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Cambodian Upper Secondary School Education amid COVID-19 Pandemic: Challenges and Opportunities

THY Savrin, LY Tong and EAN Sokunthy



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Abbreviation

ADB	Asian Development Bank
ADBI	Asian Development Bank Institute
COVID-19	Coronavirus Disease of 2019
DFAT	Australian Department of Foreign Affairs and Trade
ECLAC	Economic Commission for Latin America and the Caribbean
ESWG	Education Sector Working Group
F2F	Face-to-face
ICT	Information Communication Technology
INSET	In-Service Training
MoEYS	Ministry of Education, Youth and Sport
OREALC	Oficina Regional De Educación Para América Latina Y El Caribe (Regional Bureau for Education in Latin America and the Caribbean)
PRESET	Pre-Service Training
RGC	Royal Government of Cambodia
WHO	World Health Organization

Executive summary

The outbreak of Coronavirus Disease 2019 (COVID-19) was announced as a pandemic by the World Health Organization (WHO) on 11 March 2020. Its presence has created significant disturbances across society and particularly within education. On 16 March 2020, as a preventative measure against the spread of COVID-19, the Royal Government of Cambodia (RGC) decided to close all educational institutions. However, in an effort to continue providing education services to students, the Ministry of Education, Youth and Sport (MoEYS) alongside relevant stakeholders made significant efforts to adopt distance learning. The rapid adoption of technology in order to provide distance teaching and learning created challenges for teachers and students. The present study investigates the impact COVID-19 has had on teachers and students in upper secondary education, specifically focusing on the relative challenges teachers and students encountered during school closures and possible opportunities created by the pandemic.

This study employed quantitative research methods with both descriptive and inferential statistics used to examine the challenges and opportunities teachers and students faced. This study identified several types of challenges that teachers and students experienced during the school closure. Specifically, the problems teachers and students encountered in their teaching and learning processes are referred to as academic challenges. Hardships attributed to decreases in household income, difficulty in managing earnings and spending etc., were considered to be economic challenges. This study also highlights the high stress and anxiety levels teachers and students experienced referring to them separately as mental health challenges. Opportunities consisted of practical benefits—both academically and socially—that teachers and students gained as a result of their work-related activities or from social activities during the outbreak. The data analysis draws on survey data from 685 teachers and 2,804 students from upper secondary schools in Cambodia primarily collected between July and August 2022.

The findings showed that both teachers and students experienced decidedly challenging situations. For example, both in terms of how students interacted with each other and how teachers interacted with students, everyone struggled to manage teaching and learning remotely primarily stemmed from their difficulties in handling their teaching and learning using technology and digital devices. In addition, disruptions to teaching and learning due to poor internet connections, electricity cut-offs, and/or noisy environments were quite distracting during online instruction. Economically, both teachers and students experienced declines in family income and increasing prices for hygiene products, water and/or electricity, and distance learning materials. Furthermore, lack of food among family members and difficulty paying off loans were also noted as challenges by teachers and students. For students, the difficulties they experienced varied based on their location. Students residing in disadvantaged areas (rural and suburban areas) had to respond to more challenges than those in advantaged areas (urban areas). Both teachers and students experienced some level of mental challenges as well. Significant numbers of teachers and students experienced moderate to extremely severe stress and anxiety levels. Teachers and students who live in the capital, Phnom Penh, reported experiencing greater mental challenges than in other areas of Cambodia. Although significant challenges were universally reported, teachers and students also acknowledged potential opportunities. Academically, they gained new knowledge and skills related to ICT in educational settings, and socially, they were able to strengthen their mental and social well-being in themselves and their family members.

Based on its findings, this study offers some recommendations for both education policymakers and teacher training centres. The development and creation of e-learning materials and technologies should continue to be developed since they may serve as supplementary teaching and learning resources not only for the present day but also when similar situations happen in the future. Teacher training programmes in technical skills, particularly focusing on ICT for education, should be enacted place for both In-Service Training (INSET) and Pre-Service Training (PRESET). Moreover, equipping every school with ICT facilities across the country should be planned so that the education system can respond to unpredictable events in the future. Cambodia should take this opportunity to transition from traditional classroom setups towards a mixture of teaching and learning environments, like blended learning.

MoEYS and relevant stakeholders should promote mental health education to educate teachers and students to maintain their mentally healthy or cope with stress and anxiety during times of crisis. Online mental health consultation services from professional psychologists for teachers and students should be considered as an effective measure to support everyone in the learning environment.

1. Introduction

The outbreak of Coronavirus Disease of 2019 (COVID-19) was announced as a pandemic by the World Health Organization (WHO) on 11 March 2020, and its prevalence has created significant disturbances in education due to the closure of schools and other learning spaces. About half of the world's students were affected by partial or full school closures (UNESCO 2021). To maintain education services, each country adopted remote teaching and learning through various means, including social media, email, telephone, and even the post office (Donnelly, Patrinos and Gresham 2021).

On 16 March 2020, as a preventative measure against the spread of COVID-19, the Royal Government of Cambodia (RGC) decided to close all educational institutions, including both public and private schools. It was estimated that 3.2 million Cambodian students were affected by the outbreak (MoEYS and ESWG 2021). To continue providing education services to students, the Ministry of Education Youth and Sport (MoEYS) has made significant efforts to provide distance learning through various platforms, including the MoEYS e-learning website, official Facebook page, the YouTube channels Krou Cambodia and Komar Rien Koma Cheh, e-learning, TVK2, national radio, and others (Bhatta, et al. 2022, MoEYS and ESWG 2021).

Like many other countries, Cambodia addressed the immediate need to provide ongoing educational resources by directly translating traditional face-to-face classroom practices to distance learning strategies through synchronous and asynchronous online direct instruction to teach their students during the school closure, which required students to utilise ICT technologies, electronic devices, and the internet (Bhatta, et al. 2022, Chea, Bo and Minami 2022, MoEYS and ESWG 2021, PLAN and CARE 2022). The rapid adoption of technology in teaching and learning on platforms such as Telegram, Zoom, Microsoft Teams, or Google Meet has created challenges for both teachers and students (MoEYS and ESWG 2021, PLAN and CARE 2022). Limited access to the internet and poor internet connection significantly affected teaching and learning at all levels (Bhatta, et al. 2022, MoEYS and ESWG 2021, Pokhrel and Chhetri 2021). Furthermore, the resulting education disruption has amplified educational inequalities across regions and socioeconomic classes (Bhatta, et al. 2022, MoEYS and UNICEF 2022). Even in urban settings, the digital gap between the rich and poor is obvious—not every student can afford a smartphone, tablet, personal computer, or even an internet connection. The economic recession caused by the COVID-19 pandemic exacerbated the gap in accessing ICT even more (Nick and Khoun 2021).

Several studies have reported on the negative impacts of COVID-19 on people's economic situation (Diao and Mahrt 2020, Diao, Rosenbach, et al. 2021, Kabisa, et al. 2021, Morgan and Trinh 2021). The Asian Development Bank Institute (ADBI) reported that about 73% of households in the Association of Southeast Asian Nations (ASEAN) experienced a decline in income. Within Cambodia, 35% of households reported that their income had fallen by between 26% and 50% while 23% of households reported declines in income by more than 50% (Morgan and Trinh 2021). The negative impacts on the economy have not only required children contribute more to household chores and had lower access to food but also resulted in significant increases in domestic violence. Children have been at a higher risk of violence, abuse, or exploitation, which lead to unaddressed mental health and psychosocial distress (MoEYS and ESWG 2021).

There were several empirical studies concerning the consequences of COVID-19 on education in Cambodia. The MoEYS, in collaboration with the Education Sector Working Group (ESWG), conducted a rapid assessment to understand the impacts of COVID-19 and

subsequent school closures on education stakeholders. The rapid assessment found some key challenges, including a lack of access to necessary digital devices for teaching and learning, low access to internet connection, poor or unstable internet connections, and lack of student effort during distance learning. The assessment also identified how economic hardships during COVID-19 were impacting children by them needing to contribute more to household chores (MoEYS and ESWG 2021). A similar assessment was conducted by PLAN and CARE (2022) that focused solely on girls in the northeastern Cambodian provinces of Ratanakiri, Mondulakiri, and Stung Treng. Additionally, Gehrke, Lenel and Schupp (2022) investigated the consequences of the COVID-19 pandemic on schooling outcomes of Grade 9 students in northwest Cambodia (Banteay Meanchey, Battambang, Oddar Meanchey, and Siem Reap), and focused on the implications of the economic downturn in 2020. Chea, Bo and Minami (2022) examined teaching practises, challenges, and opportunities of online learning during the COVID-19 pandemic by considering teacher readiness in adopting educational technology (EdTech) in online teaching. Finally, studies by Bhatta et al. (2022) as well as the MoEYS and UNICEF (2022) investigated the level of learning loss among Grade 6 students during the COVID-19 pandemic period.

Expanding on the prior research listed above, this study investigates the consequences of COVID-19 on teaching and learning at the upper secondary school¹ level, specifically focusing on the relative challenges teachers and students encountered during school closures. This study also identifies possible opportunities created by the issues. The two objectives focused on in this paper are:

- Identifying the challenges on academic, economic, and mental health levels that Cambodian upper secondary school students and teachers have experienced during school closures.
- Determining the practical opportunities teachers and students gained—academically and/or socially—during school closures.

2. Literature review

2.1. Academic challenges

Due to the school closure, the traditional face-to-face (F2F) teaching and learning model was immediately transformed into remote teaching and learning in several possible modalities ranging from low/no-tech self-learning (e.g., printed materials or books) to high-tech teacher-guided (e.g., video conference lesson or digital classroom) modalities (UNICEF 2020, United Nations 2020). Thus, how students learned and the pedagogical styles adopted often combined two or more means, which is challenging (Castroverde and Acala 2021).

Roughly 86% of ministries of education around the globe provided digital (internet-based) or broadcast (TV- or radio-based) remote learning at the secondary education level while 76% focused on digital instruction. The widespread use of technology within education was a particular concern, especially in developing countries (Ly and Lalani 2020, Pokhrel and Chhetri 2021, UNICEF 2020). Three things—the internet, electricity and electronic devices (referred to here as teaching and learning devices)—are necessary for digital learning modalities (Batubara 2021, UNICEF 2020), but were reported to have various issues impacting people’s ability to access educational information. First, there is not equal access to the internet in all places. On

1 In some cases, senior secondary education was used to refer to the education system for these same levels. However, in this report, the authors preferred the term ‘upper secondary education’.

average, about 57% of the world's population has access to the internet, of which developing countries make up only 35% (World Bank 2021e). In the areas where the internet is accessible, the connection was often unstable and/or slow (Castroverde and Acala 2021, Ly and Lalani 2020). Second, electricity was unstable and not accessible to all households. These issues were even more significant for people living in rural areas. Globally, 90% of the world's population currently has access to electricity. However, 97% of people with access to electricity reside in an urban area and about 82% reside in rural areas (World Bank 2021b). Third, not all teachers or students owned a computer or other teaching and learning device. They needed to share with their siblings or other family members, and this proved even more difficult for teachers who needed to teach at the same time as their children needed it for learning (Ramos and Scarpetta 2020, Wallengren-Lynch, Dominelli and Cuadra 2021). Cambodia was not immune to these difficulties. In fact, all of these issues were also reported in part by various studies conducted in the country (Bhatta, et al. 2022, Chea, Bo and Minami 2022, MoEYS and ESWG 2021, PLAN and CARE 2021). Distance learning modalities are new and often unfamiliar to students and teachers, and so they need additional support to be as effective as possible (Pokhrel and Chhetri 2021). Teachers require training aligned with the learning modalities they are engaged in (UNICEF 2020, United Nations 2020). With the immediate transformation from traditional F2F to digital learning, most teachers were not trained properly and were not ready to teach with these new modalities. In Cambodia, more than 50% of teachers said they needed capacity development in creating teaching material and using social media for distance learning (MoEYS and ESWG 2021). Generally, teachers lack digital competencies and the pedagogical skills to utilize technology for creating content and teaching students (Almazova, et al. 2020, Heffington and Victoria 2021, Starkey 2019). In fact, Cambodian teachers are not very familiar with technology in general, and their technological knowledge is reported to be low (Chea, Bo and Minami 2022).

Teaching and learning from home have also been challenging. Not all teachers and students have private space for teaching and/or learning (Ramos and Scarpetta 2020, Pokhrel and Chhetri 2021). Although some may have a spare room, it typically needs to be shared among family members and generally lacks materials or resources (Taru 2020, Wallengren-Lynch, Dominelli and Cuadra 2021). Houses located near local business districts, factories, or markets generally have a lot of noise and are disruptive learning environments. The challenges are even greater for female teachers since they tend to be more responsible for household chores and other home activities such as cooking and cleaning (UNICEF Laos 2021, Wallengren-Lynch, Dominelli and Cuadra 2021). Women still carry the major burden of household chores supporting individual and family well-being even while working from home (Wallengren-Lynch, Dominelli and Cuadra 2021, Xiao, et al. 2021), which results in having double the work load compared to men (UNICEF Laos 2021).

