Surge in sago sickness in PNG

Sago is one of the most important carbohydrates in Papua New Guinea (PNG). It is refined from the sago palm tree (*Metroxylon sagu*), which is widespread in lowland areas of the country, especially in Western and Sepik provinces. PNG is the second largest producer of sago starch worldwide.

The sago palm is incredibly resilient. It can withstand variations in water availability, salinity, and acidity, and is resistant to most diseases and pests. A fully mature sago palm provides up to 300 kg of starch when the tree is harvested. 100 g of sago provides 86 g of carbohydrate, and it has a low glycaemic index of 27. Since the 1970s, international sago symposiums have promoted investment in sago palm as a reliable food source, and advocated for its expansion.

Unfortunately, this remarkable plant can cause a life-threatening condition known as sago haemolytic disease. First recorded in Western literature in 1974, the exact cause of this condition is unknown. Researchers suspect mycotoxins are the likely culprit. Village sago may be stored in aerobic conditions, allowing fungus to grow within the sago flour, which families then unknowingly consume. During digestion of the mouldy sago, the fungus is broken down within the body, destroying red blood cells (known as haemolysis).

The patients I have seen with this condition present with excruciating abdominal pain, blood in the urine, severe headache, high fever, weakness, and increasing agitation and confusion. While the disease is self-limiting, many patients die without emergency blood transfusions due to the loss of red blood cells. Blood transfusions are difficult to organise in remote aid posts without electricity, running water, radio or phone reception – where we most often see these patients.
Historically, this condition has been rare. The prevalence of sago haemolytic disease was previously thought to be only 5.8/100,000, with a case fatality rate of 35% in the 1988–1998 period. However, in 2021 nine cases were reported at Lake Murray Station, Boboa Health Centre, between January and April.

This surge in cases is concerning. The majority of the population in Western Province rely on sago to feed their families, and any threat to the consumption of sago could seriously threaten food security in the region.

In discussion with local health workers and community members in the Lake Murray area, numerous potential risk factors were identified which they believe may have contributed to the unusually high incidence of cases this year. The community reported they believe they are seeing greater variations in climate, including more severe dry periods followed by heavier rain, leading to unprecedented flooding. Although the sago palm can flourish under these harsh conditions, hand (or foot) preparation of the starch flour requires large volumes of clean water for straining.

Unfortunately, the recent flooding had breached the pit toilets, causing women to discard garden crops that were contaminated by faecal matter. High floodwaters also blocked bush tracks, and flooding of snake burrows had increased the activity of many venomous species, making it unsafe for families to harvest from their bush gardens further away. The floodwaters had also contaminated usual drinking water sources, causing clusters of diarrhoeal disease. This prevented the community from using their usual water sources for sago straining, meaning fresh sago could not be prepared.

The combination of these factors caused an acute food shortage. Families were reliant on sago already stored in the home.
Women’s leaders reported they knew that they should not keep their sago for more than one month, but the scarcity of food had forced them to use sago that had been stored for more than three months to feed their families. Women reported confidence in assessing the texture, dryness and smell of the sago to determine its safety for eating, but when they had no other food, they were willing to ignore some of the red flags.

The most common method of storing was in an old plastic tub or container in the cooking house. There was widespread knowledge of traditional wrapping of sago in banana leaves and tightly binding, which is more anaerobic than keeping the sago in tubs. Unfortunately, this older, more labour-intensive method had fallen out of fashion, likely increasing the risk of mycotoxin fungus growth.

Climate change is likely to worsen this problem, and may already be doing so. Drought will limit the water available for straining sago, while flooding often contaminates the water making straining unsafe. It is an incredibly frustrating position for the Western Province population, who consistently record shocking malnutrition rates, especially for chronic stunting. Without interventions to safeguard sago use, this chronic malnutrition may be exacerbated in the future.

Reassuringly, solutions will likely be indigenous to PNG. Sepik populations store their sago in anaerobic conditions (sometimes underwater in clay pots), which prevents fungus growth, and they are more likely to boil their sago, killing off pathogens. In comparison, Western Province families commonly fry their sago to make bipapi, a thick pancake, that can contain undercooked flour.

Funding cultural exchanges of agricultural officers from Sepik areas to Western Province, to provide awareness on alternative storage and cooking techniques for sago, could be an efficient way to tackle this deadly condition. Cultural and behavioural change is difficult, but sincere investment in addressing the
storage and preparation of sago will save lives.

In conclusion, the climate will continue to change, and Pacific Island countries will continue to be one of the most affected regions. Sago haemolytic disease has previously been too rare to come to the attention of the policy community, however, we cannot ignore the threat to such a reliable food source. Investment in awareness and research into safe sago storage and preparation would safeguard this resilient starch.

