INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 14, Issue 12, (2024) E-ISSN: 2222-6990

Internet Usage Pattern among Students and Working Groups: A Comparative Analysis between Rural and Urban Areas in Malaysia

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v14-i12/23711 DOI:10.6007/IJARBSS/v14-i12/23711

Published Date: 16 December 2024

Abstract

The internet has fundamentally changed our social lives, from how society communicates, facts are sought and practised, financial transactions are made, and governmental, private, and educational activities are conducted. However, during the COVID-19 pandemic, the internet became indispensable by enforcing the Movement Control Order (MCO). Hence, this research aims to explore the internet usage pattern among students and working groups in Malaysia, specifically comparing urban and rural areas. The research data were collected using offline and online survey questionnaires to reach the targeted samples. The findings explain that communities in rural areas need to gain knowledge of information technology, especially primary school students. This research provides further understanding of students' and working groups' internet usage patterns from various levels. In addition, there are significant differences in the patterns between urban and rural areas. Interestingly, the findings indicate an inadequacy of internet accessibility in urban areas. In addition, the continuity of new norms in the post-pandemic may produce different outcomes in internet usage patterns in urban and rural areas. Therefore, this research contributes to understanding the digital divide among students' and working groups, both in urban and rural areas. Hence, these research findings could provide policymakers greater insight into long-term planning for digital inclusion in Malaysia.

Keywords: Internet Usage Pattern, Students, Working groups, Urban Areas, Rural Areas

Introduction

In response to the escalating COVID-19 epidemic, Malaysia promptly implemented Movement Control Orders (MCOs) on March 18, 2020, making it one of the pioneering governments in Southeast Asia to do so. These orders restricted the operation of non-essential services, enabling only necessary services to continue functioning. The Movement Control Order (MCO) in Malaysia imposed several limitations, such as mandating a larger number of public and private sector employees to engage in remote work and imposing restrictions on business operating hours. Schools and tertiary educational institutions have also been closed because of the Movement Control Order (MCO). Consequently, internet usage has become increasingly crucial during the COVID-19 pandemic because of the Movement Control Order (MCO). Urban and rural schools and higher learning institutions encountered exceptional obstacles during the MCO period because of disrupted teaching and learning. Online learning was used by teachers and academics as an alternative to replacing conventional face-to-face teaching and learning during the pandemic (Devisakti & Ramayah, 2021). Concurrently, employed individuals were required to engage in remote work amidst the COVID-19 pandemic. It involves the allocation of tasks and obligations to employees, while also restricting them from working in the office (Abiddin et al., 2022).

In addition, Malaysia encounters underlying digital exclusion. Economically disadvantaged households depend on mobile devices for internet connectivity, which are ill-suited for educational endeavours (DOSM, 2010). In 2018, there was a clear digital divide between different social classes and the government, as seen by the low rate of computer usage and lack of fundamental Information and Communication Technologies (ICT) skills (DOSM, 2010). Another significant concern regarding internet access is the interruption of internet connectivity by strata in the states of Peninsular and East Malaysia. Rural areas in Malaysia continue to experience inadequate connectivity, with lower rates of internet and broadband access compared to urban areas. (Mohammad & Sidaway, 2012; Umar, 2021). Additionally, numerous complaints have been made, specifically addressing the level of preparedness and readiness of both students and institutions in terms of literacy, competencies, infrastructure, and financial resources. The majority emphasised the insufficient financing for the establishment of high-speed broadband networks and the limited network coverage, particularly in rural regions. (Mia et al., 2021).

On the other hand, workers must have the necessary resources to work from home. Employees' ability to work from home is constrained by limited household access to Fixed Broadband, a lack of mobility (unattached to the workplace), computer hardware, and internet connectivity (Tumin, 2020). The penetration rate of Fixed Broadband connections remains low among households, resulting in a lack of stable internet access that enables productive work from home (Gong, 2020; Tumin, 2020). Households generally do not use the internet for work. In 2019, only 11% of people used the internet to work from home, which was more common among men (11.7%) than women (10.2%). During the COVID-19 pandemic, many households are unprepared to work from home when needed (Min & Choo, 2023; Tumin, 2020).

In addition, implementing the MCO has resulted in most operational and non-operational work, including teaching, learning, and business transactions, being conducted online. This transition has resulted in a congestion of data streams. In the first week of the MCO, internet

traffic across the country increased by 23.5 %, and 8.6 % in the second week (MCMC, 2020). This drastic increase led to internet traffic congestion and a subsequent decrease in download speeds (Hassan & Rahman, 2022). The primary factor contributing to the decrease in speed is the constrained network capacity or slowdown of bandwidth. This constraint is worsened by the widespread use of mobile devices and an overload of high-quality multimedia material, video streaming, and cloud services that require consistent and substantial bandwidth capacity (Abdel-Wahab et al., 2019). Although several studies have been conducted on inadequate internet accessibility in rural areas, researchers may overlook the same in urban areas, considering the availability of internet facilities and infrastructure. However, the heavy use of the internet in new norms during the COVID-19 pandemic may change the situation.
Therefore, this research seeks to investigate the changing nature of the digital gap in urban and rural areas. Further, it is undeniable that the COVID-19 pandemic has resulted in a paradigm shift in how people communicate and establish a new norm. As such, this research seeks to identify internet usage patterns, including habits, available services, and accessibility activities, as influential elements that give rise to disparities among persons and geographical regions with varying socioeconomic statuses among students and working groups residing in urban and rural regions. Hence, this research provides a significant opportunity to advance the understanding of digital inclusivity behaviour in different socioeconomic and address the issues during the post-pandemic era.

Literature Review

Internet Usage Pattern

Internet technology has facilitated seamless connectivity across various domains, including education, social interaction, entertainment, banking, and e-commerce. According to a report by the Malaysian Communications and Multimedia Commission (MCMC), there was a significant surge in internet usage among the Malaysian population during the COVID-19 pandemic (MCMC, 2020a). The utilization of the internet and the uptake of digital technologies in Malaysia are seeing a notable upward trend. Furthermore, it is worth noting that internet usage in Malaysia predominantly revolves around content consumption, with particular emphasis on social media engagement, gaming activities, and the downloading of films and music. The ICT skills possessed by Malaysian youth are predominantly limited to primary and standard levels, with a notable deficiency in advanced abilities. Implementing the COVID-19 MCO has fostered a habit among individuals to remain within the confines of their residences. Implementing pandemic-related lockdown measures necessitated the adoption of remote work arrangements for most employees, except those employed in essential services. Consequently, the internet emerged as the primary means of communication for individuals impacted by the shutdown (Umar, 2021).

