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Challenging modernity? COVID-19, sorcery, religion and vaccines in Papua New Guinea

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ABSTRACT: Papua New Guinea (PNG) avoided the COVID-19 pandemic in 2020 by closing its borders but case numbers soared early in 2021 with the arrival of the Delta variant. That exerted unusual pressure on a poorly functioning and underfunded health care system. Mobility was constrained bringing a reluctance to visit hospitals other than as a last resort. Local food markets closed, and 'traditional' practices such as bartering and subsistence agriculture and fishing expanded. Vaccine hesitancy was substantial, through disbelief that this was a 'local' disease, widespread distrust of government and resort to social media. Rising case numbers and deaths raised doubts over both supposedly curative western biomedicine, and the utility of prayer, and invoked the spectres of sorcery and 'stranger danger', underpinned by conspiracy theories. Cultural and socio-economic issues restricted the adoption of a *niupela pasin* (new way) involving social distancing, mask wearing and vaccination. Inadequate health services, co-morbidity and shortages of various supplies and of skilled health workers accentuated social problems as the virus continued to spread along familiar transport routes. The value of 'modern' approaches was overshadowed by 'traditional' values and practices and by ineffective access to and management of resources in this small archipelagic state.

Keywords: COVID-19, governance, infrastructure, modernity, *niupela pasin*, Papua New Guinea (PNG), religion, small island states, sorcery, vaccines

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Introduction

Papua New Guinea (PNG) is a physically and culturally complex nation, of about nine million people, north of its former colonial power, Australia. It has a long land border with Indonesia (the province of Papua) and short but very close maritime borders with Australia and the Solomon Islands. The early onset of COVID-19 in PNG in 2020 and the belated and ineffective measures to deal with the pandemic, as second and third waves spread in 2021 is here examined to trace the factors that contributed to its spread. From a policy perspective, the pandemic posed severe multi-faceted problems for the nation, spanning sectoral, national and regional borders, that were constantly evolving and characterised by a lack of consensus over its nature and appropriate solutions. While these replicate parallel problems and responses in some small Pacific island states both in the exigencies of health service provision (Taylor 1990, 2016) and in government and peoples' responses to COVID-19 (Campbell and Connell 2021), they are imbricated in the hybrid cultural contexts of small-scale Melanesian societies. The pandemic inflicted a heavy shock on the economy that contracted by 3%–4% in 2020, and which remains weak, not helped by the increased incidence of COVID-19 and the arrival of the Delta variant in 2021. This paper first establishes the chronology and geographic spread of COVID-19 in PNG, before examining the multiple factors that have contributed both to its diffusion and reactions to its presence, to reveal and account for the complexity of attitudes to and impacts of governance, biomedicine, religion and Melanesian cultures.

PNG is a fragmented state of half of one large island and many smaller islands, with more than 800 languages, and a Melanesian population largely linked by a dominant shared lingua franca, Tok Pisin, and by Christianity. Its economy is dominated by several large mines, mainly in the highlands, but around 80 percent of the population live in rural areas where subsistence and commercial agriculture dominate. About a third of the population live around or below the poverty line. It experiences a double burden of both epidemic and non-communicable diseases and hence a high incidence of co-morbidity lessened resistance to COVID-19. Infectious diseases are relatively common amongst lower-income groups especially those in urban informal settlements. Many urban residents live in such settlements in crowded conditions with low income, multi-generational families and poor access to services, and exhibit a greater extent of health problems than elsewhere: local examples of the social determinants of ill health.

As in many small states, but especially the two other Melanesian states of Vanuatu and Solomon Islands, challenges to development include economic vulnerability, remote and isolated populations, no economies of scale, a high incidence of poverty (and thus ability to pay), political stability and weak governance (including corruption), rapid population growth rates, poor physical infrastructure (including roads and rural electrification) and acute gender divides (Izard and Dugue, 2003). Taking account of these issues and of worsening health service delivery problems, the Deputy Director General of the then South Pacific Commission wrote of PNG and the wider Pacific islands,

> Existing health problems (HIV/AIDS, dengue and others) are on the increase. ... there is an ever-present threat of new and emerging infections (such as pandemic influenzas) which, if imported into the islands, could devastate the health of our populations. Here we have to fight on two fronts: we need to prevent or eliminate existing infectious diseases, while remaining vigilant for new threats and be prepared for a rapid response. [We must] develop health workers to a level where they can provide high-quality health services in the context of effective and efficient health systems (Corbel, 2005, p. 35).

It was valuable, prophetic but unheeded advice. Fifteen years later, the arrival of COVID-19 drew obvious attention to and intensified all these problems and failings. PNG thus represents an extreme case of the problems experienced by small archipelagic states but where service provision and the delivery of biomedicine are further complicated by cultural factors.

The pandemic arrives

The first reported case of COVID-19 in PNG came in March 2020. A national State of Emergency (SOE) was imposed in the same month, a brief lockdown followed, numbers increased only slowly and deaths were relatively few. There was some optimism that it would not spread far but, after the lifting of the SOE in June, the number of cases again increased. In mid-year, the Prime Minister was confident enough to pronounce that,

> COVID-19 not only affects us health-wise but also economically … That is why we will not have another lockdown. We must adjust to living with COVID-19 … we will not shut our country down again. (quoted in *The National*, 27 August 2020).

By closing its borders for several months, PNG had largely escaped COVID-19 in 2020 despite a minor spike in July-August 2020, the first real phase. Case numbers soared early in 2021 and again from March to July 2021, in a second phase, and from August 2021 onwards, in a third and most numerically substantial phase (ongoing early in 2022), after the arrival of the Delta variant, precipitating a national crisis, as mortality became significant.

These spikes raised concerns over supposedly curative western medicine, and the utility of prayer, and raised the spectres of sorcery and 'stranger danger'. Rural residents became more fearful of fellow villagers who had ventured into town or worked there. National concern intensified after the Delta variant reached PNG, especially in the border provinces with Papua/Indonesia and subsequently the Eastern Highlands, effectively spreading along major highways, and especially the Highlands Highway that linked Lae to the densely populated highlands provinces. Nonetheless, by the end of 2021, less than 3% of the population were fully vaccinated: the outcome of a range of problems and divergent attitudes and approaches, elaborated below.

Early in 2020, the first COVID case in PNG was an expatriate FIFO ('fly-in fly-out') mineworker. FIFO operations were quickly ended and travel between Cairns and PNG halted by Australia early in 2020. A significant PNG expatriate community live in Cairns which is also a base for a FIFO workers in highlands mines. FIFO concerned both countries. Other borders were closed soon afterwards: the Torres Strait border between Australia and Western Province (PNG) and soon afterwards the Papuan border as the virus spread east through Indonesia. Nonetheless, for more than a year, half the few cases that Queensland contracted came from PNG. At the eastern end of the country, Solomon Islands, without any local cases, quickly closed its borders with PNG, being almost as close to Bougainville (PNG) as was Australia to PNG. That posed problems of food security for people in the Shortland Islands who regularly travelled across to PNG markets for fresh food and other goods (Radio New Zealand [RNZ], 4 September 2020).

The Torres Strait border, where Australia is just 4 kms from PNG and a special treaty covering thirteen PNG villages permits unrestricted indigenous travel across the border, was closed in March 2020 and never reopened. Families and kinship groups were divided across the border, trade ended and PNG villagers were unable to work, trade or purchase goods in Australia, but access to medical care was permitted, while Australia initially sent food and fuel to treaty villages in PNG, and set up an aid post there to discourage cross-border medical travel. Coastal communities in Western had yet to record a case. The vaccine program in Australia's Torres Strait islands was rolled out faster than in any other dominantly indigenous region of Australia, but local fears over AstraZeneca had discouraged early vaccination. It was not until March 2021, as cases increased in Western, that attempts were made to ensure 100 percent dual coverage of the three islands (Boigu, Saibai and Dauan) closest to PNG, in what was dubbed 'Australia's COVID frontline'.

