

GASTROENTEROLOGY

The impact of the coronavirus disease 2019 pandemic on gastroenterologists in Southeast Asia: A mixed-methods study

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Key words

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Abstract

Background and Aim: The coronavirus disease 2019 pandemic has impacted gastroenterology practices worldwide; however, its protracted effects within Southeast Asia were unknown. The primary aim of the study was to determine the impact of the pandemic on clinical demands including burnout among gastroenterologists within the region. The secondary aim was to identify risk factors for burnout and determine regional stressors.

Methods: This was a mixed-methods study. Gastroenterologists were surveyed electronically between September 1 and December 7, 2020, via gastroenterology and endoscopy societies of Brunei, Indonesia, Malaysia, Philippines, Singapore, and Thailand. Quantitative and qualitative data were collected. The 22-item Maslach Burnout Inventory-Human Services Survey (MBI-HSS) was used to detect burnout. Quantitative data were non-parametric; non-parametric methods were used for statistical comparisons. Logistic regression was used to determine risk factors for burnout. Content analysis method was used to analyze qualitative data. Ethical approval was obtained.

Results: A total of 73.0% reported that they were still significantly affected by the pandemic. Of these, 40.5% reported increased workload and 59.5% decreased workload. Statistically significant differences in weekly working hours, endoscopy, and inpatient volumes were present. No differences were observed in outpatient volumes, likely because of telemedicine. Burnout was common; however, 50.1% of gastroenterologists were unaware of or did not have access to mental health support. This, as well as depression, being a trainee, and public sector work, increased burnout risk significantly.

Conclusion: The effects of the pandemic are multifaceted, and burnout is common among Southeast Asian gastroenterologists. Safeguards for mental health are suboptimal, and improvements are urgently needed.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has affected gastroenterology practices worldwide, placing significant pressures on gastroenterologists in areas of high prevalence.^{1–4} Early in the pandemic, most countries faced pressures on personnel, personal

protective equipment (PPE), and virus diagnostics; consistent practice guidelines within gastroenterology were also lacking.^{5,6} More than a year after the outbreak, progress in these deficiencies have been made within Southeast Asia. However, the sustained effect of the pandemic on regional gastroenterology practices remains

uncharacterized and poorly understood. To that end, a collaborative biphasic mixed-methods study involving several member states of the Association of Southeast Asian Nations (ASEAN) was undertaken. The purpose was to investigate the intra-pandemic and post-pandemic effects on gastroenterology practices in Southeast Asia including burnout in gastroenterologists.

Specifically, the first phase of the study aimed to determine (i) the weekly workload (working hours, inpatient volumes, outpatient clinic volumes, and endoscopy volumes), (ii) the prevalence of burnout, and (iii) related stressors faced by gastroenterologists during the COVID-19 pandemic. The post-pandemic phase of the study aims to assess the recovery of normal practice and burnout in the post-COVID-19 era; this will be undertaken at a later date. Information from both phases of the study will help shape the delivery of public health in the future and improvements to institutional service provision, working conditions, and occupational health in gastroenterology, ensuring an efficient, healthy, and sustainable workforce in the region. Herein, results from the intra-pandemic phase are reported because findings are important and highly relevant to support change, which is urgently needed within the region.

Methods

Ethics. This was an unincited and voluntary electronic survey of gastroenterologists in Southeast Asia. Responses were anonymized, and respondent-identifying information was not collected. Consent was obtained before each survey. Ethical approval was granted (Singhealth Centralised Institutional Review Board: 2020/2709).

Design and administration of the survey. The electronic survey consisted of two parts. One half contained multiple-choice questions and open-ended questions. These collected demographic data, clinical data, and gastroenterologist feedback, for example, weekly working hours and effects of the pandemic on personal practice. The other half comprised the Maslach Burnout Inventory-Human Services Survey (MBI-HSS), the most commonly used and validated tool to detect burnout in clinicians.⁷ The MBI-HSS is composed of 22 questions that assessed symptoms in the three dimensions of burnout: emotional exhaustion (EE), depersonalization (DP), and a self-perceived lack of personal accomplishment (PA). Each response was scored on a 7-point Likert scale, which represented symptom frequency (ranging from 0 = never to 6 = every day).

The presence of EE, DP, and PA was defined using abnormal cut-off values provided in the fourth edition of the MBI manual (proprietary) with scores derived using the “average method.”⁸ Briefly, these abnormal cut-offs were derived from a population of 6269 health-care workers, and the following weights for each dimension were recommended as abnormal EE = mean + (SD × 0.5), abnormal DP = mean + (SD × 1.25), and abnormal PA = mean + (SD × 0.1).⁸ The presence of burnout was defined by MBI criteria that have been clinically validated by researchers against work-related neurasthenic symptoms listed in the World Health Organization’s International Classification of Disease (ICD), that is, a “high” EE score (≥ 27) and a “high” DP score (≥ 13), or a “high” EE score (≥ 27) and “low” PA score

(≤ 31).^{9–13} We have previously validated these criteria in a cohort of Southeast Asian doctors and found them to be reliable.¹³ The proportion of respondents with single dimension scores of EE scores > 27, DP scores > 10, and PA scores < 33, in addition to the proportion of respondents with combined dimension scores of EE > 27 + DP > 10 + LPA < 33, were also reported. We have included this so other researchers who have utilized different definitions of abnormality may compare their data with ours.

The remaining questions in the survey collected demographic information (e.g. “On average, how many hours do you work a week?”) and free-text qualitative feedback (e.g. “In your job, what causes you the most stress?” and “How was the COVID-19 pandemic or its consequences still affecting your work today?”). The presence of depression was tested using a single multiple-choice question, which allowed respondents to self-report their status; this minimized the survey length and optimized response rates. Specifically, participants were asked, “Have you been diagnosed with, or take medication, for depression?” Responses provided were “Yes - Before COVID-19 started,” “Yes - After COVID-19 started,” and “No.” An independently peer-reviewed protocol for this study including the full survey questionnaire has been published and is available online.¹⁴

Between September 1, 2020, and December 7, 2020, survey links were disseminated by the national gastroenterology and endoscopy societies in the aforementioned countries. Each society maintained a database of registered gastroenterologists. Administrative staff within each society sent invitation emails to every gastroenterologist in their respective databases. A monthly reminder email was sent during the duration of the survey. The survey was deliberately conducted approximately a year after the outbreak to afford clinicians a period of acclimatization to the pandemic. Surveys were administered in the native language of each country, and the Cronbach alpha was > 0.8 for all versions of the survey.

