

ECONOMICS WORKING PAPER

The Vulnerability of Jobs to COVID-19: The Case of Malaysia

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Abstract

Malaysia's economy has been adversely affected by COVID-19 and the subsequent mobility restrictions implemented to flatten the curve of the pandemic. This study estimates the extent and distribution of jobs most vulnerable to COVID-19. It finds that about 64.5 percent of jobs in Malaysia cannot be performed from home, after adjusting for internet access while about 50.9 percent of jobs require high levels of physical proximity. These jobs are those that are most vulnerable to COVID-19, particularly if strict mobility restrictions are reinstated. Workers most at risk are primarily those that were already vulnerable before the crisis due to their relatively low education, low level of income and advanced or very young age. Jobs in less developed regions of Malaysia are also particularly vulnerable. Against this backdrop, the study argues that proactive social protection and jobs policies are needed to mitigate the employment impacts of COVID-19 in Malaysia.

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The Vulnerability of Jobs to COVID-19: The Case of Malaysia¹

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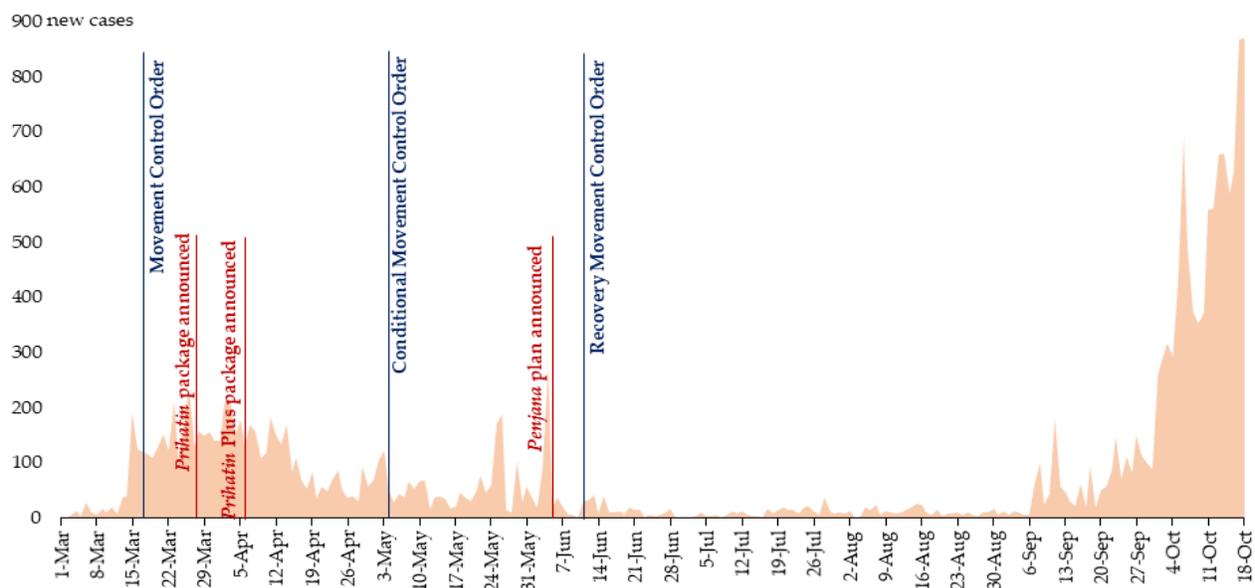
1. Introduction

Malaysia has been adversely affected by COVID-19 and the subsequent mobility restrictions implemented to flatten the curve of the pandemic. The health and human toll of the crisis on Malaysia has been severe, with 35,425 confirmed cases and 271 deaths as of November 4, 2020, and many more Malaysians suffering from economic hardship and diminished prospects. Nevertheless, Malaysia has performed better in mitigating the impacts of the crisis than many other countries, due to the government's swift action in implementing mobility restrictions and other measures. Soon after the first case of the virus was reported in Malaysia in January 2020, the government enacted contact tracing, quarantine requirements for returning travelers and a travel ban for those coming from China. With increases in the number of identified cases by mid-March, the government enacted the Movement Control Order (MCO) on March 18. During the MCO, businesses could not operate unless specifically authorized by to do so. In May, the MCO was replaced by the Conditional Movement Control Order (CMCO) and subsequently the Recovery Movement Control Order (RMCO) that allowed for progressively greater mobility and resumption of economic activity. Under the CMCO and RMCO, all economic sectors have been allowed to re-open except for those on a negative list, subject to COVID-19 standard operating procedures (see Figure 1).

As of November 4, 2020, some mobility restrictions and physical distancing requirements remain in place, with greater restrictions in regions with high numbers of cases, and many employers continue to offer or require work from home. Recent sizeable spikes in the daily cases have left some states in CMCO whereas other less-affected states are currently undergoing RMCO.

¹ The authors thank Firas Raad, Philip O'Keefe and Yasser El-Gammal for guidance and Çağlar Özden, Harry Moroz, and Kenneth Simler for helpful comments and discussions. Findings, interpretations and conclusions expressed in this paper are entirely those of the authors and do not necessarily represent the views of the World Bank, its affiliated organizations, its Executive Directors or the governments these represent.