At the start of the pandemic, it was estimated that there were about 5,000 hospital beds, 4,000 nurses and 500 doctors in the country. PNG was unprepared for a pandemic, with few ICU beds and scarce PPE, oxygen and even gloves. One outcome was that many health care workers contracted the disease in each of the three waves. That alone resulted in already overstretched health workers being less available to treat such significant diseases as TB, HIV, malaria and respiratory diseases (the last of these being a particular problem in association with COVID). Even with smaller numbers in 2020, problems were apparent. An invisible virus was posing a massive threat to a country with a fragmented and ineffective health care system. As the first phase transitioned into a second phase with rising numbers, problems became particularly evident. Thus, in a single week early in 2021, 120 staff members of the main national hospital, the Port Moresby General Hospital, contracted COVID and were forced into isolation.

The crisis intensified into a third phase in mid-2021, and a more evident human relations crisis, after the highly infectious Delta strain reached PNG in mid-July; despite PNG having tightened its arrival rules – by increasing the quarantine period to 21 days – specifically to prevent that. On July 10, PNG recorded its first Delta case; the combination of very low testing rates, a high percentage of positive tests and extremely slow vaccine rollout provided the context for rapid spread. Within a month, dozens of cases were reported in Western, one of the two border provinces, with more test results pending. People were urged to stop travelling to Papua/Indonesia for any reason, and, effectively for the first time, mask wearing in public became more common in the province's urban centre, Daru. This also marked a new realisation (see below) that COVID was not purely a disease of 'westerners'. Within a month, the main hospitals in the two border provinces, Western and West Sepik, were full with COVID patients and three medical staff from Western's Daru Hospital had died. The second hospital in the province, at Kiunga, had closed down twice in 2020, with resources exhausted and COVID patients infecting those without COVID (ABC, 10 November 2021). The other border province, West Sepik, recorded fewer cases than Western, but testing was minimal. Both provinces continued to attempt to restrict movement of traditional border crossers back and forth to Indonesia, but capabilities to monitor the long permeable (and unusually artificial) border were limited. In any case, official statements and national policies were difficult to translate into local contexts and livelihoods. However, the greatest impact of the third phase and the Delta strain was in the capital, where Port Moresby General Hospital's ICU COVID ward was again full by September and the hospital had reactivated an ancillary field hospital to treat moderately ill COVID patients, and taken over a sports centre as a second ancillary hospital. By the end of October, it had ended non-essential services.

As the virus spread from the coast into the highlands, the gravity of the situation was increasingly evident. In Lae, the city's only public hospital, serving a population of 76,000, was full and health authorities had been forced to turn the town's stadium into a makeshift hospital and morgue. Up the highway, the Eastern Highlands had banned all public gatherings due to a spike in infections and deaths. After the arrival of the Delta variant, a two week long 2pm to 8am curfew was imposed in the main towns of Goroka and Kainantu, with all night clubs, gaming sites and liquor outlets then closed, but crowds gathered in the mornings. Those who had died from COVID were sealed in body bags and placed in coffins, to prevent transmission, before being returned to relatives; a process established in West Africa during the Ebola pandemic. By early October, the main Goroka hospital had a shortage of workers, with more than 30 staff sick with COVID, and a shortage of oxygen (despite some having been flown in by helicopter).

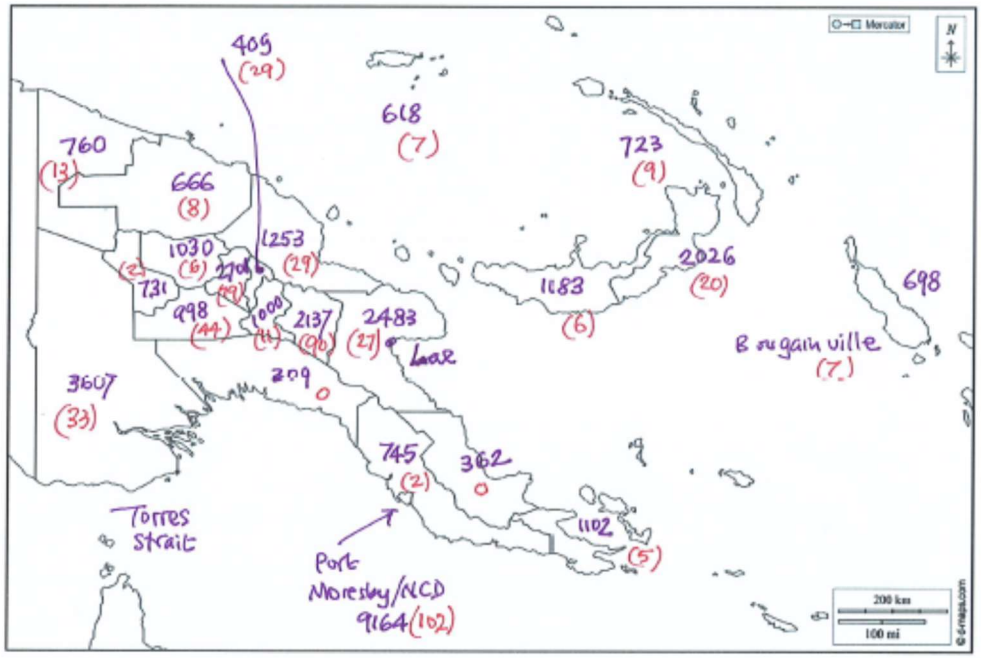
In Western Highlands province, the country's most densely populated region, at the Mount Hagen general hospital, one of the country's main referral hospitals, 104 of its 675 staff had tested positive, so that by March 2021, human resources and financial constraints meant it had to scale down services, closing the outpatient's clinic and cancelling elective surgeries (Tahana, 2021). At least a further 113 staff had tested positive by October (EMTV 21 October 2021). A similar pattern to that in Goroka and Mount Hagen was evident in other provincial capitals. In Southern Highlands in early October seven doctors and 23 nurses at the main Mendi hospital were sick with COVID-19 symptoms; other frontline workers were starting to "burn out" from the long hours. That resulted in the scaling down of services especially in the outpatient unit to move staff to priority areas. However, patients with moderate symptoms had to be sent home because there were not enough beds, and even fewer isolation beds (Ligaiula, 2021). Further west in Enga Province, the capital, Wabag, had quickly become a COVID-19 'hot spot'. The Wabag General Hospital was facing staffing issues. More than 100 medical staff at the hospital were reported to have been infected by COVID-19 and most were reluctant to attend to cases. No isolation facilities existed for COVID-19 patients, who had to stay out

of the hospital, while the hospital was running out of oxygen, with many cases left unattended (Nicholas, 2021). Throughout the highlands the same key challenges recurred: scarce human resources, oxygen (and other) shortages and few isolation beds.

By mid-2021, PNG's COVID cases stood at 17,013 and 173 deaths had been reported. Both numbers were almost certainly significantly underestimated, since testing was very limited, and may even have been as high as 200,000 cases: a substantial 'silent dead' (Bourke, 2021; Nicholas, 2021). Even in the Eastern Highlands, where the Institute of Medical Research in Goroka had undertaken around 2800 COVID-19 tests (with 468 – about 18 percent – of these being positive) in the first half of 2021, and prior to Delta, no information existed on who they were and so contact tracing was not possible (Blades, 2021a). Rather earlier a similar proportion was reported from a similarly small number of tests in the Western Highlands; 951 people had been recorded as positive from a sample of 4760 (Tahana, 2021). The sickness and death of health care workers further slowed testing. In a vicious circle, this posed more risks, especially to those with underlying sicknesses. By mid-2021 testing had been further scaled back, as resources were limited and the government indicated that the public would have to learn to live with the virus, while it promoted vaccination and public health safety measures.

Cases had been reported in every one of the 22 provinces (including Bougainville and the National Capital District), but were greatest in the capital, Port Moresby, and Western, where most of the testing had been undertaken, and growing in the highlands. Moreover, the National Pandemic Response Controller's office recorded a surge of about a thousand new cases per week during the four months until June. By 23 November, the total number of officially confirmed cases in the country was 34,707, by then rising exponentially, with the death toll at 542. Some 9,164 of these (26 percent) were in the National Capital District (Port Moresby) with Western Province the next most affected with 3,411 cases; these two provinces were followed by the two New Britain provinces, the Western and Eastern Highlands and West Sepik. Port Moresby, with 102 deaths, was followed by Eastern Highlands with 79, with deaths proportionate to case numbers (Figure 1).