Based on the e-Economy SEA 2020 research by Google, Temasek, and Bain & Company, internet usage in Malaysia has significantly increased throughout the MCO period, as individuals sought solutions to their issues by relying on the internet. A substantial percentage of new digital service users (36%) and majority (92%) of them expressing their intention to persist in using these services even after the pandemic subsides. According to the report, individuals from Southeast Asia increased their daily online activity by one hour during lockdowns. Specifically, Malaysians spent 3.7 hours online for personal use before COVID-19 and 4.8 hours during the peak of the MCO period. Besides that, the MCMC has observed a significant bandwidth consumption surge during the MCO implementation. The escalating

utilization of internet-based video conferencing, online learning, and e-commerce necessitates an unavoidable surge in bandwidth. The adherence to the MCO, which entails always remaining indoors, led to a significant surge in nationwide internet traffic. Specifically, a 23.5% increase was seen during the initial week of the MCO, followed by an additional 8.6% rise in the second week. Increased data use can result in network congestion, hence causing a decline in data transmission speeds. The observed impact on user experience is increased loading times, particularly when engaging with bandwidth-intensive material, such as high-definition (HD) streaming services. There is a global observation of similar patterns wherein operators across various countries encounter remarkable bandwidth utilization surges due to this shift in behaviour (MCMC, 2020b).

Internet Use Behaviour

The internet of behaviour refers to the connection between technology and human psychology, enabling the ability to establish patterns and exert influence over human behaviour (Bhiwgade et al., 2021). Owing to the remarkable expansion of the internet and its seamless integration into our everyday lives, individuals engage in many online activities such as banking, news consumption, communication, blogging, and other endeavours that necessitate learning and decision-making. (Singer & Thuro, 2021). In addition, during the COVID-19 pandemic, most activities are performed virtually due to increased digitization in leading businesses and educational institutions, leading to a shift in work from home (Schniederjans et al., 2020). During the MCO period, most activities are conducted online, including meetings, workshops, lectures, and online shopping.

In addition, users with different social backgrounds, demographic factors, and behaviours have different internet usage behaviours by engaging in different online activities. University students, who are widely recognised as enthusiastic internet users, primarily utilise the internet for socialising and pleasure. This is because the internet revolution encompasses more than just information retrieval; it also fosters social connections. Nevertheless, the internet serves as a platform for not only social interaction and leisure activities, but also as a valuable source of academic and scientific knowledge (Dogruer et al., 2011). On the other hand, older adults use the internet to communicate with family and friends, including maintaining and building a social support network (Aggarwal et al., 2020).

Methods

The research population comprises individuals who were employed (M40, B40) and students (primary, secondary, and tertiary) in Malaysia. In 2019, the Department of Statistics Malaysia (DOSM) categorised the B40 income group as those with a monthly household income below RM4849, whereas the M40 income group consisted of those with a monthly household income between RM4850 and RM10,959. This research was specifically conducted in the state of Negeri Sembilan. The state has a median household income of RM5,055, which falls within the middle range when compared to other states in Malaysia (DOSM, 2010). Therefore, the state can adequately represent both the M40 and B40 groups for research purposes.

In this study, a quota sampling method was employed to ensure a representative sample of both urban and rural respondents. Negeri Sembilan, Seremban, and Kuala Pilah accurately reflect the typical urban and rural settings in Malaysia in terms of population, infrastructure, and educational resources. urban and rural areas are categorised according to the guidelines

provided by (DOSM, 2010). The control categories in this study consist of students from primary, secondary, and tertiary levels, as well as working individuals from the M40 and B40 income groups. Hence, the participants were conveniently chosen from the control groups. A total of 300 samples were collected, with sub-samples of 30 each from different categories, including students from primary, secondary, and tertiary levels, as well as working individuals from the M40 and B40 groups both in urban and rural areas in Negeri Sembilan.

The primary method of collecting data in this research is a questionnaire survey. Two distinct sets of survey instruments have been created to cater to two specific types of respondents: students and working groups. Online and physical versions of surveys delivered at universities and internet centres, aimed at students from primary, secondary, and tertiary levels, as well as working individuals from the M40 and B40 income categories. Quota sampling was utilised in this research, where data collection was conducted until 30 usable questionnaires were filled for each category of respondents. The survey responses were analysed using a descriptive method using the Statistical Package for Social Sciences (SPSS) software. The descriptive analysis comprises the use of statistical measures such as frequency, charts, and crosstabs to obtain significant insights into the profiles of respondents and their patterns of internet usage, in accordance with the requirements of the new norms.

Results

Demographic Information

The overall number of student respondents was 180 people consisting of 43 (23.9%) males and 47 (26.1%) females from the Seremban district and 30 (16.7%) males and 60 (33.3%) females from the Kuala Pilah district. The student respondents in ranges from the age of 8 till 42 years old. Meanwhile, there were 120 total working group respondents, with 15 (12.5%) males and 45 (26.7%) females from Seremban district and 32 (37.5%) males and 28 (23.3%) females from Kuala Pilah district. The working group respondents consist from the age of 18 till 58 years and above.

Internet Usage Pattern Analysis

The research aim is mainly to cater to internet usage patterns during the COVID-19 pandemic. Urban area is represented by Seremban District whereas the rural area is represented by Kuala Pilah District from Negeri Sembilan. The following discussion is merely from the results of SPSS cross-tabulation on internet usage patterns during the COVID-19 MCO period.

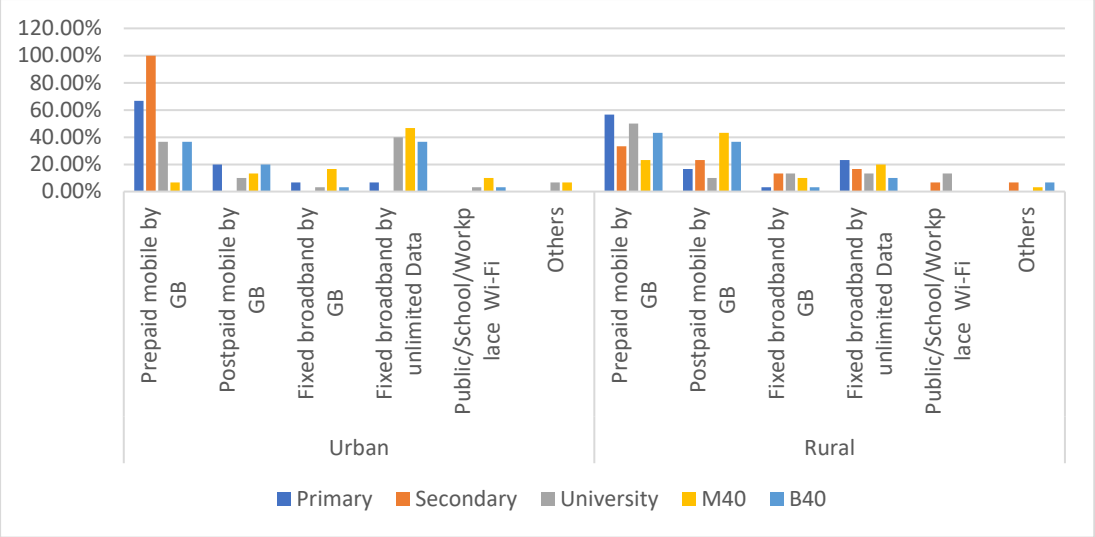

Figure 1: Most Preferred Internet Plans Subscribed for the Use of Internet Activities During the COVID-19 MCO Period