Participant selection. The inclusion criteria were any (i) consultants or (ii) trainees in gastroenterology working in an ASEAN member state, that is, Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. Trainees were defined as non-specialist doctors in training who are working towards board (specialist) accreditation in gastroenterology, for example, Specialist Training (registrar) grades and below for the UK or fellowship training and below for the USA. Our exclusion criteria were (i) respondents from an ASEAN member state for which the MBI-HSS has not been translated and validated in the national language, or the common language of instruction in their local medical practice; (ii) non-gastroenterology clinicians, for example, surgeons, nurses, and other allied health professionals who may have inadvertently taken the survey; and (iii) co-authors involved in this study. A separate study will be planned for nurses and allied health professionals.

Subsequently, we determined that the MBI-HSS had not been translated or validated for use in Cambodia, Laos, Myanmar, and Vietnam. Translated versions of the MBI-HSS in the respective languages of these countries were also unavailable from its proprietor. As it was not within the scope of our study to translate and validate the MBI-HSS in these languages, these countries were excluded. ASEAN countries that were finally involved in this study

were Brunei, Indonesia, Malaysia, Philippines, Singapore, and Thailand.

Data analyses. MedCalc V.19.1.5 was used for statistical analyses. The Shapiro–Wilk method was used to test quantitative data for normality where applicable.¹⁵ Quantitative data were non-parametric; therefore, summary statistics have been reported as count (percentage) for categorical variables and the median and interquartile range (IQR) for continuous variables. For univariate analysis, the χ^2 test was used for categorical variables. However, when $n < 5$ in any subgroup, the Fisher test was used. To compare continuous variables between two groups, the Mann–Whitney U test was used. Two-tailed P values were reported where applicable, and the significance level was set at 5%. Bonferroni correction was applied when multiple hypothesis testing was made during univariate analyses. For multivariate analyses, an exploratory logistic regression model was used to assess the relative contribution of different clinical factors (independent variables) to burnout status (dependent variable). The coding of responses was previously described in our study protocol.¹⁴ The average number of new COVID-19 cases per day during the survey was calculated by the sum of new COVID-19 cases recorded in the John Hopkins University COVID-19 Map¹⁶ during the survey divided by the duration of the survey.

Qualitative data derived from free-text responses were analyzed by the inductive content analysis approach. Briefly, keywords that described stressors were grouped by conceptual analysis, according to commonly occurring themes previously identified through a systematic review.¹⁷ All narrative data collected from the survey were reviewed and coded independently by JO and SO who then discussed the discrepancies until an agreement was reached. JO and SO have previous experience in studying stressors and their role in precipitating burnout. Dominant themes were identified by iteratively comparing the data to ascertain recurrent themes using a bottom-up coding strategy and quantifying their significance. Comments were categorized into a branching tree of thematic labels. The theme “work volume” encompassed clinical workload, long working hours, non-managerial administrative duties, research commitments, and so forth. The theme “professional risk and responsibility” encompassed professional risks that had the potential to cause significant adverse outcomes to patients or clinicians, for example, the risk of treatment failure, managerial duties, and medico-legal issues. The theme “training” included curricular requirements, postgraduate exams, training opportunities or the lack thereof, and so forth. The theme “resources” encompassed equipment, income, adequate health insurance coverage, lack of staff, and lack of transport to poorly accessible areas. The themes “relationships with colleagues” and “relationships with patients and relatives” described difficult relationships with colleagues, and patients or their relatives, respectively. The frequencies of responses were then presented as graphs.

Results

Demographics of respondents. A total of 38.8% of gastroenterologists in the region responded to the survey; 63.2% were male, 62.4% were consultants, and 60.5% worked in tertiary centers; 52.3% worked in the public sector, 32.5% worked in the

private sector, and 15.2% worked in both, that is, mixed practice. Differences were observed between countries (Table 1). Of the six ASEAN countries, Indonesia had the highest gastroenterologist-to-population ratio (GPR) (1:646 782) while Singapore had the lowest (1:38 886).

Pandemic activity varied between countries during the study (Table 2). Within the region, 47.8% of gastroenterologists reported that they were caring for patients with confirmed or suspected COVID-19. Importantly, only 27.0% of all gastroenterologists reported that their practices had returned to normal or were not affected by the pandemic. A total of 73.0% reported that they continued to experience significant effects of the pandemic in their clinical practice, of which 40.5% reported increased workload and 59.5% decreased workload. Increased workloads were more commonly reported in the public sector (odds ratio [OR] = 2.7, 95% confidence interval [CI]: 1.7–4.1, $P < 0.0001$), and decreased workloads were more commonly reported in the private sector (OR = 3.5, 95% CI: 2.3–5.4, $P < 0.0001$).

The intra-pandemic workload of ASEAN gastroenterologists.

The clinical workload was analyzed according to three groups: gastroenterologists who reported the return of normal (or no change to normal practice), increased workloads, and reduced workloads. Hereafter, these groups are referred to as “↔workload,” “↑workload,” and “↓workload,” respectively.

The median working hours for all gastroenterologists in the region was 45 h (IQR: 40–60 h) per week. For ↔workload, the median weekly working hours was 48 h (IQR: 40–60 h) per week. For ↑workload, the median was 50 h (IQR: 40–60 h) per week. These did not differ significantly; ↔workload *versus* ↑workload yielded $P = 1.00$. For ↓workload, the median was 40 h (IQR: 40–60 h) per week. Statistically significant differences in weekly working hours were present between ↓workload *versus* ↔workload and ↓workload *versus* ↑workload (Fig. 1a). Gastroenterology trainees tended to work longer hours than consultants; their median weekly working hours was 50 h (IQR: 40–64 h) *versus* 45 h (IQR: 40–55 h), respectively, $P < 0.01$.

The median number of endoscopies performed by all gastroenterologists in the region was 10 procedures (IQR: 5–15 procedures) per week. The medians for ↔workload and ↑workload were also 10 procedures per week; however, there were differences in the population distribution: IQR: 7–20 procedures *versus* IQR: 5–15 procedures, respectively. For ↓workload, the median was 7 procedures (IQR: 3–12 procedures) per week. Statistically significant differences were detected between all three groups (Fig. 1b). Interestingly, ↔workload tended to perform more endoscopic procedures compared with ↑workload. Also, gastroenterology consultants tended to perform more procedures per week compared with trainees: median of 10 procedures (IQR: 5–15 procedures) *versus* 8 procedures (IQR: 4–15 procedures), respectively, $P < 0.05$.