Figure 1: Timeline of Key Policy Responses and Daily Cases of Coronavirus in Malaysia



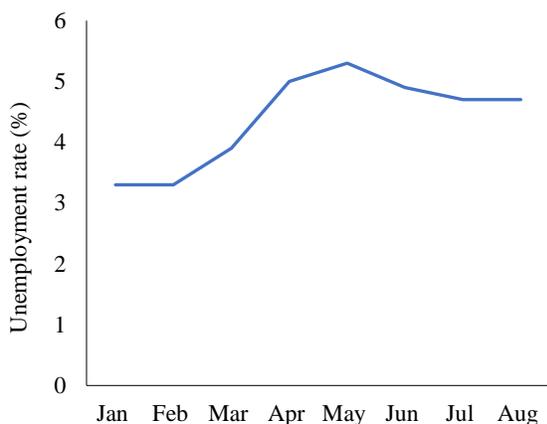
Source: Ministry of Health

Many workers and businesses have been impacted by the mobility restrictions, although employment and broad economic conditions appear to be gradually improving. Several months of mobility restrictions and business closures have severely impacted Malaysia's economy, resulting in a 17.1 percent year-on-year drop in GDP in the second quarter of 2020. The slowdown of the economy, which had begun even before mobility restrictions were imposed due to the decrease in tourism-related activities and disruptions in international supply chains, led to a sharp increase in unemployment (see World Bank 2020a). Figure 2 shows that the unemployment rate increased from 3.3 percent in January 2020 to 5.3 percent in May 2020, before decreasing to 4.7 percent in August 2020. In parallel, Figure 3 shows that the number of people outside of the labor force – which captures those who are jobless but not available to begin work or actively looking for a job, perhaps due to the difficulty of job search during the COVID-19 environment – has also been increasing.² In January 2020, there were 7.1 million people outside of the labor force. In June 2020, this number had increased to 7.4 million and moderated slightly to 7.35 million in August 2020. Moreover, unofficial government statistics based on a survey covering the period March 23 to 31, 2020 revealed that a large number of people had lost their jobs, and many others had been affected by

² See Bartik et al. (2020) and Aaronson (2020) on approaches and challenges to assessing labor market conditions using labor force surveys during the pandemic in the context of the United States.

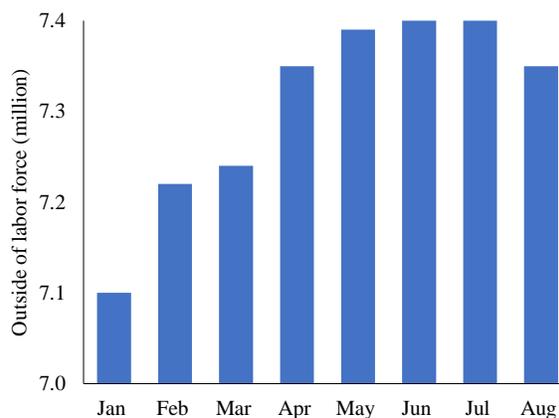
having had their working hours reduced, or by having been put on leave with not or partial pay (see DOSM 2020a). Similarly, data from the Employment Insurance System (EIS) shows that job losses increased by 42 percent year-on-year in the first quarter of 2020, and is expected to continue increasing between 50 percent and 200 percent year-on-year for each subsequent quarter in 2020 (see EIS 2020).

Figure 2: Unemployment Rate, January to August 2020



Source: Department of Statistics Malaysia

Figure 3: Working Age Population Outside of the Labor Force, January to August 2020



Source: Department of Statistics Malaysia

The economic impacts disproportionately affect the poor and those without standard employment contracts. According to unofficial government statistics, some private sector employees have lost their jobs, while close to half of self-employed respondents lost their jobs and more than two-thirds of them have savings for only less than a month. The rate of job displacement was been particularly high in the agriculture sector, which employs a large share of workers from the bottom 40 percent of the income distribution (B40). Informal workers, that is those without employment-related social insurance, have been hit particularly hard. Informal employment includes most of the self-employed and is estimated to comprise 39.2 percent of Malaysia’s total employment (World Bank 2020a) – but it was sidestepped by a large part of the early income support measures during the crisis. At least initially, this income support relied overwhelmingly on formal social insurance programs, thus making informal workers among the most economically vulnerable groups during this crisis.

In response to the crisis, Malaysia has announced and implemented a comprehensive series of social protection and employment-related measures. The measures have been part of the *Prihatin Rakyat* Economic Stimulus Package (*Prihatin*) which had a central focus on social assistance, and the National Economic Recovery Plan (*Penjana*) which had a greater focus on labor market programs. More specifically, the *Prihatin* package included a broad one-off cash transfer program channeled to the B40 and the middle 40 percent of the income distribution (M40), reduced contribution rates to and facilitated access to savings with Malaysia's largest retirement savings fund, the Employees' Provident Fund (EPF), and introduced relatively modest time-bound wage subsidies intended to incentivize employee retention. The *Penjana* package included an extension on the wage subsidy program, and incentives for training and hiring, with some focus on youth, people who had lost their jobs during the crisis, and gig economy workers. The plan also included incentives to support work-from-home arrangements as well as childcare subsidies. Overall, the direct fiscal injection from Malaysia's response has totaled RM45 billion or about 3 percent of GDP, with the bulk of the expenditure being channeled to the *Prihatin* one-off cash transfer, the wage subsidy program, and allocations for upskilling and reskilling (see World Bank 2020a). A second round of cash transfers and wage subsidies have also been announced under the *KitaPrihatin* package, with allocations totaling RM9.4 billion, to be disbursed from October 2020 onwards. Other policy areas, such as the strengthening of the health care system received smaller but still significant direct fiscal injections.

As the risk of another spike in COVID-19 infections remains a concern, the crisis has the potential to accelerate changes in the nature of work already underway beforehand. Malaysia's GDP is projected to decline by 4.9 percent in 2020, with household expenditures and business investment spending expected to only increase gradually and to remain subdued throughout the year due to heightened uncertainty (see World Bank 2020a). In parallel, as long as COVID-19 remains a health risk, businesses and jobs that cannot be performed from home and that require high levels of physical proximity are expected to face operational challenges. In addition, the crisis may accelerate changes to the nature of jobs brought about by the Fourth Industrial Revolution (IR4.0) and other megatrends already underway beforehand. In fact, Chernoff and Warman (2020) argue that the COVID-19 pandemic may accelerate the automation of jobs as employers invest in new technologies and production processes, while various news reports document a surge of demand for robots, especially in China (see CGTN 2020) – though this trend might have predated the COVID-19 crisis.