2.2. Economic challenges

The outbreak of the COVID-19 virus powerfully and negatively affected the global economy (Diao and Mahrt 2020, Diao, Rosenbach, et al. 2021, Kabisa, et al. 2021, Morgan and Trinh 2021). The uncertainty of COVID-19 and strictness of transmission prevention measures, such as social distancing and movement restriction, have created international and domestic demand and supply shocks (Diao and Mahrt 2020, Morgan and Trinh 2021) that have resulted in massive job losses, especially in developing countries (ILO 2021, Weber and Newhouse 2021). Globally, the unemployment rate of the total labour force has increased from 5.37% in 2019 to 6.47% in 2020 (World Bank 2021c). Global labour income was estimated to have declined by 8.3%, amounting to US\$3.7 trillion or 4.4% of global GDP (ILO 2021). In Cambodia, most

people remained in the same job, but around 16% experienced a reduction in income as a result of the pandemic (MoEYS and ESWG 2021). Thus, household income declined. In fact, over half of the families running non-farm business experienced a substantial loss in income to the point of having made less or no revenue in 2020 (Karamba, Salcher and Tong 2021).

Global supply chain disruptions led to price-gouging and food insecurity around the world. Coupled with income loss, households tended to consume less food resulting in malnutrition (Kabisa, et al. 2021, Ramos and Scarpetta 2020, World Bank 2021d). Within Cambodia, 40% of households reported reduced levels of access to food (MoEYS and ESWG 2021). Households also simultaneously increased their daily expenditure on healthcare and household cleaning products. While most family members had to stay at home, households had to pay more for food (Morgan and Trinh 2021), electricity (Brown 2020), internet (Purwanto, et al. 2020), and remote learning-related materials, especially on the electronic accessories and devices necessary to access digital content.

Because of the significant loss of income and potential extra expenditure within households, previously low and low-middle income families have fallen into poverty, which has been a known driver of child labour (Ramos and Scarpetta 2020). Not only are women and young girls typically at higher risk of engaging in unpaid work, such as performing caregiver duties for younger siblings and household chores, but they are also more prone to abuse (verbal, emotional, and/or physical) and child marriage resulting from household-level stressors—such as loss of income, employment, and livelihoods—and their lower social position (Ramos and Scarpetta 2020, UNICEF Laos 2021). Taken together, all of these factors make children more likely to be absent or drop out of remote learning, particularly when it is online. This scenario is even more likely for children in households facing financial difficulty that cannot afford those expenses, particularly learning devices and the internet (Morgan and Trinh 2021, Ramos and Scarpetta 2020).

2.3. Mental health challenges

The pandemic has had a significant impact on everyone's daily life. Social distancing, lockdown, and quarantine can affect mental health in multiple ways (Fegert, et al. 2020, Pokhrel and Chhetri 2021). In general, people gradually experience different levels of psychological distress, such as nervousness, anxiety, depression, sleep problems, and/or inattention (Wang, et al. 2020, Wallengren-Lynch, Dominelli and Cuadra 2021). As a result, Cambodian children have been reported as feeling more stressed due to the pandemic (PLAN and CARE 2022). School closures pushed teachers and students to teach and learn from home, which often occurred in distracting environments and with a lack of resources, leading to a poor working environment (Ramos and Scarpetta 2020). Alongside the struggles to adapt to situations without adequate support and not being ready to fully adapt to online teaching and learning, teachers and students both experienced poor time management and lacked social support, which further aggravated developing mental health concerns (Fegert, et al. 2020, Irawanto, Novianti and Roz 2021, Wallengren-Lynch, Dominelli and Cuadra 2021).

The pandemic has changed everyday life routines. Social contacts were strictly limited, and out-of-home leisure time activities were prohibited. All family members have had to cope with the stress of quarantine and social distancing (Fegert, et al. 2020). PLAN and CARE (2022) reported that in Cambodia access to social media, gardening, reading, and listening to music are the most popular way to relieve stress. However, more than 40% of participants in the PLAN and CARE study didn't know how to release stress, and about 60% didn't know how to seek out help. In addition, living in overcrowded conditions for a prolonged period has had

serious implications for mental health and has resulted in children and adolescents being more exposed to situations of violence. In fact, 20% of Cambodian children reported that they have already faced or are at additional risk of violence, abuse, or exploitation due to school closures (MoEYS and ESWG 2021). It has also been reported that being confined at home brings a rise in domestic violence, especially for women and children (Graham-Harrison, et al. 2020, Pokhrel and Chhetri 2021). Exposure to domestic violence can significantly affect children’s mental health (Jeevasuthan and Hatta 2013) and potentially create long-term consequences (Hillis, Mercy and Saul 2017). Taken together, this can result in enormous stress and psychological distress for everyone in society. Among Cambodian students, 55% reported that they have experienced at least one type of mental health or psychosocial stressor during the pandemic period, including sadness, loneliness, and fear (MoEYS and ESWG 2021).

2.4. Opportunities

COVID-19 also sparked opportunities for innovation and creativity in meeting the needs of students and moving forward in delivering education both remotely and virtually (Mclaughlin, Scholar and Teater 2020). Ministries of education around the globe have generally put in place distance learning systems and resources together with some guidelines and policies during the crisis. Teachers needed to use the stipulated digital resources and platforms to create and deliver lessons while students had to learn how to learn from this new modality (ECLAC and OREALC/UNESCO 2020). In this sense, either through training or self-teaching, both teachers and students leveraged their digital literacy and skills to some extent in order to adapt to the new situation. Perhaps some of them have even mastered these latent or under-leveraged skills. What’s more, resources and efforts were invested to develop a variety of new educational resources that could be improved and utilized to enhance teaching and learning in the post-COVID-19 period or to prepare for future crises (Donnelly, Patrinos and Gresham 2021, Wallengren-Lynch, Dominelli and Cuadra 2021).

The current crisis created by COVID-19 also brought opportunities for family reunions and to strengthen interpersonal relationships with family (Xiao, et al. 2021). Working from home during COVID-19 has eased personal expectations and allowed people to have more time to interact with their family members (Vyas and Butakhieo 2021) that has led to increased family cohesion and resilience (Fegert, et al. 2020, Wallengren-Lynch, Dominelli and Cuadra 2021). Furthermore, overcoming stressful situations has the potential lead to an individual’s personal growth (Arnold, et al. 2005), which could reinforce the sense of competence and become a protective factor for coping with future stressors (Fegert, et al. 2020, Wallengren-Lynch, Dominelli and Cuadra 2021).

3. Cambodian upper secondary school context

General education in Cambodia includes six years in primary school (Grades 1 to 6), three years in lower secondary education (Grades 7 to 9), and three years in upper secondary education (Grades 10 to 12). Cambodia education law provides nine years of free basic education in public schools, although public upper secondary education is generally free of charge. Cambodia’s upper secondary education operates under a tracking system in which the student may choose to follow the science or social science track. Officially, the number of weekly learning hours spans 40 periods (1 period has 50 minutes) (MoEYS 2016). However, practically, many schools employ a shift system split between morning and afternoon “shift” classes, and so weekly learning hours are reduced to around 30 periods or less due to the lack of classrooms. There are 559 upper secondary schools and 15,713 upper secondary teachers throughout Cambodia. In

the 2021-2022 academic year, 360,617 students enrolled in upper secondary schools. The class size and student-to-teacher ratio are both large (MoEYS 2021), and there is an average of 42 students per class in public schools and 32 students per class in private schools (MoEYS 2018).

Cambodia is a top-10 country in the world meaning that it ranked among the highest number of school closure days during the pandemic. It is reported that school closures were in effect for 532 days (fully closed for 280 days and partially closed for 253 days) between February 2020 and 2022 (Bhatta, et al. 2022). During the school closures, the MoEYS shifted traditional F2F learning to distance learning in many forms (Dy Khamboly 2020). The MoEYS and relevant partners created digital content videos for secondary education with focused subjects: Khmer, mathematics, physics, biology, chemistry, and history. They distributed the digital content via the MoEYS's official Facebook page, YouTube channel, and other e-learning platforms. Later, the MoEYS and the Ministry of Information made a memorandum of understanding (MoU) to broadcast digital content over 77 TV channels and radios in order to reach students with limited internet access. The learners who could not access TV and radio were recommended to form small study groups using printed worksheets from their teachers (World Bank 2021a).

4. Research methodology

This study employed a quantitative research design (Creswell and Cresswell 2018) where data was collected from participants in the form of surveys using two sets of questionnaires. The questionnaires cover the three aspects of challenges outlined above—academic challenges, economic challenges, and mental challenges—and opportunities posed by the COVID-19 pandemic. Difficulties teachers and the students encountered in their teaching and learning processes were called academic challenges. Hardships attributed to the decrease in household income or in managing household earnings and spending, for instance, were called economic challenges. Finally, mental health challenges consisted of high stress and anxiety levels teachers and students faced during the pandemic. Opportunities referred to possible benefits or something teachers and students? positively gained both as the pandemic unfolded.

4.1. Sample and data

The study involved 685 upper secondary school teachers and 2,804 students in Grades 10 through 12 who participated in online and offline² surveys.

○ Online sample

The online sample came from a series of networking processes in which the researchers sent out a Google Form Link (both for teachers and students) to several groups of upper secondary school teachers across several cities and provinces in Cambodia via Facebook messenger and Telegram group chats. The researchers requested teachersto help fill out the teachers' questionnaire using the provided link. At the same time, the students' questionnaire link was passed on to the students through their respective teachers. The teachers and students who volunteered to fill out the survey questionnaires were regarded as the online sample.

2 Offline survey in this report refers to the process of data collection where the researchers went to classrooms and met with research participants. The questionnaires were filled and collected after they were administered. Throughout the report the terms 'physical data collection' or 'physical survey' were used to refer to the same concept as 'offline survey' or 'offline data collection.'

○ *Offline sample*

The offline sample consisted of the teachers and students who filled out hard copies of the questionnaires distributed by the researchers as a way to complement the online survey sample for those who might not have the ability to access the survey online. The selection of offline samples followed the three step sampling process below.

● **Step 1: Provincial selection**

The researchers purposively selected one province from each region of Cambodia. The selected provinces included the central plains (Kompong Cham), Tonle Sap area (Kampong Chhnang), coastal (Kampot), mountains (Ratanakiri), and the capital (Phnom Penh).

● **Step 2: School selection**

With the exception of Phnom Penh, the researchers purposively and conveniently selected two public high schools from each chosen province one in an urban area and one in a rural area. Within Phnom Penh, eight schools were selected of which five were public high schools and three were private schools. The schools in Phnom Penh were selected to reflect the diversity of schools in the city including both public and private as well as downtown and suburb schools.

● **Step 3: Class and students selection**

Two classes from each grade (Grades 10-12) were conveniently selected. All the students studying in the selected classes and were present during the time of questionnaire administering were requested to take part in the survey.

The selection of teachers followed a convenient sampling method, where all approachable teachers in each selected school were requested to participate in this study while administering the students' offline survey.

A total of 685 teachers and 2,804 students who both participated in either the online or offline surveys and stated that they continued their teaching or learning processes during school closures were selected as the research sample for this study.

4.2. Research instruments

The survey questionnaires were prepared for two groups of participants: the teachers and the students. The questionnaires covered similar aspects, including general information about the participant, challenges faced during school closure, and the opportunities gained during the pandemic.

Table 1: Information about quantitative research instruments

Aspect Covered	Teacher's Questionnaire		Student's Questionnaire	
	# of Items	Description	# of Items	Description
General Question	10	Developed Items	7	Developed Items
Academic Challenges	14			
Economic Challenges	8			
Mental Challenges ³	7	Adopted	7	Adopted
Stress	7	Adopted	7	Adopted

3 The items were adopted from DASS21 of Lovibond and Lovibond (1995). All items are measured with the original 4-level scale proposed by the author.

Table 2: Confirmatory factor analysis of stress and anxiety scales for teacher and student questionnaires

	P-value		GFI	TLI	CFI	RMSEA	Cronbach's alpha
	Bollen-stine (n = 2000)	Chi-square					
Teacher's questionnaire							0.949
Stress	0.361	0.186	0.996	0.996	0.999	0.025	0.894
Anxiety	0.454	0.146	0.996	0.996	0.999	0.029	0.915
Student's questionnaire							0.929
Stress	0.644	0.387	0.996	1.000	0.999	0.004	0.864
Anxiety	0.468	0.368	0.999	1.000	1.000	0.000	0.889

Source: Estimated by authors based on survey data

To validate the adopted mental health items, we performed confirmatory factor analysis (CFA) with the maximum likelihood estimation method in AMOS v.23, and the result are presented in Table 2. The CFA results confirmed the validity of the adopted stress and anxiety items with neither the Bollen-Stine bootstrap at the 2,000-sample level nor Chi-square was statistically significant, which indicated that the tested model was not different from the saturated model. This result indicates that the adopted items were the best fit and, therefore, the adopted scales are valid for measuring stress and anxiety in this study.

4.3 Data analysis

The gathered data were coded and analysed using SPSS Version 25. Statistical tests, including Chi-square, t-test, and one-way ANOVA were performed to determine the differences and associations between each type of challenge with respect to some socio-demographic variables such as gender, age, school location, region, school type, internet quality, and others.

The interpretation of the adopted stress and anxiety scales followed the modified interpretation decisions presented in Table 4.

Table 3: Criteria for the interpretation of the mental challenges

Domain	Scale	Score range (Base on sum)	Converted range (Base on average)	Interpretation
Anxiety	(0 – 3)×7×2	0 - 7	0.00 – 0.56	Normal
		8 - 9	0.57 – 0.70	Mild
		10 - 14	0.71 – 1.06	Moderate
		15 - 19	1.07 – 1.42	Severe
		20 ⁺	1.43 ⁺	Extremely severe
Stress	(0 – 3)×7×2	0 - 14	0.00 – 1.06	Normal
		15 - 18	1.07 – 1.35	Mild
		19 - 25	1.36 – 1.85	Moderate
		26 - 33	1.86 – 2.42	Severe
		34 ⁺	2.43 ⁺	Extremely Severe

Note: According to Lovibond and Lovibond (1995), the sum score for all items needs to be multiplied by 2 before interpreting using the original 'Score Range'. For the sake of homogeneity of interpretation, the authors converted the sum score into an average and preserved the interpretation concepts.

