The Moral Career of a Medical Scientific Fact: How the thrifty Gene Hypothesis Became *Post* and *Anti* Colonial in Singapore and Island Oceania. (7918 words)

Abstract

Existing sociological research on global health pay attention to how medical scientific knowledge and practices become diffused, and in some cases interact with national - local institutional arrangements to engender distinct biopolitical formations and health morality. However, scant consideration has been given to how the very science underlying these ideas change as they travel. Borrowing perspectives from the sociology of scientific knowledge and postcolonial sociology, this research builds on the literature on global health by elucidating how medical scientific ideas such as the thrifty gene hypothesis, posited by American geneticist James Neel in 1962 to explain the high prevalence of type 2 diabetes among certain ethnoracial groups, was transformed as it encountered the postcolonial politics in the Asia Pacific region. Following research on diabetes causality and public facing diabetes messaging in Singapore and island Oceania between 1960-2000, a period which also saw efforts to internationalize and standardize diabetes by multilateral health institutions such as the World Health Organization, I first present how the thrifty gene hypothesis converged with local and regional ethnoracial classification systems to reproduce moralized public health messaging that sought to discipline the genetics and behavior of 'at risk' minorities. Secondly, I show how the hypothesis was mobilized by postcolonial scientific and political actors who exploited the interpretive flexibility of the 'environment' in the hypothesis to recreate an understanding of diabetes causality that emphasized postcolonial progress but more importantly, that pushed for the recognition and reckoning of colonial history in understanding population health.

Introduction

"…Acting Health Minister Yeo Cheow Tong said Singapore has achieved the status of a developed nation in its disease pattern…In many developed countries, a high incidence of heart disease accompanied the level of affluence. 'Unfortunately, this is a dubious honor that we could do without and one that is of immediate concern,' he said."

(excerpt from The Straits Times, 8 April 1989: 19)

"Chronic diseases such as diabetes were unknown on islands where Western contact was minimal and the life-style traditional."

(excerpt from Papua New Guinea Post-Courier, 4 December 1979: 9)

The excerpts above represent expert voices from different places. The first is by a politician in charge of the national health agency in Singapore. While addressing a public audience, the minister listed various diseases of 'affluence' including diabetes, that young nation was faced with given its rapid ascendancy to the ranks of 'developed' nations in the post-World War 2 era. The second excerpt captures the perspective of a diabetes researcher, Dr Paul Zimmet, who underlined the impact of a shift towards non-traditional lifestyles for the indigenous island populations in island Oceania, introduced through Western contact.

Both represent *moral* articulations concerning the causes of ill health in specific populations. Embedded within these statements are notions of civilizational hierarchy that pit 'developed' against 'undeveloped' nations, or 'western' against 'traditional' diets. It is also important to situate these statements within the context of emergent scientific ideas on metabolic health and disease, particularly the thrifty gene hypothesis introduced by American geneticist James Neel in 1962 which by the 1980s, had made its way into medical scientific and public health discourse in the Asia Pacific region. Neel (1962) asserts that genes which predispose one to diabetes were historically advantageous, particularly in hunter gatherer societies that consistently experienced food shortages. This adaptation however, became detrimental in situations where there is abundant food, a situation that Singapore and parts of island Oceania found themselves in around the second half of the twentieth century.

This paper examines how the thrifty gene hypothesis travelled both beyond the laboratories, and beyond the 'West' to become entangled with postcolonial histories in Singapore and island Oceania[1]. I borrow Irving Goffman's (1959;1963) lens of the *moral career* to examine the natural history of the thrifty gene hypothesis, as well as the different ways in which it became contextually diffracted. Training the lens of moral career on scientific ideas does not just highlight the disciplinary power of health morality (Metzl, 2010). It also allows us to

[1] I adopt the term island Oceania, rather than the Pacific Islands as a way of acknowledging the indigenous framing of the history of the Pacific Islands as being historically, culturally and materially connected through the ocean, to the outer portion of the Asia Pacific region (see Hau'ofa 1994; Hanlon 2017).

understand how morality born out of different postcolonial conditions can change the meanings attached to scientific ideas, as well as the science itself (see also Epstein 1996; Eyal 2010).

Recent work in the sociology of global health have gone beyond the institutionalist/world society theorizing of the global 'diffusion' of medicine (Inoue and Drori 2006; Chorev 2012; Harris 2017) to understand how the interaction between medicine and postcolonial contexts shape the practices of healthcare, illness identities as well as access to healthcare (Decoteau 2017, White 2023; Vijayakumar 2021, 2024). This turn towards a resurgent postcolonial framework in the sociology of global health and more broadly, sociology[2] (see Bhambra 2007, 2013; Steinmetz 2014; Go 2013, 2018; Edwards 2020) has been fruitful in elucidating continuities in colonial epistemologies and infrastructures within the postcolonial global health landscape.

While these studies have proved invaluable in highlighting the interactional and relational dynamics in the making of health, they have paid scant attention to how the *disease itself*, which include how the epidemiological and etiological facets become transformed as they encounter new institutional, cultural, moral and historical configurations in postcolonial societies[3]. Understanding this process, while tracing the changes in ideas on disease is important because it shapes how the broader society views both the disease and those afflicted (Goffman 1963; Scambler 2009), the scope of interventions (Jutel 2009; Rose 2018; Navon 2019), and more importantly, elucidates the sometimes-unexpected forms of expertise that contributes to our understanding of disease (Epstein 1996; Eyal 2013).

