


Off the COVID-19 Epicentre: The Impact of Quarantine Controls on Employment, Education and Health in China's Rural Communities

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Abstract

This study documents the COVID-19 disease-control measures enacted in rural China and examines the economic and social impacts of these measures. We conducted two rounds of surveys with 726 randomly selected village informants across seven provinces. Strict disease-control measures have been universally enforced and appear to have been successful in limiting disease transmission in rural communities. The infection rate in our sample was 0.001 per cent, a rate that is near the national average outside of Hubei province. None of the villages reported any COVID-19-related deaths. For a full month during the quarantine, the rate of employment of rural workers was essentially zero. Even after the quarantine measures were lifted, nearly 70 per cent of the villagers still were unable to work owing to workplace closures. Although action has been taken to mitigate the potential negative effects, these disease-control measures might have accelerated the inequality between rural and urban households in China.

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For the past 15 years, my husband and I have returned to the village once every year for the Lunar New Year. We spend five days with family, then go back to the city to make money for 360 days. Why wouldn't this year be the same? When we arrived home [in rural Henan] on 20 January, we did not think we would be stuck at home for such a long time with no work.
 Village informant from Henan, February 2020

In late January 2020, China's government initiated its first aggressive measures to combat COVID-19 by forbidding individuals from leaving their homes, radically limiting public transportation, cancelling or postponing large public events, and closing schools across the country.¹ The rollout of these measures coincided with China's Lunar New Year holiday, during which more than 280 million people had returned from their places of work to their home villages in rural areas.² The disease control policies remained in place until late February and early March, when they were gradually loosened to allow for more free movement of people.³ Among those who were allowed to move again were the hundreds of millions of migrant workers who, before the COVID-19 outbreak, had expected to return to China's urban and industrial centres to continue working in the nation's factories, construction sites and service sector.⁴

Although social media and official news outlets have provided coverage of the spread of COVID-19 in the Hubei province epicentre and large cities throughout the country, little is known about how the disease-control policies were implemented in rural communities and how they affected the lives of the roughly 759 million people who live in these rural areas.⁵ In particular, it is unclear what actions were taken to control the spread of the disease in rural villages outside of Hubei and whether they were successful at limiting the spread. There also is a shortage of information on the impacts of these disease-control measures on the ability of rural people to continue to access employment, healthcare and schooling. In the period that followed the lifting of the restrictions, little research has focused on the degree of economic recovery in rural areas and the remaining impacts of the restrictions on rural life.

Such research is important because previous studies have shown that economic downturns have differential impacts across demographic groups. It is well known that downturns increase poverty (or reduce the income of those in lower income brackets), especially among groups with low skills and those who are in subpopulations that are generally without a safety net.⁶ In China, social spending has long been shown to aid urban areas disproportionately. Rural communities are home

1 National Health Commission 2020a.

2 NBS 2019a.

3 State Council 2020b.

4 National Health Commission 2020b.

5 NBS 2020a.

6 Jalan and Ravallion 1999; Fox et al. 2015.

to more than 60 per cent of the population, but owing to the nature of urban–rural divisions in China’s social programmes, rural workers are excluded from coverage by most of these programmes such as medical insurance for catastrophic illnesses, unemployment insurance and government welfare payments.^{7,8} Although China has seen a sharp reduction in poverty over the past two decades, we do not know whether this means that the rural population is safer now from income shocks. In such an environment, events like COVID-19 might be expected to accelerate the substantial pre-existing inequalities between rural and urban households in China, and the rural population may still face the risk of slipping into poverty because of the economic disruption caused by the pandemic. Owing to its size and economic vulnerability, the recovery of the rural population is crucial to China’s social and economic stability. Therefore, it is important to understand how some of the country’s most vulnerable have fared during the quarantine period and afterwards.

The purpose of this study is to document the disease-control measures enacted in rural areas of China during the spread of COVID-19 and to empirically examine the economic and social impacts of these measures on rural communities over time. More specifically, we first examine the efforts of local governments and communities to control the spread of the virus. Second, we examine how many individuals in rural villages across China contracted and died from COVID-19 during February and March. Finally, we examine the consequences of disease-control measures for rural villagers, including their access to employment, education and healthcare during and after quarantine.

In pursuance of these objectives, we analyse data collected from a longitudinal survey of 726 randomly selected villages in seven provinces outside of the pandemic epicentre in China. To eliminate reporting bias, we selected and interviewed ordinary villagers rather than local officials or village doctors. During phone calls of approximately one hour in duration in each round of the survey, these village informants sought to characterize the nature of the disease-control measures and the consequences for their villages in general.

Methods and Approach

Sampling procedure

We randomly selected and interviewed 726 village informants (who were not village officials or doctors) residing in 726 randomly sampled villages in seven provinces across China: Ningxia, Shaanxi, Gansu, Jiangxi, Henan, Yunnan and Sichuan. The seven provinces have a total population of 347 million and account for over 25 per cent of China’s overall population.⁹ On average, the income per

7 Meng, Xin, and Zhang 2001; Zhu et al. 2017; Gao et al. 2018; Su, Tesfazion and Zhao 2018.

8 Wang and Yu 2019.

9 NBS 2010.

capita of rural residents in these provinces was US\$1,683 in 2018 (ranging from US\$1,127 per capita to US\$2,185 per capita), slightly below the national rural average of US\$2,209 per capita.¹⁰

We recruited village informants who had taken part in previous, unrelated studies conducted by the research team across seven provinces in China. In previous studies, the sample selection covered 2,069 villages in 540 townships across 60 counties. We included all 540 townships in this study. In our previous studies, we collected contact information from more than 68,000 villagers in these townships. Within each sample township, we randomly selected one village as our sample village. We then randomly selected ten villagers from each sample village for our telephone interview candidate list. Finally, we made telephone calls to the villagers on the list until we were able to contact an informant and complete an interview. The goal was to include 100 villages per province. Individuals were excluded if they were living in the local urban centres or county seats at the time of our survey, leaving only those households living in rural villages.