By comparing the areas, in urban reported the highest number of respondents reported Internet plan that they have subscribed to and that the most preferred for the use of their internet activities was Prepaid Mobile by GB 49.3% of respondents than rural with 41.3% of respondents. Secondary school students are reported highest in subscribing to Prepaid Mobile by GB as the most preferred Internet plan in urban with a percentage of 100% whereas 56.7% in rural for primary school students. Finally, by ranking the total most of the two areas, Prepaid Mobile by GB reported the highest at 45.3%, followed by Postpaid Mobile by GB at 19.3%, followed by Fixed Broadband by GB at 7.3%, followed by Fixed Broadband by unlimited data 21.3%, followed by public/school/workplace wi-fi 3.7%, and others were the lowest 3.0% respectively (Refer to Figure 1).

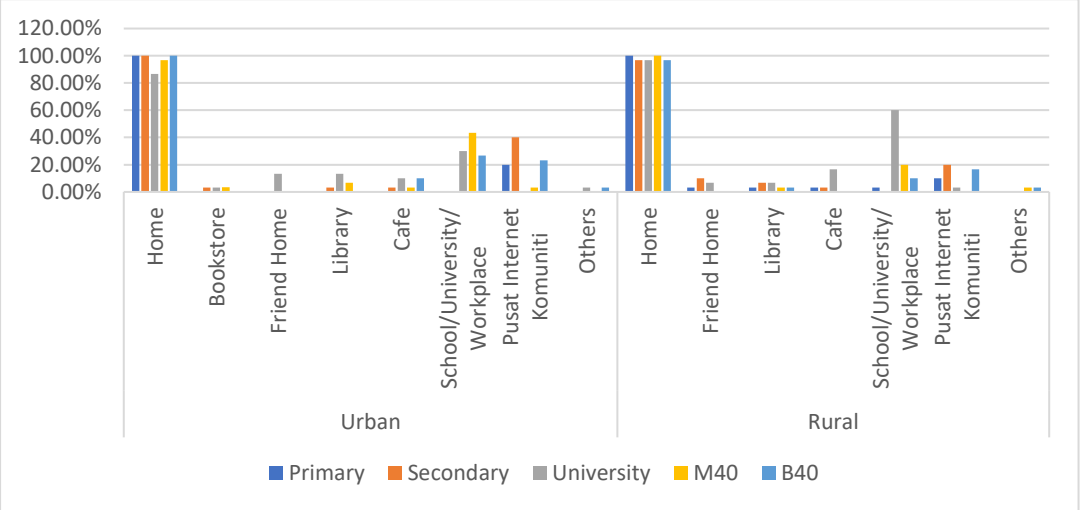

Figure 2: Preferred Internet Access Place During the COVID-19 MCO Period

Urban showed that the majority of the respondents reported using the internet most of the time during the COVID-19 MCO period at home with 96.7% responses, with all percentages of home usage 100% of respondents chose both primary and secondary school students with B40 working groups. While the lowest from urban are *others* with 1.3%, responses (Refer to

Figure 2). Students have mentioned that used to access the internet at shopping malls. Besides that, rural showed that the majority of the respondents reported using the internet most of the time during the COVID-19 MCO period at home with 98% responses; with all percentages of home usage, all 30 respondents (100%) chose both primary school students and M40 working groups. While the lowest from rural are *others* with 1.3%, responses. One of the B40 working groups has mentioned that used to access the internet at the dobby shop. By comparing the two areas, rural reported the highest number of respondents using, the internet most of the time during the COVID-19 MCO period at home with 98% responses compared with urban with 96.7%. Primary and secondary school students and B40 groups are reported highest in using the internet at home in urban with a percentage of 100% whereas 100% as well in rural for primary school students and M40 groups. The preferred place follows school/university/workplace for both areas with respective of 20% and 18.7%. The other places listed have less preference to access the internet for all the groups in urban and rural.

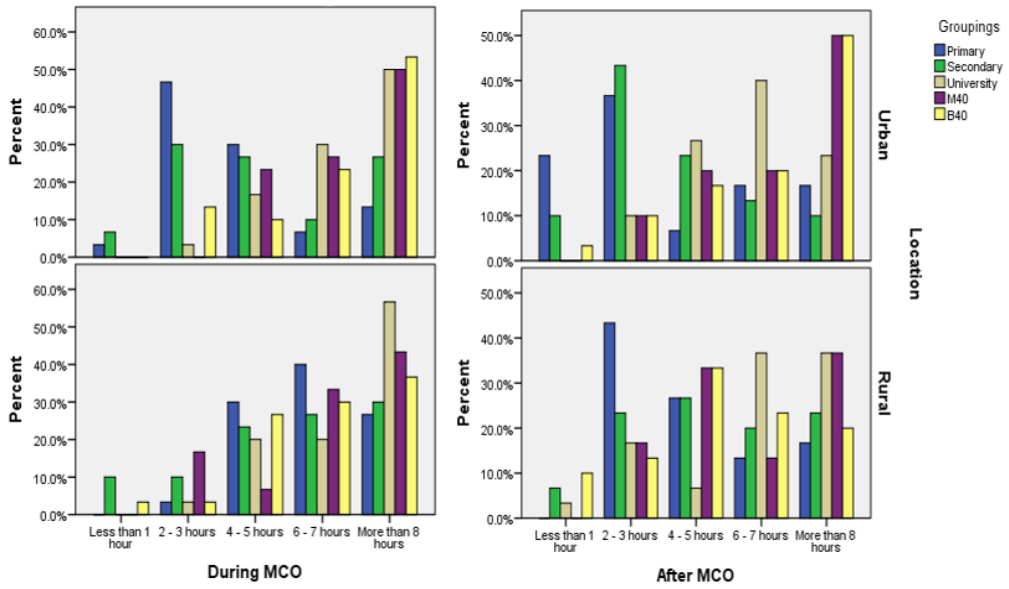

Figure 3: Daily Average Internet Usage During and After COVID-19 MCO Period

Figure 3 showed that the majority of the urban respondents reported the frequency of hours internet used daily during the COVID-19 MCO period was m*ore than 8 hours* with 38.7% of respondents. Meanwhile, B40 has the highest with 53.3% of respondents. While the lowest frequency of hours of internet use during the COVID-19 MCO period from urban was less than 1 hour at 2%. The rural showed that the majority of the respondents reported the frequency of hours internet used daily during the COVID-19 MCO period was *more than 8 hours* with 38.7% of respondents, with university students having the highest. The lowest frequency of hours of internet used daily during the COVID-19 MCO period from rural was *less than 1 hour* with 2.7%.