To illustrate the changes in scientific explanation for diabetes causality, I draw from the work of Daniel Navon (2024), particularly his recent theorizing of how scientific facts emerge, become stable, or change through using comparative historical analysis. Navon's (2024) framework of 'reiterated fact-making' underlines (1) the conditions of possibility for a scientific fact, (2) the configuration of networks of expertise that make it and (3), the 'material and epistemic path dependencies' (ibid:850) that may limit changes to a scientific fact. In tracing the genealogy of scientific facts and comparing its iterations across history, Navon (2024) provides us with the conceptual language to understand how the medical scientific ideas such as the thrifty gene hypothesis changed not just over time and across a network of expertise, but as I endeavor to show in this paper, across national borders.

Comparing sources comprising World Health Organization reports, scientific papers on diabetes etiology, public health messages and campaigns, and newspaper reports pertaining to Singapore and the Pacific populations from 1970 to 2000, this paper recreates the global field of diabetes discourse[4] where scientific research that figured ethno-racial populations in the global

[2] Adrian Favell (2022) asserts that while this turn towards post and de colonial perspectives led by Julian Go has been embraced as an important shift in US sociology, sociologists (and I would add to that, sociologists in the US who are situated within more interdisciplinary spaces such as STS) based in Britain for instance would find what Go says to be 'familiar and accepted wisdom' (306); the 'commitment to decolonial principles', Favell (2022) adds, is in fact deeply embedded in the teaching of undergraduate sociology in the UK.

[3] While not exactly focusing on postcolonial contexts, Claire Decoteau's (2017) study of Somalian diaspora communities in Toronto, Canada and how they draw from their positionality as racially marginalized and economically disadvantaged immigrants, as well as embodied experience to form epistemic communities that challenge mainstream science (Brown in Decoteau 2017:170).

[4] In recreating the global health field, I follow Gowri Vijayakumar's (2024) approach, whereby she considers both the 'objective hierarchies' that exist among nation states (for instance pertaining to public

South as targets for the testing of the thrifty gene hypothesis, intersected with postcolonial public health concerns. This process engendered a mode of health morality that sought to discipline sick and at-risk bodies (Bin Khidzer 2024; Vijayakumar 2024) within the landscape of global health. However, as the thrifty gene hypothesis circulated in both Singapore and island Oceania, its explanatory power also expanded, as scientists and other actors leveraged its 'interpretive flexibility' (Star 2010) to mobilize

(1) claims of postcolonial 'developed-ness' in the case of Singapore, where metabolic disorders such as diabetes served as an indication for the nation's induction to the first world (with first world diseases) while refiguring the 'environmental' condition in the thrifty gene hypothesis, and

(2) the folding of an *anti-colonial morality* into diabetes causality in island Oceania, where the alarming rise of diabetes among islander populations was attributed to a history of colonialism and 'Westernization'.

This analytic approach therefore traces the thrifty gene hypothesis as a cultural object; as a medical scientific fact changed in the sense that it absorbed new etiological rationale apparent in the case of diabetes in studies of island populations in island Oceania. At the same time, the hypothesis was also reinterpreted in a way that enabled the articulation of cultural and political ideas that aligned with the nation building project in Singapore. Crucially, the articulation of these ideas was located within a network of expertise that is both global and transnational. Global in the sense that the actors engaged with multilateral organizations that and audiences around the world, and transnational in the sense that some of the scientific actors inhabited networks spanning the Asia Pacific, and very often brought up diabetes prevalence in relational and comparative terms. In this regard, this research builds on Navon's (2024) analysis through locating changes in scientific facts within global and transnational networks of expertise, following similarly oriented work by sociologists of global health (Decoteau 2017; Vijayakumar 2024; Lynne-Joseph 2024).

The Thrifty Gene Hypothesis in Postcolonial Islands

The thrifty gene hypothesis, introduced by American geneticist James Neel in 1962, was essentially a way to understand the high frequencies of diabetes[5] in certain populations. Neel (1962) explains that genes which predispose one to diabetes were historically advantageous (particularly in hunter gatherer societies that were sometimes hit with famine) but they became detrimental in a 'developed' context. This thrifty gene allowed individuals to accumulate fat during periods of abundance to provide for periods of food shortage. This was typical in the 'feast-or-famine' conditions of primitive, hunter gatherer societies (Neel 1962: 355). Consequently, in environments with an abundance of food, the thrifty gene in an accumulation

health capacity or disease prevalence rates) as well as the 'subjective meanings attached to them' (ibid:211).

[5] At the time Neel's paper was published, the distinction between the different types of diabetes, namely the autoimmune type 1 diabetes which usually affects individuals from a younger age, and type 2 diabetes very often referred to as adult-onset diabetes, had not yet been made.

of fat as food stores in preparation for a food shortage that never comes, leading to health problems such as diabetes.

As a disease mechanism, the thrifty genotype does not follow a genetically determined pathway, as the case with 'single gene' or autosomal dominant diseases such as Huntington's Disease. Rather the hypothesis suggests that having the thrifty genotype confers a risk or susceptibility to the individual that is mediated by *environmental* causes. A key environmental cause proposed by Neel (1962) and others (see also King and Roglic 1999), was the condition of 'civilization', versus a 'primitive' lifestyle involving lower caloric intake and more physical activity (Neel 1962: 357). Indeed, Neel (1962) was cognizant of the potential implications of spread of the Western progress 'dietary and cultural conditions' across the globe on the worldwide incidence of diabetes (ibid: 359).

This understanding of the interplay between genetics and the environment unfolded in unique ways in the global South from the 70s through the 90s. In Singapore and the islands of Oceania, the thrifty gene hypothesis received considerable attention, partly due to the the rising influence of international health (Adams 2010; Amrith 2017). Crucially however, the hypothesis intersected with very specific conditions in Asia Pacific: a history of colonialism and imperialism, and the growing visibility of diabetes as a public health issue, the disproportionately high incidence of diabetes in minority ethnoracial populations and last but not least, the post-World War 2 developmental projects nations in the Global South were participating in.