Figure 1: Incidence of reported cases and deaths from COVID-19 by PNG province, November 2021.



Source: PNG Joint Agency Task Force National Control Centre for COVID-19.

While these are certainly underestimates, indicative of trends and reflecting better data collection in some provinces, the incidence of COVID-19 thus tended to be correlated with provinces and places identified with business activity, even including Bougainville which went into lockdown in November 2021. Official numbers almost certainly underestimated the numbers in some highlands provinces where testing and reporting were particularly limited. After testing was scaled back in mid-2021, to divert health care personnel into treatment and patient management, the available data on this third wave of the pandemic became even less accurate. By then Port Moresby General Hospital was reporting positive COVID testing rates of 60%. Like other hospitals across the country, it risked being overwhelmed by the virus.

Challenges of governance

In a country where tuberculosis and malaria are widespread, outbreaks of cholera and polio have recently occurred, and the maternal mortality rate is one of the highest in the world, only 2.5% of the budget is spent on health, although that proportion briefly reached 6% in 1999 (Izard and Dugue, 2003). Moreover, the role of urban hospitals has meant that expenditure is marked by urban bias, and a limited concern for primary health care (Connell, 2009). Despite a series of attempt to develop effective decentralisation, policies have proved largely unsuccessful, especially where other regional infrastructure has degenerated (Izard and Dugue, 2003; Wiltshire, 2016; Day, 2022). Indeed, rural and regional health care is effectively retreating, with 40 percent of all aid posts closing in the first decade of the century and many others dysfunctional. PNG has an exceptionally low ratio of health workers to population, despite the acute need (Day, 2022). Moreover, an aging health workforce lacks motivation due to poor working conditions including low wages and poor physical infrastructure and insufficient and inadequate on-site supervision and training capacity (Byrne et al., 2015; Wiltshire, 2016). The health system is thus ordinarily stretched to cope, dealing with a lack of staff, funding and insufficient resources of medicines and drugs, and malfunctioning poorly maintained technology as it has battled epidemics like polio, drug-resistant tuberculosis, malaria and HIV (Wiltshire, 2016; McIntyre, 2018). Overseas referrals remain significant. By 2015, none of the millennium development goals had been met and in this century life expectancy has fallen. In this context, the arrival of COVID-19 offered an unwelcome challenge.

As the pandemic developed and accelerated in 2021, multiple problems emerged that increased the incidence and spread of the virus and hampered responses, from the health system and from society as a whole. Initial reactions to the arrival of COVID in PNG were twofold. The first was that the smaller number of cases compared with many other countries supported the belief that God, or some other influence, had mysteriously protected PNG, unlike the rest of the world. The second, and competing, response was fear that the virus would spread throughout the country so that it was wise to deter and avoid people who might have the virus (Troolin 2020). These divergent beliefs became more complex over time. Both initially dominated public policy and complicated vaccination.

Underpinning all issues was the topography of PNG and poor physical communications, and the inadequacies of management, which slowed the spread of COVID-19 to many remote areas. Since roughly 80 percent of the population lived in rural areas this gave PNG some advantages versus contagion. Moreover, since most of this rural population consisted of semi-subsistence farmers, there was a degree of self-reliance that reduced widespread contact. Despite rural and urban markets, fewer of the population were exposed to direct contact with others than in most states. However, the same characteristics proved a problem for getting vaccines out to regional areas.

At least as problematic, PNG simply lacked adequate numbers of skilled staff - and some had limited competencies– to deal with the pandemic. On the job training and mentoring is weak in PNG (Cox and Phillips, 2015). Many heath workers were themselves fearful of COVID to the extent that it reduced their competence and basic procedures were not necessarily undertaken, thus swabbing was exceptionally limited. More than half of health workers pointed to problems of inadequate training, being busy with other tasks, inadequate access to PPE and a lack of fridges for storage, while inadequate transport, patient refusal and stigma were additional constraints (Smaghi et al., 2012). Disrupted transport systems in the wake of COVID-19 slowed the diffusion of all medical supplies to many areas; while fear of outsiders prevented many routine clinics; closure of others prevented patients from getting regular medications for tuberculosis and HIV/AIDS (McCall, 2022).

While vaccines became relatively quickly available, largely from Australia, and protective and testing equipment was also available, the knowledge and ability to use these effectively was very limited alongside the small number and local availability of health specialists (e.g. virologists and epidemiologists). The few PNG-based authoritative experts meant considerable confusion over what strategies were effective and how they were communicated, with scientists (and politicians) not providing coherent arguments. Misinformation in multiple guises proved a massive problem. Lack of electricity and refrigeration in many (probably about a quarter) of aid posts limited the effective geographical reach of vaccines (Day, 2022). A consequent grave problem was the high level of infection amongst health workers who were poorly prepared to face the epidemic since even gloves were sometimes in short supply. Most urban centres lacked the resources to treat those with a severe infection: there were few oxygen cylinders and concentrators. Intensive care beds and ventilators were non-existent in most rural areas, let alone the basic anti-malarial treatment, resuscitation fluids, analgesia and antibiotics for other conditions that people faced, which enhanced co-morbidity. Shortages of drugs of all kinds has long been reported in many parts of PNG partly from logistical problems, including access to fuel, but also because of systemic corruption that deeply compromised the medical supply chain (Chandler, 2018).

Vaccination was never made mandatory in PNG. The Prime Minister, James Marape, had stated that freedom of choice on vaccination was a basic human right and that this would be respected. Although he also confirmed that employers had the right to enact measures that would protect workers from infection, that 'respect' for choice discouraged many from seeking to be vaccinated. By late August 2021, the take-up of COVID vaccines had been slow, even among health workers; some health workers avoided vaccination, and some actively opposed it (Seymour, 2022). Fewer than 100,000 people, barely 1 percent of the population, had been vaccinated against COVID, but that number increased somewhat with the arrival of Delta, and was officially 207,000 in mid-October (still less than 2 percent of the population), many of whom were essential workers and health workers. Nonetheless, at the end of 2021, less than 11 percent of the population had received a single vaccination and barely 3 percent were fully vaccinated (*The National*, 10 December 2021; Togiba, 2022; Seymour, 2022). Australia had donated hundreds of thousands of vaccines to PNG but vaccine resistance and logistical problems had discouraged take-up. Vaccine hesitancy meant that many doses simply expired (PacNews, 6 September 2021). Even in two of the most 'at risk' provinces willingness to be vaccinated or take other precautions against COVID were minimal. In September 2021 PNG sent 30,000 doses of Astra Zeneca to Vietnam, originally donated by New Zealand, rather than letting them become outdated and be wasted locally.

During the 2020 three-month SOE, law courts, schools and fresh food markets were closed down, and national and provincial borders also closed, while the number of people who could be carried in PMVs (passenger motor vehicles: small buses) was reduced. A brief curfew was put in place in Port Moresby. Provincial borders were closed and island provinces briefly

isolated. Ironically the most distant province, Bougainville, initially suffered more than most provinces, having held a major meeting to discuss secession from PNG, which brought in leaders from PNG itself and from most parts of Bougainville, and which proved to be a super-spreader event. Much later, in July 2021, PNG sought to curb COVID-19 by putting restrictions on flights between the coast and the highlands with only the fully vaccinated allowed to travel. Nonetheless, passenger movements continued on the Highlands Highway from Lae into the interior, contributing to the spread of COVID.

