0.010)	-0.006 (0.017)	0.043 (0.039)	-0.006 (0.013)	-0.000 (0.052)	-0.009 (0.034)
After Corona R2 X Farming Times	0.004 (0.012)	-0.018 (0.018)	-0.002 (0.027)	0.003 (0.017)	0.031 (0.040)	0.036 (0.031)
After Corona R1 Dummy	-0.076 (0.164)	-0.313* (0.155)	-0.136 (0.187)	-0.006 (0.150)	-1.628*** (0.241)	-0.721** (0.220)
After Corona R2 Dummy	-0.204 (0.165)	-0.270 (0.146)	0.030 (0.135)	-0.151 (0.173)	-1.719*** (0.244)	-0.532** (0.176)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
HH Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared Adjusted	0.046	0.129	0.075	0.044	0.387	0.051
Observations	3211	3211	3211	3211	3211	3211
Average of Outcome Variables						
2020	4.858	3.753	2.305	4.365	1.652	1.779
2021R1	4.882	3.671	2.513	4.444	0.631	1.419
2021R2	4.904	3.552	2.554	4.526	0.574	1.595

Note: ***, **, and * represent the significance level at 1%, 5%, and 10%, respectively. After_Corona_R1 represents a dummy variable taking one for the sample of 2021R, and After_Corona_R1 represents a dummy variable taking the value one for 2021R2.

Table 12: Difference-in-difference estimation of coronavirus pandemic effect (HH Member Level)

	Seeking a Job (Dummy)	Work Hour (log)	Work Days (log)	Income (log)	Having Income (Dummy)
After Corona R1 X Female Dummy	-0.001 (0.012)	-0.024 (0.064)	0.079 (0.050)	0.274* (0.128)	0.027 (0.022)
After Corona R2 X Female Dummy	0.003 (0.005)	0.000 (0.048)	0.021 (0.053)	0.285** (0.091)	0.008 (0.032)
After Corona R1 X HH Head Dummy	0.005 (0.006)	-0.095* (0.052)	-0.004 (0.068)	-0.031 (0.145)	-0.032 (0.030)
After Corona R2 X HH Head Dummy	0.009 (0.013)	-0.069 (0.044)	0.011 (0.056)	0.004 (0.111)	-0.034 (0.024)
After Corona R1 X Age (log)	-0.017 (0.017)	0.110 (0.084)	0.005 (0.102)	-0.162 (0.192)	-0.042 (0.026)
After Corona R2 X Age (log)	-0.005 (0.013)	0.022 (0.086)	-0.032 (0.087)	-0.211 (0.192)	-0.065* (0.031)
After Corona R1 X School Year	0.000 (0.001)	0.002 (0.004)	-0.000 (0.002)	-0.006 (0.004)	0.001 (0.001)
After Corona R2 X School Year	-0.001 (0.000)	-0.002 (0.002)	-0.000 (0.001)	-0.003 (0.002)	0.001 (0.001)
After Corona R1 X Farming Times	0.003** (0.001)	-0.028 (0.036)	-0.041 (0.033)	0.026 (0.032)	-0.002 (0.009)
After Corona R2 X Farming Times	0.002 (0.001)	-0.004 (0.024)	-0.027 (0.033)	0.040 (0.029)	0.004 (0.007)
After Corona R1 X Garment Worker	-0.003 (0.015)	0.023 (0.079)	0.053 (0.068)	-0.194 (0.119)	-0.173** (0.064)
After Corona R2 X Garment Worker	-0.008 (0.008)	-0.010 (0.072)	0.061 (0.071)	-0.116 (0.125)	-0.162** (0.052)
After Corona R1 X Small Shop Seller	-0.001 (0.011)	-0.105 (0.078)	-0.114 (0.122)	-0.127 (0.112)	-0.176*** (0.026)
After Corona R2 X Small Shop Seller	-0.004 (0.008)	-0.075 (0.079)	-0.044 (0.099)	-0.225* (0.123)	-0.162*** (0.042)
After Corona R1 X ID Poor Card	-0.002 (0.022)	-0.113* (0.061)	-0.081 (0.055)	-0.016 (0.075)	0.028 (0.034)
After Corona R2 X ID Poor Card	-0.002 (0.013)	-0.189** (0.069)	-0.170** (0.057)	-0.051 (0.089)	-0.044 (0.048)
After Corona R1 X Female Head Dummy	0.010 (0.016)	0.033 (0.058)	0.041 (0.039)	0.039 (0.108)	0.014 (0.020)
After Corona R2 X Female Head Dummy	0.001 (0.009)	0.016 (0.049)	0.042 (0.050)	-0.023 (0.115)	0.057** (0.024)
After Corona R1 X Village Chief Trust	0.007 (0.012)	0.013 (0.123)	-0.025 (0.113)	0.004 (0.128)	-0.001 (0.036)
After Corona R2 X Village Chief Trust	-0.010 (0.018)	0.129 (0.098)	0.088 (0.071)	-0.019 (0.202)	0.016 (0.019)
After Corona R1 X Distance from FI	-0.004** (0.002)	-0.018 (0.013)	0.002 (0.006)	0.014*** (0.002)	0.000 (0.001)
After Corona R2 X Distance from FI	-0.001* (0.001)	0.006 (0.007)	0.007 (0.009)	0.010 (0.011)	0.003 (0.003)
After Corona R1 Dummy	0.107* (0.057)	-0.237 (0.397)	-0.084 (0.350)	0.236 (0.569)	0.097 (0.096)
After Corona R2 Dummy	0.048 (0.049)	-0.114 (0.326)	-0.035 (0.299)	0.653 (0.590)	0.116 (0.109)
Work Hour (log)				0.359*** (0.067)	
HH Fixed-Effect	Yes	Yes	Yes	Yes	Yes
Other Household Control	Yes	Yes	Yes	Yes	Yes
R-Squared Adjusted	0.098	0.341	0.459	0.603	0.276
Observations	9358	4975	4976	4721	9329