It is worth noting that Singapore and much of island Oceania share similar histories of colonialism and imperialism. Singapore was a colony of the British up until 1963, while island Oceania encompassing Melanesia, Micronesia, Polynesia and parts of Australasia were shared by the US, Germany, Spain, Japan, British since the 19th century. The former continues to contend with a colonially derived racialized system which animates much of the island-state's socio-political life, even science and medicine (Sun 2016; Ong 2016; Coopmans and Tan 2018; Bin Khidzer 2023). Late colonial Malaya (of which Singapore was a part of) was also a period which saw the growth of international health in Southeast Asia, led by organizations such as the Rockefeller Foundation, the League of Nations and later, the World Health Organization (Amrith 2014). These organizations played a pivotal role in shaping ideas and practices about medicine and health in Singapore, as well as the broader Asia Pacific region in the post war era.

Island Oceania, despite the vastly different languages and cultural practices, are linked a history of connection and contact across oceans, of colonialism, imperialism, and extraction (Hanlon 1998; Pollock 2017; Dauvergne 2016; Taitingfong 2019; Widmer 2021). From militarization, nuclear testing, to the stripping of resources, these islands and their populations have endured outright violence and what anthropologist Epeli Hau'ofa (1994) calls 'belittlement', by virtue of their small, inconsequential land masses. Such representations of islands and their inhabitants as isolated, and as being perpetually trapped in the wrong end of the economic developmental spectrum represents what Anaïs Maurer (2024) terms isletism, a distinct mode of orientalism that has over the course of the history, been mobilized to dispossess and inflict violence on the island populations in Oceania. Such forms of isletism were apparent even in well intentioned, global and public health efforts as this paper will demonstrate.

Colonial and imperial pasts aside, these regions - Southeast Asia and Island Oceania - were also connected by transnational scientific networks in the world of science and medicine.

Importantly, they engaged with the emergent program of global health[6] in the 60s, within which diabetes and the thrifty gene hypothesis had gained legibility.

On Postcolonial Global Health, Morality and Scientific Facts

Sociologists of global health have largely moved on from the institutional lens of global health that foreground the diffusion of practices, concerns, norms of health and biomedicine (Inoue and Drori 2006; Lakoff 2010; Chorev 2012), to interrogate its (dis)contents. Among other things, scholars have highlighted how the ever-growing sprawl of actors within the field of global health have contributed to inequalities in terms of access to care and health outcomes (De Maio 2014; Harris 2017; Lynne-Joseph 2024; White 2023; Decoteau 2013), and how global health policies have shaped local politics and social identities (Kenny 2015, 2017; Vijayakumar 2018, 2021). This body of work also underlines the increasingly neoliberal logic that underpins global health, where the adoption of specific metrics such as the Disability Adjusted Life Year (DALY) recasts health as an 'investment choice', thereby locating health 'firmly within the territory of individual agency' (Kenny 2015: 21-2).

Claire Decoteau's (2013) ethnography of people living with HIV/AIDS in South Africa follows a similar thread. She describes how 'roll out neoliberalism' in health governance, characterized by an emphasis in 'self-determination, self-responsibility and an entrepreneurial spirit' (Decoteau 2013: 405) not only individualizes health in the same way that Kenny (2015) argues. Decoteau (2013) also foregrounds the exclusionary dynamics of global health within a postcolonial setting; Global health systems and delivery of health services penalize those who choose to adhere to indigenous knowledge about the body and health, effectively reproducing the dominance of biomedicine and epistemologies of the Global North. elucidate similar dynamics that shape global health systems and policies. Alexander White's (2023) historical examination of global epidemics elucidates similar power differentials that operate within international health governance; White (2023) asserts that even as colonial era structures have been dismantled, euro and ethnocentric ideas continue to shape global pandemic responses, reproducing a kind of epidemic orientalism.

These critical interventions have certainly complicated the triumphalist narrative surrounding global health. Yet they have miss certain crucial aspects. For one, sociological studies on global health have tended to focus on infectious diseases. Decoteau's (2017) study of autism among Somalian diasporic communities in Canada, and Lynne-Joseph's (2024) study on gender affirming health care in Thailand and the US stand apart as investigations on non-communicable conditions. Chronic diseases such as type 2 diabetes have often been ignored, in part because they are incompatible with the broader perception of diseases of the 'developing' world, as explained by anthropologist Amy Moran Thomas (2019).

Most importantly however, existing studies have not seriously considered how the *disease itself*, which include the causes of disease (or what Timmermans and Haas 2008 call the 'biology of disease), are shaped as they encounter new institutional, cultural, moral and historical configurations within the global health field. Here, I am thinking about the parents in Gil Eyal's (2013) piece on the sociology of expertise, who worked together with behavioral

[6] Brown, Cueto and Fee (2006) explain that the usage of global health, as opposed to international health, gained momentum in the mid-20th century as multilateral organizations such as the World Health Organization began to think about 'the health needs of the people of the whole planet above the concerns of particular nations' (ibid: 62).

psychologists to discredit the explanation that their 'cold', refrigerator like demeanors contributed to their child's autism, or the group of Somalian refugees and immigrants in Claire Decoteau's (2017) research who created 'epistemic communities' and allyships with certain scientists to highlight the role of 'Western' diet in elevated incidence of autism among their children. Notably, these interventions were also a response to moral narratives the disease.