With government support, Professor Glen Mola, from the Port Moresby General Hospital, advised couples not to have children for 12 months because of the extra pressure this would put on the health care system. Rather later, in August 2020, after the SOE had ended, the government promoted the *Niupela Pasin* (A new way of living, or new normal) with people encouraged to wear masks, engage in regular hand washing and maintain physical distancing. There was little evidence of compliance to any of these directives. Complacency was evident while *niupela pasin* was not feasible where residents in informal settlements and in many villages had no means of applying such 'middle-class' preventive measures as regularly cleaning their hands or maintaining social distances either at home or while working (Jones 2021). Familiarity grew with the terminology of 'social distancing' and 'isolation'; but neither concept had any link to real life where access to soap and water was difficult and extended households lived at high densities. Barely 50% of households have adequate access to clean water and as many as 18% of health facilities also lack access to clean water (World Vision, 2021). Before significant contact and mobility, in the late 1800s to early 1900s, diseases such as smallpox and dysentery spread rapidly from village to village (Allen, 2020). A century later the sociality of village life had not significantly changed. One villager in the Eastern Highlands responded to a health team: 'You people are coming to the community to talk about health measures… but you have to come and give us water supply so that we can have access to water to manage our health system. Otherwise you people should go away' (quoted in Thomas et al., 2021). Policing the directives was impossible.

Competing messages from the government (not only concerning COVID) were typically ignored. Trust in political leadership was minimal following decades of frustration with growing wealth inequality, regular no-confidence motions and widespread concerns over self-interest, governance and transparency. Rather than trust official sources, out of fear and alienation, people turned to social media (Ahearn, 2021). It was not until 2021, when the government enjoined well-known rugby league (the national male sport) players, including Melbourne Storm star, Justin Olam (a PNG highlander) and the former Australian captain, Mal Meninga, of Pacific Islander heritage, to become involved, that the public became more responsive. Yet by November 2021, as the Governor of Oro Province observed, the government was still losing the 'information war' (Aus-PNG Network, 16 November 2021).

The virus was spread through markets and meetings and particularly through more or less elaborate funerary events (*haus krais*) where communities participate in ceremonies which may involve both the transporting of a body to the home place, and attending the funeral and burial (Rooney, 2021). Especially where the death was from COVID, such activities could transfer the virus quickly, often from urban to rural areas, and funeral ceremonies usually made social distancing impossible. A haus krai for the first PNG Prime Minister, Sir Michael Somare, in March 2021 in Port Moresby was attended by about 20,000 people and a second *haus krai* later took place in his home province, East Sepik. There was some evidence that both became super-spreader events but much smaller *haus krais* had similar effects. By October, they had been officially banned.

The SOE lockdown itself was short-lived, reflecting both the impossibility of regulating it and the needs of many people, especially in informal urban settlements, to have access to markets and work. The closure of large urban food markets (and betel nut markets) meant both a loss of nutritive food to urban residents and a loss of income to market vendors (who had few alternative sources of income). As elsewhere in the Pacific, the informal sector was at greatest risk, and women in female-headed households and older people were most likely to have lost work (World Bank, 2020). The economy was given a degree of priority at least in comparison with smaller Pacific island states that had quickly closed borders and reverted toward subsistence economies based on agriculture and fishing (Campbell and Connell, 2021) even after some MPs died and despite the Director of the PNG Institute of Medical Research, William Pomat, arguing that: 'Economies will recover. People who die from COVID do not return from the dead' (quoted in McQuillan, 2021, p. 24). At the same time, continued mobility and the lack of monitoring and regulation of preventive measures meant that any *niupela pasin* never occurred.

Vaccine hesitancy, aetiology and modernity

Beyond the inability to institute any behavioural changes that constituted *niupela pasin* including the regulation of *haus krais*, minimising the impact of COVID-19 in PNG was constrained by multiple factors, some affecting the spread of the virus, some to attitudes to the virus and some to attitudes to preventive measures. Many factors affected all of these. Some factors typified responses in small states, while others were accentuated by issues that took on particular national characteristics Some were inherent – notably the diversity of cultures and languages, mountainous and swampy terrain (and inaccessibility) - which in turn meant the limited diffusion of modern medical care. That was accentuated by limited expenditure on health personnel and healthcare, poor transport and media infrastructure and inadequate organisation and management.

An initial high-level reaction involved a turn to religion. Beside the early 2020 restrictions, the PNG Prime Minister James Marape, the son of a Seventh Day Evangelist pastor, and himself a committed Christian, also declared that the country would mark 25 March as a day of fasting and prayer to ward off COVID-19. A second such day was held in 2021. Given the country's long engagement with Christianity, that was not an unusual step, but it amounted to outsourcing risk and marginalising a physical response, or even misinformation (or confusion), as he promoted the need to 'put God first' rather than the need to adhere to *niupela pasin.* Indeed the Prime Minister was criticised for seemingly having no other response than blind faith, and placing 'natural immunity… a natural defence mechanism built by God himself at the forefront of the national response' (Minnegal and Dwyer, 2021, p. 431). In video addresses to the nation, Marape also attributed the initially low infection rate of COVID-19 in 2020 to God's intervention. Such approaches were common; as one Eastern Highlands woman said: "Our belief in God will save us. The Big Man knows what we are going through. Our hospitals do not have many medicines and they are in a low state, but our belief in God will protect us." Another in a Madang village said: "We need to pray that God will look out for us. He is our fence and will keep us from being harmed." (quoted in Troolin, 2021, p. 87). Significantly, such Christian discourse was common at the government level.

Vaccine hesitancy and a fear of hospitals, emphasised by distance (that discouraged people from visiting urban hospitals when symptoms – or other injuries and diseases – occurred), resulted in one of the lowest vaccination rates in the world. In 2020, the vaccines that reached PNG were exclusively AstraZeneca, mainly from Australia or through WHO COVAX, so that the considerable global fear of side effects – a significant concern in Australia – was replicated. That fear was enhanced when the Leader of the Opposition claimed that the

vaccines sent from Australia were unsafe, which is why they had been exported (Chandler, 2021). Fear of painful side effects was common. Basic information was rarely translated from English even into Tok Pisin. The most common rationale for vaccine hesitancy was a combination of scepticism and fear (Hoy et al., 2021). Beyond that, many argued that they did not need vaccinations since they were not sick and that health patrols should deal with more obvious established diseases, such as TB, leprosy and malaria (Seymour, 2021). Conversely a degree of fatalism and acceptance was part of a perception of others who felt that *sik i kisim mi* (sickness has got /caught me): a widespread converse of western aetiology. Sickness inevitably raised complex questions about who was to blame, and pointed to communities and extended families being divided by unresolved conflict. Sick individuals, even in major hospitals, often attribute sickness and injury to not being *wanbel* (literally 'one stomach': living harmoniously) with someone in their network of relationships (Lepani, 2012; Street, 2014). In turn that suggests local causes of diseases and, perhaps, distinctive local solutions (see below).

Not only were people afraid of visiting hospitals, long regarded by many as places of death and therefore of last resort (Hamnett and Connell, 1981; Koczberski and Curry, 1999), but they had less income to pay for health care and transport costs (Thomas et al., 2021). By the time people seek health care, they often present with severe disease complications due to a combination of lack of knowledge, lack of local health facilities, long and inconvenient distances to travel, costs and distrust of health workers from distant places. Fear of infection and fear of catching the disease in hospitals – a very reasonable concern (and evident early in Kiunga) – meant that many avoided going for assessments or treatment for COVID-19 and other diseases. In East New Britain Province, around half the registered COVID-19 cases were among health workers, so discouraging patients of any kind from visiting hospitals (McCall, 2022). Nurses were particularly fearful about catching the disease, and worried about transmitting it into the community. As one observed: 'Our relatives stopped visiting us as they were apprehensive too. I felt discriminated against'; while another said that her husband told her 'not to come home' if she continued working in the hospital (quoted in Tabel, 2020). In some places, villagers put up barricades against visitors and even threw their own relatives out of home for fear of catching COVID-19 (McCall, 2022). Since the first PNG case was an expatriate, fears over foreigners, and especially Chinese (because of the origin of COVID-19), grew quickly. Mobility in some remote areas, where self-reliance was feasible, effectively ground to a standstill (Dwyer and Minnegal, 2020; Lau and Sutcliffe, 2021), but retreat to autarchy was impossible. People went without some necessities or sought remittances from urban kin.

Vaccine hesitancy was widespread. A March 2021 survey found that only 38 percent of the general population and 56 percent of health workers were willing to be vaccinated. As one respondent observed,

> If you're from [the] highlands of PNG you will never know how to catch a shark, if you are from the coast you will never know how to catch a bird of paradise, because they're not from our surroundings ... why should we take a vaccine which is not ours, which we don't have any idea about? (quoted in National Department of Health, 2021).