Meanwhile, the majority of the urban respondents reported the frequency of hours internet used daily after the COVID-19 MCO period was *more than 8 hours* with 30% of respondents, with working groups (M40 & B40) having the highest 50% for each. The lowest frequency of hours of internet use after the COVID-19 MCO period from urban was *less than 1 hour* with 7.3%. The result from rural showed that the majority of the respondents reported the frequency of hours internet used daily after the COVID-19 MCO period was *more than 8 hours*

with 26.7% of respondents, with university students and M40 having the highest (36.7%). The lowest frequency of hours of internet used daily after the COVID-19 MCO period from rural was *less than 1 hour* with 4%. By comparing the two districts, both rural and urban reported equal respondents of the frequencies of hours internet used daily during and before the COVID-19 MCO period was m*ore than 8 hours* with 38.7% each. Besides that, urban reported the highest number of respondents reported the frequency of hours internet used daily after the COVID-19 MCO period was more than 8 hours with 30% of respondents compared rural with 26.7% of respondents.

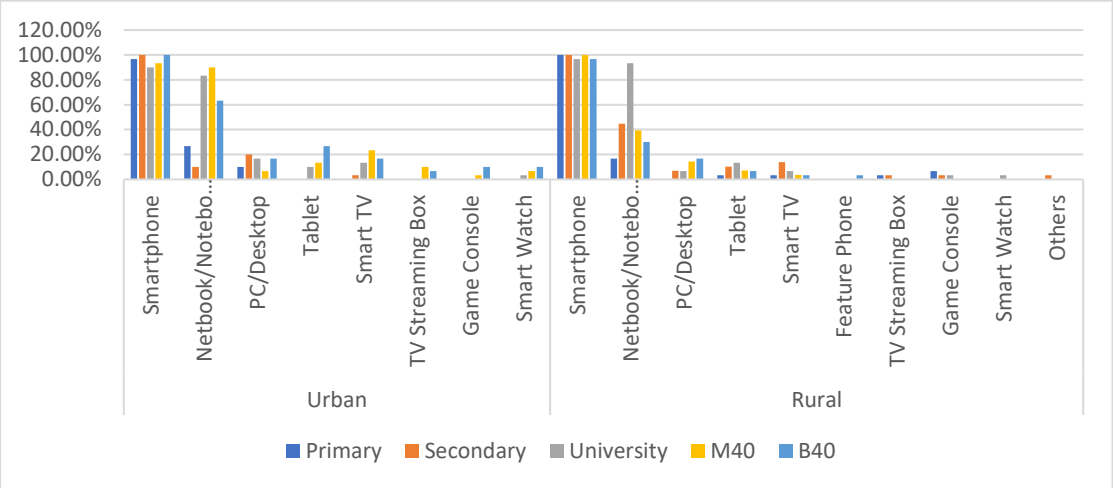

Figure 4: Mode of Internet Access During the COVID-19 MCO Period

Figure 4 illustrate that the majority of the respondents reported the internet device(s) they used for the purpose of internet activities during the COVID-19 MCO period was a Smartphone with 96% responses, with all the respondents reporting B40 and secondary school students with 100%. The lowest number of respondents reported the internet, device(s) they used for the purpose of internet activities during the COVID-19 MCO period from urban was a game console with 2.7% responses. The rural showed that the internet device(s) they used for the purpose of internet activities during the COVID-19 MCO period was a Smartphone 98.6% of responses. The least used internet device is *Others* (Chromebook) by a secondary school student (3.4%).

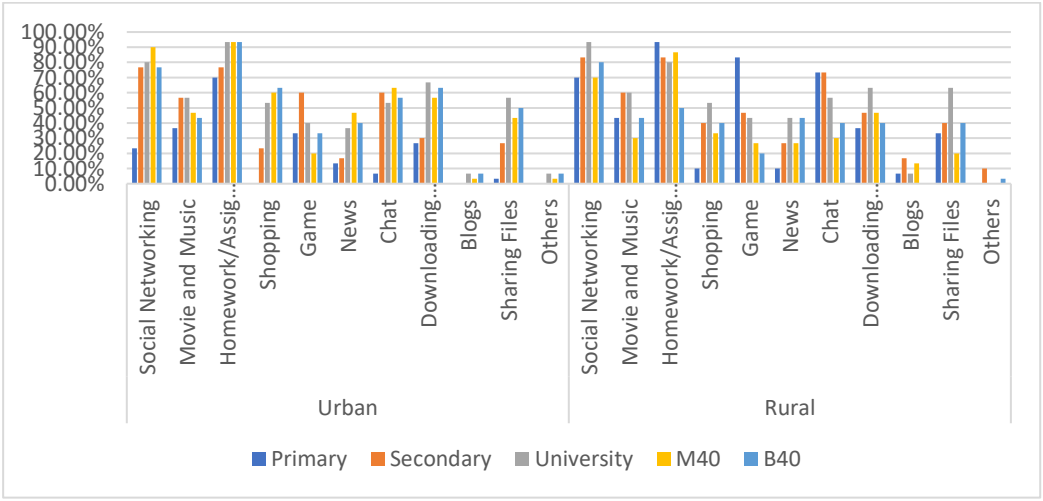

Figure 5: Purpose of Internet Access During the COVID-19 MCO Period

The findings showed that the majority of the urban respondents reported the purposes they use the internet most of the time during the COVID-19 MCO period was for homework/assignments or work/office tasks with 85.3%. Of the homework/assignments or work/office task purposes, the majority are university, M40, and B40 with 93.3% responses each. While the lowest number of respondents reported purposes, they use the internet most of the time during the COVID-19 MCO period from urban was for Blogs and *others* with 3.3% responses. The *other* purpose of using the internet by working groups such as video, vlogs, and maps. The result from rural showed that the majority of the respondents reported the purposes they use the internet most of the time during the COVID-19 MCO period was for social networking 79.3% followed by homework/assignments or work/office tasks with 78.7%. Of the social networking purposes, university reported the highest with 93.3% responses while M40 and primary reported the lowest with 70% responses. While the lowest respondents reported purposes, they use the internet most of the time during the COVID-19 MCO period from rural was for *others* with 2.7% responses. By comparing the two areas, in urban reported the highest number of respondents reported the purposes they use the internet most of the time during the COVID-19 MCO period was for homework/assignments or work/office tasks 85.3% compared with rural with 79.3% in social networking.