The median number of inpatients cared for by all gastroenterologists was 30 patients (IQR: 10–56 patients) per week in the region. For ↔workload, the median number was 39 patients (IQR: 20–53 patients) per week. The median for ↑workload was 30 patients (IQR: 15–70 patients) per week. For ↓workload, the median was 20 patients (IQR: 10–50 patients) per week. Statistically significant differences were detected between ↓workload *versus*

Table 1 Demographic information of respondents and clinical workload reported

Participant demographics	Pooled (regional) results	Results by individual country					
		Singapore	Malaysia	Thailand	Philippines	Brunei	Indonesia
Response rates	38.8% (683/1761)	45.0% (68/151)	27.8% (77/277)	45.1% (202/448)	30.0% (135/450)	60.0% (6/10)	45.9% (195/425)
Grade							
Consultants	62.4% (390/625)	75.8% (47/62)	47.1% (33/70)	68.6% (120/175)	93.8% (121/129)	83.3% (5/6)	35.0% (64/183)
Trainees	37.6% (235/625)	24.2% (15/62)	52.9% (37/70)	31.4% (55/175)	6.2% (8/129)	16.7% (1/6)	65.0% (119/183)
Sector							
Public/government	52.3% (327/625)	93.5% (58/62)	64.3% (45/70)	77.1% (135/175)	10.9% (14/129)	83.3% (5/6)	38.2% (70/183)
Private/commercial	32.5% (203/625)	6.5% (4/62)	28.6% (20/70)	14.3% (25/175)	69.8% (90/129)	0% (0/6)	35.0% (64/183)
Mixed	15.2% (95/625)	0% (0/62)	7.1% (5/70)	8.6% (15/175)	19.4% (25/129)	16.7% (1/6)	26.8% (49/183)
Participant institutions							
Tertiary center	60.5% (378/625)	74.2% (46/62)	67.1% (47/70)	81.7% (143/175)	60.5% (78/129)	83.3% (5/6)	32.2% (69/183)
District hospital	23.4% (146/625)	19.4% (12/62)	7.1% (5/70)	4.6% (8/175)	5.4% (7/129)	16.7% (1/6)	61.7% (113/183)
Private establishment	15.0% (94/625)	6.4% (4/62)	25.8% (18/70)	12.6% (22/175)	34.1% (44/129)	0% (0/6)	3.3% (6/183)
Other	1.1% (7/625)	0% (0/62)	0% (0/70)	1.1% (2/175)	0% (0/129)	0% (0/6)	2.8% (5/183)
Gender							
Male	63.2% (395/625)	71.0% (44/62)	74.3% (52/70)	52.6% (92/175)	48.1% (62/129)	100% (6/6)	76.0% (139/183)
Female	36.8% (230/625)	29.0% (18/62)	25.7% (18/70)	47.4% (83/175)	51.9% (67/129)	0% (0/6)	24.0% (44/183)
Age							
Consultants, median (IQR)	43 years (36–50 years)	44 years (38–47 years)	46 years (40–55 years)	38 years (34–42 years)	42 years (36–51 years)	42 years (38–53 years)	53 years (49–58 years)
Trainees, median (IQR)	37 years (33–46 years)	30 years (30–31 years)	36 years (36–38 years)	32 years (31–33 years)	28 years (27–35 years)	36 years (NA)	45 years (39–50 years)
Weekly working hours							
Consultants, median (IQR)	45 h (40–55 h)	50 h (45–55 h)	45 h (40–56 h)	50 h (40–60 h)	40 h (24–48 h)	46 h (44–58 h)	41 h (30–60 h)
Trainees, median (IQR)	50 h (40–64 h)	65 h (50–88 h)	50 h (45–62 h)	60 h (50–72 h)	50 h (43–71 h)	45 h (NA)	40 h (26–50 h)
Weekly inpatients cared for							
Consultants, median (IQR)	20 pts (10–50 pts)	25 pts (12–50 pts)	30 pts (14–50 pts)	36 pts (12–77 pts)	10 pts (5–19 pts)	40 pts (24–69 pts)	40 pts (19–70 pts)
Trainees, median (IQR)	35 pts (20–60 pts)	40 pts (8–95 pts)	40 pts (16–60 pts)	25 pts (20–34 pts)	48 pts (38–50 pts)	50 pts (NA)	50 pts (20–75 pts)
Weekly outpatients seen							
Consultants, median (IQR)	50 pts (30–80 pts)	50 pts (40–58 pts)	50 pts (40–63 pts)	70 pts (43–100 pts)	27 pts (15–40 pts)	40 pts (35–45 pts)	100 pts (60–135 pts)
Trainees, median (IQR)	40 pts (25–80 pts)	20 pts (20–25 pts)	30 pts (22–40 pts)	40 pts (30–60 pts)	30 pts (30–38 pts)	30 pts (NA)	70 pts (40–120 pts)
Patients scoped weekly							
Consultants, median (IQR)	10 pts (5–15 pts)	9 pts (6–10 pts)	10 pts (5–15 pts)	15 pts (10–20 pts)	5 pts (3–9 pts)	15 pts (13–15 pts)	10 pts (6–15 pts)
Trainees, median (IQR)	8 pts (4–15 pts)	8 pts (6–10 pts)	20 pts (15–24 pts)	15 pts (10–20 pts)	10 pts (8–19 pts)	12 pts (NA)	4 pts (2–6 pts)

IQR, interquartile range; NA, not applicable; pts, patients.

Table 2 The prevalence of burnout and its symptoms in ASEAN gastroenterologists in relation to pandemic activity and gastroenterologist per population coverage