A smart phone a day keeps the doctor away: mobiles and health in PNG

Health services in Papua New Guinea are mainly provided by Community Health Workers (CHWs), who have two years of training provided by Health Colleges, after which they are allocated their aid post roles, usually to rural or remote areas. Encouragingly, many of the young graduates I have had the pleasure of working with are eager to serve the communities of PNG and have a genuine passion for their work. However, once working in the rural aid post, CHWs find themselves battling with an irregular and unreliable supply of health care products, lack of access to continued professional development, professional isolation and lack of support.

The rural communities in which CHWs are stationed commonly have limited electricity, sanitation via dug toileting and water provided by the local creek in which bathing, washing and cooking all take place. Nevertheless, even in the most remote locations one modern gadget seems omnipresent— the mobile phone.
In the past, short wave radio has often been relied upon in PNG, especially to support and connect health care services. One particularly good example is that of Rumginae Hospital where Dr Brandon conducts weekly meetings with workers from 5 health centers and 10 aid posts. Through these meetings Dr Sharon Brandon is able to provide pastoral support, education, medical advice, and collect crucial epidemiological information regarding disease in the region. However this opportunity to converse directly with a doctor is not available for many rural health care workers.

When a woman is laboring, obstructed in the middle of the night, a CHW needs urgent advice – they cannot rely on a nurse or doctor to conveniently be next to a large, bulky and difficult-to-transport radio system. When a small child has an unfamiliar rash and fever – the health care worker worries enough to consider meningitis versus the typical childhood exanthem, but how can they seek a timely opinion via radio when this is a clinical sign best photographed and reviewed? In a country with a limited number of specialists, imagine the immense benefit of being able to call one in their offices in Port Moresby to seek advice, or perform a tele-health consult for specialist expertise which would otherwise never reach these remote areas.

Professor Suwamaru of Divine Word University Madang interviewed health care workers from seven provinces and found that practitioners were using mobile phones for ordering medical supplies, receiving calls from the community about women laboring, using the calculator function to analyse malaria parasite density and transmitting injury photos to colleagues to clinical seek advice. Some workers also reported keeping tallies of malaria incident accounts and texting them for epidemiological purposes, allowing for targeted provision of care to areas battling outbreaks. Many Community Health Workers are also using their mobiles to send information about locations in which they will be conducting clinics or
vaccinations so that villagers from surrounding areas can congregate for health care provision.

The key benefits of mobile over radio are portability, accessibility, and future proofing with extended technological capacities. Most PNG families, particularly young people, have access to mobile phones. The paradox of teenagers living without electricity, running water or sanitation, but being able to apply snapchat filters to their selfies is almost comical – but certainly an opportunity which cannot be denied, with the World Bank estimating that 2 million people in PNG now own a mobile.

Mobile phone networks in PNG continue to expand and improve, with companies such as Digicel, BeMobile and Citiphone investing in network expansion. In comparison, the short-wave radio network has fallen into disrepair and requires specific government support to maintain functionality. For example, in Orora Village in the Madang Province only a third of villagers had access to a working radio receiver, but all villages had full phone coverage.

Dr. Jonathan Ritchie says that 80% of the land mass of PNG has mobile coverage, a remarkable feat considering the difficult terrain, dense rainforest and formidable isolation of most areas. Further, since the introduction of competition into the mobile market in 2007, prices of handsets and calls have plummeted, with the cost of a call falling by 60% by 2016.

A successful example of mobile use in the PNG Health setting is the toll free “Kaunselin Helpim Line,” which provides counselling and advice on family violence, including STIs and HIV, and can be called without any phone credit. Internationally, Danis et al describe the use of the Ugandan Health Ministry SMS reminder system which encourages patients to take medication at certain times – this could be a game changer in the battle against multidrug resistant TB within PNG.
Looking to the future, the mobile, especially the smart phone, may become a way for individuals to carry their health books – which are often presented to health workers in poor condition, with pages missing, or patients losing their books altogether. To have a record of visits, vaccinations, and treatments on the individual’s phone would revolutionise the system, with no need to print thousands of health books yearly.

As the PNG population continues to expand, health care in the region needs to embrace modern technology to meet expanding needs. Rural Community Health Care Workers are indispensable to the provision of care at a grass roots level, and these workers need to be supported, educated, and connected with to provide the quality services Papuans deserve. Mobile phones are the only way we can realistically continue to support these workers in the 21st century, and should be focused on in policy and funding.