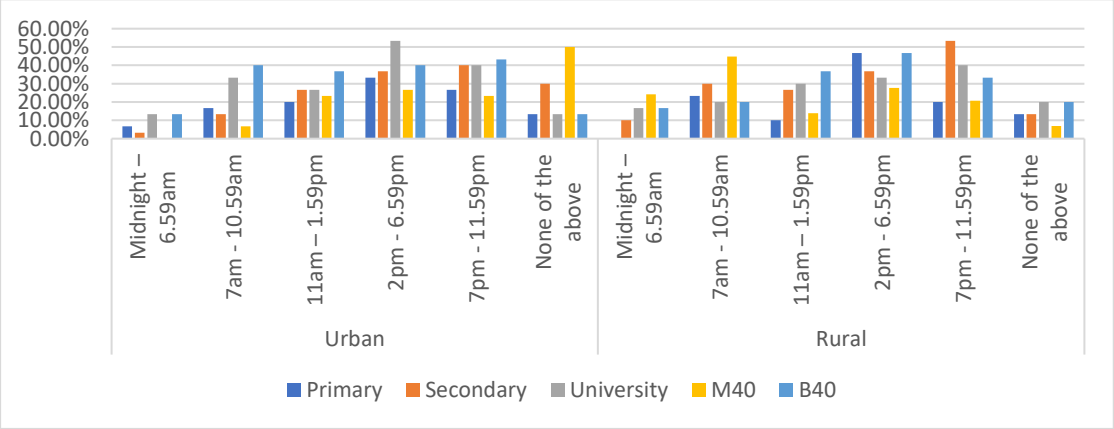

Figure 6: Internet Interruptions During COVID-19 MCO Period

Figure 6 showed that the majority of the urban respondents reported the frequencies of the time period that they have frequently faced internet interruption during the COVID-19 MCO period was *2 pm-6.59 pm* with 38% of respondents. Of the 38% of respondents, the university has the highest with 53.3% and the lowest was M40 with 26.7% respondents. The lowest frequency of time period that they have frequently faced internet interruption was *midnight-6.59am* with 7.3%. The result from rural showed that the majority of the respondents reported the frequency of time period that they have frequently faced internet interruption was *2 pm-6.59 pm* with 38.3% of respondents. Of the 38.3% of respondents, primary school students and the B40 working group reported the highest with 46.7% each and the lowest was M40 with 27.6% respondents. The lowest frequency of time period that they have frequently faced internet interruption during the COVID-19 MCO period was *midnight-6.59am* with 13.4% responses. By comparing the two areas, both rural and urban respondents reported the frequencies of the time period that they have frequently faced internet interruption during the COVID-19 MCO period was *2 pm-6.59 pm* with about 38% of respondents each.

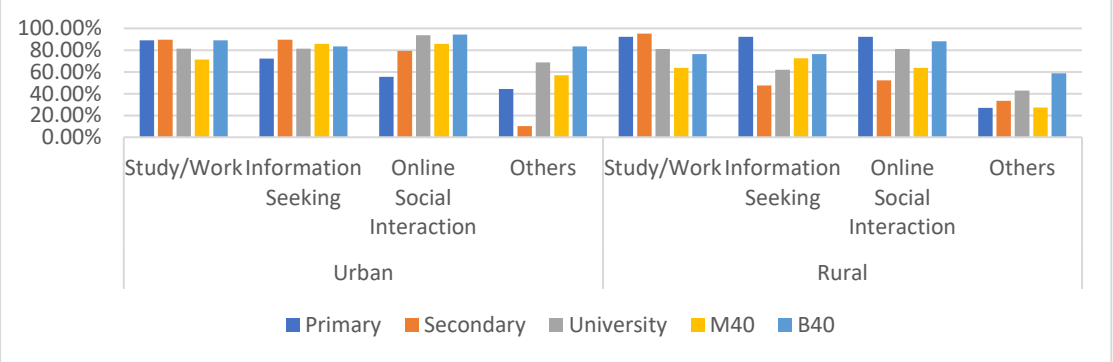

Figure 7: Internet Usage Pattern for Prepaid Mobile by GB During COVID-19 MCO Period

The findings indicate that the majority of the urban respondents reported the Internet Plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period (Prepaid Mobile by GB) studied or worked with 76 (86.4%) responses. Of the 86.4% responses, secondary school students have the highest with 26 (89.7%) while M40 has the lowest with 5 (71.4%). While the lowest number of respondents reported, that the Prepaid Internet plan that they have subscribed to for the use of their internet activities during the COVID-19 MCO period was *others* with 41 (46.6%) responses (Refer to Figure 6.9). The result from rural showed that the majority of the respondents reported the Prepaid Internet plan that they have subscribed to for the use of their internet activities during the COVID-19 MCO period was also study or work with 81 (84.4%) responses. Of the 84.4% responses, primary school students have the highest with 24 (92.3%) while M40 reported the lowest with 7 (63.6%). The lowest number of respondents reported the Prepaid Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period were *others* with 36 (37.5%) responses. The both urban and rural reported the highest number of respondents that subscribed to Internet Plans for the use of their internet activities during the COVID-19 MCO period (Prepaid Mobile by GB Patterns) was study/work with 86.4% and 84.4% respectively.

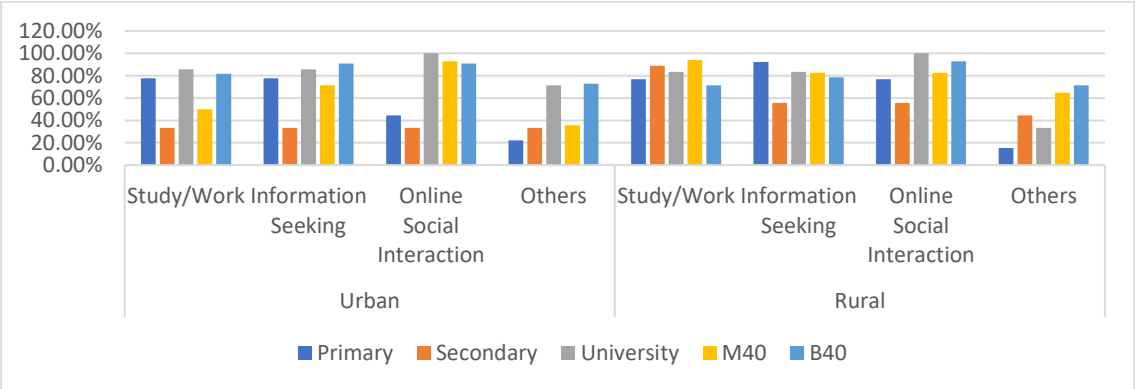

Figure 8: Internet Usage Pattern for Post-paid Mobile by GB During COVID-19 MCO Period