Note: ***, **, and * represent the significance level at 1%, 5%, and 10%, respectively. After_Corona_R1 represents a dummy variable taking the value one for the sample of 2021R, and After_Corona_R2 represents a dummy variable taking the value one for 2021R2.

loan dummy. These results might suggest that assistance through social capital can be substituted for borrowing money for households to deal with negative income shocks.

We also found that households dependent on farming activity were more likely to reduce income, and agricultural production, and also more likely to seek an alternative job in 2021R1. They were even more likely to take out new loans both in 2021R1 and 2021R2. Those results might suggest that income from farming activities is also affected during the coronavirus pandemic.

4.4. The perception of corona pandemic and real impacts

Next, we estimate the difference in decline of outcome variables between households who thought they were affected by corona pandemic and who did not think so. Taking advantage of the panel dataset, we again employ the DID approach to estimate to quantify the impacts of COVID-19. The empirical model is specified as follow:

$$y_{it} = \alpha + \beta * Affected_i * I(t \Rightarrow 1) + \delta W_{it} + \mu_t + u_i + \varepsilon_{it} \quad (1)$$

where y_{it} is the outcome variable of interest of household i at time t . $Affected_i$ is an indicator variable which represent whether households thought they were affected by corona pandemic. For the identification of affected households, we employ a subjective measure of taking one for households who answered as they were affected by corona pandemic directly and indirectly in either of the survey 2021R1 and 2021R2, and 0 otherwise. We set the time of March 2020 as the baseline for measuring the impact of the corona pandemic crisis. β is the parameter of interest which identifies effects of the COVID-19 pandemic. We estimate the model using the fixed-effect estimation and use the cluster-robust standard errors at village-level.

The results of the estimation are presented in Table 13. We found that the dummy for perception of being affected by the coronavirus pandemic was positively associated with total expenses and negatively associated with own food consumption. In addition, it was also positively associated with the dummy of taking a new loan and the dummy of taking an informal loan.

