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A comparative study of COVID-19 emergency funds allocated to the health sector: US, UK, and Canada

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1. Introduction

The COVID-19 pandemic caused over 22.4 million cases and 423.9 thousand deaths in 2020 in three English-speaking countries: the US, the UK, and Canada [1]. In response, these countries provided \$277.7 billion USD emergency funds through 2020 to produce domestic COVID-19 related health care and public health services; these funds are national/federal assistance to the health sector in the form of grants [2]. However, this large cash flow into the health sector raises questions [3]: How were funds allocated among which recipients? Were allocations efficient, transparent, and accountable?

Answers to these questions pertain to public finance; they are important to emergency fund execution and to taxpayers who ultimately pay for COVID-19 emergency funds. Taxpayers have expressed concerns about transparency issues and potential waste of taxpayer's money in the following areas: misappropriation [4]; procurement of overpriced equipment and substandard services [5,6]; overinvestment in vaccine development [7,8]; unfair sharing of tax burden [9]; and potential resulting tax hikes [10]. For emergency funds in general, the International Monetary Fund (IMF) warns countries about the possibility of corruption [11]. Funds implemented hastily may lack checks and balances that lead to abuse and fraud. Funds implemented slowly may risk healthcare provider insolvency that leads to service shortages. Mistargeting recipients and uncoordinated funding also risk inefficiency and leakage [11]. For COVID-19 emergency funds in particular, the World Bank calls

for a country-specific trade-off balance between prioritizing health benefits and minimizing economic downturn [12].

These general issues have yet to be examined for COVID-19 emergency funds, in particular. The trade-off of allocating scarce fiscal resources suggested by the World Bank is between health and non-health sectors rather than between health care and public health services within the health sector. Also, this trade-off suggested by the World Bank is from the government chief executive's (e.g., president's) view for allocating the total budget among all sectors rather than from the granting agency's (e.g., health agency's) view for allocating part of the budget within the health sector. Although the US and UK announced further health sector emergency funds of \$86.2 billion and £7 billion as recently as March 2021 [13,14], without examining the successes and mistakes of funds already distributed in 2020, countries risk the aforementioned misallocation and misuse of future funds.

2. Methods and materials

To address this literature gap, we employed the public financial management (PFM) framework that generally includes four major stages: budget preparation, budget approval, budget execution, and budget reporting and audit (Fig. 1) [2,15,16]. According to the PFM literature [2,15,16], non-discretionary budget spending is based on the definitions of eligibility and allocation rules (e.g., payment formulas) created by authorization legislation or authorized granting agencies; those who meet eligibility criteria receive assistance according to a payment formula [2]. Formulas based on different variables can create substantial tension among recipients with different characteristics [2]. Whereas well-designed allocation rules better "provide aid to those having the greatest needs and give them a reasonable degree of financial certainty." [2] Government accounting and reporting allow fiscal transparency and account-

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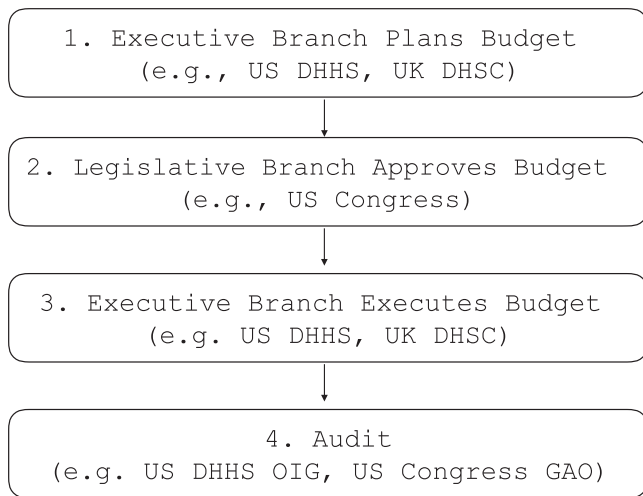


Fig. 1. General Public Financial Management (PFM) Framework
 Source: Data cited from Note 2 in text. Notes: The figure presents a public financial management (PFM) framework of the national/federal budget process in general.

ability. The accounting system allows for assembling and analyzing data of the budget process; data must be complete, accurate, and timely. The financial reporting system records transactions and collects such data; the system must be consistent with the same basis for all transactions and comparable across governments and recipients [2]. The accounting and reporting system makes it possible to monitor the financial performance of government funds, have unspent funds returned to the treasury, and reallocate these funds to areas of greatest emerging public needs, all of which have been the recent evidence-based budgeting reform [15,16]. At the end of the budget cycle, the audit phase evaluates compliance and performance of fund execution to hold the granting agencies accountable. Therefore, we expand the budget execution and audit stages into seven sequential steps for executing and auditing COVID-19 health sector emergency funds: 1) verifying eligibility, 2) allocating funds, 3) accounting, 4) reporting use of funds, 5) re-evaluating health production needs, 6) returning and reallocating excess funds, and 7) auditing (Figs. 2 and 3).

In each step, we examined the key performance indicators – allocative efficiency [17], transparency, and accountability – of each country’s emergency fund execution. Allocative efficiency refers to allocating scarce (fiscal) resources in a way that meets either public needs or public preferences (see details in Discussion section) [2,17]. Fiscal transparency means openness in fiscal operations whereby budget processes, from preparation to execution and audit, are subject to public scrutiny [2]. The IMF further emphasizes its four general principles, including clarity of roles and responsibilities, open budget processes, public availability of information, and assurances of fiscal data integrity [18–20]. Grounded in transparency, fiscal accountability refers to clarifying which public officials will be responsible for public funds, in what amount, and for what purpose and outcome [2]. The World Bank further emphasizes its two elements, including answerability and consequences, with public officials facing consequences for their success or failure in achieving specified targets or benchmarks [16]. We focus on the emergency funds’ allocative efficiency, transparency, and accountability to constituencies, including the public (taxpayers) and the health sector that receives funds. We then compared countries to share learnings and make policy recommendations to improve the budget execution and audit of future public health emergency funds.

We searched the literature, including both government documents and academic peer-reviewed articles, using the country

Table 1
 US Provider Relief Fund Allocation Rules.