5. Research findings

5.1. Participants' background

5.1.1. Teachers' background

The present paper involved 685 upper secondary school teachers who stated that they continued teaching during school closure, and out of which, 55.8% of them were male. The average age for teachers in this sample was 35.6 years old with the youngest teacher 22 years old and the oldest teacher 57 years old. The majority of teachers taught at public schools⁴ (87.3%) and only 12.7% of teachers taught at private schools.⁵

By region, the largest percentage of teachers participating in the study were from the plains area provinces⁶ (28.8%). The next largest percentage of participating teachers were from Phnom Penh (23.0%) followed by teachers from plateau and mountainous provinces (22.7%), coastal provinces (14.5%), and then the Tonle Sap Lake area (11%). The percentage of participating teachers from rural schools (52.4%) was significantly higher than the percentage of teachers from urban schools (24.7%). Teachers teaching at downtown and suburban public schools accounted for 14.7% and 8.2% of the sample population, respectively. Lastly, by grade level, the highest percentage of teachers taught Grade 10 (36.9%) while 30.9% taught Grade 11 and 32.2% taught Grade 12.

Among all teachers in the sample, 74.3% of them had earned a bachelor's degree, and 19.5% held a master's degree or higher. Teachers who had not earned a bachelor's degree comprised just 6.1% of the sample population. Regarding their professional teaching certification, 18.9% of teachers sampled possessed a basic level of teacher education⁷ whereas 8.1% reported as teachers with a secondary level of teacher education. Teachers with higher education certification were the largest group and comprised 73.0% of the total sample. By teaching experience, 25.0% of them had less than 5 years of teaching experience while 57% had more than 10 years of teaching experience. Teachers with between 5 and 10 years of teaching experience accounted for 18.0% of the sample.

It is also important to note teachers' family and marital status. Based on the survey, 22.0% of teachers self-identified as single, 65.6% reported to be married and living with their spouse, and 10.2% of teachers reported that they were married but living apart from their spouse. Only 2.2% of the sample reported that they were divorced or separated. Since additional parental responsibilities may impact teachers' abilities, the survey also asked participants to report the number of children they have. In the sample, 30.3% of teacher reported having no children, 52.3% had one or two children, and 17.4% had more than two children. For teachers who did have children, 42.9% of them reported they had no school-aged children⁸, 47.8% reported having one or two school-aged children, and 9.3% of them had more than two school-aged children.

4 It should be noted here that based on the research context, the word 'school' in this report was referred to 'upper secondary school' or 'senior high school' as the two terms are commonly used with the same meaning.

5 In reality, it is complicated to conclusively classify teachers as being public school teachers or private school teachers as, in Cambodia, teachers who teach at public schools also teach at private schools. However, to make the matter simpler, the researchers requested them to choose whether to put it as public or private school teachers.

6 A list of the provinces included in this study were presented in Section 3.1 in the methodology section.

7 A teacher with a basic level of teacher education can be a primary school or lower secondary school teacher.

8 School-age children refer to children who are students of any school during the period of data collection.

5.1.2. Student's background

As stated in the methodology section, 2,804 students participated in the surveys. Among those, 65.4% of them identified as female. By grade, 31.3% of the students were in Grade 10, 39.1% were in Grade 11, 29.5% were in Grade 12, and 0.1% did not report their grade level (missing). In addition, the data showed that 87.3% of the students were studying in public schools while only 12.7% of students were studying at a private school. By geographical location (region), 21.0% were in Phnom Penh, 28.1% were in the plains area, 15.3% were in the Tonle Sap Lake area, 19.5% were in coastal areas, 16.0% were in the plateau and mountainous areas, and 0.2% did not report a region (missing). Of the students living in Phnom Penh, 13.6% were studying at downtown schools, and 14.6% were in urban schools. In the remaining four regions, 32.7% were students in urban schools and 39.2% were in rural schools.

5.2. Teachers' facing challenges

This section presents the research findings about challenges teachers faced with a particular focus on academic, economic, and mental health challenges.

5.2.1. Teachers' Academic Challenges

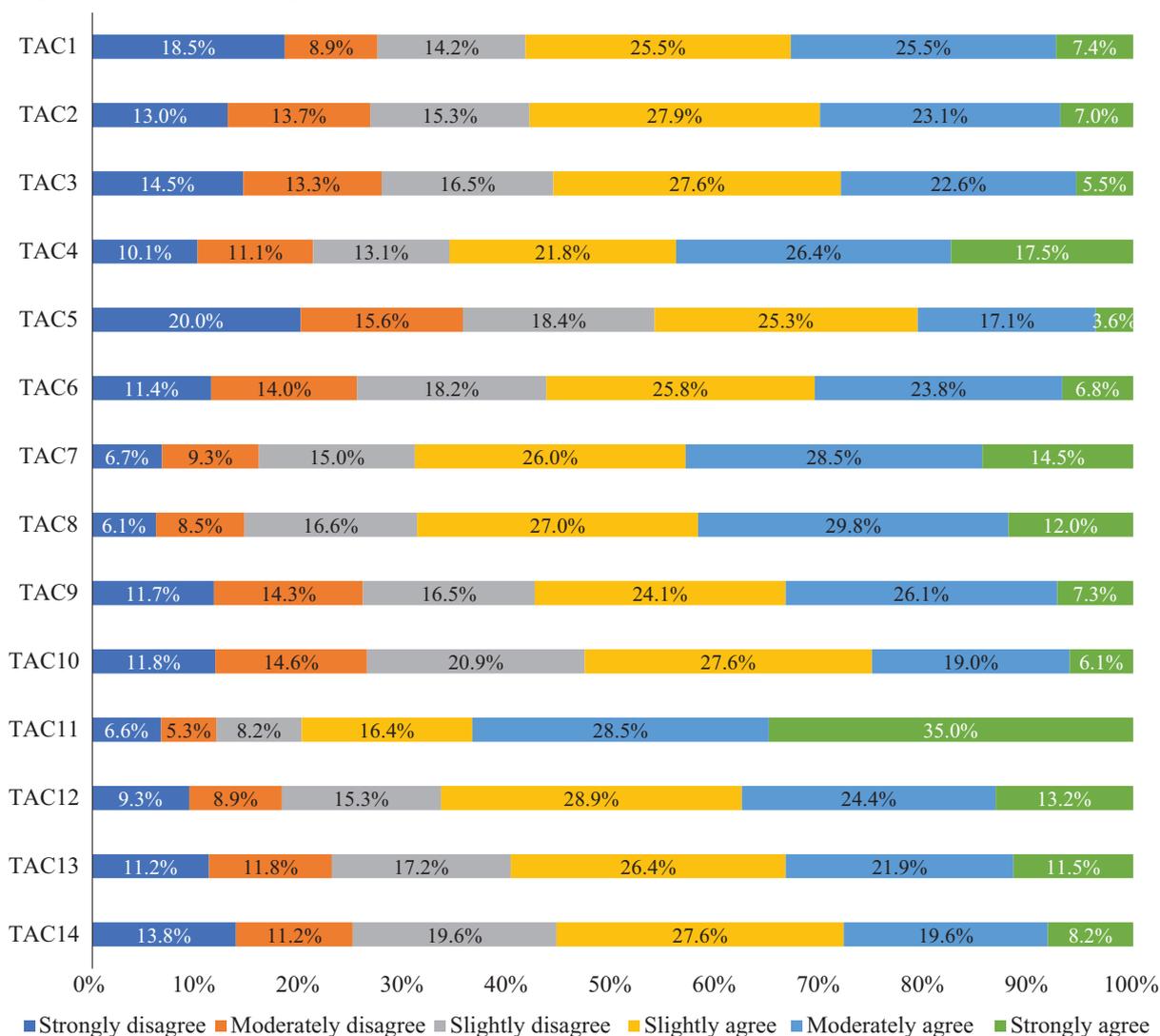
Figure 1 below presents the descriptive findings of each surveyed item of the teachers' academic challenges. It was revealed that 58.4%⁹ of the teachers reported having faced challenges using online learning platforms like Google classroom, Class Dojo, Seesaw, and others. A similar percentage (58.0%) of participating teachers experienced challenges in using online teaching technology such as Telegram, Zoom, Microsoft Team, Google Meet, and others. When faced with the tasks of distance and online teaching, 55.7% of teachers reported having encountered challenges in operating electronic devices such as smartphones, tablets, iPads, and computers to organize their daily lessons.

At the core task of online teaching, the survey revealed that 56.4% of the teachers experienced difficulty in delivering lessons or content to their students online. Additionally, 68.8% of them reported facing challenges in utilizing different teaching tactics, methods, or techniques in their teaching.

The findings revealed that participating teachers also experienced difficulties with noise, slow internet connections, and electricity outages, among others, that disrupted their lessons. In fact, 79.9% of the teachers reported having faced disruptions in their daily teaching due to no internet connection or low connection speeds while 66.5% of them faced disruption due to electricity outages. In addition, 59.8% of teachers experienced lesson disruptions due to surrounding noise while 55.4% experienced disruptions due to family members (kid's noise, sounds of household chores managed by other family members, etc).

9 The value was calculated using the combination of responses reported with slightly agree, moderately agree, and strongly agree, which represent the trend toward 'challenging' for each task in academic challenges.

Figure 1: Visual descriptive information about each academic challenge item



TAC1 I found it difficult to use online learning platforms (Google classroom, Class Dojo, Seesaw, ...) for my distance teaching.

TAC2 I found it difficult to use technology (Telegram, Zoom, Microsoft Team, Google meet) for my distance teaching.

TAC3 I had problems operating my phone/tablet/iPad/Desktop/ Laptop etc. for organizing my distance teaching.

TAC4 I lacked support from the school with the necessary devices or teaching materials for delivering teaching.

TAC5 I found it difficult to access e-learning materials from other online resources such as MoEYS's App, YouTube, Educational websites etc.

TAC6 I found it difficult to deliver lessons or content to my students.

TAC7 I found it difficult to involve/manage my students in finishing the tasks, homework or assignment I assigned.

TAC8 I found it difficult to utilize different teaching tactics, methods or techniques in my teaching.

TAC9 I found it difficult to design and manage quality online assessments/tests/exams.

TAC10 I found it difficult to develop appropriate test items for online assessment or evaluation.

TAC11 My online lessons were disrupted due to the Internet connection or its speed.

TAC12 My online lessons were disrupted due to instability or the electricity cut-off.

TAC13 My online lessons were distracted due to the surrounding noise in my living area.

TAC14 My online lessons were distracted due to family members (kid's noise, the sound of household chores managed by other family members, etc.)

Source: Calculated by authors based on the teachers' survey data

Table 4 shows the Chi-square tests of association among each item of the teachers' academic challenges associated? with some variables like gender, education level, school type, subject, school location, and region. For example, in terms of difficulties in using online teaching platforms (Google classroom, Class Dojo, Seesaw, etc.) a higher percentage of rural teachers (62.4%) faced challenging situations compared to urban teachers (59.2%) and downtown teachers (47.5%). Additionally, teachers in the plateau and mountainous provinces (69.7%) tend to face more challenges than teachers in any other region, including Phnom Penh (49.0%), plains area (59.9%), the Tonle Sap Lake area (54.7%) and coastal area (56.6%).

When using online technology, such as Telegram, Zoom, Microsoft Team, Google Meet, and others, the data demonstrated that female teachers (62.7%) face more difficulties compared to their male counterparts (54.2%). Additionally, public school teachers (60.0%) tended to face more challenges using these technologies than private school teachers (43.7%). Finally, teachers in more remote? Rural? Mountainous? locations experienced more challenges when compared to their counterparts in other regions.

Regarding difficulties in operating electronic devices for distance teaching, the data revealed that more female teachers (60.4%) reported experiencing challenging conditions compared to male teachers (52.1%). Public school teachers (57.2%) had more difficulty in operating electronic devices compared to teachers from private schools (46.0%). Furthermore, teachers teaching at rural (59.3%) and urban schools (58.6%) experienced more difficulty operating these devices compared to teachers from either suburban (41.1%) or downtown schools (46.5%). Additionally, teachers in plateau and mountainous areas (69.7%) faced more challenges accessing and using technology when compared to teachers in coastal (56.6%), Tonle Sap Lake area (54.7%), plains area (59.9%), and Phnom Penh (49.0%).

The findings in Table 5 illustrate the level of pedagogical challenges teachers faced in the transition to online teaching. The study found that female teachers (60.7%) reported experiencing challenges in delivering lessons and content online compared to male teachers (52.9%). Teachers with bachelor's degrees were more likely to report experiencing challenges (59.0%) compared to those holding a master's degree or higher (46.7%). In addition, public school teachers (58.4%) faced more difficulty in this aspect compared to teachers from private schools (42.5%). Teachers in rural schools (59.9%) reported facing slightly challenging situations more often compared to teachers in urban schools (58.6%) while downtown (45.5%) and suburban (46.4%) school teachers reported the least challenges. In terms of region, coastal teachers (62.6%) reported at the highest level of challenges delivering lessons and content online while Phnom Penh teachers faced the lowest level of challenges (45.9%).

Teachers' difficulty in utilizing different tactics, methods, or techniques in their online teaching practice was found to be significantly associated with school type, location, and region. As shown in Table 5, teachers from public schools (70.9%) reported facing more difficulty than teachers from private schools (54.0%). In addition, teachers in rural schools (72.1%) experienced more challenges compared to teachers from other locations—urban (70.4%), suburb (60.7%) and downtown (58.4%). It was also clear that teachers from the plains area (70.6%), Tonle Sap Lake area (74.7%) and coastal area (75.8%) experienced more challenges.

