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Illustrating the impact of commercial determinants of health on the global COVID-19 pandemic: Thematic analysis of 16 country case studies

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ABSTRACT

Previous research on commercial determinants of health has primarily focused on their impact on non-communicable diseases. However, they also impact on infectious diseases and on the broader preconditions for health. We describe, through case studies in 16 countries, how commercial determinants of health were visible during the COVID-19 pandemic, and how they may have influenced national responses and health outcomes. We use a comparative qualitative case study design in selected low- middle- and high-income countries that performed differently in COVID-19 health outcomes, and for which we had country experts to lead local analysis. We created a data collection framework and developed detailed case studies, including extensive grey and peer-reviewed literature. Themes were identified and explored using iterative rapid literature reviews. We found evidence of the influence of commercial determinants of health in the spread of COVID-19. This occurred through working conditions that exacerbated spread, including precarious, low-paid employment, use of migrant workers, procurement practices that limited the availability of protective goods and services such as personal protective equipment, and commercial actors lobbying against public health measures. Commercial determinants also influenced health outcomes by influencing vaccine availability and the health system response to COVID-19. Our findings contribute to determining the appropriate role of governments in governing for health, wellbeing, and equity, and regulating and addressing negative commercial determinants of health.

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1. Background

The 'commercial determinants of health' framework describes the ways that for-profit actors, through their activities and in pursuit of their interests, contribute to shaping the health of populations and the social and economic structures that they act within [1–4]. While commercial actors can make a positive contribution to health, for example by providing decent employment (and thus income), paying taxes, and creating and developing health-promoting products, such as medicines, they can also harm health. It is, however, difficult for those responsible for protecting and promoting public health to counter these harms because of the large power asymmetry, with some transnational corporations having wealth that far exceeds many nations [5–9]. Particularly in countries with neoliberal approaches to public policy, there is great concern about the undue influence of commercial actors. Many have extensive access to decision-making processes and can thus shape public policy to serve their interests, in some cases capturing what were once core functions of the state [10–12]. These once private functions that have been privatised in some countries include care for people in some of the most disadvantaged circumstances in society, such as children removed from their families [13], and asylum seekers and refugees [14]. Thus, following Diderichsen, Dahlgren, and Whitehead [15], and Gilmore and colleagues [4], we include the privatisation of previously state-provided services as a critical commercial determinant of health, intertwined as it is with the political interests driving the privatisation, and the potential for detrimental impacts on the health and wellbeing of the population, and on equity [16].

There is now a large body of literature investigating commercial determinants of non-communicable diseases, including creation of unhealthy food environments, in particular affecting children [17], the marketing and sale of unhealthy commodities such as alcohol, tobacco, gambling products, and fossil fuels, and lobbying against greater public health regulations and increased tax on these commodities. Although this literature has paid less attention to infectious diseases [1,18,19] some issues have been investigated. These include the neglect of antimicrobials by pharmaceutical companies and the role of producers of food, iron ore, palm oil, and biofuel crops in the spread of Ebola in West Africa [20,21].

The COVID-19 pandemic provides an opportunity to revisit these issues. Commercial determinants of health may have been a factor in the emergence of COVID-19. There have long been warnings of the risks of catastrophic pandemics caused by intensive agriculture, attendant deforestation and industrial animal farming [22]. Zhang [22] traces the potential origin of COVID-19 in the Huanan Seafood Wholesale Market to market-orientated reforms in China and industrialisation in food production, drawing parallels with the emergence of SARS in 2003. Thoradeniya and Jayasinghe [23] include corporate interests and neoliberal capitalism as two drivers of the context in which COVID-19 emerged, exacerbating deforestation and climate change, disrupting biodiversity, and accelerating industrialised animal factory farms. The United Nations argues that "deforestation, and habitat encroachment are primary pathways of transmission for emerging infectious diseases, including COVID-19" [24] and commercial interests are major drivers of deforestation and habitat encroachment [25].

The role of political and social determinants of health in the magnitude of COVID-19 cases and deaths is now clear [26]. Countries whose governments were able to act rapidly and decisively, which had created socially and racially inclusive societies, and which had established strong social welfare safety nets, achieved better outcomes [26,27]. Evidence from many countries highlighted how social inequities on dimensions such as gender, ethnicity, citizenship/migration status, housing, wealth, employment and working conditions, and racism and discrimination explained patterns of disease [26,28–30].

In contrast, relatively little has been written on how commercial determinants of health shaped countries' pandemic discourses, responses and outcomes. Dall'Alba and Rocha [31] provide a brief overview of the situation in Brazil, which saw corporate lobbying to promote ineffective therapies for COVID-19 and to undermine the quality of Brazilian primary health care, focusing instead on hospitals and medicines that offer greater potential for profits with significant cases, particularly in the private health insurance sector. These commercial interests were supported by Federal government strategy [32,33]. Maani and colleagues [34] have articulated some of the commercial determinants of health impacting COVID-19 in the United States. Some were positive, through the development of vaccines (albeit with considerable public funding and while making large profits [35,36]) and contributing to public health responses. Other impacts were negative, notably, commercial activities that have contributed to severe COVID-19 illness risk factors (such as cardiovascular disease, diabetes, and obesity) through the sale and marketing of unhealthy products, privatisation of government services reducing public capacity, and commercial capture of institutions such as the Centers for Disease Control and Prevention [34]. Gilmore and colleagues [4] provide some examples of how commercial determinants affected COVID-19 responses, including political lobbying by unhealthy commodity companies, and pharmaceutical companies' use of intellectual property rights which increased the cost of vaccines and so restricted vaccine access. Barlow and colleagues have also examined how the pandemic impacted on international trade and, thus, on commercial actors, and their responses to it [37] and van Schalkwyk and colleagues have outlined the ways in which these actors may exploit the pandemic and associated recovery [38]. However, no articles were found that provide an overarching consideration of the ways in which different commercial determinants of health impacted COVID-19 outcomes. This paper aims to fill this gap through consideration of 16 country case studies.