The numbers of counties, townships and village informants for each province are listed in [Table 1](#). In total, the research team surveyed 726 informants in 726 villages, 540 towns and 60 counties (see Appendix A for more sample information). We estimate that the total number of rural residents covered by the estimates of the village informants was around 726,000.

Data collection

Data were collected via a quantitative survey approach administered by telephone by members of the research team. We believe that data collected via telephone calls are reliable for three reasons. First, because the respondents were drawn from earlier samples, in virtually all cases we had spoken with them before, albeit as part of earlier studies. We believe that their familiarity with our team helped to build trust with our enumerators. Second, telephone interviews allowed us to reach respondents regardless of their geographical location or daily schedule during the lockdown. Third, responding by telephone also gave the interviewees the appearance of greater anonymity and may, therefore, yield more reliable responses.

In the first round of the survey, which was conducted during the last week of February 2020, we interviewed all 726 village informants. The second round of the survey was conducted in late March 2020. We randomly selected and interviewed approximately half (349) of the village informants from each county. Twelve village informants had left the village for work elsewhere by the time of our second survey, so we asked them to refer us to a friend or family member who still lived in the village. With this methodology, there was no attrition in the second round of the survey.

10 NBS 2019a.

Table 1: Sample Distribution

Province	Sample Counties (n)	Sample Townships (n)	Sample Villages (n)	Avg. Distance from Village to County Seat (km)	Avg. No. of Households in Village	Han Ethnicity (%)
Gansu	5	62	107	42.95	90	99
Ningxia	20	103	103	25.44	304	41
Shaanxi	11	109	105	39.70	168	100
Jiangxi	3	50	101	24.04	439	100
Sichuan	4	80	107	37.05	317	99
Henan	6	47	101	14.88	606	100
Yunnan	11	77	102	48.15	229	76
<i>Total</i>	60	540	726	33.17	308	88

By design, each survey covered around 30 days (the first month of quarantine, from 24 January to 24 February, and the first month during which disease-control measures were gradually lifted, from 24 February to 24 March). The same survey questionnaire was used for each round of the survey. The questionnaire contained four sections. The first section focused on information on disease-control measures, including transportation measures and travel restrictions, both within and outside the village. The second section collected information about COVID-19 infections and deaths in the village and surrounding townships. The third section of the survey concerned the general impacts of disease-control measures on employment and income. The fourth section of the survey focused on the impacts of disease-control measures on education for children and healthcare in the village.

This study was approved by the Stanford University Institutional Review Board (Protocol No. 55168). All participants provided informed verbal consent and were guaranteed confidentiality.

Results

We divide our results into several subsections and report each subsection for the two survey periods: during and after the implementation of disease-control measures. The first subsection contains the types of disease-control measures reported by village informants. The second subsection includes the reported incidence of the virus, including the number of people who contracted COVID-19 and the number of people who died of it. The fourth subsection contains the impact of the disease-control measures on access to employment and effects on income, education and healthcare.

Types of Disease-Control Measures

The coronavirus outbreak was reported on TV in late January. It was mainly in Hubei; there were no infections in our county, so we did not think much of it. Then, all of a sudden, the

government said we were “fighting a war” against the coronavirus. We were told to “contribute to the country by staying home.” Now, everyone is being asked to stay at home. No one is allowed to meet anyone from outside the household. Even our Spring Festival family dinner had to be cancelled. The roads are all blocked. Everyone has to wear a mask. People in my village are all supportive of all these measures, and we are so afraid to go out for fear of getting sick. It is hard to stay at home all day long, but we understand.

Village informant from Jiangxi, February 2020

There are two particularly salient findings from the first-round survey in February: (a) an array of strict disease-control measures were implemented across almost all villages, and (b) there was a high degree of compliance with the disease-control measures. The first-round survey indicated that multiple restrictions on the movement and assembly of villagers were in place (Table 2). In 631 villages (87 per cent), the informants reported that they were unable to leave the village and outsiders were not permitted to enter the village, even if they were relatives or friends from nearby villages. In 471 villages (65 per cent), villagers were not permitted to leave the village to buy food or other supplies. In many cases, adults (72 per cent) and children (88 per cent) were not permitted to go for walks outside. Local authorities in 699 villages (96 per cent) required villagers to wear face masks outside, while only 119 village informants (16 per cent) reported that masks could be bought in the village or local market. Authorities in 716 villages (99 per cent) did not permit villagers to gather in public for activities such as dancing or exercise; 714 villages (98 per cent) did not permit villagers to convene for weddings or funerals; and 707 villages (97 per cent) did not permit villagers to visit neighbours to play cards or have meals together.

As Table 2 shows, the results from the second-round survey reveal that, by late March, the quarantine barriers at the individual level were almost uniformly less strict, although restrictions on large gatherings were still present. The share of villages that banned visitors from outside the village dropped from 86 per cent in February to 17 per cent in March. Few villages (0.3 per cent) reported that residents were not permitted to leave the village to buy supplies. The percentage of villages that reported restrictions on walks outside also dropped for adults (down to 14 per cent) and children (down to 21 per cent). The wearing of a face mask was still required outside (90 per cent), and masks were available for purchase at the local market (74 per cent). Despite the reduction of many control measures, restrictions that limited group activities remained strict in most villages. For example, weddings and funerals were still temporarily banned in most villages (74 per cent). Public gatherings for activities such as dancing or exercise were not permitted (66 per cent).