General Distribution Phase 1: April – June 2020	Rule 1	Payment per Provider = (2019 Medicare Fee-For-Service Payments / \$453 Billion) x \$30 Billion.
	Rule 2	Payment per Provider = [(Most Recent Tax Year Annual Gross Receipts x \$50 Billion) / \$2.5 Trillion] – Initial General Distribution Payment to Provider.
General Distribution Phases 2 & 3: July 2020 – as of this writing	Rule 3	Payment per Provider = 2% x Most Recent Tax Year Net Patient Care Revenue.
Targeted Distribution	High-Impact Hospitals Rule	Payment Allocation per Hospital = Number of COVID-19 Admissions* x \$76,975.

Source: Data from Note 25 in text. Notes: The US Department of Health and Human Services (DHHS) used changing rules to allocate the COVID-19 Provider Relief Fund general distribution to healthcare providers in different phases. Rules 1 and 2 were for the first and second rounds of phase one, respectively, and rule 3 was for phases two and three. The \$453 billion was the total sum of Medicare Fee-for-Service (FFS) payments in 2019. Gross receipts included all operating and non-operating revenues, such as capital income. Most recent tax year was referred by DHHS to the calendar year 2017, 2018, or 2019 whichever data was available and most recent.

name and keyword in each step of the extended PFM framework or each performance indicator (e.g., “United States, COVID-19, Transparency”). Government documents were systematically retrieved from branches and agencies relevant to each step of the PFM framework: 1) the legislative budget (e.g., US Congressional Budget Office, CBO) and audit (e.g., US Government Accountability Office, GAO) agencies and appropriations laws; 2) the chief executive budget offices (e.g., US Office of Management and Budget, OMB), granting agencies (e.g., ministry of health, ministry of finance), and their internal auditors (e.g., US Department of Health and Human Services-Office of Inspector General, DHHS-OIG). Similar searches were also conducted from international organization websites (e.g., IMF, World Bank, OECD) and academic literature databases (e.g., PubMed). Some sources were not peer-reviewed by academic experts or officially published by governments or were government news without references to substantiate their claims. Those sources were excluded from this study. As COVID-19 health sector emergency funds are commonly national/federal assistance to the health sector in the form of categorical grants [2], we use assistance, aid, grants, funds interchangeably throughout the paper.

3. Results

3.1. United States

The US had a 329.5 million population and experienced 19.3 million COVID-19 cases and 336 thousand deaths in 2020 [1]. Despite its \$3.1 trillion [21] fiscal deficit and \$26.5 trillion [21] national debt in fiscal year (FY) 2020, the US has financed \$2.4 trillion (11.1% of GDP) total emergency funds.

The Provider Relief Fund (PRF), as a categorical grant, received \$178 billion from three appropriation laws (Appendix Table 1) [22–24]. The US Department of Health and Human Services (DHHS) allocated the PRF to healthcare providers conditional on their providing COVID-19 related services in three phases through two channels: general distribution and targeted distribution [25]. The general distribution allocated \$92.5 billion using three rules (Table 1). Throughout 2020, phase one round one (April to June) automatically distributed \$30 billion to Medicare providers us-

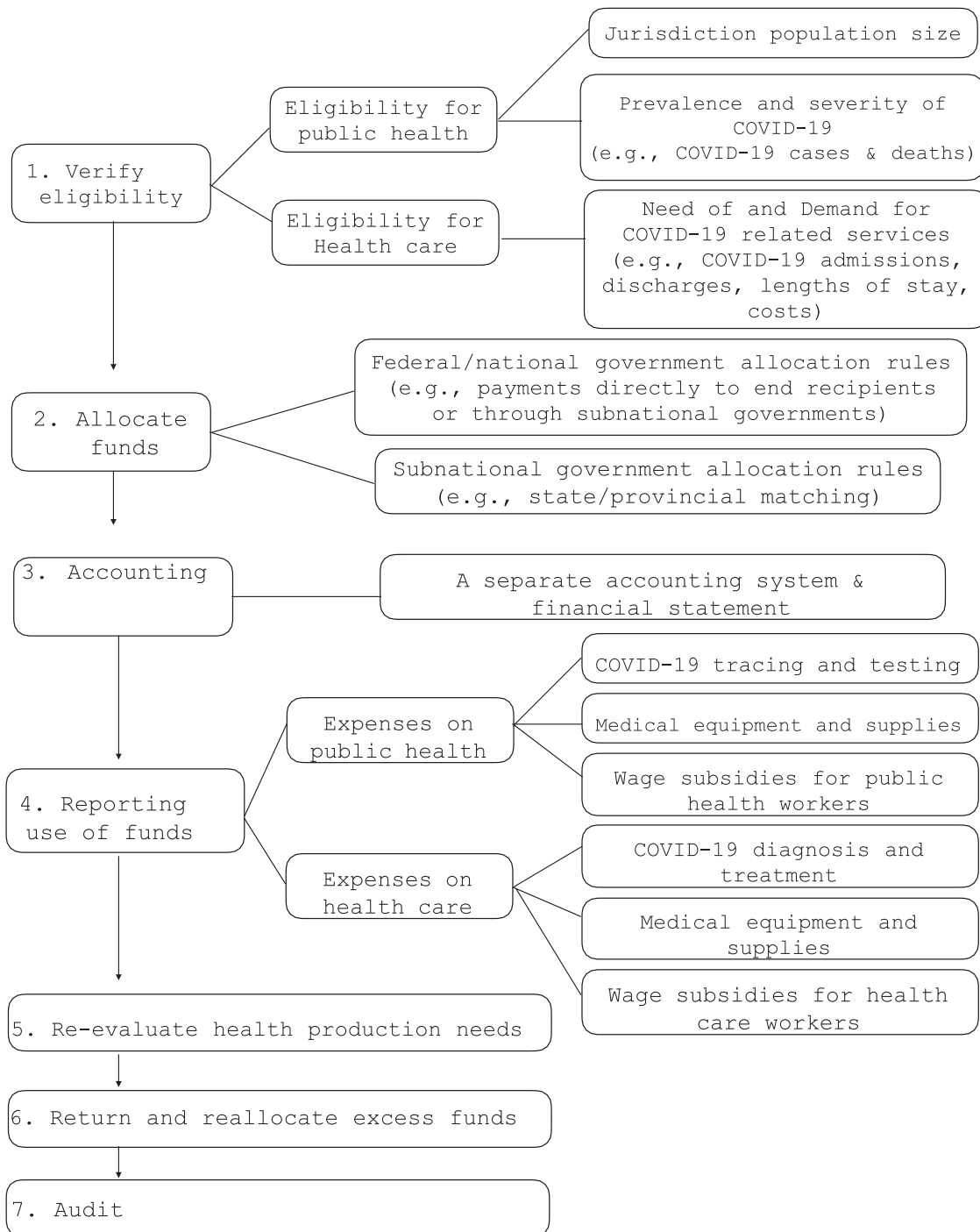


Fig. 2. Expanded Public Financial Management (PFM) Framework for Executing the COVID-19 Health Sector Emergency Funds.