Our research question was 'what evidence is there for the different ways commercial determinants of health impacted on countries' COVID-19 outcomes?

2. Methods

This research followed a comparative qualitative case study design [39], analysing 16 case study countries (see Table 1). This design was chosen to allow detailed understanding of the complexity of factors that would have interacted to determine COVID-19 outcomes in each country, taking into account its specific historical, geographic, and political context, characteristics over which researchers had no control [39]. We also saw the empirical findings for the case studies as an opportunity to elaborate theory [40]. We know generally about the ways commercial determinants of health may positively or negatively influence health outcomes [5,7,18]; through these case studies we sought to provide detailed understanding of the different ways commercial determinants affected COVID-19 outcomes.

In selecting countries, we drew from those in the top and bottom quartiles in terms of cumulative excess deaths per 100,000. We used cumulative excess deaths attributable to COVID-19 from the Global Burden of Disease [41] compiled as of July 2021 and reviewed with updated data in December 2021 (resulting in one change to selected countries). We sought a spread of low-, middle-, and high-income countries. This is important as Mialon [42] notes that most literature on the commercial determinants of health is from high income countries. Additional criteria were pragmatic: data availability and having a country expert in the research team's network who we could invite to contribute to the analysis for their country. In most cases, these experts were academic or policy researchers, who were residents and/or citizens of the case study country.

Firstly, the research team created a data collection template for each country informed by insights from the literature on COVID-19 outcomes (see Supplementary material). The template included questions on private and public health sector performance, system weaknesses revealed during the pandemic, considerations of equity, political leadership, and important contextual factors.

Table 1
Case study countries' COVID-19 outcomes (deaths, cases, vaccine coverage) in 2021 and 2022.

	Income	Cumulative Excess deaths per 100,000 January 2021	Cumulative Excess deaths per 100,000 January 2022	Cumulative reported deaths per million January 2021	Cumulative reported deaths per million January 2022	Cumulative cases per million January 2021	Cumulative cases per million January 2022	Vaccine coverage July 2021	Vaccine coverage Jan 2022
Australia	High	3.73 (3.72–3.73)	15.55 (15.54–15.55)	35.25	148.71	1117.49	100,060.66	14.99% 2 dose 32.36% 1 dose	78.37% 2 dose 84.08% 1 dose
Ethiopia	Low	49.83 (31.59–76.52)	174.24 (110.44–267.54)	17.76	62.24	1167.75	3946.16	N/A[1]	N/A[1]
New Zealand	High	0.74 (0.73–0.74)	1.60 (1.6–1.6)	4.88	10.34	449.45	3242.1	14.36% 2 dose 22.43% 1 dose	76.59% 2 dose 81.40% 1 dose
Nigeria	Low	40.95 (28.01–55.93)	78.95 (54–107.83)	7.50	14.83	620.82	1197.64	0.67% 2 dose 1.21% 1 dose	2.58% 2 dose 7.02% 1 dose
Taiwan	High	0.08 (0.08–0.08)	3.7 (3.7–3.7)	0.34	35.67	38.18	787.51	1.60% 2 dose 32.31% 1 dose	73.11% 2 dose 80.02% 1 dose
South Korea	High	2.77 (2.68–3.59)	13.12 (12.7–17.02)	27.77	131.99	1530.22	16,841.22	14.23% 2 dose 37.83% 1 dose	85.86% 2 dose 87.12% 1 dose
Thailand	Upper Middle	0.17 (0.14–0.21)	44.7 (35.06–56.29)	1.10	317.15	268.5	34,995.49	5.51% 2 dose 19.50% 1 dose	69.64% 2 dose 74.89% 1 dose
Vietnam	Lower Middle	0.14 (0.09–0.19)	75.53 (49.15–110.04)	0.36	384.82	18.51	23,181.77	0.60% 2 dose 5.44% 1 dose	75.57% 2 dose 80.55% 1 dose
Belgium	High	199.19 (186.16–235.42)	272.28 (254.47–321.76)	1813.22	2497.52	61,049.92	271,247.28	59.00% 2 dose 69.57% 1 dose	76.35% 2 dose 78.72% 1 dose
Brazil	Upper Middle	123.62 (111.6–144.92)	339.45 (308.28–396.04)	1049.79	2932.75	43,031.79	118,992.1	19.21% 2 dose 48.82% 1 dose	70.06% 2 dose 79.59% 1 dose
India	Lower Middle	85.12 (66.9–105.82)	254.87 (199.77–316.79)	110.8	356.13	7720.35	29,761.18	7.30% 2 dose 25.82% 1 dose	50.95% 2 dose 67.68% 1 dose
Peru	Upper Middle	459.80 (346.87–607.81)	900.83 (679.57–1190.81)	3111.86	6160.33	34,120.47	96,656.55	15.62% 2 dose 24.40% 1 dose	68.82% 2 dose 77.24% 1 dose
South Africa	Upper Middle	226.62 (175.49–297.77)	487.39 (377.34–640.26)	735.55	1583.78	24,212.4	60,045.01	4.72% 2 dose 9.86% 1 dose	27.69% 2 dose 32.66% 1 dose
Spain	High	230.18 (204.34–264.16)	344.82 (305.85–394.5)	1247.59	1994.32	58,682.35	213,096.76	57.62% 2 dose 68.14% 1 dose	81.92% 2 dose 87.53% 1 dose
United Kingdom (UK)	High	184.61 (183.4–186.94)	268.94 (266.98–272.63)	1557.61	2285.45	56,017.78	254,483.27	55.87% 2 dose 68.58% 1 dose	71.02% 2 dose 76.77% 1 dose
United States of America (US)	High	173.65 (154.18–200.02	342.50 (303.62–394.47)	1346.91	2673.81	79,115.81	225,564.83	51.14% 2 dose 57.83% 1 dose	64.22% 2 dose 75.53% 1 dose