The cases of autism capture how 'wise ones' (Goffman 1963: 143), individuals who are close and sympathetic to those with medical conditions, can sometimes constitute themselves as lay experts and engage with the etiological facet of the disease. The 'facts' of the disease changed, to the point where the lives of the afflicted were no longer encumbered by moral judgment and stigma. These efforts should also be situated within specific social and structural arrangements. In her work on the history of race and diabetes for instance, Arlene Tuchman (2020) describes how the discourse of the *Judankrankheit* (Jewish disease) in early 20th century United States that gave rise to labels such as indulgent or fat Jew. Yet these meanings changed along with broader social structures in 20th century American society.

As Jews in the United States became absorbed into the White category, and the proportion of diabetics increased among White Americans during the interwar period, the moral meanings attached to diabetes also changed. Tuchman describes how, as diabetes became more prevalent among middle-class White Americans, the disease took on a wholly positive spin. In fact, because being diabetic meant having to control one's dietary intake, measure insulin intake, take self-administered urine tests, and perform other meticulous tasks, which effectively transformed the diabetic into a "patient expert"; the initially negative meanings became rehabilitated, and White diabetics came to be saluted as possessing the necessary qualities of a good American citizen (Tuchman 2020: 63).

We see here how actors as well socio-historical factors coalesce to form the necessary conditions that led to the shift in both the moral tenor and facts relating to specific diseases. But what are the specific mechanisms through which these changes occur? Sociologist Daniel Navon (2024) draws insights from the sociology of expertise and STS to put forth a framework explaining how transformations (or equally important, continuities) in scientific facts are shaped by (1) the prevailing conditions of possibility, (2) the configuration of networks of expertise, social mobilization and power and (3), the 'material and epistemic path dependencies' (ibid: 850). Thus, it is not just the assemblage of experts, knowledge, material technologies and socio-historical factors that are relevant in a genealogical analysis of a scientific fact (see Eyal 2013). For Navon (2024) change (or not) in scientific facts also depend on whether they are constrained by epistemic and material path dependencies[7].

Navon's (2024) point on epistemic path dependencies is especially important for this paper. Where prior understanding of the causes of diabetes focused on the biochemistry of the disease, particularly the function of the pancreas and interaction between insulin and blood sugar (see King and Roglic 1999; Tattersall and Matthews 2024), Neel's (1962) epidemiological approach incorporated perspectives from population genetics. Particularly, Neel's (1962) fusion of the physiological aspects of the disease with population history that incorporates

[7] Epistemic path dependencies comprise 'prior findings, definitions, measures, and standards' whereas material path dependencies comprise the 'tools we use to detect and measure a fact; the interventions, infrastructures, and devices developed in response; the repositories and databases researchers use; and so on' (Navon 2024: 860).

environmental pressures as a causal variable, opened up new ways of thinking about the cause of diabetes in certain populations. It represented a *paradigm shift* in the Kuhnian sense (2012: xxii), with experts solving novel questions well into the 1990s.

The 'environment' in the hypothesis enabled new directions particularly as the hypothesis travelled and accrued new facts relating to diabetes causality, since path dependency became fractured. Diabetes causality became refracted through the lens of national and transnational postcolonial politics, with certain scientists and scientist-politicians playing a major role in reshaping the moral career of the disease. These epistemic actors, not unlike Anderson and Pol's (2012) scientific patriots, synthesized scientific and moral ideas relating to the history of colonialism and worked across borders and within multilateral organizations to make causal claims about the etiology of diabetes that aligned with nationalist postcolonial developmental objectives as the case of Singapore, or with anticolonial narratives as the case of island Oceania.

A Brief note on Methods

My primary data sources consist of 12 research papers and a total of 32 newspaper articles over the course of 3 decades that highlight the causes of diabetes in Singapore and island Oceania, specifically Australia, Papua New Guinea and the Micronesian, Melanesian and Polynesian island clusters in the Pacific. I had started with just the Pacific Islands but expanded my analysis to include nations in the rim of the Pacific, namely Australia and Papua New Guinea to more accurately capture the how the language of health morality followed islander populations as they migrated to these areas (Rallu 1994; Voight-Graf 2007; Bedford and Hugo 2008).

I started by doing a simple keyword search in the PubMed database, using the terms 'diabet*' and 'Singapore' and limiting the range to 1970-2000. I then scanned through the titles and abstracts and selected only the papers that focused on *diabetes etiology*. Between this period, I found one name which appeared very frequently in diabetes research – Cheah Jin Seng. This included a review article on diabetes in Singapore[8]. I expanded my search to other databases, specifically the Singapore Medical Journal and the Annals of the Academy of Medicine Singapore and focused on Cheah's contribution to the field of diabetes research. In examining, Cheah's body of work, I found that he had very frequently cited the work of Paul Zimmet, a researcher from Melbourne, Australia who happened to be a leading figure in diabetes epidemiology in the Pacific. I traced Zimmet's work from Cheah's references, while also expanding my search to include Zimmet's other work related to the thrifty gene and diabetes in the Pacific.

Zimmet conducted and published research on diabetes etiology in the Pacific Islands, beginning with the Micronesian community of Nauru, and later on, as a consultant with the World Health Organization, he conducted surveys in Western Samoa, Fiji, Tuvalu, Kiribati, New Caledonia, Wallis and Futuna, the Cook Islands and Papua New Guinea (see Zimmet 2009 for biographical details). The multiple population studies conducted in the 70s would form the basis of Zimmet's attempt to validate James Neel's thrifty gene hypothesis. Such was Zimmet's success and influence in the field of diabetes in the 70s through the 2000s that the Singapore

[8] These are often written on the basis of invitations.

government invited him to serve as a consultant to assess public health measures relating to chronic diseases in 1989, and later again in 2016 (Wong, 2 November 1989: 7; Monash University n.d.).