Source: Prepared by authors. Notes: Fig. 2 expands the budget execution and audit stages of Fig. 1 into seven sequential steps, proposing a simplified framework of the entire, complex procedure of executing and auditing the COVID-19 health sector emergency funds. The authors recommend countries integrate steps 2 through 7 into a separate inexpensive real-time financial information system, which is essentially a simplified financial (income, in particular) statement of the COVID-19 health sector emergency funds used by both government granting agencies and grant recipients.

ing rule (1) and round two distributed \$20 billion using both rule (2) and up to 2018 traditional Medicare claims data [25]. Phase two (July to September) allocated \$18 billion, required applications to collect current data, expanded eligibility to recipients of non-Medicare federal health plans, and implemented rule (3) limiting an eligible provider’s cumulative allotment to 2% of its historical net patient care revenue. Phase three (October to present) allocated \$24.5 billion, continued the 2% rule, and compensated up to 88% of providers’ reported revenue losses while

expanding eligibility to telehealth and behavioral health providers [25].

The targeted distribution allocated \$55.9 billion in 2020 to providers highly impacted by COVID-19 or those serving vulnerable populations: 1) \$22 billion to providers whose COVID-19 admissions exceeded 100 through April; 2) \$500 million to tribal providers; 3) \$14.7 billion to safety-net hospitals based on certified beds and Medicare or Medicaid income percentage; 4) \$7.4 billion to skilled nursing facilities based on certified beds and COVID-19

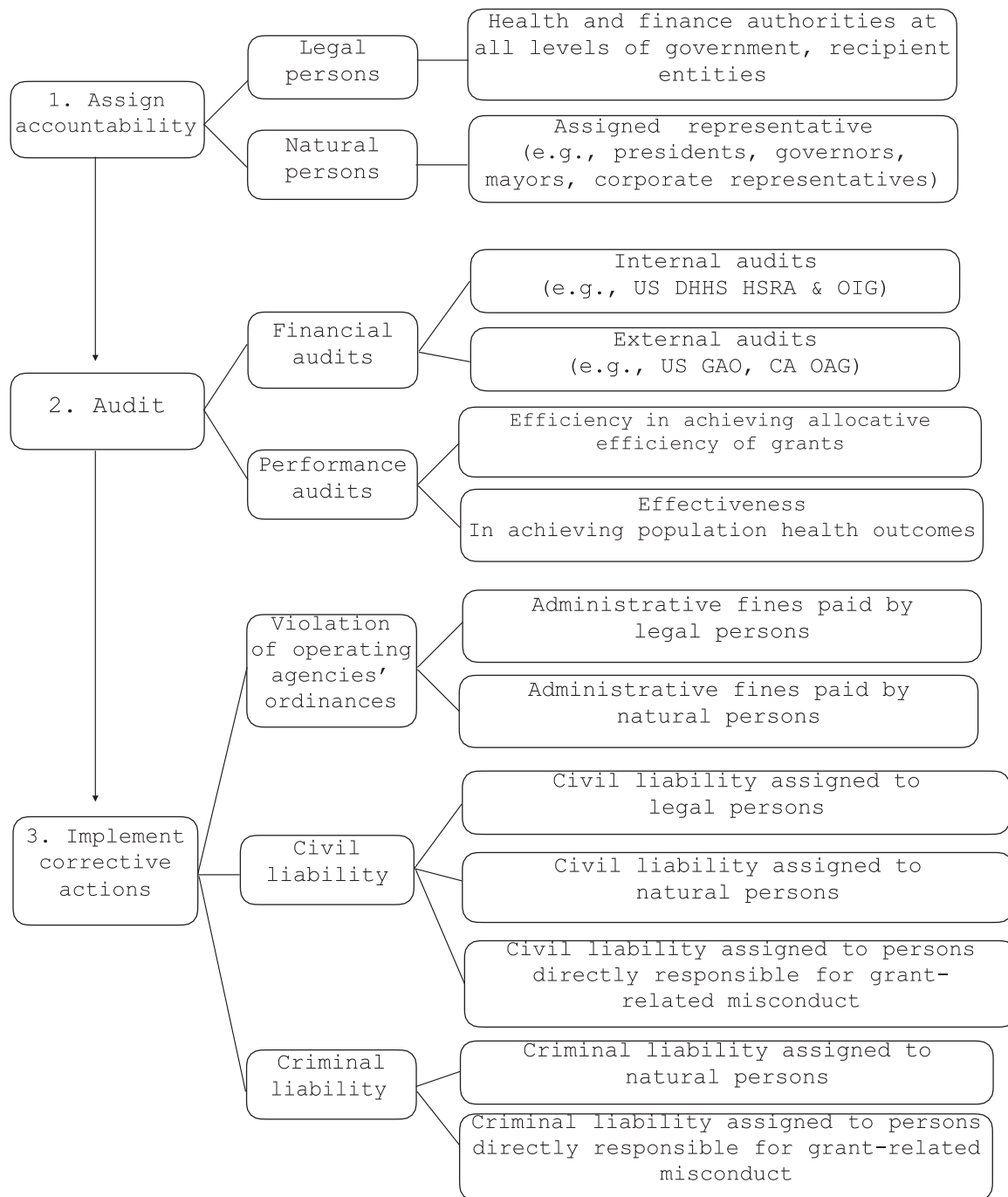


Fig. 3. Flow Chart of Auditing: A Tool of Accountability

Source: Prepared by authors. Notes: “DHHS” indicates the Department of Health and Human Services. “DHSC” indicates the Department of Health and Social Care. “HSRA” indicates Health Resources and Services Administration. “OIG” indicates the US DHHS Office of Inspector General. “GAO” indicates the US Government Accountability Office. “OAG” indicates the Office of the Auditor General of Canada. Fig. 3 expands the audit step of Fig. 2 to further propose accountability mechanisms. Before audits, persons to which accountability is assigned should be identified in the first place. Audit includes both financial and performance audits. Financial audits investigate the compliance of granting agencies and grant recipients. Performance audits evaluate key measurements such as the efficiency and effectiveness of executing COVID-19 health sector emergency funds. After audits, corrective action plans are implemented to improve the fund execution.

infection rates; 5) \$11.3 billion to rural hospitals having a \$1–3 million base payment and 1.97% of its operating expenses; 6) the remainder to providers serving the uninsured [25].