Sources: Global Burden of Disease Study. COVID-19 projections: Cumulative deaths. Institute for Health Metrics and Evaluation; 2022 [29 March 2022]; Available from: https://covid19.healthdata.org/global?view=cumulative-deaths&tab=trend; Our World in Data. Cumulative confirmed deaths per million; 2022 [29 March 2022] Available from: https://ourworldindata.org/covid-deaths; Our World in Data. Cumulative confirmed cases per million; 2022 [29 March 2022] Available from: https://ourworldindata.org/covid-cases; Our World in Data. Vaccine coverage; 2022 [29 March 2022] Available from: https://ourworldindata.org/covid-vaccinations.

[1] Our World in Data COVID vaccinations data not available for Ethiopia. COVAX data (https://covidvax.live/location/eth) estimates that as of 31 July 2021, 2217,097 vaccine doses had been administered, enough for one dose for 1.88% of the Ethiopian population. As of 31 January 2002, 10,975,026 vaccine doses had been administered, enough for one dose for 9.31% of the population.

Secondly, the country experts and research team then collaborated to create a detailed case study, including extensive grey and peer-reviewed literature from each country, to find available evidence corresponding to each section of the template. The literature examined included: academic articles and books; government reports and websites; reports by non-government and international institutions; and media such as online newspaper articles. Having country experts allowed inclusion of local literature that was not in English. Non peer-reviewed literature was included because of the rapidly changing nature of the pandemic, and to understand local political and civil society viewpoints usually not included in academic literature. In addition, our data collection framework focused on issues such as political, civil society, and equity considerations because these were less researched in the peer review literature. The need to respond to each country's context and salient issues meant an overly structured approach would not be useful. Instead, a broad data collection template was used, and the approach and goals of the data collection were discussed with each country lead. This led to the production of rich and deeply knowledgeable case studies of each country. Drafts were developed iteratively with feedback from the central research team. The case studies covered the period from the start of the pandemic (January 2020) through to March 2022, when they were completed.

Thirdly, from these case studies, the research team identified commercial determinants of health as a clear, central concern in understanding experiences and outcomes of the COVID-19 pandemic. Our analysis of commercial determinants was guided by Freudenberg et al.'s [18] commercial determinants of health framework. This framework highlights the need to look at both the structures (including the political and economic system, social stratification, organisation of structures and relations, governance, and norms) that shape the influence, power, and practices of commercial actors (including market-orientated practices such as supply chain management, product design, and pricing, and policy- and political-orientated practices such as lobbying and philanthropy), and how commercial determinants affect health. Freudenberg and colleagues [18] identify market-orientated practices, such as the promotion of unhealthy commodities, tax contributions by corporations, and policy- and political-orientated practices, such as lobbying governments. Wherever there was evidence of commercial market-orientated and policy- and political-orientated practices, or the social structures that shaped commercial activities, these data were coded for inclusion by the lead author, who led the analysis of commercial determinants themes, identifying themes that grouped findings across case studies. These themes were further workshopped and reviewed by co-authors, with alternative explanations discussed and additional considerations added.

Lastly, we conducted iterative rapid literature searches (of Web of Science and Google Scholar, in June-August 2022) pertaining to COVID-19 to ascertain the extent of broader evidence for our commercial determinant themes in the literature.

3. Results

Below we highlight the high-level themes we identified from the comparative analysis of the country accounts, structured according to Freudenberg and colleague's framework [18].

3.1. Structural influences on commercial determinants of health

3.1.1. Political and economic system

As indicated by the framework, it was essential to interrogate the distinct historical and political economy of each country. For example, Nigeria had inherited a colonial legacy [43] in which "In essence, the Nigerian people and their land were imagined not as people with rights to exist and function as a community or even nations. They were imagined as corporate money making entities whose bodies were enslaved and lands plundered" [44]. This was seen as framing the evidence related to privatisation and corporate power in the Nigerian case study. The role of the private sector in Nigeria's response is exemplified by the government and the Nigeria Centre for Disease Control partnering through the Coalition Against Covid-19 with Nestle, KPMG, PWC, and several banks [45]. The South African case study documented widespread corruption under President Zuma [46], which set the stage for failures of procurement of COVID-19 personal protective equipment (PPE), including the assassination of a health department whistle-blower [47]. The heavily pro-business stance of leaders in countries such as the US, UK, and Australia also shaped government COVID-19 responses. The fraught political status of Taiwan, contested by its much larger neighbour China, was also central to understanding the challenges it faced in obtaining vaccines [48]. Thirty years of underinvestment in public systems for health, education, and social protection was noted as creating vulnerabilities in Peru that meant the effects of COVID-19 were severe, particularly for people experiencing disadvantage and marginalisation [49,50]. In contrast, the Vietnam case study noted that the one party communist government allowed a strong, co-ordinated, immediate response to the COVID-19 pandemic that emphasised population health over competing economic interests [51, 52].