Against this backdrop, this study uses detailed data on employment patterns in Malaysia from DOSM and on the possibility to work from home and without physical proximity from America's Occupational Information Network (O*NET) data base to estimate the extent and distribution of jobs most vulnerable to COVID-19. In order to document the extent of jobs most vulnerable to COVID-19, the study relies on two indicators of this vulnerability that measure the ability to work from home and the degree of physical proximity involved in a job, respectively. The ability to work from home provides an indication of vulnerability to job loss with mobility restrictions in place, while the degree of physical proximity is an indicator of the likelihood that a worker can return to work given that COVID-19 remains a health risk, even if mobility restrictions are gradually lifted. To analyze the distribution of jobs most vulnerable to COVID-19, the study analyses the relationship between the two indicators and a number of socioeconomic variables including income, education, gender, urban-rural location, and employment status.³

The study finds that more than half of Malaysians have jobs that are either not conducive to home-based work or involve high levels of physical proximity, and are therefore most vulnerable during a prolonged crisis. Vulnerability is highest among those already more economically at risk prior to the crisis, including those with lower levels of education and the self-employed. Thus, further rounds of relatively broadly targeted, tax-financed cash transfers may be needed. The argument for such transfers is further strengthened by the observation that many of the most vulnerable are unlikely to be covered by social insurance, that the economic impact of the crisis is expected to persist in the foreseeable future, and that the occurrence of a second wave could lead to the return of stricter mobility restrictions (see World Bank 2020a).

The potential acceleration in the demand for digitization and automation requires workers to have skills that complement new technologies. Taking a forward-looking perspective, this study also looks at the types of skills that are associated with the ability to work from home. For this purpose, it explores the relationship between skills that have been increasingly in demand in the advent of

³ It should be noted that those who are employed in essential services for which operations continued despite the imposition of mobility restrictions have been less vulnerable to job loss but that the calculations in this study have not been adjusted for this factor due to the subjectivity and fluidity involved in the determination of essential services. While during the first phase of the MCO beginning on March 18, a list of essential services was defined that included sectors such as healthcare, banking, accommodation food supply and transportation services, the distribution of fuel and lubricants, solid waste management and public cleansing, and defense and security, the list was gradually expanded as mobility restrictions were lifted. In addition, there was a certain amount of subjectivity as business owners were to apply for approval to operate with the Ministry of International Trade and Industry (MITI). Failure to comply with MITI's conditions may have also resulted in the approval being revoked. Further, some non-essential services were also allowed to operate, subject to MITI's approval.

IR4.0 with the ability to work from home (see World Bank 2018). The data show that there is a positive relationship between occupations that allow work from home and that require non-routine analytical skills, non-routine interpersonal skills, and routine cognitive skills. Hence, continued support for upskilling and reskilling – for which the *Penjana* package has been a good starting point – will be important to address the likely increasing demand for these skills.

2. Home-Based Work, Internet Access, Physical Proximity and Vulnerability to COVID-19

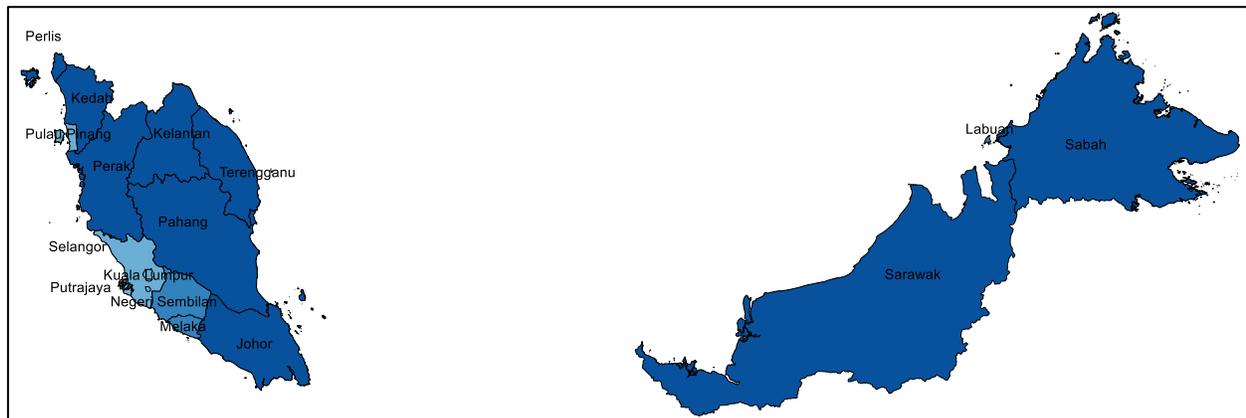
The first indicator of the vulnerability of jobs to COVID-19 used in this study is a measure of the ability to work from home corrected for internet access. Dingel and Neiman (2020) argue that the ability to work from home is a good indicator of an occupation’s vulnerability to COVID-19 and classify occupations into those that can be performed from home and those that cannot using responses to two surveys from O*NET covering “work context” and “generalized work activities.” If answers to these surveys reveal that an occupation requires daily “work outdoors” or that “operating vehicles, mechanized devices, or equipment” is very important to the occupation’s performance, the occupation is classified as one that cannot be performed from home. Building on the methodology by Dingel and Neiman (2020), Garrote Sanchez et al. (2020) find that 55 percent of all occupations in O*NET require internet, and argue that failing to account for this internet access requirement causes an overestimation of the number of jobs that can be performed from home. Accordingly, this study uses the same methodology as Garrote Sanchez et al. (2020) in identifying jobs that can be performed from home, which relies on additional O*NET indicators on the importance and frequency of computer and email use.⁴ The share of jobs that can be performed from home in this study adjusted for internet access is calculated as the sum of: (1) the share of jobs that can be performed from home and do not require internet access, and (2) the share of jobs that can be done at home and need internet access, multiplied by the internet access rate. The internet access rate is measured as the percentage of individuals using the internet by administrative district in Malaysia obtained from DOSM’s ICT Use and Access by Individuals and Households Survey 2019.