The PRF allocation lacked consistent accounting practices. Some recipients declined automatic payments (e.g., Encompass) [26]; others recognized them as current liabilities rather than grant income in their corporate financial statements (e.g., National) [27], which created comparability and transparency issues.

Recipients had 90 days to decline automatic payments and 15 days to return declined funds. Unused funds after June 2021 must be returned. The process for the return was available starting from November 2021 [28]; however, the process for reallocating these returned funds to the underfunded has not been indicated to date.

Recipients of \$10,000 or more must report unused funds and interest earned on funds and be subject to public sector internal audits conducted by the DHHS. Recipients of \$750,000 or more

were subject to single audits [29]. However, the reporting system of use of the funds has been delayed [30].

Both regularity and frequency of public sector internal audits were unspecified. The Government Accountability Office warned of corruption risks among recipients of PRF's targeted distribution uninsured program [31]. We also found PRF lacked compliance with appropriation laws. First, the law [22] required the PRF to “be spent on healthcare-related expenses or lost revenues attributed to COVID-19.” However, the historical data which the PRF used for its general allocation rules were irrelevant to COVID-19. This was acceptable for initial prepayments in phase one because real-time data were unavailable through June 2020 to DHHS, but this should not have continued in subsequent phases after data became available. Moreover, the general distribution decisions utilized variables which did not make sense as basis for allocation rules. Although the phase three rule included “lost revenue” as an additional basis, all rules used revenues rather than “expenses” as required by the law. It was this inappropriate use of revenues as allocation bases that made DHHS presume that health insurers' data would be necessary and that such proprietary data collection from commercial insurers in real time would be costly, both of which were not the case because this grant allocation essentially needed hospitals' expense data, not hospitals' revenue. Therefore, how much and from which insurers the hospitals obtain reimbursements were irrelevant and should not be a concern in allocating this federal grant according to the appropriation laws. Second, the law required “[PRF] payments shall be made in consideration of the most efficient payment systems.” However, PRF general distribution was less allocatively efficient than its targeted distribution (see Discussion section). Third, the law required that a “provider shall submit...an application that includes a statement justifying the need of the provider for the payment”; however, non-compliance of phase one automatic payments resulted in declining funds and allocative inefficiency [22].

Overall, due to unavailable data in real time, the US PRF allocation lacked not only original assessment and subsequent re-evaluation of providers' production needs of COVID-19 related services but also the timely return and reallocation of excess funds to providers in need. Due to inappropriate variables (e.g., capital income) as the basis in allocation rules, the PRF general distribution that used revenues was less allocatively efficient than the targeted distribution that used expenses for COVID-19 admissions and services.

3.2. United Kingdom

The UK had a 67.2 million population and experienced 2.5 million COVID-19 cases and 72.5 thousand deaths in 2020 [1]. Despite its \$0.3 trillion USD [21] fiscal deficit and \$2.6 trillion USD [21] national debt in FY 2020, the UK financed \$372 billion USD (£271 billion, 13.3% of GDP) total emergency funds, devoting £57 billion to the health sector (Appendix Table 2) [32].

The Department of Health and Social Care (DHSC), counterpart to the US DHHS, allocated the health sector emergency funds. Phase one, announced in March 2020, increased FY 2020 health budgets by £2.9 billion [32] and allocated 1) £1.6 billion to local governments based on FY 2014 historical health budget and local population size [33], and 2) £1.3 billion to the National Health Service (NHS) [32].

Phase two of £1.3 billion, announced in April 2020, established the Adult Social Care Action Plan (ASCAP) [34], which created rules requiring local governments to allocate 75% of received funds to local Adult Social Care (ASC) facilities based on hospital beds and occupancy rates and spend the remaining 25% on local infectious disease control [35].

Phase three round one, announced in May 2020, allocated £600 million through the Infection Control Fund (ICF) [32], a subsection of ASCAP, to address the needs of COVID-19 patients (e.g., sustaining healthcare workers' wages). It also disbursed £22.9 billion to NHS for COVID-19 testing and tracing and £15.2 billion for personal protective equipment (PPE) [32]. Based on ASC facilities' weekly capacity trackers, the DHSC increased their allocation ratio from 75:25 to 80:20 [35]. Round two, announced in August, increased ICF by £588 million and allotted £9.2 billion for vaccine rollout and healthcare worker recruitment [32]. Besides £49.3 million for research, the remaining £4.4 billion was given to public health services [32].

By budget planning and eligibility verification, accountability for spending was assigned to local healthcare administrators and local finance officials. Eligible ASC facilities must meet DHSC compliance codes and grant conditions and have their Chief Executive Officers (CEOs) submit operating budgets that specify their production needs and roles in local governments' total budgets. These budgets must detail local needs for COVID-19 tracing, testing, and treatment based on COVID-19 cases and be approved by the national DHSC by May 2020 [35], who standardized budget templates nationwide and publicized the budgets. ASC facilities retained eligibility by submitting weekly e-tracking of operational needs and supplies until March 2021 [34].

The DHSC required six monthly reports from both local governments and ASC facilities about how much funds were spent, what they were spent on, and how the remaining would be spent. However, no invoices and receipts were required [34].

No reallocation process was indicated despite requiring unused funds after March 2021 to be returned by April with justifications. In general, both the Secretary of State and local governments can require repayment of funds spent in violation of grant conditions. Although national auditing guidelines existed, many local governments stated no plans to audit [35].