3.1.2. Stratification

The most prominent theme relating to stratification we identified was how working conditions driven by commercial interests affected COVID-19 spread and risk. Across the globe, precarious and lower paid essential workers faced greater infection risk [53] as well as being more susceptible to the economic fallout of job losses [54]. Some workplaces were found to be especially problematic. For example, in South Korea, outbreaks in a call centre and a warehouse highlighted poor working environments, with poor ventilation, poor disinfection measures, and no capacity for social distancing [55,56]. Informal employment brings particular vulnerabilities [57]. Our Vietnamese case study noted widespread informal employment, where workers do not have access to paid leave, or recourse to claim government support. Undocumented workers in the US and in Brazil faced similar challenges [58,59].

Foreign born workers have also been found to have higher infection risk, identified as a critical issue in the case studies from Taiwan, Thailand, and South Korea [58,60–62]. Migrant workers are more likely to have precarious and/or informal work, low skilled work that is not amenable to remote working, and care work that puts in them at high occupational risk of contracting COVID-19, as well as potentially poorer access to health care [60,61]. Overcrowded accommodation for migrant workers was reported in India, and across Europe [58]. In India, the stringent, abruptly imposed lockdown measures stranded millions of migrant workers far from family support [63]. While corporations employing these workers were compensated in many ways for their losses, the tremendous loss in earnings and the sufferings and death of the migrant workers received very meagre or no compensation.

In all these cases, shortcomings can be seen as at least partly driven by the private sector being driven to maximise profits and reduce costs, especially for labour where short-term savings are easiest. In this way, the private sector has externalised costs of their working practices to society and to governments, in terms of COVID-19 infections, and government responsibility to support the private sector during the pandemic. Commercial actors that had long argued that the role of the state should be minimal turned to it when their interests were threatened.

In contrast, the South African Department of Labour and Employment was proactive in attempting to regulate and protect working populations [64], demonstrating how a state-led response could use public funds to address unemployment and adversely impacted working conditions.

3.1.3. Organisation/Governance

The key theme relating to organisation and governance was how the

procurement of vaccines and other COVID-19 response goods and services were governed and organised.

3.1.3.1. Vaccination procurement. Much has been written about global COVID-19 vaccine inequities [65,66]. Several of our case study countries experienced difficulties in procuring COVID-19 Vaccines. In Nigeria, the 4 million vaccines received through the COVID-19 Vaccines Global Access (COVAX) scheme as of July 2021 covered less than 2% of the population [67]. Globally, COVAX failed to meet half its 2021 target of 2 billion doses [36,68]. COVAX has been criticised for avoiding sharing power amongst members, unduly depending on private philanthropy such as the Bill and Melinda Gates Foundation, socialising corporate risk at a time when pharmaceutical companies are posting large profits, and for allowing richer countries to gain more beneficial terms while poorer countries remained reliant on aid [69]. Oxfam International has noted that Pfizer, BioNTech and Moderna were making $1000 profit every second towards the end of 2021 while the world's poorest countries remained largely unvaccinated [70].

In the US case study, it was argued that even though Pfizer and Moderna vaccines – the two most commonly used vaccines globally [71] - were developed by the private sector, the discovery, development, testing, and production of COVID-19 vaccines had been largely paid for using public money [35,36]. Wouters and colleagues [72] have tabulated how much public and non-profit funding the leading vaccine candidates have had. Despite this, most patents for COVID-19 vaccines are owned by private companies. Pfizer and Moderna were estimated to have made US$41 billion profit (above production costs) on vaccines sold to governments as of July 2021 [73]. The cost of production of two doses of COVID-19 vaccines is estimated as low as US$2.40 per person [for two doses, 73], yet the US government purchased Pfizer vaccines at $39 per two doses, and Moderna vaccines at $30 per two doses [35]. An attempt to allow countries to manufacture their own vaccines, using a Trade-Related Aspects of Intellectual Property Rights (TRIPS) waiver, stalled for almost two years because of failure to garner enough countries support at the World Trade Organization, where it was blocked by the EU, UK, and Switzerland [36,68]. The extent of the pharmaceutical industry's lobbying and threats to these countries has been documented [74]. A weaker version of the initial proposal eventually passed in July 2022 despite heavy opposition from the pharmaceutical industry [75].

The speed, lack of transparency, and process of vaccine procurement was also heavily criticised in several case studies, including South Korea, Peru, Brazil and Australia, where the slow response of the government led to the term 'vaccine strollout' [76]. For some countries, this was exacerbated by very powerful pharmaceutical company interests. In South Africa, vaccines were largely procured from Pfizer and Johnson and Johnson, for USD$10 per dose [77]. Once again we saw the privatisation of profit and socialisation of risk [78] as both involved transfer of risk from manufacturers to governments. The Pfizer deal was subject to indemnity and no-fault compensation requirements [77], and the Johnson & Johnson deal was subject to a government compensation fund that would indemnify Johnson & Johnson for any vaccine-related injuries [79], and the company receiving a letter from the government endorsing the local investment the company had made in Aspen Pharmaceuticals [80]. In Brazil, Federal Government hesitancy delayed vaccination rollout, however a decades-old public immunization program and state-owned pharmaceutical laboratories were key to catching up with other countries [81]. In Peru, there was a scandal involving almost 500 elites, including the President, Health Minister and a congressman receiving early access to a COVID-19 vaccine from a university conducting clinical trials [82], highlighting further potential for corruption.