This study uses physical proximity at work as a second indicator of an occupation’s vulnerability to COVID-19 resulting from the health risk. This follows Mongey, Pilosoph and Weinberg (2020)

⁴ Following Garrote Sanchez et al. (2020), an occupation is classified as requiring internet access if the combined average score of O*NET indicators on the importance and frequency of computer and email use exceeds eight out of 10.

who argue that jobs that require physical proximity are most likely to be affected by policy measures to minimize disease transmission. For measurement purposes, the study again relies on O*NET data and more specifically on a question that captures the extent to which respondents' job requires them to perform tasks in close physical proximity to other people. Answers are rescaled to reflect a value between zero and one, where higher values indicate higher levels of physical proximity. Mongey et al. (2020) also validate the two measures, by comparing them with data from the American Time Use Survey and documenting that answers to the work-from-home and physical proximity questions in O*NET correspond to how Americans actually spend their time. Other studies that have also used one or both O*NET-based measures to assess the vulnerability of jobs during the COVID-19 crisis include Avdiu and Nayyar (2020), Garrote Sanchez et al. (2020), and Lekuangufu et al. (2020).⁵

Figure 4: Share of Jobs Not Conducive to Home-Based Work by State



Source: Authors' calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Note: Darker colors indicate higher shares of jobs that are not conducive to home-based work.

About 64.5 percent of jobs in Malaysia are not conducive to home-based work (adjusted for access to the internet) and 50.9 percent require high levels of physical proximity, making them most

⁵ The analysis conducted in this study assumes that the O*NET indicators, which are based on surveys conducted in the United States, are applicable to the Malaysian context. In other words, it is assumed that the task content of occupations is identical in Malaysia as in the United States. The assumption of applicability of the O*NET indicators has also been made by Garrote Sanchez et al. (2020) and Dingel and Neiman (2020) for a broader set of countries.

vulnerable during the COVID-19 crisis.⁶ At the outset, it should be noted that internet access in Malaysia is high, with the percentage of individuals with access to the internet ranging from 73.9 percent in Kelantan to 98.4 percent in Putrajaya. Nevertheless, almost two thirds of jobs are not conducive to home-based work while more than half of jobs require high levels of physical proximity. In addition, there is a high degree of state-level variability in the share of jobs that cannot be performed from home and that require high levels of physical proximity (see Figure 4 and Figure 5). In Putrajaya, the state or federal territory with the lowest share of jobs vulnerable to COVID-19, only 29.3 percent of jobs cannot be performed from home, and only 32.1 percent of jobs require high levels of physical proximity. In contrast, 78.1 percent of jobs in Kedah cannot be performed from home, while 56.6 percent of jobs require high levels of physical proximity. In Perlis, 62.6 percent of jobs require high levels of physical proximity, the highest share in the country. There are negative correlations both between GDP per capita and the share of jobs that are not conducive to home-based work, and between GDP per capita and the share of jobs that involve high levels of physical proximity, as also evident Figure 6. The correlation coefficients for the two relationships are -0.77 and -0.65 respectively, suggesting that workers in less developed states are more vulnerable to job losses during the COVID-19 crisis.

Figure 5: Share of Jobs Requiring High Physical Proximity by State

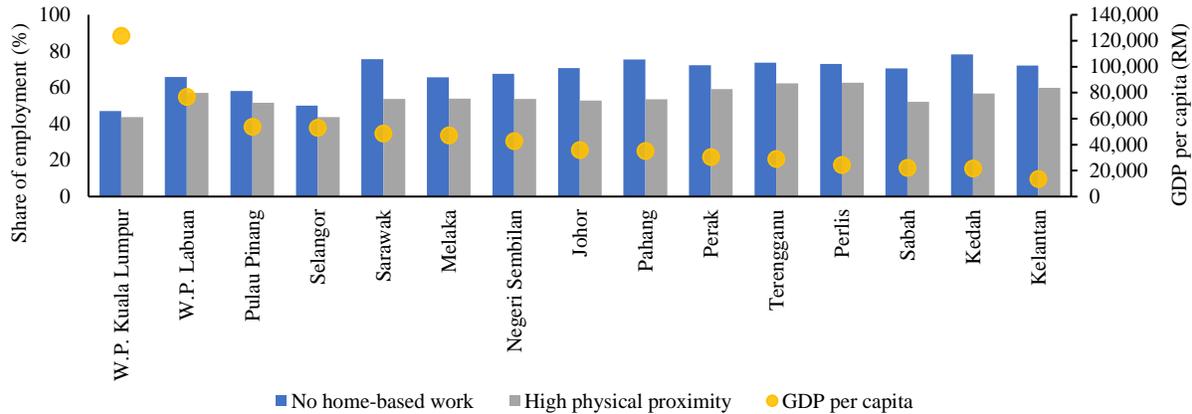


Source: Authors' calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Note: Darker colors indicate higher shares of jobs that require high levels of physical proximity.