The research articles published by Cheah and Zimmet helped reconstruct the scientific discourse on diabetes etiology between 1970 and 2000[9]. The timeframe was intentionally chosen to account for a possible lag in the circulation of the thrifty gene hypothesis outside of United States and Western Europe. This presumption held true, given that research on diabetes and thrifty gene in Singapore and island Oceania gained traction in the 70s, as the hypothesis 'arrived' in the Southern Hemisphere. To complement perspectives from within medical research, I also expanded my archival analysis to include news articles from media outlets in Singapore (newspaper.sg) and Oceania (Trove.nla.gov.au). The point of this was to examine public facing diabetes discourse, which sometimes draw from research articles, interviews with experts on diabetes and/or public health officials. Altogether, these primary sources formed a discursive package through which diabetes is articulated, and made meaningful in social and cultural life.

The Thrifty Gene and Racialized Moralities in Postcolonial Singapore

In the 1970s Singapore, diseases related to metabolic syndrome such as diabetes were not necessarily on the radar of the public health authorities. The island state, which gained independence from the British in 1963, was focused on eradicating communicable diseases such as malaria, cholera and tuberculosis (Clancey 2018). However, research relating to diabetes prevalence and causality had begun to pick up since the WHO introduced standardized guidelines for diagnosing, treating and managing diabetes in 1965 (WHO 1965). Within the local medical scientific discourse, attempts to both measure the extent of the diabetes problem in the population and explain its cause began in earnest, with endocrinologist Cheah Jin Seng in particular engaging with research on the thrifty gene hypothesis that was making its way into the Asia Pacific.

In a research paper investigating the prevalence of diabetes among the ethnic groups, endocrinologist Cheah Jin Seng and colleagues (1975) stated that the prevalence of diabetes in Singapore was low compared to other countries. The authors also presented data on diabetes prevalence for the different ethnic groups in Singapore:

[9] While quite a bit further than 1962 (when Neel published his hypothesis), 1970 was chosen to correspond with some of the earliest publications based in Singapore and the Pacific that utilized the ideas from the thrifty gene hypothesis. By the end of the millennium however, there were already sufficient challenges to the hypothesis as well as competing explanations that pluralized the diabetes etiology research, making the thrifty gene hypothesis one of many; a World Health Organization published a public health 'classics' version of Neel's original article in 1999, with a foreword that reflected on the influence of Neel's ideas on scientific research and public health over the course of four decade.

TABLE II

PREVALENCE OF DIABETES IN THE VARIOUS ETHNIC GROUPS
(age-group 30 to 66 years in brackets)

Ethnic groups	*No*	*With diabetes*	*% with diabetes*
Chinese	3386 (627)	10 (6)	0.30 (0.96)
Malays	1252 (288)	6 (4)	0.48 (1.39)
Indians	508 (220)	14 (14)	2.76 (6.36)
Others	134 (32)	1 (1)	0.75 (3.12)
All ethnic groups	5280 (1167)	31 (25)	0.59 (2.14)

(Diagram 1 from Cheah, Tambyah and Mitra 1975: 15)

The table illustrates the comparatively higher prevalence of diabetes among Indians, thereby confirming previous studies which were only based on 'clinical impressions' (ibid: 16). Importantly, the authors presented possible reasons for this exceptional situation among Indians:

> "There are various reasons for the higher prevalence of diabetes in Indians compared with the other ethnic groups. Geographical and environmental factors are not important, as Indians in South Africa and North America have also been noted to suffer from diabetes more frequently. There is little doubt that heredity plays a part in the causation but the exact role is difficult to evaluate. In the present study, overweight is more frequent than in the other ethnic groups. It is likely that the diet of the Indians (high in carbohydrate and fat and low in proteins) plays an important part. In Indians, a hereditary tendency may be coupled with a dietary factor."
>
> (Cheah, Tambyah and Mitra 1975: 16)

Here, the authors dismiss the role of 'geographical and environmental' factors, asserting that Indians (referring to South Asian Indians), regardless of where they are in the world, are at a higher risk of getting diabetes because of hereditary factors. The authors also pointed out that this comparatively higher prevalence of diabetes among Indians correspond with the higher proportion of overweight Indians. What the authors meant by 'geographical and environmental' factors was not made clear. Separately, the Indian diet, with supposedly high levels of carbohydrate and fat, was highlighted as the likely contributor to the elevated incidence of diabetes among Indians. In other words, Indian dietary practices and choices were cast as being problematic.

In a later, review style article, Cheah (1980: 99) reiterates the positive correlation between weight and the incidence of diabetes. Crucially however, Cheah reversed the position taken on geography in 1975, claiming this time around that it is *only Indians living outside of India,* rather than all Indians, who are more likely to get diabetes:

> "The prevalence of diabetes in Indians in India is 1.8%; when Indians migrate and live outside India, the prevalence of diabetes increases. In Singapore it is 6.07%; in Malaysia

> it is 4.2%; in South Africa it is 4.2-38% and in Trinidad it is 2,4%. Indians living outside of India appear to consume more food than those in India and the dietary factor coupled with hereditary predisposition may explain the high prevalence of diabetes among Indians living outside of India."
>
> (Cheah 1979: 99).

In the article, Cheah elaborates that a 'harmful lifestyle' which consist of overeating and not engaging in enough exercise, leads to obesity, which in turn 'predisposes to and aggravate the diabetic state' (ibid: 99). This explanation is especially true for non-insulin dependent diabetes (NIDD or what is commonly known today as type 2 diabetes) and adds to Cheah's earlier research (Cheah, Tambyah and Mitra 1975) blaming Indian dietary patterns; here the 'diabetic state' is explained to arise more frequently among certain ethnoracial groups because they don't exercise enough, compounding an emergent moral narrative on metabolic health.