The U.S. government's vaccine donation to South Korea after the Korea-U.S. summit in May 2021 is hard to explain other that in the context of the long-standing political and economic alliance between the two countries, given the U.S. government's previous stance to prioritise vaccine donation to neighbouring countries such as Canada and Mexico, and the other QUAD countries (Australia, India, and Japan). During the summit, South Korean semiconductor (Samsung), battery (LG and SK), and automobile (Hyundai) companies announced their commitment to invest in the U.S., and the U.S. government reciprocated by donating vaccines to South Korea [83]. The South Korean government was finally able to defend itself against "vaccine procurement failure" attacks from the right-wing opposition party and the right-wing news media, but this undermined the public perception of the necessity of the TRIPS waiver and legitimised the South Korean government's position of not supporting it [83].

3.1.3.2. COVID-19 response goods and services. As well as vaccinations, the public health response to COVID-19 required a range of goods and services, including PPE, laboratory testing, rapid antigen tests, face masks, quarantine facilities, and contact tracing. In some countries the public sector played a major role, with notable examples including Vietnam [84], Taiwan and South Korea [85], where the state had a monopoly on N95 and surgical masks [though this did involve private masque production companies, [86]. This allowed the government to support universal access to masks, and to ration and prioritise masks for health services when needed.

In other countries, initial attempts to engage the private sector faltered. For example, in India, COVID-19 testing and vaccination were primarily provided by the public sector [87,88] after an initial attempt to shift the task of vaccinating those aged under 60 to the private sector, later blocked following a Supreme Court ruling accompanied by widespread public protest. The converse happened in South Africa, where because of resource inequities between private and public health care [in South Africa, the private health sector consumes 50% of health spending to serve 15% of the population, 89], COVID-19 testing per population was 4.8 times higher in the private sector in South Africa compared to the public sector [90]. This was reported to be due in part to intellectual property barriers that limited access by national laboratories to test materials at key points in the pandemic [89].

The UK has come under considerable scrutiny for outsourcing key COVID-19 public health responsibilities to private companies, with poor results, and a series of procurement scandals [91,92]. A preferred provider fast track list allowed the government to bypass the usual procurement regulations, and it is alleged that one parliamentarian received £29 m from a company in which her family had an interest [92]. Mobile testing centres were outsourced to security company G4S, but reports noted how they frequently failed to turn up when needed [93]. Contact tracing was replaced with a privately run tracing system that has been heavily criticised [94], and has performed particularly badly in more disadvantaged areas [95]. The UK government issued a "ventilator challenge" that saw a failed attempt to engage an inexperienced private company to manufacture ventilators [96]. This was in contrast to a ventilator project launched by the South African Department of Trade and Industry led by a national science agency which successfully stewarded private sector support to produce ventilators - a public-private collaboration led by a state-funded research institution [97]. amongst other expensive UK contracting failures, a Chinese company sold antibody tests to the UK government that didn't work [98], and a Turkish company sold PPE to the UK government, but only delivered 10% of the order, and that 10% failed to meet required standards [99].

In Australia and in some other countries, quarantine was outsourced to the private hotel sector rather than purpose-built facilities, and security to enforce quarantine was outsourced to private security companies. This was heavily criticised when outbreaks occurred in these facilities [100]. In the Australian state of Victoria, these failures led to 22 breaches, resulting in hundreds of deaths, and eight lockdowns [101]. In Belgium, the outsourcing of contact tracing to private call centres became controversial when one of the call centres allegedly defrauded

the government agency by diverting some staff onto other projects [102].

3.2. Actor influences on commercial determinants of health

Freudenberg and colleagues split actor influences up into market-orientated practices and policy and political-orientated practices.

3.2.1. Market-orientated practices

We observed market-orientated practices in privatisation in the health sector, and emerging concerns around private aged care and prisons.

3.2.1.1. Privatisation in the health sector. The health sector has an obvious role in a country's response to COVID-19. While the public health sector response is largely under the control of governments, the private sector will require appropriate incentives to contribute to a public health emergency and is, inherently, more difficult to influence. In Vietnam, the private health sector had limited engagement with the response to COVID-19, with commentators expressing frustration at being unable to mobilise it [103]. In Nigeria, government encouragement of the private health sector - in part driven by externally imposed structural adjustment programs [104,105] - has left private providers delivering approximately 60% of health services in the country. This meant that access to health care was highly dependant on socioeconomic status, with poorer people accessing unlicensed, unregulated low fee commercial health providers [104]. A myriad of shortcomings were identified in the Nigerian private sector's COVID-19 response, including failure to apply relevant medical protocols and standards, and COVID-19 testing using expired reagents [104].

In Thailand, the public sector has a dominant role in health service provision and financing, with full geographical coverage of primary health care coverage and a goal of Universal Health Coverage [106]. This supported broad access to COVID-19 related services, including for migrant workers [107]. The government applied the same terms, conditions, and payment rates to public and private sectors for providing pandemic services and imposed stringent auditing measures to prevent fraud [107].