⁶ It should be noted that jobs that are not conducive to home-based work and jobs that require high levels of physical proximity are vulnerable in different ways. Jobs that are not conducive to home-based work are most vulnerable when mobility restrictions are implemented, and become less vulnerable when mobility restrictions are lifted. Jobs that require high levels of physical proximity are vulnerable for as long as the health risk persists.

Figure 6: Share of Jobs by Ability to Work From Home, Physical Proximity, and GDP per Capita



Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

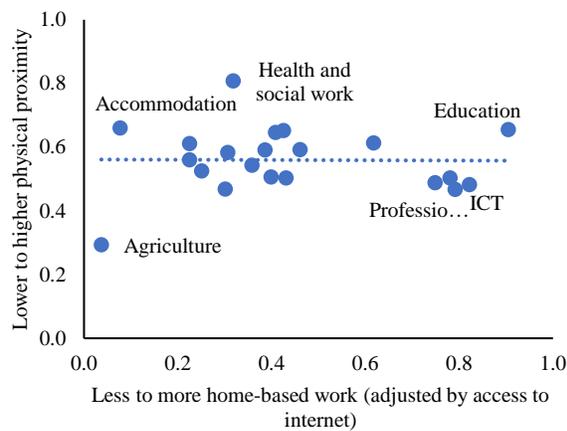
Note: GDP per capita for W.P. Kuala Lumpur includes that for W.P. Putrajaya.

Jobs that are conducive to home-based work are generally but not universally associated with lower degrees of physical proximity. Mapping the measure for working from home by Dingel and Neiman (2020) adjusted for internet access and the O*NET physical proximity measure to the occupations and sectors covered in DOSM’s 2016 Household Income and Basic Amenities Survey (HIS) reveals that a worker’s ability to work from home is negatively correlated to the level of physical proximity required by his or her jobs.

Figure 7 and Figure 8 visualize the relationship between the two measures by sector and occupation, respectively, and show practically no correlation on the sector level and a negative correlation on the level of occupations, though one that is not particularly pronounced.⁷ The finding of a negative but modest correlation on the occupational level is intuitive: occupations such as healthcare support are not likely to be able to be performed from home and involve a relatively high degree of physical proximity. In contrast, legal occupations are conducive to home-based work and involve low levels of physical proximity. But there are also occupations, such as those related to education and training, that are conducive to home-based work even though they involve a high level of physical proximity.

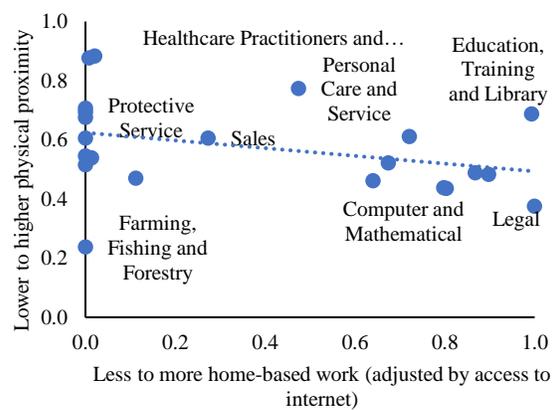
⁷ The correlation coefficients between the ability to work from home and physical proximity by sector and occupation are -0.01 and -0.33 respectively.

Figure 7: Ability to Work From Home and Level of Physical Proximity by Sector



Source: Authors' calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Figure 8: Ability to Work From Home and Level of Physical Proximity by Occupation



Source: Authors' calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Socio-Economic Status and Vulnerability to COVID-19

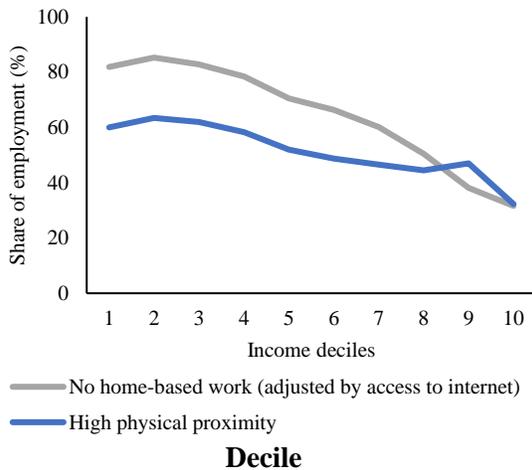
The jobs of workers with relatively low levels of income and education are most vulnerable to COVID-19. Figure 9 and Figure 10 plot the shares of jobs that are not conducive to home-based work adjusted for access to internet or that require a high degree of physical proximity by workers' income and education level. This provides an indication of the vulnerability of the jobs of different groups of workers to COVID-19. Maybe most strikingly, the figures show that workers with lower levels of income and education are more likely to have jobs that cannot be performed from home. 81.9 percent of workers in the lowest income decile are not able to work from home, compared to 31.6 percent of workers in the highest income decile. Similarly, 89.5 percent of workers without a formal education are not able to work from home, compared to 22.6 percent of workers with tertiary education.

There is a more pronounced relationship between workers' income and education with the ability to work from home than with the level of physical proximity. While there is a pronounced negative relationship between physical proximity and income, this negative relationship is more modest compared to that between the ability to work from home and income (see Figure 9). The difference in the share of workers with jobs requiring high physical proximity between the lowest

and highest income deciles is 27.7 percentage points, compared to a difference of 50.3 percentage points for the ability to work from home. Moreover,