At much the same time, about 40 of the 100 employees of the Marie Stopes family planning clinic in Port Moresby were opposed to or reluctant to take the vaccine (Kaye, 2021). A smaller proportion of students at the University of Papua New Guinea were willing to be vaccinated, and even amongst nurses by mid-2021 the take-up rate was only 10 percent, and only 10 percent of the population were reported to be interested in becoming vaccinated (Bourke, 2021). In the second largest city, Lae, vaccines were therefore mainly given to resident expatriates. Even in October 2021, as the Delta variant was spreading, when the

possibility of vaccination was offered to workers at the Bank of PNG in Port Moresby, only about 30 out of 200 staff took up the offer (Nicholas, 2021) while less than 10 percent of nurses at the main Port Moresby General Hospital had been vaccinated (RNZ, 5 October 2021). Thus even in the most modern sectors of society, including those oriented to health care, hesitancy and opposition were widespread.

Limited interest in vaccination broadly followed earlier national trends where PNG exhibited some of the lowest global figures for receipt of the measles vaccine, the combined vaccine for diphtheria, whooping cough and tetanus (DPT) and the hepatitis B vaccine. Even in 2019, in response to an outbreak of polio, itself the outcome of limited vaccination, a massive immunisation drive was conducted, with significant donor support, but take-up was very limited (Chandler, 2018; Tahana, 2018). Immunisation rates had deteriorated to crisis levels prior to COVID-19. Controversies over the AstraZeneca vaccine made the immunisation task harder (Howes and Mambon, 2021). Familiarity with vaccination and any measures, or recognition, of its efficacy were largely absent. Response to the possibility of an AstraZeneca vaccine was unsurprisingly limited.

Further complicating vaccination and hospital visits, various conspiracy theories were diffused by social media. One prominent anti-vaxxer in PNG with almost 7000 Facebook followers offered multiple daily commentaries on what she described as a global project to kill and maim millions. The information shared included denigration of organisations which supported the vaccine rollout in PNG, and posed questions such as: "How many times do we have to tell these idiots who have allowed themselves to be injected with poison?" (RNZ, 18 June 2021). Some believed that vaccination was a preparatory activity for the digital economy, and an assault on freedom and privacy; others believed that the vaccine would be as addictive as betel nut, cigarettes or alcohol (Manoka, 2022). An alternative theory was that vaccines were being tested on black people as part of a global experiment to control population, with Papua New Guineans as guinea pigs; and which unfortunately aligned with Glen Mola's suggestion that births should be postponed. Others therefore felt that it involved sterilisation (Day, 2022). In contrast, some felt that COVID was imaginary and the government was only talking about the Delta variant to make money from partner countries, who had offered support to PNG to combat COVID (Kuku, 2021; Ahearn, 2021). Others perceived that the vaccine was Satan's 666 microchip (ABC, 10 November; Macdonald, 2021). By October 2021, with only half of parliamentarians themselves vaccinated, official information campaigns had little traction with a sceptical public (Sora, 2021) and several influential members of parliament remained vocal vaccination sceptics, despite their colleagues' entreaties (Blades, 2021c). Vaccinated politicians were criticised for still wearing face masks, implying that vaccination had not worked, while vaccinated church leaders were seen to be betraying their religious beliefs, in failing to believe that God would protect them. Simultaneously fake cures and miracle cures jostled for online attention. Combining secular and religious practices was not unusual.

Other related theories, not necessarily conspiratorial, included views that it was a western disease that did not affect Papua New Guineans (who had a natural immunity), that tropical countries were unlikely to experience it, that it was no more than flu, that God was protecting Papua New Guineans and that vaccines would impact people's DNA. While the last of these meant nothing in PNG it became a response (National Department of Health, 2021). Other circulating ideas were that people would become magnetic or that they would die within three years. An early argument was that the heavy rain and thick clouds of the rainy season shielded the country from the airborne virus (Troolin, 2020). One social media argument was that God had placed the Christian country of PNG at the equator where moderately high temperatures would protect the people from the virus (Minnegal and Dwyer, 2020). In Lae (where health workers had faced death threats), and probably elsewhere, some thought that vaccination transmitted electricity through bodies and people would die within a few months (Fox and Faa,

2021). Not only was there hesitancy but there was violent opposition to community vaccine rollouts, castigated as a 'campaign of terror', and to any attempts to mandate vaccinations for employment or organise lockdowns and curfews (Blades, 2021b; Macdonald, 2021). However, such detractors were often eventually vaccinated as they recognised that, without employment and income, life would be too difficult (Manoka, 2022).

Especially in the first year, when the numbers of cases and deaths were fairly low, risk perception was also low. In some of the most threatened areas, such as the overcrowded informal settlements of the capital, Port Moresby, most residents felt it was a hoax and carried on much as usual (Ezebilo, 2020). The PM advised people against being reliant on Facebook, and while social media were primarily directly accessed by urban residents (with about 7 percent of the population having Facebook) their contents still diffused quite quickly in a climate of fear and concern, where inadequate newspaper, radio and television coverage (and multiple languages) reduced access to alternative and more formal voices. While irrelevant theories were diffused, they were often contested and, at least in Western Province in the early days, social media provided a valuable local source of basic information on preventative measures and lockdown restrictions (Dwyer and Minnegal, 2020) and on when and where aid posts were open.

Despite the resort to prayer encouraged by the Prime Minister (and other church leaders), local people's Christian beliefs were challenged by the apparent lack of efficacy of prayer. By mid-2021 the saving value of religion was called into question. Faith in God was being eroded. One outcome was the emergence of claims to sorcery that accorded with older values over the aetiology of sickness. The rise in sorcery accusations paralleled circumstances where no cure for the virus existed which had 'defeated white people and their science' (Minnegal and Dwyer, 2021, p. 433). Late in 2021 a local doctor was arguing on Facebook that all vaccines would fail just as 'they failed for Ebola, MERS, HIV, SARS, Influenza. It will fail also for Covid' hence 'you are only digging your own grave yard by vaccination' (PNG LOOP News, 16 November 2021). Nonetheless Papua New Guineans are pragmatic thus in some places people may assert a belief in Christianity alongside the certainty that most deaths are the result of sorcery (Minnegal and Dwyer, 2021). Sorcery accusations, usually following a sudden or inexplicable death, have arguably increased following the decline in medical services and the rise in inequality (Cox and Phillips, 2015) and increased again in the wake of COVID-19, with bio-medical explanations taking second place. Accusations sometimes led to the capture of suspected sorcerers – usually women – and violence against them and occasional killing. Women have increasingly become suspects and targets where they were marginalised or vulnerable. The unfamiliar and invisible COVID-19 became a potential 'time-bomb' for sorcery related violence, initially in the highlands region (RNZ, 26 June 2021), provoked by disappointment and uncertainty and marking a broader turn to the past, reflected, for example, in a resurgence of attempted natural remedies, as neither church nor state could remove COVID.

Multiple factors contributing to the spread of COVID-19 and confusion over causes was partly the outcome of COVID-19 being invisible and, to many, unbelievable. Various constraints and problems, especially concerning vaccination, and therefore over the value of modern biomedicine, produced an outcome where, at the end of 2021, PNG had the seventh lowest vaccination rate in the world, and the lowest outside Africa. Indeed its vaccination rate was particularly low when compared to smaller island states such as Samoa (without any COVID cases) and Fiji. This was accentuated by conflicting messages from government (over whether vaccination was mandatory or not), vaccine resistance and other cultural issues, to the extent that by mid-2021, despite the spread of the virulent Delta strain, the country had effectively abandoned its testing regime. Vaccination required a trust in values that were not widely shared. Dissent in parliament and religious faith discouraged government decisiveness.

Despite steadily increasing cases and deaths, the Prime Minister never sought to mandate vaccination but regarded choice as a human right. Responding to an unprecedented crisis proved challenging and complex.