The findings of both surveys suggest widespread enforcement and compliance with disease-control measures. When all restrictions were in place in February, virtually no one reported being able to move freely. By March, after China had announced a nationwide loosening of restrictions that allowed individuals to resume movement to go in and out of villages, most villages reported that

Table 2: COVID-19 Disease-control Measures Reported in Sample Villages

Control Measure	February <i>N</i> = 726	March <i>N</i> = 348
Visits are not permitted from family or friends who live outside of the village	86.91	16.95
Villagers are not permitted to leave the village for shopping	64.88	0.29
Villagers are not permitted to go for walks	71.90	14.37
Children are not permitted to play freely outside	88.29	20.69
Villagers are required to wear masks outside	96.28	89.08
Surgical masks are available for purchase	16.39	73.56
Group entertainment activities are not permitted	98.62	65.52
Weddings or funerals are not permitted	98.35	74.43
Villagers are not permitted to visit other homes within the village	97.38	52.59

Note:

Data are n/N (%), where N is the total number of village informants who responded to each question.

individuals were moving more freely.¹¹ Local governments, however, kept certain restrictions in place, including limits on large gatherings.

Three key underlying factors could have contributed to the high level of compliance with the control measures that we observe in our data. The first is a high level of enforcement capability throughout rural communities in China. All villages have a committee that is empowered to enforce policies promulgated by the national government. The social network in rural China provides a society of acquaintances and allows local public leaders and villagers to take collective action on COVID-19 control measures. For example, we asked informants to describe the disease-control enforcement measures and the related village environment during the first month of quarantine. Informants responded that village committee members and village “volunteers” worked together as “epidemic prevention and control teams” to enforce the control measures. Roadblocks were set up at the entrance of the village. Everyone who went in and out of the village had to register at the roadblock, where their temperature was taken. Most of the villagers were understanding and followed these measures. Villagers who violated the rules, such as walking around without wearing a mask, would receive verbal warnings or even small fines from the epidemic prevention and control teams.

The second factor is that the adherence of rural residents to control measures was most likely influenced by knowledge gained from pervasive public awareness campaigns. Research has shown that Chinese residents were knowledgeable about COVID-19 largely owing to ubiquitous news reports on it during the early stages of the pandemic.¹² The rural population received information about COVID-19 through various means, such as China Central Television, local broadcast stations and official accounts on social media platforms. Also,

¹¹ State Council 2020b.

¹² Zhong et al. 2020.

in our sample, stay-at-home orders and COVID-19 awareness information were broadcast using loudspeakers in the villages.

The third factor is that there may be a higher degree of receptivity for disease-control measures on the part of the general population in rural China thanks to previous experiences with epidemics of this kind. During the SARS outbreak of 2003, there was strong a top-down approach to enforcing all public health measures.¹³ Since SARS, a strong governmental commitment together with a centrally coordinated response has been considered the most important factor in the control of epidemics in China.¹⁴ The memory of SARS also could have fuelled hope that containment of COVID-19 was feasible.¹⁵ Control measures similar to those used to stop the spread of SARS, such as contact tracing, social distancing and community quarantine, were used to combat COVID-19. As a consequence, villagers in rural China may have been more familiar with such measures than people in other countries, thereby facilitating implementation.

The high level of compliance reflects the comprehensive capacity of China's government to impose and enforce limits on movement and gatherings. Even if it were known globally that these measures were effective in containing the spread of the virus, the example would be of limited utility to other developing nations wishing to protect their rural populations unless those states had a similarly pervasive capacity to enforce restrictions.¹⁶

According to the February survey, infection rates in the sample area were low (Table 3). Only four village informants out of 726 reported any COVID-19 infections in their villages. In all four villages, the village informant stated that all infection cases were being isolated and treated in locally designated hospitals. When extrapolating to the sample of all rural residents inside the sample villages, of the nearly 726,000 residents represented, only 10 people were reported to have contracted the virus. No one in any surveyed village reported deaths from the virus.

To verify that the numbers of infections and deaths from COVID-19 reported by the village informants in the sample villages were valid, we cross-checked informant-reported numbers with official infection numbers released by national, provincial and city-/county-level authorities. The ten cases reported by the village informants in our sample were consistent with the official records.

We then considered how this implied infection rate of 0.001 per cent (or about 13 infections for every one million people) compared to that in other parts of China and other countries. Although low, the infection rate for the sample's 726 villages is actually almost the same as the rate of infection reported across China (12 infections per million population), excluding Hubei province.

13 Lee and McKibbin 2004; Ahmad, Krumkamp and Reintjes 2009; Wilder-Smith, Chiew and Lee 2020.

14 Vlas et al. 2009.

15 Wilder-Smith, Chiew and Lee 2020.

16 Kupferschmidt and Cohen 2020.

Table 3: COVID-19 Cases Reported by Village Informants

COVID-19 spread	February	March
Diagnosed patient in village	4/726 (0.55%)	0/348
No. of diagnosed patients per village, reported by four village informants	2.5 (4.85–7.85)	0
Infection rate	10/726000 (0.001%) + 0	

Notes:

Data are mean (95% CI) or *n/N* (%). + Calculation based on 1,000 villagers per village.

According to the official data, as of the end of May 2020, the infection rate inside Hubei province was much higher (1,154 infections per million).¹⁷

For several reasons, we believe that the low infection rates reported in our survey are accurate and not a result of underreporting. First, information spreads quickly in villages in China.¹⁸ If an infection were present, close family members, relatives and neighbours inside the village would certainly know. Almost universal cell phone and social media use means that word would likely spread quickly. Further, efforts to ensure that villagers stay informed about infection cases enhanced the speed of communication. Contact tracing information was available on social media and official websites.¹⁹ In many villages, if an individual became infected, a prominent banner or sign would be posted on that person's home, warning villagers to stay away. Our data are also less likely to be biased by political motivation because we rely on ordinary villagers rather than village officials as informants. Finally, the willingness of the informants to talk in nearly every village that we randomly sampled suggests that authorities did not issue any type of order for villagers to avoid reporting cases to outsiders (in which case, the informants may have been less willing to speak to the enumerator). In fact, the informants in the several villages in which there were infections were open and willing to discuss their village's experience in detail.