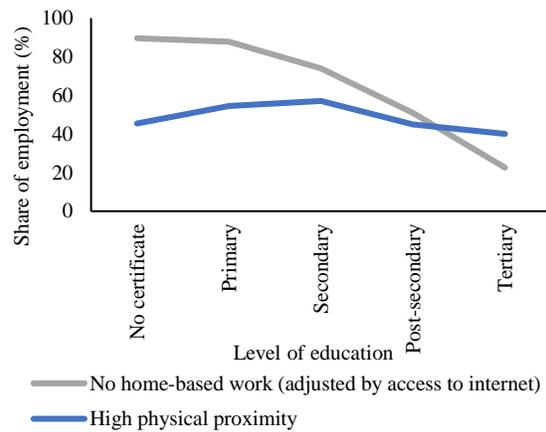
Figure 10 shows that there is only a relatively slight negative relationship between physical proximity and workers’ education level. The share of workers employed in jobs with high physical proximity averages 50.9 percent across the five education categories, with the share being lowest for workers with postsecondary and tertiary education (at 45 and 40 percent) and highest for those with primary and secondary education (at 54.4 and 57.7 percent).⁸

Figure 9: Share of Jobs by Ability to Work From Home, Physical Proximity, and Income



Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Figure 10: Share of Jobs by Ability to Work From Home, Physical Proximity and Education



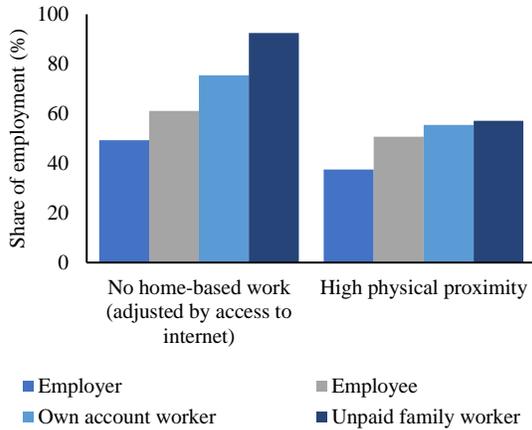
Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

The jobs of own account workers, unpaid family workers and those at advanced or very young age are also particularly vulnerable to COVID-19. Figure 11 shows that own-account workers and unpaid family workers are relatively more likely to have jobs that are not conducive to home-based work and that require physical proximity. Thus, their jobs are more vulnerable to COVID-19 than those of employers and employees, everything else equal. Figure 12 shows that the jobs of the youngest and oldest workers are also relatively more vulnerable to COVID-19, in particular with

⁸ These patterns found for Malaysia are similar to those documented for the United States by Mongey et al. (2020), who indicate that there is greater economic diversity among jobs associated with high levels of physical proximity than among jobs allowing for work from home.

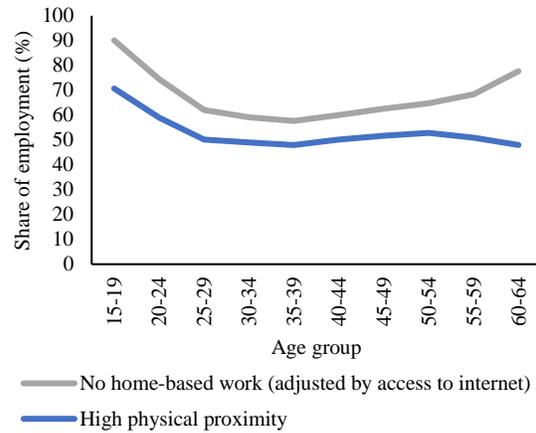
regard to the ability to work from home. In contrast, according to the physical proximity measure there is only a heightened vulnerability for workers age 15 to 19, but no clear relationship between workers’ age and their jobs’ physical proximity across other age groups.

Figure 11: Share of Employment by Ability to Work From Home, Physical Proximity and Employment Status



Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Figure 12: Share of Employment by Ability to Work From Home, Physical Proximity and Age Group

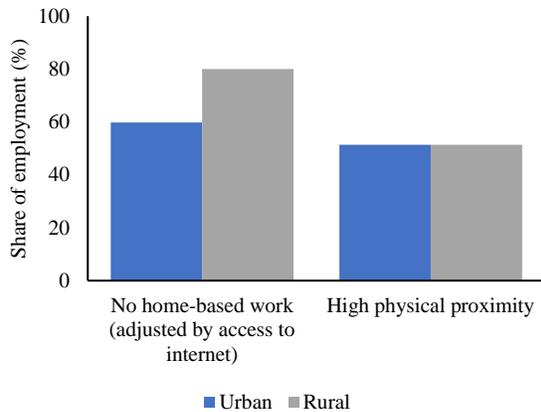


Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Workers from rural areas and men are more likely to have jobs that cannot be performed from home and are therefore somewhat more vulnerable to COVID-19 – though there are little differences in physical proximity requirements between urban/rural locations and genders. Figure 13 shows that 80 percent of workers in rural areas have jobs that are not conducive to home-based work, compared to 59.8 percent of workers in urban areas. The share of workers who have jobs that require a high degree of physical proximity in rural and urban areas are similar, at 51.3 percent and 51.4 percent respectively. In addition, Figure 14 shows that 70.5 percent of male workers have jobs that are not conducive to home-based work, compared to 53.2 percent of female workers. This association is somewhat reversed when looking at the degree of physical proximity, with the share of women with jobs that involve high physical proximity 7.8 percentage points higher than that of men. Nevertheless, workers from rural areas and men seem generally more likely to have jobs that are vulnerable to COVID-19 while it is also worthwhile to note that in Malaysia – as in many other

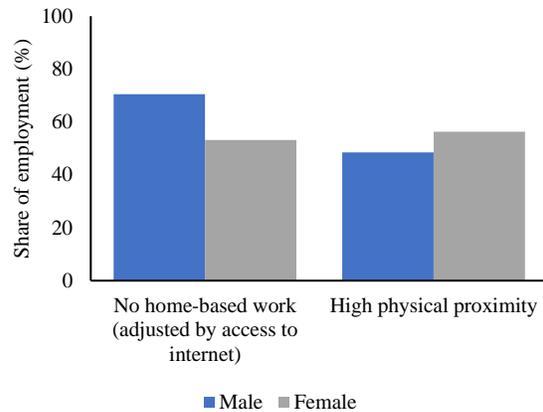
countries – workers from rural areas and women are on average relatively more economically vulnerable (see World Bank 2019 and World Bank 2020b).