	Pooled (regional) results					Results by individual country				
	Singapore	Malaysia	Thailand	Philippines	Brunei	Indonesia				
Total population	5 871 755	32 560 459	69 883 271	110 264 730	439 449	274 882 460				
COVID-19 cases per million (at the end of December 7, 2020)	9924	2282	59	4003	34 per 100 000 [†]	2116				
Average number of daily new COVID-19 cases per million (August 1 to December 7, 2020)	7.6	15.6	0.1	24.5	0.1	13.3				
Trend of new cases (August 1 to December 7, 2020)	Country dependent	↑	↓	↓	↓	↑				
Total number of gastroenterologists	1761	277	448	450	10	425				
Gastroenterologist:population ratio	1:38 886	1:117 547	1:164 431	1:245 033	1:43 945	1:646 782				
Gastroenterologists caring for patients with active or suspected COVID-19	47.8% (298/623)	20.0% (14/70)	26.9% (47/175)	47.7% (61/128)	16.7% (1/6)	78.6% (143/182)				
Gastroenterologists at high risk or currently experiencing burnout	17.1% (114/667)	35.1% (26/74)	20.5% (40/195)	11.9% (16/134)	33.3% (2/6)	5.2% (10/192)				
Emotional exhaustion (EE)										
Abnormal EE score	36.2% (247/683)	45.5% (35/77)	51.0% (103/202)	36.3% (49/135)	33.3% (2/6)	12.3% (24/195)				
EE score > 27	33.0% (220/667)	41.9% (31/74)	45.1% (88/195)	35.8% (48/134)	33.3% (2/6)	9.4% (18/192)				
Depersonalization (DP)										
Abnormal DP score	14.6% (100/683)	32.5% (25/77)	13.9% (28/202)	10.4% (14/135)	16.7% (1/6)	4.6% (9/195)				
DP score > 10	19.8% (132/667)	36.5% (27/74)	17.4% (34/195)	17.9% (24/134)	33.3% (2/6)	7.8% (15/192)				
Low personal accomplishment (LPA)										
Abnormal LPA score	37.3% (255/683)	50.6% (39/77)	41.6% (84/202)	32.6% (44/135)	50.0% (3/6)	25.1% (49/195)				
LPA score < 33	20.8% (139/667)	37.8% (28/74)	25.6% (50/195)	12.7% (17/134)	33.3% (2/6)	12.5% (24/192)				
Presence of EE > 27 + DP > 10 + LPA < 33	8.8% (59/667)	27.0% (20/74)	9.7% (19/195)	4.5% (6/134)	33.3% (2/6)	1.0% (2/192)				
Gastroenterologists with depression pre-COVID-19	2.2% (14/625)	0% (0/62)	2.9% (5/175)	3.9% (5/129)	0% (0/6)	2.2% (4/183)				
Gastroenterologists developing depression during COVID-19	2.1% (13/625)	7.1% (5/70)	1.2% (2/170)	2.4% (3/124)	0% (0/6)	1.1% (2/179)				

[†]Results represented as per 100 000 because the population of Brunei is less than 1 000 000.

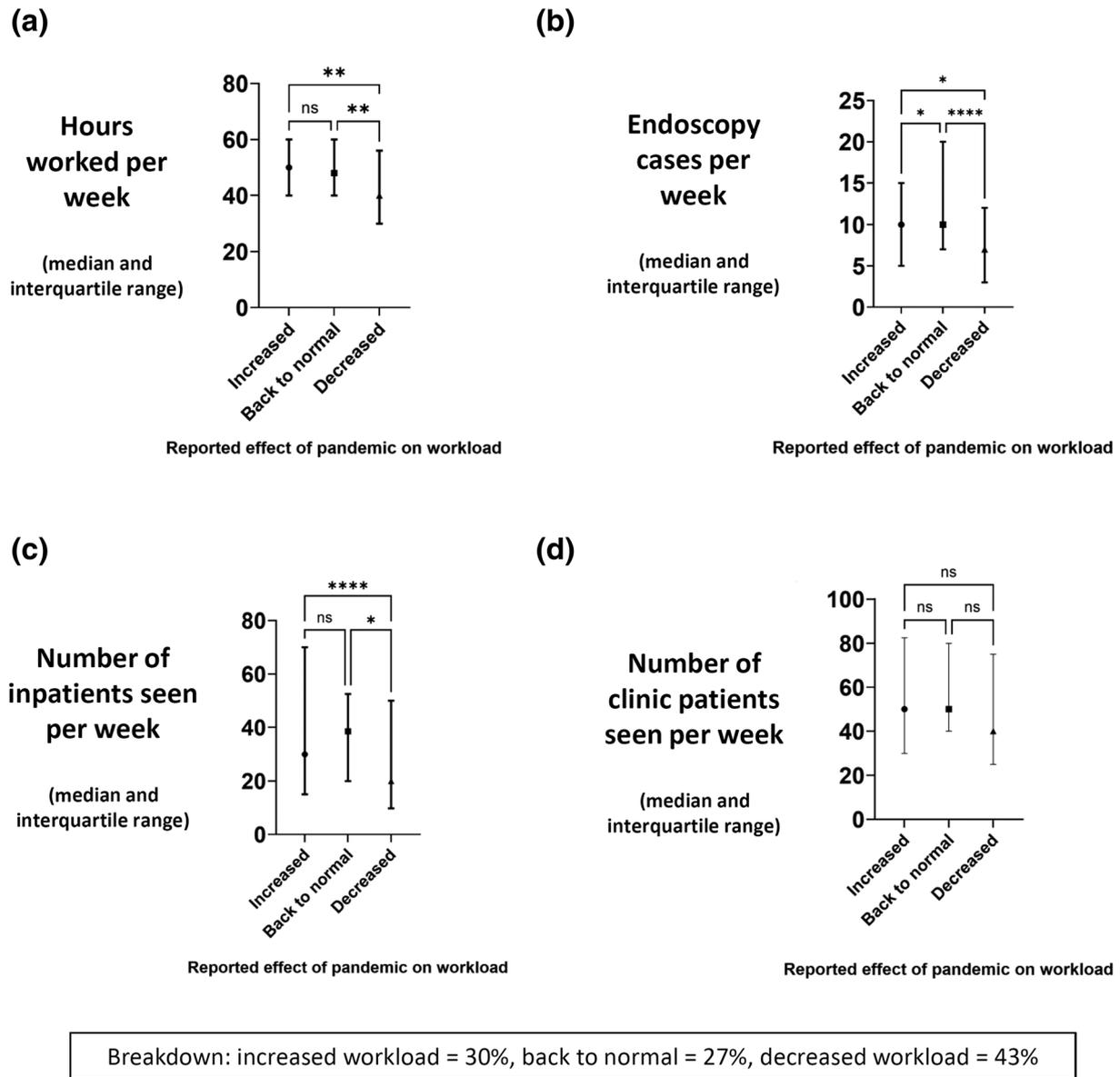


Figure 1 (a) Working hours, (b) endoscopies performed, (c) inpatients cared for and (d) outpatients seen in clinic per week as reported by ASEAN gastroenterologists who continue to experience increased workloads, the return of normal practice, and decreased workloads.

↔workload and ↓workload *versus* ↑workload. However, no significant differences were detected between ↔workload and ↑workload (Fig. 1c). Gastroenterology trainees tended to care for more inpatients than consultants per week; their median was 35 patients (IQR: 20–60 patients) *versus* 20 patients (IQR: 10–50 h), respectively, $P < 0.0001$.