Diffusing reliable and accepted information on the virus was particularly difficult and misinformation, updating and fear were rife, even at parliamentary levels. PNG has an adult literacy rate of less than 65% and many do not speak English in a country where complex messages are often delivered in sometimes fractured English. One outcome was that COVID-19 became regarded by some in PNG as simply another disease alongside malaria, tuberculosis, typhoid, cholera and even polio. The arrival of the Delta variant shook some of the complacency that followed the first phase. It spread through human contact, often through mobile younger people (and PNG has a youthful population) amongst whom it could be asymptomatic. PNG was partly reliant on – and over-optimistic about – the potential protection from having a youthful population that might mitigate some of the impacts of COVID-19. As one politician suggested,

> 75 percent of our population are under 30. And by and large (among) under-30s, only one out of 1,000 gets seriously ill, and one out of 2,000 dies. So we're going to rely on the protection of youth (RNZ, 18 June 2021).

A similar optimism related to having a dominantly rural population distanced from urban centres. The absent demographic transition (from high to low fertility) and limited urbanisation were seen in a new and positive light.

In every phase, the virus was associated with international connectivity and with modernity, first developing in a mining centre, then the capital city and the two provinces adjoining Indonesia, and spreading through the highlands along the Highlands Highway, much as HIV/AIDs had done a couple of decades earlier (Connell and Negin, 2012). At the same time the arrival of COVID in PNG both challenged expectations of modernity, including the trust that people had put in modern practices and institutions, whether politicians, churches or hospitals, and led to a revaluation of the past. Closed borders, both international and provincial, further forced and encouraged people back to a more 'local' realm. The increase in bartering, local exchanges, collective work, revival of traditional means of preservation of foods and the construction of fish traps, concern over sorcery and revivals of some traditional medical practices were the converse of any *niupela pasin*.

The words, advice and orders of 'modern' leaders, especially politicians whose promises had sometimes amounted to very little, and who were increasingly perceived as venal and corrupt (Martin, 2013; Eves, 2022), were now distanced from local values and expectations. COVID generated difficult encounters between indigenous and foreign medical knowledge and methods of health provision and enormous confusion and uncertainty about aetiology, response and potential outcomes, especially with an invisible virus and few overt symptoms. Church leaders were more likely to be respected hence many people straddled a line between prayer and precautionary practices. Many felt that through being *wanbel* with God and one another they would be protected from COVID-19. Evangelical churches invoked a religious response; in November 2021 the President of the Evangelical Alliance was encouraging members 'to not fear the Corona virus, but fear God only, who will destroy both the spirit and the physical being' (PNG Loop News, 6 November 2021). Government and medical authorities faced the challenge of how to help local communities reinforce helpful cultural practices while discouraging similar ideas and practices, such as communal work, sharing food, betel nuts and other goods, and participating in ceremonies, notably *haus krais*, that potentially spread the virus (Troolin, 2020).

Disavowal of 'modernity' was problematic where cultural factors shaped responses to both the value of vaccinations and, more generally, access to formal medical care. While hybridity is of value in much of socio-economic change, it rarely has value with respect to medical science. Topography and transport infrastructure were only partial constraints to the failures of extending vaccinations. Ironically the growing ubiquity of mobile phones, presenting more opportunities to connect people, tended to enable the spread of rumours and uncertainties rather than of *niupela pasin.* Overseas aid was less effective than it might have been (with overall Australian aid at its lowest ever in global terms, and stimulated here by fears of contagion across the Torres Strait and through FIFO) and vaccines were wasted.

Socio-economic outcomes

As elsewhere, COVID-19 led to significant economic problems even in islands and regions where it was absent. Economic growth shrunk, partly as leading sectors declined, mines were intermittently closed and exports of agricultural commodities slowed by transport constraints. PNG's limited tourism industry was decimated. Despite most Papua New Guineans living in rural areas and practicing semi-subsistence agriculture, COVID-19 disrupted the national economy, and its impacts elsewhere (for example on supply chains that increased the cost of imports) had further negative impacts. Jobs were lost, especially in the informal sector, incomes fell, social protection was largely absent and food markets declined (as access was reduced, purchasing ability worsened and households needed once excess food). Almost 60% of people surveyed in PNG, Timor Leste, Solomon Islands and Vanuatu had either lost their job, lost income, or had resorted to alternative sources of income due to the economic impacts of the pandemic. The main reasons for loss of income were stated as reduced demand for goods/services (29%), closed markets (20%), lack of access to livelihood inputs such as seeds and materials (18%), movement restrictions (15%), and transport limitations (10%). Street vendors were hardest hit, with more than half (56%) fully or severely affected by the pandemic (World Vision, 2021). Supply chain problems increased the price of all imports including foods – a particular blow to urban households (who were more dependent on imports). Such changes typified other small states and social costs often followed (Campbell and Connell, 2021). Incomes declined, especially as market activity declined, so that those in the informal sector were most affected.

Border closure with Australia prevented ties between PNG and Torres Strait Islanders ending trade and exchange and preventing PNG residents accessing various services and traditional fishing areas across the border (Faa, 2020). In villages that had previously relied on trade with the Torres Strait islands villagers were forced re-establish agriculture, extend fishing and resume hunting and gathering but with poor outcomes (Clun, 2021). Similar problems emerged for Shortland Islanders following the closure of the PNG border with the Solomon Islands. In the border villages, where external ties were suddenly truncated, and in urban settlements livelihoods were most affected. By choice and by imposition socio-economic life was truncated and took on a much earlier autonomy and localism, but which did not necessarily welcome greater agency.

The reduction of informal sector economic activity, on the margins of the formal economy, was linked to an increase in petty crime in urban areas and a rise in police brutality. It was paralleled by the growth of more informal economic activities elsewhere. Semi-subsistence agriculture and fishing grew both by village residents and by the urban-rural migration of some of those who had lost urban livelihoods. New production was not always easy as many returned to 'homes' they had not always kept in touch with, creating arguments over land and marine tenure, and with lost 'rural' skills. Collective self-help agricultural projects emerged in some peri-urban areas. Older people, at least in East New Britain, taught

younger villagers how to make fish traps and ways of preserving food (Fainu, 2020). The need for cash incomes resulted in a profusion of roadside stalls. Nonetheless, by default, self-reliance increased, but it took some time before that translated into any improvements to nutrition. Such improvements did not however flow through to urban areas, where urban gardening ('pop-up gardens') was limited, because of higher imported and domestic food prices (Diao et al., 2021). Urban gardening was more difficult than in other Pacific island states because of land tenure issues and climatic constraints (especially in the capital, Port Moresby). Throughout rural areas women carried the burden of extra responsibilities as they were the main food producers.

Typically, as on the tiny island of Ahus (Manus), people had less access to food from now more inaccessible urban markets so resumed processing and eating local foods, including sago - regarded as a 'famine food', limited their meal sizes and ate fewer meals, at some nutritional cost (Lau and Sutcliffe, 2021). That broad pattern was particularly common in urban areas where food insecurity increased, with people eating fewer meals per day and consuming cheaper and less nutritious food (Davila et al., 2021; World Vision, 2021). Some families bought fewer items, shared costs and limited their food consumption (Yakam, 2020). New forms of sharing did not always work at a time of shortage, and theft of food and plants was not unusual. Loss of income and rising unemployment from lockdowns and movement restrictions put downward pressure on food prices as households reduced their expenditure on food. At the same time, COVID-19 and measures to contain the virus disrupted food supply chains and labour mobility, which then affected the marketing and purchase of food and increased the cost of production and transport, placing upward pressure on food prices.

Social tensions and domestic violence increased in some urban areas (in a country with already notoriously high levels) but in more rural parts of PNG, where it had previously been high, it decreased somewhat as, although men stayed at home more frequently, they no longer had the income to spend on beer and drunkenness was reduced (Thomas et al., 2021). Children were disadvantaged where schools were closed; home schooling was rare, online lessons were scarce and limited internet access and lack of rural electrification emphasised a sharp digital divide.