Despite acknowledging the importance of hereditary factors for diabetes, that is diabetes risk is passed onto one's offspring, Cheah remained unconvinced that Indians had a thrifty genotype per the thrifty gene hypothesis (ibid: 101). Diabetes, Cheah explains in review article, is primarily caused by poor dietary habits, and changing one's diet constitutes the 'anchor of diabetic therapy' (ibid: 99). This position would however change in a paper published in 1982. Here, Cheah and colleagues (1982) managed to reproduce the findings from 1975, this time with a *representative* sample. The point on obesity as well as the higher prevalence of diabetes among Indians was again stressed, but the paper concluded with the following statement:

> "It is likely that the Indians have a genetic predisposition to diabetes and when they settle outside India, an environmental factor in the form of abundant food giving rise to obesity unmasks the genetic predisposition. This has been shown to be the likely causes of the high prevalence of diabetes among the Nauruans and the Pima Indians. Although we have not shown this conclusively in the present study, it is a probable theory and further work remains to be done."
>
> (Cheah et al. 1982: 148)

In this instance, Cheah and colleagues (1982) acknowledges there being a genetic predisposition among Indians and certain populations that can be 'unmasked' when paired with certain environmental conditions. In the case of Singapore, an environment of 'abundant food' has triggered a higher incidence of diabetes specifically for Indian bodies. While Cheah and colleagues (1982) proposed further studies to confirm this, the implications for NIDD prevention are quite apparent: avoid overeating and lead an active lifestyle, particularly if you are at risk due to genetic or hereditary factors.

This exhortation for metabolic discipline, aimed at the Indian population, emerged out of an infrastructure constituting universalized standards (see Bowker and Star 1999) for epidemiological surveys, diagnostic procedures thresholds which as mentioned earlier were derived from the WHO (1965), and 'technical objects' such as glucose urine test sticks (see Cheah et al. 1982) that serve an important purpose in materializing said standards (Akrich 1992). Altogether, these ideational and material conditions, alongside emergent epidemiological universal frameworks enacted by local actors, lent weight to diabetes as 'fact' in postcolonial Singapore. Yet this network of standards, things and expertise did not just render the diabetic

population legible and comparable[10]. They created moral and racialized targets in public health. Moreover, this moral dimension of diabetes causality would evolve as it encountered a hybrid actor - the scientist-politician - who would mobilize the diabetes problem and aspects of the thrifty gene hypothesis in ways that converged with the political goals of a postcolonial state.

In an article published in the Singapore news daily The Straits Times in 1978, then Health Minister Dr. Toh Chin Chye, who has a PhD in physiology from London's National Institute for Medical Research, described the rise of a new class of diseases such as obesity diabetes, stress and strain that are quite unlike infectious diseases. Invoking language from the thrifty gene hypothesis, the minister added that 'self-induced diseases of the environment' are a consequence of Singaporeans 'overeating' and seeming 'to spend more time eating than doing anything else' (Ngoo, 30 July 1978: 13). This criticism of dietary behavior is consistent with what we have seen in the scientific literature. However, within the news reports, the emergence of non-communicable diseases had also been framed as only being possible with the rising 'affluence' of Singapore society, a condition Dr Toh emphasized in the news report (Ngoo, 30 July 1978: 13).

In other words, as postcolonial Singapore society as a whole grows wealthier, the patterns of diseases too change. This narrative of increasing affluence and its relationship to diabetes gained momentum throughout the 80s. A news article from 1981 not only highlighted the four-fold increase in the rate of diabetes within the population, but also suggested diabetics in Singapore to be the 'victims of increasing wealth and obesity' (The Straits Times, 9 November 1981:14). Another news article with the title 'More Money, More Diabetics' published in a widely read daily tabloid drew an explicit link between wealth and diabetes (Rajaram, 14 November 1988:5). Diabetes is constructed as a public health issue. Crucially, it is also regarded as a 'rich man's disease' caused by 'money' (ibid).

Such claims that highlight the relationship between diabetes and affluence need to be situated within the broader context of postcolonial development in the second half of the twentieth century. Given the tumultuous circumstances in which Singapore gained independence in 1965, as well as a citizen-state compact that relied heavily on economic development at the expense of democratic policies[11], the Singapore government had in the interest of protecting its legitimacy, to maintain a consistent pattern of development (Huff 1995; Pereira 2008). The public health claims regarding new classes of diseases, particularly metabolic diseases such as diabetes, and their relationship to affluence became constitutive of the postcolonial political discourse. In asserting that diabetes as a condition has grown more prevalent, the state makes it clear it has continued to fulfill its mandate, with diabetes (among other diseases) being both the cost and marker of developed-ness.

In the case of postcolonial Singapore then, the thrifty gene hypothesis underwent significant translation through key actors; Cheah Jin Seng's research rendered the thrifty gene hypothesis and diabetes legible to local public health (see also Coopmans and Tan 2018) through, among other things, utilizing racial categories as well as raising the profile of the

[10] Firstly, Cheah et al. (1982) found that within the sample of diabetics, close to 60% were newly diagnosed and did not present any symptoms. Secondly, the prevalence of diabetes in Singapore (1.99%) had crept up when compared an earlier study (0.59%) by Cheah, Tambyah and Mitra (1975).
[11] Notably, this period of development, marked by constricted civil liberties, relied on a Hobbesian compact between the state and citizen body where the legitimacy of the government hinged on the promise of continued economic growth (Chua 1994).

disease by highlighting its hidden-ness. Meanwhile, scientist-politicians such as Dr Toh Chin Chye and public health messaging following his statements amplified the language of behavioral adjustments that appeared in medical research and injecting moral urgency through calls for health discipline in the population.