Table 4: Chi-square test results of the association between each item of teachers' academic challenges and gender, school type and grade

	TAC1	TAC2	TAC3	TAC4	TAC5	TAC6	TAC7	TAC8	TAC9	TAC10	TAC11	TAC12	TAC13	TAC14
Gender	Female	58.4%	62.7%	60.4%	65.3%	48.2%	60.7%	71.3%	70.6%	63.4%	54.5%	-	-	-
	Male	58.6%	54.2%	52.1%	66.0%	44.2%	52.9%	67.0%	67.3%	52.9%	51.3%	-	-	-
	<i>P-value</i>	0.953	0.025	0.030	0.865	0.304	0.040	0.230	0.348	0.006	0.413	-	-	-
Education	Below Bachelor	57.6%	63.6%	54.5%	69.7%	54.5%	60.6%	60.6%	60.6%	48.5%	48.5%	-	-	-
	Bachelor	59.8%	58.8%	56.7%	66.2%	46.8%	59.0%**	70.3%	70.7%	58.3%	52.8%	-	-	-
	Master/Higher	54.0%	53.3%	52.6%	62.8%	40.9%	46.7%**	65.7%	63.5%	56.9%	53.3%	-	-	-
	<i>P-value</i>	0.470	0.401	0.679	0.665	0.279	0.035	0.336	0.160	0.539	0.880	-	-	-
School Type	Public School	59.7%	60.0%	57.2%	67.2%	46.7%	58.4%	69.9%	70.9%	59.0%	53.8%	-	-	-
	Private School	50.6%	43.7%	46.0%	55.2%	41.4%	42.5%	62.1%	54.0%	47.1%	4428%	-	-	-
	<i>P-value</i>	0.107	0.004	0.049	0.027	0.356	0.005	0.140	0.002	0.036	0.115	-	-	-
Subject	Math/Pure Science	58.1%	56.9%	55.4%	67.9%	47.9%	58.4%	72.2%	71.4%	59.4%	56.4%	-	-	-
	Social Science	59.1%	59.4%	56.3%	62.6%	43.4%	53.5%	64.3%	65.0%	54.9%	47.6%	-	-	-
	<i>P-value</i>	0.804	0.505	0.814	0.147	0.242	0.202	0.029	0.075	0.240	0.022	-	-	-
School Location	Downtown	47.5%*	45.5%**	46.5%*	60.4%	41.6%	45.5%*	61.4%	58.4%*	50.5%	48.5%	74.3%	65.3%	61.4%
	Suburb	51.8%	41.1%**	41.1%*	55.4%	32.1%*	46.4%	62.5%	60.7%	51.8%	44.6%	73.2%	67.9%	62.5%
	Urban	59.2%	64.5%*	58.6%	65.7%	53.8%*	58.6%	71.6%	70.4%	62.7%	53.8%	79.9%	66.3%	60.4%
	Rural	62.4%*	61.0%	59.3%*	68.8%	45.7%	59.9%*	70.8%	72.1%*	57.9%	54.6%	82.7%	66.6%	58.5%
	<i>P-value</i>	0.040	0.001	0.013	0.142	0.025	0.027	0.181	0.031	0.196	0.428	0.147	0.991	0.908
Region	Phnom Penh	49.0%**	43.9%***	44.6%***	58.6%	38.2%*	45.9%***	61.8%	59.2%***	51.0%	47.1%	73.9%	66.2%	61.8%
	Plain Area	59.9%	59.9%	54.8%	67.5%	44.2%	58.4%	70.1%	70.6%	59.4%	53.8%	84.3%	67.5%	59.4%
	Tonle Sap	54.7%	50.7%	49.3%	70.7%	44.0%	57.3%	74.7%	74.7%	53.3%	52.0%	81.3%	69.3%	58.7%
	Coastal Province	56.6%	63.6%	62.6%	66.7%	57.6%**	62.6%	74.7%	75.8%	59.6%	61.6%	81.8%	66.7%	61.6%
	Plateau & Mountain	69.7%***	71.0%***	67.1%***	67.7%	49.7%	60.0%	67.7%	69.0%	62.6%	51.6%	78.7%	63.9%	57.4%
	<i>P-value</i>	0.006	0.001	0.001	0.292	0.034	0.044	0.155	0.034	0.250	0.258	0.175	0.932	0.937

For post-hoc test: * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$

Note: percentages in the table are the sum of the percentage of those who chose to agree, moderate and strongly agree on each item.

Source: Estimated by authors based on teacher survey data

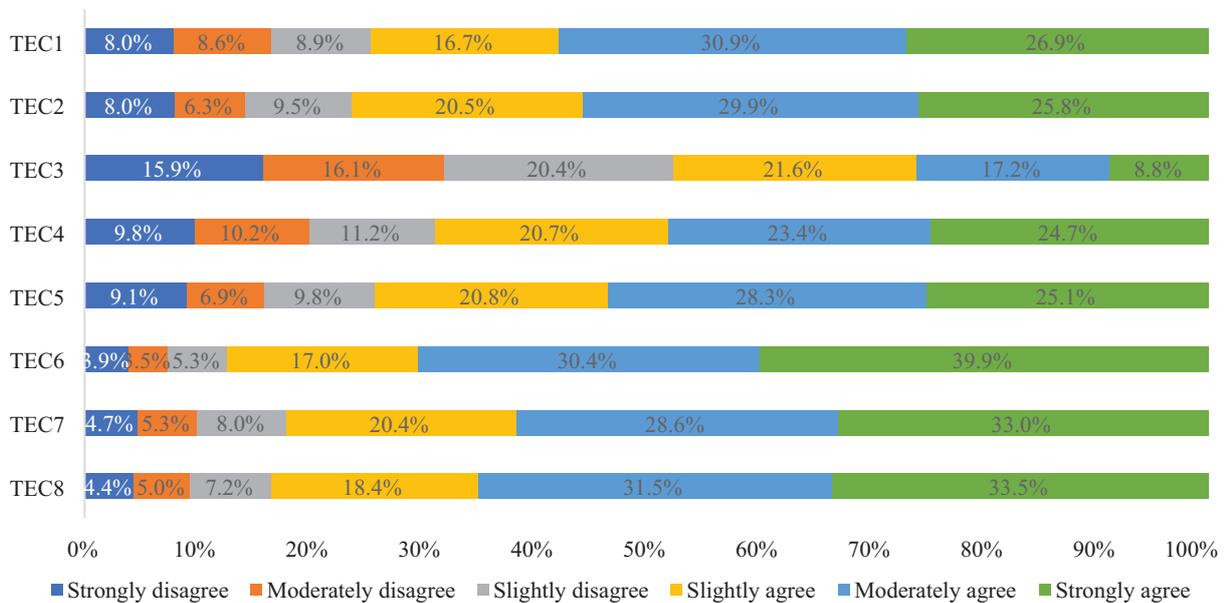
in utilizing different tactics, methods, or techniques in online teaching compared to teachers in both Phnom Penh (59.2%) and the plateau and mountainous area (69.0%).

Disturbances due to electricity outages, surrounding noise, and from family members were found to have no significant association with any variable, which meant that these issues seemed to be common problems across all school locations and regions.

5.2.2. Teachers' economic challenges

This section presents findings related to teachers' economic challenges. Figure 2 shows the visual descriptive findings of each survey item regarding teachers' economic challenges. It was found that 74.5% of teachers reported having experienced a drop in their family's income. However, despite being in such a situation, few teachers reduced the amount of food they ate daily, and only 47.6% of participating teachers reported having reduced the amount of their family's daily food consumption. Although their family's income dropped, 76.2% of the teachers reported having experienced an increase in their daily expenses. The increase in their family's expenses may be due to the increase in expenses for hygiene products (87.3%), utilities (82.0%), and internet usage (83.4%). It was also demonstrated that 68.8% of the teachers reported having critical issues in managing family loans which may be due to the increase in family expenses and the decrease in income. Moreover, 74.2% of teachers revealed that they had difficulty affording their children's online learning materials.

Figure 2: Visual descriptive information about each economic challenge item



- TEC1 My family's income significantly decreased.
- TEC2 My family faced an increase in daily expenses.
- TEC3 My family members ate less amount of food compared to before the pandemic.
- TEC4 My family found difficulty in managing the existing loans.
- TEC5 I found it difficult to afford my children's distance or online learning materials.
- TEC6 My family have extra expenses on hygiene or cleaning products (hand gel or alcohol, mask, ...).
- TEC7 Water and electricity expenses increased and became an issue for my family.
- TEC8 Internet expenses became an issue for my family.

Source: Calculated by authors based on teacher survey data

Table 5: Chi-square tests of the association between each item of the teachers' economic challenges and some variables

	TEC1	TEC2	TEC3	TEC4	TEC5	TEC6	TEC7	TEC8
Gender								
Female	73.3%	75.2%	49.5%	66.3%	73.6%	86.5%	81.8%	80.9%
Male	75.4%	77.0%	46.1%	70.7%	74.9%	88.0%	82.2%	85.6%
<i>P-value</i>	<i>0.526</i>	<i>0.600</i>	<i>0.372</i>	<i>0.233</i>	<i>0.705</i>	<i>0.561</i>	<i>0.905</i>	<i>0.097</i>
Subject								
Math/Pure Science	77.9%	77.4%	46.6%	71.2%	75.2%	88.5%	82.0%	83.2%
Social Science	69.6%	74.5%	49.0%	65.4%	73.1%	85.7%	82.2%	83.9%
<i>P-value</i>	<i>0.013</i>	<i>0.368</i>	<i>0.546</i>	<i>0.107</i>	<i>0.533</i>	<i>0.277</i>	<i>0.943</i>	<i>0.806</i>
School Kid								
No Kid	76.3%	76.3%	45.4%	64.6%*	68.7%***	86.9%	82.1%	80.4%
1 or 2 Kids	74.4%	75.3%	49.4%	69.8%	78.7%**	87.0%	81.8%	84.9%
More than 2 Kids	69.8%	81.0%	49.2%	84.1%**	77.8%	92.1%	82.5%	92.1%
<i>P-value</i>	<i>0.551</i>	<i>0.629</i>	<i>0.588</i>	<i>0.009</i>	<i>0.015</i>	<i>0.511</i>	<i>0.987</i>	<i>0.054</i>
School Type								
Public School	73.6%	75.6%	47.2%	69.2%	73.1%	86.3%	80.6%	83.1%
Private School	80.5%	80.5%	50.6%	65.5%	82.8%	94.3%	92.0%	86.2%
<i>P-value</i>	<i>0.169</i>	<i>0.318</i>	<i>0.551</i>	<i>0.485</i>	<i>0.053</i>	<i>0.037</i>	<i>0.010</i>	<i>0.467</i>
School Location								
Downtown	78.2%	77.2%	46.5%	64.4%	82.2%	90.1%	86.1%	80.2%
Suburb	73.2%	69.6%	41.1%	62.5%	67.9%	85.7%	80.4%	76.8%
Urban	77.5%	75.1%	54.4%	73.4%	75.7%	87.0%	82.8%	86.4%
Rural	72.1%	77.4%	45.7%	68.8%	72.4%	86.9%	80.8%	84.1%
<i>P-value</i>	<i>0.451</i>	<i>0.616</i>	<i>0.195</i>	<i>0.307</i>	<i>0.148</i>	<i>0.824</i>	<i>0.633</i>	<i>0.289</i>
Region								
Phnom Penh	76.4%	74.5%	44.6%	63.7%	77.1%	88.5%	84.1%	79.0%
Plain	78.7%	81.2%	46.7%	72.1%	73.1%	90.4%	79.2%	82.7%
Tonle Sap	80.0%	78.7%	49.3%	70.7%	77.3%	89.3%	80.0%	89.3%
Coastal	73.7%	76.8%	51.5%	70.7%	76.8%	81.8%	84.8%	85.9%
Mountain	64.5%	69.7%	47.7%	67.1%	69.7%	84.5%	83.2%	85.2%
<i>P-value</i>	<i>0.022</i>	<i>0.143</i>	<i>0.856</i>	<i>0.496</i>	<i>0.527</i>	<i>0.206</i>	<i>0.658</i>	<i>0.288</i>

*For post-hoc test: *p <= 0.05, **p < 0.01 and ***p < 0.001*

Note: percentages in the table are the sum of the percentage of those who chose to agree, moderate and strongly agree on each item.

Source: Calculated by authors based on teacher survey data

Table 5 presents Chi-square analyses of the associations between each item of the teachers’ economic challenges with regard to certain factors, including school type, gender, region, school location, and subject, among others. It is clear from the table that mathematics/pure science teachers (77.9%) experience greater challenges when their family’s income dropped compared to social science teachers (69.6%). This is probably due to the fact that math/pure science subject teachers lost more income due to in-class teaching suspensions or students’ decreased attendance in their private tutoring classes during the school closure.

Surprisingly, the data revealed that teachers in more disadvantageous provinces—plateau and mountainous provinces (64.5%)—reported lower instances of their family’s income decreasing when compared to the teachers in more advantageous provinces, like Phnom Penh (76.4%), plains area (78.7%), coastal (73.7%), or the Tonle Sap Lake area (80.0%).