When COVID-19 hit in India, private hospitals largely abandoned health care provision for the first few months, and when they resumed, they initially would turn away COVID-19 patients. There was evidence of price gouging (where excessively high prices are charged when demand increases), increasing profits and inappropriate care [87,108]. Attempts to contract or regulate the private sector failed, and the Indian government had to rely on the public health sector in their COVID-19 response [87,108].

Williams, Yung, and Grépin [105] reported how, in low and middle income countries, private providers faced a liquidity crisis, which caused failures of provision and led to unethical behaviour such as the price gouging, and the refusal to admit and treat COVID-19 patients seen in the Indian case study. Our case studies indicated that in high income countries such as New Zealand, Australia, Taiwan, and South Korea, the private health systems have also played a very limited role in the pandemic response. In the US, the private model of primary care proved extremely vulnerable to the reduction in routine care [109]. In the cases of New Zealand and Taiwan, universal health care and the rapid, comprehensive government and community responses meant that the public health system was able to cope with the relatively low level of COVID cases [110,111].

Assa and Calderon's [112] analysis of 147 countries found that health sector privatisation may have undermined countries' responses to COVID-19: controlling for country income and other covariates, countries with greater private health expenditure had more COVID-19 cases and deaths (with a 10% increase in private health expenditure associated with a 4.3% increase in cases and 4.9% increase in mortality). They argued that privatisation in the health sector undermined a country's long-term pandemic preparedness.

The private health sector in the United States raised particular challenges during the pandemic because of the prominent role of employer-provided health insurance [113]. More than 20 million people in the United States lost their job during the pandemic [113,114]. This resulted in over 10 million people losing their health insurance coverage [inclusive of people who lost their jobs and their dependents, 114]. Others regained insurance coverage through Medicaid, the Affordable Care Act, or self-paid insurance coverage [115] – thus these alternative coverage plans were either publicly funded or paid for from peoples' savings.

There were two areas with little current evidence of the influence of commercial determinants of health but which warrant concern for the future. These have particular relevance for high income countries: privatisation of aged care and prison facilities.

3.2.1.2. Aged care. COVID-19 outbreaks in aged care institutions were a global phenomenon, caused by the mix of the age and characteristics of residents, and the higher risk environment of institutional settings, often exacerbated by insufficient resourcing and staffing [116–118]. Failures and subsequent outbreaks in aged care facilities were particularly noted in our Spanish and Belgian case studies, consistent with reports by Medicine Sans Frontier [119]. In Spain, 43% of all deaths in the two first waves occurred in aged care homes [120], which had poor infection control and preparedness [119]. In Belgium, where almost two thirds of deaths in the first wave were in aged care [121], the sector was found to be underprepared, with shortfalls of PPE and disinfectants, and only a 60% adherence with isolating COVID-19 positive patients [121]. Belgium has a mix of public, private, and not-for-profit aged care facilities, but no difference in COVID-19 infection rates was found between these different types of facilities [121,122].

Other studies in the US have also failed to find any differences in COVID-19 outcomes between public, private, and not-for-profit aged care homes [123]. However, Armstrong and colleagues [124] raise several concerns about privatised aged care in regards to COVID-19: that it shifted decision-making power to private companies, who are afforded secrecy on commercial competition grounds; that they have been found in general to provide lower quality care than public aged care in the US and UK; and that staff in private aged care have lower pay and higher precarity, which increases the risk that they will be a vector for COVID-19 infection into nursing homes. In Australia, which also had a high number of deaths in aged care, especially in Victoria, weaknesses were identified particularly in privatised aged care [125]. COVID-19 outbreaks in that state were found to be more likely in private aged care than public facilities [126]. Residential care in the UK, increasingly dominated by private equity with complex business models in which care homes are, in effect, a means of monetarising vulnerable people with profits accruing in tax havens, were especially hard hit [127].

3.2.1.3. Prisons. COVID-19 outbreaks in prisons have been a significant health concern in many countries [128], the close quarters confinement representing a high transmission risk [128,129]. COVID-19 in prisons was raised in two of our case studies – Thailand and Australia, but there are reports of COVID-19 outbreaks in prisons in China [130], African countries [131], and the US [128,129]. This becomes a commercial determinant of health when the extent of privatisation of prisons is considered. The US relies extensively on private prisons [132,133], even though for-profit prisons have many flaws, including poorer prisoner safety [133], and there were many shortcomings throughout both the private and public the US prison sector COVID-19 response [129,134]. Similarly, the UK, which has a substantial proportion of private prisons [135], faced criticism over their COVID-19 handling [134]. Australia has one of the highest proportions of prisoners incarcerated in private facilities in the world [136]. Payne and Hanley [136] provided an

example of an outbreak in an Australian private prison, and raised concerns about how little influence governments can have over the COVID-19 response of private prisons.

3.2.2. Policy and political-orientated practices

Commercial actors can have considerable political power, and their interests can run counter to public health. In Australia, the government's ongoing management of COVID-19 was subject to extensive commercial lobbying from the business sector, including an open letter calling for lockdowns to end [137]. There was a legal challenge from mining company owner and pro-business politician Clive Palmer to Western Australia's COVID-19 triggered state border closure when the closure threatened Palmer's business operations [138]. In the New Zealand case study, the business sector lobbied, relatively unsuccessfully, to curtail COVID-19 measures recommended by epidemiologists, citing the more permissive Australian regulations. In South Africa, the mining industry lobbied for vaccine priority for their workers based on societal economic benefits, and the tobacco and alcohol industries lobbied against restrictions on their products during lockdowns, spending millions on public marketing campaigns [139]. These examples show the potential for privileging commercial interests over public health.