At the same time, the 'interpretive flexibility' (Star 2010) of the thrifty gene hypothesis, particularly the lack of clarity surrounding environmental factors, afforded politically motivated actors and institutions the opportunity to mobilize related ideas to support claims of postcolonial state legitimacy. Thus, the thrifty gene hypothesis as an explanatory mechanism for population disease prevalence accrued new facts and meaning associated with the postcolonial condition in Singapore. However, this very same notion of development and progress engendered by the hypothesis would be expressed in a markedly divergent way in island Oceania.

The Thrifty Gene Hypothesis and Anticolonial Morality in Island Oceania

Dear Editor,

I would like to explain my comment on local radio (TSIMA) last week which read - Question: "How do you know if you have diabetes."

Answer: "Look in the mirror and if you see a brown face and black frizzy hair you are probably looking at a DIABETIC."

I hope the comment did not offend and if it did, I apologize.

- P.J. Holt

Government Medical Officer

(excerpt from Torres News, 2 September 1988: 2)

This commentary by a government medical officer who worked in the Torres Straits Islands, a cluster of islands between Australia and Papua New Guinea, provides an insight to the thinking behind diabetes causality and its relationship to race and ethnicity in island Oceania. While on a local radio show, P.J. Holt argued that race can serve as a good indicator of diabetes risk. Specifically, he linked diabetes risk with the phenotypical features of the Torres Straits islanders, Pacific Islanders who migrated to the area from islands in the South Pacific, and aboriginal peoples located in the northern peninsula area region: brown face and black frizzy hair. This comment offended enough listeners to the point that the good doctor felt compelled to pen the quoted response in the local paper to clarify what he meant.

There are a couple of other important points that Holt makes about disease causality and race that map onto health morality. Firstly, much like the case in Singapore, the burden of diabetes prevention is passed onto the specific ethnoracial groups; the onus is then on *these* people to make behavioral changes that would minimize their diabetic tendencies. Secondly, the doctor makes it explicit in a later part of the article, that White bodies are different from islander and aboriginal bodies; the former are not the least affected by 'Western' diet because they are

biologically better suited to metabolizing sugary 'Western' goods. Islander and aboriginal bodies on the other hand, are much better suited to the 'hunter gatherer' lifestyle (Holt 2 September 1988: 2).

It is essential to contextualize these pronouncements within the broader research landscape on diabetes in the region. Particularly, I focus on Paul Zimmet's body of work on lifestyle change and the incidence of diabetes among island populations in Oceania. Zimmet was one of the first scientists to sound the alarm on the increasing prevalence of NIDD in the Pacific Island population, beginning with a survey of Nauru in 1975, the results of which were published in 1977 (Zimmet et. al 1977). Zimmet was already engaging with Neel's thrifty gene hypothesis in his early studies of the islander populations, arguing that the evidence from comparing populations and their environments suggest that 'a possible diabetic genotype cannot be underestimated' (ibid: 114). Yet Zimmet and colleagues (1977) also point to the correlation between this increased prevalence of diabetes among island population, with increased 'Westernization', particularly with respect to food or caloric intake (ibid:114).

However, Zimmet was less measured in his assessment of the public health situation for the islander populations in public facing reports. In a news report published in the Papua New Guinea Post-Courier (27 January 1978) title 'White Man Came with Diseases', Zimmet drew parallels between the emergent diabetes epidemic affecting the island populations in the Pacific, with the beginning of European colonialism in the region in the 19th century which brought 'infectious diseases like measles, whooping cough, tuberculosis and influenza to the people in the Pacific countries' (Zimmet in Papua New Guinea Post-Courier 27 January 1978). Zimmet added that 'Western influence' essentially brought 'two disastrous waves of new diseases to the region' (ibid). In this statement, Zimmet makes clear the broader historical and political factors that have had a significant bearing on islander health. The language of colonization and the introduction of Westernization as a cause of disease was also repeated in other news articles elsewhere (Zimmet in Papua New Guinea Post-Courier 4 December 1979).

A research article published with his colleagues in 1978 provides us with a clearer idea of what colonization and Westernization entailed:

"There is evidence from this and other studies to implicate westernization as a possible reason for the dramatic increase in the prevalence of diabetes. Certainly, the change from the traditional diet to a low-fibre refined carbohydrate western diet is a common feature in these populations. In Nauru, nearly all food consumed by the population is imported in the form of canned meats, fruit and vegetables, flour, sugar, cordials, and soft drinks." (Zimmet, Arblaster and Thoma 1978: 145)

It is important to note how Zimmet and his co-authors did not simply blame the islander populations for their health woes. Instead, the authors underlined important structural factors in the form of consumption patterns that have contributed to the rise of diabetes. Zimmet, Arblaster and Thoma (1978) explained, that most of the food available to the Nauruan population was imported, and comprised 'refined carbohydrates. The entanglement between colonialism, westernization, consumption patterns and diabetes is made possible here through the mechanism of the 'environment' in the thrifty gene hypothesis. But where Neel (1962) had posed the interaction between the thrifty genotype and an environment of 'progress' as a trigger for increased prevalence of NIDD in certain populations, Zimmet's framing of the issue in island Oceania places Westernization alongside colonialization.