The nature of migration in China and the rapidness and strictness of the disease-control measures supports the general finding that infection rates were low in the sample villages. Specifically, long-distance migration for work in developing countries is often characterized by "chain migration," whereby migrants in a particular urban target destination come from a relatively small subset of rural source communities.²⁰ The literature has repeatedly shown that this type of migrant network is common in China²¹ and suggests that a large share of rural workers find and work at jobs in their own county, prefecture or province.²² What seems to have protected these villages from having large numbers of disease

17 Chinese Centre for Disease Control and Prevention 2020.

18 Luo et al. 2007.

19 Liu et al. 2020.

20 Bastos and Greve 2003.

21 Rozelle et al. 1999; Zhao 1999; 2003.

22 Guang and Zheng 2005; Zhang, Linxui, et al. 2018.

infections is that there were not heavily travelled migration chains between the infection epicentre sites in Hubei and the sample villages. More than 70 per cent of the migration out of the epicentre in Wuhan was limited to other parts of Hubei province rather than the rest of China's rural areas.²³

Although the measures to control the COVID-19 outbreak were, indeed, strict in rural communities outside the epicentre (as reported above), in the absence of a counterfactual, it is not possible to assert that those measures were directly responsible for the low rate of infection in our sample. It is possible to conclude from our survey, however, that the disease-control measures coincided with the limited spread of COVID-19 virus in the sample areas. Given that the absence of similar control measures in the rest of the world has demonstrably increased infection rates, our intuition based on the findings of the current survey is that the measures were conducive to containing disease spread where cases did occur.

COVID-19, Employment and Income

It is a hard time for people in my village. This coronavirus outbreak put almost all business activities on hold since the Lunar New Year holiday. People in the village used to work in the cities as housekeepers in hotels, waitresses in restaurants, delivery workers, manufacture and construction workers. Now, we are all waiting to go back to work, but it's not easy to find a job.

Village informant from Shaanxi, March 2020

Access to employment while disease-control measures were in effect

Among the most striking findings of the first-round survey was the widespread impact of disease-control measures on rural employment (Table 4). In February, nearly three-quarters (74 per cent) of village informants reported that villagers had stopped working because their workplaces were closed owing to the COVID-19 outbreak and related disease-control measures. Across the provinces, the rate of workplace closures reported by village informants in late February ranged from 51 per cent in Jiangxi province to 100 per cent in Ningxia. There were no villages in which everyone was back at work. In 59 per cent of villages, respondents reported that 100 per cent of the village's migrant and local workers were out of work.

The results presented in Table 4 also demonstrate that there were other reasons (beyond the shutting down of their places of employment) behind the high reported incidences of unemployment. Four out of every five village informants (81 per cent) reported that local public transportation had ceased to operate. Most village informants (64 per cent) stated that villagers were not permitted to drive to the cities. Almost all informants (93 per cent) indicated that rural individuals were not permitted to rent any place to live in a city owing to the restrictions put in place by urban governments and urban neighbourhood community

23 Zhou et al. 2020.

leaders. Thus, even when a villager's employer would have been willing and able to put the villager back to work, there were many barriers that prevented this. Interestingly, out of the 726 village informants, 487 (67 per cent) stated that the fear of infection was so great that many villagers did not want to leave the village to find employment even if the hiring, transportation and rental barriers were not in effect. In conclusion, owing to a combination of reasons, the employment rate was close to zero for a full month after the start of the quarantine.

In normal times, China has 288 million migrant labourers who leave their counties for extended periods to work in distant cities.²⁴ There are an additional 93 million rural workers who live in their villages but work elsewhere within their own counties (so called "leave in the morning and return home in the evening," or *zaochu wangui* 早出晚归, workers).²⁵ Together, these two populations of rural workers amount to 381 million people. If it is assumed that 75 per cent of these workers had stopped working (because their workplaces were closed because of the COVID-19 outbreak and related disease-control measures), this indicates that 286 million workers were unemployed for that month. Rural migrant workers make an average of roughly US\$500 per month, but they are paid only if they work.²⁶ This means that the lost wages of rural workers amount to as much as US\$143 billion per month. A loss of that magnitude in February alone would be higher than the highest estimate of the global economic impact of the SARS virus in 2003.²⁷

In our first-round survey, village informants reported whether agricultural production activities were disrupted. Over 90 per cent of the village informants reported that there were no shortages of agricultural supplies or animal feed in their villages. In fact, the government had put together programmes to mitigate the impact of COVID-19 on the production and marketing of agricultural products both during and after lockdown. Action was taken by the government to ensure that the logistics for the production and marketing of agricultural products, such as providing access to vehicles for transporting fresh and perishable agricultural products, remained stable. Research based on stratified random sampling shows that the impacts of the pandemic on vegetable production, sales volume and price were relatively small outside of Hubei.²⁸ Other research also suggests that the pandemic had a lesser impact on the supply side of the agricultural supply chain than on the demand side because of the lockdown restrictions on residents.²⁹

Access to employment following the lifting of the disease-control measures

Even with the lifting of the restrictions on movement in March, a significant majority of villagers appeared unable or unwilling to find work (Table 4).

24 NBS 2019b.

25 MOHRSS 2018.

26 NBS 2020b.

27 Smith 2006.

28 Zhou et al. 2020.

29 Gu and Wang 2020.

Table 4: **Reported Impact of COVID-19 Disease-control Measures on Employment and Income**

Employment and Income Questions	February <i>N</i> = 726	March <i>N</i> = 348
Villagers are unable to work because workplaces are closed	74.24	67.53
Villagers are unable to use public transportation to travel to city	81.68	4.60
Villagers are unable to drive or carpool to the city	64.32	2.01
Villagers are unable to rent a place to stay in the city	93.66	10.34
Villagers decided not to leave the village to work for fear of infection	67.08	60.92
Villagers reported income decreased	91.60	85.34
Prices of common goods were higher than last year	63.22	65.80

Note:

Data are *n/N* (%), where *N* is the total number of village informants who responded to each question.