Households that reported that they were affected by the coronavirus pandemic actually decreased food expenses and total expenditure more than households that did not report that they were affected. We confirmed the accuracy of the self-reporting measures of being affected

Table 13: Impacts on Household which Perceived Damage from Corona Pandemic

	Gross Income (log)	Agricultural Production (log)	Sales of Livestock (log)	Migration Income (log)	Wage Income (log)	Charity Income (log)	Total Expenditure (log)	Food Expense (log)	Own Consumption (log)	Non-Food Expense (log)	Education Expense (log)	Health Care Expense	Work Days (log)	Work Hour (log)	Seeking a Job	New Loan	New informal loan
Perception Dummy	0.096 (0.065)	-0.092 (0.097)	0.231* (0.102)	0.374** (0.154)	0.069 (0.052)	-0.012 (0.053)	-0.093* (0.050)	-0.111* (0.053)	0.021 (0.107)	-0.103 (0.058)	-0.108 (0.127)	-0.159* (0.081)	0.079 (0.057)	0.033 (0.065)	0.051 (0.036)	0.042* (0.019)	0.014** (0.005)
Corona After R1	-0.421*** (0.094)	-1.602*** (0.218)	-1.134*** (0.211)	-0.662*** (0.192)	-0.114 (0.090)	0.240* (0.108)	0.069 (0.058)	-0.173* (0.091)	0.215 (0.169)	0.178** (0.057)	-1.076*** (0.086)	-0.145* (0.071)	-0.162 (0.114)	-0.068 (0.121)	0.018 (0.018)	-0.035 (0.031)	0.021* (0.009)
Corona After R2	-0.262** (0.083)	0.009 (0.066)	0.040 (0.138)	-0.701*** (0.150)	-0.106 (0.090)	-0.007 (0.105)	0.044 (0.040)	-0.052 (0.079)	0.174 (0.139)	0.091** (0.032)	-1.021*** (0.089)	-0.336** (0.103)	-0.341*** (0.097)	-0.329** (0.135)	0.047* (0.021)	0.029 (0.033)	0.036** (0.013)
HH Fixed-Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Household Contro	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared Adjusted	0.131	0.351	0.181	0.041	0.049	0.016	0.064	0.114	0.036	0.057	0.364	0.049	0.056	0.048	0.016	0.015	0.013
Observations	3406	3406	3406	3406	3406	3406	3405	3406	3406	3406	3406	3406	3406	3406	3406	3406	3406

Note: ***, **, and * represent the significance level at 1%, 5%, and 10%, respectively. Perception Dummy represents a dummy variable taking the value one if households answered that they received damage from the coronavirus pandemic directly or indirectly.

by the coronavirus pandemic. And we further find that those affected households were more likely to access informal loans.

5. Discussion

Narith and Alissar (2022) argue that the cash transfer program during the coronavirus pandemic reduced the negative impact on IDPoor equity card holders, as there is no statistical difference between IDPoor households and non-IDPoor households. In our analysis, we found that IDPoor households were able to mitigate the decline in gross income compared to non-IDPoor households (Table 8), even though IDPoor households experienced declines in working hours and days compared to non-IDPoor households. In addition, IDPoor households mitigated the decline in education expenses. Given that 90% of households with IDPoor equity cards received government cash transfers during the coronavirus pandemic period, our results support the view that the government cash transfer program worked as a safety net for households with an IDPoor equity card.

In our analysis, households distant from financial institutions have generally experienced less impact from coronavirus pandemic in terms of income, expenditure, and also in terms of employment status. Since the branches of financial institutions are generally located in the center of large cities, the variable of the distance from financial institutions might rather capture the distance from the center of the large cities in our analysis. It is generally assumed that households in rural villages had a serious damage and cash transfer program that helped those households to a large extent. However, if households in the distant areas were less likely to be affected, it is doubtful whether the selection of households in the cash transfer program was optimal. Actually, some studies in other countries indicate that the damage by the coronavirus pandemic is significant in households living in urban cities and is not pronounced for households in rural villages (Adjognon et al. 2021).

Occupation was also an important factor in determining the impact of the coronavirus pandemic. There was a negative impact in wage income for the households with workers in the garment sector, although this was pronounced in the short term. In addition, there was a negative impact on food expenses and own food consumption, and those negative impacts on food consumption were persistent over the long term. In addition, households which had migrated members were also affected by the coronavirus pandemic in terms of household income and expenditure variables. Particularly, migration income, agricultural production and non-food expenditure, and total expenditure showed a statistically significant decrease. Thus, the households dependent on those income sources are vulnerable in a pandemic, and must receive support measures in addition to IDPoor households.