4. Discussion

It is accepted that social determinants of health exert considerable influence on people's experience of the COVID-19 pandemic and their health outcomes [26,28,29]. We show how central commercial determinants of health have also shaped the course of the pandemic, the government and health system response, and health outcomes.

It is important to distinguish commercial determinants from other social determinants because they require a different set of responses [2]. While governments can invest in positive determinants of health through the provision of resources such as housing and education, addressing the negative impacts of commercial determinants of health requires different approaches. Addressing commercial determinants may require strategies such as regulation of business practices, winding back privatisation, altering financial incentives and subsidies to address commercial practices, civil society activism, and litigation to combat harmful commercial determinants of health [2]. Addressing the commercial determinants necessitates balancing economic considerations and the interests of often powerful commercial actors against the health, equity and wellbeing of the population [140]. The COVID-19 pandemic highlighted the areas of conflict between commercial and public health interests, and there was concern documented in many case studies that governments prioritised commercial interests over population health in some instances. This is despite the finding that countries who fared worse in terms of COVID-19 deaths also fared worse in loss of gross domestic product [141], which suggested that commercial and public health goals ought to have been considered more in alignment rather than in opposition.

We found evidence of the influence of commercial determinants of health in the origin and spread of COVID-19, through; shaping working conditions that influenced workers' risk of contracting and spreading the SARS-CoV-2 virus; affecting the procurement of PPE, rapid antigen tests, and other goods and services that help protect against spread of the virus; and commercial actors lobbying against public health regulations that have the potential to reduce transmission, when those public health regulations threatened profit. The commercial determinants of health also influenced the availability and rollout of vaccines that had the capacity to reduce the severity of illness, and the health system response to the virus, which was complicated in countries with an extensive private health sector, who often failed to engage in the public response to COVID-19, and in some cases instead used it as an opportunity to refuse care to people with COVID-19, and to engage in price gouging for care for COVID-19. Thus, the commercial determinants of health would also have directly influenced the health outcomes of the pandemic in addition to exacerbating the spread of the virus.

We found that there is only mixed evidence on the effects of privatisation of aged care and prisons on the spread of COVID-19. What is known raises important questions about how the pursuit of profit by the companies that run these facilities can be balanced with the health and wellbeing of the residents. If adequate regulation is not put in place, private facilities will remain difficult to mobilise for public health goals, and it will remain a governance challenge to ensure the health and wellbeing of residents, workers, and the broader community are not compromised in the pursuit of profit [124,136]. These findings illustrate the urgent need that Diderichsen, Dahlgren and Whitehead [15] identified of including privatisation as a central concern in the commercial determinants of health, so we can understand better how the introduction of these market forces into previously public spheres affect health and equity.

COVID-19 cases and mortality have been distributed inequitably in the population, along socioeconomic, racial, and other social exclusion lines [26,142]. Our findings show that commercial determinants of health may be one of the contributing factors to this inequity by exacerbating inequities that already affect many groups. For example, we found commercial interests shaping working conditions that were detrimental to the health and safety of low skilled and foreign-born workers, that private prisons may have adversely affected the health of prisoners, and that shortcomings in vaccine availability particularly affected low-income countries. Inequity has to-date received little attention in the commercial determinants of health literature, although there are indications that the effects of commercial determinants on inequities have been recognised without explicitly framing them as commercial determinants [3]. However, it should be noted that manufacturers of harmful commodities, corruption, and procurement failures are explicitly addressed in the evidence review underpinning the work of the Pan-European Commission on Health and Sustainable Development, which is being taken forward by the World Health Organization Regional Office for Europe [143]. Experiences of the pandemic have been heavily gendered, including the way that essential health and care workers are predominantly female. Cohen and van der Meulen Rodgers [144] also argue that in capitalist countries, capitalism has exacerbated these gender inequities during the pandemic.

Our findings show the value in being guided by a framework, in this case Freudenberg et al.'s [18], to ensure different component practices, and, importantly, the societal structures that support the prioritisation and impact of commercial determinants, are examined. The political economy within which the COVID-19 pandemic has played out is vital to understanding the differing economic and commercial forces influencing COVID-19 outcomes in different countries [145]. Bump and colleagues argue that "Internationally, the political economy of COVID-19 reflects global patterns of extraction that were established in colonial times" and our case studies reinforced this [145]. Greater international action is needed to address these longstanding inequities, to ensure future pandemics do not face the same extent of between country inequities in vaccine access and health outcomes.