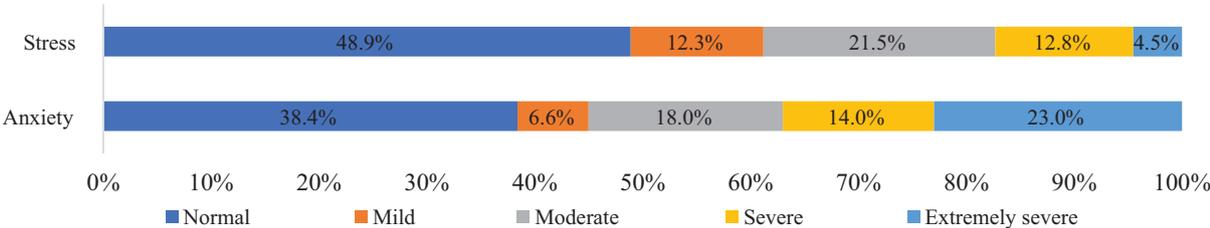
When faced with difficulties in managing existing loans, the data shows that teachers with more than two school-aged children (84.1%) reported challenges more often than either those with one or two school-aged children (69.8%) or single teachers (64.6%). Teachers with more than two school-aged children (77.8%) reported facing challenges affording their children’s distance or online learning materials less often than teachers with one or two school-aged kids (78.7%). Interestingly, 68.7% of single teachers also reported challenges in affording distance learning supplies for their children, but this may be due to supporting their relatives rather than their own children.

The findings also showed that the teachers’ challenges with extra expenses for hygiene or cleaning products (hand gel or alcohol, masks, etc.) had a significant association with school type. Roughly 94.3% of teachers in private schools experienced challenges in this regard compared to 86.3% of teachers in public schools. Similarly, a teachers’ difficulty affording utility costs was found to have a significant association with school type. Teachers in private/ NGO or community schools (92.0%) experienced more challenging situations handling extra expense from utilities compare to 80.6% of teachers in public schools.

5.2.3. Teachers’ Mental Challenges

This section presents the findings about teachers’ mental challenges, specifically conditions around stress and anxiety. Figure 3, shown below, presents the finding related to levels of stress and anxiety symptoms.

Figure 3: Teachers’ anxiety and stress conditions



Source: Calculated by authors based on teacher survey data

Table 6 presents the comparisons of teachers’ mental health challenges due to anxiety and stress levels with regard to several variables, including gender, teaching experience, subject taught, number of school-aged children, the teachers’ family status, and others.

Table 6: Comparison analyses of teachers' mental challenges with respect to some factors¹⁰
(based on mean value)

		Stress (n = 685)	Anxiety (n = 685)
Gender	Female	1.14	0.88
	Male	1.19	0.92
	<i>p-value</i>	<i>0.543</i>	<i>0.729</i>
School Type	Public School	1.16	0.90
	Private School	1.22	0.98
	<i>p-value</i>	<i>0.542</i>	<i>0.404</i>
Teaching Experience	Less than 5 Years	1.13	0.86
	5-10 Years	1.00	0.72
	More than 10 Years	1.24	1.00
	<i>p-value</i>	<i>0.003</i>	<i>0.001</i>
School Location	Downtown	1.29	1.03
	Suburb	1.43	1.10
	Urban	1.17	0.97
	Rural	1.10	0.83
	<i>p-value</i>	<i>0.001</i>	<i>0.001</i>
Region	Phnom Penh	1.34	1.06
	Plain Areas	1.07	0.82
	Tole Sap Lake	1.24	0.97
	Coastal Provinces	1.11	0.85
	Plateau & Mountain	1.13	0.91
	<i>p-value</i>	<i>0.003</i>	<i>0.048</i>
Subject Taught	Math/Pure Science	1.17	0.87
	Social Science	1.17	0.95
	<i>p-value</i>	<i>0.94</i>	<i>0.153</i>
School Kids	No Kid	1.08	0.79
	1 or 2 Kids	1.21	0.96
	More than 2 Kids	1.33	1.13
	<i>p-value</i>	<i>0.018</i>	<i>0.001</i>
Family Status	Single	1.14	0.83
	Married & Live Together	1.17	0.92
	Married but Live Apart	1.22	1.00
	Divorce/Separated	0.99	0.77
	<i>p-value</i>	<i>0.957</i>	<i>0.527</i>

Source: Calculated by authors based on teacher survey data

- Teachers' stress

During the school closure, teachers generally experienced mild stress situations (Mean = 1.17, SD = 0.73). At the two ends of the spectrum, 4.5% of participating teachers faced extremely severe stress conditions and 48.9% of teachers reported experiencing normal conditions. By other measures, 12.3% of teachers reported feeling to mild stress, 21.5% experienced moderate stress, and 12.8% of teachers reported experiencing severe stress (see Figure 3). Additionally, the findings from Table 7 below demonstrate that teachers' stress was found to be significantly different across variables such as teaching experience, school location, region, and the number of school-aged children the teachers had. Post-hoc tests revealed that teachers with 5 to 10

¹⁰ It should be noted that the analysis was made among those having a challenging symptom, that is among those having moderate, severe and extremely severe anxiety or stress conditions.

years of experience felt less stress (Mean = 1.00) compared to those who had more than 10 years of experience (Mean = 1.24). It was also clear that teachers in suburban schools (Mean = 1.43) experienced higher stress levels than teachers from both urban schools (Mean = 1.17) and rural schools (Mean = 1.10). By region, teachers in Phnom Penh (Mean = 1.34) experienced higher stress than the teachers from plains area schools (Mean = 1.07). The finding also showed that the teachers with 'no school-aged children' reported lower stress levels (Mean = 1.08) compared to those with 'more than 2 school-aged children' (Mean = 1.33).

- Teacher's anxiety

Regarding anxiety, the findings revealed that participating teachers experienced moderate anxiety levels (Mean = 0.91, SD = 0.76). At the two ends of the survey, 23.1% of teachers faced extremely severe anxiety while 38.4% reporting having normal anxiety levels. The teachers who reported mild, moderate, and severe anxiety accounted for 6.6%, 18.0%, and 14.0% of the sample population, respectively. The findings from Table 7 showed that there were statistically significant differences in the teachers' anxiety levels across some variables such as teaching experience, school location, region, and the number of school-aged children the teacher had. Post-hoc tests revealed that teachers with 5 to 10 years of teaching experienced less anxiety (Mean = 0.72) than teachers with more than 10 years of teaching experience (Mean = 1.00). Additionally, the data showed that teachers in Phnom Penh (Mean = 1.06) experienced higher anxiety than the teachers teaching in the plains area (Mean = 0.82). When looking at the number of school-aged children teachers had, it was found that teachers with no school-aged children experienced less anxiety (Mean = 0.79) compare to those with either one or two school-aged children (Mean = 0.96) or teachers with more than 2 school-aged children (Mean = 1.13).

5.3. Students' facing challenges

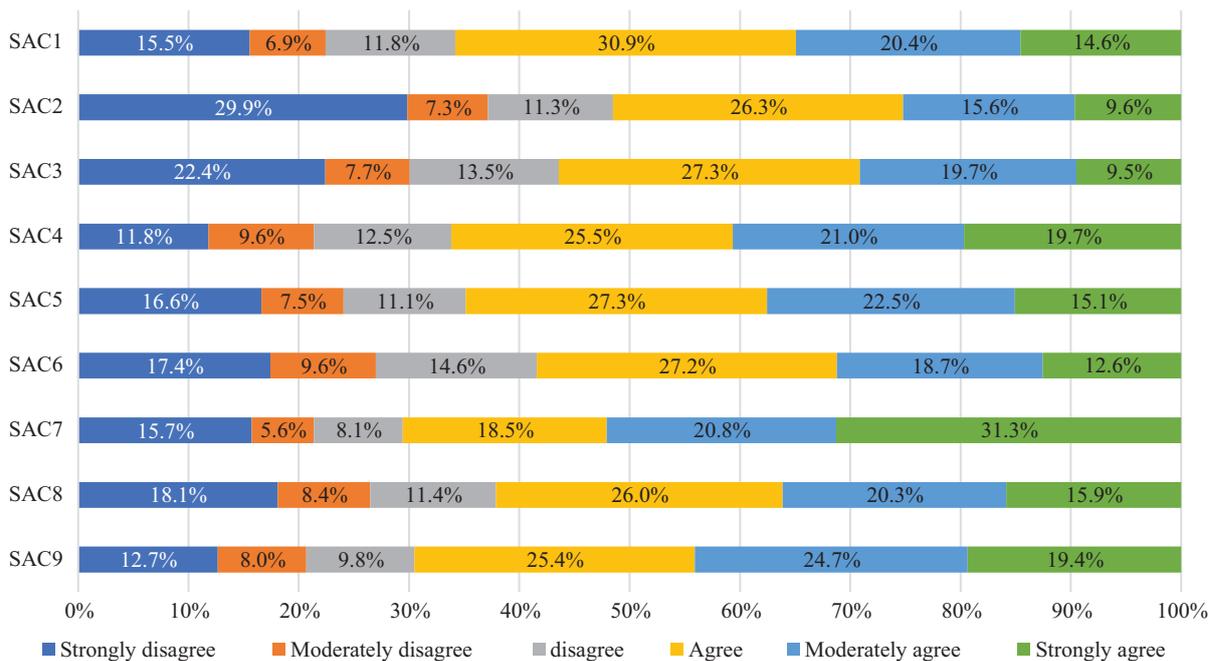
5.3.1. Students' academic challenges

Figure 4 depicts how students rated items on the academic challenge questions while Table 7 lists the percentages of students who agreed (on a scale of agree to strongly agree) with the academic challenge questions by gender, school type, grade, school location, and region.

About 65.8% of students stated that they had difficulty utilizing online learning technology, like Telegram, Zoom, Microsoft Team, Google classroom, and others. Additionally, 51.5% of students reported that they had problems operating their electronic devices (smartphones, tablets, or computers) for online learning, and 56.4% of students expressed that they had difficulty accessing learning materials from e-learning platforms. About 65% of students expressed that they found it hard to communicate with teachers and friends, and a similar percentage indicated that they had difficulties engaging with or participating in synchronous discussions in online classes. Regarding online tests, around 58.4% of students said that the test-taking process was complicated on an online system since they were not very familiar with the test format and structure.

Across gender, girls reported having more difficulty using ICT technologies than boys. In fact, the percentage of girls reporting difficulties with technology was 10% higher than the percentage of boys.

Figure 4: Percentage of students' rating on the academic challenge questions



- SAC1. I found it difficult to use online learning technology (Telegram, Zoom, Microsoft Team, Google classroom).
- SAC2. I had problems operating my phone/tablet/iPad/Desktop/Laptop etc. for online learning.
- SAC3. I found it difficult to access the e-learning materials from other e-learning platforms such as MoEYS's App, Facebook, websites etc.
- SAC4. I found it difficult to communicate with teachers and classmates to discuss confusing topics outside of online classes.
- SAC5. I found it difficult to engage/participate in synchronous discussions during online learning classes.
- SAC6. I found it difficult or was unfamiliar with the online test format/structure.
- SAC7. My online lessons were disrupted due to the Internet connection or its speed.
- SAC8. My online lessons were disrupted due to instability or the electricity cut-off.
- SAC9. My online lessons were distracted due to the surrounding noise in my living area.

Source: Calculated by authors based on student survey data

On a grade level comparison, the percentage of students who stated that they had difficulties with technology are similar across all grades except regarding online testing where the percentage of Grade 12 students is about 6% higher than the other grades. Students who attended private schools (71.9%) were more likely to indicate having difficulties engaging with or participating in activities in online classes than their peers attending public schools (63.8%). Conversely, 59.4% of public school students stated that they were concerned about taking online tests compared to 51.4% of their peers in private school.

Across the entire student sample population, 70.6% of students reported that their online lessons were disrupted due an unstable internet connection, and 62.1% cited electricity outages as problems that interrupted their online learning. Finally, roughly 70% of students reported that their lessons were also interrupted by surrounding noise in their living area.

When considering how academic challenges varied based on school location and region, the data was not statistically significant for all aspects. However, the data shows that students in Phnom Penh reported having greater difficulties than students other regions, and students in the plateau and mountainous area had the lowest percentage of reported difficulties. On the other hand, disadvantaged areas—including rural areas across all provinces or the suburbs of Phnom Penh—had higher percentages than students in advantaged areas, including urban or downtown.