Figure 13: Share of Employment by Ability to Work From Home, Physical Proximity and Location



Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Figure 14: Share of Employment by Ability to Work From Home, Physical Proximity and Gender



Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

The unequal distribution of jobs that can be performed from home – skewed in favor of those who are better off, and particular those with higher levels of education – is not unique to Malaysia. Using data for Europe, Brazil, India, Mexico and Turkey, Garrote Sanchez et al. (2020) find that workers with tertiary education are much more likely to be able to work from home, and that education explains a large share of the variation in the ability to work from home. Country-level analysis using actual data on unemployment during the crisis as opposed to vulnerability has also supported the finding that the impacts of COVID-19 on employment has caused disproportionate employment losses among those whose jobs cannot be conducted remotely, and specifically those with lower levels of education, for example in Spain (see Farré et al. 2020) and the United States (see Angelucci and Bennet 2020).

3. Home-Based Work and Changing Skills Requirements

While physical distancing requirements might soften over time, the increase in home-based work during the crisis is expected to last well into the recovery period from the COVID-19 pandemic and potentially beyond. Even though most mobility restrictions have at least temporarily been lifted in Malaysia and many other countries, the risk of COVID-19 contagion persists. As a result, some companies have started exploring the possibility of permanent home-based work options.⁹

In parallel, early research suggests that changes to the nature of work resulting from rapid technological change and automation already underway prior to the COVID-19 crisis will be accelerated. Chernoff and Warman (2020), Marin (2020) and KPMG (2020) see indications that the COVID-19 crisis has accelerated automation and other changes to the nature of work. This suggests that even as countries gradually recover from the crisis, the demand for skills that are less likely to be automated such as non-routine and manual skills may increase more rapidly.

Jobs that are less likely to be automated are those that require high levels of non-routine cognitive and socio-behavioral skills. Using data from O*NET, Acemoglu and Autor (2011) classify skills required in various different jobs according to five categories: non-routine cognitive analytical, non-routine cognitive interpersonal, and non-routine manual physical skills, which are all relatively less susceptible to automation; and routine cognitive and routine manual skills, which are both more susceptible to automation.¹⁰ Indeed, the experience of countries worldwide suggests that as automation has increased over time, the relative demand for non-routine cognitive analytical and interpersonal skills has grown (see World Bank 2018). This is because technology can complement, rather than replace these skills (see Chuah, Loayza and Schmillen 2019).

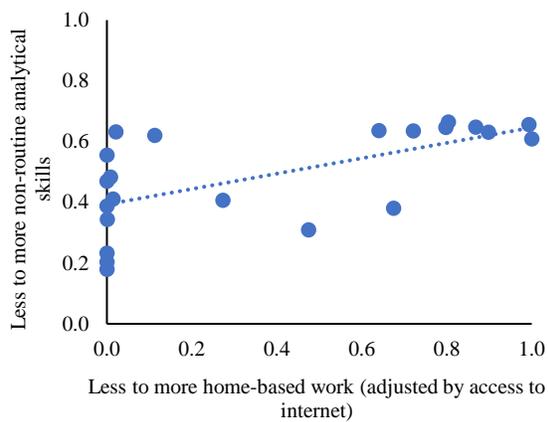
Jobs that can be performed from home are relatively more likely to require non-routine cognitive analytical and interpersonal skills, as well as routine cognitive skills. Using the same approach as Acemoglu and Autor (2011) to measure the degree to which occupational groups in Malaysia require non-routine cognitive analytical skills, non-routine cognitive interpersonal skills, and routine cognitive skills. Figure 15 through Figure 17 show that there is a positive relationship between the ability to perform home-based work and the requirement for these skills. This means that increased

⁹ <https://www.theedgemarkets.com/article/working-home-%E2%80%94-new-normal>

¹⁰ See also Autor and Handel (2013). Frey and Osborne (2017) argue that developments in machine learning and robotics are making many non-routine tasks automatable.

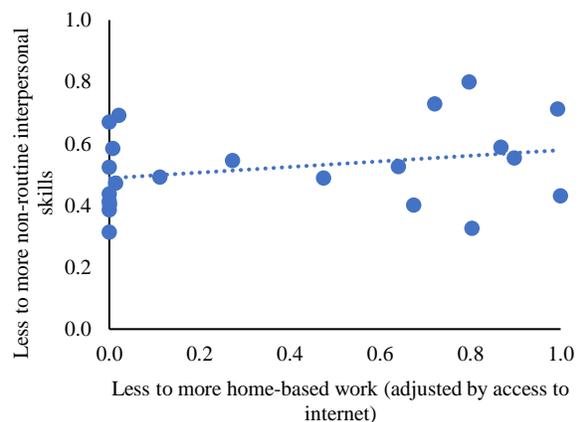
home-based work will likely further increase the demand for non-routine cognitive analytical and interpersonal skills, two types of skills already in the ascent prior to the crises due their complementarity with technology. In other words, the analysis reconfirms that non-routine cognitive skills such as logic, critical thinking, complex problem-solving and reasoning are increasingly in demand. It is worthwhile to note that there is also a positive relationship between routine cognitive skills and the ability to work from home, even though routine cognitive skills have been flagged by Acemoglu and Autor (2011) as being susceptible to automation. In this context, it is worth noting that evidence from the Philippines, Vietnam and elsewhere in fact shows that the demand for routine cognitive skills has increased in at least some developing and emerging countries (see World Bank 2018).¹¹