Figure 8 illustrate that the majority of the urban respondents indicated the Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period (Post-paid Mobile by GB) was for *online social interaction* 35 (79.5%) responses. Of the 79.5% of respondents, university students have the highest with 7 (100%), and secondary school students have only 1 (33.3%) respondent. While the lowest number of respondents reported, the Post-paid Internet plan that they subscribed to for the use of their internet activities

during the COVID-19 MCO period was *others* with 21 (47.7%) responses (Refer to Figure 6.10). The result from rural showed that the majority of the respondents reported the Post-paid Internet plan that they subscribed to for the use of their internet activities during the COVID-19 MCO period was also study or work with 49 (83.1%) responses. Of the 83.1% of respondents, M40 has the highest with 16 (94.1%) and B40 reported the lowest with 10 (71.4%) respondents. The lowest number of respondents reported the Post-paid Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period were *others* with 29 (49.2%) responses (Refer to Figure 6.10). Rural area reported the highest number of respondents reported the Internet plan that they subscribed for the use of their internet activities during the COVID-19 MCO period (Post-paid Mobile by GB) was for study or work at 83.1% responses compared with urban with 79.5% responses *online social interaction*.

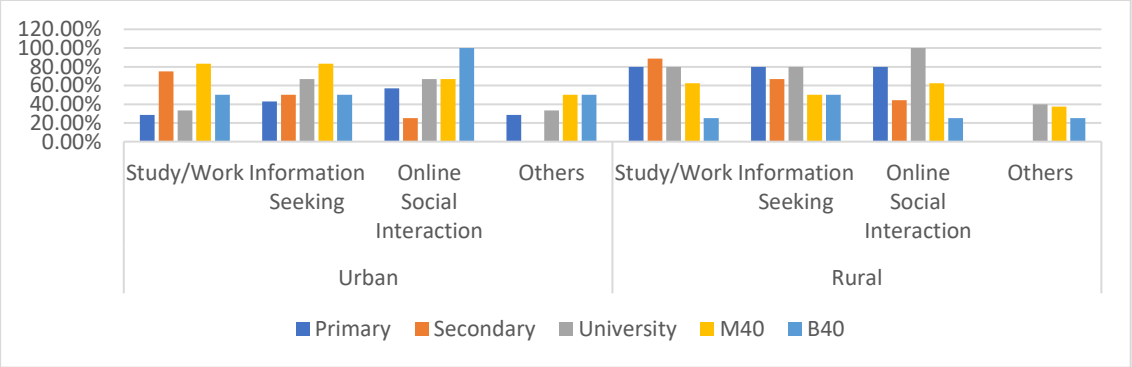

Figure 9: Internet Usage Pattern for Fixed Broadband by GB During COVID-19 MCO Period

Findings from urban showed that the majority of the respondents reported the Internet plan that they subscribed to for the use of their internet activities during the COVID-19 MCO period (Fixed Broadband by GB) was for *information seeking* and *online social interaction* 13 (59.1%) responses. Of the 59.1%, respondents from *information seeking*, the majority are M40 with 5 (83.3%) and the lowest was B40 with only 1 (50%) respondent. Of the 59.1% respondents from *online social interaction*, B40 has the highest with 2 (100%), and secondary school students have the lowest with only 1 (25%) respondent. While the lowest number of respondents reported, that the Fixed broadband by GB Internet plan that they have subscribed to for the use of their internet activities during the COVID-19 MCO period was *others* with 7 (31.8%) responses. The result from rural showed that the majority of the respondents reported the Fixed Broadband by GB Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period was also study or work with 26 (72.2%) responses. The lowest number of respondents reported the Fixed Broadband by GB Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period with 6 (16.7%) responses. By comparing the two areas, rural reported the highest number of respondents reported the Internet plan that they subscribed for the use of their internet activities during the COVID-19 MCO period (Fixed Broadband by GB) was for study or work with 72.2% responses compared with urban with 59.1% responses for information seeking and online social interactions.

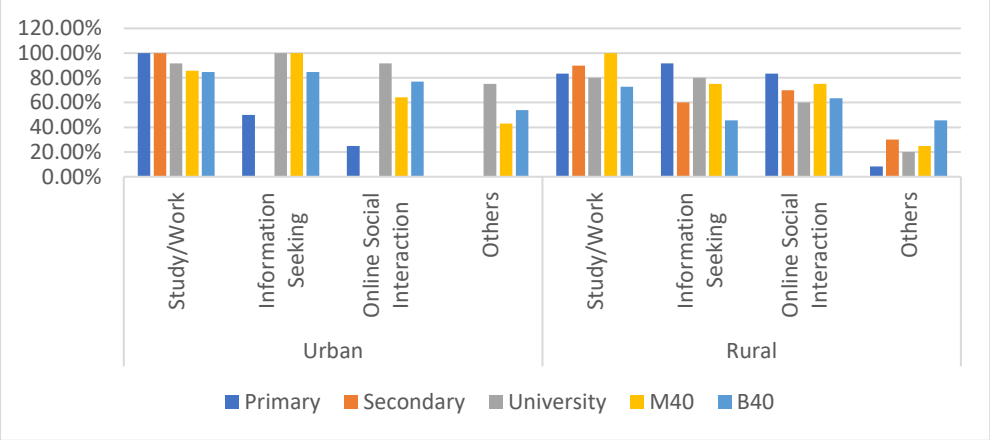

Figure 10: Internet Usage Pattern for Fixed Broadband by Unlimited Data During COVID-19 MCO Period

Majority of the urban respondents reported the Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period (Fixed Broadband by Unlimited Data) was for study or work 40 (88.9%) responses. Of the 88.9% of responses, the majority are primary and secondary students (100%) and the lowest are secondary with 84.6% respondents. While the lowest number of respondents reported, that the Fixed Broadband by GB Internet plan that they have subscribed to for the use of their internet activities during the COVID-19 MCO period was *others* with 22 (48.9%) responses. The result from rural showed that the majority of the respondents reported the Fixed Broadband by GB Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period was also study or work with 35 (83.3%) responses. Of the 83.3% of respondents, M40 reported the highest with 100% respondents, whereas B40 reported the lowest with 72.7% responses. The lowest number of respondents reported the fixed broadband by GB Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period were *others* with 11 (26.2%) responses. By comparing the two areas, urban reported the highest number of respondents reported the Internet plan that they subscribed to for the use of their internet activities during the COVID-19 MCO period (Fixed Broadband by Unlimited Data) were for study or work 88.9% of responses compared with rural with 83.35% responses.