Bartering became more common, as in Ahus where incomes fell and petrol prices increased and it also became impossible to access urban ATMs (Lau and Sutcliffe, 2021). It marked a partial reversion to the 'silent markets' that existed at contact times; usually a land-sea synergy where coastal people exchanged fish for the root crops of inland people. In East New Britain province, an old tradition was revived with the reintroduction of shell money for some transactions, such as the payment of school fees, as 'real' money was less available (with the decline of markets). Store goods were bartered for fresh produce.

Sorcery, subsistence agriculture, resuscitated fishing and preserving techniques, bartering and return migration marked different patterns of return to an older order and to local flexibility and resilience: "When a new virus disease emerges, people rely on pre-existing and competing cultural explanations of infectious diseases" (Ennis-McMillan and Hedges, 2020). As an East New Britain man suggested,

> Nature is telling us to go back to basics, so if there's another disaster, we don't need to rely on the stores or worry if shops are closed down. Our future generations depend on what we do now; if we teach them to garden now, they'll be able to sustain themselves and live well (quoted in Fainu, 2020).

In the midst of a global and national crisis, it offered a degree of optimism, combining hybrid possibilities.

Conclusion

PNG's topography, its archipelagic structure and its division into provinces (that enhance similarities with other Pacific small island states, notably Vanuatu and Solomon Islands), its cultural complexity, considerable urban poverty, a weak health care system and double disease burden (and thus co-morbidity) posed unique challenges to coping with COVID-19. The health care system has long been underfunded, with shortages of drugs and equipment, a lack of adequately trained health workers: a long existing problem of multiple resource shortages (Connell, 1997; McIntyre, 2018). Rural health services have closed rather than opened, fuel costs and inadequate roads have reduced mobile services (Wiltshire, 2016) and a 'brain drain' of skilled health workers has occurred (Duke et al., 2004). So substantial has the decline of biomedical service become that it has been claimed that it has caused Papua New Guinean communities to 'lose their collective memory of the efficacy of biomedicine, reducing it to simply another option alongside magical means, or even an inferior option compared with the healing power of God' (Cox and Philips, 2015, p. 37). All such problems were exacerbated under COVID-19.

In combatting COVID-19 PNG faced formal challenges: inexperienced human resources, oxygen (and other equipment) shortages and few isolation beds, all necessary facets of a 'modern' health care system. Even clean water and refrigeration were not always accessible in aid posts. These were accentuated by poor physical infrastructure, included deteriorating roads and limited electrification, preventing effective modern care. Underinvestment in health care meant inadequate services and therefore both unfamiliarity with good medical care, especially where complex cases were involved, and scepticism over belated government invocations to be vaccinated. Both political will and effective governance were absent. Contact tracing was implausible, testing and recording of deaths was inadequate, hence tracing the virus was impossible. No adequately maintained national data reporting system exists. Maintaining livelihoods and high residential densities, in villages and towns, prevented much semblance of the trilogy of activities intended to be part of *niupela pasin,* while regulation and policing of market closures or curfews were non-existent. In such circumstances, many people sought alternative explanations for the presence or absence of COVID-19, and for its impacts and cures, some of which involved reverting to more local and more established belief systems.

Responses to, and the impact of, COVID-19 have demonstrated how disaster risks are interconnected, as a public health crisis can rapidly precipitate economic problems, social tensions and uncertainty. The impact of COVID in PNG has also pointed to related issues including reducing trade costs by strengthening and transforming productive capacity, through reducing dependence on a narrow range of primary industries, and revitalising the agricultural and fisheries sectors**.** Sustainable agricultural practices would potentially be more affordable, provide more nutritious food, and enhance indigenous biodiversity (Davila et al 2021). That is also linked to building resilience to natural disasters. Indeed the COVID crisis has been seen as a forerunner of a potentially even greater crisis – the impact of climate change.

An overstretched, underfunded and underpeopled health system has failed to cope with both COVID-19 and an increased incidence of malaria, TB and other longstanding diseases. Ultimately vulnerability to these diseases increased under COVID-19 as attention was diverted elsewhere (Ahearn, 2021; McCall, 2022). As in smaller states, the COVID crisis has demonstrated the obvious need for a more effective health care system, with more numerous and adequate human resources and more robust health infrastructure (which would require substantial financial and management resources). That will require external aid to extend significantly beyond the donation of vaccines, to finance and support more complex structural reforms extending beyond the confines of the health system itself. COVID-19 vaccines work but their reception and inclusion in public health programs requires creative solutions to ensure

accelerated and equitable delivery. Above all, it requires not merely technology but trust in effective health workers. That might be the core of *niupela pasin* and a new normal, but the limited vaccination rate in PNG emphasises the serious problem of the minimal embrace of modernity, and where the more economically vulnerable are most at health risk. A massive challenge concerns how PNG might reduce the incidence and impact of the virus by quickly vaccinating its population and preparing the health system to deal with similar or other health hazards. But any *niupela pasin* will be neither easy nor quick to achieve. Modelling predictions suggest that it will take five years to vaccinate even a third of the population, undermining economic growth and suggesting a very high mortality rate in the interim (Dayant, 2021). For PNG the vaccination failure may mean a health and economic crisis effectively without end: a national version of 'long COVID'.

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References

Ahearn, S. (2021). Social media 'bullshit' threatens control of COVID-19 outbreak. Canberra: ANU DevPolicy Blog, 23 March.

Allen, B. (2020). Coronavirus Covid-19 in Papua New Guinea. *In Brief 2020/6***.** Canberra: ANU Department of Pacific Affairs.

Blades, J. (2021a). Is PNG sleepwalking through the pandemic? *Radio New Zealand*, 18 August.

Blades, J. (2021b). Mob attacks on vaccination teams on the rise in PNG, *Radio New Zealand*, 3 November.

Blades, J. (2021c). Vaccine sceptics in PNG parliament asked to shut up. *Radio New Zealand,* 20 November.

Bourke, M. (2021). Impact of COVID-19 in Papua New Guinea, Canberra, ANU (mimeo), 16 June.

Byrne, A., Hodge, A. and Jimenez-Soto, E. (2015). Accelerating maternal and child health care gains in Papua New Guinea: Modelled predictions from closing the equity gap using LiST. *Maternal and Child Health Journal*, *19*(11), 2429-2437.

Campbell, J. and Connell, J. (2021). COVID-19 and small island states. In Y. Campbell & J. Connell (Eds.), *COVID in the islands: A comparative perspective on the Caribbean and the Pacific* (pp. 1-39). Singapore: Palgrave Macmillan.

Chandler, J. (2018). Fighting a polio outbreak in Papua New Guinea, *The Lancet*, *392*, 17 November, 2155-2156.

Chandler, J (2021). 'The fear of this vaccine is real': how Papua New Guinea's Covid strategy went so wrong, *The Guardian*, 2 December.

Clun, R. (2021). Near neighbours desperate for support, *Sydney Morning Herald*, 27 March, 19.

Connell, J. (1997). Health in Papua New Guinea: A decline in development. *Australian Geographical Studies, 35*(3), 271-293.

Connell, J. (2009). *The global health care chain: From the Pacific to the world.* London: Routledge.

Connell, J. and Negin, J. (2012). The malaise of modernity: Urbanization, mobility and HIV in the Pacific. *Pacific Studies*, *35*(3), 369-397.

Corbel, Y. (2005). Healthy islands: The Pacific vision. *Islands Business, 31*(5), 34-35.

Cox, J. and Phillips, G. (2015). Sorcery, Christianity and the decline of medical services. In M. Forsyth & R. Eves (Eds.), *Talking it through: Responses to sorcery and witchcraft beliefs and practices in Melanesia* (pp. 37-54). Canberra: ANU Press.

Davila, F., Bourke, R. M., McWilliam, A., Crimp, S., Robins, L., van Wensveen, M., Alders, R. and Butler, J. (2021). COVID-19 and food systems in Pacific Islands, Papua New Guinea and Timor-Leste: Opportunities for action towards the Sustainable Development Goals, *Agricultural Systems*, *191*(1):103137.

Day, B. (2022) Covid-19 and Papua New Guinea: The story so far. *Asia Policy*, *17*(1), 53-66.

Dayant, A. (2021). Forecasting vaccination in the Pacific. *The Interpreter*, 22 November.