Altogether, the UK devoted a significant proportion (21.3%) of total emergency funds to the health sector [32]. Allocation decision-making featured a high degree of national coordination due to its unitary fiscal system, which required local revenues and expenses to be approved by the single national government and publicly involved key stakeholders, such as local healthcare administrators, local finance authorities, and the national health authority. The execution of UK health sector emergency funds encompassed most steps of our PFM framework, indicating a high degree of allocative efficiency, transparency, and accountability.

3.3. Canada

Canada had a 38.0 million population and experienced 565.5 thousand COVID-19 cases and 15.4 thousand deaths in 2020 [1]. Despite its \$0.3 trillion USD [21] fiscal deficit and \$2.1 trillion USD [21] national debt in FY 2020, the Canadian federal government announced the COVID-19 Economic Response Plan (CERP) in March 2020 and a subsequent agreement in July to finance emergency funds totaling \$321 billion USD (\$403.4 billion CAD, 18.9% of GDP) [36].

Of the total emergency funds, 5.3% (\$21.3 billion CAD) was allocated to the health sector through two channels [36]: 1) \$5.3 billion for immediate responses, including PPE and medical supplies; 2) \$20.3 billion for provinces and territories with the initial payment (\$1 billion) and the forthcoming SRA transfer (\$19.3 billion, Appendix Table 3).

The Safe Restart Agreement (SRA) between the federal and provincial governments offered a categorical grant for seven priority areas, including testing and contact tracing, healthcare system capacities, and vulnerable populations. Moreover, the Canadian healthcare system was primarily publicly financed, which helped

hospital and long-term care facilities offset lost revenues and compensate COVID-19 related services [36].

Eligibility for SRA federal transfers required provincial premiers to submit budgets based on provincial population sizes to offer services in the above priorities [36]. However, no further eligibility criteria and allocation rules for subnational governments were indicated.

Provincial governments financed matching provisions. For example, the Ontario Ministry of Finance provided a \$17 billion budget in April 2020 for vulnerable populations with home care needs and community outbreak prevention [37]. While Canada's public sector accounting standards required such grants to be recognized as revenue [38], the Auditor General of Ontario (OAG) recently found that COVID-19 health-related programs lacked strong processes to ensure timely allocation and proper documentation [39]. Specifically, some recipients did not distinguish between funds spent and funds committed for future spending in their reports of use of the funds; some failed to meet reporting deadlines; others internally reallocated unused funds without approval [39]. Moreover, no return and reallocation of excess funds have been indicated as of this writing. Although more than 80% of Canadians supported governmental COVID-19 programs in general [40], their preferences for health-related programs were unavailable to determine the allocative efficiency of health sector emergency funds.

The Ontario government distinguished itself by implementing information technology (IT) to invest in inputs of health production, including 1) providing financial capital, 2) matching the supply of and demand for physical capital [41] and health labor [42], and 3) eliciting public preferences regarding COVID-19 policies [43]. Online information-sharing platforms were quickly launched during March–April 2020. A procurement platform helped individuals and local governments procure medical supplies at wholesale prices [41]. The Workforce Matching Portal paired healthcare workers with employers across the province [42].

Ontario's IT responses were consistent with IMF's recommendation for digital solutions as efficient use of emergency funds [44]. However, federal assistance to indigenous health was criticized for not targeting the needs of individuals at high risk of COVID-19 and thus was inefficient [45].

Overall, Canadian health sector emergency funds lacked allocative efficiency in its allocation rule solely based on population size and in its absence of procedures for reporting and auditing as well as returning and reallocating excess funds. Lacking nationwide coordination [46] between the federal and subnational governments due to fiscal federalism [47] made funds execution less accountable.

4. Discussion

In this section, we compared the three countries' performance – allocative efficiency, transparency, and accountability – in each of the seven sequential steps of executing the COVID-19 health sector emergency funds (Table 2). We provided overall and country-specific policy recommendations for each step and for the entire execution (Table 3).

4.1. Eligibility criteria

Eligibility criteria varied among countries from the type of healthcare providers to the involvement of finance officials. Although US healthcare entities with high COVID-19 admissions or those serving vulnerable populations were eligible for the PRF targeted distribution, other providers were ineligible for different phases of the PRF general distribution, including 1) non-Medicare providers for phase one due to data unavailability, 2) new entities operating in certain years for phase two, 3) group homes for

phases one and two despite high infections among their elder residents [48], and 4) individual healthcare workers such as physicians for all phases [25].

However, in the UK, individual healthcare workers were directly supported by secured wages [32]. All local healthcare facilities were eligible conditional on their CEOs budgeting for COVID-19 related production needs. These operating budgets were reviewed by local finance officials, who then submitted total local budgets to the national health authority for approval [32]. Thus, British health and finance authorities shared accountability for spending. Applications were required in all UK phases [32], but not until phase two in the US [14], and not in Canada [34].

We recommend eligibility be verified through applications from healthcare administrators and government health and finance officials to promote shared accountability for spending. This was done in the UK because of its unitary fiscal system. However, given the US's federal fiscal system and uncertainty in the immediate moment of the pandemic, the PRF phase one automatic distribution to Medicare providers was more feasible. Still, as the pandemic progresses, we recommend that US DHHS require applications from recipients providing COVID-19 caseload and related estimated production needs (i.e., operating expenses rather than revenues) to adjust allocations in subsequent phases.

4.2. Allocation rules and bases

Allocation rules, with their inherent impact on allocative efficiency and accountability, varied widely for eligible recipients. The UK devoted the largest proportion (21.3%) of total emergency funds to the health sector, which was allocated to healthcare facilities based on their COVID-19 related production needs [32]. Canada allotted only 5.3%, most of which was through the SRA transfer to provinces based on population size mainly because healthcare is a provincial government responsibility (Appendix Table 4) [36].

The US allotted 7.6% of total emergency funds through PRF to healthcare entities. The PRF general distribution, based on hospitals' sales revenue and gross receipts that included capital income which was irrelevant to patient care (let alone COVID-19 care), was insufficient to justify taxpayer obligations and thus was allocatively inefficient. First, government funds are provisions to produce public goods to meet public needs [2], such as infectious disease-related health care and public health services, rather than private goods, such as non-infectious disease-related routine care and capital projects. However, only the PRF high-impact distribution, rather than other distributions, elicited these needs from a one-time April 2020 hospital survey.