Figure 15: Ability to Work From Home and Importance of Non-Routine Cognitive Analytical Skills by Occupational Groups



Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

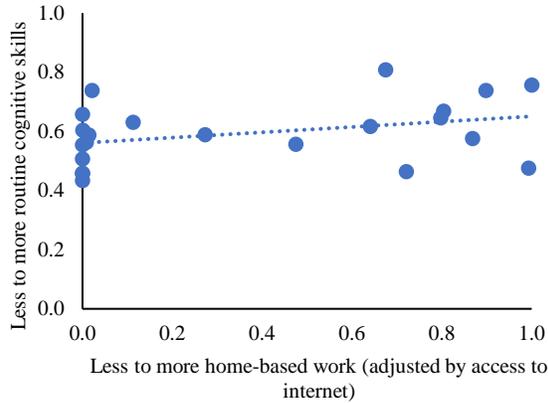
Figure 16: Ability to Work From Home and Importance of Non-Routine Interpersonal Skills by Occupational Groups



Source: Authors’ calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

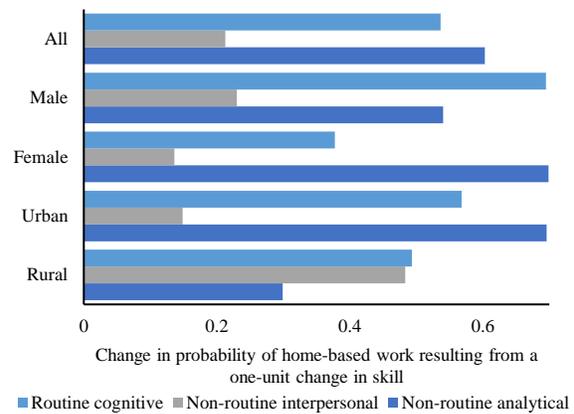
¹¹ The relationship between the ability to work from home and the requirement of non-routine manual physical skills and routine manual skills is not analyzed in this study, as some of the items from O*NET that are used to measure the ability to work from home are also used for the home-based work variable adopted from Dingel and Neiman (2020) Specifically, these items are those related to “controlling machines and processes” and “operating vehicles, mechanized devices, or equipment is very important.”

Figure 17: Ability to Work From Home and Importance of Routine Cognitive Skills by Occupational Groups



Source: Authors' calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Figure 18: Change in Probability of Home-Based Work Resulting From a One-Unit Change in Skill



Source: Authors' calculations based on Dingel and Neiman (2020), Garrote Sanchez et al. (2020), O*NET and Department of Statistics Malaysia

Non-routine cognitive analytical skills have the most pronounced positive relationship with the ability to work from home. Figure 18 presents the coefficients from a linear probability model with state-level fixed effects that regresses the ability to work from home on the three types of skills as well as on a set of sociodemographic variables including age, age-squared, gender, urban-rural location, educational attainment, and ethnicity. The figure shows that there are some common patterns but also differences in the relative importance in the three types of skills in increasing the likelihood of being able to work from home for different types of jobs. More specifically, non-routine cognitive analytical skills are the most important correlates of being able to work from home for women and workers in urban areas as well as for Malaysia as a whole while routine cognitive skills are the most important correlates for men and workers in rural areas.

4. Conclusions

This study uses detailed data on employment patterns and the possibility to work from home and without physical proximity, and finds that more than half of jobs in Malaysia are particularly vulnerable to COVID-19, particularly if strict mobility restrictions are reinstated. In order to document the extent of jobs most vulnerable to COVID-19 during a prolonged crisis, this study

relies on two indicators of this vulnerability that measure the ability to work from home (corrected for internet access) and the degree of physical proximity. The ability to work from home provides an indication of the vulnerability to job loss with mobility restrictions in place, while the degree of physical proximity is an indicator of the likelihood or at which a worker can return to work given that COVID-19 remains a health risk, even as mobility restrictions are gradually lifted. Based on this approach, the study finds that about 64.5 percent of jobs in Malaysia cannot be performed from home, after adjusting for internet access. At the same time, about 50.9 percent of jobs require high levels of physical proximity. These jobs will be among the most vulnerable, particularly during a prolonged crisis or if strict mobility restrictions are reinstated.

Vulnerability is highest among those already more economically at risk prior to the crisis, including those with lower levels of education and the self-employed, necessitating continued income support. Workers with jobs most vulnerable to COVID-19 include low income earners, workers with relatively low levels of educational attainment, own account and unpaid family workers, and workers from rural areas. These kinds of workers also tend to have informal jobs unprotected by formal social insurance (see World Bank 2020a). Thus, it is vital that direct income support in the form of cash transfers continues as long as the unprecedented crisis brought forth by the COVID-19 pandemic persists. In this context, further rounds of cash transfers targeted at the B40 – as the group that needs the most support – will remain vitally important. These transfers provide short-term relief to mitigate acute financial strains, they support medium-term recovery efforts, and they support consumption and human capital development at a time of economic downturn.

In addition, there is an increased and urgent need for skills-building programs that can enhance workers' non-routine cognitive analytical skills and non-routine interpersonal skills. These are skills that have been suggested to be relatively less susceptible to automation in the advent of rapid technological change that has been accelerated by the current crisis (see World Bank 2018 and Chernoff and Warman 2020). In the current environment, these skills are also required to obtain jobs that can be performed from home. As part of Malaysia's short-term economic recovery plan, *Penjana*, the government has already introduced incentives for the upskilling and reskilling of workers. It is important that these initiatives continue and that they focus on activities that enhance digital skills, but also other non-routine cognitive analytical skills and non-routine interpersonal skills that can complement rapid technological advancement against the backdrop of the changing nature of work.

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