The median number of patients seen per week in outpatient clinics was 50 (IQR: 30–80 patients) in the region. ↔workload gastroenterologists saw a similar number of patients in their outpatient clinics compared with ↑workload gastroenterologists: median = 50 patients in both groups (IQR: 40–80 patients *vs* IQR: 30–83 patients, respectively). For ↓workload, the median was 40

patients (IQR: 25–75 patients) per week. No statistical differences were detected between all three groups (Fig. 1d). Gastroenterology consultants saw slightly more patients in outpatient clinics compared with trainees: median of 50 patients (IQR: 30–80 patients) *versus* 40 patients (IQR: 25–80 patients), respectively; however, this difference was not statistically significant, $P = 0.31$.

Apart from a few exceptions, weekly working hours, endoscopy, and inpatient volumes were generally lower in the private sector compared with the public sector (Table 3), even in countries with a predominant private health-care sector. Comparisons of regional (pooled) results showed that these differences were statistically significant, $P < 0.0001$. However, no significant differences

Table 3 Gastroenterology workloads in the public and private sectors within Southeast Asian countries

	Regional (pooled) results				Singapore		Malaysia		Thailand	
	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector
Weekly working hours: median (IQR)	50 h (40–60 h)	40 h (30–50 h)	50 h (48–64 h)	42 h (40–43 h)	50 h (45–62 h)	46 h (40–60 h)	56 h (40–70 h)	45 h (43–50 h)	56 h (40–70 h)	45 h (43–50 h)
Patients scoped weekly: median (IQR)	10 pts (7–20 pts)	5 pts (3–10 pts)	8 pts (6–10 pts)	15 pts (10–20 pts)	20 pts (14–23 pts)	10 pts (8–14 pts)	15 pts (10–20 pts)	6 pts (4–11 pts)	15 pts (10–20 pts)	6 pts (4–11 pts)
Weekly inpatients cared for: median (IQR)	36 pts (20–60 pts)	15 pts (8–45 pts)	33 pts (15–70 pts)	1 pt (0–2 pts)	36 pts (16–60 pts)	30 pts (10–50 pts)	30 pts (20–65 pts)	20 pts (10–56 pts)	30 pts (20–65 pts)	20 pts (10–56 pts)
Weekly outpatients seen: median (IQR)	50 pts (30–80 pts)	50 pts (56–75 pts)	50 pts (24–50 pts)	40 pts (30–50 pts)	30 pts (25–45 pts)	50 pts (30–75 pts)	60 pts (30–100 pts)	60 pts (49–76 pts)	60 pts (30–100 pts)	60 pts (49–76 pts)
Gastroenterologists at high risk or currently experiencing burnout by sector	20.8%	6.9%	32.8%	0	48.9%	20.0%	23.0%	0	23.0%	0

Table 3 (Continued)

	Philippines		Brunei		Indonesia	
	Public sector	Private sector	Public sector	Private sector	Public sector	Private sector
Weekly working hours: median (IQR)	48 h (40–60 h)	38 h (20–49 h)	45 h (45–50 h)	NA [†]	40 h (25–56 h)	40 h (28–48 h)
Patients scoped weekly: median (IQR)	10 pts (5–10 pts)	5 pts (3–8 pts)	15 pts (12–15 pts)	NA [†]	6 pts (2–10 pts)	4 pts (2–7 pts)
Weekly inpatients cared for: median (IQR)	28 pts (12–50 pts)	10 pts (5–15 pts)	45 pts (27–50 pts)	NA [†]	60 pts (25–100 pts)	42 pts (20–70 pts)
Weekly outpatients seen: median (IQR)	28 pts (12–50 pts)	28 pts (15–40 pts)	38 pts (35–45 pts)	NA [†]	70 pts (30–150 pts)	80 pts (55–120 pts)
Gastroenterologists at high risk or currently experiencing burnout by sector	28.6%	8.9%	33.3%	NA [†]	11.4%	3.2%

[†]None of the respondents from Brunei worked in the private sector (Brunei had a 60.0% response rate). IQR, interquartile range; NA, not applicable; pts, patients.

in outpatient volumes were detected between the public and private sectors ($P = 0.24$).

Stress, burnout, and depression among gastroenterologists within Southeast Asia. Chronic and excessive occupational stress leads to burnout. Notably, 66.6% of gastroenterologists reported that the pandemic continued to cause them significant stress. Specific to the pandemic, the three most significant themes of stress perceived by respondents were the fear of getting infected (38.7%), reduced income (27.3%), and stringent infection control measures adding to workload (18.0%). In Indonesia and the Philippines, 8.0% and 5.7% of gastroenterologists reported that the lack of resources was the most significant stressor, respectively. Of these, some reported a direct impact on clinical care, examples of such feedback are provided in Table 4. Not limited to the pandemic, stressors relating to the themes of work volume (38.0%), difficult relationships with patients and relatives (23.0%), and difficult relationships with colleagues (18.5%) were the three most significant sources of stress in routine gastroenterology practice within the region. Other themes of stressors and the results per country have been summarized in Figure 2.

Overall, the symptoms of burnout were common within the region (Table 2); however, intercountry variability was present. EE was present in 12.3% to 50.0%, DP was present in 4.6% to

33.8%, and PA was present in 25.1% to 52.9% of respondents. The pooled prevalence of burnout in gastroenterologists was 17.1%, and likewise, intercountry variability was evident; burnout prevalence was lowest in Indonesia and highest in Malaysia: 5.2% and 35.1%, respectively. To identify quantifiable risk factors for burnout, this study collected data spanning almost 20 variables ranging from weekly patient load to personal demographics; the full survey is available with our protocol.¹⁴ However, an exploratory logistic regression model demonstrated that (i) those who reported significant stress at work due to the pandemic, (ii) the presence of depression, (iii) trainees, (iv) public sector gastroenterologists, (v) the lack of awareness or access to mental health support services, and (vi) high clinic volumes were the only factors independently associated with burnout.