Second, allocations must also satisfy public preferences [2,49]. Although a July 2020 national poll found 76% of Americans supported funding hospitals [50], it did not elicit their preferences regarding compensation for hospitals' capital losses. It is highly doubtful that the public would like to use tax money to do so except for rural hospitals with Congressional support [51]. Rather, evidence showed that a disconnection between tax obligations (e.g., hospitals' capital losses) and individual taxpayer benefits caused negative tax attitudes [52]. We focused on needs-based criteria as the first-level approximation of allocative efficiency given the general public support for meeting health needs, which can be objectively conceptualized as disease burden and measured as caseloads. Whereas public preference data have been lacking and can be the basis for more fine-grained allocations across specific services subjectively valued by the public [53,54]. This justifies our using needs-based criteria for first-level emergency fund allocations from the national government to sub-national governments and health entities in this paper.

Conversely, the PRF targeted distribution was based on entities' COVID-19 patient volume and operating expenses rather than sales

Table 2
Comparison of Seven Sequential Steps of Executing and Auditing the COVID-19 Health Sector Emergency Funds in US, UK, and Canada.

	US	UK	Canada
Fiscal system	Federal.	Unitary.	Federal.
Verify eligibility	Phase 1: Medicare providers' Phase 2 added: non-Medicare federal health plan providers; Phase 3 added: telehealth, behavioral health providers, etc.	Healthcare workers; Local ASC facilities' CEOs submitted budget plans; Local governments added CEOs' budgets to local budgets & submitted them to the national DHSC.	Premiers of provinces & territories submitted budget plans for SRA federal grants.
Allocate funds: rules & bases	PRF General distribution: Phase 1 round 1: Historical Medicare FFS payments Phase 1 round 2: Historical annual gross receipts Phases 2 & 3: Historical annual net patient care revenues. Targeted distribution: COVID-19 admissions & infection rates, certified beds, operating expenses, Medicare/Medicaid income percentage.	Phase 1: FY 2014 historical health budget & jurisdiction population size; Phases 2: 75:25 ratio between local ASC facilities and local government based on hospital beds & occupancy rates; Phase 3: 80:20 ratio based on tracking ASC facilities' weekly capacity.	Provincial population size.
Accounting practice guidelines	N/A, lacked accounting guidelines; some recipients recognized funds as current liabilities rather than grant income	N/A, given that DHSC referred funds as grant & oversaw ASC facilities, these facility recipients likely recognized funds as grant income.	Yes, Canada's public sector accounting standards required such federal grants to be recognized as revenue.
Reporting use of funds	Requested reports to DHHS with unspecified time and delayed reporting portal.	Monthly reports through 6 months from local governments & ASC facilities to national health authority DHSC.	N/A.
Re-evaluate changing health production needs	N/A.	DHSC reviewed weekly capacity tracking records of local ASC facilities to increase their allocation ratio.	N/A, federally. Yes, Ontario implemented IT to match demand for & supply of medical necessities & health labor.
Return & reallocate excess funds	Unused funds after June 2021 must be returned, but no return and reallocation processes were indicated.	Unused funds after March 2021 must be returned by April 2021, but no reallocation processes were indicated.	N/A.
Audit	Recipients of a certain dollar amount or more were subject to public sector internal single audits conducted by HRSA with unspecified regularity & frequency.	National auditing guidelines existed, but many local governments stated no plans to audit.	While no auditing processes have been indicated at the federal level, Ontario OAG released in May 2021 an audit report on health-related COVID-19 expenditures for spending through June 30, 2020.

Source: Authors' analysis of data from 2, 15–16, 22–46 in text. Notes: The table examines all seven steps for the US (see notes 22–31), UK (see notes 32–35), and Canada (see notes 36–46). "N/A" indicates not available. "PRF" denotes Provider Relief Fund. "DHHS" denotes the US Department of Health and Human Services. "DHSC" is the Department of Health and Social Care. "IT" is information technology. "OAG" is the Office of the Auditor General of Ontario.

revenue and capital income and thus was more allocatively efficient. Under this targeted distribution, a rural hospital received a base payment plus 1.97% of its operating expenses, which could be a higher dollar amount than the 2% of sales revenue received by a non-rural counterpart under the general distribution. Although the health sector emergency funds of both the US and UK were allocated to healthcare entities, the US PRF allocation was decided solely by the federal health authority [25], whereas the UK AS-CAP allocation required national coordination and shared accountability between health and finance authorities at both local and national levels [32]. Therefore, the UK's allocation rules embodied more allocative efficiency and accountability than those of the US and Canada mainly due to its unitary fiscal system.

When allocating scarce fiscal resources during pandemics, the World Bank emphasizes the balance between health and non-health sectors [12]; we recommend countries design allocation rules based on COVID-19 health production needs and emphasize the balance between health care and public health services within the health sector to further augment allocative efficiency. We suggest US DHHS convert the general distribution and other programs of the targeted distribution into the high-impact program. We recommend Health Canada use COVID-19 disease burdens when allo-

cating federal transfers to provinces and provinces adopt explicit allocation rules similar to the British subnational allocation ratios or the American high-impact distribution formulas.

4.3. Accounting

Accounting practice guidelines for COVID-19 emergency funds allocated to the health sector were established in the UK and Canada [32,36], but only partially in the US which created consistency, comparability, and transparency issues. Such aid was recognized as grant income by some US recipients and as current liabilities by others in their corporate financial statements [27].

Consistent with IMF's suggestion of "separating COVID-19 spending from other spending to bolster financial transparency and accountability, and create a clearly defined audit trail," [49] we recommend a separate inexpensive accounting and reporting system for executing the health sector emergency funds. We further recommend US DHHS guide recipients on how to recognize PRF in their corporate financial statements, either as current liabilities before deciding to accept, as grant income after the acceptance, or nothing but notes including both funds received and returned after the decline.

Table 3
Recommendations to Seven Sequential Steps of Executing and Auditing the COVID-19 Health Sector Emergency Funds in US, UK, and Canada.