When asked to estimate what share of workers were employed in cities in March 2019 versus March 2020, 59 per cent of the village informants reported that at least half of the workers in the village were still unemployed after the lifting of the disease-control measures. Only 12 per cent of the respondents reported that more than three-quarters of the workers in the village were back at work after the lifting of the restrictions. This indicates that even after the quarantine was lifted, at least half – and potentially up to 60–70 per cent – of the rural workers who had been working in the previous year were still not working.

The March survey data yield some insight into why workers remained out of work. Government-mandated and voluntary workplace closures appeared to continue to prevent at least some village workers from seeking employment in 67 per cent of the villages. A majority of villages (61 per cent) also reported that some rural residents were unwilling to return to work for fear of being infected by the coronavirus. By late March, however, transportation and rental restrictions for outsiders did not appear to be one of the factors that kept people from work.

The findings of the February and March surveys differ from official statistics on the re-opening of China's economy in key respects. Data from the Ministry of Industry and Information Technology show that 29 per cent of China's enterprises had resumed operation as of 23 February.³⁰ Although this is an aggregate number that covers enterprises that employ primarily urban workers as well as rural workers, it is roughly in keeping with our finding that 75 per cent of the rural workers were confined to their villages in February. Official data, however, later showed that 71 per cent of enterprises had opened by 24 March.³¹ This sharply contrasts with the March survey results, which indicate widespread workplace closures and the absence of off-farm employment opportunities at over 50 per cent.

30 Ministry of Industry and Information Technology 2020.

31 Ministry of Commerce 2020.

Our findings provide new empirical evidence to show that economic downturns have larger impacts on unemployment among low-income groups. Studies on the Great Recession in the United States (2007–2009) show that workers with low education and low skills were hit the hardest during the economic downturn, and their unemployment levels stayed stubbornly high well after the economy began to recover.³² Similarly, migrant workers in China experienced the most dramatic employment decline during the last global financial crisis.³³ Our research is consistent with a growing literature that shows greater negative impacts of COVID-19 on the rural population.³⁴ A March survey by Peking University that combined data from more than one million enterprises showed that job listings for lower-salaried workers dropped nearly four times more than did those for higher-salary positions.³⁵ The fall in off-farm employment during the pandemic was a very important factor that resulted in higher incidences of falling back or falling into poverty. Luo Ren-Fu and colleagues show that among those who recently transitioned out of poverty, 23 per cent reported that they might fall back into poverty owing to the COVID-19 pandemic.³⁶

Impacts of the disease-control measures on income

The substantial decline in employment during and after the quarantine was already having an impact on the livelihood of rural communities in our sample, especially by late March (Table 4). Most of the village informants reported that disease-control measures had reduced their income levels in February (92 per cent) and March (85 per cent). Over half of the villages surveyed (53 per cent) reported that local workers had lost approximately two months' worth of income, or about 17 per cent of their annual income. This drop in income was also exacerbated by a rise in the cost of living. The prices of common goods in 2020 were reported to be higher than in 2019 in February (63 per cent) and March (66 per cent).

As a result, families, especially those with relatively limited savings, had to decide what commodities to cut down on in order to survive on their now-limited funds (Figure 1). The data on reduced spending are based on the self-reported data of village informants. About 55 per cent of village informants reported that they had reduced spending on food. The share of reported reduced spending was smaller for education (10 per cent) and healthcare (9 per cent). To cope with income loss, 10 per cent of villagers borrowed money from relatives or friends. Of those villagers who did not have to give up essentials (for example, nutrition, schooling, healthcare), all expenditures were paid for out of savings. Our data show that only 1–2 per cent of village informants chose emergency plans, such

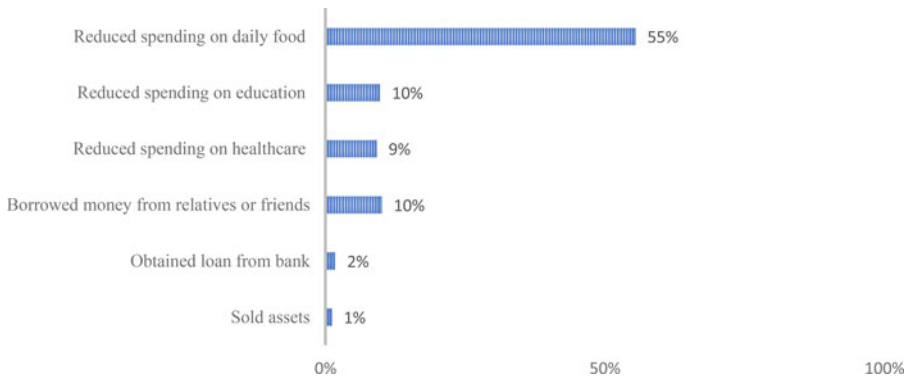
32 Verick 2009; Hoynes, Miller and Schaller 2012; Duque, Pilkauskas and Garfinkel 2018.

33 Cai and Chan 2009; Chan 2010.

34 Che, Du and Chan 2020; Luo et al. 2020.

35 Lu, Song and Shen 2020.

36 Luo et al. 2020.

Figure 1: **Villagers' Self-reported Responses to Decreases in Income in March**

as getting a loan from a bank or selling assets. Because this was just the beginning of the income decline, under the stagnating economy and global recession, rural workers might have been reserving such emergency plans for the future.