Of these risk factors, pandemic-related stress had the strongest association with burnout (OR = 4.41, 95% CI: 2.01–9.69, $P = 0.002$) and high clinic volumes had the most marginal association (OR = 0.99, 95% CI: 0.98–1.00, $P = 0.025$). The strength of associations of all other variables is displayed in Table 5. Although fear of getting infected with COVID-19 was the most frequently reported pandemic-related stressor, statistically significant associations were not found between clinicians who were caring for suspected or confirmed COVID-19 patients, national COVID-19 cases loads (cases per million of the population), and burnout: $P = 0.35$ and $P = 1.00$, respectively. Since an association between

Table 4 Examples of reported stressors from respondents grouped according to common themes

	Themes	Quotes
Pandemic-related stressors	Fear of infection	“Fear of getting infected and spreading it to the family” “The fear of being exposed to asymptomatic COVID-19 patients every day” “Family members asking me not to work due to COVID-19”
	Reduced income	“Working hours are reduced, take-home pay is reduced” “Sometimes no income—no patient, no income, that’s how it goes here in the Philippines” “Decreased income due to a drastic decrease in non-covid patient visits”
	Infection control measures	“Wearing mask and face shields are draining” “Preparation becomes longer” “Must adapt to a strict process on the other hand must still be able to provide optimal service”
	Resources	“The quality of work has been affected because we cannot fully examine the patients. In our locality, the equipments for testing and for protection are limited” “... problems such as limited medication, limited PPE” “Still not 100% with procedures because some patients cannot afford a swab”
General stressors	Work volume	“Non-clinical demands, admin and research” “Workload, shortage of time” “Workload, systems issues, administrative overhead/burden”
	Relationships with patients and their relatives	“... difficult and demanding patients” “Aggressive patients and relatives” “Ingrate patients, dissatisfied parents and spouses”
	Relationships with colleagues	“Unsupportive colleagues,” “Incompetent colleagues!” “Colleagues and subordinates at different generation” “The director likes to create problems”
	Professional risk and responsibility	“Patients with many co-morbidities” “Treatment failure and malpractice” “Patients have a poor prognosis in my care because most will die”
	Training	“Postgraduate exams” “Specialist doctor education”
	Resources	“BPJS (health insurance), drugs and therapy not available” “Not enough co-workers” “Workload that does not correlate with compensation”

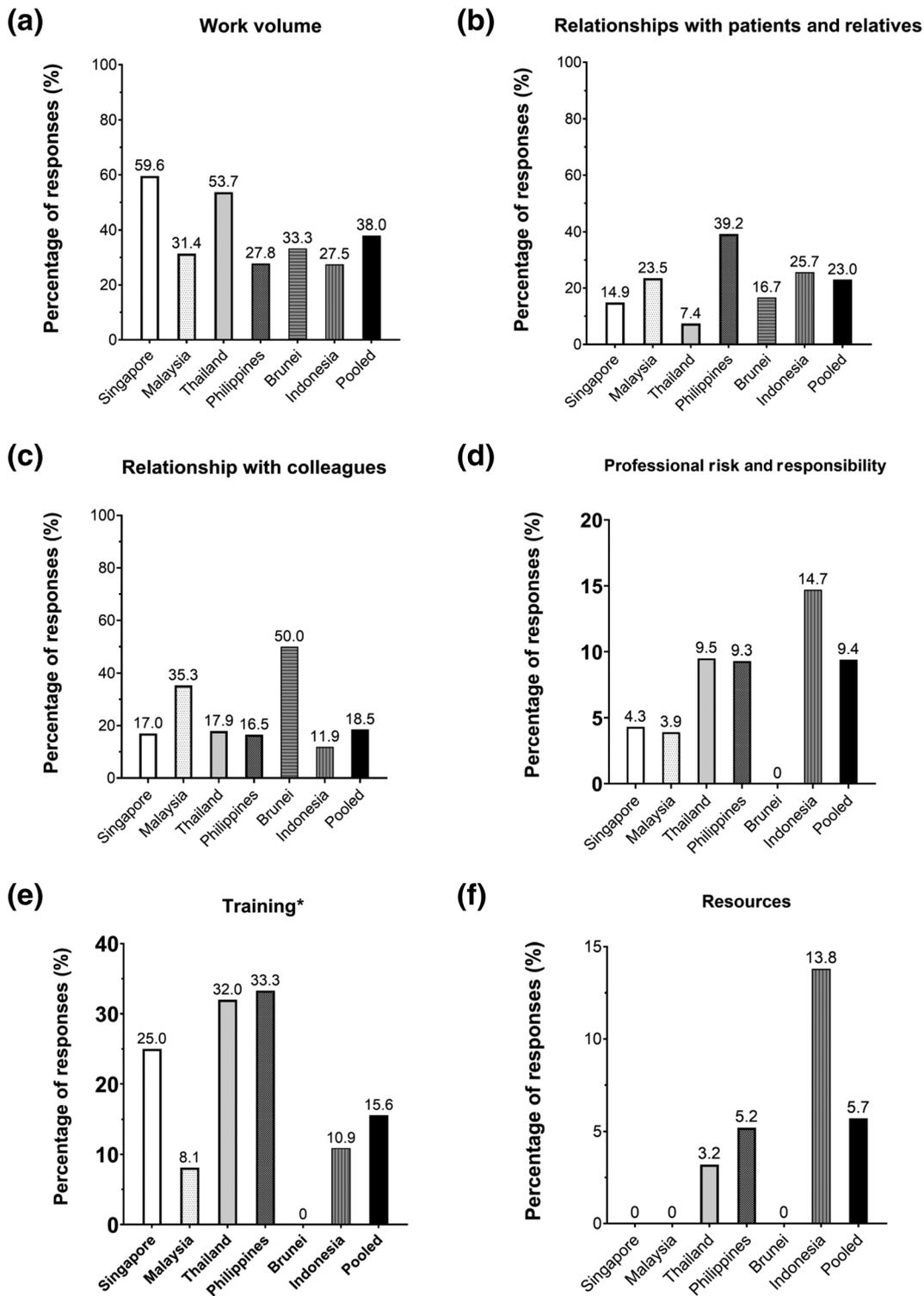


Figure 2 Stressors caused by the COVID-19 pandemic. The theme “work volume” encompassed clinical workload, administrative duties, and research commitments. The theme “professional risk and responsibility” encompassed managerial duties, the risk of treatment failure, and the risk of litigation. The theme “training” encompassed curriculum requirements, postgraduate education (or the lack thereof), and postgraduate examinations. * denotes that frequency rates were adjusted to reflect feedback provided by trainees only. The theme “resources” encompassed the lack of equipment, income, adequate health insurance coverage, staff, and transport to poorly accessible areas.