Prior studies of the coronavirus pandemic documented that women tended to be affected by the coronavirus pandemic crisis (Brodeur et al. 2021; Bundervoet et al. 2021; Adjognon et al. 2021). However, our analysis did not find any supporting evidence for this view. Our study rather revealed that the decline in income was lower for female workers within a household. One of the reasons could be that our study focuses on the rural areas of Cambodia, so that the impact was generally weak. In the Cambodian context, men tend to work at construction sites in urban areas or temporally migrate to urban areas for work, while women tend to work at garment factories in rural areas or work at home as small shop sellers. Thus, men might be likely to lose income during the pandemic. Therefore, our results suggest that gender difference is not the only factor determining the impact of the coronavirus pandemic, the impact is dependent on several characteristics of the households involved.

Lastly, we suggest that alternative risk sharing networks need to be developed within villages and within communes, or through financial institutions. According to our analysis, the coronavirus pandemic affected households through various channels, reduction in agricultural production sales, reduction in wage income, and reduction in work hours by lockdown measures. Therefore, unlike floods and droughts, the shocks of the coronavirus pandemic could be both idiosyncratic and covariate for rural households, and identifying the severely affected households on a real time basis might be difficult. Thus, households are required to have various coping strategies in the case of nation-wide pandemic, as developing countries have limited fiscal space for cash transfer programs to provide support to all the affected households. Therefore there is a need to develop other risk sharing networks for such households.

One of the strategies for establishing effective risk sharing networks could be to develop social capital. In private sector, there is a practice that microfinance institutions provide loans using social capital to reduce default risks (Cassar and Wydick 2010). Our analysis also found that many households rely on borrowing from family and friends. Thus, developing social capital by encouraging the communication among households within villages could be an effective way to reduce the shocks on households in the period of economic downturn.

6. Conclusion

Our study investigated the consequences of the crisis induced by the coronavirus pandemic on for the Cambodian households. We collected both the pre-pandemic and post-pandemic household data, and estimated the impact by using the difference-in-differences approach.

Around the world, there are already a flood of researches on the socioeconomic impacts of the coronavirus pandemic. However, a lot of these studies about on the coronavirus pandemic have been focused on the situation of in developed countries, while and there is still a limitation on studies in the developing countries. Our study was done in the context of one of these developing countries, Cambodia. Thus, the evidence from our study could provide insights on for the debate of about the policy for establishing resilient economic systems and government measures to against a pandemic in developing countries.

However, our study has several limitations. Firstly, our data is limited to the households in the rural areas of a single developing country. According to our study results, the impact seems less pronounced for those areas distant from large cities. Thus, the impact on the households in peri-city areas might be different. Secondly, the current panel data is are not appropriate to identify the effect of financial infrastructure as there are only 11 villages in our data. For testing the effectiveness, we would be better employing the data which that has variation varies across villages or communes. Lastly, our study focuses mainly on economic outcomes. Other aspects of household well-being, such as mental health, work productivity, child abuse, neglect, and also education, are out of our the scope in of this study. However, the coronavirus pandemic could also have a negative consequences on for those variables. In particular, the coronavirus pandemic caused the long-term school closure over accross the country (World Bank, 2022). Thus, further studies are needed to investigate the short-term and long-term impact on impact of the pandemic to understand their community vulnerability and to discuss the development of more resilient economic systems in such communities.