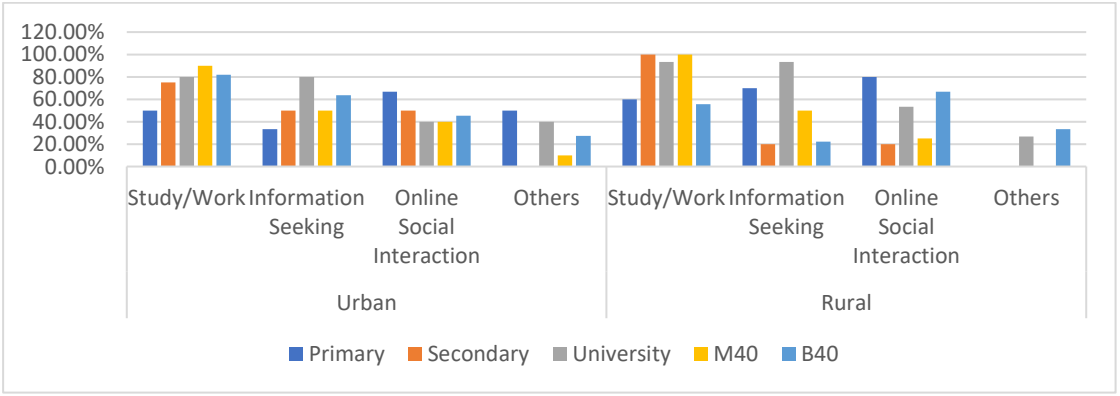

Figure 11: Internet Usage Pattern for Public/School or Workplace Wi-Fi During COVID-19 MCO Period

The figure 11 indicate that the majority of the urban respondents reported internet access for the use of their internet activities during the COVID-19 MCO period (public/school or workplace wi-fi) was for study or work which was 28 (77.8%) responses. Of the 77.8% of respondents, M40 has the highest with 90%, meanwhile, primary school students have the lowest with 50% responses. While the lowest number of respondents reported, the public/school or workplace wi-fi that they have accessed for the use of their internet activities during the COVID-19 MCO period with 9 (25%) responses. The result from rural showed that the majority of the respondents reported the public/school or workplace wi-fi that they accessed for the use of their internet activities during the COVID-19 MCO period also studied or worked with 34 (79.1%) responses. Of the 79.1% of respondents, secondary school students and M40 have the highest with 100% and the lowest was B40 with 55.6%. The lowest number of respondents reported the public/school or workplace wi-fi that they have accessed for the use of their internet activities during the COVID-19 MCO period were others with 7 (16.3%) responses. Rural area reported the highest number of respondents reported the Internet plan that they subscribed for the use of their internet activities during the COVID-19 MCO period (public /school/workplace wi-fi) were for study work 79.1% of responses compared with urban with 77.8%.

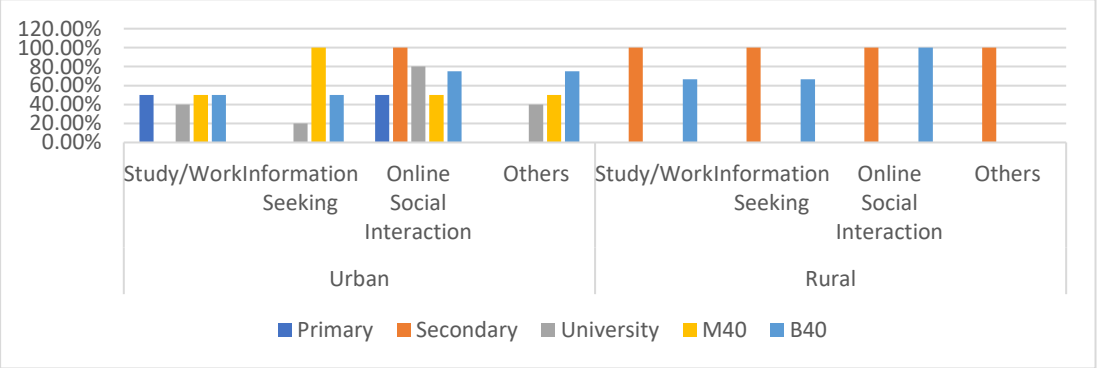

Figure 12: Internet Usage Pattern for Others Internet Plan Subscribed During COVID-19 MCO Period

The findings from urban showed that the majority of the respondents reported the Internet plan that they have accessed for the use of their internet activities during the COVID-19 MCO period *(others*) was for *online social interaction* with 14 (77.8%) responses. Of the 77.8% responses from *online social interaction, the* majority are secondary school students with 5 (100%) respondents the lowest are primary school students, and M40 with 1 (50%). While the lowest number of respondents reported, the *others Internet plan* that they have subscribed for the use of their internet activities during the COVID-19 MCO period with 5 (27.8%) responses for *information seeking*. The result from rural showed that the majority of the respondents reported the other Internet plan that they have accessed for the use of their internet activities during the COVID-19 MCO period was also *online social interaction* with 5 (100%) responses. Of the 100%, 3 (60%) are from B40 and the remaining 2 (40%) are from secondary school students. While the lowest number of respondents reported the other Internet Plans that they have accessed for the use of their internet activities during the COVID-19 MCO period were others with 2 (40%) responses. One of the students mentioned that subscribed to Post-paid by Unlimited Data for internet activities. Urban area reported the highest number of respondents who reported the Internet plan that they have subscribed for the use of their internet activities during the COVID-19 MCO period (Others)

was for online social interaction with 14 (77.8%) responses compared with rural with five responses.

Discussion

The primary findings on internet usage patterns during the COVID-19 epidemic are approximately 50% of the participants from both urban and rural areas indicated that their preferred Internet plan is Prepaid Mobile by GB. This interaction is intended for secondary students in metropolitan areas and primary school students in rural places. Fixed Broadband Unlimited Data is the second most popular option in urban areas, while Postpaid Mobile by GB is the second preferred choice in rural regions. Therefore, Fixed Broadband is not extensively available to rural internet users, since the majority rely on Prepaid Mobile Data Plans based on Gigabytes (GB) and Postpaid Plans based on Gigabytes (GB). These results are likely to be related to (Dawood et al., 2019) who writes that rural communities could not afford better quality internet accessibility packages. Besides that, the majority of students and working groups prefer to access the internet at home, regardless of whether they live in urban or rural areas.

During the MCO period, a significant proportion of working groups and university students from both urban and rural areas devoted more than 8 hours per day on average. Nevertheless, whereas working groups had a duration of over 8 hours after the MCO period, university students in both urban and rural areas saw a decrease to 6-7 hours. In addition, the majority of urban school pupils spent approximately 2-3 hours throughout the MCO time and continued to do so even after the MCO period. During the MCO period, the majority of primary kids in rural areas spent 6-7 hours on their studies, which decreased to 2-3 hours after the MCO period. After the end of the MCO period, there was a decline in the average daily internet usage among students in school as they returned to school. Nevertheless, university students and working groups remain with more than 8 hours of internet usage. University students continue to engage in online learning and working groups in internet activities still remain even after the MCO period ends. Online activities such as shopping, banking, meetings, and training continue to take place on the internet. These results are likely to be related to the implementation of MCO which caused the majority of operational and non-operational works, including teaching, learning and business transactions, to be done online using the internet (Malaysian Communications and Multimedia Commission, 2020a).