	All countries	US	UK	Canada
Verify eligibility	Eligibility may be verified through applications from healthcare administrators and government health and finance officials to promote shared accountability for spending.	DHHS may require a simple makeup application of phase 1 distribution from recipients consisting of COVID-19 caseload, estimated production needs, and legal representative information to assign accountability. DHHS may also require Medicare recipients to promptly return excess funds and prepaid funds for ineligible expenses.	Eligibility statuses & allocation amounts may be publicly disclosed.	Each province may conduct initial evaluations of public health and health care providers' production needs through applications from providers and approvals by provincial health and finance authorities at the provincial level, similar to the verification process at the British national level.
Allocate funds: rules & bases	Countries may design allocation rules based on COVID-19 health production needs and emphasize the trade-off balance between health care and public health services within the health sector to further augment allocative efficiency.	Convert the PRF general distribution to the targeted distribution, using allocation rules specifically based on COVID-19 cases and operating expenses for such cases.	None.	In addition to population size, Health Canada may add to federal allocation rules weighted COVID-19 cases/disease burdens. Provinces may adopt allocation rules similar to the subnational allocation ratios in the UK or the high-impact distribution formulas in the US.
Accounting practice guidelines	Countries establish a separate inexpensive accounting and reporting system for all steps of executing the funds.	Private sector accounting practice guidelines may specify how recipient healthcare providers recognize PRF in corporate financial statements – as current liabilities before deciding to accept it, as grant income after the acceptance, or nothing but notes including both funds received and returned after the decline.	Accounting practice guidelines specifically for all recipients to recognize COVID-19 health sector emergency funds may be made available.	None
Reporting use of the funds	IMF suggests digital solutions to increase fiscal transparency & accountability. We further recommend implementing a real-time reporting system.	DHHS may launch the PRF reporting portal as soon as possible and design it to be a separate real-time financial information system for future pandemics.	Reports may be made available to the public on a transparency portal.	Recipients may comply with provincial reporting requirements, e.g., distinguish funds received and funds budgeted in use reports and meet reporting deadlines.
Re-evaluate changing health production needs	Countries may use IT to re-evaluate recipients' health production needs frequently.	DHHS may use this separate inexpensive accounting and reporting system to conduct frequent production needs reevaluations, and based on which, update allocation rules accordingly.	None.	Each province (e.g., ministries of health) may take advantage of IT to conduct subsequent evaluations of public health and health care providers' production needs and update allocation rules accordingly.
Return & reallocate excess funds	Countries may require more frequent returns of excess funds and more prompt reallocations of these funds to the underfunded to increase the allocative efficiency and prevent the misappropriation of funds.	Reallocation process may be created to account for changing provider needs. Excess funds may be returned in a mechanism for declined funds.	Reallocation process may be created.	Return & reallocation may be prompt and adequately overseen, consistent with Ontario OAG's recommendation.
Audit	Countries may conduct both financial & performance audits investigating compliance, efficiency, and effectiveness of emergency funds, and establish accountability mechanisms.	Alongside the Congress GAO, audit reports of PRF may be issued timely. Recipients may also conduct quarterly internal audits of received PRF alongside HRSA.	Audits at both national and local levels may be conducted.	We expect other provincial OAGs will release audit reports similar to Ontario OAG. We recommend the federal health authority Health Canada conduct such internal audits or Parliament conduct such audits.

Source: Prepared by authors. Notes: The table presents recommendations for all seven steps for the US, UK, and Canada. "None" indicates a recommendation for the corresponding allocation step was not necessary and that the process implemented adequately contributed to allocative efficiency, transparency, and accountability of emergency funds. "PRF" denotes Provider Relief Fund. "DHHS" denotes the US Department of Health and Human Services. "HRSA" indicates Health Resources and Services Administration. "DHSC" is the Department of Health and Social Care. "IT" is information technology. "GAO" is the US Government Accountability Office. "OAG" is the Office of the Auditor General of Ontario.

4.4. Reporting

Reporting use of the funds was required in the US and UK but not in Canada [29,32]. US recipients must report unused PRF funds and interest earned on funds. Recipients of a specific amount or more must report in greater detail [29]. Yet, the online reporting portal has not been implemented in a timely fashion [30]. In contrast, the UK required monthly reporting from recipients [32], holding both healthcare administrators and government officials accountable through its unitary fiscal system distinct from the US and Canada's fiscal federalism [47].

The IMF recommends digital solutions to increase fiscal transparency and accountability [3,49]. We further recommend an inexpensive real-time accounting and reporting system. Alongside Ontario OAG's report [39], we recommend that Canadian recipients comply with provincial reporting requirements and deadlines and that US DHHS launch the reporting portal immediately.

4.5. Re-evaluation of changing health production needs

Re-evaluation of the health sector's changing production needs, given the fast-evolving COVID-19 pandemic, was only established in the UK [32]. However, Ontario Canada used IT to help local governments and employers procure medical necessities and labor [41,42]. Information technology facilitated reevaluating and matching health production needs and supply in a decentralized way, thus enhancing the allocative efficiency of the emergency funds. Similarly, the UK national health authority monitored healthcare facilities' weekly capacity trackers to re-evaluate their production needs and updated allocation ratios accordingly [32]. Therefore, we recommend that the US initiate the aforementioned reporting system to re-evaluate recipients' health production needs frequently.

4.6. Return and reallocation of funds

Return of unused or declined funds was outlined in the US and UK but not in Canada. Reallocation of returned funds from the overfunded to the underfunded was not indicated in all three countries [28,32]. US recipients must return unused funds after June 2021 by a date yet to be determined. Potentially remote deadlines can delay returns, jeopardize allocative efficiency, and risk misappropriation of funds. Similarly, UK recipients were expected to spend all funds by March 2021 and justify unused funds afterwards.

We recommend that countries require more frequent return and reallocation of excess funds to the underfunded to increase the allocative efficiency and prevent the misappropriation of funds; noncompliance will result in exclusion from future funds or even civil monetary penalties. We particularly recommend Canadian provinces utilize established IT to oversee return and reallocation behaviors of recipients.

4.7. Audit

Financial audits of COVID-19 health sector emergency funds were roughly described by the US but not the UK and Canada. The US federal government required PRF recipients of a certain dollar amount or more to accept internal and single audits without a specified timeline [29]. Whereas the UK national government required local governments to maintain adequate audit trails for all grants in general [35], and local governments stated no intention to audit COVID-19 grants in particular [32].

We recommend that countries conduct both financial and performance audits. Financial audits should investigate compliance: Did the US DHHS's allocations violate appropriation laws [22–24]?