Reference

1. Asian Development Bank, (2015). “*Promoting women’s economic empowerment in Cambodia.*” ADB.
2. Adjognon, Guigonan Serge, Jeffrey R. Bloem, and Aly Sanoh. (2021) “The Coronavirus Pandemic and Food Security: Evidence from Mali.” *Food Policy* 101: 102050. <https://doi.org/10.1016/j.foodpol.2021.102050>.
3. Bundervoet, Tom, Maria E Dávalos, and Natalia Garcia. (2021) “The Short-Term Impacts of COVID-19 on Households in Developing Countries: An Overview Based on a Harmonized Data Set of High-Frequency Surveys.” Policy Research Working Paper 9582. World Bank.
4. Brodeur, Abel, David Gray, Anik Islam, and Suraiya Bhuiyan. (2021) “A Literature Review of the Economics of COVID-19.” *Journal of Economic Surveys* 35, no. 4: 1007–44. <https://doi.org/10.1111/joes.12423>.
5. Beyer, Robert C.M., Sebastian Franco-Bedoya, and Virgilio Galdo. (2021) “Examining the Economic Impact of COVID-19 in India through Daily Electricity Consumption and Nighttime Light Intensity.” *World Development* 140: 105287. <https://doi.org/10.1016/j.worlddev.2020.105287>.
6. Brum, Matias, and Mauricio De Rosa. (2021) “Too Little but Not Too Late: Nowcasting Poverty and Cash Transfers’ Incidence during COVID-19’s Crisis.” *World Development* 140: 105227. <https://doi.org/10.1016/j.worlddev.2020.105227>.
7. Cassar, A, and Wydick, B.. “Does Social Capital Matter? Evidence from a Five-Country Group Lending Experiment.” *Oxford Economic Papers* 62, no. 4 (October 2010): 715–39. <https://doi.org/10.1093/oep/gpq010>.
8. Karamba, Wendy, Isabelle Salcher, and Kimsun Tong. (2021) “Results from the High-Frequency Phone Survey of Households Round 5.” *Socioeconomic Impacts of COVID-19 on Cambodian Households*. World Bank.
9. Kikuchi, Shinnosuke, Sagiri Kitao, and Minamo Mikoshiba. (2021) “Who Suffers from the COVID-19 Shocks? Labor Market Heterogeneity and Welfare Consequences in Japan.” *Journal of the Japanese and International Economies* 59: 101117. <https://doi.org/10.1016/j.jjie.2020.101117>.
10. Lakner, D. C, G., Mahler, M., Negre, E., B., Prydz, (2022). “How much does reducing inequality matter for global poverty?” *Policy Research Working Paper No. 8869*, World Bank
11. Mahmud, Mahreen, and Emma Riley. (2021) “Household Response to an Extreme Shock: Evidence on the Immediate Impact of the Covid-19 Lockdown on Economic Outcomes and Well-Being in Rural Uganda.” *World Development* 140: 105318. <https://doi.org/10.1016/j.worlddev.2020.105318>.
12. Miguel, Edward, and Ahmed Mushfiq Mobarak. (2022) “The Economics of the COVID-19 Pandemic in Poor Countries.” *Annual Review of Economics* 14, no. 1: 253–85. <https://doi.org/10.1146/annurev-economics-051520-025412>.
13. Narith, Chan, and Alissar Chaker (2022) “Socioeconomic Impacts of the COVID-19 Cash Transfer Programme in Cambodia: Micro and Macro-Level Evaluations.” UNDP
14. Nguyen, Thanh-Tung, Trung Thanh Nguyen, and Ulrike Grote. (2020) “Multiple Shocks

- and Households' Choice of Coping Strategies in Rural Cambodia.” *Ecological Economics* 167: 106442. <https://doi.org/10.1016/j.ecolecon.2019.106442>.
15. Rahman, Hossain Zillur, Imran Matin, Nicola Banks, and David Hulme. (2021) “Finding out Fast about the Impact of Covid-19: The Need for Policy-Relevant Methodological Innovation.” *World Development* 140: 105380. <https://doi.org/10.1016/j.worlddev.2020.105380>.
 16. Shimizutani, Satoshi, and Eiji Yamada. (2021) “Resilience against the Pandemic: The Impact of COVID-19 on Migration and Household Welfare in Tajikistan.” Edited by Stefan Cristian Gherghina. *PLOS ONE* 16, no. 9: e0257469. <https://doi.org/10.1371/journal.pone.0257469>.
 17. Stoop, Nik, Sébastien Desbureaux, Audacieux Kaota, Elie Lunanga, and Marijke Verpoorten. (2021) “Covid-19 vs. Ebola: Impact on Households and Small Businesses in North Kivu, Democratic Republic of Congo.” *World Development* 140: 105352. <https://doi.org/10.1016/j.worlddev.2020.105352>.
 18. United Nation (2020) “Policy brief: The impact of COVID-19 on women” United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) United Nations Secretariat