Table 5 An exploratory logistic regression model identifies key factors that influence burnout risk in ASEAN gastroenterologists

Variable	OR	95% CI	P values
Workplace stress: the pandemic has caused significant stress at work (yes)	4.41	2.01–9.69	0.002
Depression: pre-pandemic or intra-pandemic (yes)	3.37	1.21–9.36	0.020
Grade: trainees (vs consultants)	2.37	1.14–4.92	0.020
Average patients seen in clinic per week	0.99	0.98–1.00	0.025
Sector of work: public sector only (vs any private sector work)	2.58	1.08–6.18	0.034
Unawareness/lack of access to psychological support services (yes)	1.83	1.05–3.18	0.032
Average endoscopies performed per week	1.02	1.00–1.05	0.073
Average hours of work per week	1.01	0.99–1.02	0.424
Average number of warded patients cared for per week	1.00	0.99–1.01	0.856
Workload (reference category = the pandemic has increased clinical workload)			
The pandemic has not affected clinical workload.	2.61	0.95–7.18	0.063
The pandemic has reduced clinical workload.	1.20	0.62–2.32	0.583
Age	0.94	0.87–1.02	0.153
Gender: female	1.31	0.75–2.29	0.346
Years of practice in gastroenterology	1.00	0.91–1.09	0.937
Workplace (reference category = tertiary center)			
District hospital	1.06	0.45–2.46	0.899
Private establishment	1.57	0.54–4.51	0.405
Other establishment	0.00	0.00–0.00	0.998
Normal clinical practice has been significantly affected by the pandemic (yes)	0.62	0.25–1.53	0.302
Caring for patients with active/suspected COVID-19 (no)	1.34	0.73–2.48	0.349
Ongoing effects: the pandemic is still affecting normal clinical practice today (no)	1.27	0.61–2.63	0.529
Number of COVID-19 cases per million of population (caseloads per country)	1.007	—	1.000
Country (reference category = Indonesia)			
Brunei	13.78	—	1.000
Malaysia	2.50	—	1.000
Philippines	0.48	—	1.000
Singapore	0.02	—	1.000
Thailand	8.42	—	1.000

CI, confidence interval; OR, odds ratio.

burnout and depression is widely recognized, we sought to determine the prevalence of depression among Southeast Asian gastroenterologists. Through self-reporting, we found that the onset of depression intra-pandemic was 2.1% and the pre-pandemic prevalence was 2.2%. There was no detectable evidence that the pandemic had increased the prevalence of depression in our cohort ($P = 1.00$). Reasons why trainees and public sector gastroenterologists may be at increased risk of burnout are discussed further in the succeeding text.

Importantly and worryingly, 50.1% of all gastroenterologists who participated in this study reported that they were unaware of or did not have access to support services, and this was associated with an almost twofold increase in burnout risk. Proportions varied between countries: Malaysia (70.0%), Brunei (66.7%), Philippines (58.9%), Indonesia (53.8%), Singapore (38.7%), and Thailand (34.9%). Awareness of or access to support services were similar between consultants and trainees (48.3% vs 52.8%, $P = 0.28$). Interestingly, private sector gastroenterologists were observed to be twice as likely not to have access to or awareness of mental health support services compared with public sector gastroenterologists (OR = 1.99, 95% CI: 1.45–2.74, $P < 0.0001$). Nevertheless, burnout risk was significantly higher in public sector gastroenterologists compared with private gastroenterologists (OR = 2.58, 95% CI: 1.08–6.18, $P = 0.034$).

Insights from gastroenterologists’ feedback on reported workloads.

A total of 70.6% of ↑workload gastroenterologists practiced in the public sector. However, significant increases in weekly working hours, endoscopic volumes, inpatient volumes, and clinic volumes were not observed when compared with ↔workload gastroenterologists. Analysis of respondent feedback suggested that there could be several reasons for this. Firstly, increased workloads were frequently attributed to more general medical and COVID-19 patients. Secondly, a backlog of cases had accumulated in the public sector. Thirdly, stringent infection control measures could have limited workflow in institutions. These factors, whether occurring in isolation or combination, could explain why ↑workload may not have had significantly higher clinical outputs compared with ↔workload. Examples of such feedback are as follows:

Having to look after more general medical and COVID patients.

There is a large backlog of endoscopy referrals we are struggling to get through. Donning/Doffing procedures and room decontamination restrict the number of cases we can do per day.

Private sector gastroenterology consultants and public sector trainees comprised 78.6% of ↓workload gastroenterologists. Reduced workloads in the private sector were mainly attributed by respondents to a decrease in patient demand, an increase in health-care costs, and local policies that curtailed routine practices. In countries with predominant private health-care systems, for example, the Philippines, gastroenterologists reported that they were encountering fewer but sicker patients, in addition to a reduction in income. In addition, trainees in the public sector commonly reported a reduction in endoscopic opportunities, which was concordant with our quantitative data that have demonstrated consultants tended to do more endoscopy than trainees during the pandemic. Examples of such feedback are as follows:

Patient number is less, endoscopic cases are much fewer, health (care) workers are more worried also about getting infected, and cases that have come in are more severe, owing to the procrastination of consulting out of fear of hospitals.

Reduced scopes. Not enough training. Cancelled teaching sessions.

Nonetheless, feedback from gastroenterologists in both sectors suggested that the use of telemedicine was common, and this likely impacted outpatient clinic volumes in both the public and private sectors. Examples of such feedback are as follows:

Mix of face to face and teleconsult patients has increased workload time at any time of the day in the week.

I'm not going to the hospital yet, just doing telemedicine.

Discussion

This study achieved the highest response for any study on burnout prevalence in the field of gastroenterology.¹⁷ Interestingly, the majority of respondents were male, and this suggests that the speciality has a male predominance in certain Southeast Asian countries. Similar observations have been reported in Western countries; for example, 79.0% and 82.4% of all gastroenterologists are male in the UK and USA, respectively.^{18,19} In addition, it was noted that the GPR varied considerably within Southeast Asia (Table 2). However, we believe this is an expected relationship that is closely related to health economics; that is, the higher the gross domestic product per capita (GDP/C) of a country, the more doctors and gastroenterologists there were in the country's population.²⁰ For example, the UK and Singapore have a GDP/C of US\$42 328.90 and US\$65 233.30 and a GPR of 1:42 571 and 1:38 886, respectively. In contrast, the Philippines and Indonesia have a GDP/C of US\$3485.10 and US\$4135.60 and have a GPR of 1:245 033 and 1:646 782, respectively (GDP/C data are available from <https://data.worldbank.org>). Nonetheless, across the region, there was balanced representation from gastroenterologists in both the public and private sectors: 52.3% and 47.7%, respectively.