The government in China, like most governments around the world, took several actions to minimize the impact of the disease outbreak on incomes. There appeared to be a mismatch between urban workers covered by the social safety net and those rural workers who truly needed aid; thus, the impacts of COVID-19 may have created new layers of inequality along *hukou* 户口 lines. By early March, the government had rolled out programmes to provide subsidies for key enterprises, systematically allowing for delayed debt repayment and providing emergency loans to qualifying firms.³⁷ Local governments gave tax benefits to businesses and encouraged landlords to offer rent reductions.³⁸ To protect employment, especially in cities, the government prohibited firms from laying off salaried employees.³⁹

In contrast, there were almost no central government actions taken to directly address the plight of rural workers. Although the government announced relief measures and subsidies for households in poverty (not specifically in rural areas) to cope with COVID-19 in early March,⁴⁰ by the time of the second survey, village informants in only 17 per cent of villages reported that a COVID-19 relief policy had been put in place in their villages. Most of the relief measures were given in small quantities of grains and other foodstuffs. This finding may not be surprising, as research has shown that social spending in China has long been disproportionately directed to urban rather than rural areas.⁴¹

As China entered the economy re-opening phase, government officials and economists, realizing the gravity of the situation in rural China, began to devise

37 State Council 2020a.

38 Shaanxi Provincial Government 2020.

39 MOHRSS 2020.

40 State Council 2020c.

41 Wong 1998; Croll 1999; Gao et al. 2018.

economic policies to support rural Chinese affected by disease-control measures. For example, the central government planned to “ensure rural residents who return to their homes have a job and income” and encouraged local governments to transport migrant workers directly from rural villages to urban factories. Only 2 per cent of migrant workers (5 million out of 288 million) benefited from this effort.⁴² Academics have called for more direct transfers to be made.⁴³ By the first two months of the disease outbreak, 10–25 per cent of rural households were already suffering cutbacks in nutrition, schooling and healthcare. If the slow recovery in employment continues, the negative consequences to welfare will increase steadily.

COVID-19 and Rural Education

I can't get back to work. Many parents are staying at home like me, because my kids need help with their online courses. Grandparents don't know how to get online for the courses. All I can do is to have my kids sit in front of my phone's tiny screen, I have no idea how much they are learning.

Village informant from Ningxia, March 2020

Access to education under disease-control measures

Respondents reported widespread disruptions to regular schooling but also various efforts to mitigate these disruptions (Table 5). According to our first-round survey, in February, all 726 village informants (100 per cent) reported that school was not in session in their village, and no village informants knew when schools would re-open. Of the villagers, 69 per cent reported, however, that local teachers were in contact with the parents of students and provided daily homework assignments, mostly through WeChat, a social media app. In the case of the villages whose children were provided homework assignments, 83 per cent also received grades and feedback from local teachers. Approximately 71 per cent of villages had students who attended classes online. In 40 per cent of these villages, online courses were taught by local teachers. In the remaining 60 per cent, students did not know the online instructor (i.e. the instructor was from the county or province). Further, in 75 per cent of the villages, students could see their teachers during their online classes. Teachers, however, could seldom see their students online (in only 19 per cent of the villages). This indicates that lessons might have been conducted asynchronously, with students watching their teachers through pre-recorded videos and lectures and submitting their assignments at a later date without any videoconferencing follow-up.

42 “Renshe bu: leiji dian dui dian, yi zhan shi, yunsong nongmin gong chao 469 wan ren” (MOHRSS: in a point-to-point one stop way, more than 4.69 million rural workers transported). *Renmin wang*, 25 March 2020, <http://finance.people.com.cn/n1/2020/0325/c1004-31648286.html>. Accessed 13 May 2020.

43 “Zhuanfang Yao Yang: jianyi fa 1.4 wan yi yuan tebie guozhai, banshu guoren mei ren fa 2 qian” (Interview with Yao Yang: suggestion to issue 1.4 trillion yuan in treasury bonds to issue half the population with 2,000 yuan). *Paper.com*, 24 April 2020, https://www.thepaper.cn/newsDetail_forward_7101377. Accessed 13 May 2020.

Table 5: **Reported Impact of COVID-19 Disease-control Measures on Education and Healthcare**

	February	March
<i>Education</i>		
School is in session	0/726 (0)	0/348 (0)
Schools are scheduled to re-open	0/726 (0)	74/348 (21.26)
Local teachers assigned homework for students daily	500/726 (68.87)	302/348 (86.78)
Local teachers corrected homework for students daily	415/500 (83.00)	284/302 (94.04)
Schools organized online courses	513/726 (70.66)	304/348 (87.36)
Online courses were taught by local teachers	206/513 (40.08)	203/320 (63.44)
Students could see a video of the teacher during online courses	387/513 (75.44)	252/304 (82.89)
Teacher could see a video of students during online courses	100/513 (19.49)	64/304 (21.05)
<i>Healthcare</i>		
Villagers were able to see a doctor outside of village	687/726 (94.63)	291/348 (83.62)
Village clinic was currently open	516/726 (71.07)	315/348 (90.52)
Villagers were able to buy medicine	645/726 (88.84)	313/348 (89.94)
Villagers chose to delay healthcare because of COVID-19	N/A	68/348 (19.54)
Villagers knew how to use online doctors/telemedicine	N/A	14/348 (4.02)

Note:

Data are n/N (%), where N is the total number of village informants who responded to each question.

Access to education following the lifting of the disease-control measures

In our second-round phone survey, after the loosening of disease-control measures, we found slightly improved results. The share of local teachers who provided homework assignments (87 per cent) increased. In the villages where children were provided with homework assignments, a higher portion received grading for their homework (94 per cent). In addition, more students (87 per cent) attended online classes. The share of online classes taught by local teachers increased from 40 per cent in February to 63 per cent in March. None of the schools in our sample villages, however, was in session, and only 21 per cent of the schools had set a date to re-open. The share of students who could see their teachers during their online classes (82 per cent) and the share of teachers who could see their students (21 per cent) remained roughly the same in February and March.