Seen this way, the issue is not necessarily that of maladapted racial bodies, per Neel's (1962) hypothesis. Rather, it is the introduction of a negative, external factor in the form of western colonialism that caused diabetes to rise in numbers. Much like the case in Singapore then, the 'environment' in this causal equation is refracted by local and regional concerns. The importance of the 'environment' in the hypothesis cannot be understated. As an innovation, it allowed for a greater degree of 'interpretive flexibility' (Star 2010), which in turn enabled Zimmet to incorporate colonialism as a causal variable to explain the prevalence of diabetes among islander populations in Oceania. Thus, where scientific facts tend to stay unchanged because of path dependency (Navon 2024), the thrifty gene hypothesis, by virtue of an ambiguous internal explanatory element - the 'environment' – was made malleable.

While seemingly anticolonial, Zimmet's analysis is not unproblematic[12]. Zimmet's (1979) research on the medical effects of 'progress' utilized the categories 'traditional' and 'Western' (147); the implication here is that Western signifies social and technological modernity as opposed to a traditional life where islanders subsisted on island diet and led 'easy-going', stress free lives as opposed to the demanding work life of a market economy (Zimmet 1979: 148). In a later research paper, Zimmet with his colleagues, reproduced the same analytic categories, with the rapid transition from traditional to 'Western' lifestyle or 'coca-colonization', being blamed for the diabetes epidemic in Pacific Island and Asian populations (Coughlan et al. 1997: 323).

In these articulations relating to diabetes causality, morality takes the form of a disciplining apparatus and figures the bodies of the indigenous peoples of island Oceania as suitable for traditional, but not Western lifestyles and diets; the people of island Oceania are not just figured as being biologically different, but also as belonging in the realm of the traditional. Even in narratives that are more critical of Westernization and colonialism then, this 'isletism' (Maurer 2024) which is a form of imagination of the islands and their constituents as belonging to an undeveloped, untouched past, persists. Take Zimmet's point in a newspaper, the same one where he had also chastised western colonialism:

> "As long as Polynesians and Micronesians live on fish, coconuts, taro and other traditional foods they are protected from the disease."
>
> (excerpt from Papua New Guinea Post-Courier, 4 December 1979: 9)

Here, Zimmet casts the island populations into the island past, recommending that they stick to 'traditional foods'. The issue of the increased consumption of refined Western food imports, something which P.J. Holt actually pointed out in his *mea culpa*, was not at all addressed. Rather, the solution for the afflicted islanders was a *return to the traditional*. Colonialism was bad for the people of island Oceania and the solution was to revert to past lifestyles because biologically, these populations were unsuited for western ways. Much like how the Black man is framed as being in perpetual *belatedness* within a world of modernity that is white (see Fanon in Bhaba 1991: 194), so too are the island and indigenous populations in

[12] This is not the first instance in which scientists based in Australia have expressed anti-colonial and anti-racist sentiments about indigenous populations in the Pacific. In a study of race science in Australia and the Pacific during the interwar period, Warwick Anderson (2009) pointed out that while there were certainly scientists who held anti-miscegenation views born out of racism, there were also scientists who were critical of the history of colonialism in the region, and celebrated racial mixing. Anderson (2009) added that some of the American scientists involved in studying racial hybridity in the Pacific would go on to push against the use of racial categories in scientific studies.

Oceania who are cast as backwards because of their biological and genetic constitution. The thrifty gene's duality allows contradictory positions to co-exist simultaneously: the western colonial environment is detrimental to islanders yet there is also a perpetual *belatedness* that is attributed to their bodies through the idea of incompatible and therefore unfit genetics.

Conclusion: Divergent Postcolonialisms in Asia Pacific

In this article, I presented two historical cases that reflect distinct ways in which a particular scientific 'fact' was interpreted and importantly, changed. Focusing on the thrifty gene hypothesis and its moral career as it made its way through parts of the Asia Pacific region, I highlight how this new mechanism for diabetes causality engendered new perceptions of racialized bodies. In the context of Singapore, owing to a complex history of migration and the environment, Indians were deemed to have both deficient genetics and lifestyles, leading to Indian bodies being figured as targets of disciplinary exhortations in public health. This very same explanatory mechanism, particularly the environmental component, was also mobilized by certain hybrid actors, in the form of scientist politicians, to assert claims of 'developed-ness' tied closely to Singapore's tumultuous history of independence and the developmentalist objectives of its postcolonial government

A similar pattern of ethnoracial minority blaming for the problem of diabetes also emerged in island Oceania, as scientists and physicians alike mobilized aspects of the thrifty gene hypothesis to the service of health morality. Yet the thrifty gene in the case of island Oceania, also enabled novel ways of articulating disease causality in relation to the prevalence of diabetes among the islander populations. Much like the case of Singapore, the environment component of the thrifty gene hypothesis was expanded in ways that were quite unique to island Oceania; scientists capitalized on the interpretive flexibility of the environment in the hypothesis to draw historical connections between the disproportionately high incidence of diabetes among the islander populations with Westernization and colonization in island Oceania. This is where health morality shows itself as not just being flexible but crucially, multivalent.

The incorporation of environmental factors in diabetes etiology also represents an innovation that allowed the transformation of scientific fact through the breaking of path dependence, an important condition in Navon's (2024) theoretical framework. The environment, evolves from Neel's (1962) construct of the 'blessings of civilization' (ibid: 357), a notion that was enthusiastically adopted in postcolonial Singapore, to a form of anti-colonialism in the case of island-Oceania, popularized by Paul Zimmet. This expansive augmentation of the environment in the hypothesis is important, not least because it represents a precursor to approaches in medicine and health that views colonialism as a form of structural violence which increases risk of disease to certain populations (see Farmer 2004). When viewed in relation to the existing literature in the sociology of global health, this analysis also adds to our understanding of how the disease itself becomes ideationally transformed, as it travels within postcolonial societies.

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