Table 7: Percentage of students who agree (agree to strongly) on academic challenge questions by gender, school type, grade, school type, grade, school location and region

	SAC1	SAC2	SAC3	SAC4	SAC5	SAC6	SAC7	SAC8	SAC9
Gender									
Female	69.6%	54.3%	59.8%	69.3%	68.8%	61.5%	-	-	-
Male	58.7%	46.2%	50.1%	60.2%	57.5%	52.6%	-	-	-
<i>P-value</i>	0.000	0.000	0.000	0.000	0.000	0.000	-	-	-
School									
Public school	66.1%	51.6%	56.2%	65.6%	63.8%	59.4%	-	-	-
Private school	63.8%	50.8%	54.2%	69.9%	71.9%	51.4%	-	-	-
<i>P-value</i>	<i>0.386</i>	<i>0.791</i>	<i>0.369</i>	<i>0.106</i>	0.003	0.004	-	-	-
Grade									
10	63.0%	49.1%	55.1%	63.9%	63.8%	56.8%	-	-	-
11	66.8%	52.3%	56.6%	66.3%	64.7%	56.4%	-	-	-
12	67.4%	53.0%	57.5%	68.4%	66.2%	62.7%**	-	-	-
<i>P-value</i>	<i>0.101</i>	<i>0.211</i>	<i>0.603</i>	<i>0.144</i>	<i>0.568</i>	0.011	-	-	-
Location									
Downtown	63.8%	49.2%	56.3%	67.3%	65.4%	52.8%*	71.5%	67.6%*	73.8%
Suburb	68.5%	52.0%	60.6%	71.7%*	71.7%*	53.4%	77.4%**	70.3%**	78.9%***
Urban	63.8%	50.0%	55.1%	63.2%*	62.3%*	58.6%	67.7%*	60.0%	67.0%*
Rural	67.3%	53.2%	56.6%	67.0%	65.2%	60.8%*	71.7%	60.6%	68.3%
<i>P-value</i>	<i>0.206</i>	<i>0.399</i>	<i>0.437</i>	0.039	0.036	0.019	0.015	0.002	0.000
Region									
Phnom Penh	66.0%	50.5%	58.3%	69.4%	68.4%*	53.1%**	74.3%**	68.9%***	76.2%***
Plain	65.9%	51.7%	56.5%	68.7%	65.9%	59.0%	71.8%	62.3%	71.8%
Tonle Sap	66.6%	51.4%	54.4%	65.4%	65.0%	58.4%	74.5%	62.1%	69.9%
Coastal	66.3%	53.8%	57.9%	64.1%	64.5%	63.7%**	67.8%	59.9%	64.7%***
Mountain	64.2%	49.6%	53.8%	60.9%**	59.1%**	58.2%	63.6%***	55.8%**	62.7%***
<i>P-value</i>	<i>0.952</i>	<i>0.712</i>	<i>0.507</i>	0.019	0.039	0.009	0.000	0.000	0.000

*For post-hoc test: *p <= 0.05, **p < 0.01 and ***p < 0.001*

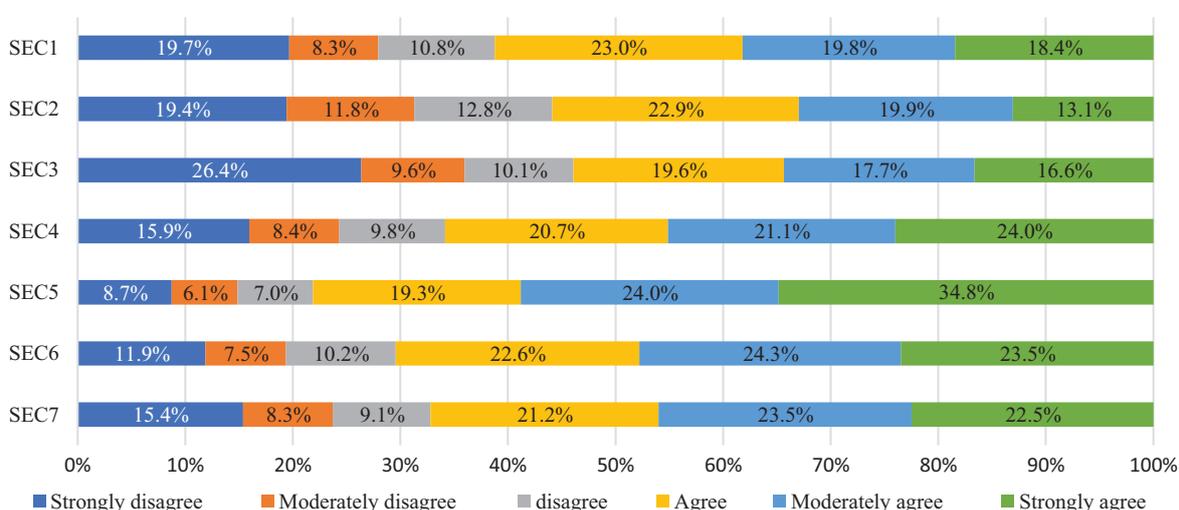
Note: percentages in the table are the sum of the percentage of those who chose to agree, moderate and strongly agree on each item.
Source: Calculated by authors based on student survey data

This could imply that students in Phnom Penh experienced the most difficulties while disadvantaged areas also had a higher percentage of reported difficulties than advantaged areas.

5.3.2. Students' family economic challenges

Figure 5 shows how students rated survey items regarding economic challenges they may have faced. Out of all students, 61.2% affirmed that their parents complained about a significant decrease in income. About 56% of students noticed that their family members ate less food than before. About 54% of students indicated that their parents talked about difficulties paying their loans, and 66% felt that their parents faced financial difficulty supporting their distance learning. A relatively high percentage, 78.1% of students, perceived that their families needed to spend more on hygiene or personal protection products. Roughly 70% of students stated that their parents complained about a significant increase in utility expenses, like water, electricity, and internet, while they were engaged in distance learning.

Figure 5: Percentage of students' rating on the economic challenge questions



- SEC1. I have often heard my parents complain about a significant decrease in our family's income.
- SEC2. I noticed that my family members ate less amount of food compared to the time before the COVID-19 pandemic.
- SEC3. I have often heard my parents talk about the difficulty in managing existing family's loans/debts.
- SEC4. I felt that my parents had financial difficulty in buying distance learning equipment/materials (phone, tablet, computer/laptop, books, etc.) for me or my siblings.
- SEC5. I noticed that my family needed to spend extra money on hygiene or COVID-19 protection products (hand gel, alcohol, mask, ...).
- SEC6. I often heard my parents' complaints about a significant increase in utility expenses such as water, electricity, ...
- SEC7. I heard my parents talk or complain about extra expenses on the Internet for my online/e-learning.

Source: Calculated by authors based on student survey data

Table 8 lists the percentages of students who agreed (on a scale of agree to strongly agree) with the statements regarding economic challenges by school type, school location, and region. Statistical tests showed that the proportions of students who agreed that their family had economic challenges did not differ between public and private schools. However, 6.6% of students in public school expressed that their parents were concerned about the costs of distance learning materials whereas 6.5% of private school students indicated their families had problems with the increase in utility expenses. Altogether, the data illustrated a similar

pattern regarding academic challenges. Economically, Phnom Penh appears to have the highest proportion of students whose families faced difficulties compared to other regions while the plateau and mountainous area had the lowest percentage of reported difficulties. The data also illustrates a trend where students in disadvantaged areas (rural areas in the provinces or in suburbs of Phnom Penh) are higher in percentage of what? Difficulties? than advantaged areas (urban and downtown).

Table 8: Percentage of students who agree (agree to strongly agree) on economic challenge questions by school type, school location and region

		SEC1	SEC2	SEC3	SEC4	SEC5	SEC6	SEC7
School Type	Public School	60.7%	56.5%	54.2%	66.7%	77.9%	69.6%	67.5%
	Private School	64.9%	51.4%	51.7%	60.1%	79.8%	76.1%	65.2%
	<i>P-value</i>	<i>0.130</i>	<i>0.068</i>	<i>0.365</i>	<i>0.015</i>	<i>0.424</i>	<i>0.012</i>	<i>0.385</i>
School Location	Downtown	64.7%	54.7%	51.1%	58.9%**	80.6%	77.0%**	65.0%
	Suburban	69.2%**	60.6%	56.3%	65.9%	85.7%**	79.6%***	69.5%
	Urban	57.7%**	54.4%	51.7%	62.8%*	74.5%***	66.7%**	64.8%
	Rural	61.4%	65.4%	55.9%	70.0%***	78.7%	69.7%	69.1%
	<i>P-value</i>	<i>0.003</i>	<i>0.294</i>	<i>0.146</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.109</i>
Region	Phnom Penh	66.8%**	57.5%	53.6%	62.2%	83.0%**	78.2%***	67.2%
	Plain	62.3%	57.3%	57.7%*	67.1%	79.0%	72.7%	68.7%
	Tonle Sap	56.8%*	50.7%*	49.8%	66.4%	77.3%	68.2%	66.8%
	Coastal	65.0%*	59.5%	56.2%	68.3%	78.8%	67.0%	66.5%
	Mountain	52.0%***	52.0%	49.1%*	64.9%	70.7%***	62.4%***	65.8%
	<i>P-value</i>	<i>0.000</i>	<i>0.021</i>	<i>0.012</i>	<i>0.227</i>	<i>0.000</i>	<i>0.000</i>	<i>0.841</i>

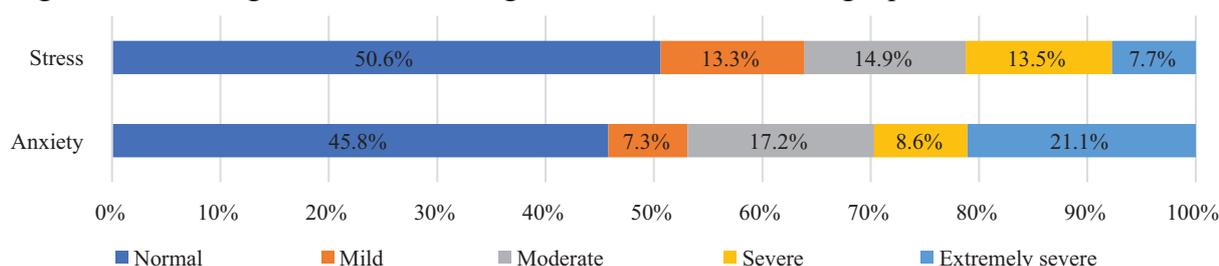
For post-hoc test: * $p \leq 0.05$, ** $p < 0.01$ and *** $p < 0.001$

Note: percentages in the table are the sum of the percentage of those who chose to agree, moderate and strongly agree on each item. Source: Calculated by authors based on student survey data

5.3.3. Students' mental health challenges

Students' experience of mental health challenges is indicated by levels of stress and anxiety based on self-rating scales. Overall, students' stress and anxiety levels were mild (Mean = 1.16, SD = 0.736, and Mean = 0.79, SD = 0.739, respectively). Even so, disaggregated by levels of stress experienced, as shown in Figure 6, significant numbers of students reported experiencing moderate (14.9%), severe (13.5%), and extremely severe (7.7%) levels of stress amounting to 36.1% or 1,011 of all students experiencing some level stress. Anxiety, on the other hand, was reported at higher percentages where 17.2% of students reported moderate, 8.6% reported severe, and 21.1% reported having extremely severe levels of anxiety, and 46.9% or 1,316 total students reported feelings of some level of anxiety. Table 9 lists stress and anxiety levels by gender, age, grade, school type, school location, and region.

Figure 6: Percentage of students' rating on the economic challenge questions



Source: Calculated by authors based on student survey data

- Students' stress

The statistical tests showed that girls reported higher levels of stress than boys, and the stress level was also higher in older age groups (post-hoc test $p < 0.05$). Private school students were significantly more stressed than public school students. Lastly, by school location, the students in Phnom Penh's downtown schools had the highest stress level among all locations (post-hoc test $p < 0.05$).

- Students' anxiety

The statistical tests demonstrated that anxiety levels were also higher in older age groups (post-hoc test $p < 0.05$) but did not differ based on gender. Similar to reported levels of stress, private school students stated feeling significantly more stressed than public school students, and the students in Phnom Penh's downtown schools had the highest stress levels compared to other locations (post-hoc test $p < 0.05$). By region, the Tonle Sap Lake area had the lowest levels of anxiety while the plains area had the highest (post-hoc test $p < 0.05$). Overall, mental health challenges followed a trend that differed from academic and economic challenges wherein students in advantaged areas indicated experiencing more mental health challenges than their counterparts in disadvantaged areas.

Table 9: Levels of students' stress and anxiety by gender, school, school location and region

		Stress (N=2804)	Anxiety (N=2804)
Gender	Female	1.19	0.79
	Male	1.10	0.80
	<i>P-value</i>	0.002	0.875
Age	≤ 16	1.15	0.76
	17	1.13	0.76
	18	1.19	0.83
	19	1.21	0.86
	> 19	1.39	1.12
	<i>P-value</i>	0.006	0.000
Grade	10	1.15	0.80
	11	1.17	0.81
	12	1.18	0.77
	<i>P-value</i>	0.653	0.564
School Type	Public school	1.13	0.77
	Private school	1.34	0.96
	<i>P-value</i>	0.000	0.000
School Location	Downtown	1.33	0.93
	Suburb	1.08	0.71
	Urban	1.13	0.80
	Rural	1.17	0.77
	<i>P-value</i>	0.000	0.002
Region	Phnom Penh	1.21	0.83
	Plain	1.20	0.83
	Tonle Sap	1.11	0.71
	Coastal	1.09	0.77
	Mountain	1.17	0.80
	<i>P-value</i>	0.020	0.047

Source: Estimated by authors based on student survey data

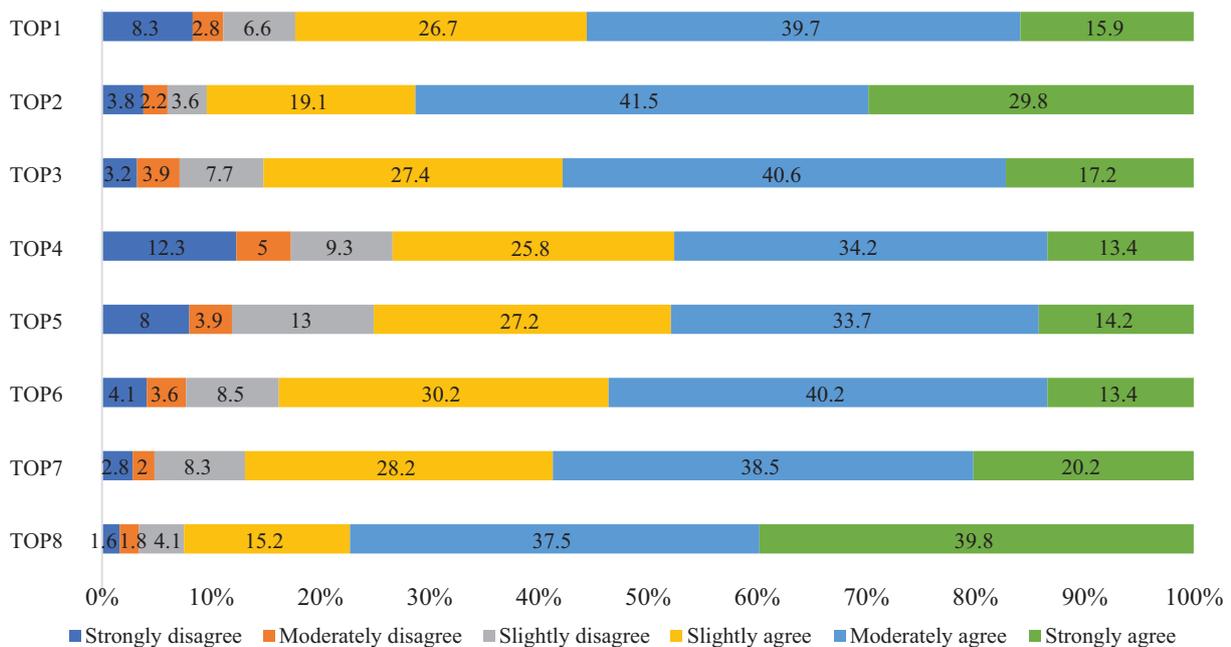
5.4. Opportunities amid COVID-19

This section presents the findings related to the opportunities, or advantages, teachers and students gained from distance learning during school closures. Besides the challenges the teachers and students experienced academically, economically, and mentally, teachers also got an opportunity to grow academically and socially during the school closure.