With more than 270 million children and adolescents in China attending online classes because of school closures, the quality of online classes was key to maintaining student learning.⁴⁴ There are several reasons, however, to believe that the quality was not high. First, 92 per cent of village informants reported that students primarily used smartphones to attend online classes, the small screens of which are not ideal for student learning. Few rural students used

44 “Yi qing zhi xia, ‘tingke bu tingxue’ 2.7 yi xuesheng jiang ‘zhai’ jia shangke” (Classes suspended for 270 million students who will learn from home because of the epidemic). *Renmin wang*, 9 February 2020, <http://edu.people.com.cn/n1/2020/0209/c1053-31577853.html>. Accessed 21 June 2020.

tablets (9 per cent) or computers (19 per cent) for their online classes. Second, internet connectivity is erratic in parts of the countryside: 76 per cent of students reported difficulties with their internet connection during online classes, and 30 per cent of students had to stay outdoors to maintain reception. In addition to the issues of devices and connectivity, only 50 per cent of the village informants reported that students could communicate with teachers during their online classes.

These limitations in educational opportunities during online classes may lead to unequal learning outcomes between rural and urban China. The educational gap that already exists between rural and urban areas has had a negative impact on human capital accumulation in China for the past 40 years.⁴⁵ Prolonged school closures during the COVID-19 outbreak may have further widened this gap. Prediction models have shown that a three-month school closure could lead to more than a year's worth of learning loss for students, as they will be behind the curriculum upon re-entering school and will fall further behind as time goes on.⁴⁶ The results from a large-scale survey show that rural students fared worse than urban students in learning outcomes during COVID-19.⁴⁷ These gaps in both the learning opportunities and learning progress of rural and urban students during COVID-19 stand to exacerbate the already substantial rural–urban disparities in academic achievement and educational attainment.⁴⁸

Moreover, the hidden opportunity costs of the time required for rural parents to support their children's online education also could contribute to gender inequality in rural China. Parents in our sample reported spending about 60 minutes per day on helping their children with their schoolwork. Concerned about their children's educational progress, many villagers, especially mothers, told us during the interviews that they had foregone opportunities for work (on the farm, at home and perhaps in local industries) to be with their children and to help them with their schoolwork. A previous study found that female women in rural China were less likely to be in the labour force, and gender bias in employment status increased after economic shocks.⁴⁹ Thus, the impact of school closures owing to COVID-19 might exacerbate the employment and associated gender inequities that the *hukou* system has already inflicted on rural communities.⁵⁰

45 Zhang, Huafeng 2017; Golley and Kong 2018.

46 Kaffenberger 2021.

47 Li et al. 2021.

48 Zhang, Dandan, Li and Xue 2015.

49 Giles, Park and Cai 2006.

50 Mao, Connelly and Chen 2018.

COVID-19 and Rural Healthcare

Village doctors work with village authorities to check temperatures and encourage hand washing in the village. There is a loudspeaker that repeats quarantine rules every morning and in the afternoon. Every household can hear it. If a villager has a fever, he or she will be taken to a designated hospital immediately.

Village informant from Gansu, February 2020

Access to healthcare under disease-control measures

Most villages reported that healthcare remained accessible during and after quarantine. During the quarantine in February, 71 per cent of the village clinics were open daily (Table 5). Almost all village informants (95 per cent) reported that they were able to leave the village to seek healthcare. Despite the potential for the pandemic and quarantine to affect supply chains, medicines were reported to be generally available in most of the sample villages in February (89 per cent). Although healthcare was generally accessible, about 20 per cent of the village informants reported that people had delayed seeking routine healthcare services because of COVID-19. This may have been because people were avoiding the increased risk of contracting the virus or because of the increased difficulty of travelling to seek care as a result of quarantine measures. Although telemedicine was promoted across the country as a means to provide easy access to medical consultations for people with potential symptoms of the virus and to alleviate the strain on the health system, very few (4 per cent) villagers reported being aware of telemedicine services.⁵¹

Access to healthcare following the lifting of the disease-control measures

After the quarantine, the share of village clinics reported to be open daily increased to 91 per cent in March (Table 5). A large share of village informants reported that they could seek healthcare freely (84 per cent) and had good access to medicines (90 per cent).

Although it seems that the virus was well contained in rural areas during the initial COVID-19 outbreak, an important question arises as to whether the healthcare system could handle future outbreaks of COVID-19 and other diseases in rural China. China launched an ambitious push for healthcare reform as a policy reaction to the 2003 SARS pandemic.⁵² This was effective in improving access and healthcare utilization.⁵³ However, there remain major deficits in the quality of healthcare, particularly in rural areas. Recent research has shown that village and township doctors in rural areas misdiagnose the health problems of rural patients and provide inappropriate treatments at startlingly high rates.⁵⁴ A litmus

51 Hollander and Carr 2020.

52 Meng, Qingyue, et al. 2015.

53 Wagstaff et al. 2007.

54 Sylvia et al. 2015; Sylvia et al. 2017.

test for the pandemic preparedness of rural doctors may be their ability to diagnose and manage patients with symptoms of tuberculosis, another highly infectious respiratory disease that infects nearly one million people a year in China and at rates three times higher in rural areas than in urban areas.⁵⁵ The deficit of rural doctors who are competent in their ability to diagnose and treat diseases and other health conditions suggests that if there had been a major outbreak in rural areas, the disease might have exacted a much heavier toll.⁵⁶ Therefore, the COVID-19 pandemic highlights the importance of improving the quality of the healthcare system in rural China.