Did the recipients' use of the funds adhere to DHHS's grant conditions [29]? Did the Canadian provincial matching funds fulfill the SRA agreement [39]? Did the British allocation ratios follow the ASCAP guideline [35]? Performance audits evaluate efficiency and effectiveness: How allocatively efficient were the health sector emergency funds in meeting public needs and effective in achieving population health outcomes? We recommend countries establish accountability mechanisms (Fig. 3): 1) assign accountability for spending and for outcomes to both legal persons (e.g., governments, entities) and natural persons (e.g., governors, corporate representatives); 2) conduct frequent and regular, internal and external, single and comprehensive audits; 3) require granting agencies to convert low-performance programs (e.g., US PRF general distribution) to high-performance programs (e.g., targeted distribution) and penalize persons accountable for fund misappropriation, abuse, and fraud to protect taxpayer interests.

4.8. Recommend systematic practice guideline

Taken together, we recommend countries establish a systematic practice guideline, which has been lacking, for the COVID-19 health sector emergency funds (Table 3). First, granting agencies refine eligibility criteria to ensure shared accountability among healthcare administrators, and government health and finance officials. Second, granting agencies redesign allocation rules to expand the basis from population sizes for public health to COVID-19 cases and admissions for healthcare providers' COVID-19 production needs, rather than providers' historical sales or capital gains. Third, the granting agency (e.g., US DHHS) and grant recipients use a separate inexpensive real-time accounting and reporting system. This is an inexpensive add-on to the agency's existing website and is a simplified income statement of the COVID-19 health sector emergency funds only, which generates more recipient compliance; funds allocated to non-compliant recipients will be decreased, suspended, or retrieved. Fourth, using this information system, granting agencies frequently re-evaluate providers' changing production needs and adjust grant allocations. Fifth, granting agencies promptly reallocate excess funds from the overfunded to the underfunded. Sixth, countries use accountability mechanisms to conduct both financial and performance audits.

4.9. Recommend financial information system

Consistent with IMF's suggestion for digital solutions [3,44,49], we recommend the granting agency (e.g., US DHHS) establish this separate inexpensive real-time grant information system that extends from the agency to end recipients nationwide. From the agency's perspective, this system is a simplified electronic income statement of the COVID-19 health sector emergency funds only, using consistent accounting practices [55] to record a minimal number of variables: 1) revenue received from appropriation laws; 2) expenses allocated to end recipients; 3) expenses of end recipients on items to produce services for COVID-19 cases; 4) COVID-19 cases. From the agency's perspective, grant allocations are expenses that are spent by end recipients to produce COVID-19 related health services. Although recipients view the grants as revenues, similar to insurance reimbursements, only the agency's "expenses" are taken into account and recorded. The correspondence between revenues and expenses of grants from the national/federal government to end recipients provides real-time money trails for audits, prevents leakage, and bolsters allocative efficiency and accountability for spending the grants.

This electronic income statement of federal emergency funds allocated to the health sector allows frequent account settlement for each phase to reallocate funds to underfunded recipients efficiently. It also produces final accounts that conclude which

recipients were ultimately overfunded and must return those tax dollars. This financial information system is a cost-beneficial add-on to the granting agency's existing webpage and can be used in the future to provide assistance for epidemics and public health emergencies that occur more frequently than pandemics. Although establishing this real-time information system would require publications in the federal register for public comments, which would have delayed funding in an emergency and is no longer feasible for COVID-19 grants because 2020 data on hospital expenses are still unavailable as of this writing, it should be in place for future emergencies and pandemics.

4.10. Strengths and limitations of our analysis and future research

This article provides a detailed analysis of the public financial management of COVID-19 health sector responses in three English-speaking countries. Very few academic peer-reviewed articles have been developed in this field. This analysis provides interesting lessons for refining emergency financial management procedures in and for the health sectors beyond the reviewed countries. This study, however, has limitations. First, it was impossible to capture all relevant documents in the literature search and to account for all contextual factors influencing decision-making processes in country comparative studies like ours. Second, our findings mainly came from analyzing government documents. Although certain health economists and government officials in the US and Canada who were familiar with the UK health system reviewed and validated our findings, these informants were from a convenience sample rather than a randomly selected or representative sample.

Future research may provide evidence to strengthen our recommendations in the following directions. Continuous monitoring government documents and updating policy analysis results are needed. Selected steps in the recommended systematic practice guideline may be implemented as a small-scale pilot study to evaluate their effects on improving the performance of health sector emergency funds. Moreover, key informant consultations are needed to further elicit PFM practice information about these funds. This requires research funding for well-designed qualitative interview studies with a sound sample strategy that generates a representative sample of key stakeholders in governments, health sectors, and policy areas. Furthermore, we found very few academic articles like ours in the literature search, possibly due to the lack of PFM education and expertise in the health sector. Collaboration between finance and health experts is urgently needed in health policy research and practice. Finally, similar country-specific studies could be conducted individually by academic experts and government officials, who then collaborate for country comparisons through international organizations that are specialized in fiscal and health affairs, such as the IMF, the World Bank, and the World Health Organization.

5. Conclusions

The US, UK, and Canada responded to the COVID-19 pandemic with \$3.1 trillion USD total emergency funds in 2020, of which \$277.7 billion USD were spent on their health sectors. Using our expanded public financial management (PFM) framework, we found that the UK featured more allocative efficiency, transparency, and accountability than the US and Canada because of its unitary, rather than federal, fiscal system. We also found that the US and Canada lacked a systematic practice guideline for executing COVID-19 health sector emergency funds and that the US used inappropriate bases for allocations, lacking compliance with its appropriation laws. Our comparative study contributes to raising taxpayer concerns about allocative inefficiency that wasted

scarce fiscal resources and about weak accountability for spending COVID-19 health sector emergency funds. Our purpose is to help governments better respond to public needs and preferences during pandemics and implement measures specific to infectious disease control and care for the public good, rather than for the private interest (e.g., US PRF compensation for hospitals' capital losses). Our pioneering framework serves as a stepping-stone for countries to establish a systematic practice guideline and an inexpensive real-time information system for emergency funds in order to enhance the allocative efficiency, transparency, and accountability for executing future emergency funds.

Declarations of Competing Interest

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.healthpol.2022.03.012](https://doi.org/10.1016/j.healthpol.2022.03.012).

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