More than 90% of students and working groups utilise mobile phones as their primary means of accessing the internet, regardless of whether they are in urban or rural settings. Approximately 50% of the working groups and university students residing in urban areas utilised netbooks, notebooks, or laptops. Meanwhile, the vast majority of university students utilised netbooks, notebooks, or laptops, which constituted over 90% of their devices. Additionally, nearly half of secondary students and the M40 working group in rural areas also relied on these types of devices. The emergence of new Information and Communication Technology (ICT), such as the internet, mobile phones, and computers, has significantly diminished the prevalence of traditional ICTs like television, radio, and fixed telephone lines. Nevertheless, the implementation of this emerging technology is not exclusively confined to metropolitan regions, and it has progressively become more attainable in rural areas. However, the level of adoption is still not at its maximum potential (Kamarudin et al., 2019). Despite the fact that the majority of students use the internet for studying throughout the

COVID-19 MCO era, it is worth noting that urban students, especially primary students living in remote areas, lack access to laptops for internet use.

The majority of students and working groups utilise the internet for studying, working, and social networking, regardless of whether they reside in urban or rural areas. Approximately 50% of students and working groups utilise the internet mostly for streaming films and music, as well as engaging in online discussion. More than 50% of university students and working professionals allocate their time to shopping in metropolitan areas, while university students in rural areas do not engage in as much shopping. It has been discovered that primary school children in rural areas have the highest level of engagement with gaming, followed by secondary school students in urban areas. File sharing is most prevalent among university students, regardless of whether they reside in urban or rural areas. This result may be explained by the fact that majority of individuals enjoy utilizing their leisure time to browse the internet, regardless of location or time. The aforementioned study by Mahdi et al. (2020) demonstrates that Malaysians have significantly improved their communication efficiency, irrespective of geographical separation or temporal constraints.

The data on Internet plan purchases indicates that the majority of students and working individuals in urban areas go for Prepaid Mobile by GB. This plan is primarily used for studying, working, seeking information, and engaging in online social interactions. However, students utilise it for the purpose of studying in remote areas. However, a majority of university students and working groups in urban areas use Postpaid Mobile by GB for the purpose of acquiring information and engaging in online social interaction. Meanwhile, the M40 group is engaged for work purposes, while primary school students in rural areas are seeking information. In addition, university students and working groups utilise internet platforms for the purpose of social engagement. It should be emphasised that urban working groups mainly utilise Fixed Broadband by GB for information seeking and online interaction, while rural secondary school students leverage it for studying. surprisingly students and working groups in urban areas used Fixed Broadband with Unlimited Data for studying, working, and seeking information, whereas it was mostly used for studying and working in rural areas. In addition, students and working groups in both urban and rural areas utilised public and school/work wi-fi for educational and professional endeavors. Furthermore, internet options such as fiber and Prepaid/Postpaid by Unlimited Data were predominantly utilised for online social interactions in both urban and rural regions. These results are consistent with data obtained by MCMC (2020b) that in 2020, the highest percentage of internet users engaged in text communication (98.1%), followed by browsing social media (93.3%), acquiring information (74.3%), and other miscellaneous activities.

A significant proportion of students and working groups experience disruptions in internet connectivity between 2 pm and 6.59 pm, regardless of whether they are located in urban or rural areas. More than 50% of university students experience disruptions in urban areas, while over 50% of students in primary schools and the B40 working group endure interruptions in rural areas. Another important finding was that there is no distinct urban-rural disparity in terms of internet quality. The majority of individuals in the B40 working group residing in urban centres, as well as students in primary schools in rural areas, expressed dissatisfaction with the speed and performance of the internet during peak hours, namely from 8 pm to 11 pm. These results are in accord with recent study indicating that inadequate internet

connectivity and services pose significant challenges for individuals, particularly students and working professionals, in carrying out their tasks (Lai et al., 2020).

The current study found that B40 working group in urban areas observed that the range of Internet Plans available did not meet their requirements. Besides, there is an anticipated digital divide among students in primary schools in rural locations due to their limited access to laptops for studying and difficulties in accessing the internet during school and peak hours. In addition, the B40 working group encounters internet disruptions in rural areas. Meanwhile, in urban areas network quality issues and a lack of Internet Plans that cater to their demands. Although several researches (Dawood et al., 2019; Hao et al., 2020; Kamarudin et al., 2019) have been carried out on inadequate internet accessibility in rural areas, researchers may overlook the same in urban areas considering availability of internet facilities and infrastructures. However, the heavy usage of the internet in new norms during COVID-19 pandemic may vary the situation and it is proven in this research.

Conclusion

In summary, this research reinforces the notion that internet services and accessibility initiatives exert an impact on individuals' internet usage patterns. Collectively, the results indicate that location has a significant influence in fostering disparities between urban and rural regions.

This research addresses the research gap on the influence of internet access during the COVID-19 epidemic and other factors influencing internet use activities in rural communities. It expands our understanding of internet usage patterns. An intriguing discovery is that rural communities lack knowledge in information technology, particularly primary school students. Moreover, the research has made progress in improving our comprehension that internet accessibility activities effectively contribute to internet usage patterns and are particularly beneficial for students. Furthermore, this research addresses the disparity in internet usage patterns between urban and rural areas during the COVID-19 pandemic. Previous studies have typically focused on the insufficient availability of internet access in rural regions and may have disregarded the same issue in urban areas. The empirical findings in this research offer novel insights into internet accessibility, which may also be inadequate in urban areas. The results certainly indicate that there are insignificant differences between urban and rural locations.

Hence, several crucial improvements must be implemented. An essential policy objective should be to strategize for the sustainable maintenance of digital inclusion in Malaysia. Policymaking should prioritise the establishment of appropriate systems, services, and assistance to ensure internet accessibility. Telecommunication providers play a crucial role in ensuring that disadvantaged groups, particularly students and low-income individuals, have access to affordable Internet Plans.

Limitation

This research focused on students and working groups' responses from urban and rural areas in Negeri Sembilan as mid-ranking median household income state. Therefore, this research can be extended to other states in Malaysia to obtain and test their students and working groups' perspectives. In addition, able to provide better dispersion on internet usage patterns

of each sub-samples. As such, information of students and working groups on internet use behaviour responses from remaining states would help to establish a greater degree of accuracy.

Acknowledgement
This Research is funded by the Malaysian Communications and Multimedia Commission through the Digital Society Research Grant.

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