5.4.1. Teachers' opportunities

Based on the survey data, teachers were equipped with some practical opportunities while social distancing and through the burden of continuing to teach during school closures (see Figure 7). Academically, teachers gained more knowledge related to technology for education, new ways of engaging students outside of sitting together in a traditional classroom setting, and more opportunities for pedagogical training. The data showed that 82.3% of teachers reported that they learnt new ways of teaching without being in person, and that 90.4% of teachers gained new knowledge and skills by using a video conference platform (e.g., Zoom and Google Meet) for teaching students online. A similar trend was found when teachers were asked to rate their level of confidence in utilizing digital devices for distance teaching.

Figure 7: Percentage of teachers' rating on the economic challenge questions



TOP1 I learnt new ways for teaching my students from a distance.

TOP2 My knowledge and skills in using ICT (Zoom, Google Meet, ...) in teaching have increased compared to the time before COVID-19.

TOP3 I am now confident that I can utilize my phone/tablet/iPad/ computer etc. for teaching and even beyond the COVID-19 situation.

TOP4 During COVID-19, I got various virtual trainings from home to improve my pedagogical knowledge and skills.

TOP5 The COVID-19 pandemic brought me opportunities for interpersonal relationships with my family, and increased cohesion, which strengthens resilience.

TOP6 Overcoming stressful situations created by the COVID-19 pandemic led me to personal growth, which reinforces the sense of competence and becomes a protective factor for coping with future stressors.

TOP7 Through this COVID-19 pandemic, I am physically and mentally ready for a similar issue in the future.

TOP8 Through this COVID-19 pandemic, I learnt that hygiene, sanitation and healthy living are important for family and social responsibility.

Source: Estimated by authors based on teacher survey data

In their response, 85.2% of teachers reported gaining more confidence in using digital devices for educational purposes. However, there was a noticeable drop in the percentage of teachers who claimed that they were able to engage in virtual training about pedagogy knowledge and skills, and only 73.4% of participating teachers stated that they had the opportunity to attend some form of pedagogical training provided by MoEYS.

Socially, 75.1% of teachers revealed that they had more opportunities for interpersonal relationships with family or experienced increased cohesion. This measure is particularly important as it indicates that the majority of teachers developed resilience. About 83.8% of teachers reported having overcome stressful situations created by COVID-19, which could reinforce their sense of competence and become a protective factor for coping with future stressors. In addition, 86.9% of teachers claimed that they were physically and mentally ready for a similar crisis in the future while 92.5% stated that they believed hygiene, sanitation, and healthy living are important for both family and social responsibility.

Table 10, shown below, presents findings concerning how opportunities the teachers gained during school closures relate to some variables. The data show that teachers had gained similar academic opportunities and social advantages regardless of their gender, subject taught, school type, school location, or region. Survey items TOP2, TOP7, and TOP8, were notable exceptions as they indicated a certain level of unequal opportunities and advantages for teachers in different subjects and types of school where they taught.

Table 10: Chi-square test results of the association between teachers' opportunity with some variables

		TOP1	TOP2	TOP3	TOP4	TOP5	TOP6	TOP7	TOP8
Gender	Female	82.5%	90.8%	83.2%	73.6%	77.6%	84.5%	86.5%	94.4%
	Male	82.2%	90.1%	86.6%	73.3%	73.0%	83.2%	87.2%	91.1%
	<i>P-value</i>	<i>0.916</i>	<i>0.756</i>	<i>0.204</i>	<i>0.930</i>	<i>0.174</i>	<i>0.661</i>	<i>0.786</i>	<i>0.103</i>
Subject	Math/Pure Science	82.5%	92.7%	86.7%	75.7%	76.4%	85.5%	89.5%	93.5%
	Social Science	82.2%	87.1%	82.9%	70.3%	73.1%	81.5%	83.2%	91.3%
	<i>P-value</i>	<i>0.922</i>	<i>0.013</i>	<i>0.163</i>	<i>0.114</i>	<i>0.316</i>	<i>0.162</i>	<i>0.017</i>	<i>0.274</i>
School Type	Public School	81.4%	89.8%	84.4%	72.2%	74.7%	83.8%	87.3%	93.5%
	Private School	88.5%	94.3%	89.7%	81.6%	77.0%	83.9%	83.9%	86.2%
	<i>P-value</i>	<i>0.106</i>	<i>0.188</i>	<i>0.202</i>	<i>0.065</i>	<i>0.649</i>	<i>0.976</i>	<i>0.383</i>	<i>0.016</i>
School Location	Downtown	85.1%	92.1%	90.1%	81.2%	78.2%	82.2%	87.1%	89.1%
	Suburb	89.3%	92.9%	87.5%	76.8%	80.4%	85.7%	87.5%	91.1%
	Urban	81.1%	88.8%	84.0%	74.0%	76.9%	84.6%	87.0%	94.7%
	Rural	81.1%	90.3%	83.8%	70.5%	72.4%	83.6%	86.6%	92.8%
	<i>P-value</i>	<i>0.392</i>	<i>0.742</i>	<i>0.416</i>	<i>0.167</i>	<i>0.388</i>	<i>0.931</i>	<i>0.997</i>	<i>0.385</i>
Region	Phnom Penh	86.6%	92.4%	89.2%	79.6%	79.0%	83.4%	87.3%	89.8%
	Plain	78.7%	91.9%	84.8%	71.6%	76.1%	87.3%	87.8%	94.9%
	Tonle Sap	78.7%	92.0%	89.3%	66.7%	70.7%	84.0%	85.3%	93.3%
	Costal	85.9%	83.8%	81.8%	71.7%	67.7%	79.8%	83.8%	88.9%
	Mountain	81.9%	89.7%	81.3%	73.5%	76.1%	81.9%	87.7%	94.2%
	<i>P-value</i>	<i>0.254</i>	<i>0.173</i>	<i>0.220</i>	<i>0.255</i>	<i>0.273</i>	<i>0.500</i>	<i>0.874</i>	<i>0.206</i>

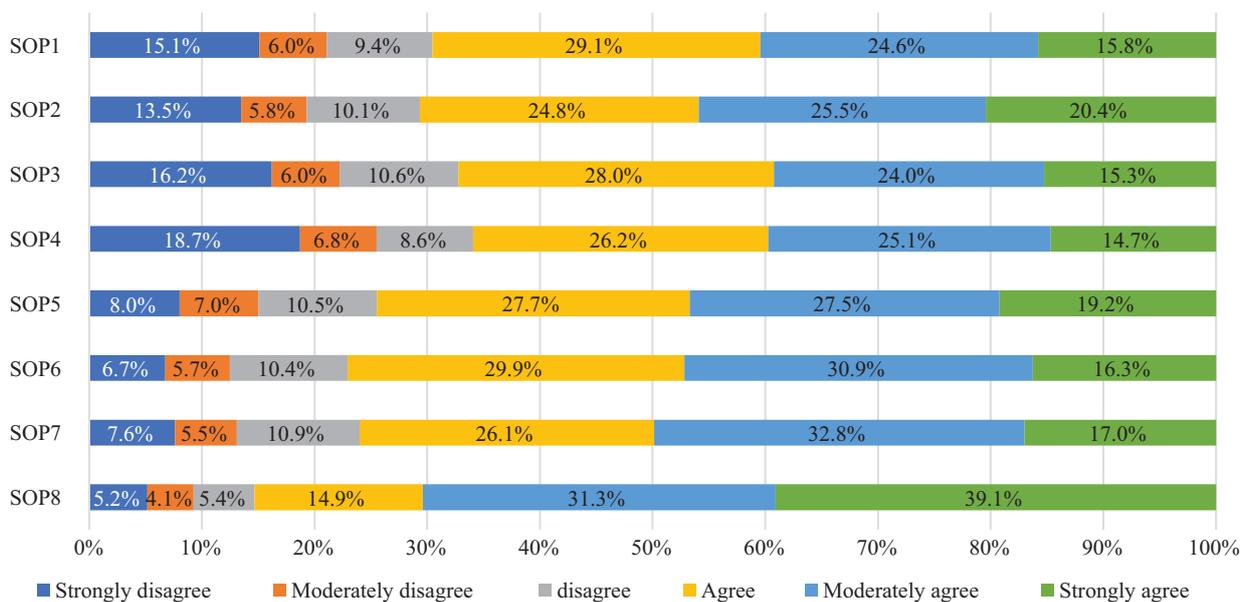
For post-hoc test: * $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$

Source: Estimated by authors based on teacher survey data

5.4.2. Students' opportunities

The data also indicated that there were some practical advantages for students. Figure 8 depicts how students rated survey items concerning possible opportunities. The survey data supported prior evidence that students had learned and gained new skills in ICT for education. Nearly 70% of all students confirmed that they discovered new ways for self- or independent learning that they were able to access through multiple sources online. A similar percentage of students stated that their knowledge and skills in utilizing ICT for learning had improved compared to before the COVID-19 outbreak. Moreover, 67.2% of students demonstrated that they have developed more confidence in using a smartphone, tablet, or computer to learn both online and offline. Notably, 66% of students expressed that they could regularly conduct online study with their friends.

Figure 8: Percentage of students' rating on the economic challenge questions



SOP1. I found new ways for independent/self-learning that I am able to access multiple sources for learning online.

SOP2. My knowledge and skills in using ICT (Zoom, Google Meet, ...) in learning have increased compared to the time before COVID-19.

SOP3. I am now confident that I can utilize my phone/tablet/iPad/ computer etc. for learning both online and offline, and even beyond the COVID-19 situation.

SOP4. The learning during COVID-19 taught me that I can organize virtual study clubs among my friends regularly.

SOP5. The COVID-19 pandemic brought me opportunities for interpersonal relationships with my family, and increased cohesion, which strengthens resilience.

SOP6. Overcoming stressful situations created by the COVID-19 pandemic led me to personal growth, which reinforces the sense of competence and becomes a protective factor for coping with future stressors.

SOP7. Through this COVID-19 pandemic, I am physically and mentally ready for a similar issue in the future.

SOP8. Through this COVID-19 pandemic, I learnt that hygiene, sanitation and healthy living are important for family and social responsibility.

Source: Estimated by authors based on student survey data

Lastly, opportunities surrounding mental and social well-being were also widely noted by students. About 75% of students acknowledged that the COVID-19 pandemic provided them with opportunities for greater interpersonal relationships with their families, increased social cohesion, and strengthened their resilience. Nearly 80% of students affirmed that overcoming stressful situations during the COVID-19 pandemic resulted in personal growth, which

reinforced their sense of competence and became a protective factor for coping with future stressors. About 75% of students stated that they felt more adaptive and resilient should a similar crisis happen in the future. The highest percentage of students (85%) stated that during the pandemic they learnt that hygiene, sanitation, and healthy living were essential aspects of family and social responsibility.

Table 11 lists the percentages of students who agreed (on a scale of agree to strongly agree) on survey items related to opportunities across gender, school type, grade, school location, and region. Statistical tests showed the percentage of girls who agreed with the opportunities survey items was significantly higher than boys by between 6% to 11% meaning that girls felt that they had more opportunities both academically and socially. There was no difference between students at public and private schools concerning social opportunities. However, public school students reported lower percentages of agreement with academic opportunities than private school students (differences ranged from 5% to 12%, respectively). Disaggregated by grade, the percentage of agreement appeared to be the same. By region, the Tonle Sap Lake area had the highest percentage of agreement, whereas the plateau and mountainous area had the lowest percentage. By school location, there was little difference between urban and rural schools, but suburban schools had the highest percentage of agreement whereas downtown had the lowest. The differences between suburban and downtown schools was between 5.3% and 14.3%, depending on the survey item.