We discovered that the effects of the COVID-19 pandemic on gastroenterology practice within Southeast Asia were

multifaceted. Public sector gastroenterologists frequently reported increased workloads as a result of the pandemic, although we did not find any statistically significant increase in the clinical parameters we analyzed (weekly working hours, endoscopy volumes, inpatient volumes, and clinic volumes). This may be explained by restrictive infection control measures in public institutions that has led to workflow saturation; public sector gastroenterologists reported a backlog of cases that this study was unable to quantify and similar experiences with workflow saturation have been reported by gastroenterologists in the UK.^{21,22} On the contrary, reduced workloads were frequently reported by private sector gastroenterologists, even in countries with a predominant private health-care sector like the Philippines. In our data, this reduction was demonstrable in the weekly working hours, endoscopy volumes, and inpatient volumes, but not in outpatient clinic volumes (Fig. 1). Stable outpatient clinic volumes may be explained by a greater emphasis on telemedicine by health-care systems within the region, which is corroborated by the feedback provided by our respondents.

Interestingly, two-thirds of all gastroenterologists stated that the pandemic continued to cause them significant stress. However, only 38.7% reported that the risk of infection was the most significant stressor caused by the pandemic. We have elucidated that the pandemic has given rise to other avenues of stress to gastroenterologists such as income reduction and changes to working practices that had been implemented across the region. This range of pandemic-related stressors possibly explains why direct associations between burnout, caring for COVID-19 patients, and national COVID-19 cases loads were not demonstrable on multivariate analyses. Also surprising was the high frequency at which stress was attributed to patient and relative relationships within the region. We previously observed within the speciality that stressors related to high work volumes and difficult relationships with colleagues were frequently reported, while stressors related to patient and relative relationships were less frequent in current literature.¹⁷ This observation in Southeast Asia may be due to a complex combination of societal, racial, and cultural differences²³; Southeast Asia is indeed diverse and home to over 20 ethnic groups. Further research in understanding doctor–patient relationships and patient–doctor expectations within the region would be beneficial.

Importantly, this study has shown that burnout symptoms were common among Southeast Asian gastroenterologists. However, we are currently unable to comment if the pandemic had increased the regional prevalence of burnout in the speciality because this has not been studied previously. Nonetheless, the pooled burnout prevalence was found to be 17.1% although intercountry variability was observed; Singapore, Malaysia, and Brunei had higher burnout rates (30.3–35.1%), which would be similar to the UK (37.3%) if comparisons are made using the same detection tool and criteria for burnout.¹⁷ Interestingly, Indonesia had the lowest burnout rates but the highest outpatient and inpatient volumes in the region (Table 1). Evidently, there are “soft” and complex factors that vary with geography, and these influence how clinicians perceive and cope with stress in the face of high workloads. It is also noteworthy that there are several tools and criteria used to “diagnose” burnout in literature and unless identical tools and criteria are used, the comparison of results across studies is not appropriate. Nevertheless, burnout remains an important occupational

hazard, which if unaddressed, can lead to clinician ill-health, sub-optimal clinical outcomes, and avoidable health-care costs.^{24–26}

The importance of mental well-being in the efficient and safe provision of gastroenterology services during the pandemic was previously highlighted.^{4,27} Therefore, to develop safeguards to reduce burnout risk, we sought to understand risk factors for the syndrome in Southeast Asian gastroenterologists. Importantly, we found that public sector gastroenterologists, trainees, and the poor awareness of and the lack of accessibility to mental health services were strongly associated with burnout risk. Public sector gastroenterologists tended to work longer hours and had larger endoscopy and inpatient volumes compared with private sector gastroenterologists (Table 3); the larger workload likely accounted for the increased burnout risk. Similarly, trainees may have also been over-extended because they tended to work more hours per week and cared for more inpatients than consultants (Table 1). These factors, in combination with stress related to postgraduate examinations and postgraduate training (as per respondents' feedback), likely contributed to the stronger association with burnout.

Of concern is the fact that 50.1% of all gastroenterologists who participated in this study were unaware of or did not have access to support services; we observed similar findings in a pilot study of UK gastroenterologists.²⁸ In Southeast Asia, this was more prevalent in the private sector than the public sector (58.9% vs 41.9%, respectively). Understandably, gastroenterologists in their private establishments are unlikely to have the resources to afford a dedicated occupational health team or have access to one. In this situation, increasing the visibility of national organizations (e.g. mental health helplines) or charities can help bridge this area of deficiency. However, poor rates were also reported in the public sector, which strongly indicate that improvements within public institutions and occupational health departments need to be made urgently.^{29,30}

Nonetheless, in addressing the additional workload generated by the pandemic, clear opportunities to optimize gastroenterology practices exist. The expansion of telemedicine is likely to be a permanent feature in the region because of its ability to maximize outpatient clinic capacity as discussed herein. Further, exploring novel and cost-effective technologies as alternatives to diagnostic endoscopy could potentially alleviate work pressures in public health-care systems within the region and improve patient care, for example, the screening for gastric cancer and lower gastrointestinal malignancies through the use of novel serological biomarkers and fecal immunochemical test, respectively.^{31,32} Future improvements in point-of-care coronavirus diagnostics may also improve workflow for both inpatient and outpatient services.

Lastly, this study had several limitations. Firstly, although it had the highest response rate among burnout prevalence studies in gastroenterology, there is a risk of non-response bias; that is, burnout prevalence may have been underestimated. This is because burnout is closely associated with professional disengagement, exhaustion, and an "unwillingness and resistance to spending any necessary effort at work for proper task completion."³³ It is therefore extremely unlikely that more burned out gastroenterologists participated in the survey than non-burned out gastroenterologists. Secondly, burnout exists as a continuum, and non-burned out gastroenterologists may develop clinical burnout after the survey. Thirdly, a universal detection tool and criteria for burnout do not exist. Nonetheless, we have chosen a detection tool widely

regarded as a field standard, adopting clinically validated criteria that we have previously evaluated in Southeast Asia. Fourthly, this was a survey-based study so the quality of the qualitative data may be limited. Therefore, respondent feedback was used to help us understand our quantitative data instead of theory development.

Conclusion

The COVID-19 pandemic continues to affect most gastroenterologists in Southeast Asia, and its effects on gastroenterology practice are multifaceted. Burnout is common in the region although its prevalence varies considerably between countries. Opportunities to optimize clinical practices in the "new normal" should be explored to address the increased workload that has been frequently reported by gastroenterologists in the public sector. Nonetheless, awareness of and access to mental health support services were poor in the region, and improvements are urgently needed.

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Data availability statement. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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