Within countries, our findings support the argument for more pushback against privatisation in the health system, aged care, prisons, and other sectors, to better safeguard the health and wellbeing of the population. The recurrence of similar negative impacts across the 16 countries suggests that, rather than reflecting a few misbehaving companies, the examples we have presented indicate how the practices of the private sector are influenced by their for-profit motive, and fail to prioritise equity, access, healthy workplace conditions, and worker wellbeing. This means that careful public oversight is needed (such as in the South African case for ventilators, and the Taiwan case for masks) to ensure the outcomes arising from involving the private sector in a public pandemic response are positive and equitable. Renationalising privatised services would allow equity and public good goals to be prioritised and safeguard the rights and wellbeing of residents and recipients of these services. At the very least, improving state oversight and

governance of private services to make them more likely to pursue public good goals is critical. Our analysis also indicates that we need greater advocacy to governments to hold them accountable for governing for health, rather than governing for the profit of commercial actors [146]. Our findings add to calls for stronger regulation of private sector business practices to ensure healthy and just employment practices, including greater requirements on companies to safeguard the health of their workers from infectious diseases. Our findings also add to calls for more equitable vaccine distribution, including addressing the profits private companies have made off vaccinations at the expense of more comprehensive and equitable availability.

5. Limitations

This research looked at the country level to examine the impact of commercial determinants of health. Freudenberg and colleagues [18] also flag the influence of commercial interests on global organisations that are critical to public health such as the World Health Organization and the World Trade Organization, reducing global co-ordination to safeguard population health against commercial determinants. De Lacy-Vawdon, Vandenberg, and Livingstone [12] and Barlow and colleagues [37] also highlight the role of multinational free trade agreements. These global structures also warrant scrutiny for their influence of COVID-19 health outcomes. Another global consideration that sat outside our case studies is the role that private media [147] and social media companies, such as Facebook and Twitter [148], play in the dissemination of health information, misinformation and disinformation (the latter designed to mislead). COVID-19 disinformation has spread inaccurate beliefs about COVID-19 and can decrease the seriousness with which people treat the pandemic, increasing vaccine hesitancy and refusal, and strengthening opposition to governments enforcing public health rules, all of which hampered the containment of the pandemic [147]. Yamey and Gorski have documented how a US libertarian group funded by, amongst others, the oil and tobacco industries, supported one of the most widely disseminated documents undermining public health messaging [149].

The value of using case studies of countries with country experts was to provide a rich, rigorous overview of critical factors influencing the countries' experiences of the COVID-19 pandemic informed by local expertise, supported by grey and peer reviewed literature, including media, and material in languages other than English. We found the depth and quality of data far surpassed what would have been possible using a standard literature review method. We used the best available evidence for each point, giving the rapidly changing nature of the COVID-19 pandemic, and the inclusion of political and other perspectives not common in the peer reviewed literature.

We included case studies of countries with higher and lower rates of COVID-19 cases and mortality. However, assigning attribution to particular drivers of these outcomes is a very difficult undertaking given the complexity of factors and contexts that differed between countries that interacted to produce COVID-19 outcomes, including geography, political leadership, health systems, previous experience of epidemics, and government responses [26]. Nevertheless, the positive health outcomes for countries such as Taiwan, South Korea, Thailand, Vietnam and New Zealand, who all emphasised a strong public sector response to the pandemic (exemplified in Vietnam's motto of 'saving lives is prioritised above consideration of the economic loss' [150]), contrasted with the high COVID-19 toll in countries plagued with controversies around commercial interests, such as private sector procurement arrangements, and heavy reliance on a private health sector, such as the UK, US, and South Africa.

6. Conclusions

We found extensive scope for the commercial determinants of health to lead to adverse health outcomes in the COVID-19 pandemic through a multitude of avenues: they are likely to have affected the origin and spread of the virus, the health system response to the virus, and the availability and rollout of COVID-19 vaccines. It is crucial to extend scholarship on the commercial determinants of health and health equity beyond its main focus on unhealthy commodities and non-communicable diseases to understand their influence on both the spread and control of infectious diseases such as COVID-19. Understanding the influence of commercial determinants of health will help build evidence to advocate for the role of governments in governing for health, wellbeing, and equity, and provide knowledge to underwrite regulation to address the negative impacts of commercial determinants of health that may otherwise undermine these goals.

CRediT authorship contribution statement

Toby Freeman: Conceptualization, Methodology, Formal analysis, Writing – original draft, Funding acquisition. **Fran Baum:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Supervision, Funding acquisition. **Connie Musolino:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Project administration, Funding acquisition. **Joanne Flavel:** Methodology, Formal analysis, Investigation, Writing – review & editing. **Martin McKee:** Investigation, Writing – review & editing. **Chunhuei Chi:** Investigation, Writing – review & editing. **Camila Giugliani:** Investigation, Writing – review & editing. **Matheus Zuliane Falcão:** Investigation, Writing – review & editing. **Wim De Ceukelaire:** Investigation, Writing – review & editing. **Philippa Howden-Chapman:** Investigation, Writing – review & editing. **Thanh Huong Nguyen:** Investigation, Writing – review & editing. **Hani Serag:** Investigation, Writing – review & editing. **Sun Kim:** Investigation, Writing – review & editing. **Alvarez Dardet Carlos:** Investigation, Writing – review & editing. **Hailay Abrha Gesesew:** Investigation, Writing – review & editing, Funding acquisition. **Leslie London:** Investigation, Writing – review & editing. **Jennie Popay:** Investigation, Writing – review & editing, Funding acquisition. **Lauren Paremoer:** Investigation, Writing – review & editing. **Viroj Tangcharoensathien:** Investigation, Writing – review & editing. **T Sundararaman:** Investigation, Writing – review & editing. **Sulakshana Nandi:** Investigation, Writing – review & editing. **Eugenio Villar:** Investigation, Writing – review & editing.

Declaration of Competing Interest

Declarations of interest: none

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Supplementary materials

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