Diao, X., Dorosh, P., Fang, P., and Schmidt, E. (2021). *Effects of Covid-19 and other shocks on Papua New Guinea's food economy*. Washington DC: IFPRI Discussion Paper 02004.

Duke, T., Tufuarani, N. and Baravilala, W. (2004). Getting the most out of health education in Papua New Guinea, *Medical Journal of Australia*, *181*(11/12), 606-607.

Dwyer, P. and Minnegal, M. (2020). COVID-19 and Facebook in Papua New Guinea: Fly River Forum, *Asia Pacific Policy Studies*, *7*, 233-246.

Ennis-McMillan, M. and Hedges, K. (2020). Pandemic perspective: Responding to COVID-19, *Open Anthropology*, *8*(1).

Eves, R. (2022). The anti-politics of colonial nostalgia: Development, disenchantment and the critique of the state in Papua New Guinea. In A. Regan (Ed.), *Leaning about Papua New Guinea.* Canberra: ANU Press (forthcoming).

Ezebilo, E. (2020) COVID-19 Pandemic is perceived by residents of informal-built areas Segment of Port Moresby, *Spotlight*, *13*(10), 1-5.

Faa, M. (2020). Torres Strait and PNG families separated by Australia's COVID border closures, *ABC Radio*, 7 December.

Fainu, K. (2020). The return of shell money: PNG revives old ways after COVID's blow to economy. *The Guardian*, 22 August.

Fox, L. and Faa, M. (2021). Health workers face death threats as COVID-19 vaccine hesitancy takes hold in PNG, *ABC Radio,* 10 September.

Hamnett, M. and Connell, J. (1981). Diagnosis and cure: The resort to traditional and modern medical practitioners the North Solomons. *Social Science and Medicine*, *15B*(4), 489-498.

Howes, S., and Mambon, K. (2021). PNG's plummeting vaccination rates: now the lowest in the world? Canberra: ANU DevPolicyBlog, 30 August.

Hoy, C., Wood, T., and Moscoe, E. (2021). Addressing vaccine hesitancy. Survey and experimental evidence from Papua New Guinea. Washington DC: World Bank Policy Research Working Paper 9837.

Izard, J. and Dugue, M. (2003). *Papua New Guinea: The Health Sector Development Program Experience.* Manila: Asian Development Bank.

Jones, P. (2021). COVID-19, human security and the plight of informal settlements, *Development Bulletin*, *82*, 109-114.

Kaye, B. (2021). 'Stop it': PNG raps Facebook for COVID-19 misinformation, says hurting vaccine push, *Reuters*, 1 April.

Koczberski, G. and Curry, G. (1999). *Sik Bilong Ples*: an exploration of meanings of illness and wellbeing amongst the Wosera Abelam of Papua New Guinea. *Geographical Research, 37*(3), 230-247.

Kuku, R. (2021). PNG authorities order corpses to be swabbed amid fear of undetected Delta outbreak, *The Guardian*, 19 August.

Lau, J. and Sutcliffe, S. (2021). Of isolation and atolls: Coping with Covid-19 in Manus, Papua New Guinea. In Y. Campbell & J. Connell (Eds.), *COVID in the islands: A comparative perspective on the Caribbean and the Pacific* (pp. 385-401). Singapore: Palgrave Macmillan.

Lepani, K. (2012). *Islands of Love, Islands of Risk. Culture and HIV in the Trobriands,* Nashville: Vanderbilt University Press.

Ligaiula, P. (2021). Killer delta in PNG, *The National,* 11 October.

McCall, C. (2022). Disrupted care in Papua New Guinea: The harms of COVID-19, *The Lancet*, 399, 15 January, 225-226.

McIntyre, M. (2018). Papua New Guinea's health services in crisis: sound policies and catastrophic failures in implementation, *Development Bulletin*, *80*, 95-98.

McQuillan, K. (2021). Coping with COVID, *Islands Business*, *47*(6), 24-25.

Manoka, A. (2022). Why many Papua New Guineans reject the COVID-19 vaccine and why I changed my mind. Canberra: ANU DevPolicy Blog, 8 February.

Martin, K. (2013). *The death of the Big Men and the rise of the Big Shots: Custom and conflict in East New Britain*. Oxford: Berghahn.

Minnegal, M. and Dwyer, P. (2020). God, health and COVID-19 in remote Papua New Guinea, Canberra, ANU DevPolicy Blog, 16 April.

Minnegal, M. and Dwyer, P. (2021). God and the virus in Papua New Guinea: Outsourcing risk, living with uncertainty and (re)creating a *Niupela Pasin*. In Y. Campbell & J. Connell (Eds.), *COVID in the islands: A comparative perspective on the Caribbean and the Pacific* (pp. 425-441). Singapore: Palgrave Macmillan.

National Department of Health (2021). *COVID-19 vaccine hesitancy in Papua New Guinea*. Port Moresby, PNG: National Department of Health.

Nicholas, W. (2021). COVID-19 in PNG: The silent dead, Canberra: ANU DevPolicyBlog., 6 October.

Rooney, M. (2021). COVID-19 and the haus krai, Canberra: ANU DevPolicyBlog. 30 March.

Seymour, M. (2021). Vaccine hesitancy and the risks in rural Papua New Guinea. *Interpreter*, 5 March.

Seymour, M (2022) Creating vaccine advocates. *Asia and the Pacific Policy Forum*, 25 January.

Smaghi, B., Collins, J., Dagina, R., Hiawalyer, G., Vaccjer, S., Flint, J., and Housen, T. (2021). Barriers and enablers experienced by health care workers in swabbing for COVID-19 in Papua New Guinea: A multi-methods cross-sectional study, *International Journal of Infectious Diseases,* 110 (Supplement 1), October, S17-S24.

Sora, M. (2021). Overcoming community resistance to vaccination in Papua New Guinea, *The Interpreter,* 28 October.

Street, A. (2014). *Biomedicine in an unstable place: Infrastructure and personhood in a Papua New Guinean hospital*. Durham NC: Duke University Press.

Tabel, R. (2020). A silent threat: The mental health impact of pandemic in Papua New Guinea. *Australian Institute of International Affairs*, 13 July.

Tahana, J. (2018). How Papua New Guinea brought back polio. *Radio New Zealand,* 17 September.

Tahana, J. (2021). 'We don't have any grasp': Covid-19 crisis pushes PNG hospitals to the brink. *Radio New Zealand*, 29 April.

Taylor, R. (1990). Problems of health administration on small states: Observations from the Pacific. In Y. Ghai (Ed.), *Public administration and management in small states*: *Pacific experiences* (pp. 276-307). Suva, Fiji Islands: Commonwealth Secretariat.

Taylor, R. (2016). The tyranny of size: Challenges of health administration in Pacific Island States. *Asia Pacific Journal off Health Management, 11*(3), 65-74.

Thomas, V., Kauli, J., Fufurefa, E., Apa, A., and Peter, U. (2021). *Igat wei bilong lukautim mipela yet istap* (We can look after ourselves): Community-based organisations responding to COVID-19 in Papua New Guinea. In Y. Campbell & J. Connell (Eds.), *COVID in the islands: A comparative perspective on the Caribbean and the Pacific* (pp. 443-462)*,* Singapore: Palgrave Macmillan.

Togiba, L (2022) Papua New Guinea reports first Omicron cases, amid fears over low vaccination rate, *The Guardian*, 19 January.

Troolin, D. (2020). Distantly united: Papua New Guinean relationality in the face of COVID-19. *Anthropology Now*, *12*(1), 84-90.

Wiltshire, C (2016). *Public expenditure, decentralisation and service delivery in Papua New Guinea: Tracking budgets to health clinics,* PhD thesis, Canberra: ANU.

World Bank (2020). *Papua New Guinea high frequency phone survey on COVID-19,* Washington DC: World Bank.

World Vision (2021). *Pacific aftershocks: Unmasking the impact of COVID-19 on lives and livelihoods in the Pacific and Timor-Leste.* World Vision.

Yakam, L (2020). *Approaches to the COVID-19 Pandemic in Papua New Guinea: Government measures and public responses*. Canberra: ANU Department of Pacific Affairs in Brief 2020/28.