Conclusion

The findings of both survey rounds of 726 randomly chosen villages across seven provinces suggest that strict disease-control measures were successfully implemented in rural China and that compliance with disease-control measures was high. In February, all villages in our sample implemented strict measures on movement. By March, the quarantine barriers at the individual level were almost uniformly less strict, although restrictions on large gatherings were still largely present. The high level of compliance with control measures was likely owing to high enforcement capability, pervasive information campaigns to raise public awareness and a high degree of receptivity for disease-control measures thanks to previous experiences with SARS.

These strict disease-control measures likely helped to contain the infection in rural China. According to our survey, the infection rate for the sample's 726 villages was 0.001 per cent, about 13 infections for every one million people. This rate is almost exactly the same as the rate of infection reported across China, with Hubei province excluded. No surveyed villages reported deaths from the virus.

The control measures, however, had strong negative implications for the rural population and might have accelerated the already high levels of inequality between rural and urban households in China in several ways. First, our findings show that the economic downturn has taken a larger toll on unemployment among the rural population. For a full month during the quarantine, the employment of rural workers was essentially zero. Even after the quarantine measures were lifted, nearly 70 per cent of the villagers were still unable to work. During the quarantine in February, restrictions on local public transportation and access to rental spaces created barriers for employment in rural areas. In March, although the restrictions on transportation and renting were lifted, rural workers still decided not to leave the village to work for fear of infection.

Second, rural workers have suffered significant income losses in this pandemic, and the impacts of COVID-19 might have created new layers of inequality along

55 Sylvia et al. 2017.

56 Xi et al. 2020.

hukou lines. The combination of the loss of two months or more of income and the increases in the prices of common goods resulted in rural households having to cut down on education, nutrition and health expenditures and forced many to borrow money. There is a strong need for the government to put in place measures to extend the coverage of the social safety net among rural communities. In the short term, policymakers could consider cash transfers for struggling families to ensure that they do not reduce spending on essentials and to stimulate consumer spending.

Third, although actions were taken to mitigate the potentially negative effects of control measures on education, the limitations in educational opportunities during online classes may have led to unequal learning outcomes between rural and urban China. Moreover, the hidden opportunity costs of the time required for parents to support their children's online education also may have contributed to gender inequality in China.

Finally, although it seems that the virus was well contained in rural areas during the initial COVID-19 outbreak, healthcare quality in rural China must be improved to handle future outbreaks of COVID-19 and other diseases. Our results show that the healthcare system remained functional in rural areas, with most villagers still able to access healthcare during the outbreak. The COVID-19 pandemic, however, highlights the importance of improving the quality of the healthcare system in rural China.

As COVID-19 continues to spread across the globe, our findings have strong implications for other countries that have adopted similar lockdown policies. Based on the findings of this research, it is not possible to conclude that nationwide quarantines (as opposed to targeted, local measures) are an advisable means of limiting the spread of the virus, even for the relatively few countries able to enforce such measures. In controlling the COVID-19 pandemic, lockdown policies might exacerbate pre-existing social inequality. In the context of rural communities in China, which suffer from deficits in social safety nets and healthcare access, aggressive measures to contain the spread of the virus may be warranted. When implementing COVID-19 control measures, however, countries must provide aid to economically vulnerable communities. Rural communities and other economically vulnerable groups are among the hardest hit and may face dramatic increases in economic hardship.

Conflicts of interest

None.

Biographical notes

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摘要: 本文记录了中国为控制新冠病毒在农村地区实施的防疫措施, 并研究防疫措施对农村经济社会的影响。对除湖北省之外的七个省随机采样抽取的 726 个村进行两轮的电话访谈发现, 样本农村地区均采取了严格的防疫措施, 新冠病毒在样本地区的传播情况得到有效控制。样本农村地区的新冠感染率约仅为 0.001%, 和全国除湖北省之外的平均感染率基本一致。

样本地区没有发现因新冠感染去世的病例。研究同时发现，防疫措施对农村社会经济造成潜在负面影响。在严格防疫措施实施的近一个月期间，农村劳动力几乎无法外出就业。即使在防疫措施解除之后，仍有约 70% 的农村劳动力因为工作或打工的地方停工不能就业。虽然各级政府采取了诸多举措降低防疫措施对农村就业、教育和医疗的影响，但是防疫措施可能进一步拉大城乡间的发展差距。

关键词: 新型冠状病毒; 防疫措施; 农村; 经济影响

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Appendix

Overall, the village informants in our sample had demographic characteristics similar to those of the general rural population according to several metrics. First, 52 per cent of the village informants were female, 42 per cent had a primary school education, and 45 per cent had a junior high school education. The 2010 Census data show that the same percentage (52 per cent) of the rural population was female. The percentages of the rural population who had a primary school education (44 per cent) and junior high school education (45 per cent) in the 2010 Census data also were similar to those of our sample.⁵⁷ Moreover, the age of our village informants ranged from 20 to 74 years old, with an average

57 NBS 2010.

Appendix Table 1: **Village Informants' Individual Characteristics**

Characteristic	Mean/%	SD	Min	Max
Age	39.89	9.32	20	74
Female	0.52	0.51	0	1
Education level				
Primary school	41.90	0.49	0	1
Junior high	44.92	0.49	0	1
High school	8.63	0.28	0	1
Above high school	4.53	0.21	0	1
Occupation				
Farm only	31.47	0.46	0	1
Off-farm work only	28.57	0.45	0	1
Mixture of farm and off-farm work	17.63	0.38	0	1
Housework	22.32	0.42	0	1
Has school-age children	85.12	0.57	0	1

age of 40 years. Finally, 29 per cent of our village informants were migrant workers, close to the national average, which is about 31 per cent. According to the National Bureau of Statistics' "Migrant workers survey report," 288 million out of the 888 million rural population were migrant workers.⁵⁸ Of the 726 village informants, 618 (85.12 per cent) had children of school age.

58 NBS 2019b.