Table 11: Percentage of students who agree (agree to strongly agree) on opportunity questions by gender, school type, grade, school location and region

		SOP1	SOP2	SOP3	SOP4	SOP5	SOP6	SOP7	SOP8
Gender	Female	73.3%	72.6%	69.9%	68.0%	77.1%	80.0%	78.3%	88.3%
	Male	62.5%	66.9%	62.2%	62.1%	69.5%	71.6%	71.6%	79.7%
	<i>P-value</i>	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000
School Type	Public	68.8%	69.4%	65.6%	65.3%	74.0%	76.7%	76.3%	84.4%
	Private	74.7%	79.2%	78.4%	70.5%	77.5%	79.5%	73.9%	89.0%
	<i>P-value</i>	0.023	0.000	0.000	0.052	0.156	0.244	0.316	0.035
Grade	10	70.6%	73.3%	69.1%	68.2%	73.8%	76.7%	76.3%	85.5%
	11	68.9%	70.0%	67.7%	66.7%	75.0%	77.5%	76.3%	84.3%
	12	69.2%	68.5%	64.5%	62.5%*	74.3%	76.9%	75.2%	86.4%
	<i>P-value</i>	0.700	0.078	0.116	0.034	0.824	0.900	0.818	0.420
School Location	Downtown	65.0%	71.8%	69.6%	58.9%**	68.3%**	73.5%	69.6%**	83.5%
	Suburb	76.0%*	81.0%***	74.9%**	71.3%*	77.4%	80.3%	83.9%**	90.3%*
	Urban	69.8%	68.4%	65.4%	64.9%	73.6%	75.9%	74.4%	83.5%*
	Rural	69.0%	69.8%	66.4%	67.3%	76.1%	78.2%	77.1%	86.2%
	<i>P-value</i>	0.034	0.001	0.017	0.007	0.023	0.138	0.000	0.021
Region	Phnom Penh	70.2%	76.2%***	72.1%**	64.8%	72.6%	76.7%	76.4%	86.7%
	Plain	71.7%	69.9%	67.0%	67.2%	77.3%*	80.3%*	76.2%	86.1%
	Tonle Sap	74.8%*	75.5%*	73.1%**	68.2%	82.0%***	82.5%***	80.8%*	88.6%*
	Costal	66.1%*	66.5%*	64.5%	65.8%	70.1%**	75.6%	76.4%	83.9%
	Mountain	64.4%**	65.8%*	59.3%***	63.6%	70.4%*	68.9%***	70.4%**	81.3%**
	<i>P-value</i>	0.003	0.000	0.000	0.549	0.000	0.000	0.010	0.021

For post-hoc test: * $p \leq 0.05$, ** $p < 0.01$ and *** $p < 0.001$

Source: Estimated by authors based on student survey data

6. Discussion

The rapid spread of COVID-19 led to nationwide school closures. However, through MoEYS's and relevant stakeholders' intervention, 70% of students were able to continue their learning through various distance learning programmes (MoEYS and ESWG 2021). Distance learning may be commonplace in more technologically advanced countries, but in Cambodia, the idea and implementation in classrooms could be a source of great distress for both teachers and students alike. In fact, the MoEYS and ESWG (2021) reported that roughly 13% of teachers and school principals possibly possessed enough capacity to do their job properly during school closures. The immediate measures implemented around distance learning and usage of unfamiliar technologies led to undisputable academic and mental health challenges for both teachers and students, especially those in more disadvantaged areas. This study found that more than half of the sampled teachers reported having difficulties accessing teaching and learning materials from MoEYS's e-learning platforms, which echoed some previous studies (see MoEYS and ESWG 2021; and PLAN and CARE 2022).

As shown in the findings, teachers experienced difficulties in utilizing distance learning technologies, including teaching and learning platforms (Google Classroom, Google Classroom, Class Dojo, and Seesaw among others) and other online teaching technologies (Telegram, Messenger, Google Meet, and Microsoft Teams). Simultaneously, more than half of teachers reported having difficulties utilizing proper teaching tactics, methods, or strategies during their online classes. Based on these results, it can be deduced that the challenges teachers faced in utilizing the aforementioned teaching technologies hindered their ability to effectively utilize relevant teaching strategies in online classes. Other factors may also play a role in this scenario. For example, since COVID-19 spread rapidly, a teacher's pedagogical skills and ICT skills were at a low baseline level, and both the MoEYS and teachers, in general, were not well-prepared to cope with the sudden changes. Furthermore, Chea, Bo, and Minami (2022) have indicated that most Cambodian teachers were not quite ready to teach using these new methods due to a lack of ICT skills and related pedagogical skills. Slow internet connections may have also been the cause of teachers' challenges in utilizing different techniques in online classes since, as was shown in this study, more than 50% of teachers reported that their lessons were disrupted due to a poor internet connection.

In addition, the issues were varied across variables like gender, school type, school location, and region. Female teachers seemed to report having more challenges compared to their male counterparts, and public school teachers also had more unfavourable conditions utilizing online teaching technologies. Teachers from more disadvantaged schools and areas were also found to be in more challenging conditions in this regard. This finding was echoed by some existing literature concerning challenges in Cambodian education during the COVID-19 pandemic. Chea, Bo, and Minami (2022) also indicated that teachers found it hard to utilize various technologies and ICT skills in teaching online classes during the school closure. Moreover, even those teachers who had attended some sort of capacity-building program felt that the knowledge and skills they gained during the training program were not sufficient to teach online classes.

Aside from pedagogical challenges, more than 70% of teachers reported a drop in their family income with math/pure science subject teachers stating that they had a more significant decrease in family income while teachers in more disadvantaged areas appearing to be better off compared to other regions. This may be due to the fact that math/pure science teachers have more opportunities to earn more with private tutoring when classes are held in person and so

COVID-19 hit them harder than social science teachers. A similar reason may apply to more disadvantaged regions as, normally, teachers in this region may not have much chance to earn additional income from private tutoring. Teachers with school-aged children reported having economic challenges at higher percentages which was to be expected given that they also reported an increase in expenses for online learning materials for their children.

With regard to their mental health, teachers experienced mild stress and moderate anxiety. Although this study did not cover the causes of teachers' mental health difficulties, it may be due to academic work, economic distress, and/or the social environment during school closures. The data also showed that less experienced teachers reported higher levels of stress and anxiety. Also, teachers teaching at more advantageous schools and areas seemed to suffer more, and teachers with more school-age children reported suffering mental challenges at a higher rate.

Although participating teachers reported experiencing certain kinds of challenges related to their academic work, financial situation, and mental health condition, they also gained some opportunities. For example, they learned new knowledge and skills for distance or online teaching. They also benefitted socially by increasing their sense of family unity and ability to cope with stressful situations involving social distancing. Chea, Bo, and Minami (2022) also pointed out in their study that almost 80% of teachers surveyed reported having attended some kind of capacity development program to enhance their teaching skills during school closures. They also reported that a large number of teachers learnt new ICT skills in teaching and managing some online teaching technologies (e.g., Google Classroom, Microsoft Team, and other messaging applications) in order to facilitate distance and online teaching.

According to prior studies, around 80% of upper secondary school students utilized smartphones for their learning (MoEYS and ESWG 2021, PLAN and CARE 2022). However, this study found that over half of the students sampled had problems operating smartphones, and roughly two-thirds of them found it difficult to use online learning technology on their smartphone. Girls were more likely to report having difficulties with online learning technology than boys. From previous studies, it is known that students with higher socioeconomic status (SES) generally have more access to online learning technologies compared to students with a lower SES (Karamba, Salcher and Tong 2021, PLAN and CARE 2022). Students attending private schools, whose family had a higher SES, or were from an urban area reported having greater access to technology-based learning (Bhatta, et al. 2022) and got more support at home than students in public schools, whose family had a lower SES, or were from a rural area (MoEYS and UNICEF 2022). Yet this study found that after experiencing distance learning, especially online learning, students were able to find various ways to access self-directed learning materials. They also improved their ICT skills and gained more confidence in utilising digital devices for learning.

During the school closures, private companies, factories, and businesses were also closed, and these closures negatively impacted students' families' economies. Echoing previous studies, this study also found that students' families experienced a drop in income (MoEYS and ESWG 2021, PLAN and CARE 2022) and reported consuming less food (Karamba, Salcher and Tong 2021, MoEYS and ESWG 2021). Non-farm family businesses experienced greater difficulties than farm-based family business (Karamba, Salcher and Tong 2021). Additionally, more than 50% of students' families had to cope with loan payments. Reducing their food consumption and other household expenses was one of the common coping strategies, especially for poor families (Karamba, Salcher and Tong 2021). Additionally, the extra expenses from distance

learning materials, water, electricity, and cleaning and hygiene products became financial burdens for students' families.

All of these challenges and burdens potentially lead to mental health challenges as well. According to an earlier study with students, 55% stated that they experienced increased mental health and psychosocial distress during COVID-19 (MoEYS and ESWG 2021). Job loss, financial insecurity, and travel restrictions caused increased levels of stress and anxiety among families, which had the potential to increase instances of domestic violence. This situation exacerbated existing challenges and worsened the mental well-being of students (PLAN and CARE 2022). As evidenced in this study, around 40% of students reported experiencing stress and anxiety levels ranging from moderate to extremely severe. PLAN and CARE (2022) reported that a large percentage of adolescents did not know any ways to reduce stress, while others had many ways to cope with their stress, such as talking with friends and family members, watching TV or YouTube, accessing social media, gardening, reading, and listening to music. The findings from this study demonstrated that overcoming these stressful situations created both directly and indirectly by the COVID-19 pandemic have led to personal growth and a sense that students can handle future stressors.

7. Conclusion, limitations and recommendations

7.1. Conclusion

With extensive support from MoEYS and relevant stakeholders, teaching and learning was able to continue even when schools were completely closed due to the high numbers of community cases. Both teachers and students faced considerable challenges during this time. Two examples of academic challenges were the limited interactions teachers and students had during distance learning and how they managed handling using technology and digital devices in their teaching and learning. Additionally, lesson disruptions due to poor internet connections, electricity outages, or a noisy environment were each quite distracting during online classes. Economically, both teachers and students reported decreases in family income and increase in expenses for hygiene products, water and/or electricity, and distance learning materials. Furthermore, decreased amount of food among family members and difficulties in dealing with loan repayment were also reported by teachers and students. For students, the difficulties differed based on location. Students who lived in disadvantaged areas reported having more financial difficulty than those in advantaged areas. Mentally, both teachers and students experienced mental health challenges. Overall, moderate percentages of teachers and students experienced moderate to extremely severe stress and anxiety. Teachers and students who lived in Phnom Penh reported experiencing more mental health-related challenges than in other areas. Although significant challenges were reported across teachers and students, potential opportunities were also acknowledged by both groups. Academically, teachers and students reported that they were able to gain new knowledge and skills, especially related to ICT. Furthermore, they could strengthen their mental and social well-being both for themselves and with their family members.

7.2 Limitations

There are some limitations to this study. First, the data was collected based on self-reporting, and, therefore, was subjective to respondents who were potentially biased towards producing social-desirable responses. In addition, the focus of the study was the school closure period (covering roughly 20 months), which was a very long period for people to recall. However,

to mitigate this potential problem, the data was collected immediately after schools reopened in order to investigate both the school closure and reopening periods. The respondents might forget, not specify the time, or intentionally not report their current situation accurately. Second, teacher and student data were not linked by design. Therefore, the study could not make any relationship between teacher's and student's challenges. Third, this study was descriptive. Thus, these findings could not identify the root causes behind the challenges students and teachers faced, but operated under the assumption that the COVID-19 outbreak alone was the cause, either directly or indirectly.

7.3. Recommendations

Alongside the challenges presented in the paper as well as findings from in-depth interviews with key informants in another part of this study, the authors developed the following recommendations which may be of practical benefit for similar situations in the future.

• Further develop e-learning materials

Interventions by the government and relevant stakeholders to develop and create online learning materials and technologies were considered to be the most effective measures during COVID-19. The e-learning materials and technologies developed should be further cultivated and properly documented for daily use in classrooms. These may serve as supplementary teaching and learning resources not only for today's teachers but also will be helpful in the event of a similar situation in the future.

• ICT skills development & ICT facilities

Teachers' knowledge and skills in technology and how to operate various kinds of technological equipment to improve teaching and learning activities should be the main focus of teacher capacity building. Lessons learnt from COVID-19 suggest that teacher training in technological skills should be put into place for both In-Service Training (INSET) and Pre-Service Training (PRESET) teachers. Moreover, equipping every school with ICT facilities throughout the country should be planned for similarly unpredictable events in the future.

• Blended learning using ICT should remain

Countries around the world, including Cambodia, learned in this crisis that they need to shift their focus away from traditional classroom teaching and learning and instead begin embedding a mixture of teaching and learning environments, like blended learning. Teachers' training in methods and content preparation in advance should be taken into consideration.

• All measures and procedures should be documented

Intervention from the government and MoEYS in the form of increased documentation of practices would undeniably ensure acceptable standards of teaching and learning throughout the country, though certain areas may be remain behind. These measurement and intervention procedures should be properly documented and, if possible, distributed to local schools to learn where they can improve.

• More supports for disadvantage schools

The findings suggested that more disadvantaged teachers and schools should be provided with additional resources. Stable internet connections, better ICT facilities, and improvements in

teachers' and students' knowledge and skills in using technology in the classroom must be a priority. Additional financial support should be considered not only for disadvantaged schools but for all schools in general.

- **Promote mental health education**

With the COVID-19 pandemic and resulting school closures, teachers and students stayed home and were doing less socialising. This study found that this resulted in harm to students' and teachers' mental health. During a similar crisis in the future, not only should MoEYS and relevant stakeholders focus on teaching and learning but they should also make room for mental health education through the various channels used for distance learning (i.e., TV and radio channels) in order to educate both teachers and students on how to stay mentally healthy and how to cope with stress and anxiety. There should also be consultation services with professional psychologists for teachers and students in case they are needed.

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